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Los Alamos, New Mexico 87544
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Date: MAR 22 2013
Refer To: EP2013-0050

John Kieling, Bureau Chief
Hazardous Waste Bureau
New Mexico Environment Department
2905 Rodeo Park Drive East, Building 1
Santa Fe, NM 87505-6303

Subject: Submittal of the Interim Measures Work Plan for Source Removal Testing at Well CdV-16-4ip

Dear Mr. Kieling:

Enclosed please find two hard copies with electronic files of the interim measures work plan to perform source removal testing at well CdV-16-4ip. This scope is being proposed pursuant to the requirement of the New Mexico Environment Department letter, "Approval with Modifications, Work Plan to Reconfigure Well CdV-16-4ip," dated December 21, 2012. If you have any questions, please contact John McCann at (505) 665-1091 (jmccann@lanl.gov) or Cheryl Rodriguez at (505) 665-5330 (cheryl.rodriguez@nnsa.doe.gov).

Sincerely,

Jeff Mousseau, Associate Director
Environmental Programs
Los Alamos National Laboratory

Sincerely,

Peter Maggiore, Assistant Manager
Environmental Projects Office
Los Alamos Field Office

35784

JM/PM/DM/JM:sm

Enclosures: Two hard copies with electronic files – Interim Measures Work Plan for Source Removal Testing at Well CdV-16-4ip (LA-UR-13-21795)

Cy: (w/enc.)
Cheryl Rodriguez, DOE-NA-00-LA, MS A316
John McCann, EP-CAP, MS M992
Public Reading Room (hard copy)
RPF (electronic copy)

Cy: (Letter and CD and/or DVD)
Laurie King, EPA Region 6, Dallas, TX
Steven Rydeen, San Ildefonso Pueblo
Joe Chavarria, Santa Clara Pueblo
Steve Yanicak, NMED-DOE-OB, MS M894
Danny Katzman, ET-EI, MS M992 (w/ MS Word files on CD)
Wendy Staples, EP-BPS, MS M992

Cy: (w/o enc.)
Tom Skibitski, NMED-Resource Protection (date-stamped letter emailed)
lasomailbox@nnsa.doe.gov (date-stamped letter emailed)
Annette Russell, DOE-NA-00-LA (date-stamped letter emailed)
David Rhodes, DOE-NA-00-LA (date-stamped letter emailed)
David McInroy, EP-CAP (date-stamped letter emailed)
Jeff Mousseau, ADEP (date-stamped letter emailed)

Interim Measures Work Plan for Source Removal Testing at Well CdV-16-4ip

Introduction	This interim measures (IM) work plan was prepared by Los Alamos National Laboratory (LANL) pursuant to a requirement of the New Mexico Environment Department (NMED) letter, "Approval with Modifications, Work Plan to Reconfigure Well CdV-16-4ip," dated December 21, 2012 (NMED 2012, 521747). The work proposed in this plan dovetails with ongoing investigation and corrective measures underway to address contaminated groundwater related to solid waste management units (SWMUs) and areas of concern in the vicinity of Technical Area 16 (TA-16). Existing and pending perched-intermediate and regional groundwater wells at TA-16 compose a network that is predominantly focused on high explosives contamination associated with Consolidated Unit 16-021(c)-99 (also known as the 260 Outfall), which includes SWMUs 16-003(k) and 16-021(c). The results of hydrologic testing conducted in well CdV-16-4ip in 2011 also precipitated this work (LANL 2011, 203711).
Objectives	The principal objective of the work presented in this plan is to conduct an extended pumping test at well CdV-16-4ip to determine the potential for effective removal of RDX (hexahydro-1,3,5-trinitro-1,3,5-triazine) and volatile organic compounds (VOCs) (e.g., tetrachloroethylene) from within the complex perched-intermediate zone beneath Cañon de Valle. Of all the perched-intermediate and regional wells in the vicinity of TA-16 (Figure 1), CdV-16-4ip has the highest RDX concentrations observed to date. Concentrations in results from screen 1 (the upper screen) varied between approximately 150 µg/L and 200 µg/L during a 10-d pumping test conducted in 2011 (LANL 2011, 203711) (Figure 2). Preliminary estimates presented in the corrective measures evaluation report for the 260 Outfall (LANL 2007, 098734) suggest that groundwater in the perched horizons contains a larger portion of RDX mass than other areas, including the regional aquifer. Mass estimates for the perched-intermediate groundwater zones range from as low as 700 kg of RDX to as high as about 8000 kg of RDX. The combination of high RDX concentrations in screen 1 and the potential that the perched horizons likely contain a proportionally high percentage of RDX mass warrants the testing proposed in this plan to determine whether source removal from this zone can be conducted to limit potential migration of RDX to the underlying regional aquifer. Information from drilling of additional perched-intermediate and regional aquifer monitoring wells and surface-based geophysics in the 260 Outfall area will be used in conjunction with the data from implementation of this IM work plan to further refine the spatial extent and hydraulic characteristics of perched-intermediate groundwater and identify long-term corrective action alternatives. Results of this IM will also help determine if long-term pumping in the perched-intermediate zone is a viable source removal option.
Site Conditions near CdV-16-4ip	The 2011 pumping test conducted at CdV-16-4ip screen 1 demonstrated that the upper saturated perched zone at this screen is highly permeable, with lower-bound transmissivity values ranging from about 4000 to 7000 gallons per day per foot (gpd/ft) and a lower-bound estimated hydraulic conductivity of about 100 gpd/ft^2, or 13 ft/d, assuming saturated thickness is equal to 69 ft. Towards the end of the 10-d pumping test, drawdown increased dramatically, indicating the perched zone in screen 1 is limited in lateral extent (LANL 2011, 203711). The brief (440-min) step-drawdown test showed pronounced boundary effects. The 10-d test, at discharge rates ranging from 11.8 to 7.33 gallons per minute (gpm), substantially lowered the water levels in the well screen. The screen 1 interval appeared to recharge at a rate of about 4.8 gpm, presumably from laterally adjacent sediments during the 10-d pumping period and for much of the recovery period. This value probably represents the upper bound of sustainable yield that could realistically be obtained from screen 1 over time and provides the basis for the pumping rate proposed for this IM. However, it is also possible that pumping at this rate may not be sustainable during extended pumping durations.

