

New Mexico Bureau of Geology and Mineral Resources

A research and service division of New Mexico Tech

Dr. J. Michael Timmons

Director and State Geologist



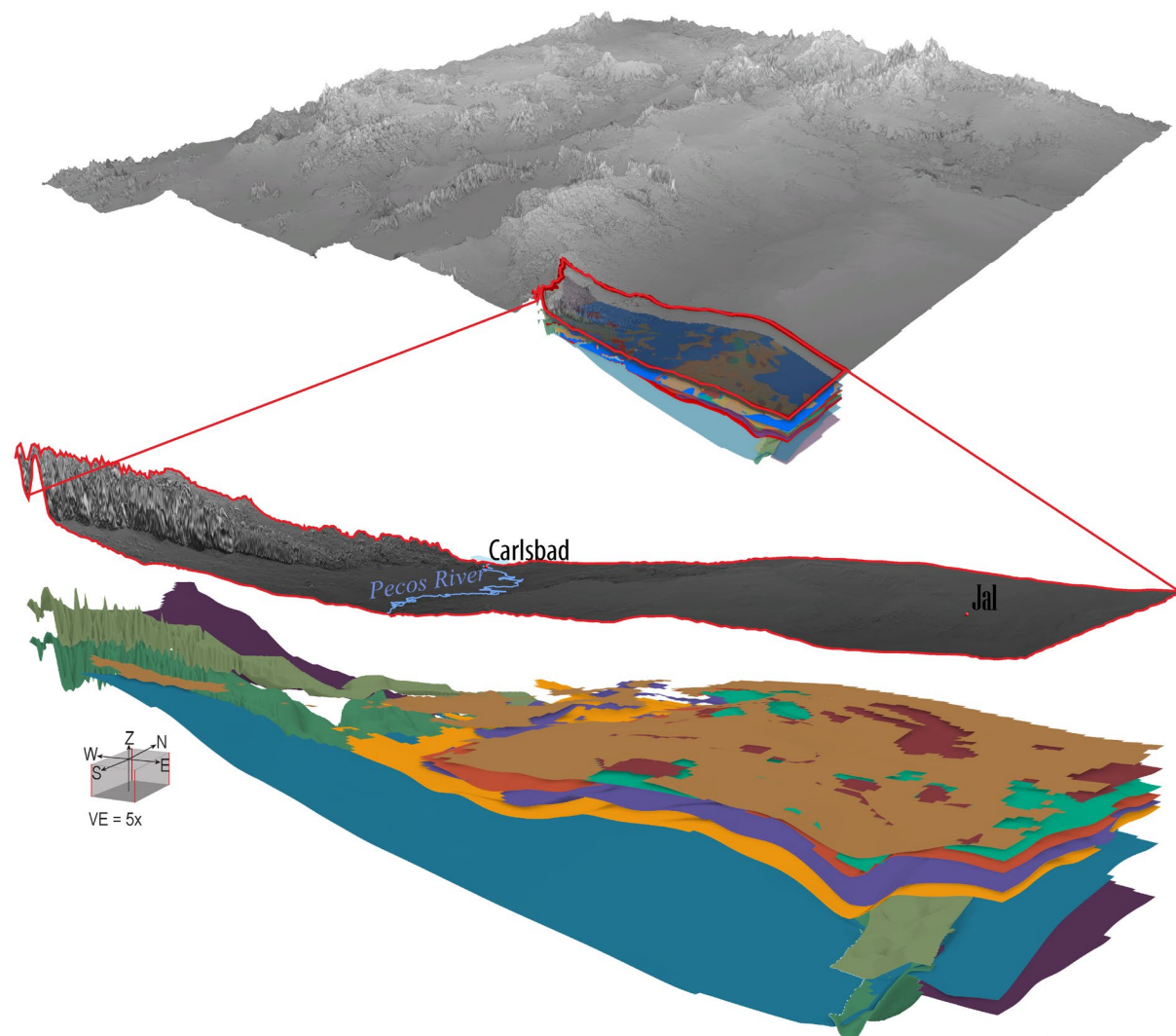
About the New Mexico Bureau of Geology

- As a non-regulatory governmental agency (the state's geological survey), we conduct scientific investigations that lead to responsible economic development of the state's mineral, water, and energy resources.
- We currently have 96 staff members. We also mentor and employ students, and in FY25, we hired 58 full- and part-time undergraduate and graduate students.
- **Conduct research** and interact with state/federal agencies and industry to facilitate the responsible development of the state's energy, mineral, and water resources.
- **Distribute accurate information** to the New Mexico public.
- **Create accurate, up-to-date maps** of the state's geology and resources.
- **Provide timely information on potential geologic hazards**, including earthquakes, volcanic events, soil- and subsidence-related problems, and flooding.
- **Act as a repository of geological data**, including cores, well cuttings, and geophysical logs. Provide convenient physical and online access to these resources for New Mexicans.
- **Provide public education and outreach** through publications, our Mineral Museum, college teaching and advising, and teacher and student training programs.



Programs at the New Mexico Bureau of Geology

- **Geologic mapping and hazards**
 - STATEMAP program
 - Earthquakes, volcanic activity, landslides, and other hazards
- **Hydrogeology**
 - Aquifer Mapping Program
 - New Mexico Water Data Act
 - Water Leaders Education
- **Energy resources**
 - Oil and gas
 - Geothermal
 - Uranium



Programs at the New Mexico Bureau of Geology

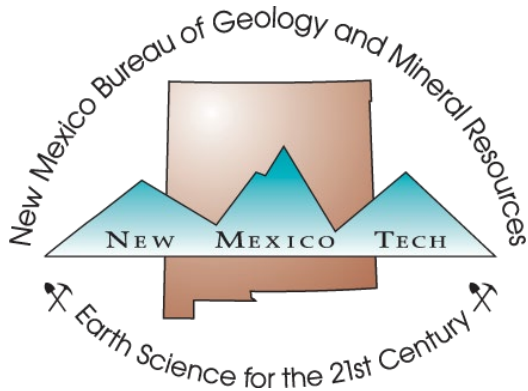
- **Mineral resources**
 - Critical and strategic minerals
 - Metals
 - Industrial minerals
- **Analytical laboratories**
 - Chemistry/water quality
 - Electron microprobe
 - Geochronology
 - X-ray diffraction
- **Outreach and education**
 - Mineral Museum
 - Publications
 - Teacher and student training
 - Archives and collections



New Mexico's Progress on Aquifer Mapping and Monitoring

Stacy Timmons

Associate Director, Hydrogeology Programs
NM Bureau of Geology and Mineral Resources



Aquifer Mapping and Monitoring Program

What We Do

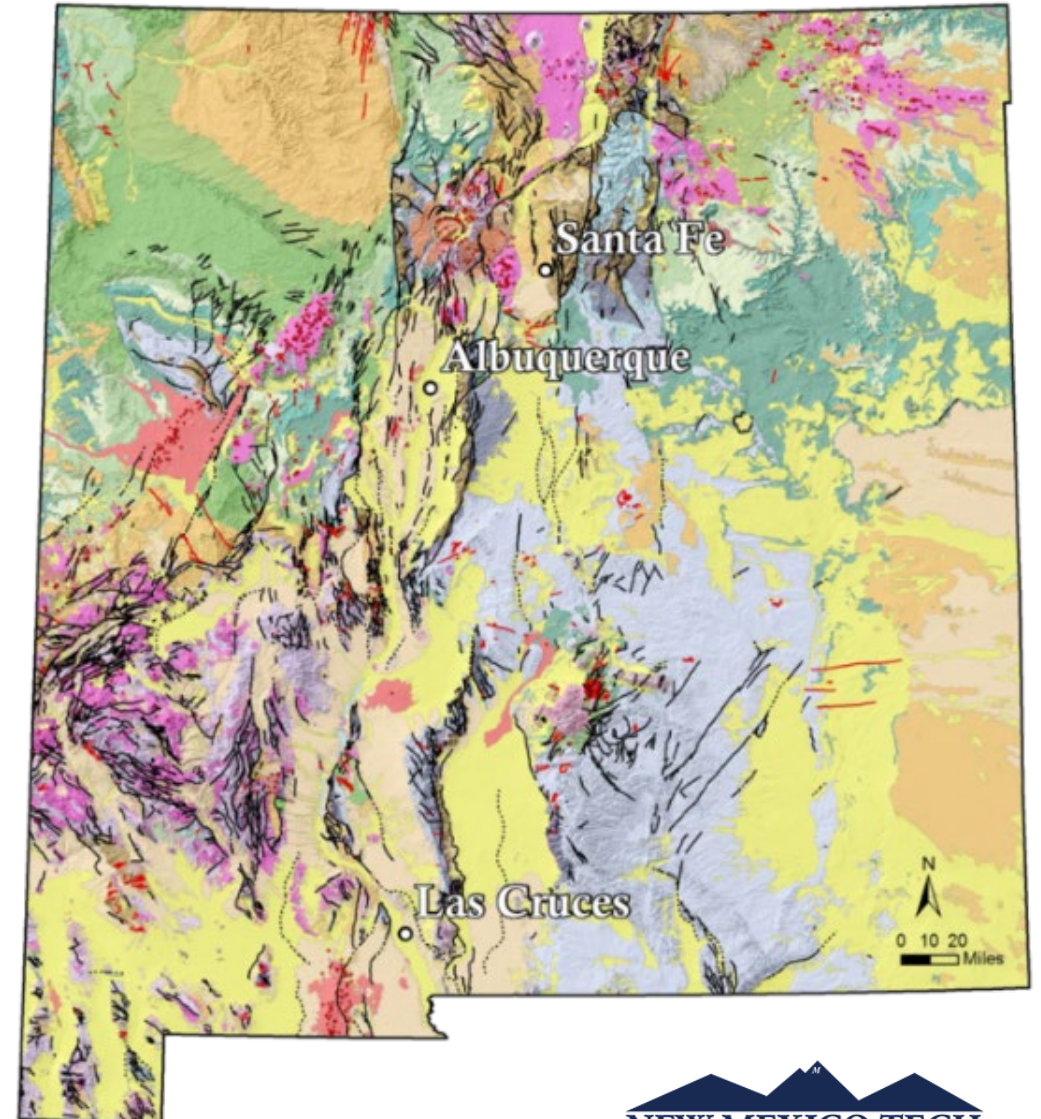
- We analyze the quantity, quality, and distribution of groundwater within aquifers by integrating geological, geophysical, hydrological, and chemical data
- Our work is for New Mexicans and our data becomes public
- It supports communities, agencies, policymakers, and managers in making informed, science-driven decisions on water resources
- We work with funding and support from state, federal, local and philanthropic sources



