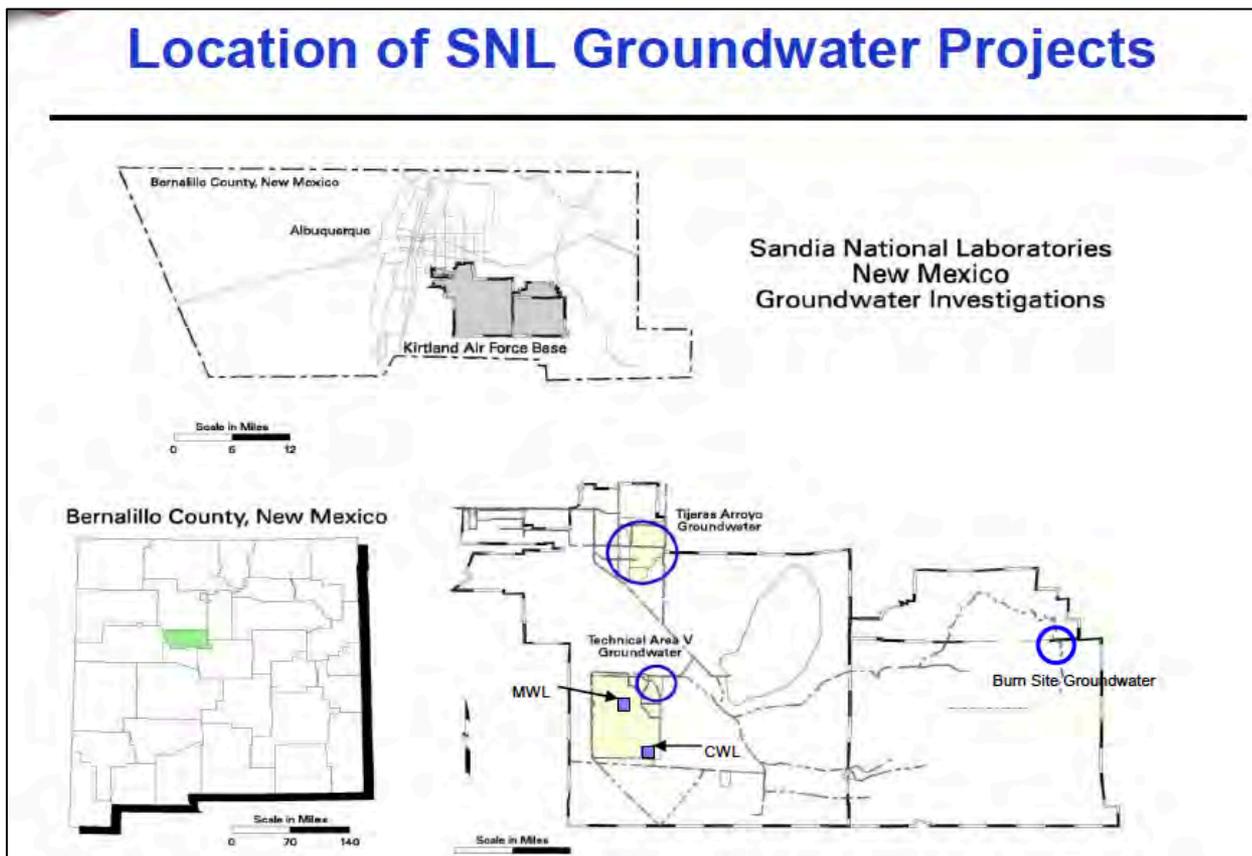


**Groundwater Contamination at Sandia National Laboratories (SNL) Continues
At Tijeras Arroyo, Tech Area-V and Burn Sites
Environmental Restoration (ER) Areas of Concern (AOCs):
Increased transparency and stakeholder involvement needed to accelerate clean-up**

Presentation before
Albuquerque Bernalillo County Water Utility Authority (ABCWUA)
Water Protection Advisory Board (WPAB)
June 10, 2016

By Paul Robinson
Research Director
Southwest Research and
Information Center
PO Box 4524
Albuquerque, NM 87106
sricpaul@earthlink.net