Site Conditions near CdV-16-4ip (continued)	The pumping tests at CdV-16-4ip and at nearby R-25b demonstrated that the upper perched zone between the wells is highly heterogeneous (Figure 3). Relatively high initial pumping rates quickly dewatered those sediments, reflecting a much lower effective transmissivity for this perched zone at a larger scale and suggesting potentially limited water production potential. The only monitored location that showed response to pumping CdV-16-4ip screen 1 was R-25 screen 2. However, the response was muted, suggesting complicated spatial propagation of the pumping cone of depression through the saturated media and indicating a somewhat indirect hydraulic connection between these zones.
Approach	Well CdV-16-4ip is planned for reconfiguration to a single-screen well that retains screen 1 (Figure 4). The initial objectives of this well were to characterize the contaminant concentrations and test the viability of pumping for contaminant removal in two separate perched-intermediate zones (screens 1 and 2). Because the RDX concentrations in screen 1 are much higher than in screen 2, and to protect from potential cross-flow downward from screen 1, a recommendation was made in the TA-16 network evaluation report prepared in March 2012 to reconfigure the well into a single-screen well that retains only screen 1 (LANL 2012, 213573). The CdV-16-4ip reconfiguration work plan provides the details of the reconfiguration approach (LANL 2012, 232222). As part of reconfiguration, the well will be equipped with a dedicated variable-rate pump suitable for extended pumping at rates up to about 6.5 gpm. This pumping rate is selected based on information obtained during the 10-d pumping test (discussed above) and on a goal of attaining steady and sustained long-term pumping rates. This IM proposes a 45-d pumping duration to determine whether extended pumping for source removal is viable. This finite-duration test will specifically assess water-level transients and whether the concentrations of RDX, VOCs, and other geochemical indicators are sustained or vary during pumping. The ability to assess changes in the concentrations of RDX and other constituents after the pumping is terminated will also be informative. The data collected during the pumping test will provide important information about the hydraulic and geochemical properties of the flow medium as well as spatial distribution of contaminants. This test will also determine the viability of long-term pumping for source removal.
Treatment and Disposal	If approved by the NMED Ground Water Quality Bureau (GWQB), water generated as part of this IM will be treated and dispositioned in a manner consistent with the approach used during the 10-d test conducted in 2011 (LANL 2011, 203711, Appendix D). The process that will be proposed to the GWQB will include use of dual granular-activated carbon units to treat pumped water to concentrations below the land-application criterion for all applicable constituents. Water will be land-applied using either trucks with spray hoses or a sprinkler array.
Schedule and Reporting	The reconfiguration of well CdV-16-4ip, as described above, is currently required by NMED for completion by June 30, 2013. Initiation of pumping conducted in accordance with this IM work plan is proposed to begin by August 30, 2013. Applicable permits requested for disposition of the water generated during this work plan will be submitted no later than May 30 to support this project. A report summarizing the results and recommendations for the path forward will be submitted to NMED by December 13, 2013.