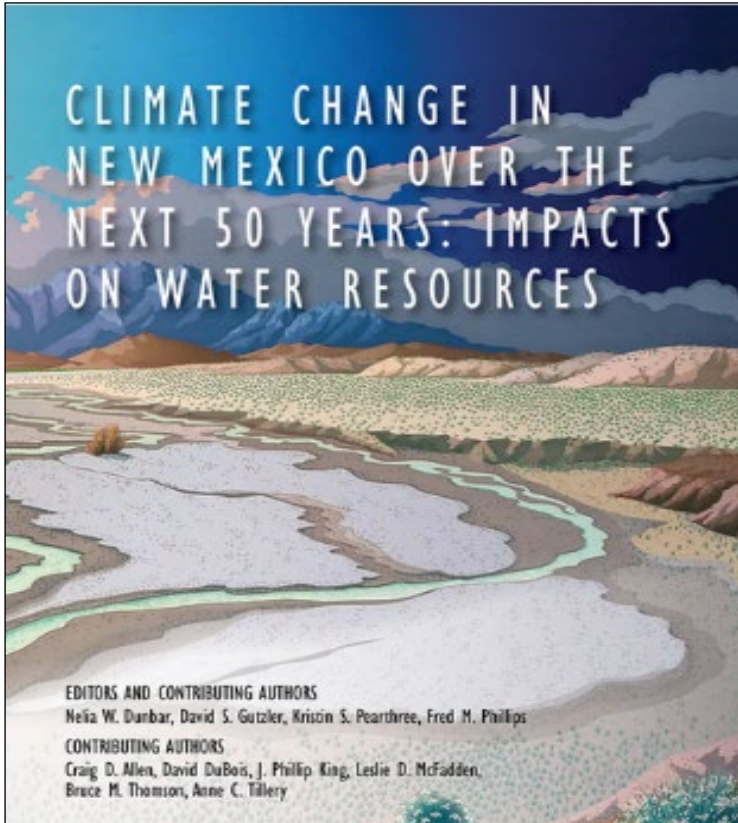
All together, our team currently has over 250 years of experience!

Aquifer Mapping and Monitoring Program

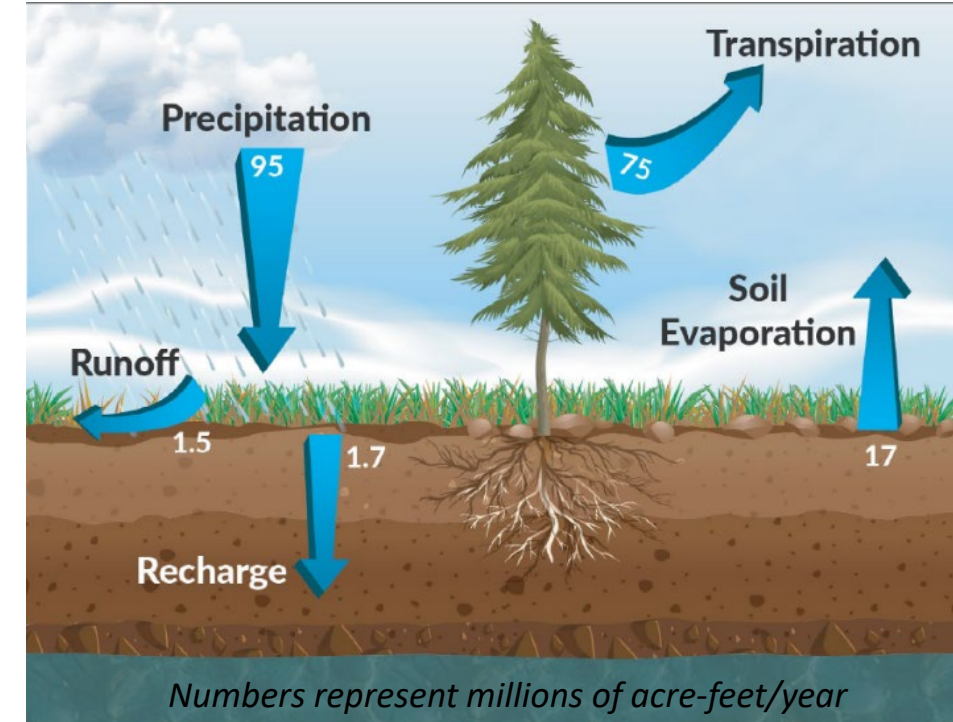
- New Mexico's geology is complex, and so are the aquifers
- Many aquifers and regions have not been fully characterized, which makes planning and water management more challenging
- We are the only non-regulatory state agency engaged in this specialized, multidisciplinary water science and research



Water in New Mexico is becoming increasingly scarce



- Average temperatures warming 5-7°F over next 50 years
- Increasing aridity
- 25-30% reduction in surface water
- Increasing demand on groundwater
- Increasing wildfire
- Increasing sedimentation
- Degraded water quality
- And more...



<https://geoinfo.nmt.edu/ClimatePanel/report/home.html>

NEW WORK:

NM Bureau of Geology in the 50-Year Water Action Plan



1. Identify and characterize major and minor aquifers within the state, including fresh and brackish sources by 2032

- Develop comprehensive subsurface datasets and model layers to support groundwater management and planning efforts
- Produce accurate estimates of aquifer boundaries, water quality, and production potential for fresh and brackish aquifers
- Create online visual tools to provide accessible aquifer visualizations

2. Establish a statewide groundwater-monitoring network with 100 dedicated wells by 2037

- Regional and statewide dashboards to effectively monitor groundwater levels

50-YEAR WATER ACTION PLAN

Office of the Governor
MICHELLE LUJAN GRISHAM

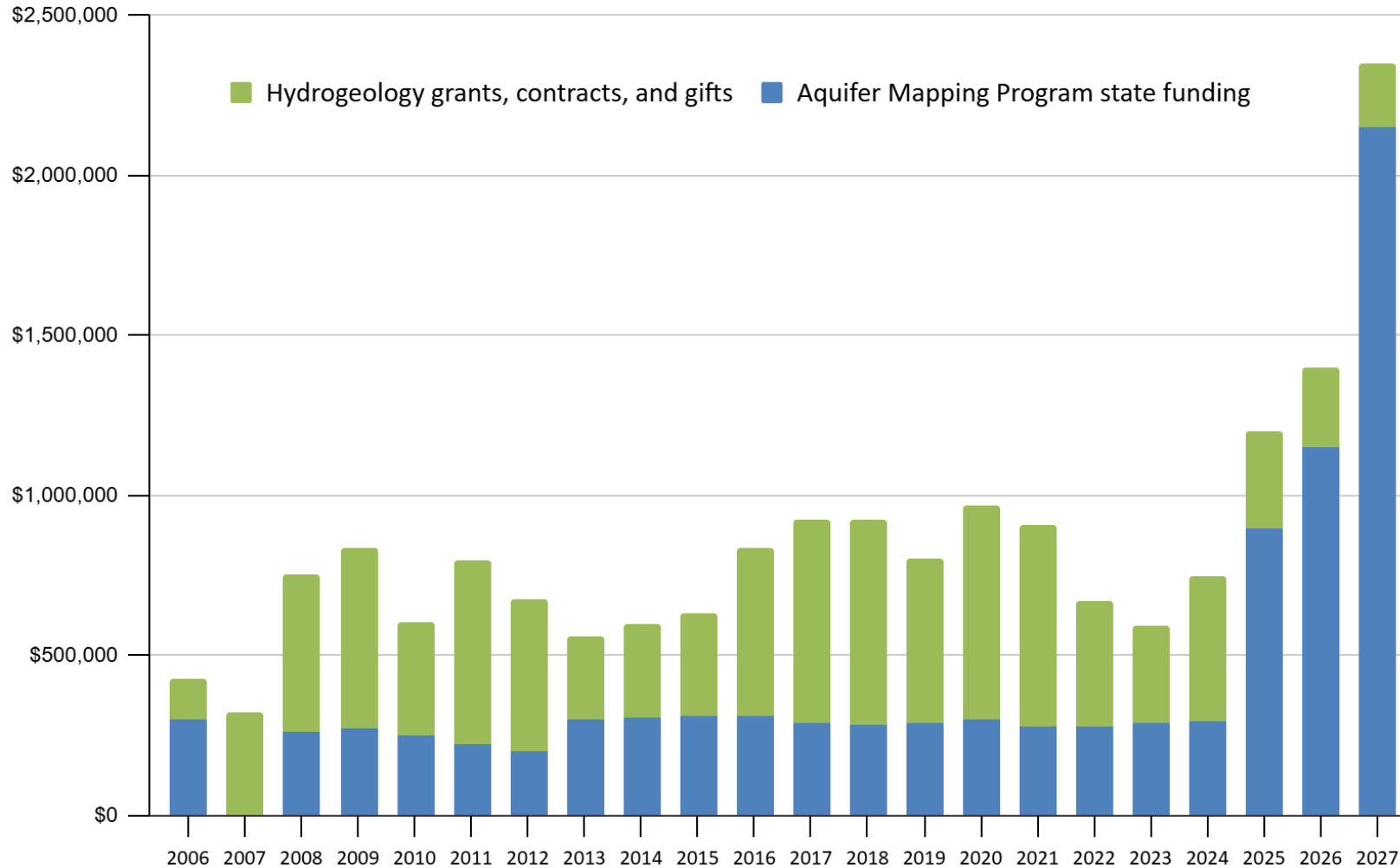
WHAT WE ARE DOING TO INCREASE WATER SECURITY:
50-Year Water Action Plan.
The Water Plan actions will help address the reality of a reduced supply in the future.