Programmatic Key Points

- SNL's ER Operations successfully investigated & closed 279 of 314 legacy sites through the NMED regulatory process
- The DOE and Sandia Corporation are in compliance with the SNL Compliance Order on Consent as well as Federal and State requirements
- The DOE/EM plans to fully fund SNL's ER Program in FY13
- Restoration of remaining legacy sites is planned for completion by 2020

General Groundwater Conditions at SNL

- Groundwater in two regimes, basin-fill aquifer & bedrock aquifer
- Depths to groundwater is 100 ft (bedrock) to 550 ft (basin fill)
- Perched groundwater system near Tijeras Arroyo (~300 ft deep)
- Natural flow from the mountains to the Rio Grande
- Water-supply wells are located in the northern part of KAFB
- Current GW flow NW toward KAFB & ABCWUA production wells
- Water table falling 1 to 2 ft/yr due to pumping, except for wells in the far north that are currently showing an increase
- Minimal recharge from rain--except in mountains & along channels
- Slow flow rates (few ft/yr to 10's of ft/yr), except on the west side of KAFB (100's ft/yr)



J. Lawrence Barela, *Chair*
Erik K. Webb, *Vice Chair*
Rip Anderson
Michael J. Bitner
John S. Derr

Steve Glass
Tom McHugh
Elizabeth H. Richards
Jennifer Thacher

Water Protection Advisory Board
c/o ABCWUA
P.O. Box 568
Albuquerque, NM 87103

HAND-DELIVERED

August 10, 2012

Chairman Ken Sanchez
City of Albuquerque
P.O. Box 568
Albuquerque, New Mexico 87102

Re: Increased Funding for DOE-NNSA Environmental Restoration Projects

Dear Chairman Sanchez:

Your Water Protection Advisory Board (WPAB) requests that the WUA governing board voice its support of the Department of Energy's National Nuclear Security Administration (DOE-NNSA) proposed increase in funding for environmental restoration projects on the Sandia National Laboratories' (SNL's) property, and include this issue in your federal legislative agenda.

The WPAB was recently presented with some salient concerns from members of the public and an environmental advocacy group, "Our Endangered Aquifer Working Group" (OEAWG), regarding the status and adequacy of funding for the lab's environmental restoration projects. OEAWG members feel that insufficient progress has been made by the DOE towards conformance with a 2004 Compliance Order on Consent being enforced by the New Mexico Environment Department NMED and that contamination from these former operational areas are threats to nearby Water Authority production wells.



NEW MEXICO ENVIRONMENT DEPARTMENT

Hazardous Waste Bureau

SUSANA MARTINEZ Governor

JOHN A. SANCHEZ Lieutenant Governor

2905 Rodeo Park Drive East, Building 1 Santa Fe, New Mexico 87505-6303 Phone (505) 476-6000 Fax (505) 476-6030 www.nmenv.state.nm.us



RYAN FLYNN Cabinet Secretary-Designate

BUTCH TONC... Deputy Sec

TOM BLAINI Director Environmental Hea

Mr. Beausoleil and Mr. Davies December 17, 2013 Page 2

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

December 17, 2013

Geoffrey L. Beausoleil Manager U.S. Department of Energy NNSA / Sandia Site Office P.O. Box 5400, MS 0184 Albuquerque, NM 87185-5400

Peter Davies Director Nuclear Energy & Fuel Cycle Programs Sandia National Laboratories P.O. Box 6200, MS-0771 Albuquerque, NM 87185

RE: TECHNICAL AREA-V GROUNDWATER CORRECTIVE MEASURES EVALUATION REPORT AND CURRENT CONCEPTUAL MODEL, LETTER OF DECEMBER 5, 2013 SANDIA NATIONAL LABORATORIES, EPA ID# NM5890110518 HWB-SNL-05-027

Dear Mr. Beausoleil and Mr. Davies:

The New Mexico Environment Department (NMED) has received the U. S. Department of Energy's letter of December 5, 2013, on behalf of itself and Sandia Corporation (collectively, the Permittees), requesting that the 2005 Technical Area-V (TA-V) Corrective Measures Evaluation (CME) Report be withdrawn, and replaced with an updated CME report and a report on the Current Conceptual Model (CCM), both to be due by November 21, 2014.

