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Los Alamos National Laboratory's Chromium and RDX Projects Update for Northern New Mexico Citizens' Advisory Board

September 25, 2019

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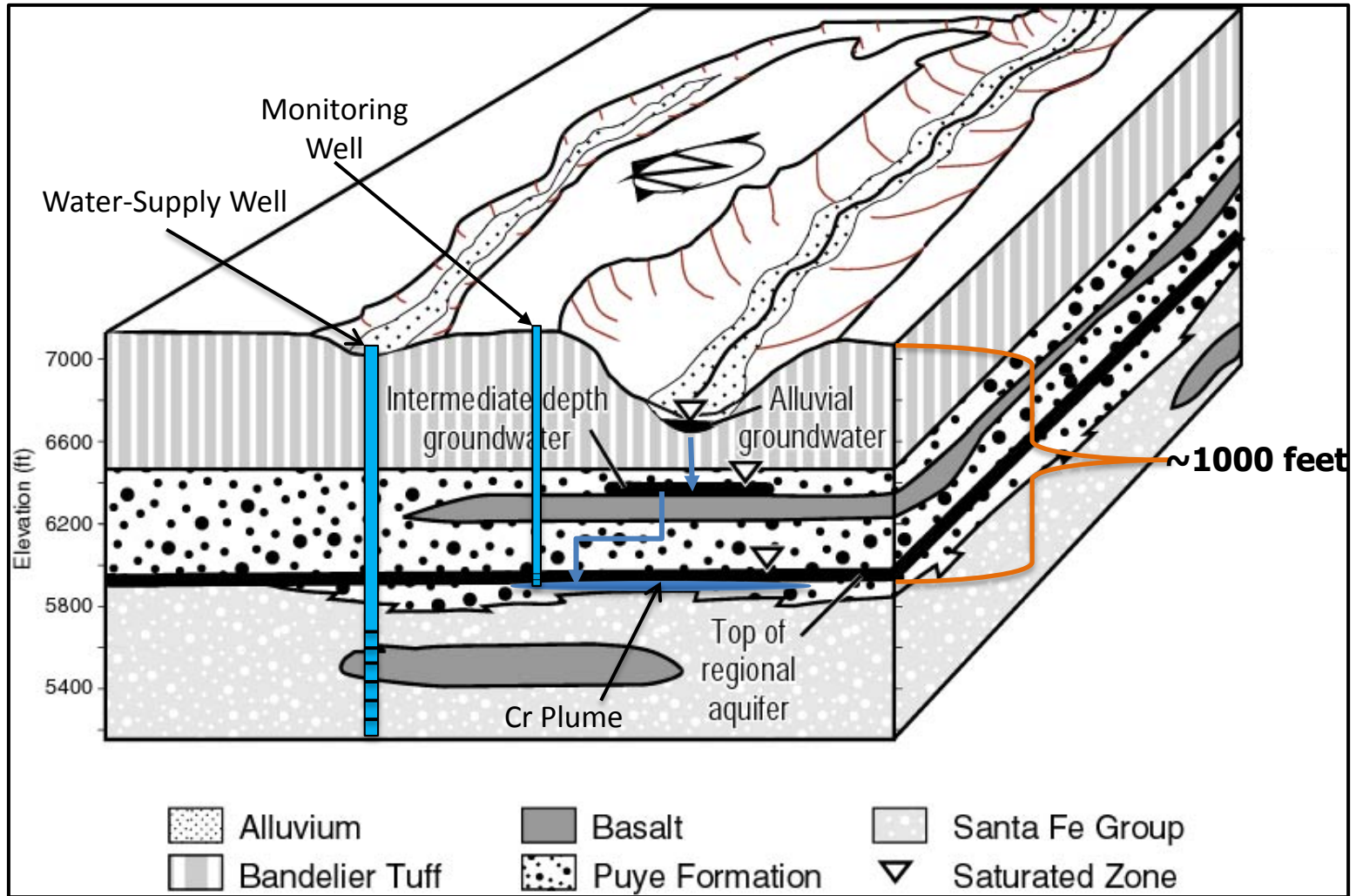


- Groundwater Setting
- Where did the chromium come from and where is it now?
- What is being done to address the plume?
- Project Status
- What's next?
- Summary