Category	Action
Water Conservation EST. IMPACT: 660,000 AF PER YEAR	A1 Develop a public education campaign
	A2 Incentivise agricultural water conservation
	A3 Reduce leaks in drinking water infrastructure and increase municipal conservation
	A4 Improve water storage and delivery systems
New Water Supplies EST. IMPACT: 150,000 AF PER YEAR	B1 Establish a \$500M strategic water supply to spur investments in desalination and wastewater treatment
	B2 Adopt policies to expand potable and nonpotable water reuse
	B3 Improve groundwater mapping and monitoring
Water and Watershed Protection	C1 Cleanup contaminated groundwater sites
	C2 Protect surface water by controlling pollution through a discharge permitting program
	C3 Modernize wastewater treatment plants and stormwater infrastructure
	C4 Protect and restore watersheds

3

<https://www.nm.gov/wp-content/uploads/2024/01/New-Mexico-50-Year-WaterAction-Plan.pdf>

Launching into a new paradigm for data collection



Non-recurring state funding

- FY2026: \$7.5M
- FY2027-28: \$20M

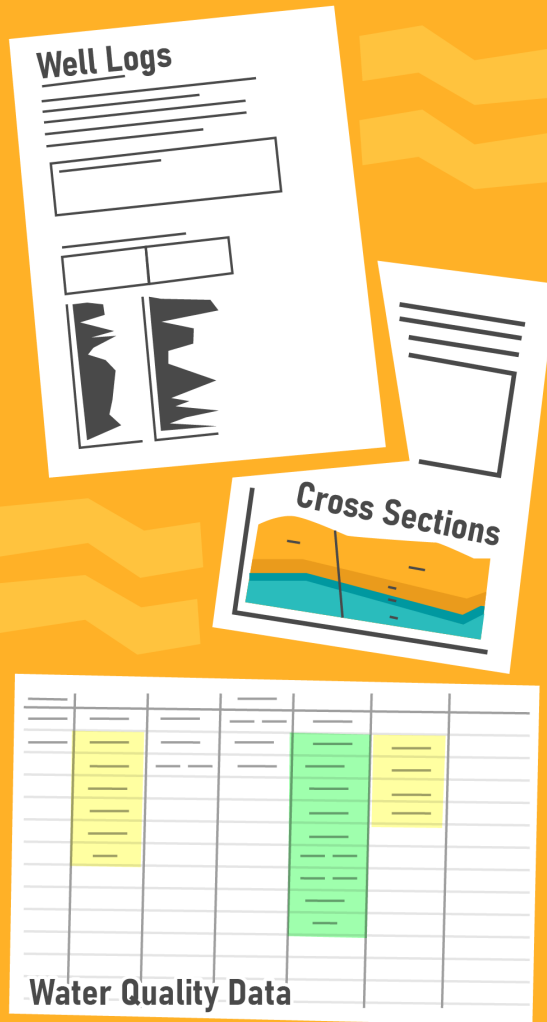
Growth in staff with 8 FTEs in 2025

Contractor support for new data collection, interpretation, model development, and drilling

Step 1

Collect Existing Data

Collection of surveys, well logs, cross sections, water quality data, and models



Step 2

Collect New Data

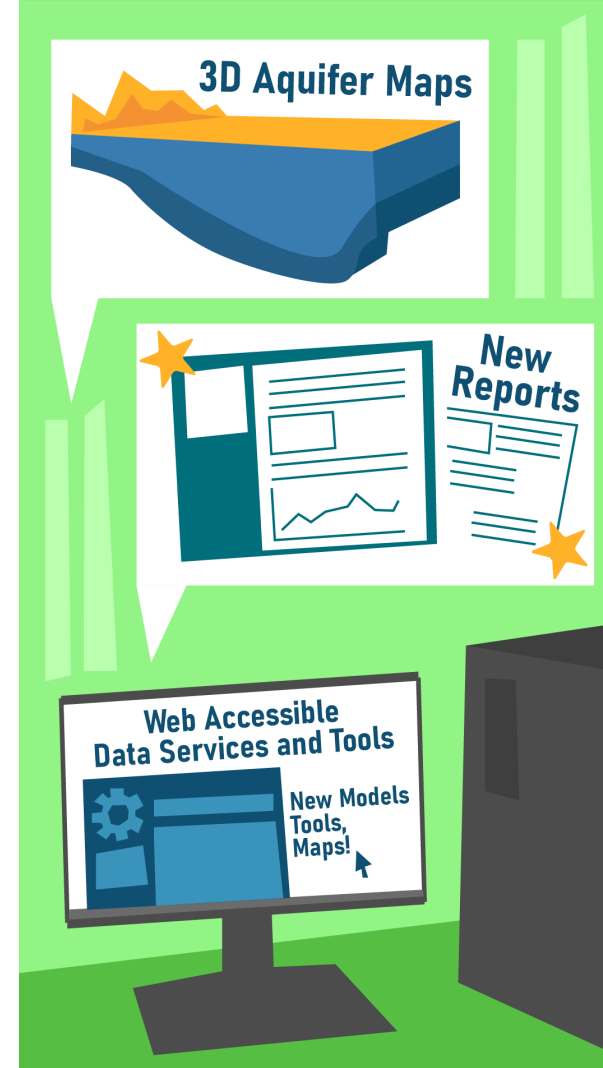
Conducting AEM surveys, drilling wells, groundwater level measurements



Step 3

Build New Aquifer Maps!

Building new models with new and old data, short reports, data services



Geophysics for groundwater resources: Airborne Electromagnetic Surveys (AEM)

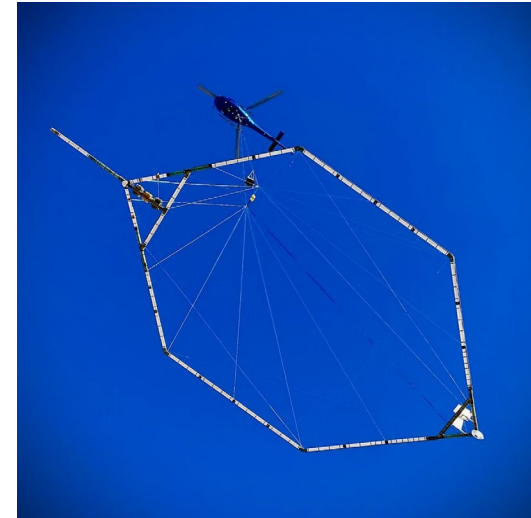
AEM surveys help to identify fresh & brackish groundwater

- Facilitate mapping of aquifers & locate sites for new monitoring wells
- Enable coverage of extensive areas without disturbing the ground
- Depth of investigation: ~1500 ft (*depending on equipment & local conditions*)

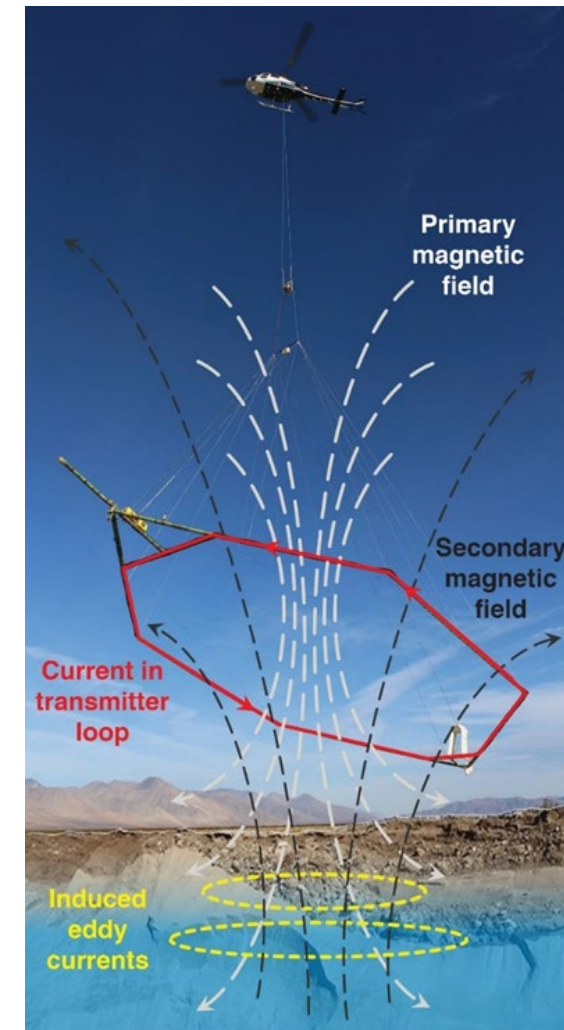
Ongoing evaluation of technologies tailored for New Mexico basins

