# Los Alamos National Laboratory's RDX and Chromium Groundwater Projects

# Voices of Los Alamos

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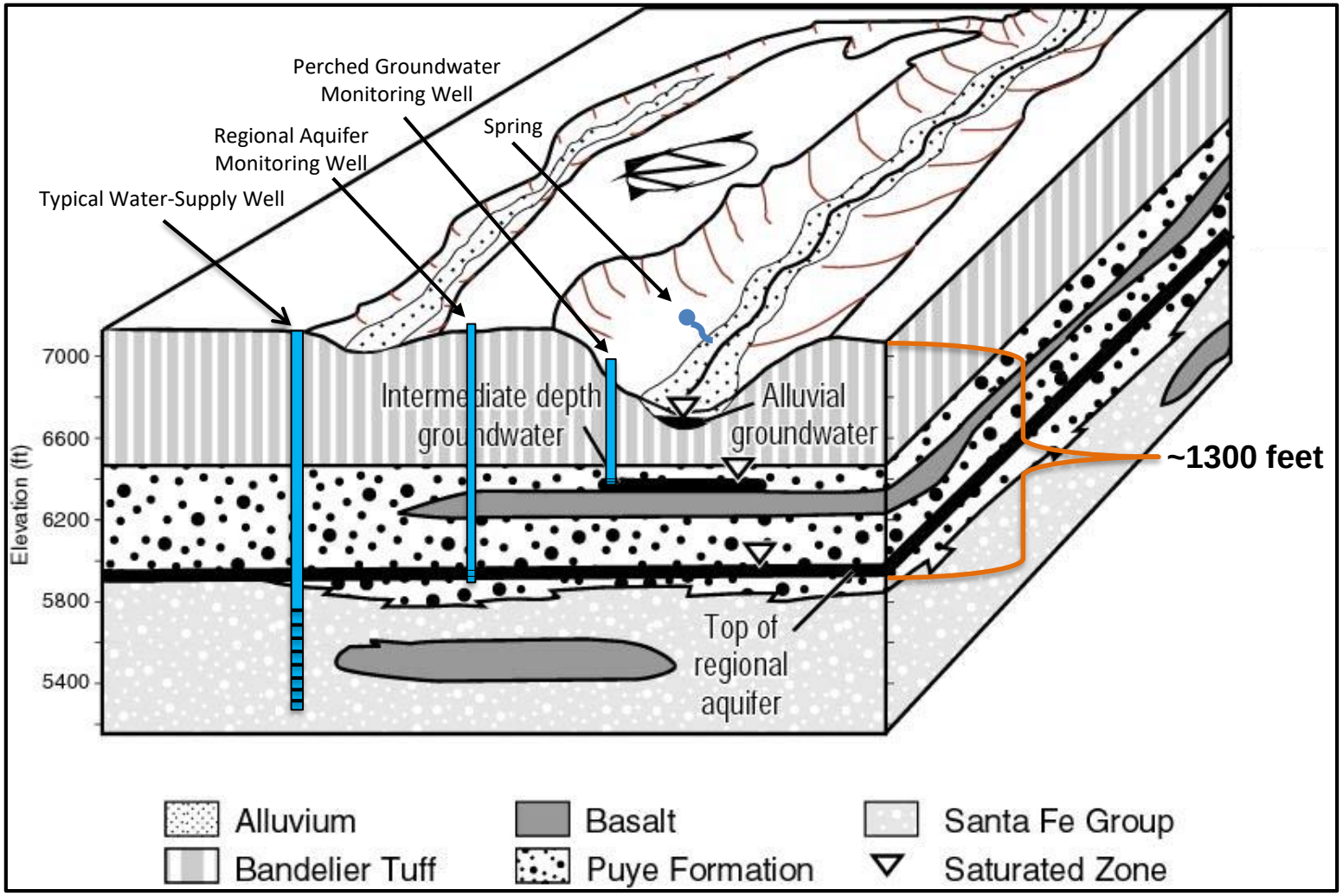
**January 28, 2019**

# RDX Project

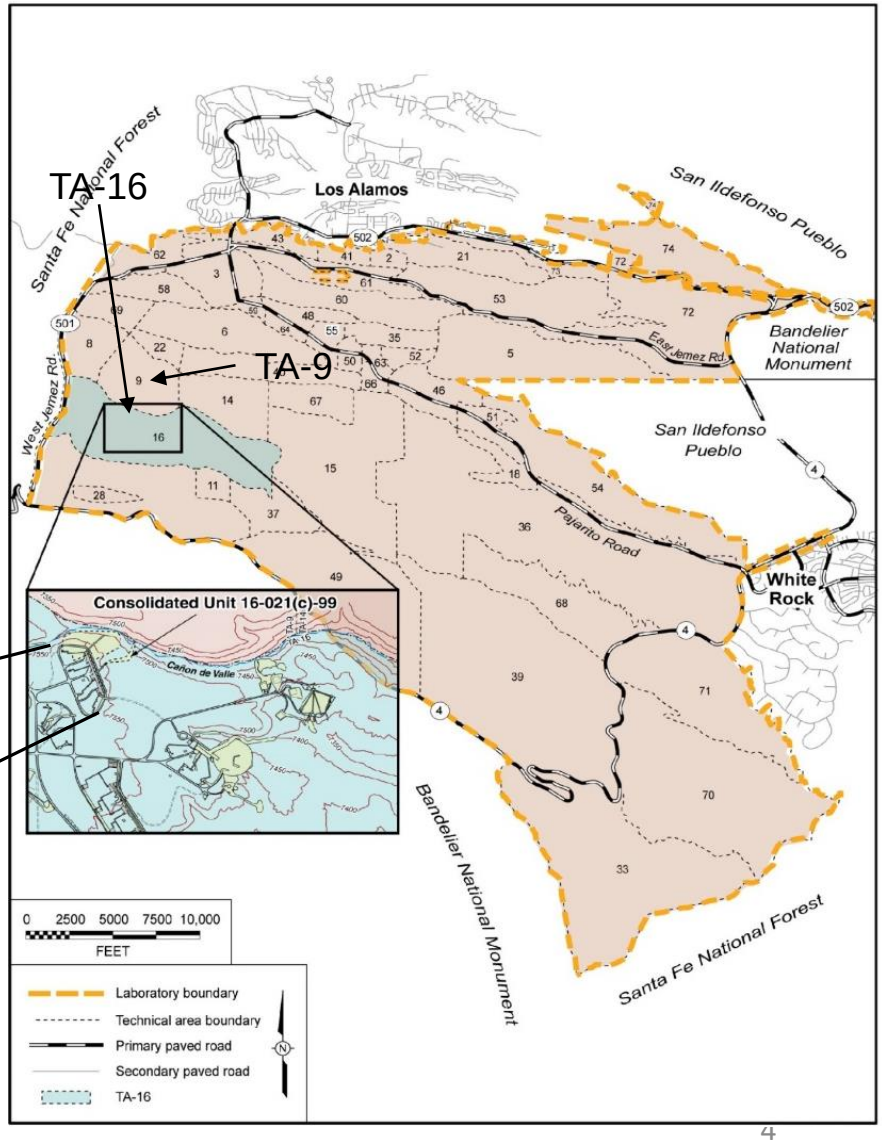
- Background
  - Groundwater setting
  - Source and history
  - Remediation conducted to date
- Extent of RDX in groundwater
- Next Steps