There was originally a due date of May 2013 for submitting an updated CME Report, but as explained in your December letter, the Permittees have been coordinating with NMED technical staff on the preparation of the TA-V CME Report and similar reports for the Tijeras Arroyo Groundwater Investigation (TAG) and the Burn Site Groundwater Investigation. It was agreed as also indicated in your letter that the Burn Site CME Report and CCM would be completed first, and the CME reports for TAG and TA-V would be submitted one year later. Furthermore,

as stated in the December 5 letter, the agreement to move forward first on the Burn Site was not formally documented. The December 5 letter corrects this oversight.



The 2005 TA-V CME Report is withdrawn from review as requested. NMED hereby approves your request to submit an updated TA-V CME Report and CCM Report by November 21, 2014.

If you have any questions, please contact Mr. William Moats of my staff at (505) 222-9551.

Sincerely,

John E. Kieling Chief Hazardous Waste Bureau

- cc: D. Cobrain, NMED HWB W. Moats, NMED HWB S. Brandwein, NMED HWB T. Skibitski, NMED DOE OB J. Cochran, SNL/NM, MS0719 J. Weckerle, SFO/FP, MS 0184 L. King, EPA-Region 6 (6PD-N) File: SNL 2013 and Reading

RECENT PUBLIC INVOLVEMENT



An April 27, 2016 Public Meeting on SNL Groundwater Contamination Sites convened by the New Mexico Environment Department at the request of the “The Water Groups” and other civil society organization was attended by more than 50 people.

Almost half of the attendees provided comments and questions to NMED about the contamination from and environmental oversight regarding the SNL Groundwater Contamination Sites.

CONTAMINANTS OF CONCERN – additional information in attached Fact Sheet among other sources

Table 1 - Summary of Groundwater Contamination at TAG and TA-V Environmental Restoration Sites at SNL

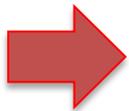
(SNL 2003b p. 9)

Characteristic	Tijeras Arroyo Groundwater (TAG) Site	Technical Area V (TA-V) Site
Nitrate groundwater contamination (EPA MCL = 10 mg/L)	Up to 30 ppm	Up to 25 ppm
TCE groundwater contamination (EPA MCL=5 µg/L=5 ppb)	Up to 10 ppb	Up to 25 ppb
PCE groundwater contamination (EPA MCL=5 µg/L=5 ppb)	None detected	Up to 8 ppb
Other groundwater contaminants	Chlorinated volatile organic compounds (less than 5 ppb)	cis-1,2-DCE 4.5 µg/L; well below EPA MCL of 70 µg/L
Probable source of contamination	Solid-waste management units	Liquid-waste disposal system
Depth to groundwater (ft. below ground surface)	450-475 (regional aquifer) 250-375 (perched aquifer)	+/- 500

Robinson 2011, p. 6, "Groundwater Contamination and Remediation Options at the Technical Area Five (TAV) and the Tijeras Arroyo Groundwater (TAG) Environmental Remediation Sites at Sandia National Laboratories, New Mexico" at <http://www.sric.org/nuclear/docs/2011-07-20%20CARD%20Project%20Sixth%20Draft%20w%20Figs.pdf>

Technical Area V Groundwater

- GW monitored since 1992
- GW occurs ~500 ft deep in unconsolidated sediments
- Contaminated with nitrate & TCE
 - Nitrate: 0 to 14 ppm (std. = 10 ppm)
 - TCE: 0 to 19 ppb (std = 5 ppb)
- Suspected sources include high-volume waste-water disposal systems
- Small plume 4 mi. away from drinking-water supplies
- 16 groundwater monitoring wells sampled four times/yr
- 3 soil-vapor monitoring wells sampled four times/yr
 - low-level detections of TCE in vapor phase
- Corrective Measures Evaluation Report: FY14