Simplified Depiction of Groundwater beneath Chromium Project Area

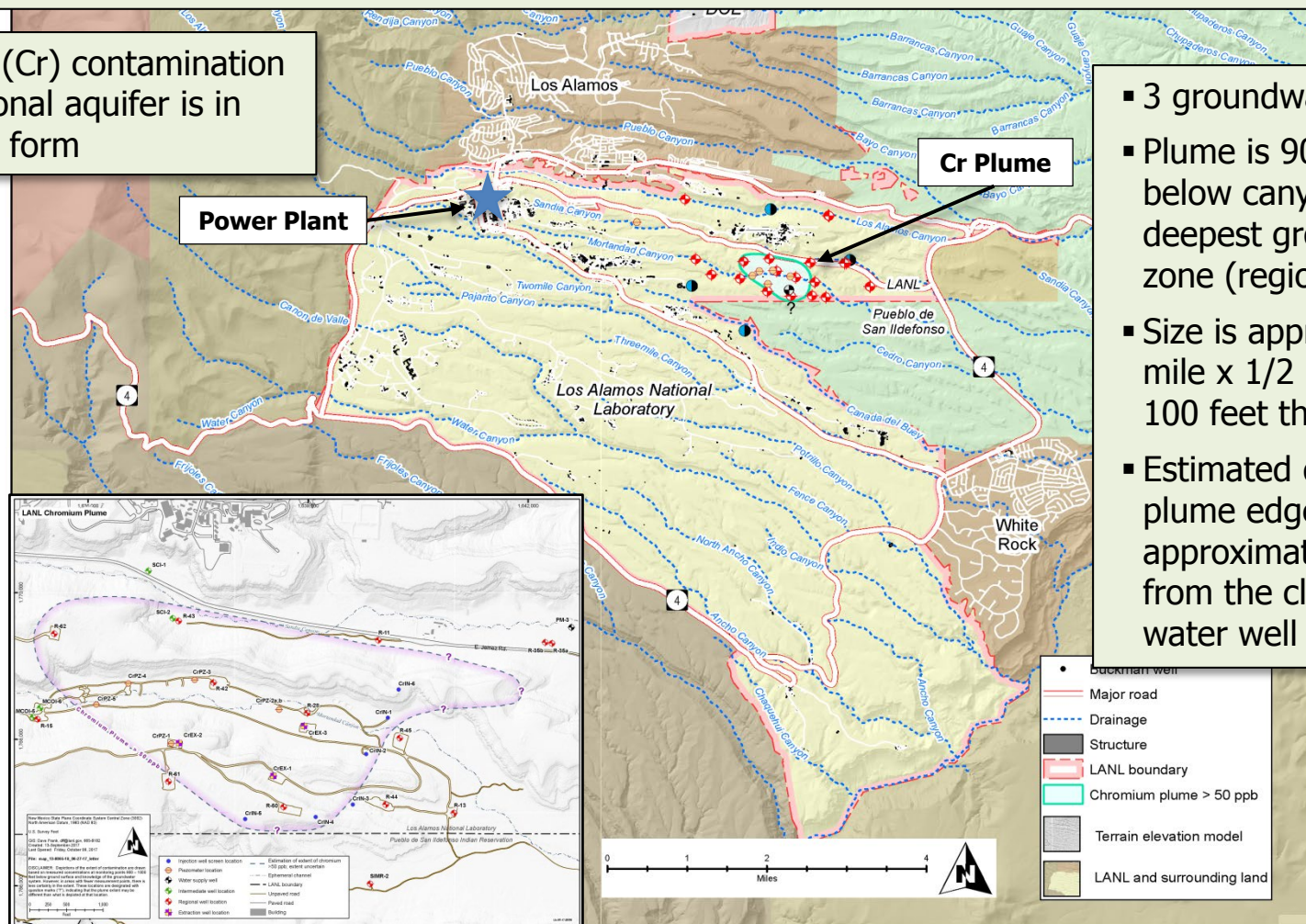




Chromium in Groundwater Beneath LANL

- Potassium dichromate used in cooling towers at a Laboratory power plant
- Up to 160,000 lb released from 1956-72 in hexavalent form [Cr(VI)]

Chromium (Cr) contamination in the regional aquifer is in hexavalent form

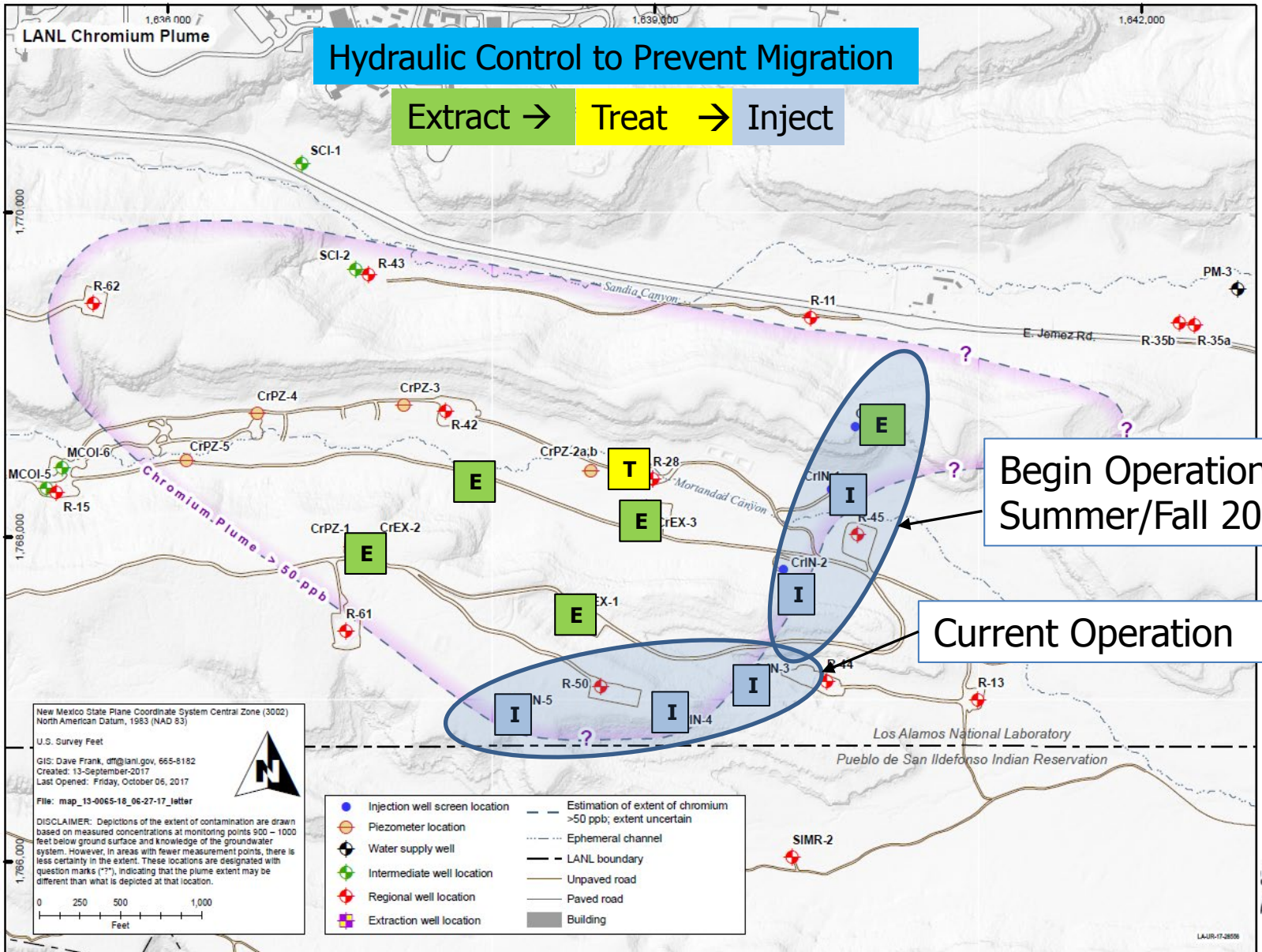


- 3 groundwater zones
- Plume is 900–1,000 feet below canyon bottom in deepest groundwater zone (regional aquifer)
- Size is approximately 1 mile x 1/2 mile x <75-100 feet thick
- Estimated downgradient plume edge is approximately 1/4 mile from the closest drinking water well





