

TAS4

Kulis, Jerzy, NMENV

From: Kulis, Jerzy, NMENV
Sent: Wednesday, April 28, 2010 12:26 PM
To: 'Everett, Mark C'; Dale, Michael, NMENV; Cobrain, Dave, NMENV
Cc: Shen, Hai; Mignardot, Edward R Jr; Whitacre, Thomas J; Ball, Theodore T; Lynnes, Kathryn D; Mike Klahn
Subject: RE: R-57 proposed well design

Mark,

This e-mail serves as NMED approval for installation of regional aquifer well R-57 as proposed in the document attached to the original e-mail received by NMED on April 28, 2010 at 10:49 AM. 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-57 as soon as such information becomes available. LANL shall give notice of this installation to the New Mexico Office of the State Engineer as soon as possible.

Thank you,
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 28, 2010 10:45 AM
To: Dale, Michael, NMENV; Kulis, Jerzy, NMENV; Cobrain, Dave, NMENV
Cc: Shen, Hai; Mignardot, Edward R Jr; Whitacre, Thomas J; Ball, Theodore T; Lynnes, Kathryn D; Mike Klahn
Subject: R-57 proposed well design

Attached is LANL's proposed design for well R-57 located east of Area G. Please review and if you are ok with design as proposed, respond to this e-mail with your concurrence. Alternatively, if you wish to discuss further feel free to call me.

Thanks,

Mark Everett, PG
Drilling Project Technical Lead
EP-WSP
LANL
(505) 667-5931 (office)
(505) 231-6002 (mobile)

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4/28/2010

R-57 Well Objectives

R-57 is a regional groundwater monitoring well located on Mesita del Buey about 300 ft east of MDA G and 200 ft northwest of R-22 (Figure 1). The primary purpose of R-57 is to monitor regional groundwater down gradient of Material Disposal Area (MDA) G at the eastern end of TA-54. Well R-57 will supplement groundwater monitoring for MDA G provided by wells R-22, R-23, R-39, R-41, and R-49. Secondary objectives for well R-57 include establishing water levels for the regional aquifer in this area, determining if perched-intermediate groundwater occurs in the vicinity of MDA G, characterizing rock units that can impact contaminant pathways in the vadose zone and regional aquifer.

Transport of potential contaminants reaching the regional aquifer is expected to occur primarily by lateral groundwater flow within the upper part of the regional aquifer. At R-57 the upper 62 ft of the regional aquifer is located within fractured dacite lava and a possible flow breccia, and deeper parts of the aquifer consist of porous sands and gravels. The projected groundwater flow direction is towards the east-southeast based on water table maps using water levels from existing wells in the area. Water-level data collected from R-57 will improve the water-level map in the vicinity of MDA G.

The R-57 well objectives are best met by installing a two-screen well to monitor water quality and water levels in the lavas and sedimentary deposits that make up the upper part of the regional aquifer down gradient of MDA G.

R-57 Recommended Well Design

It is recommended that R-57 be completed as a two-screen well with a 20-ft stainless-steel, 20-slot, wire-wrapped well screen in the lavas extending from 910 ft to 930 ft (screen 1) and a 20-ft stainless-steel, 20-slot, wire-wrapped well screen in the sedimentary deposits extending from 970 to 990 ft (screen 2). The primary filter pack will consist of 10/20 sand extending 5 ft above and 5 ft below both well screen openings. A 2-ft secondary filter pack consisting of 20/40 sand will be placed above the primary filter pack of both well screens. A Baski system with a submersible pump and isolating packers will be installed to sample the two well screens. 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-57 Well Design Considerations

Preliminary lithological logs indicate that the geologic contacts are, in descending stratigraphic order: Tshirege Member of the Bandelier Tuff (0–95 ft), Otowi Member of the Bandelier Tuff (95–177 ft), basaltic and dacitic lavas of the Cerros del Rio volcanic series and associated scoria, cinder, maar, and sedimentary deposits (177–950 ft), and quartzo-feldpathic riverine deposits (950–1081.5 ft TD). The preliminary logs identify the quartzo-feldpathic riverine deposits as part of the Totavi Lentil.

