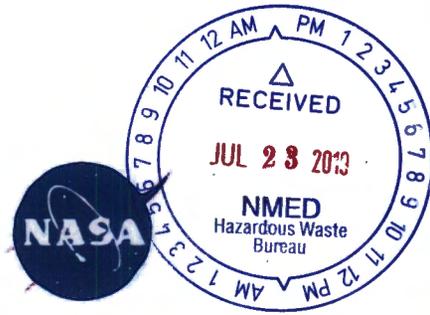


National Aeronautics and  
Space Administration  
Lyndon B. Johnson Space Center  
White Sands Test Facility  
P.O. Box 20  
Las Cruces, NM 88004-0020



July 19, 2019

Reply to Attn of: RE-19-110

Mr. John E. Kieling  
New Mexico Environment Department  
Hazardous Waste Bureau  
2905 Rodeo Park Drive East, Building 1  
Santa Fe, NM 87505

Subject: NASA WSTF PL-12 Monitoring Well Design

This letter report provides a summary of fieldwork and well design for groundwater monitoring well PL-12 in accordance with NMED's September 14, 2018 *Work Plan for Abandonment of NASA WSTF Well PL-5 and Replacement with Monitoring Well PL-12*.

NASA performed well drilling and logging activities in accordance with the NMED-approved DWP between June 30 and July 16, 2019. Figure 1 provides the proposed well construction design for PL-12 based on the lithology and geophysical logs, which are summarized below. NASA requests prompt NMED review of the proposed well design to minimize the risk of borehole collapse. NASA expects to begin well installation on July 23, 2019.

The well design for PL-12 uses bentonite chips between the two screened intervals of the well instead of bentonite grout, a deviation from the NMED approved work plan. The subcontract drilling company's experience indicates that bentonite grout does not fully cure, and when other annular materials are emplaced on top of it, they sink into the uncured grout and displace it. There is a significant risk of losing the top screen in this well if grout were emplaced between the screened intervals. Deviations from the NMED-approved work plan with regard to well construction will be documented in the PL-12 well completion report.

#### Well PL-12 Drilling and Lithology Summary

The 17in. (inch) borehole was initially drilled to 23 ft (feet) bgs (below ground surface) and a 14-in. surface casing was cemented in place as shown on the proposed well design in Enclosure 1. The 12 ¼-in. diameter borehole continued to a total depth of 902 ft bgs. The borehole was installed primarily within Tertiary Santa Fe Group alluvial deposits. The subsurface lithologies were interpreted using field lithological logs performed by the field geologist, borehole drilling rates reported by the drilling subcontractor, and geophysical logs completed within the open borehole by the geophysical logging subcontractor. Sedimentary alluvial deposits were identified to a depth of 460 ft bgs and consisted of silty, sandy gravels containing up to 40% subangular to subrounded clasts composed primarily of Pennsylvanian to Permian limestones, siltstones, quartzites, and sandstones. The interval between 460 ft bgs and 560 ft bgs comprises a zone in

which the alluvial clasts transition from predominantly sedimentary in composition to predominantly volcanic in composition. Volcanic clasts are primarily Tertiary andesite and rhyolite in composition and derived from the Organ Mountains intrusive complex to the east and southeast. The sedimentary to volcanic transition is reflective of an unroofing sequence derived from erosion of the Tertiary volcanics and underlying Paleozoic sediments in the southern San Andres Mountains. Volcanic alluvium continues to the depth of Tertiary volcanic bedrock identified at 696 ft bgs. Volcanic bedrock continues to the total depth of the borehole at 902 ft bgs.

#### Well PL-12 Geophysical Logs

The geophysical log suite consisting of caliper, gamma ray, density, resistivity, neutron, and sonic logs was reviewed to support the selection of two groundwater monitoring zones for the well as described in the DWP. The static water level was identified at approximately 490 ft bgs based on the resistivity and sonic logs, which is consistent with the water level within nearby monitoring wells in the area. The transition in alluvial lithology from sedimentary-rich to volcanic-rich from 460 ft bgs to 560 ft bgs and position of the volcanic bedrock at 696 ft bgs were identified primarily using the gamma ray, neutron log, sonic log, and drill cuttings.

#### Well PL-12 Screened Intervals

Two 10-ft screened intervals, or groundwater monitoring zones, are positioned at 570 ft bgs to 580 ft bgs and 800 ft bgs to 810 ft bgs (Enclosure 1). The upper zone (570-580) is based on the electrical resistivity, sonic, and neutron logs that are consistent with water bearing formations. The lower zone (800-810) is within bedrock and is based on a slight widening of the borehole indicated by the caliper log and potential fracturing on the sonic log. Below a depth of 810 ft to total depth of 902 ft, there are no clear indications on any of the logs of water-bearing zones in the bedrock. The caliper log indicates a relatively stable borehole with no caving. Several dry boreholes have previously been installed within this volcanic lithological unit to the east, which were subsequently plugged and abandoned.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for known violations.