- FY2026: assess tools, teams, and optimize survey coverage

SkyTEM in flight



VTEM in flight



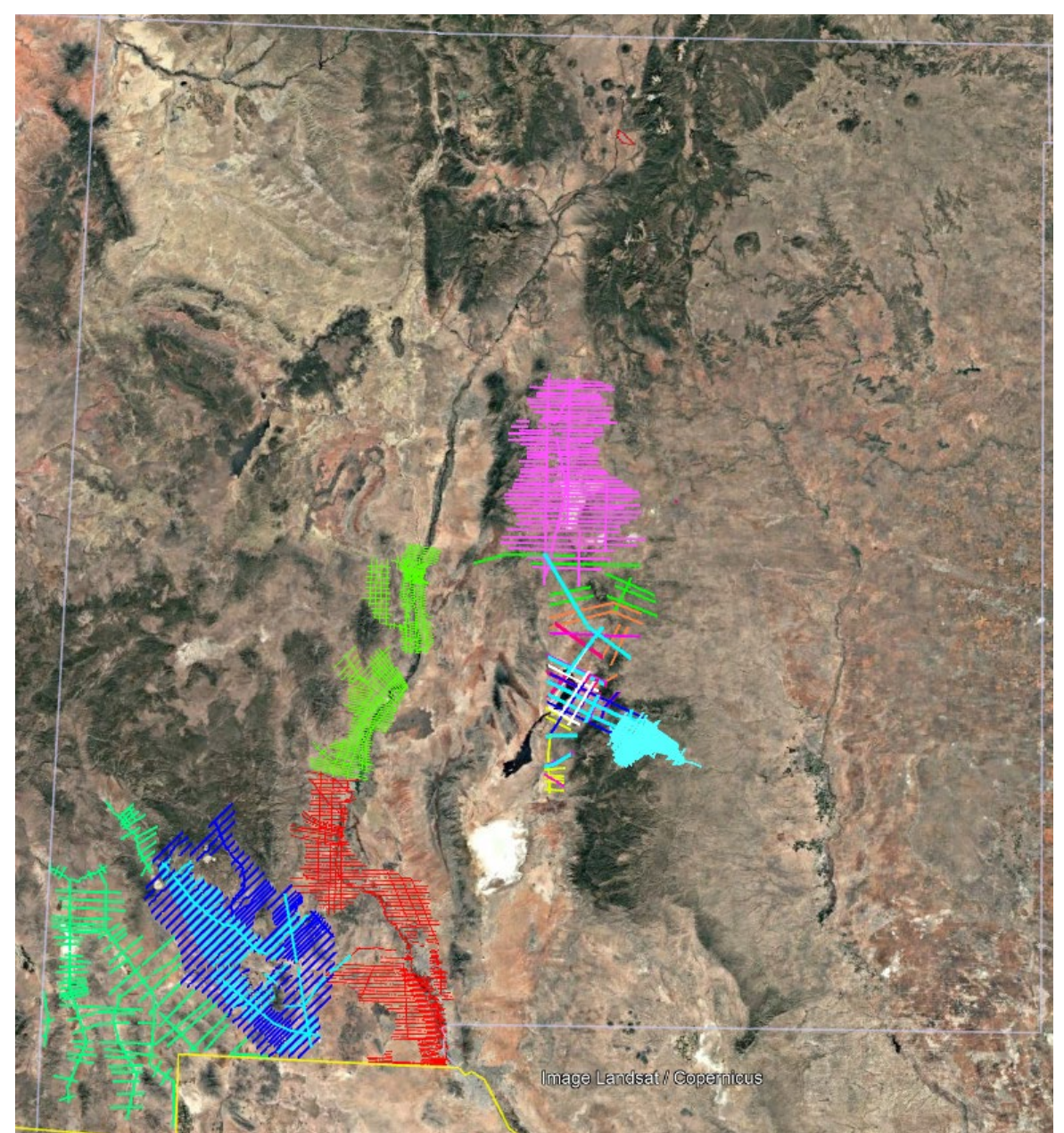
AEM Survey Schematic (from CA DWR)

2026: AEM surveys

- Estancia Basin
- Middle Rio Grande
- Lower Rio Grande
- Mimbres Basin
- Southwest Bootheel – Gila - Animas Region
- Northern Tularosa Basin / Ruidoso Slope

Next steps:

- Data processing
- 3D model development and improvement
- Follow up surveys for depth, refinement





EXAMPLE DATA: Lower Rio Grande

- 4,000 line-kilometers of data collected from November 16 – December 9, 2025
- Depth of investigation for this method in the LRG is between 200 meters (656 feet) and 500 meters (1,640 feet)