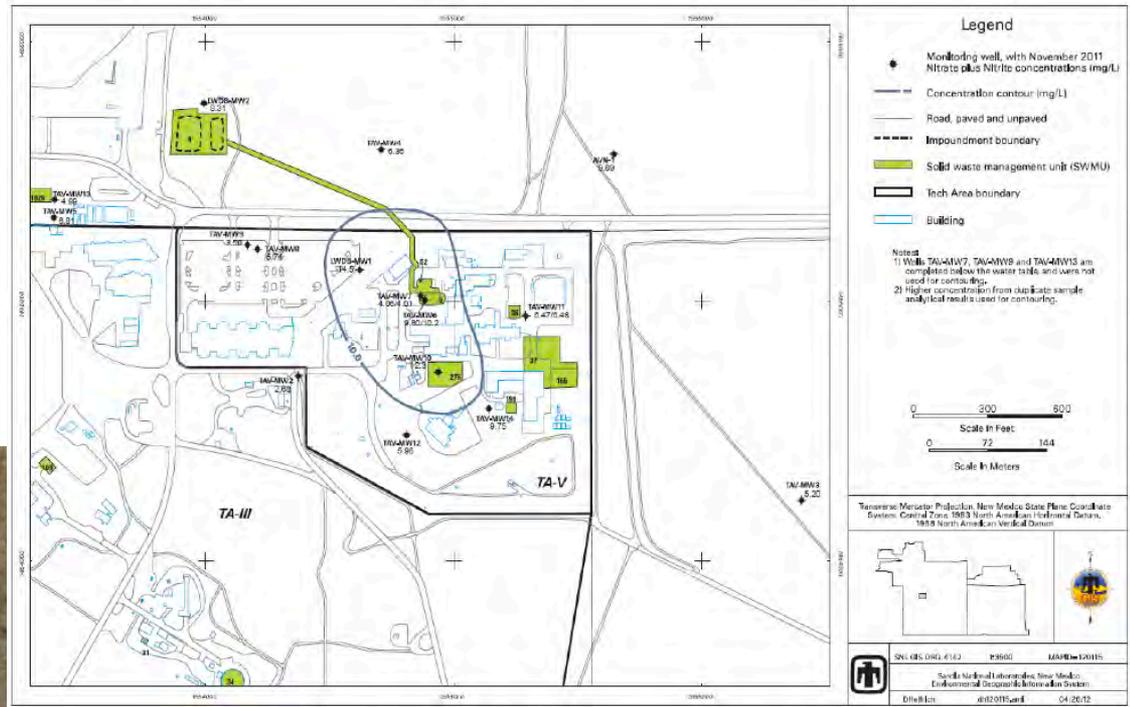
Legacy of NMED Notices of Disapproval regarding Corrective Measures at Tech Area V

As of 2011 – “**Status of the Remediation Process at TAV**”

- SNL is required by the regulations being implemented at the TA-V site to submit and attain approval from NMED-HWB for a Corrective Measure Evaluation Report (“CMER”) prior to selection and implementation of a remedy to the contamination at the site. **During its review of the TA-V CMER issued in July 2005, NMED issued a series of three Notices of Deficiency to SNL. The first NOD was issued in June 2008, the second NOD was issued August 2008 and a third NOD was issued December 2009 following SNL responses to the previous NODs. SNL’s February 2010 response to the third NOD provided the basis for NMED’s May 2010 Conditional Approval of SNL Groundwater Investigation Work Plan. ...**

“Milestones in SNL’s 2011 GWI [Groundwater Investigation] Work Plan Approved by NMED were:

- February 2012 – Completion of eight consecutive quarterly samples for the groundwater and soil vapor monitoring wells;
- May 2013 – Submittal of a revised Corrective Measures Evaluation Report;
- May 2014 – NMED Approval, disapproval or approval with conditions of revised CMER
and make approved CMER available for Public Review’
- December 2014 – NMED selects recommended final remedy; and
- December 2015 – NMED convenes hearing on and selects final remedy.”



SNL 11-2012, Slide 21 of 26

Environmental Oversight of TA-V Groundwater

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- ❑ Regional Groundwater occurs 500 ft. below the ground surface (bgs)
- ❑ Groundwater monitored at 18 Monitoring Wells (MW) since 1993
 - Nitrate: up to 14 ppm (standard 10 ppm)
 - TCE: up to .019 ppm (standard .005 ppm)
- ❑ 3 soil-vapor MWs installed in 2011 with 10 sampling ports from 50 to 500 ft
 - Sampled quarterly with low-level detections of TCE: ND to 2.5 ppmv
 - 31 VOCs detected, max total concentration is 2.813 ppmv including TCE at 350 ft bgs
 - Main contributor is TCE with highest concentrations at 350 to 500 ft bgs ports
 - Significant mass transfer not expected
- ❑ Groundwater monitored quarterly
- ❑ Revised Treatability Study Work Plan for in-situ bio remediation of GW
 - Submitted to NMED on March 28, 2016 and under review
 - Draft Notice of Intent for Discharge Permit submitted to GWQB
- ❑ Two additional MWs proposed to define Southern Extent of the GW Plume
- ➔ Current Conceptual Model (CCM) and Corrective Measures Evaluation (CME) Report due May 20, 2022