If you have any questions or comments concerning this submittal, please contact Antonette Doherty at 575-524-5497.

**TIMOTHY  
DAVIS**

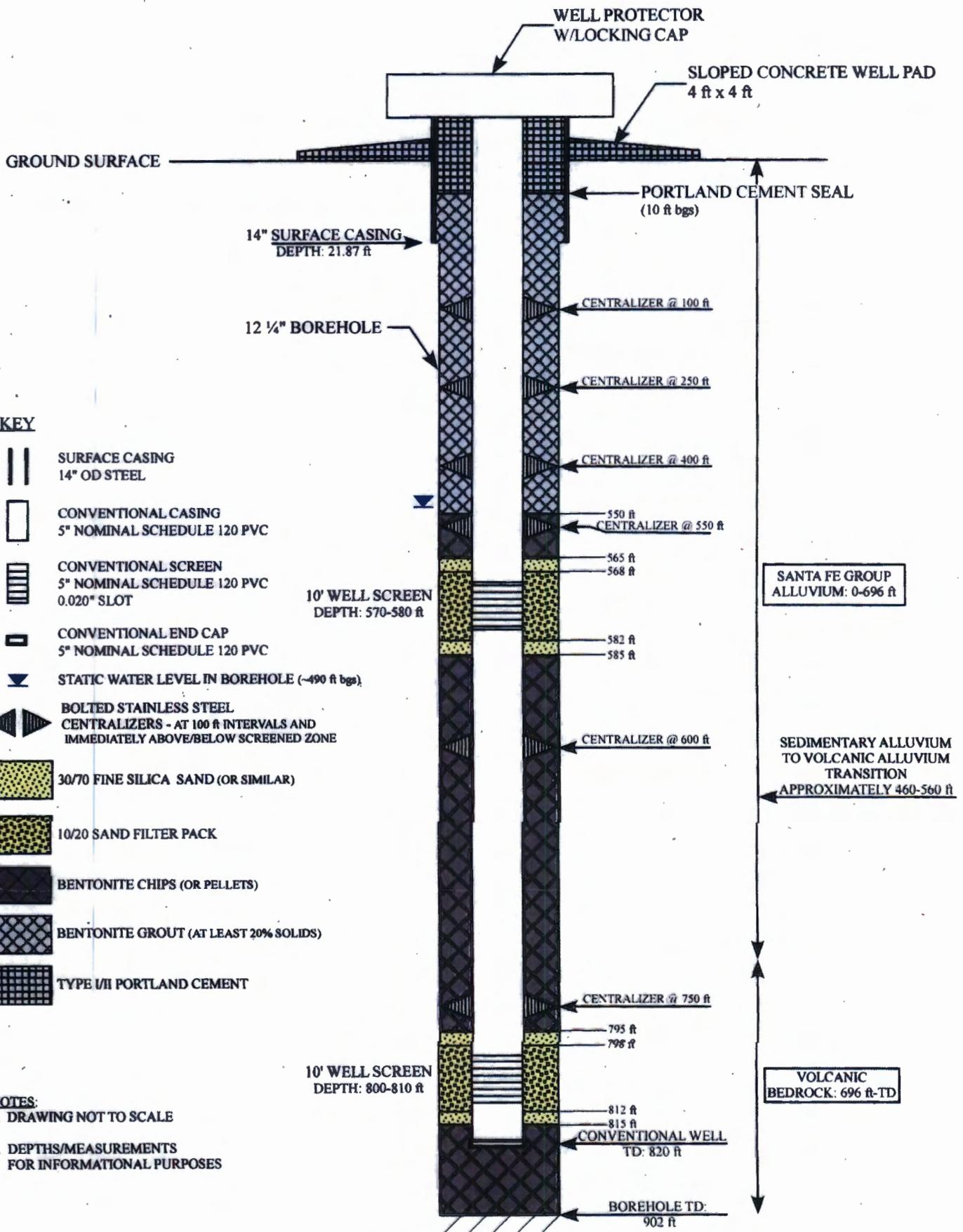
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TIMOTHY DAVIS  
Date: 2019.07.19  
08:55:55 -06'00'

Timothy J. Davis  
Chief, Environmental Office

Enclosure

cc:

Mr. Gabriel Acevedo  
Hazardous Waste Bureau  
New Mexico Environment Department  
2905 Rodeo Park Drive East, Building 1  
Santa Fe, NM 87505



PL-12 WELL DESIGN: DUAL-ZONE CONVENTIONAL