REFERENCES

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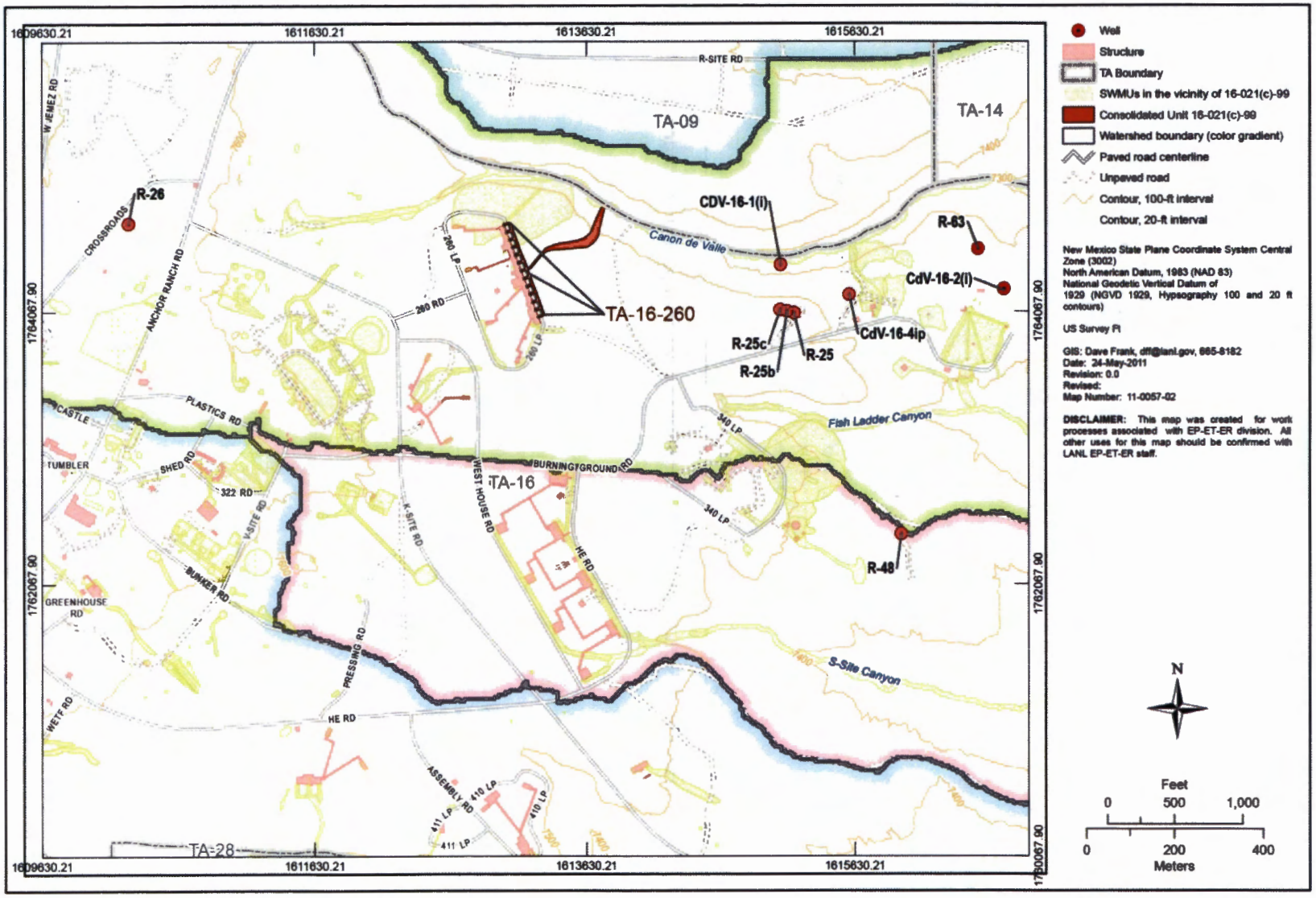