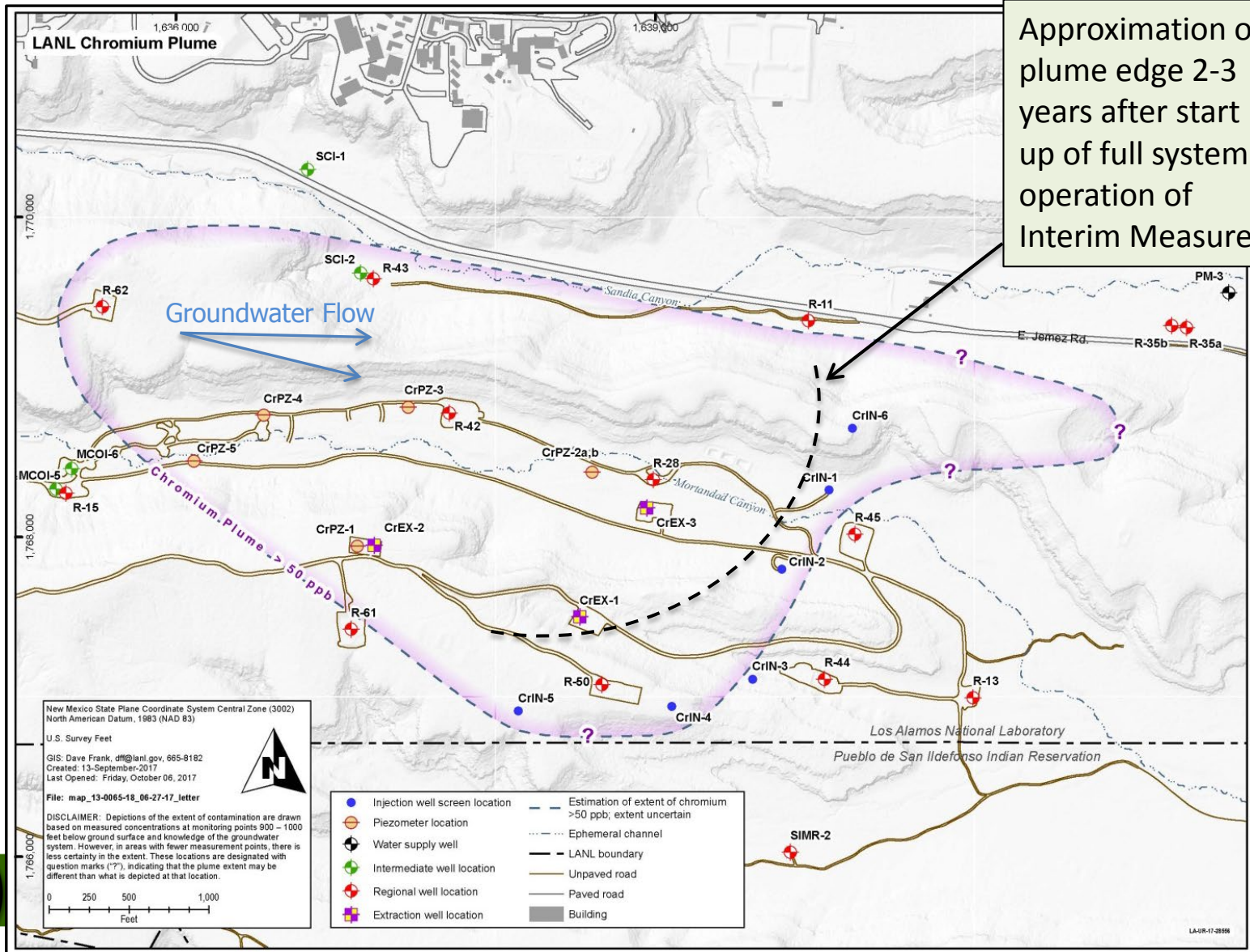
What is being done about the plume? "Interim Measure"