# Groundwater beneath Los Alamos



# 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
  - Building 260 used since 1951 to machine HE
  - Several million gal/yr of HE-contaminated water discharged to Cañon de Valle (CdV) between 1951 – 1996
- First investigations of RDX in soils occurred in the mid 1990s
- Groundwater investigations first identified RDX (below standard) in perched and regional groundwater in the late 1990s
- Present-day RDX contamination is low in nearby springs, surface water, and shallow groundwater

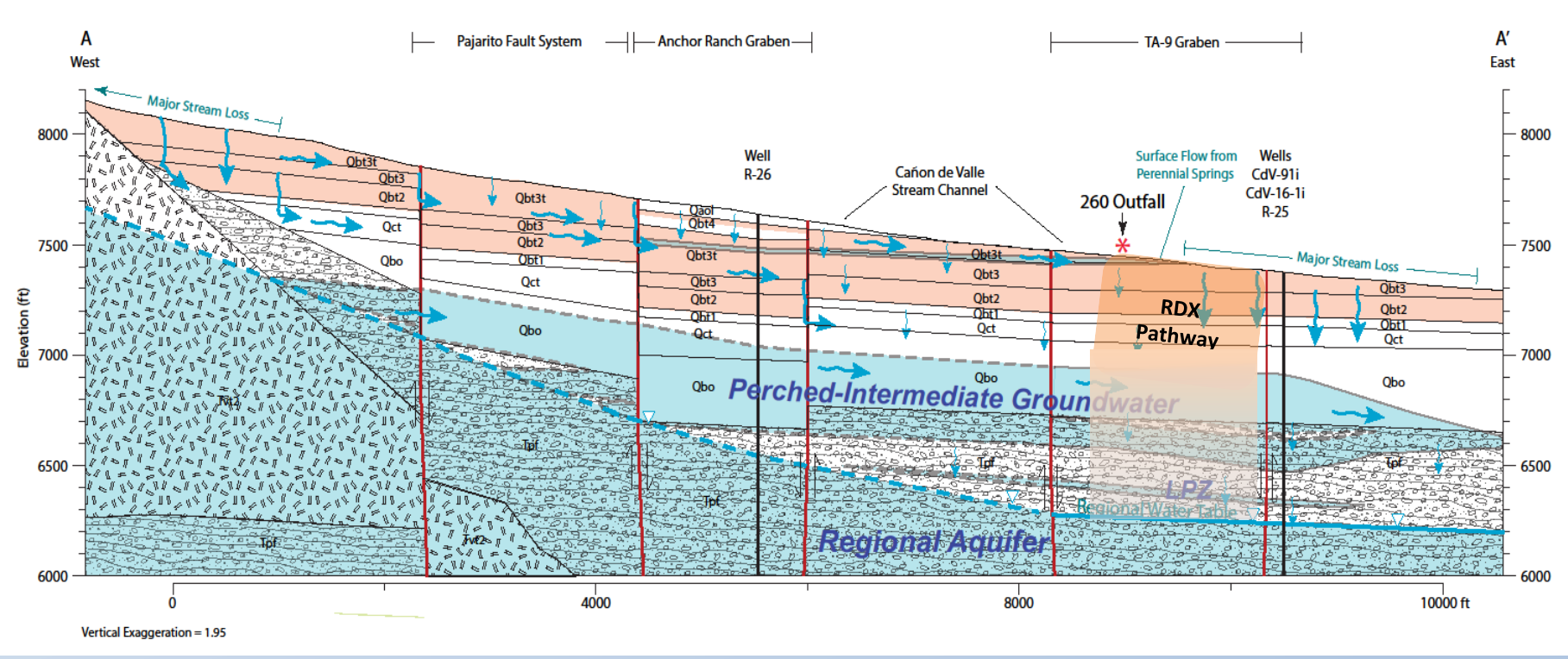
# RDX Remediation Activities

- 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 $yd^3$ 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