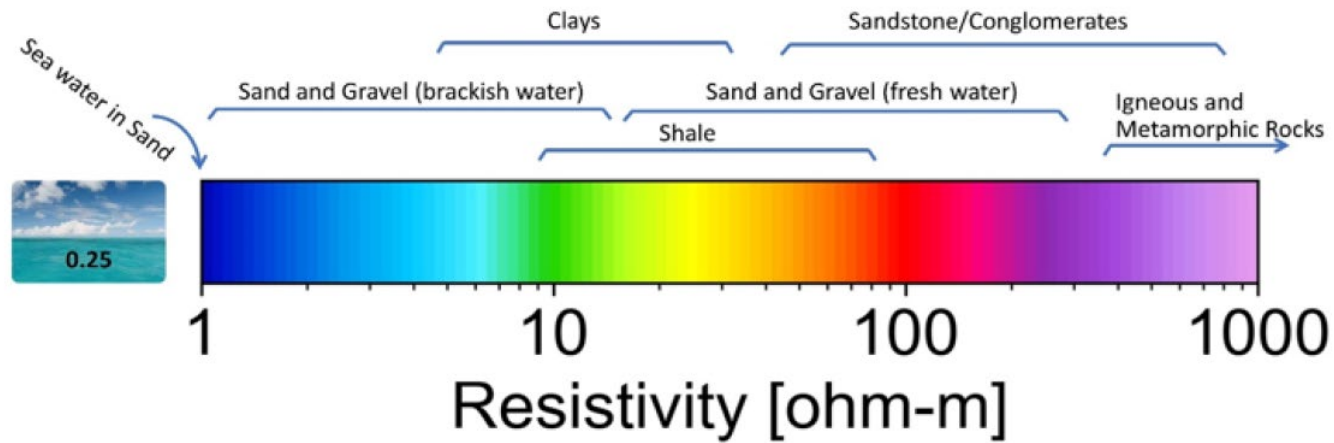


GEOPHYSICAL
IMAGING
PARTNERS

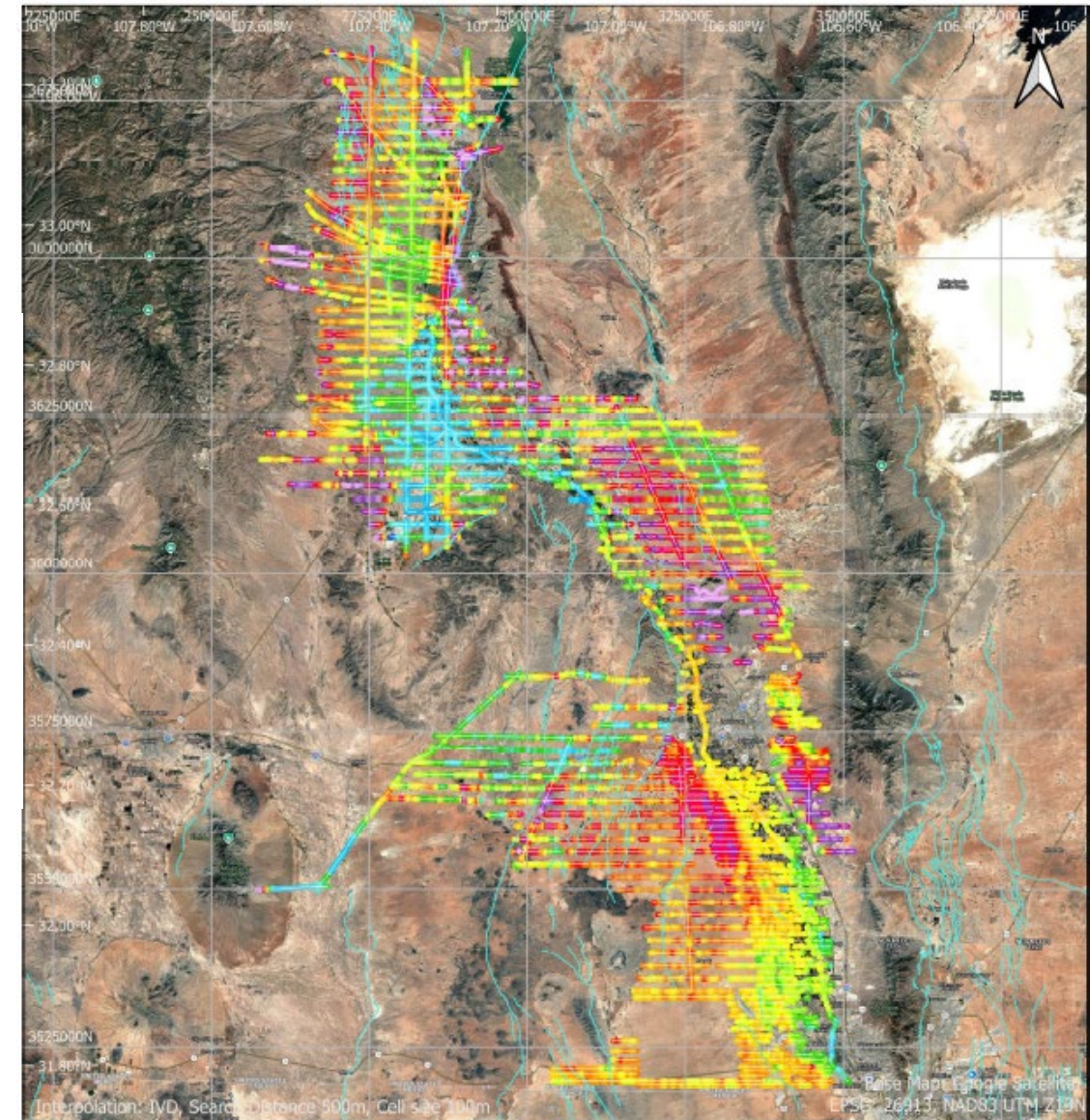


INTERA

Mean Resistivity Map



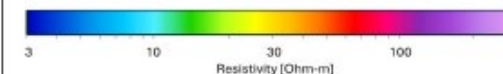
- Distinct regional variances in resistivity values across the survey area



Mean Resistivity Map
Depth
60 to 80 Meters (197 to 262 Feet)

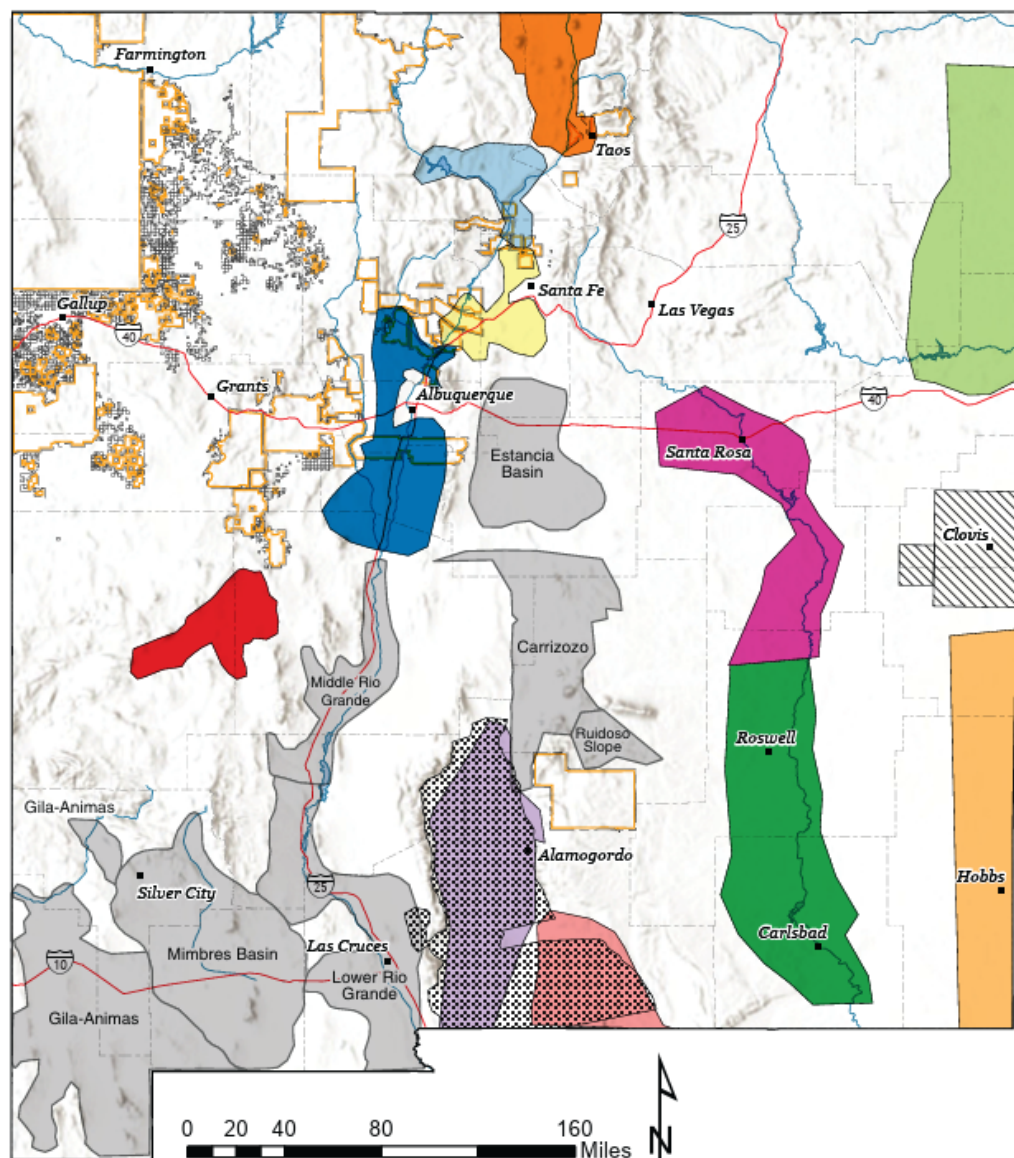
0 10 20 km
0 5 10 mi

Date surveyed: 11/16 to 12/9/2025
Date map created : 19/03/2026
Created by: MH
Checked by: AAB



• Data points used for inversion
— USGS Quaternary faults

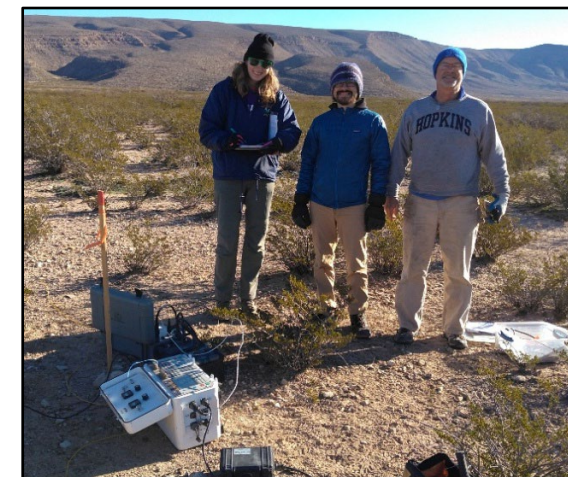
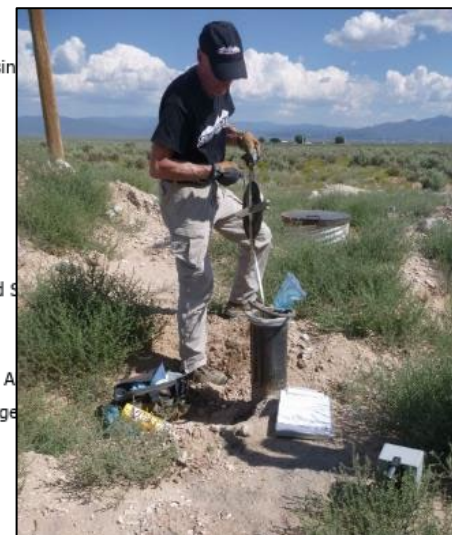
AEM surveys and work ahead in next 2 years



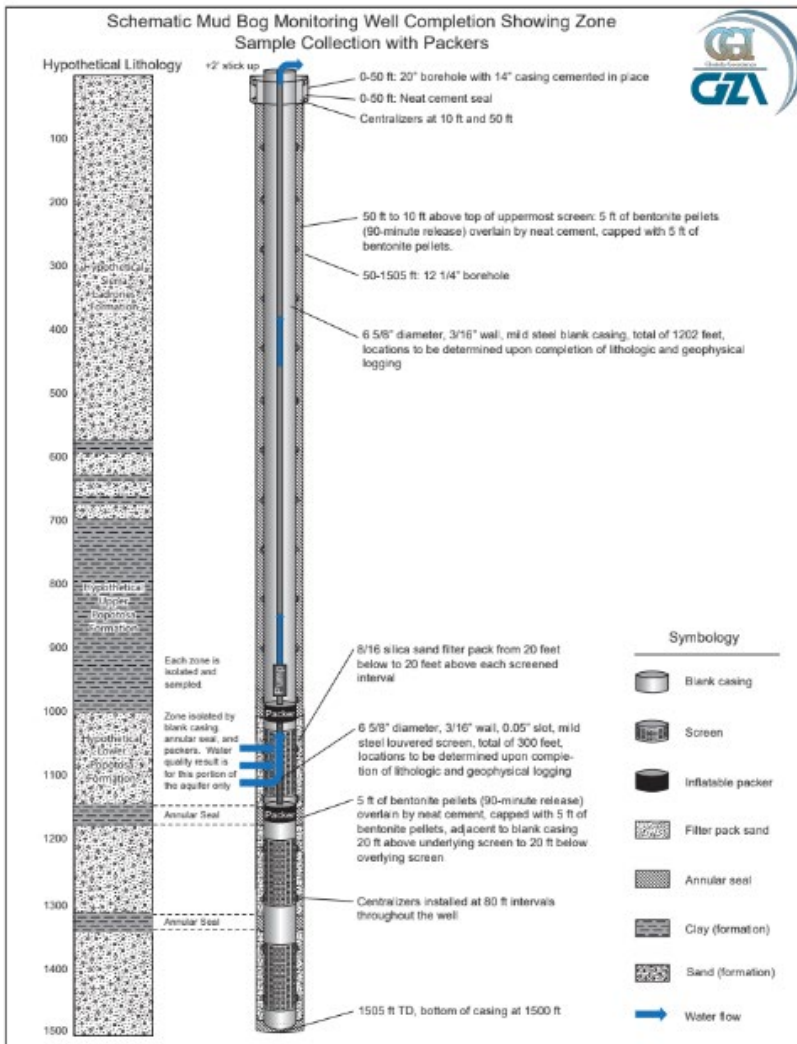
- Focus AEM on new regions and data infill in previous study areas
- Explore alternative geophysical techniques for bedrock aquifer studies
- Continued community outreach and engagement
- Continued data collection