Figure 1 **Wells in the vicinity of TA-16, including CdV-16-4ip**

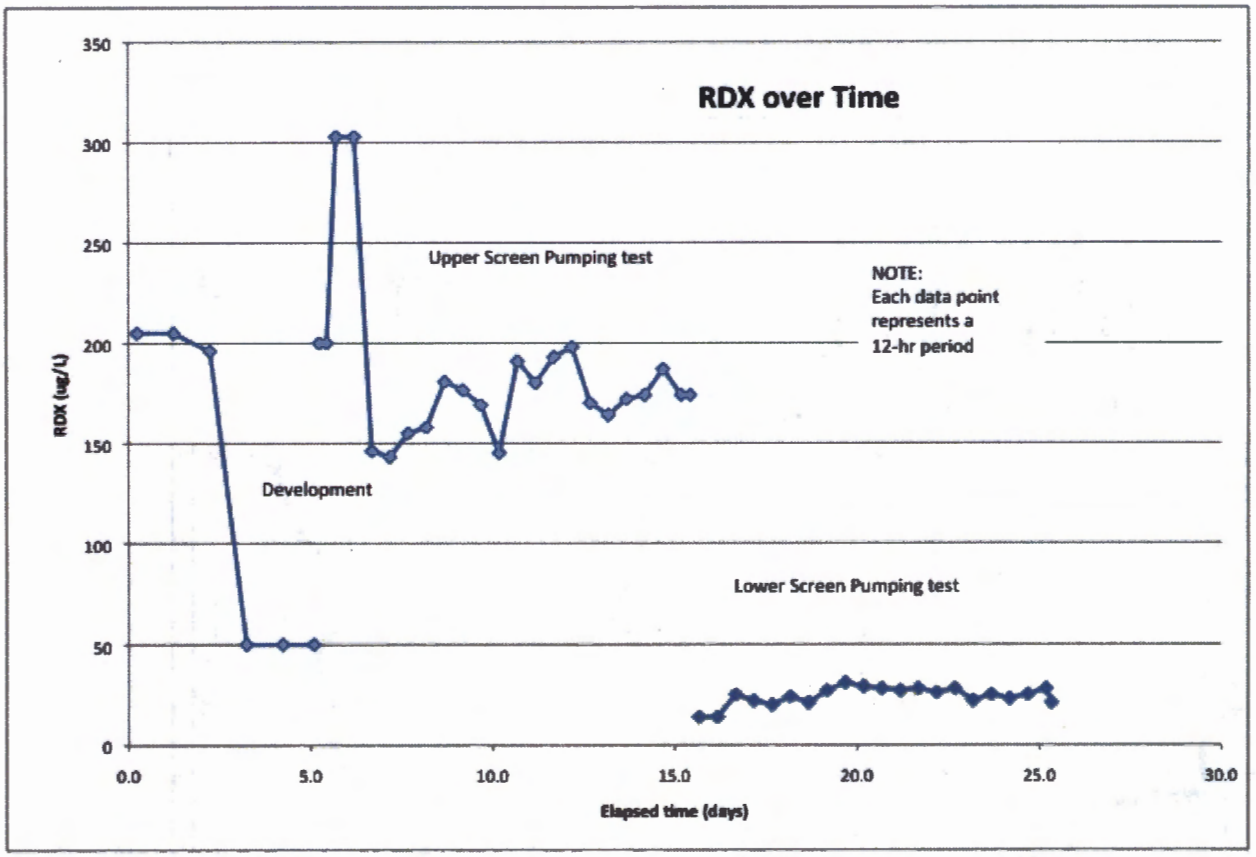

Figure 2 **Concentrations of RDX during 2011 pumping at CdV-16-4ip, screens 1 and 2**

