106087

Mark Everett ENTERED

From: Danny Katzman [katzman@lanl.gov]
Sent: Thursday, August 13, 2009 12:33 PM
To: meverett@lanl.gov
Subject: Fwd: Review for approval, well TA-53-1(i) design
Attachments: TA-53-1(i) well design.doc

X-Sieve: CMU Sieve 2.2
X-Mailer: QUALCOMM Windows Eudora Version 7.1.0.9
Date: Fri, 06 Mar 2009 16:05:42 -0700
To: Michael.Dale@state.nm.us,mdale@lanl.gov
From: Dave Vaniman <dvaniman@lanl.gov>
Subject: Review for approval, well TA-53-1(i) design
Cc: katzman@lanl.gov,broxton@lanl.gov
X-NIE-2-MailScanner-Information: Please see http://network.lanl.gov/email/virus-scan.php
X-NIE-2-MailScanner: Found to be clean
X-NIE-2-MailScanner-From: dvaniman@lanl.gov
X-Spam-Status: No

Dear Michael:

Please review for approval the attached rationale for construction of perched intermediate well TA-53-1(i).

Thank you.

Dave Vaniman

Standard mail:
David Vaniman
Group EES-14, MS D462
Los Alamos National Laboratory
Los Alamos, NM 87545

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31951

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TA-53-1(i) Well Objectives

The TA-53-1(i) monitoring well is being installed to help define the extent of contamination within the perched intermediate groundwater observed in Los Alamos Canyon at LADP-3, LAOI-3.2, LAOI-3.2a, and R-6i, and to address whether zones of perched saturation observed in these boreholes extend beneath the mesa and/or communicates with perched saturation observed to the south in Sandia Canyon (e.g., well SCI-1). Additional objectives are to collect drill-cutting samples, acquire borehole geophysical data, and sample potential perched groundwater zones, if present.

TA-53-1(i) Recommended Well Design

It is recommended that TA-53-1(i) be installed as a single-screen well with a 10-ft stainless-steel, 20 slot, wire-wrapped well screen extending from 600 ft to 610 ft bgs. The primary filter pack will consist of 10/20 sand extending 2 ft above and 2 ft below the well screen openings. A 3-ft secondary filter pack will be placed above the primary filter pack and a 1 ft secondary filter pack below. The proposed well design is shown in Figure 1.

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

TA-53-1(i) Well Design Considerations

Perched saturation was predicted to occur at depths within or below the Guaje Pumice Bed, based primarily on observations at LAOI-3.2/3.2a in Los Alamos Canyon (see comparison stratigraphy of LAOI-3.2a in Figure 1). Borehole TA-53-1(i) was drilled using casing advance methods and without addition of any water up to a depth of 596 ft bgs. At 596 ft bgs hard drilling required addition of small amounts of municipal water to cool the bit. At TD with casing advanced all the way to the bottom (at 636.5 ft bgs, in contact with Cerros del Rio lava) a small amount of water was detected (~1 ft), interpreted at that time as a residue of added drilling water. A gamma log was collected at this time. When the casing was retracted to 616 ft bgs video investigation showed dry walls of Puye sediment with no seepage and no additional water accumulation. When the casing was retracted to 532.4 ft bgs (the top of the Guaje Pumice Bed), reexamination by video showed water standing in the borehole up to 600 ft bgs. An induction log was then collected, showing convergence of intermediate and deep conductivity curves below about 585-590 ft bgs (Figure 2).

Bailing was employed to attempt to lower the water level, but water elevations returned to 600 ft bgs; bailing could not lower this depth to water. This water level measurement has been constant over 24 hours. Of the total of ~500 gallons of water added during drilling, the driller believed that most was circulated out during drilling. Bailing has removed an additional 220 gallons of water. Maintenance of the perched interval indicates a significant amount of formation water, well beyond the amount added during drilling. Preliminary water analyses indicate a composition consistent with formation water (e.g., measurable nitrate contamination).

Cuttings and geophysical logs indicate best transmissive intervals in gravels at 600-605 ft depth and 615-620 ft depth. Since the deeper interval was observed to be dry in the first video interrogation, the upper interval is being targeted for screen placement.

Preliminary lithologic logs indicate that the geologic units encountered while drilling TA-53-1(i) are, in descending stratigraphic order: fill to ~7 ft, Bandelier Tuff ash flows with Cero Toledo sediment (7–532 ft), Guaje Pumice Bed (532-559 ft), Puye Formation fine facies (559-600 ft), interbedded coarse and fine Puye Formation (600-634 ft), and Cerros del Rio lava (634 ft to TD).