# Deep Groundwater Activities

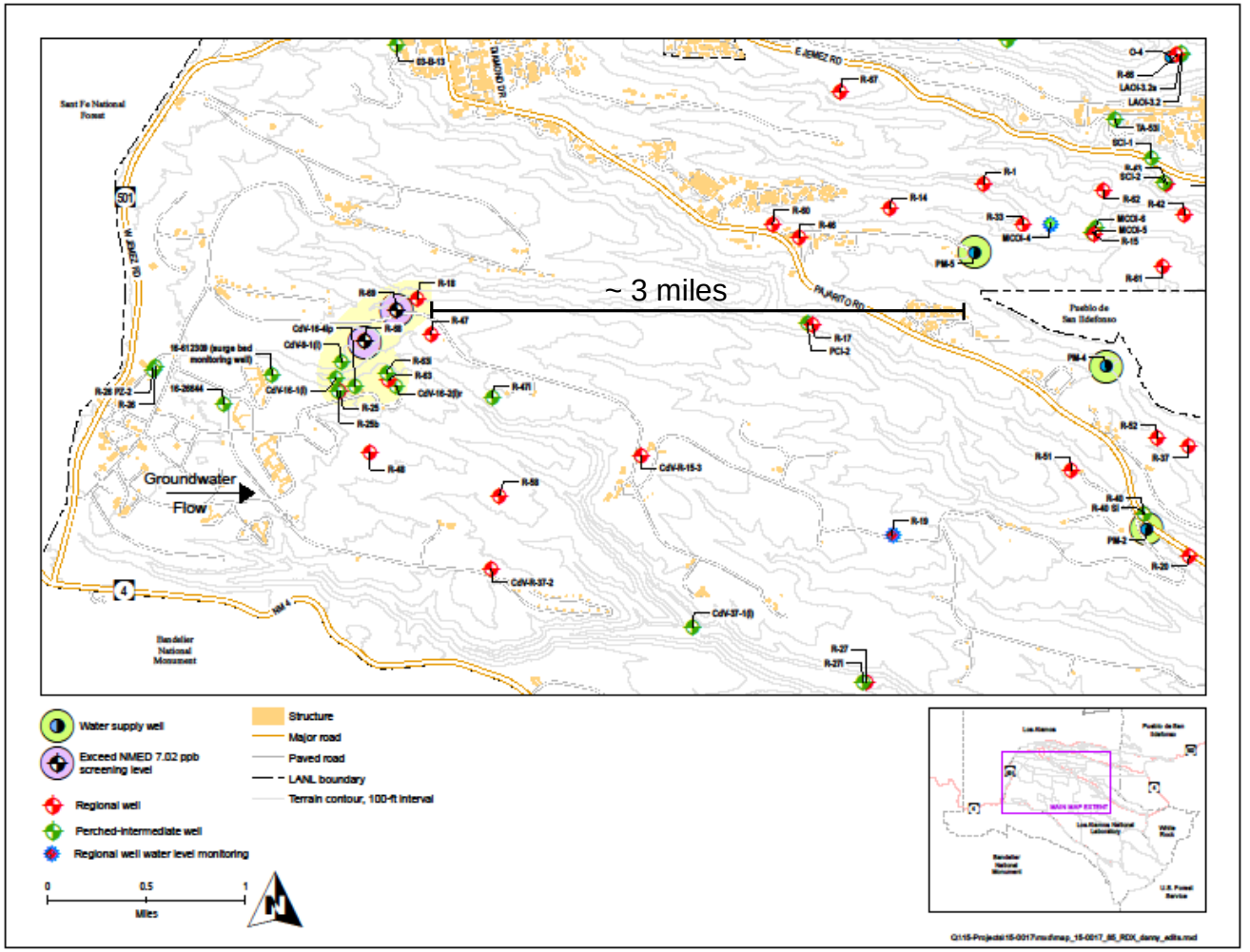
- Installation of monitoring wells to investigate "nature and extent" of contamination
  - Including the latest monitoring well, R-69, there are 9 wells used to monitor the regional groundwater in the RDX area
  - Intermediate-depth wells screened in perched groundwater (~600-1000 ft bgs)
  - Deep wells screened in the regional aquifer (~1200-1400 ft bgs)
- Studies to understand the hydrology and "fate and transport" of contamination
  - Tracer studies
  - Aquifer tests
- All investigation activities performed with NMED's approval

# Conceptual Model



# RDX in Regional Aquifer

- RDX is present in several regional groundwater monitoring wells
- Known since 1998
- Two monitoring wells (R-68 and R-69) have RDX above the NMED's 7.02 ppb screening level
- RDX is not present in LAC water-supply wells (approx. 3 miles away)
- DOE collects groundwater samples from water-supply wells for RDX analysis
  - sampled since 1998
  - Current semi-annual sampling supplements LAC's sampling efforts
- DOE/N3B will continue to monitor for RDX in water-supply wells and in monitoring wells closer to the RDX project site



# Upcoming Activities

- Deep Groundwater Investigation Report (DGIR)
  - Due to NMED in August 2019
- DGIR Objectives
  - Is the contamination sufficiently characterized?
  - A groundwater model will evaluate
    - long-term fate of RDX in regional aquifer (predictions for whether the footprint could expand)
    - whether groundwater remediation is necessary
- All activities conducted under the Consent Order with NMED

# Los Alamos National Laboratory's Chromium Project

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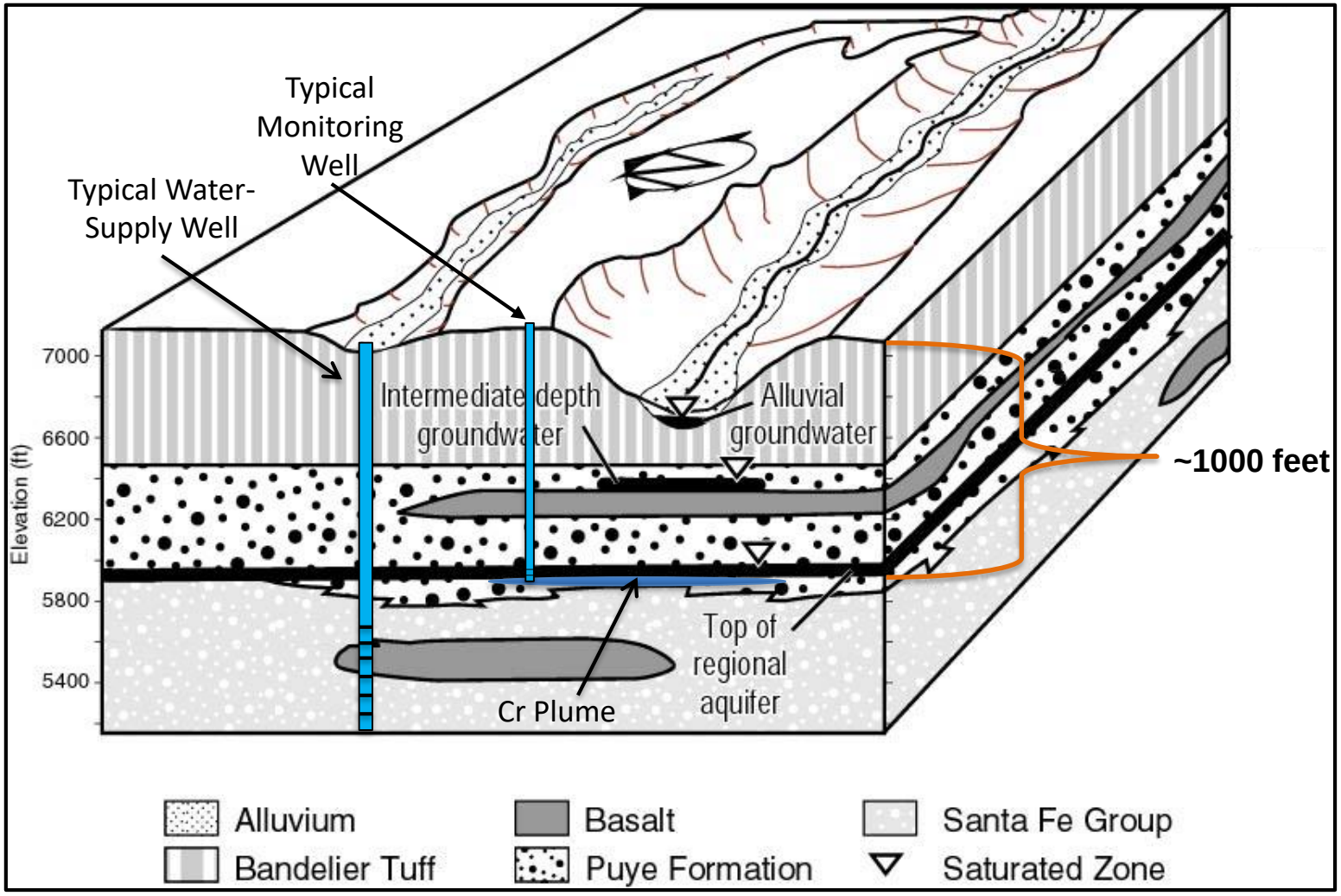
**August 29, 2018**