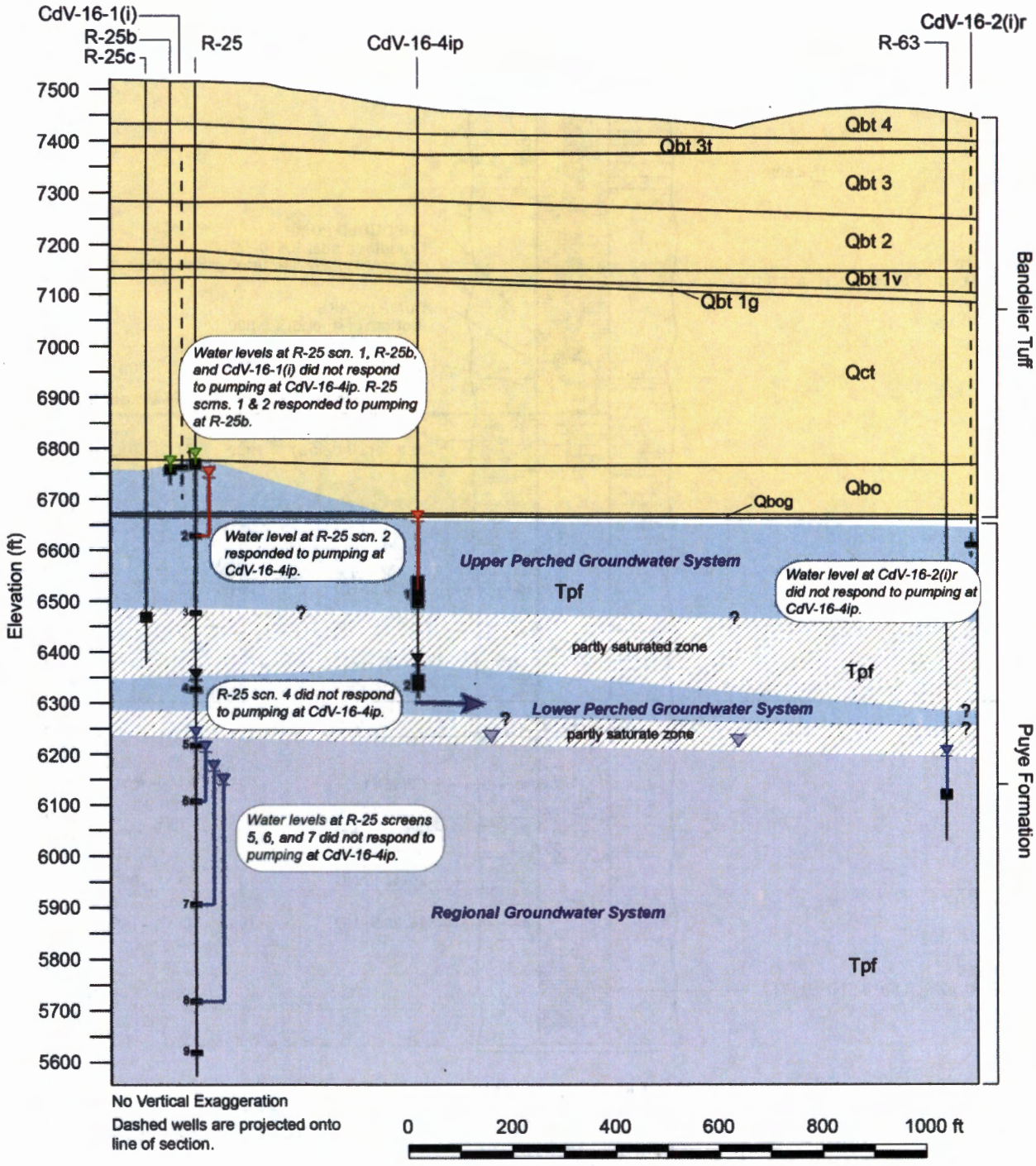

Figure 3 **Conceptualized cross-section for water-bearing zones in the CdV-16-4ip area**