Slide 30 of 59, "NMED Groundwater Investigations Sites at SNL" – Presentation, April 27, 2016 (NMED4-2016)
At https://www.env.nm.gov/DOE_Oversight/documents/2016NMEDTijerasArroyoGroundwaterPublicMeeting.pdf

The Regulatory Deadline for Tech Area-V Corrective Measures Evaluation Report has slipped 8 years since 2012

Burn Site Groundwater

- GW monitored since 1996
- GW occurs at ~100 to 200 ft deep in fractured bedrock
- Currently monitoring 10 wells
- Nitrates (6 wells) and perchlorate (1 well)
 - Nitrate: 0 to 37 ppm (std. = 10 ppm)
 - Perchlorate: 0 to 9 ppb (no std. established)
- Small plume 9 mi. away from drinking-water supplies
- Tentative source—suspected wide-spread non-point source from use of high explosives, with a possible contribution from natural nitrate sources
- Corrective Measures Evaluation Report: FY13



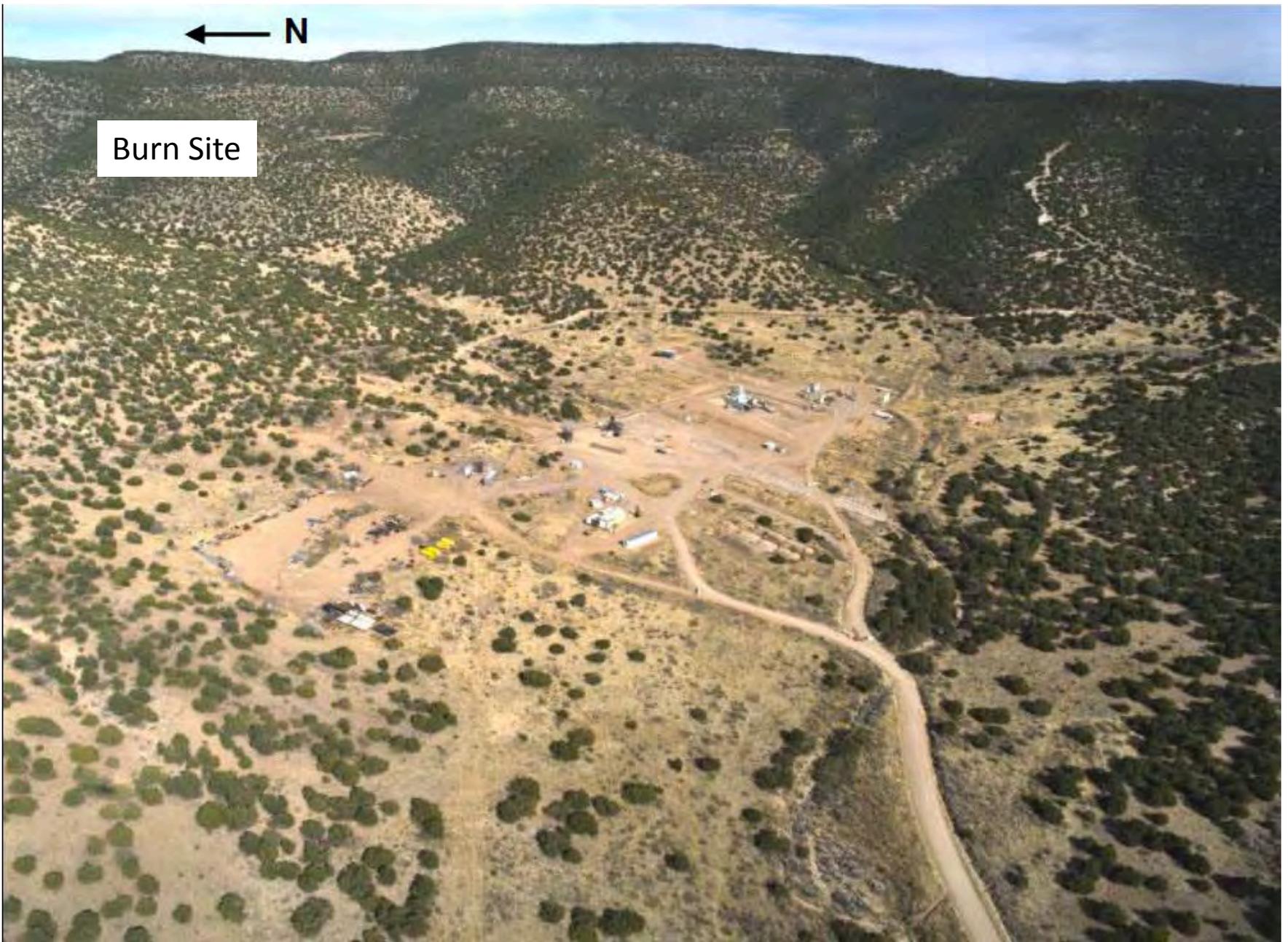