# Presentation Topics

## Chromium

- Groundwater Setting
- Where did the chromium come from and where is it now?
- What is being done to address the plume?
- Recent changes
- Project status

# Groundwater beneath Los Alamos



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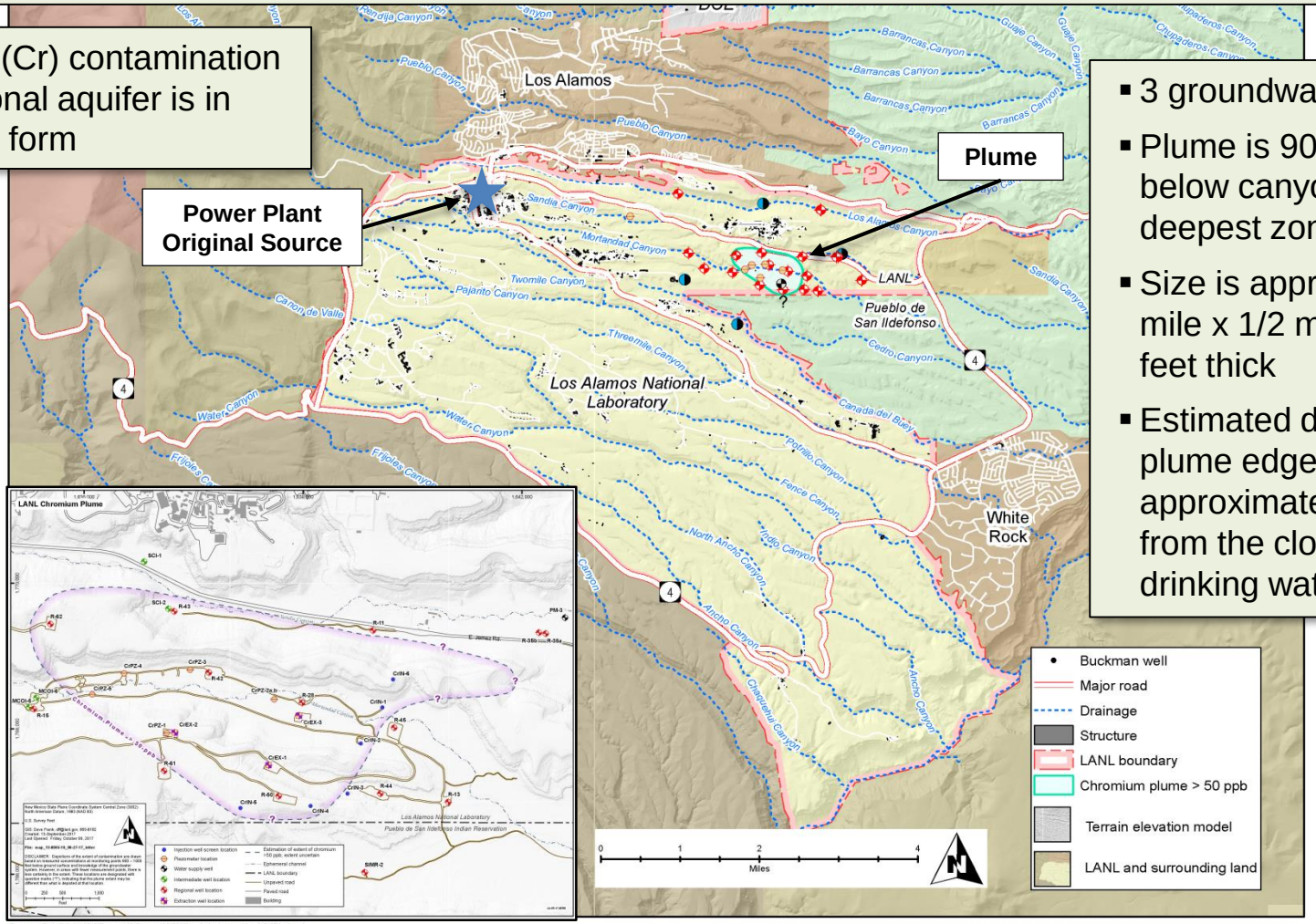
# Chromium in Groundwater Beneath LANL

- 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 zone
- Size is approximately 1 mile x 1/2 mile x <50-75 feet thick
- Estimated downgradient plume edge is approximately 1/4 mile from the closest drinking water well