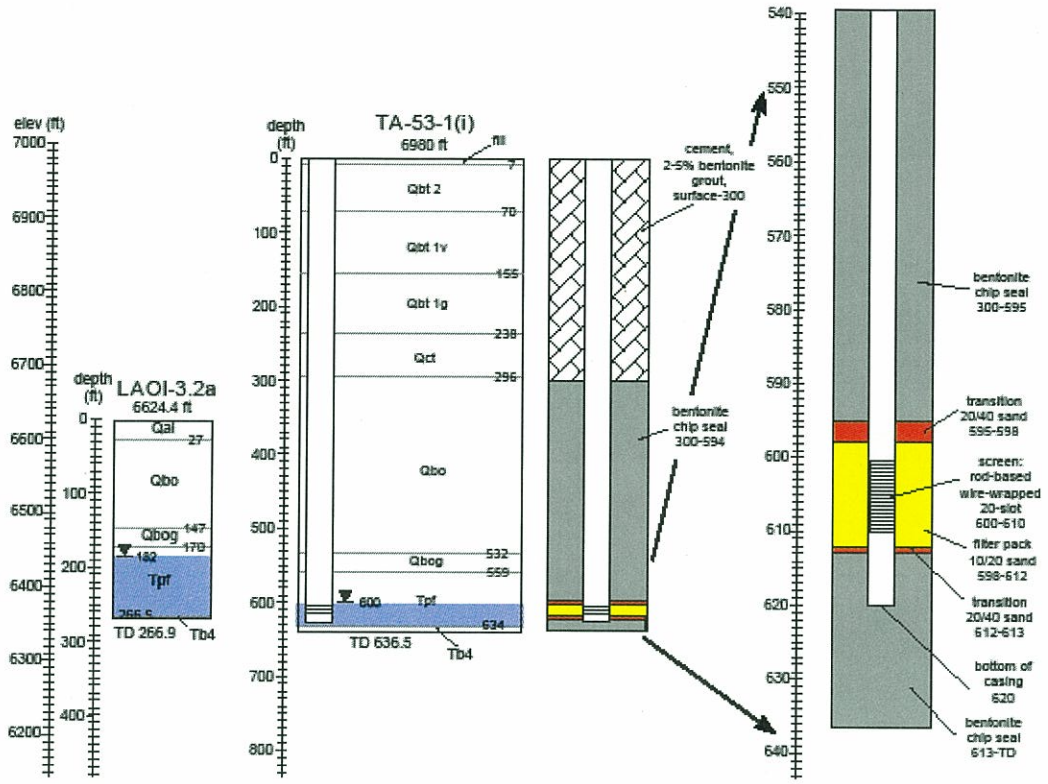

Figure 1. Proposed well design for TA-53-1(i), with LAOI-3.2a shown for comparison.