Figure 1-2. Location of wells, piezometers, and springs at and near the Burn Site.

Environmental Oversight of Burn Site GW

24

- ❑ GW occurs ~100 to 325 ft. below ground surface in fractured and faulted bedrock
- ❑ GW contains nitrate, up to 42 ppm (standard is 10 ppm)
- ❑ Perchlorate detected in only one MW at below action levels
 - Detections range from .006-.009 ppm (action level .015 ppm adopted 2015)
 - Detected regularly since 2004
- ❑ GW is monitored semi-annually in 12 MW
- ❑ Aquifer Pump Test Work Plan will be submitted by June 8, 2016
- ❑ Additional Monitor Well Installation Plan to NMED in 2017
- ➔ Updated Current Conceptual Model (CCM) and Corrective Measure Evaluation Report to NMED by October 14, 2020



NMED 4-2016, p. 24 of 59

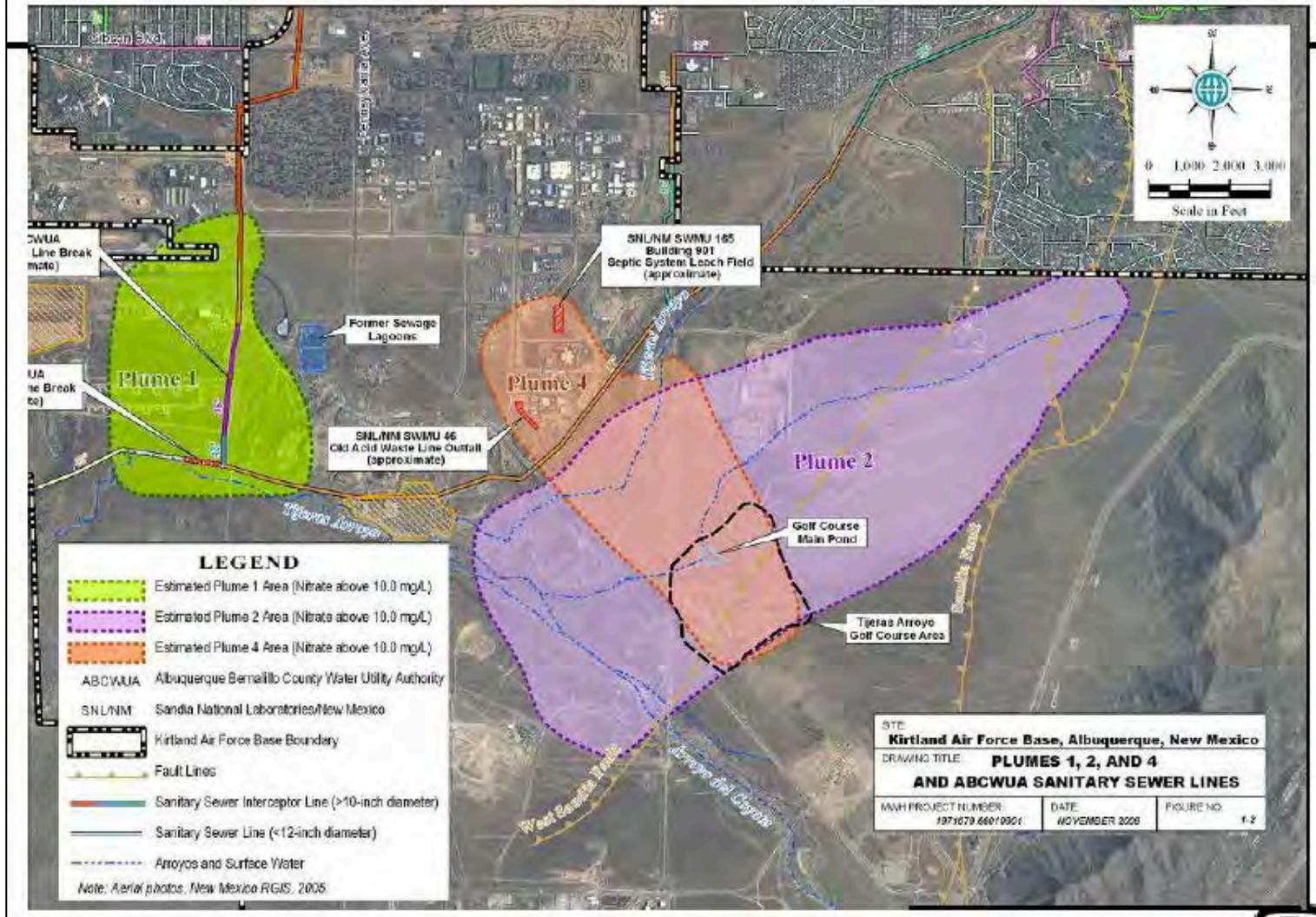
The Regulatory Deadline for the Burn Site Corrective Measures Evaluation Report has slipped 8 years since 2012