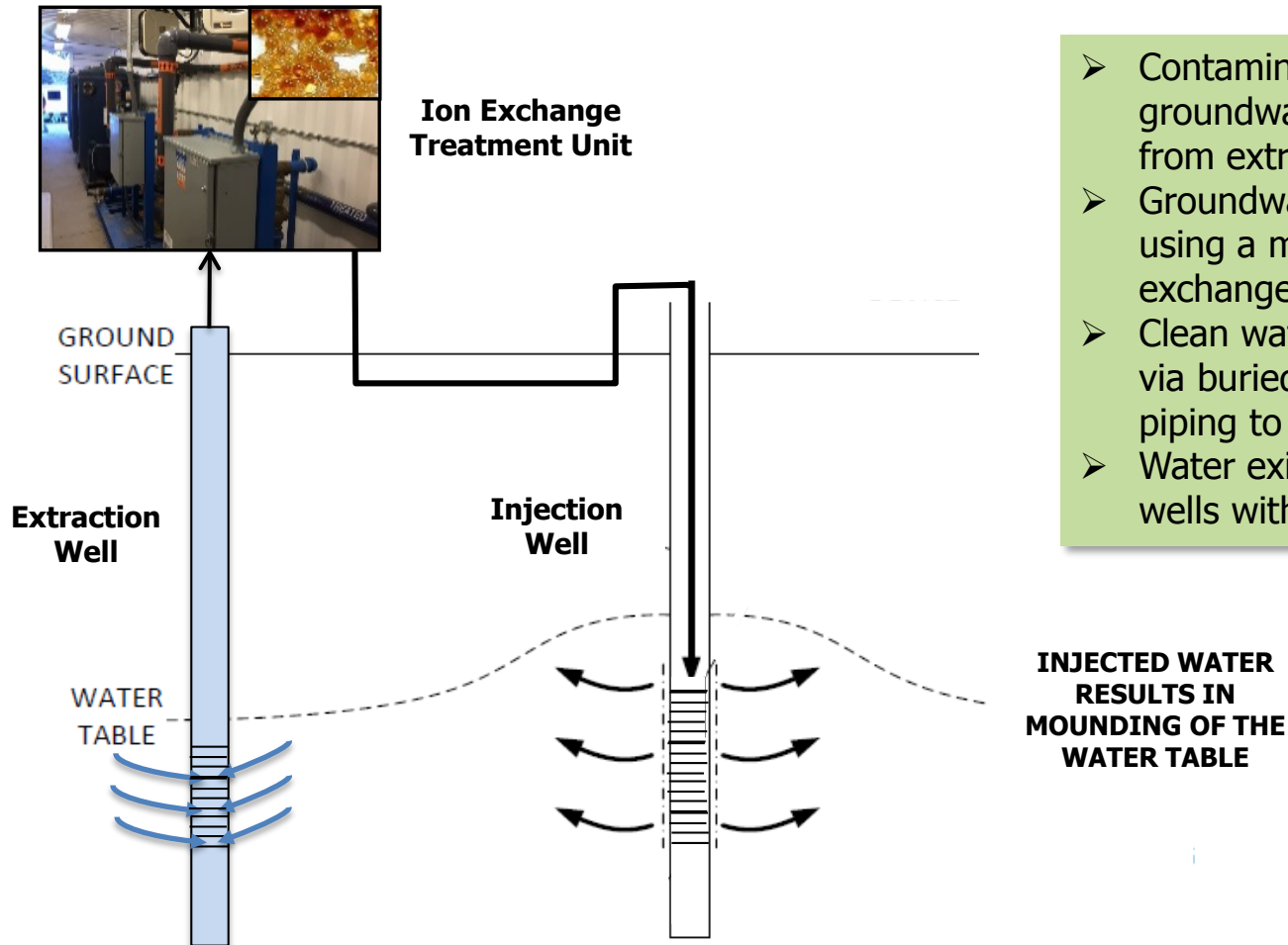
Goal of the Interim Measure

Approximation of plume edge 2-3 years after start up of full system operation of Interim Measure





Extraction, Treatment & Injection Loop

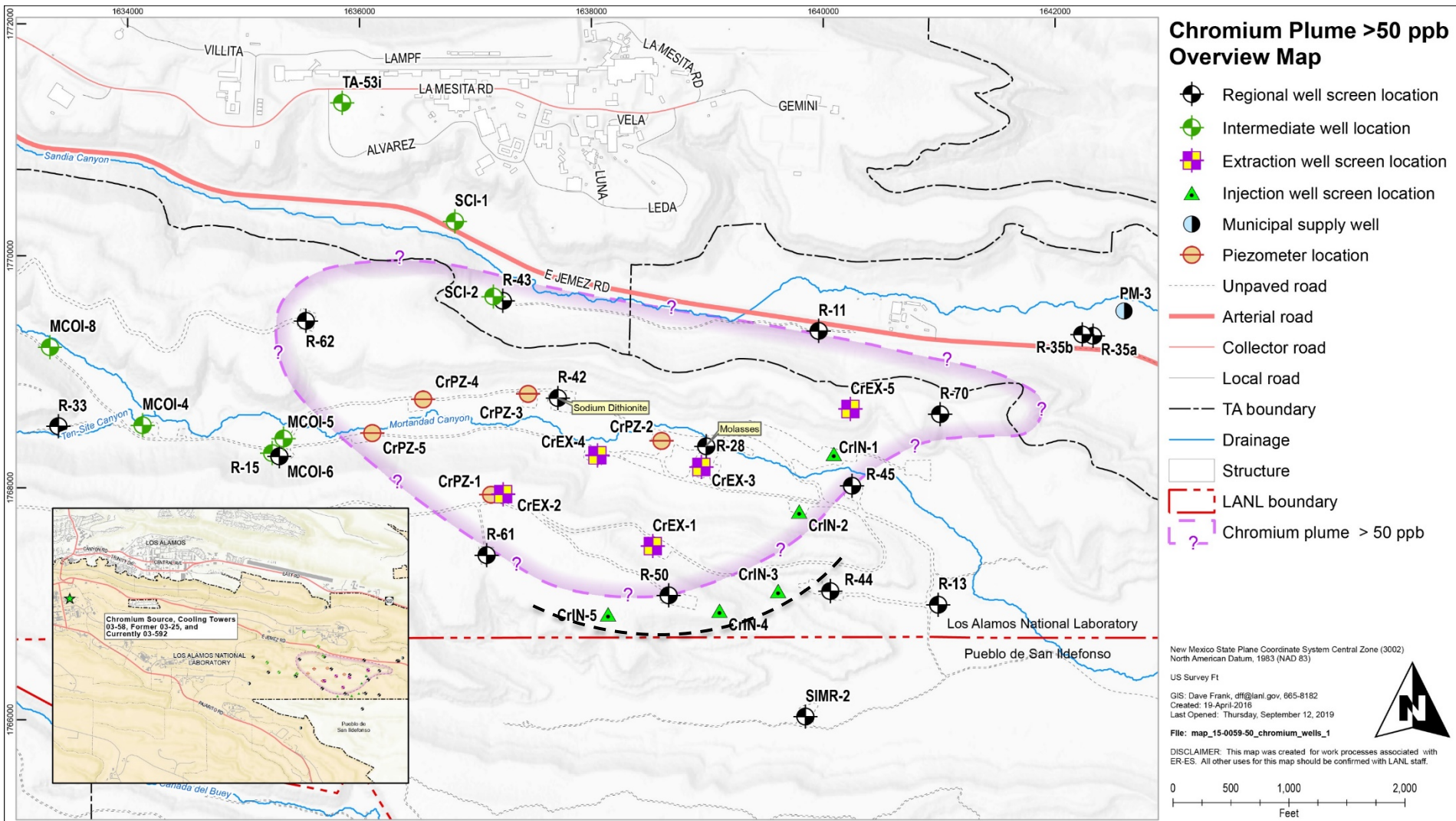


- Contaminated groundwater is pumped from extraction wells
- Groundwater is treated using a method called ion exchange
- Clean water is delivered via buried thick-walled piping to injection wells
- Water exits the injection wells within the aquifer