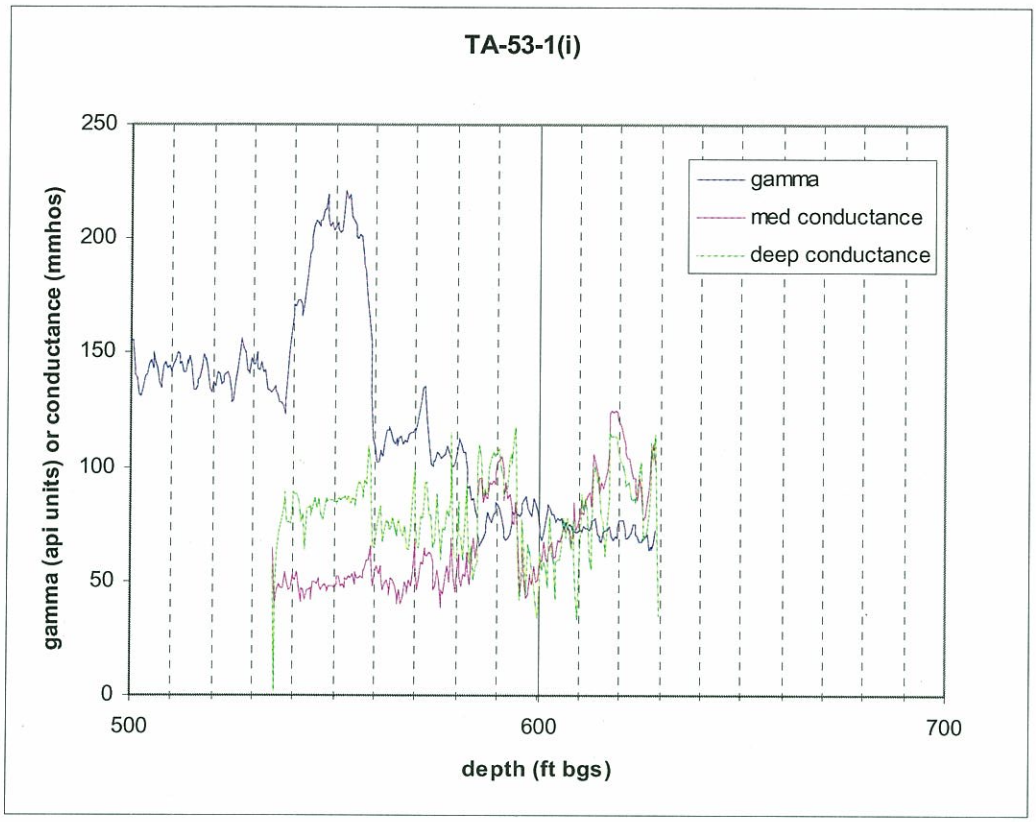

Figure 2. Jet West combined geophysical logs for the lower portion of TA-53-1(i).

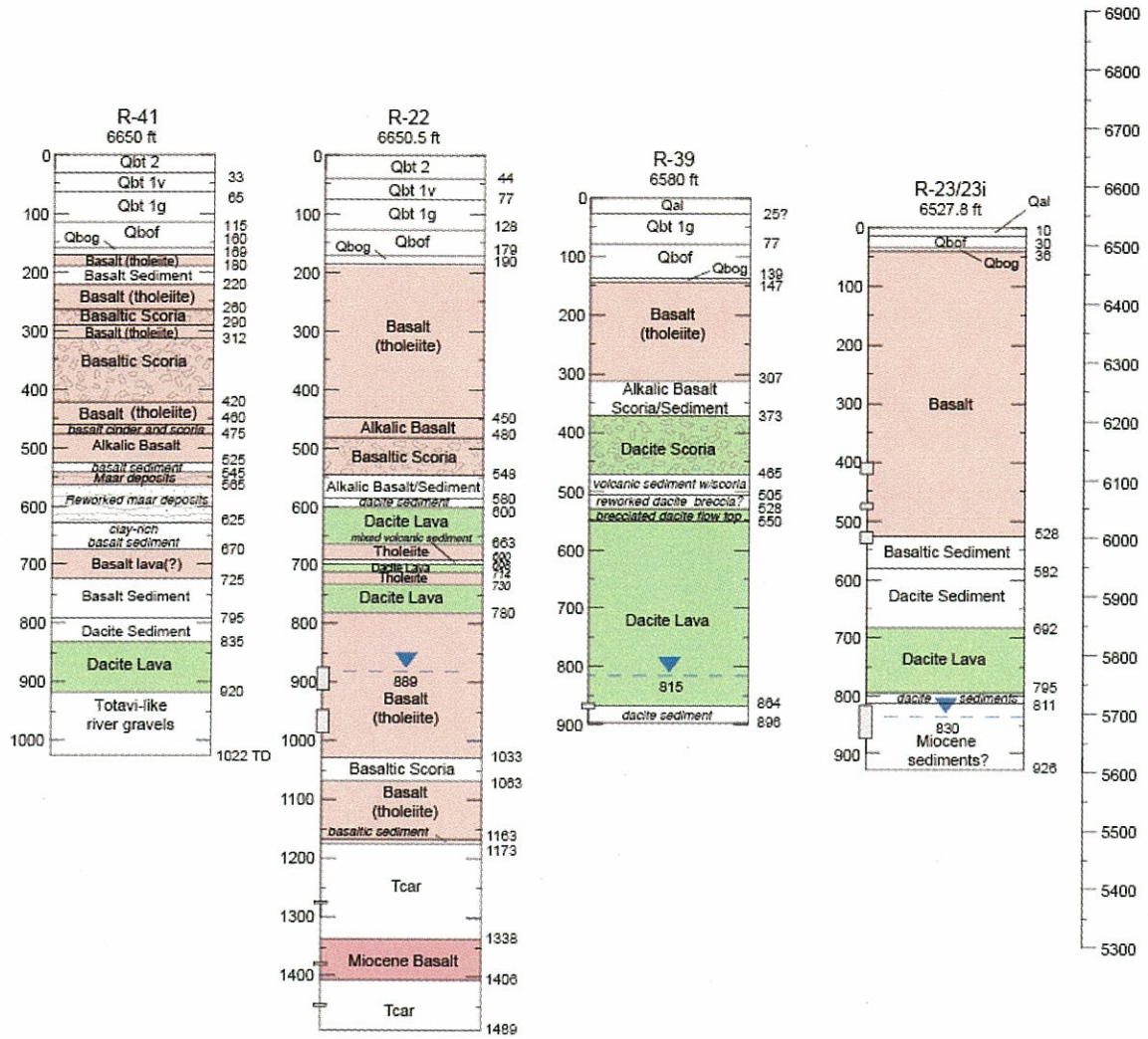

Figure 4. Comparison of geologic logs for wells in the vicinity of borehole R-41.