Tijeras Arroyo Groundwater

- GW monitored since 1992
- GW occurs at ~300 ft in a perched aquifer & 500 ft in the regional aquifer in unconsolidated sediments
- Large area--covers forty mi², DOE/SNL responsible for less than 2 mi² of the total & limited to the perched aquifer (no production wells in perched system)
- Contaminated with nitrate (5 wells) & TCE (1 well)
 - Nitrate: 0 to 33 ppm (std. = 10 ppm)
 - TCE: 0 to 9 ppb (std. = 5 ppb)
- Suspected sources include former & active waste-water systems owned or operated by DOE/SNL, KAFB and ABCWUA

→ Corrective Measures Evaluation Report: FY14

Boundary of Nitrate Plume 4 in Perched Aquifer (orange), Tijeras Arroyo GW above 10 ppm



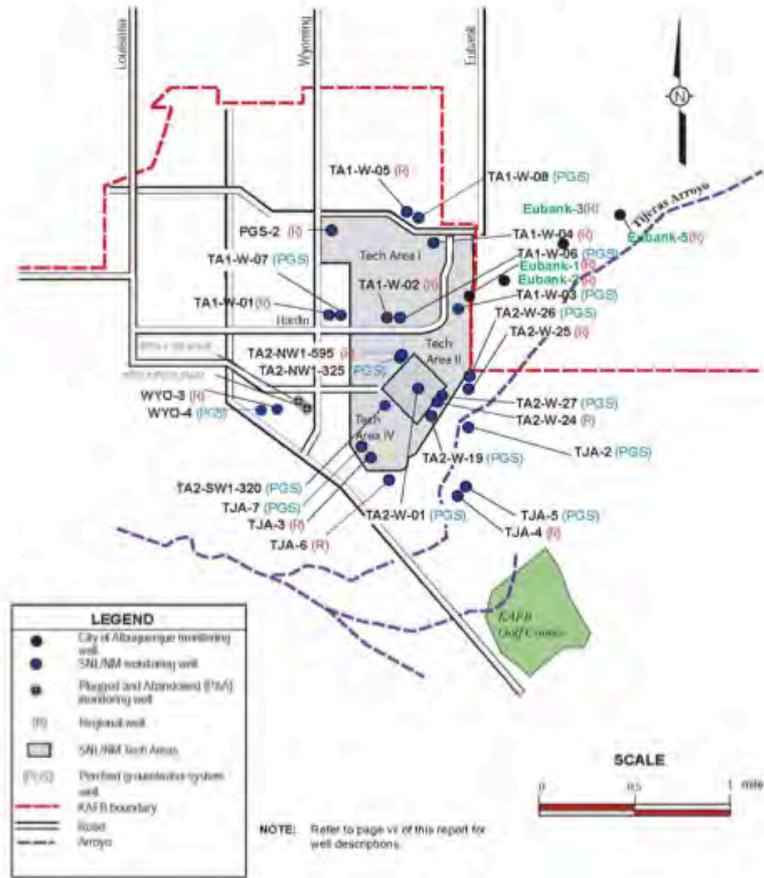


Figure 6-2. Tijeras Arroyo Groundwater (TAG) Investigation Monitoring Well Locations (30 Active Wells)