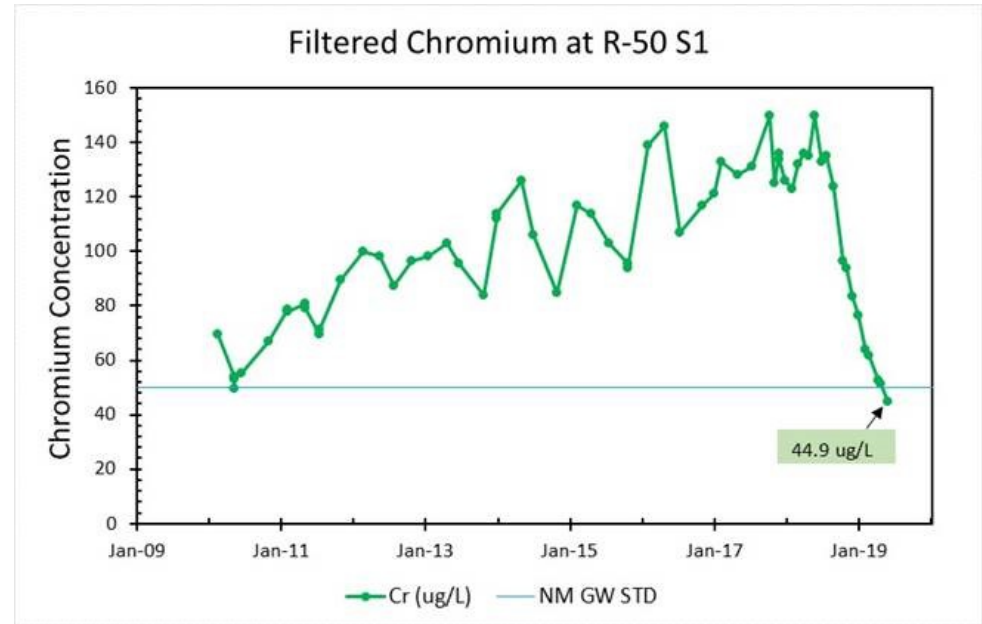
Current Plume Depiction





Interim Measure Status

- The Interim Measure along the southern edge of the plume near the boundary with the Pueblo de San Ildefonso has been underway for about a year
- The most recent samples at regional aquifer well R-50, near the Laboratory boundary with San Ildefonso, show chromium levels at 44.9 parts per billion (ppb)



- Chromium levels at the southern boundary are now under the state groundwater standard of 50 ppb
- This indicates that the Interim Measure's hydraulic plume control approach is effective





- Full implementation of the IM is scheduled in calendar year 2019
- This past spring, crews installed another monitoring well, R-70, to help monitor the interim measure's performance along the eastern portion of the plume
- The well is located in between CrEX-5 and the nearest county drinking water well (PM-3)
- Initial sampling results from R-70 have helped better characterize the distribution of chromium in that portion of the plume
- Continue studies to evaluate final remedy
- Corrective Measures Evaluation Report scheduled for September 2021





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RDX Project Overview



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Presentation Topics

- Background
 - Groundwater setting
 - Source and history
 - Remediation conducted to date
- Extent of RDX in Groundwater
- Next Steps

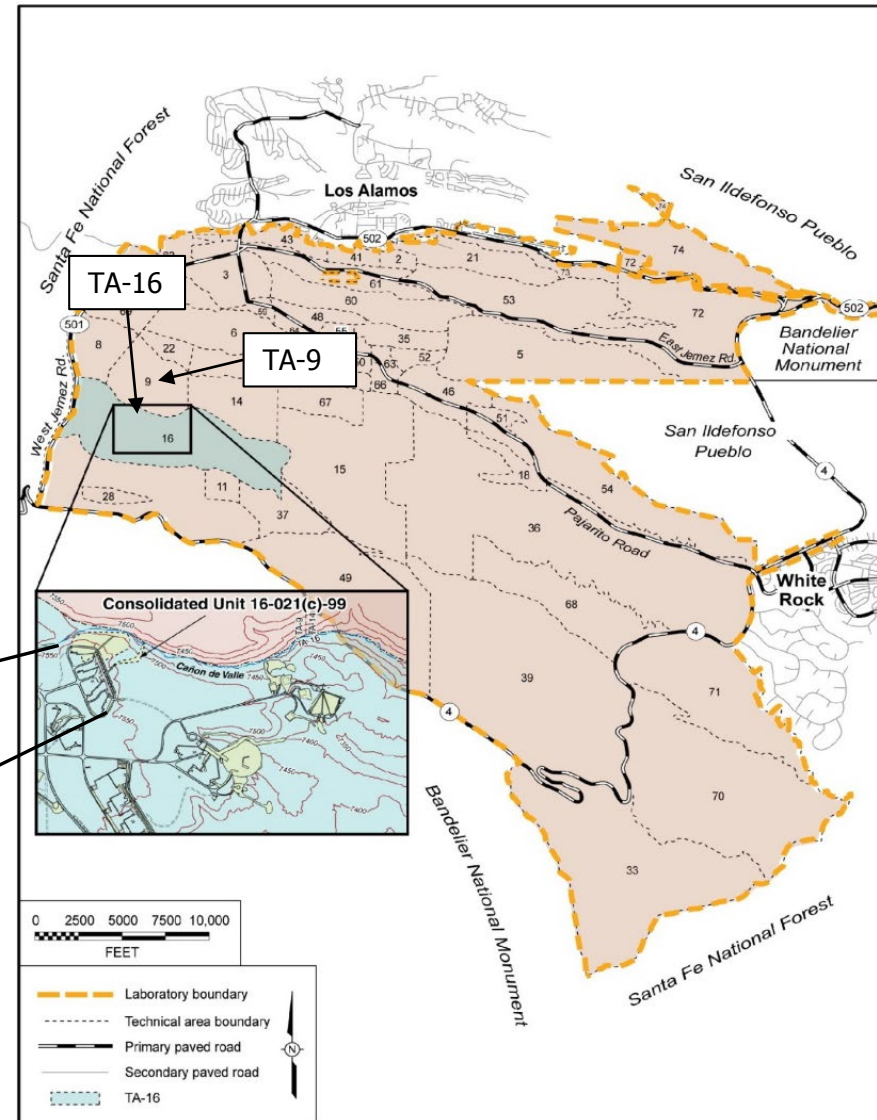




Background

- TA-16 facilities established in early 1950s to develop high explosive (HE) formulations
 - Explosives (RDX, HMX, TNT) were casted and machined for nuclear weapons in 260 Bldg starting in 1951
 - Several million gal/yr of HE-contaminated water discharged to Cañon de Valle between 1951 – 1996
- Groundwater investigations first identified RDX (below screening level) in perched and regional groundwater in the late 1990s
- Present-day RDX concentrations are low in nearby springs, surface water, and shallow groundwater