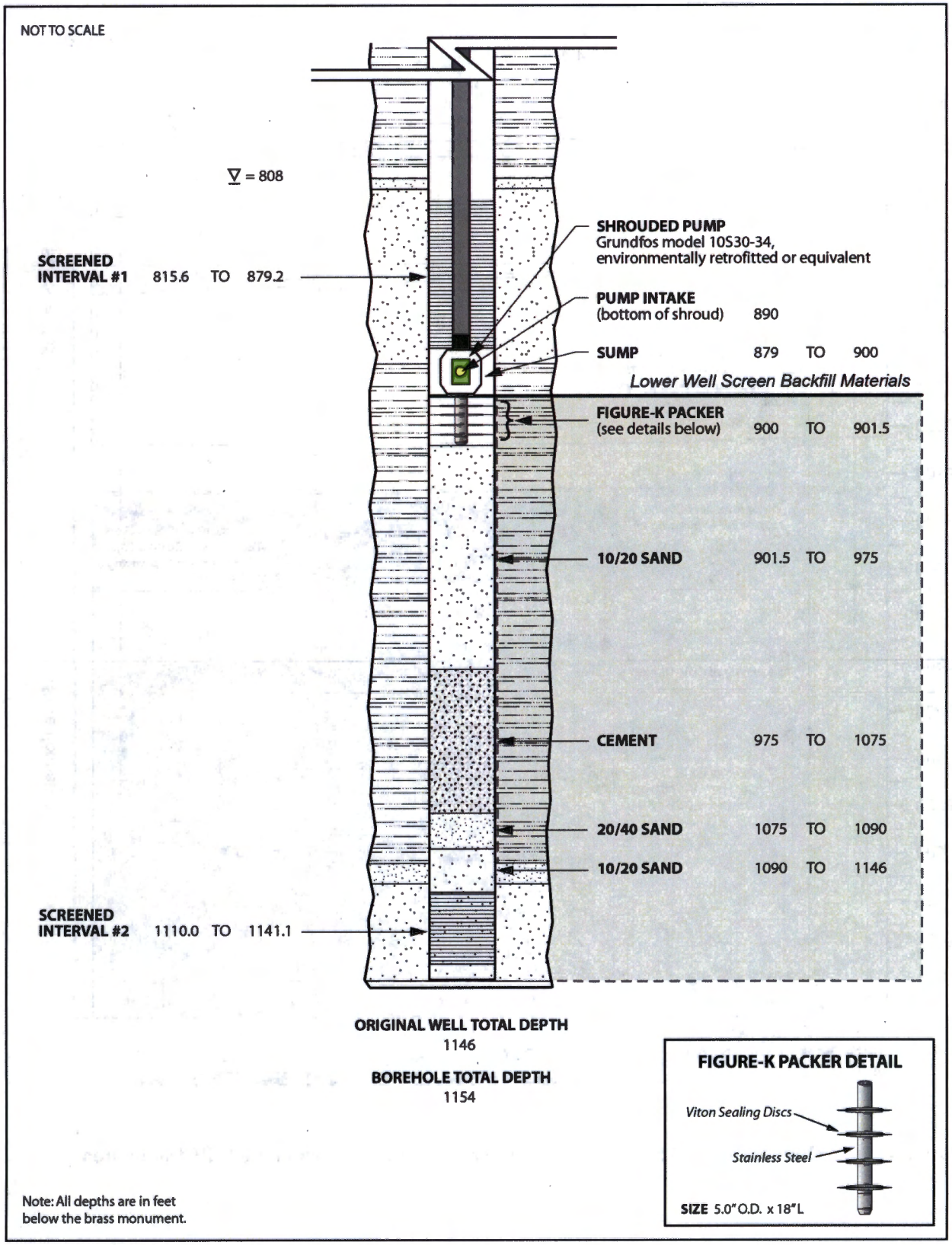

Figure 4 Planned reconfiguration design for CdV-16-4ip

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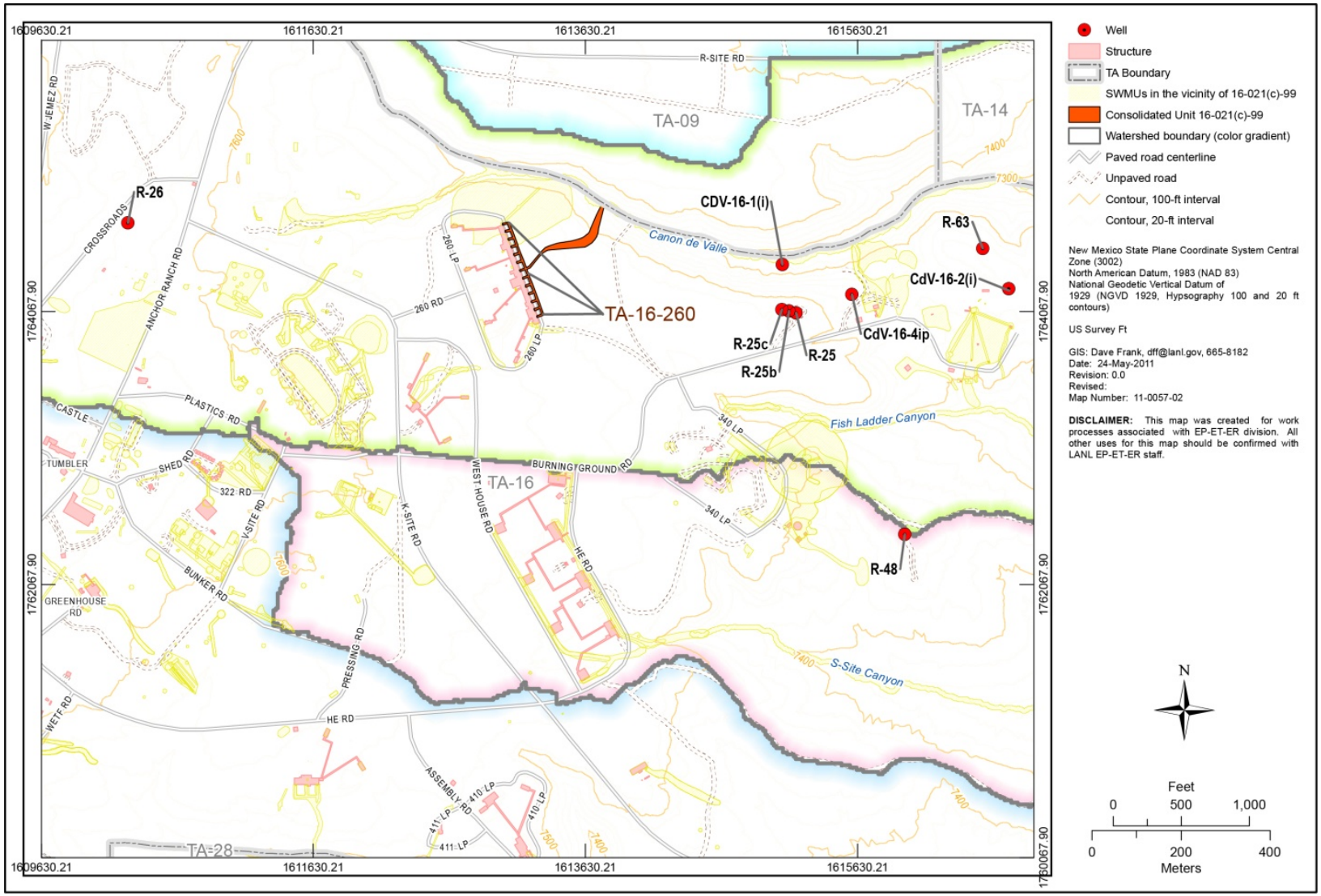