Legacy of NMED Notices of Disapproval regarding Corrective Measures at Tijeras Arroyo Groundwater Contamination Site

[2011] “Status of the Remediation Process at TAG – SNL is required by the regulations being implemented at the TAG site to submit and attain approval from NMED-HWB or a Corrective Measure Evaluation Report (“CMER”) prior to selection and implementation of a remedy to the contamination at the site. [In 2011], NMED [was] reviewing the August 2005 CMER for the TAG site following approval of the Groundwater Investigation Report (GIR) for the site in February 2010. NMED-HWB staff have indicated that they will begin review of the 2005 CMER following the Agency’s acceptance of SNL responses to two Notices of Disapproval it issued for the GIR. The GIR was submitted to NMED-HWB by SNL in November 2005. The two Notices of Disapproval were provided to SNL on August 1, 2008 and August 12, 2009. The SNL response to the first NOD in February 2009 was the focus of the second NOD issued in August 2009. The SNL’s January 19, 2010 Response to the second NOD provided the basis for NMED’s February 22, 2010 approval of the TAG GIR. In that letter notifying SNL of the NMED approval of the January 19, 2010 SNL response to second TAG NOD, NMED notified SNL of its intent to begin review of the August 2005 TAG CMER.

“NMED-HWB’s February 2010 GIR approval letter does not address the need for, or opportunity to prepare, a consolidated update the August 2005 CMER including all post-2005 groundwater information or remedial technology developments.”

Environmental Oversight of Tijeras Arroyo GW

- Approximately 40 sq mi in the north central portion of KAFB
- SNL and KAFB both have areas of responsibility
- A perched aquifer and the regional aquifer are both present
- Groundwater investigation and monitoring started in 1992
- Current monitoring well network:
 - Water level measurements in 30 MWs
 - Groundwater quality analysis in 21 MWs
- Multiple sources of contamination
 - Including former sewage lagoons, wastewater outfalls, septic systems, landfills, sewer lines and a golf course
- Two constituents of concern:
 - Nitrate
 - TCE



Environmental Monitoring and Reporting

39

- Annual GW monitor report submitted in June.
- ➔ Updated Current Conceptual Model and Corrective Measures Evaluation will be submitted to NMED by December 2, 2016
- Quarterly groundwater monitoring, sampling and analysis to continue

The Deadline for the Tijeras Arroyo GW Site Corrective Measures Evaluation Report has slipped 3 years since 2012

Slide 39 of 56, NMED 4-2016



Findings:

Neither NMED nor the Permittee DOE-SNL has posted any recent documents generated as a result of regulatory requirements or environmental oversight related to three Areas of Concern without Corrective Action Completed where groundwater contamination exceeds maximum contaminant levels – TAG, TA-V and the Burn Site.

Therefore, no members of public, (or WUA staff, to the authors knowledge) have had an opportunity to review and comment on the regulatory orders setting deadlines for the SNL GW Contamination Sites where Environmental Oversight action have been deferred 3 – 8 years beyond deadline in place or planned in 2012.

Recommendations:

ABCWUA and WPAB actively seek opportunities to review and comment on the environmental oversight records for SNL for the three groundwater contamination sites as soon as possible.

ABCWUA and WPAB seek prompt posting of all documents associated with the three groundwater contamination sites.

ABCWUA and WPAB request opportunities for review of ABCWUA and WPAB, and Public comments on the environmental oversight records for the three sites with NMED.

ABCWUA and WPAB request opportunity to comment on draft environmental oversight reports currently required of SNL-DOE in a timely manner prior to acceptance of the draft reports as final.

ABCWUA and WPAB seek opportunity for Public Hearings on Corrective Measure Evaluation Report for TAG due in December 2016 and other CMERs when completed.

ABCWUA and WPAB recommend that opportunities to review and comment on SNL documents prior to their acceptance as complete be provided by NMED to the Public and Staff.