AEM Regions

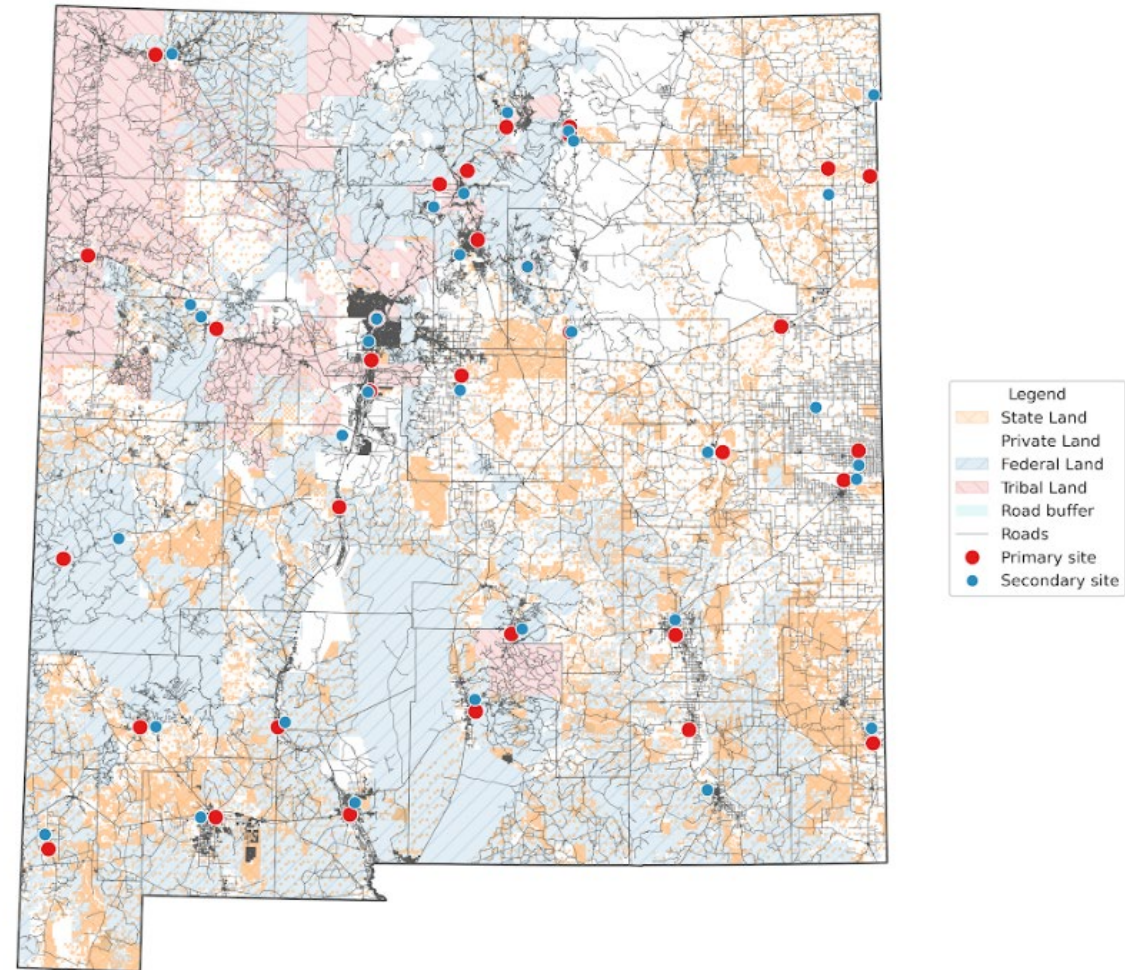
- Chama-Rio Grande Basin
- Middle Rio Grande North
- Northern High Plains
- Pecos Slope and Roswell Basin
- Salt Basin
- San Agustin Plains (Approx.)
- Southern High Plains
- Taos Plateau
- Tularosa Basin
- Upper Pecos Slope
- Southern Espanola Basin and S
- Completed AEM Regions
- Curry County Region - USGS A
- Sandia National Labs Coverage
- Tribal Lands



Pilot well drilling program in 2027: Preliminary plans



Potential Monitoring Sites with Roads, Buffers, and Land Ownership



Building platforms to share information and data



Ways we share information

- Twice annual newsletter (Get AMMPed!)
- Building new data platform for compiling and sharing geophysical data for New Mexico
- New Mexico Bureau of Geology website redesign underway, publications and data links
- Working with New Mexico Water Data Initiative to continue to build data and tools to improve access
- Regional, state and national presentations, workshops, and meetings to share info



https://geoinfo.nmt.edu/publications/periodicals/get_Ammped/home.cfm

The Water Data Challenge: Where to find the data?

- As we face warmer, drier years ahead, water managers, planners, and decision makers need quick access to robust water data!
- New Mexico's water data has been in various formats
- Goal is FAIR – Findable, Accessible, Interoperable, Reusable



THE SOLUTION: THE WATER DATA ACT

Enacted by the state of New Mexico in 2019

NMSA 1978, § 72-4B

**OUR MISSION: TO MAKE FINDING WATER
DATA SIMPLE!**

Our Vision: New Mexicans will have accessible
and useful data for water management and
planning



THE NEW MEXICO WATER DATA CATALOG: YOUR GATEWAY TO NEW MEXICO'S WATER DATA

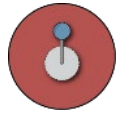
- A catalog of downloadable datasets and linked applications, web maps, tools and resources
- Over 300 datasets and 78 applications shared by 67 different organizations
- Helps users find what is out there!
- New geospatial search feature

visit catalog.newmexicowaterdata.org



The NM Water Data Landscape

Data Providers



Regional



Federal



State



Research

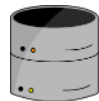
Data Types



CKAN



Spreadsheet



Database

Application Programming Interfaces (API)

Machine-readable APIs provide a menu of data that can be pulled into applications

Data Integration

NMBGMR is working to integrate data from multiple sources

Applications, Tools, Maps, Dashboards

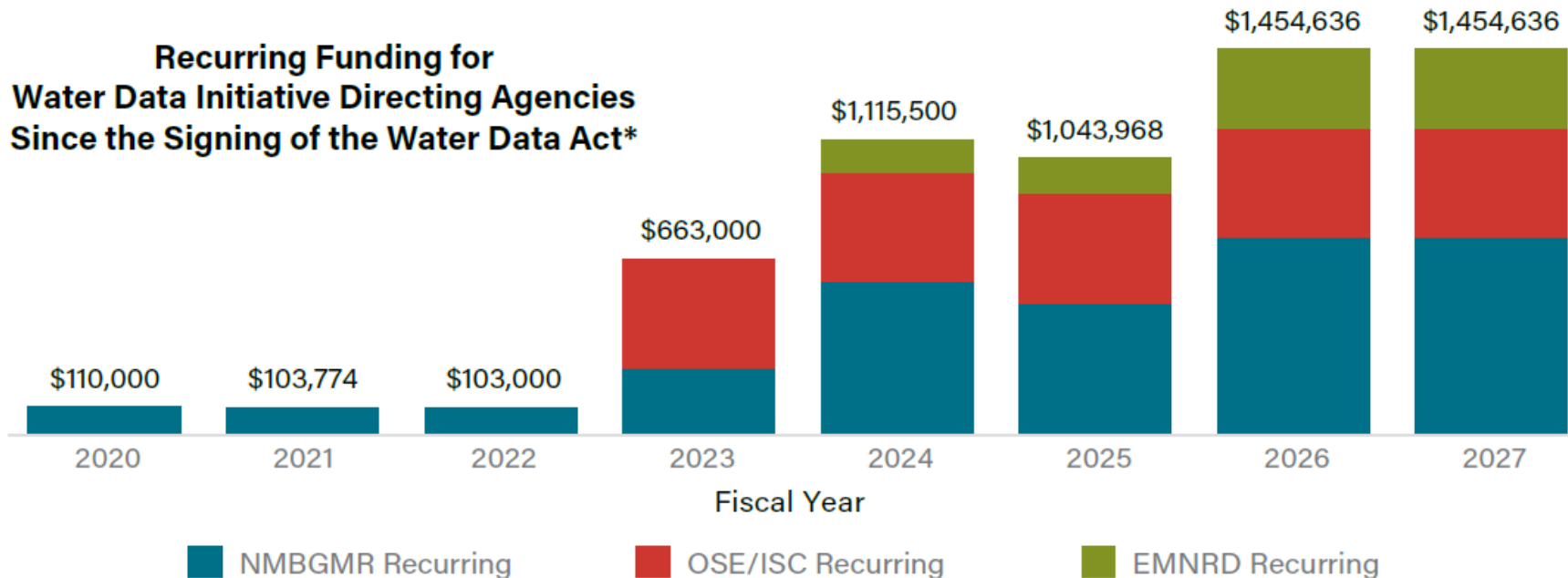
The result is data available to the user community and developers for applications and web tool development



COMING SEPTEMBER 1ST: 2026 WATER DATA PLAN

- Submitted every year as a requirement of the Water Data Act
- Compiled data from the WDI Directing Agencies
- Provides information on accomplishments from the past year
- Provides goals and budgetary needs for coming year

**Recurring Funding for
Water Data Initiative Directing Agencies
Since the Signing of the Water Data Act***



*To date, NMED has received no recurring state funding for Water Data Act implementation.