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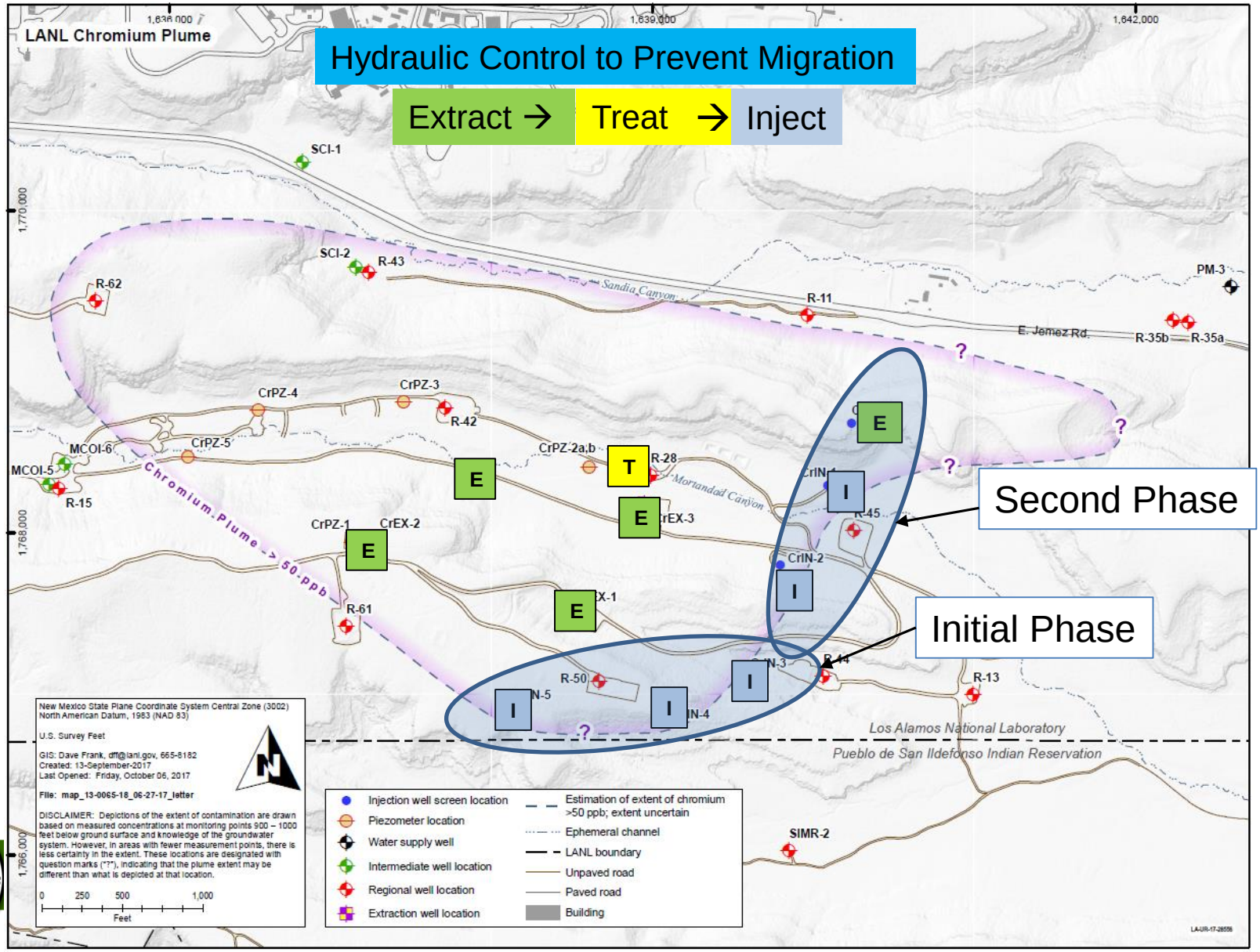
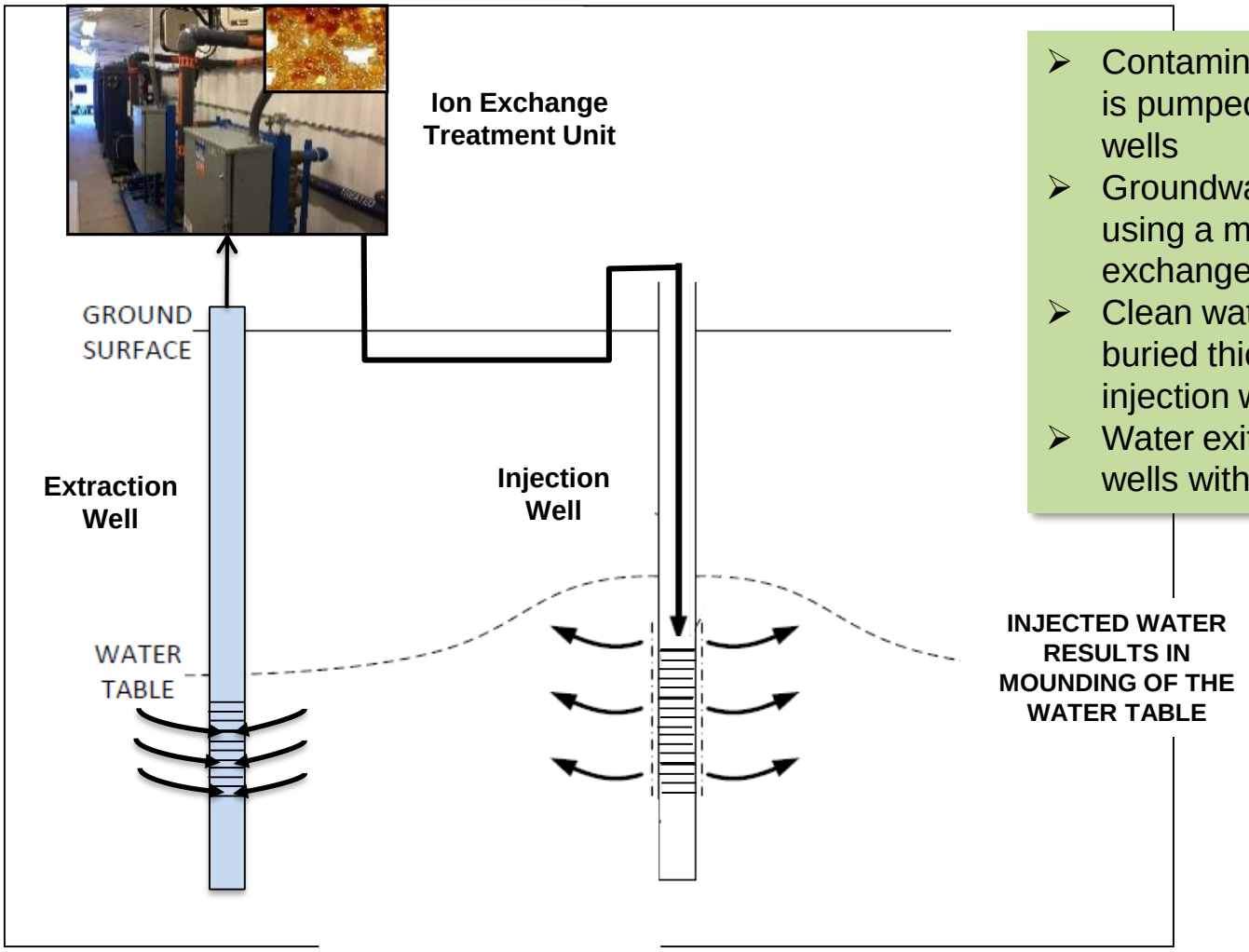
# Interim Measure Technical Approach