No potential perched intermediate groundwater was identified in the R-57 borehole. Open-borehole video logs collected from 226 to 385 ft and 226 to 793 ft showed no evidence for saturation in the vadose zone.

Regional groundwater was predicted to occur at a depth of approximately 888 ft based on water table maps for the area with particular emphasis on water levels measured in screen 1 at nearby well R-22. At R-57, a stable water level of 888.1 ft bgs was measured in dacitic lava and possible flow breccia when the cased borehole reached the TD of 926 ft. The measured water level of 888.1 ft is consistent

with the predicted water level of 888 ft, and it was used to constrain the placement of the well screen near the water table.

Screen 1, at 910 ft to 930 ft depth, targets the dacite lava of the Cerros del Rio volcanic series to monitor the uppermost part of the regional aquifer down gradient of MDA G. Small amounts of pink clay and discoloration of some lava clasts suggest that the target interval includes fractured lava and possible flow breccia. The interval from 888–926 ft produced an estimated 15 gpm after airlifting groundwater for 40 minutes with the drill casing set at 926 ft. A 20-ft well screen is recommended for this interval to increase the likelihood that water production from fractures or breccia is intercepted by the well screen. The top of the well screen is 22 ft below the water table to ensure that the well screen remains submerged during pumping development and aquifer testing, particularly if this zone has poor transmissivity. In comparison to well screen elevations at nearby wells, screen 1 at R-57 overlaps the uppermost well screens at R-22 and R-41, and is slightly higher than the single well screen at R-39. Screen 1 at R-22 straddles the water table and screen 1 at R-41 was dry. The anomalously low water level at R-41 may be due to placement of screen 1 in a section of the regional aquifer that is not hydraulically well connected with the rest of the aquifer.

Screen 2, at 970 to 990 ft depth, targets a riverine sequence of coarse sands and gravel deposits that are tentatively identified as the Totavi Lentil. The sand fraction contains abundant frosted quartz and/or quartzite, pink microcline, and subordinate mafic to intermediate lava. The gravels are up to 4 cm in diameter and consist of well-rounded clasts of quartzite, granite, chert, and mafic to intermediate lava. Although these deposits are stratified, no aquicludes such as clays or strongly cemented sediments were identified. Screen 2 is proposed to be 20 ft long to ensure that the well screen includes a number of productive beds in these heterogeneous deposits. The top of the well screen is placed 50 ft below the bottom of screen 1, the minimum separation needed for installation of the Baski sampling system. Thus screen 2 is placed high as possible within the porous sedimentary deposits in the area immediately down gradient of MDA G to monitor groundwater exiting the overlying fractured lavas and entering the regime of porous flow. In comparison to well screen elevations at nearby wells, screen 2 at R-57 overlaps the lower part of screen 2 at R-22 and is deeper than screen 2 at R-41.

Other Zones and Designs Considered for R-57 Well Screens

Screen 1 is placed as close to the water table as possible, consistent with observations during drilling and development and aquifer testing considerations. Placement of a well screen in dacite lava could result in poor water production or a dry (non-productive) screen. Consideration was given to placing screen 1 in the riverine deposits below the lava, but the top of the well screen would be submerged at least 62 ft. This was considered too deep given a primary goal of R-57 is to monitor groundwater in the uppermost part of the regional aquifer down gradient of MDA G.

Screen 2 is placed as high as possible within the riverine deposits of the regional groundwater system, consistent with constraints imposed by the Baski sampling system and sampling goals described above. Borehole cuttings indicate that deeper horizons in the riverine deposits are similar in lithology to the selected well screen interval and probably have similar hydraulic characteristics. Flowing fine-medium sands below 1065 ft are probably very transmissive, but proper installation of the annular filter pack and bentonite seals during well construction could be compromised in these unstable deposits.