FY2026 Accomplishments by the Numbers

 **476**
Seepage Datasets
Compiled, NMBGMR

 **8M+**
Data Requests Served,
EMNRD

 **65M+**
Pages Digitized, NMED

 **5,094**
Digital Meter Entries, OSE

 **594**
Public Water Systems
Captured, ISC

ACCELERATING WATER DATA MODERNIZATION: THE NM WATER DATA FUNDING OPPORTUNITY



- In FY26, NMBGMR launched a program to help New Mexico state agencies implement the Water Data Act.
- NMBGMR and New Mexico Tech established the Water Data Funding Opportunity to support water data modernization efforts.
- More than \$1M has been distributed to Directing Agencies for projects focused on modernizing, digitizing water data, and discovery/ planning.

Agency	Project	Award
NMED	Project 1: Project Velocity—AI-Powered Search for Water Regulatory Documents	\$299,999
OSE	Project 2: GIS Application Modernization—Protecting Senior Water Rights	\$53,430
OSE	Project 3: WATERS Well Log and Measurement Modules Prototype	\$111,682
OSE	Project 4: Analytical Interface (Ani) Development	\$131,283
ISC	Project 5: Historical Riparian Evapotranspiration Geodatabase	\$182,239
EMNRD	Project 6: Geothermal Data Platform Discovery—Phase 1 Needs Assessment and Framework	\$299,999
Total Awarded in FY2026:		\$ 1,078,632

Water Data Workshop: December 2-3, 2026

The 2026 Water Data Initiative Workshop will be held December 2-3, 2026, at the Sheraton Albuquerque Airport Hotel.

This workshop will bring back the popular Application Showcase and offer more short courses for hands-on learning. Details on registration and programming will be announced in the coming months.

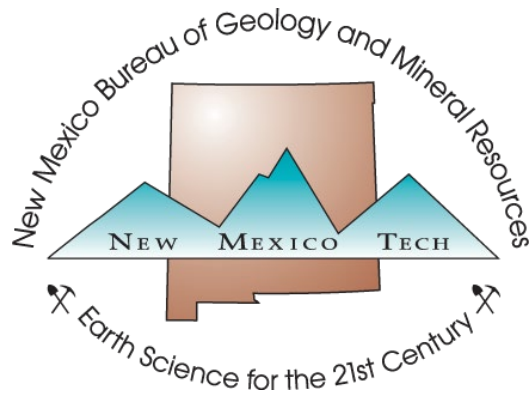
Visit newmexicowaterdata.org or sign up for the monthly Water Data Newsletter to stay informed.



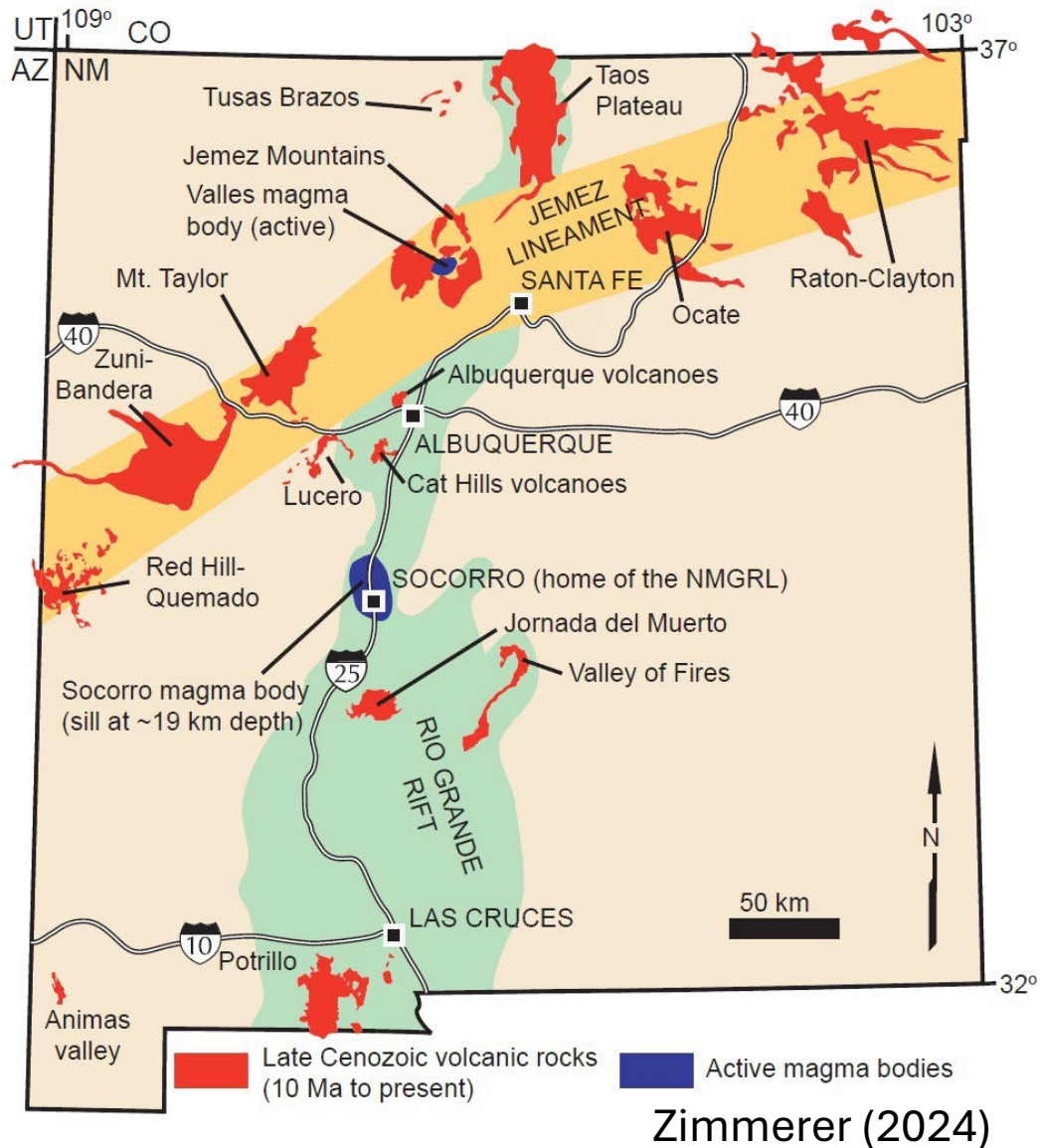
New Mexico's Geothermal Program at NMT

Dr. Shari Kelley

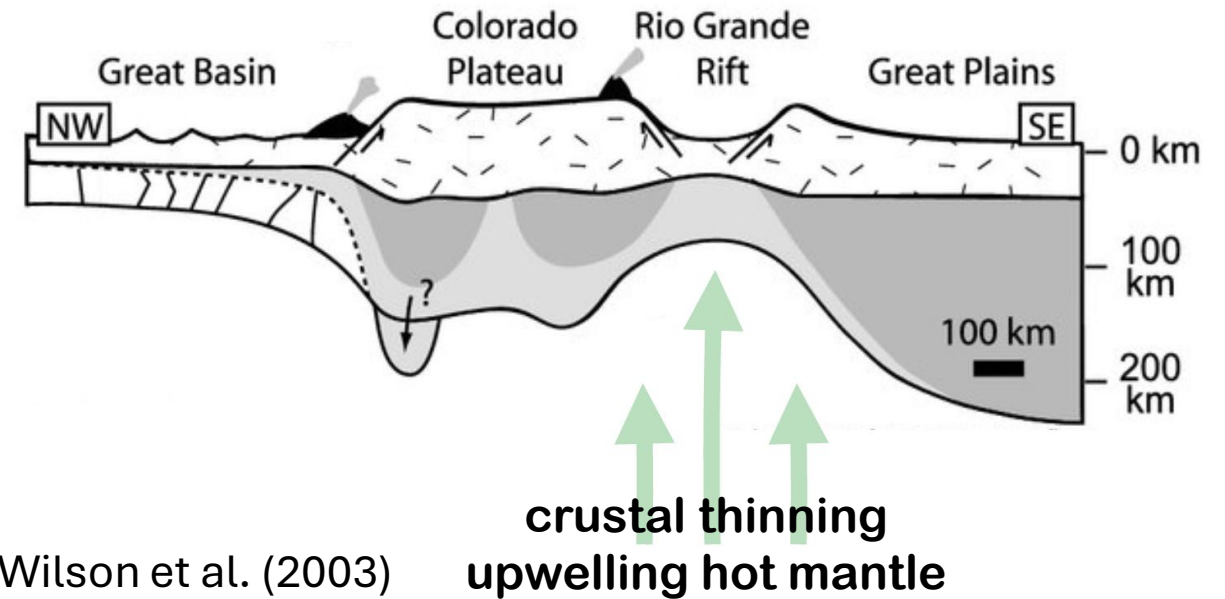
Senior Research Scientist, Geothermal Program
NM Bureau of Geology and Mineral Resources