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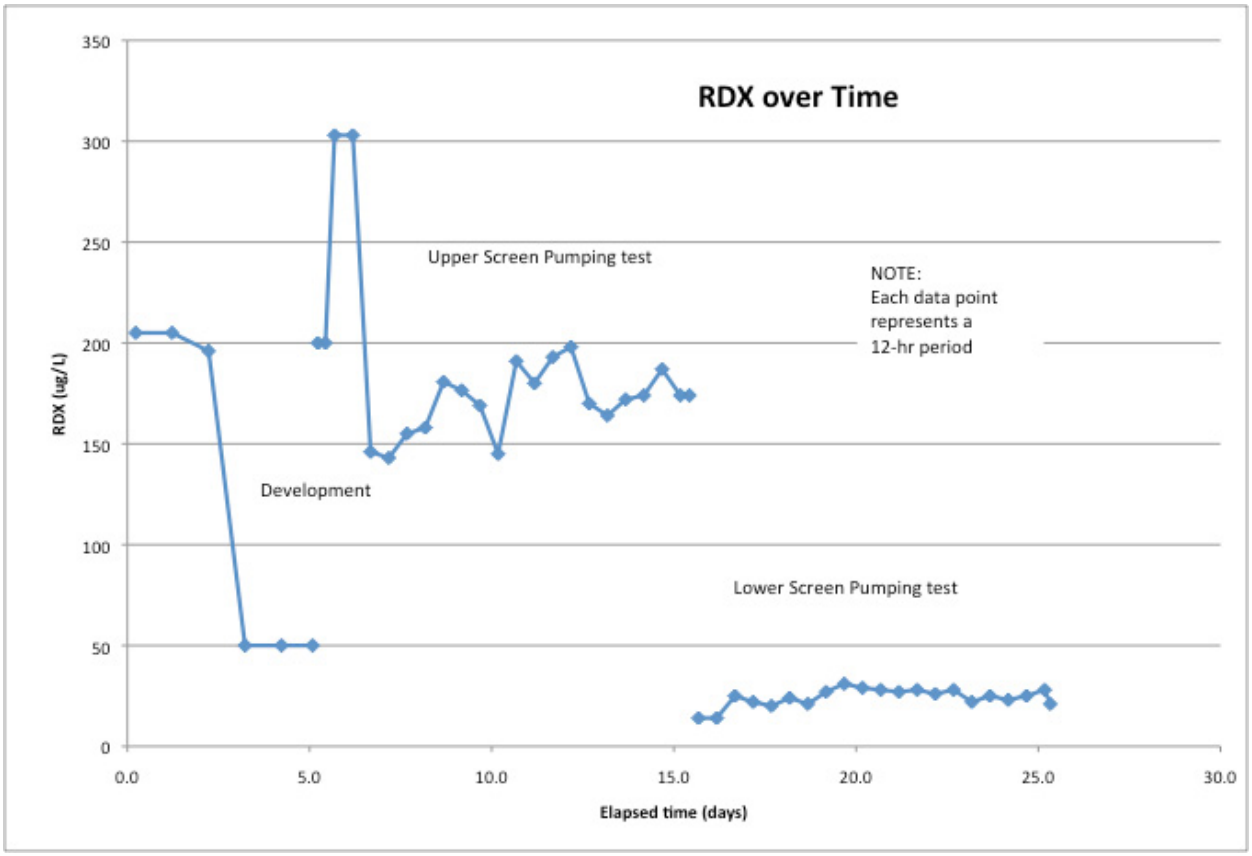

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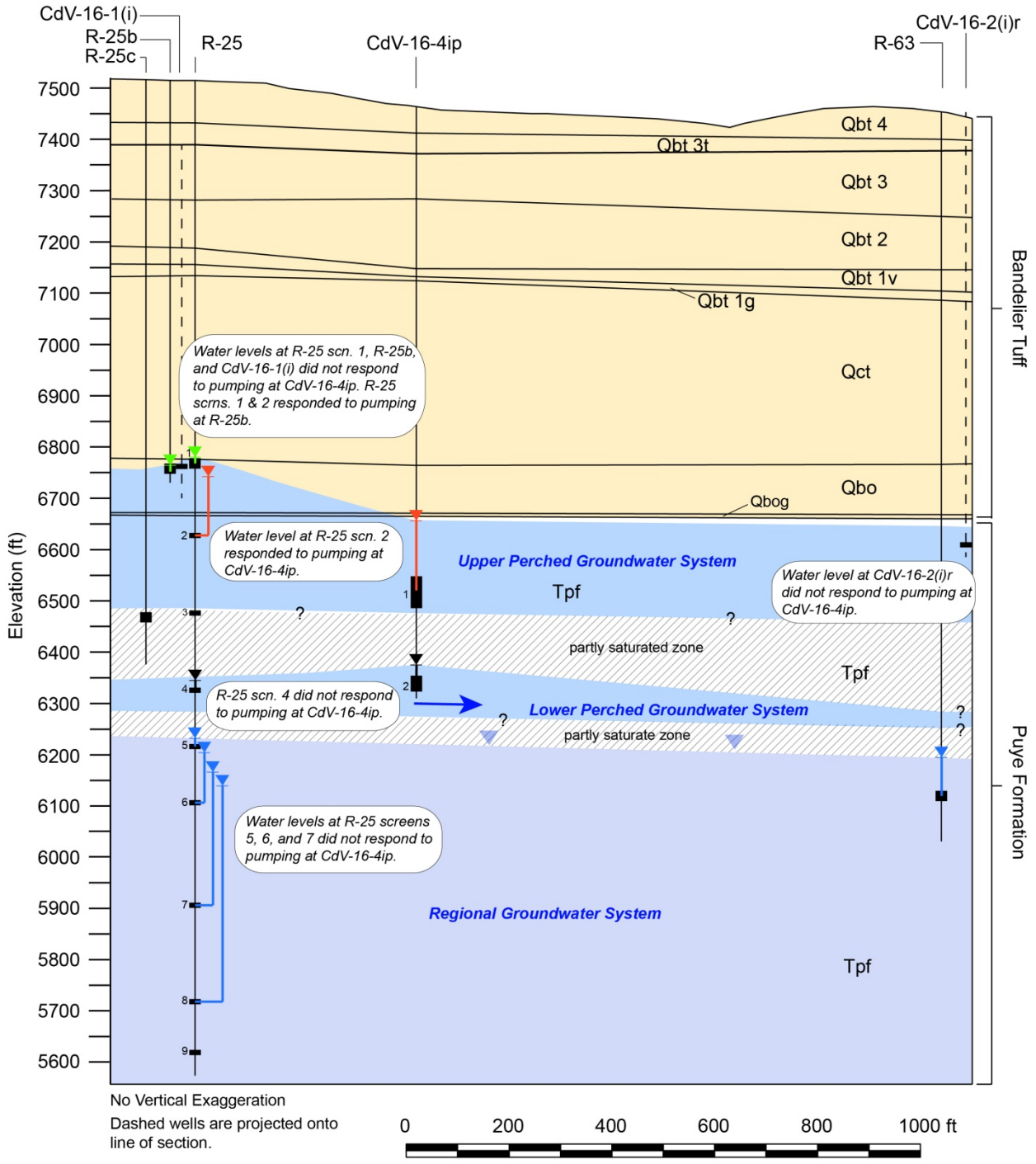