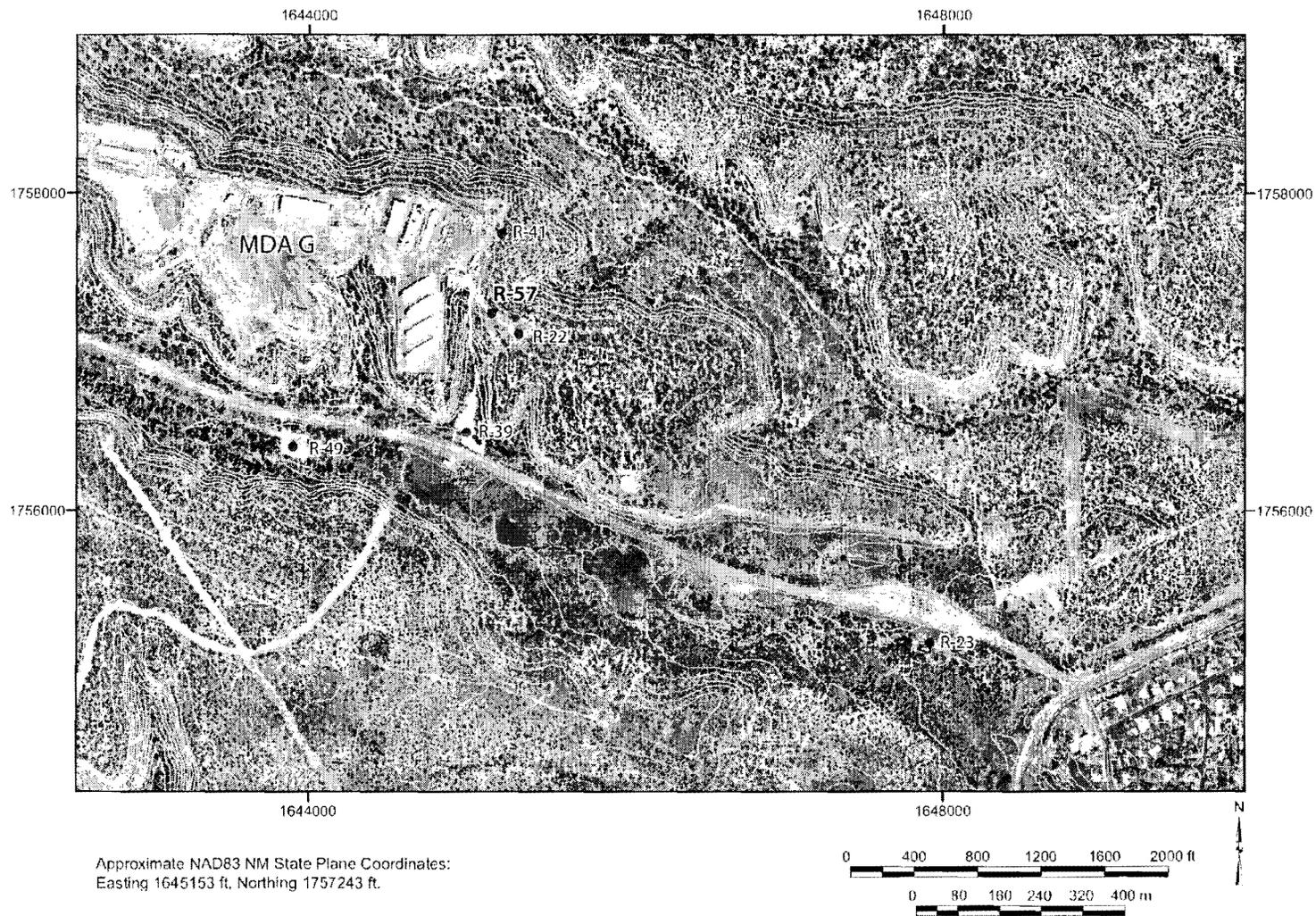


Figure 1. Location map for R-57 showing locations of nearby monitoring wells.