260 Building





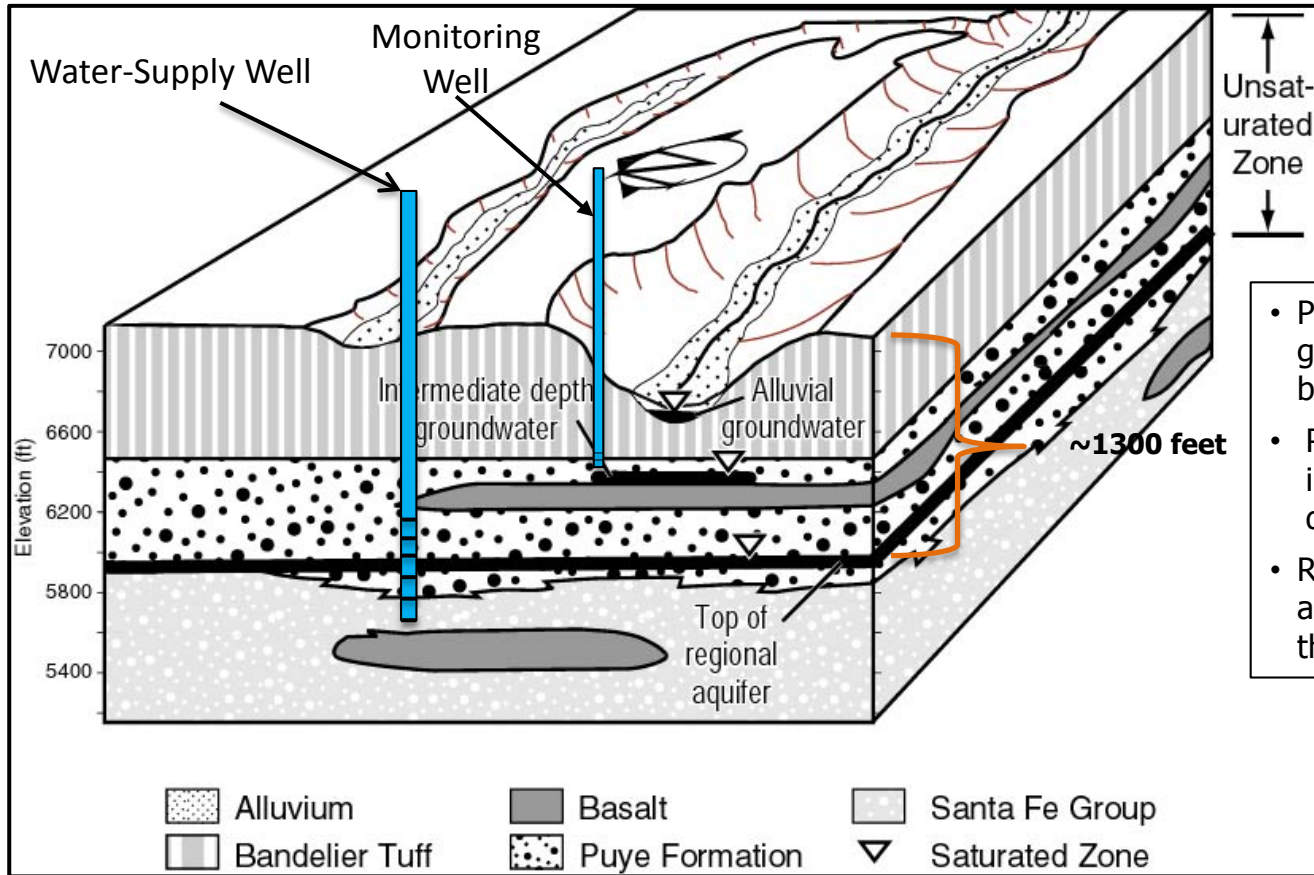
RDX Remediation Activities Conducted to Date

- Surface soil cleanup conducted in outfall area in 2000 – 2001 under an Interim Measure, and in 2009 – 2010 under a Corrective Measures Implementation
- More than 1500 yd³ HE-contaminated soil excavated and disposed offsite
- Significantly reduced contamination in surface soils
- Injected grout in permeable rock layers to cut off infiltration pathways
- Remedy Completion Report - 2017
 - Documentation of no further action necessary for cleanup for RDX in surface setting
 - Long-Term Monitoring Plan and reporting requirements for surface water, springs, shallow alluvial wells