# Extraction, Treatment & Injection Loop

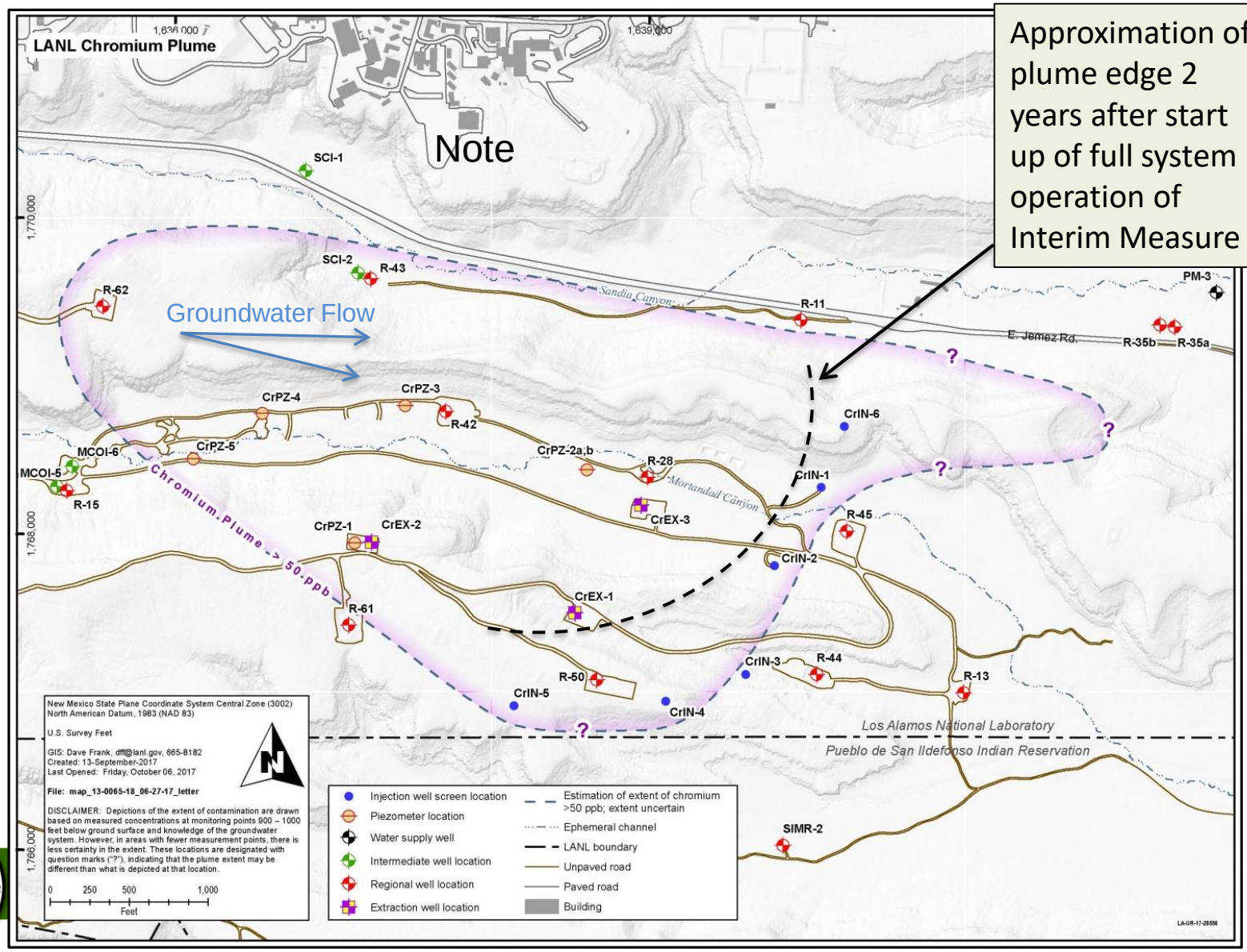


Ion Exchange Treatment Unit




- 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

# Goal of the Interim Measure



# Recent Changes to IM Approach

April 26, 2018 Submittal to NMED - *Evaluation of Chromium Plume Control Interim Measure Operational Alternatives for Injection Well CrIN-6*

Evaluated injection vs. extraction scenarios for CrIN-6

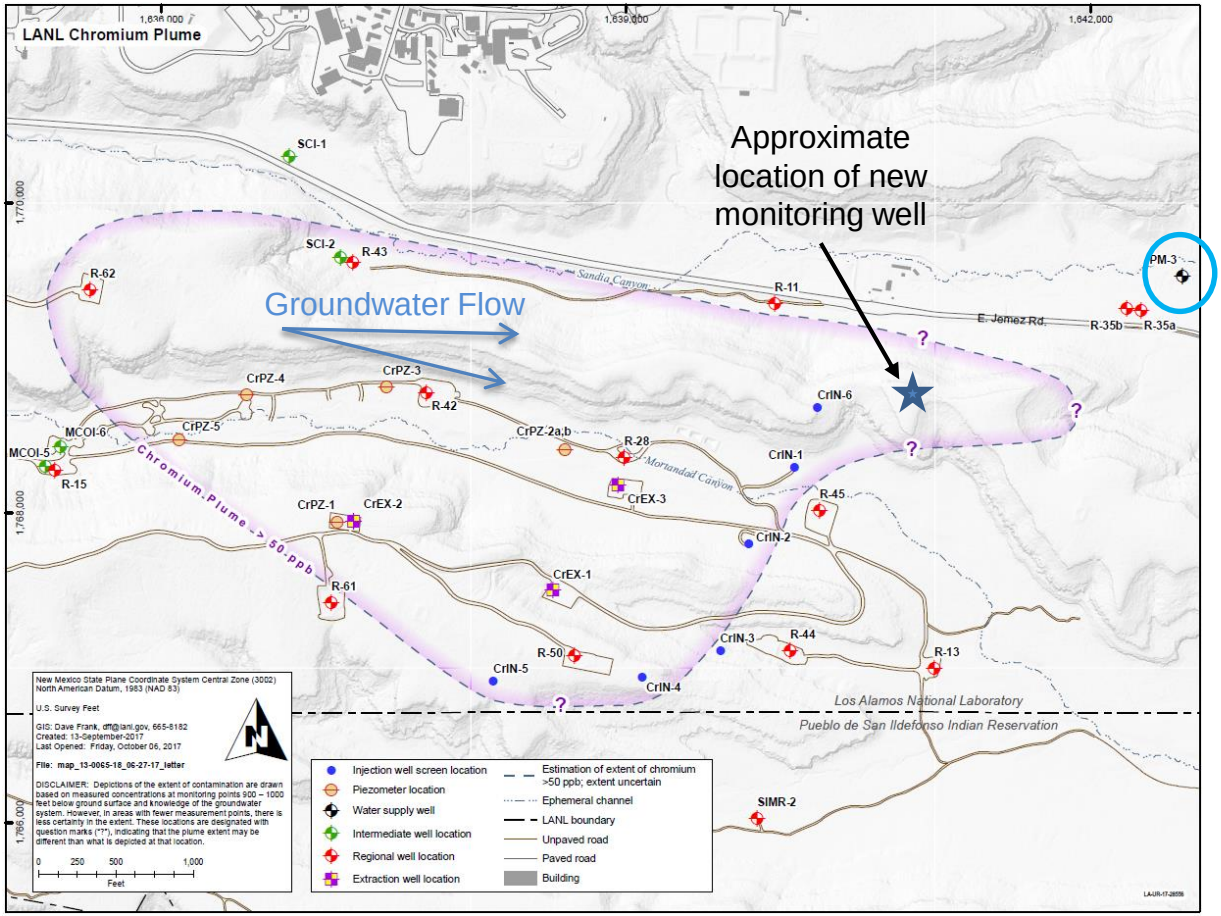
Primary considerations:

- Establish control of plume edge
- Protect PM-3
- Rate of reduction of Cr downgradient (east) of CrIN-6

Conclusion:

- Convert CrIN-6 to extraction well
- Install additional monitoring well

June 6, 2018 NMED Approval to convert CrIN-6 to CrEX-5



# Modeling Results

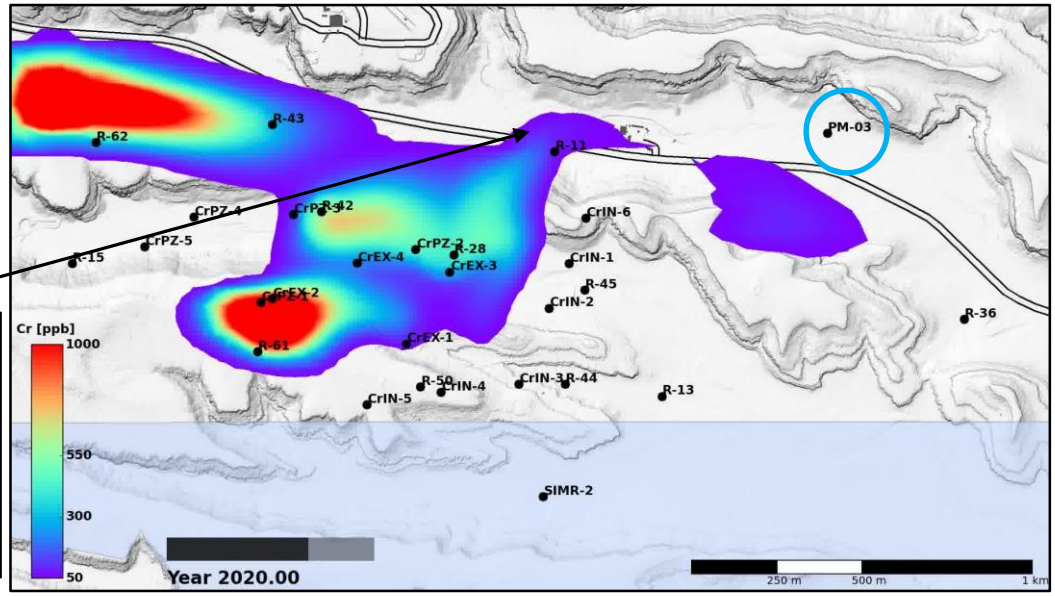
Scenarios evaluated included continuous extraction at CrEX-1, CrEX-2 and CrEX-3, and continuous injection at all injection wells