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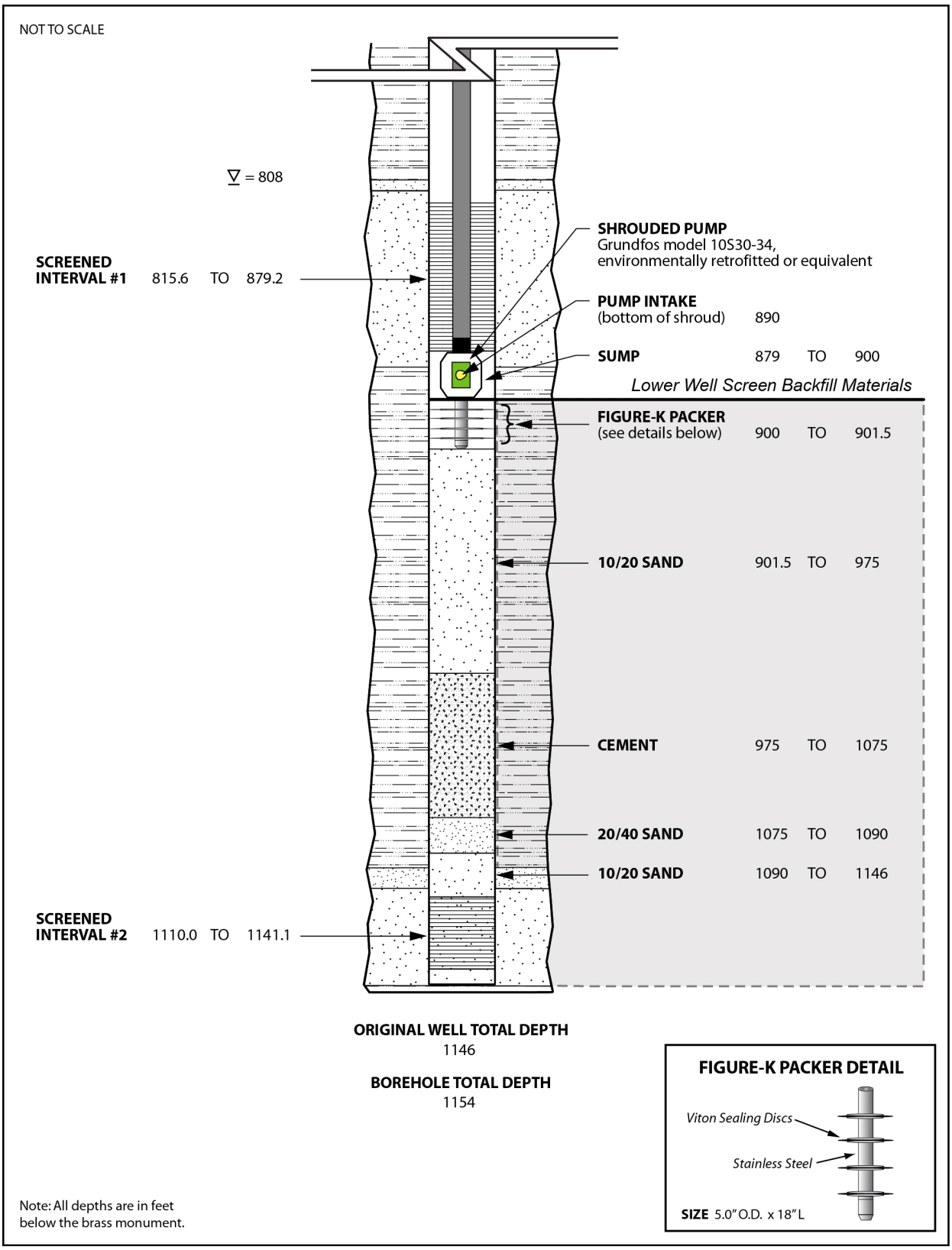

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