Simplified Depiction of Groundwater Beneath RDX Project Area



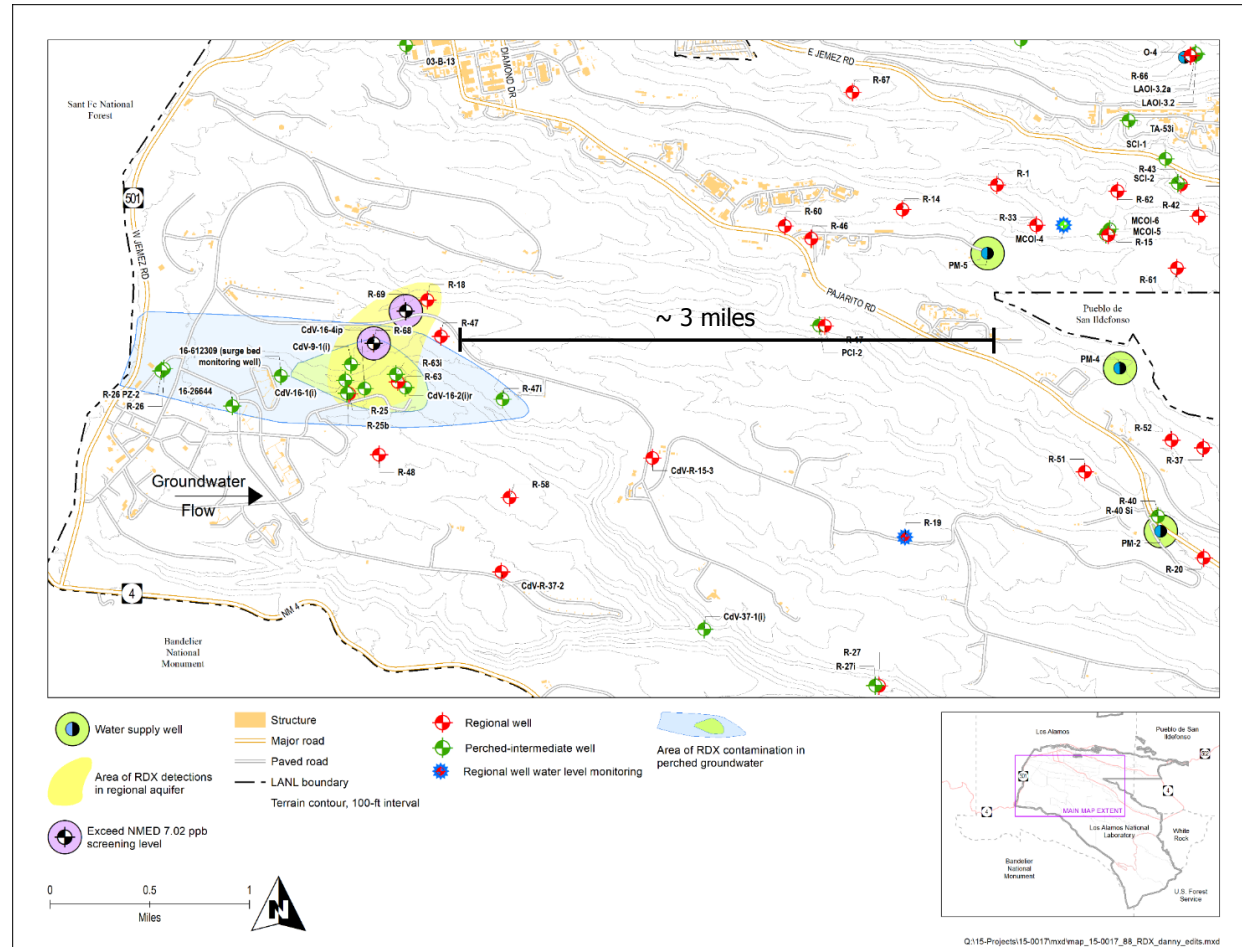
- Perched-intermediate groundwater is ~600-1000 ft below ground surface
- Perched groundwater occurs in limited and often disconnected zones
- Regional aquifer is approximately 1300' bgs in the TA-16 area





RDX in Regional Aquifer

- RDX is present in perched-intermediate and regional groundwater monitoring wells
- Several perched-intermediate wells have RDX above NMED's tap-water screening level of 9.66 ppb
- Two regional aquifer monitoring wells (R-68 and R-69) have RDX above the tap-water screening level
 - R-68 ~14 ppb
 - R-69 ~18 ppb
- RDX is not present in Los Alamos County (LAC) water-supply wells (~3 miles away)
- DOE collects groundwater samples from water-supply wells for RDX analysis
- Sampled since 1998
- Current semi-annual sampling supplements Los Alamos County's sampling efforts





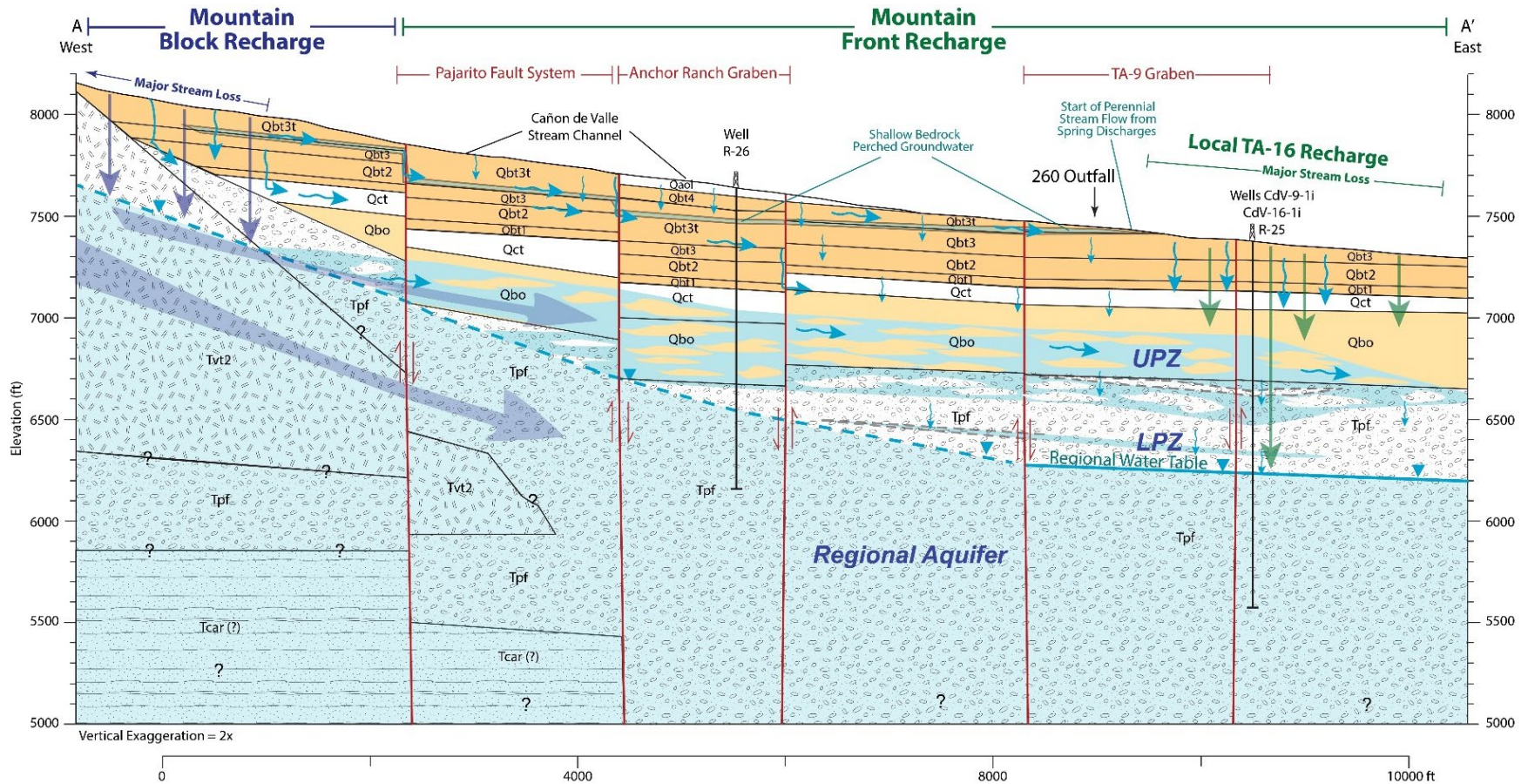
Recent Deep Groundwater Investigation Activities