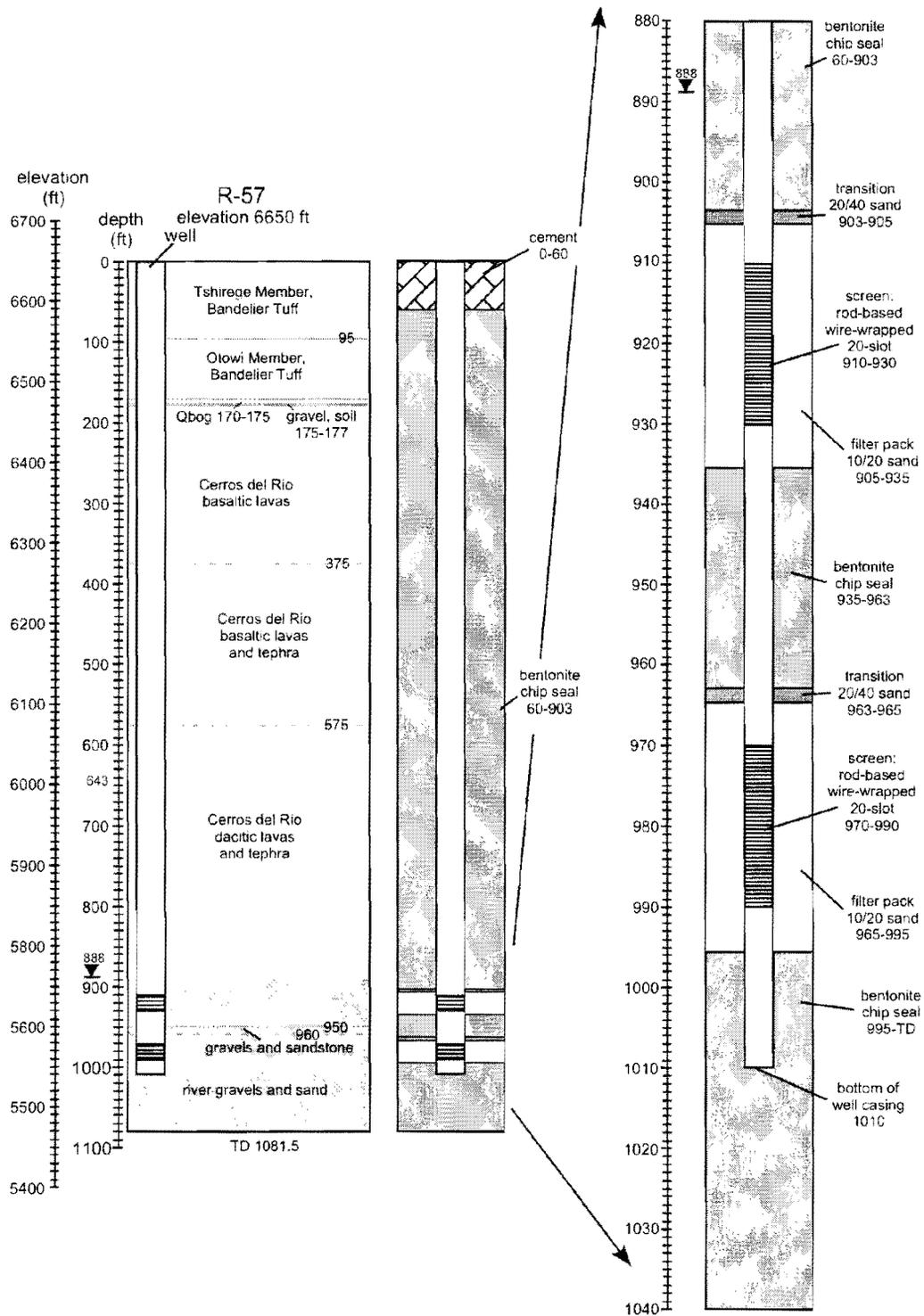


Figure 2. Proposed well design for R-57.