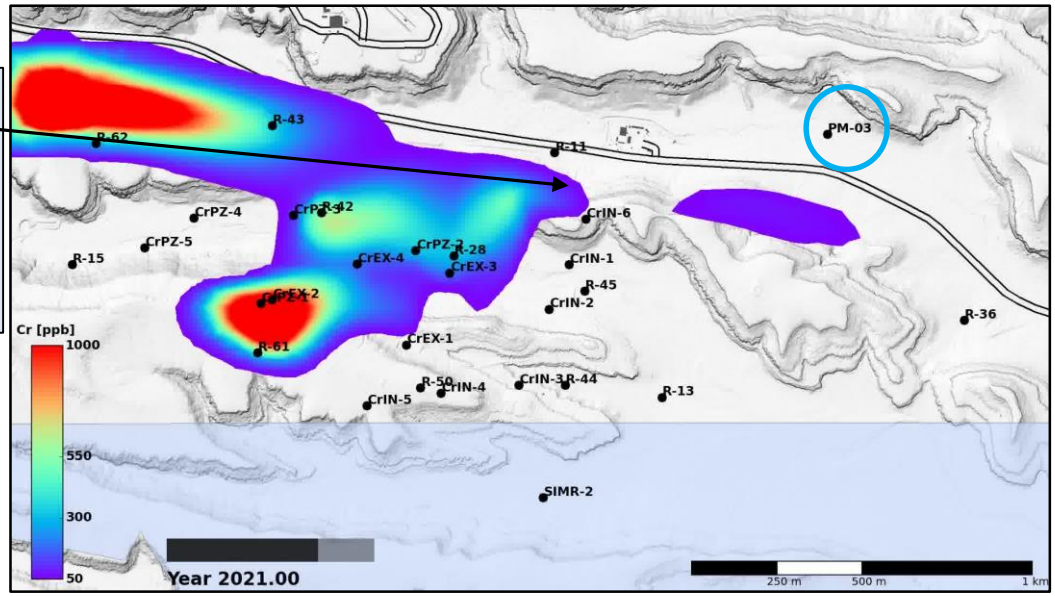
## Injection Scenarios

- "pushes" contamination to the north and possibly towards PM-3

## Extraction Scenarios

- "captures" contamination from the north
- more protective of PM-3



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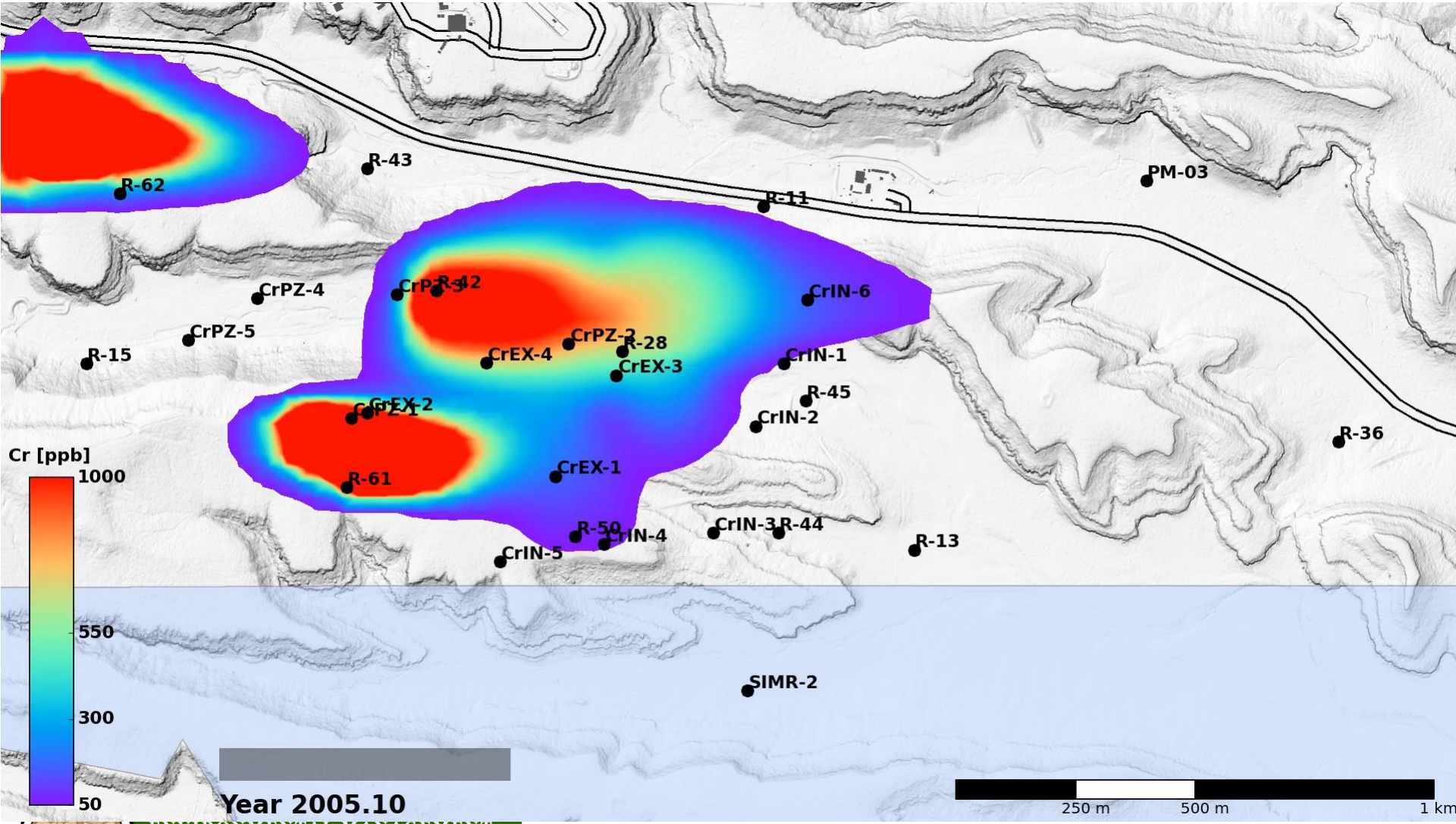
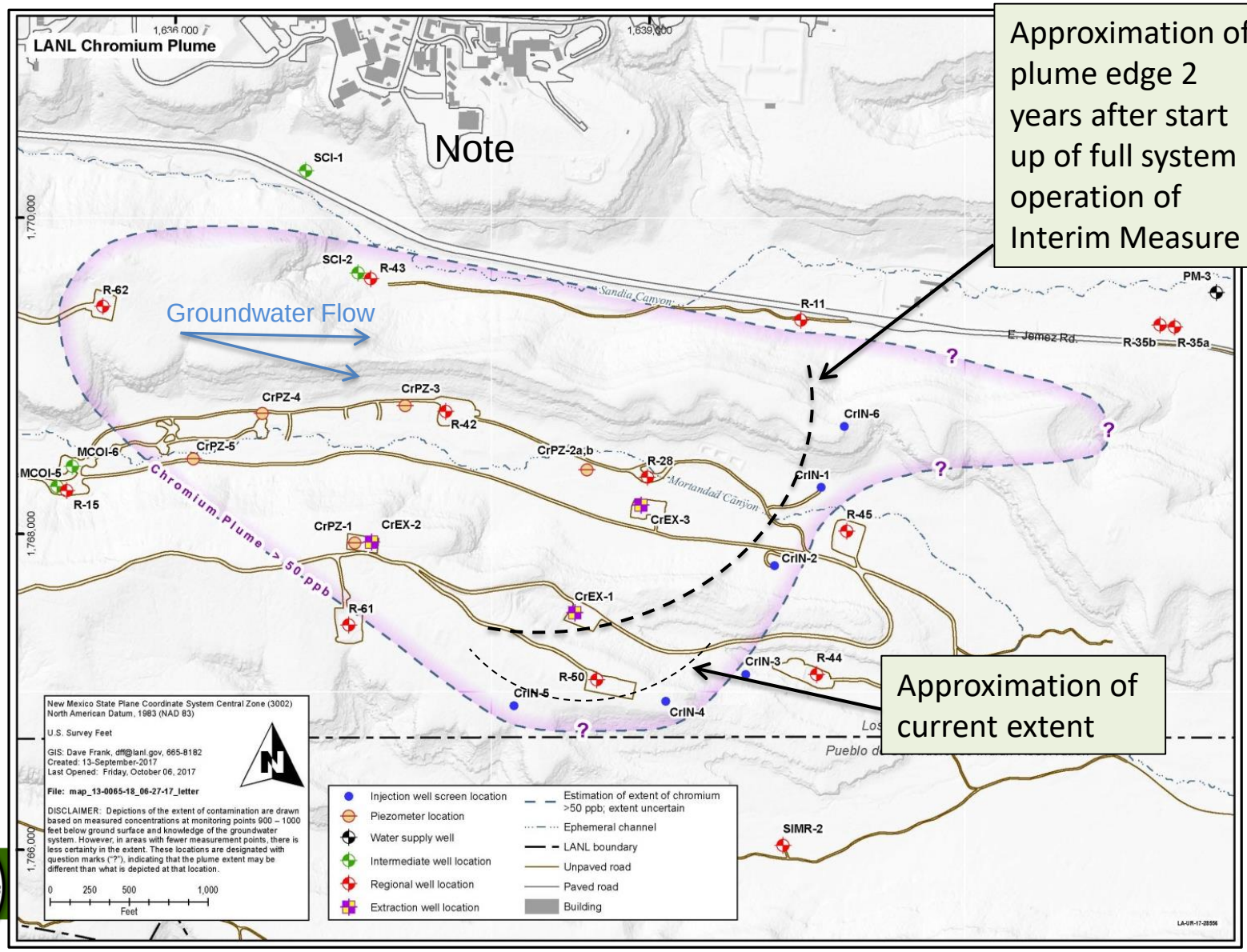
# Groundwater Modeling Animations - Extraction



# Goal of the Interim Measure



# Project Status

- Operated pumping and injection system for ~ 5 months in early 2017
- Full-time operation along Laboratory boundary with Pueblo de San Ildefonso restarted late May 2018 and has run continuously since
- CrIN-6 conversion late Spring 2019
  - Converting CrIN-6 into an extraction well ("CrEX-5")
  - Design/install infrastructure to connect to treatment system
- New monitoring well, R-70 late Spring 2019
- Full system operation expected to start early Summer 2019
- Complete ongoing testing to develop and evaluate final remedy


Questions?