- Installation of monitoring wells to investigate “nature and extent” of deep groundwater contamination
 - 12 perched-intermediate groundwater monitoring wells (~600-1000 ft bgs)
 - 9 Regional aquifer groundwater monitoring wells (~1200-1400 ft bgs)
- Studies to refine the conceptual model and understand the hydrology and “fate and transport” (movement) of RDX
 - Tracer studies
 - Aquifer tests
 - Groundwater flow ~20 – 40 ft/yr; RDX in groundwater slightly slower





Conceptual Model





Deep Groundwater Investigation Report

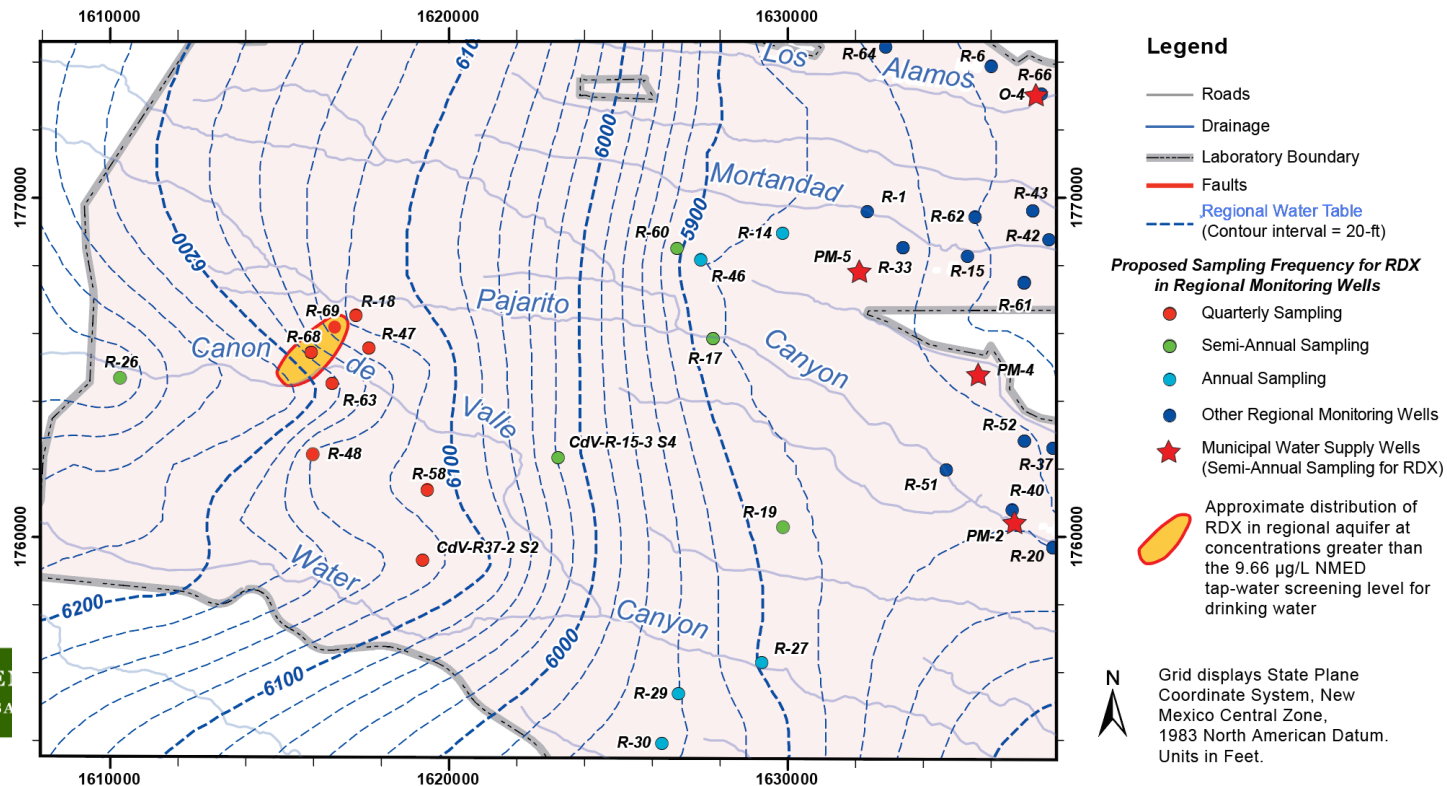
- Submitted to NMED in August 2019
- Objectives/Findings
 - Nature and extent of RDX in deep groundwater
 - Updated conceptual model
 - Assess potential risk to human health
 - Determined no imminent risk to human health exists because contamination is not present near existing water-supply wells or Laboratory boundary





Upcoming Activities

- Fate and Transport and Risk Assessment Report in 2020
- Potential for long-term migration of RDX in regional aquifer (i.e., predictions for whether and how much the plume footprint could grow)
- Increase sampling of regional groundwater monitoring wells around the downgradient portion of the RDX plume
- If remediation is necessary, a Corrective Measures Evaluation Report will be developed to evaluate alternatives and propose an approach





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Questions



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Produced by Los Alamos Legacy Cleanup Contractor, N3B Los Alamos
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