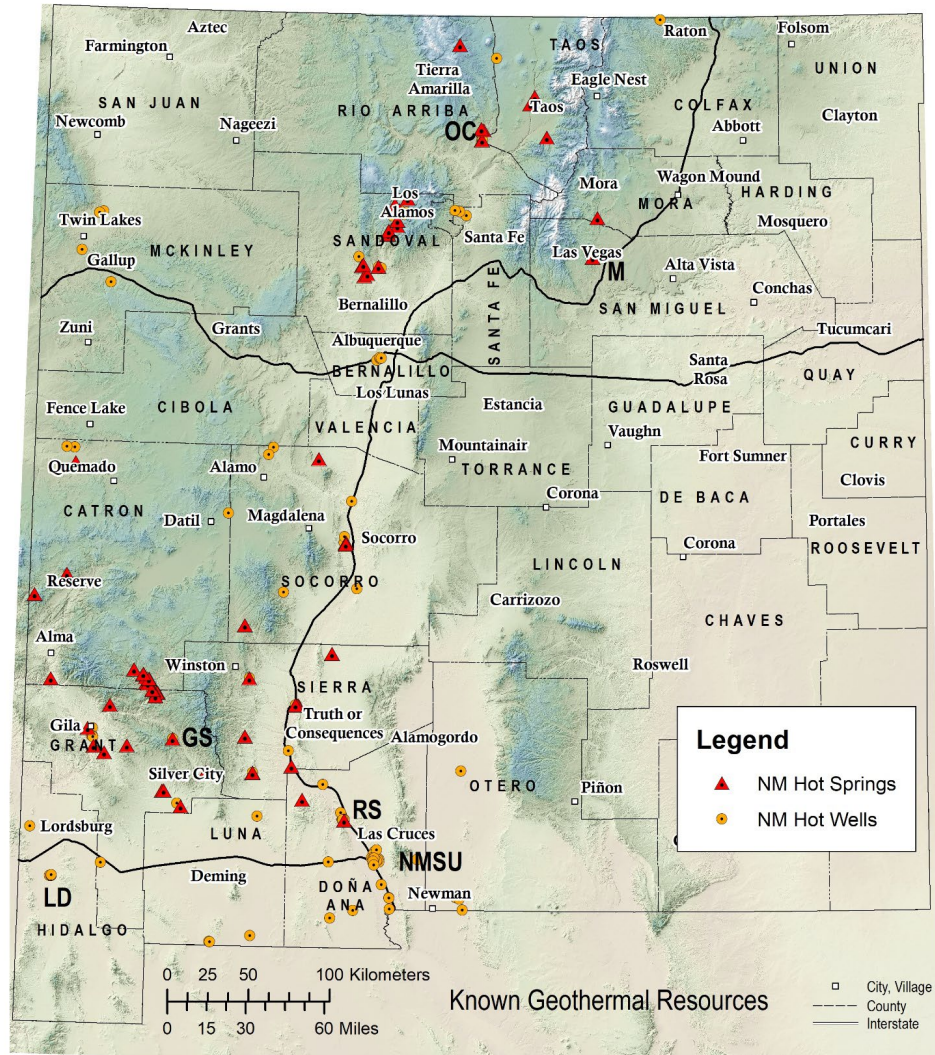
Geothermal Energy Basics



The geothermal potential of New Mexico is driven by two tectonic features: the Rio Grande rift and the Jemez lineament



Direct Use Geothermal Systems

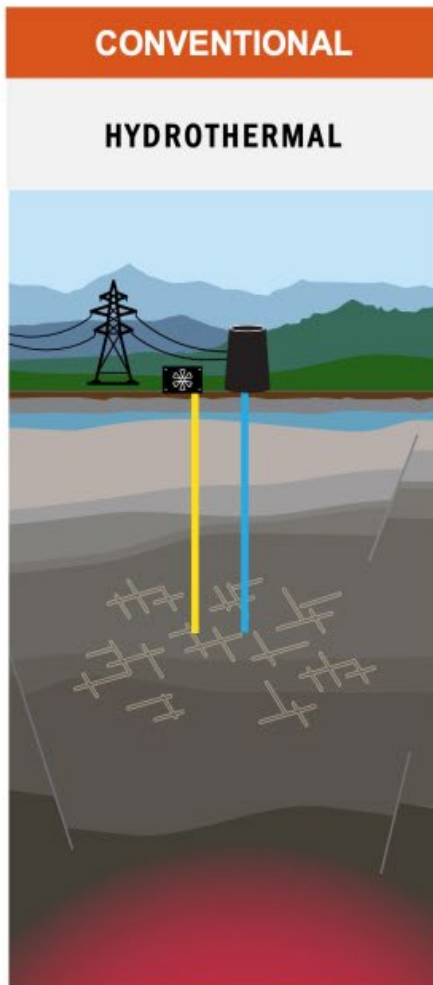


LD=Lightning Dock; RS=Radium Springs; GS=Gila Hot Spring;
NMSU=New Mexico State University; OC=Ojo Caliente; M=Montezuma

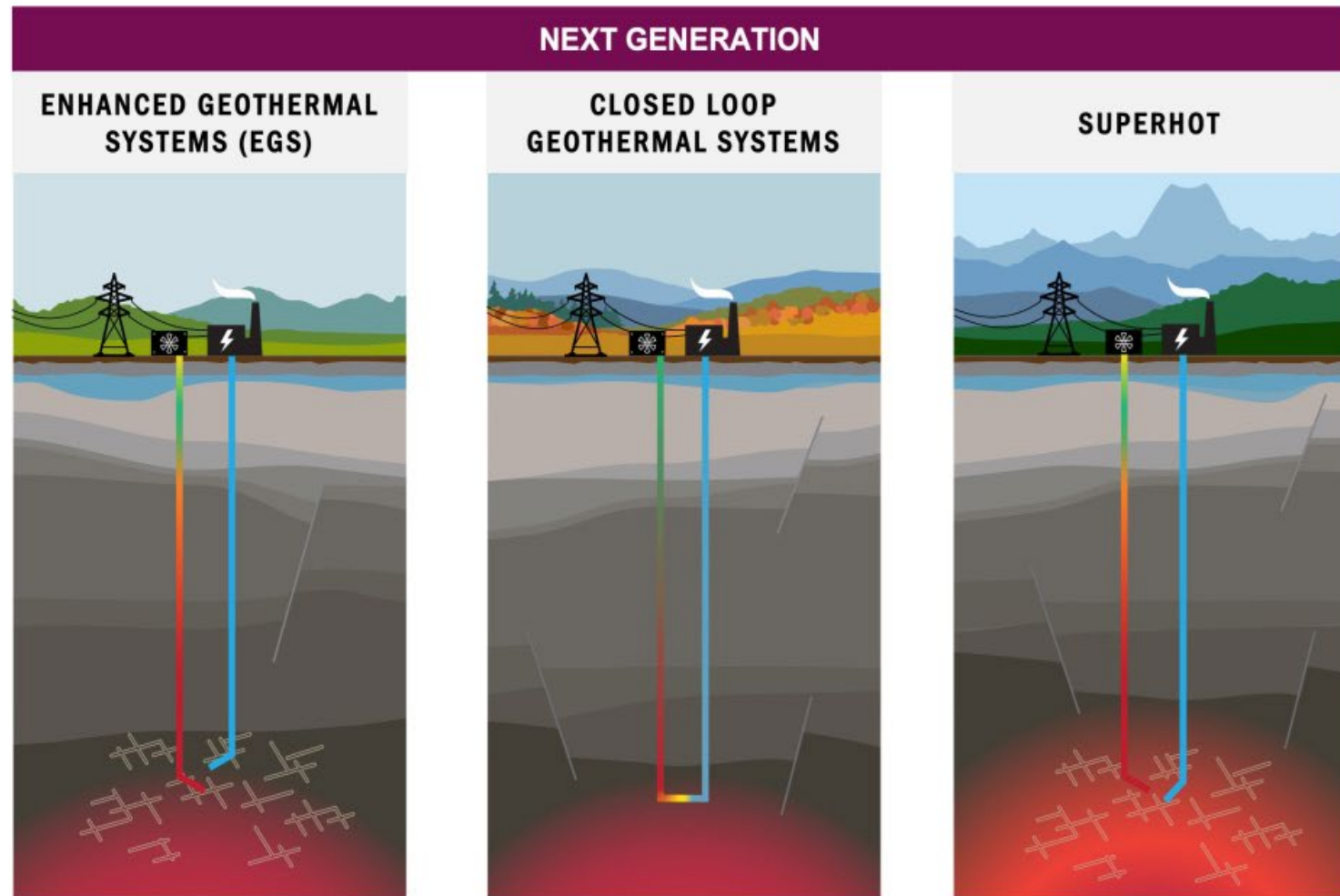


Direct uses of Earth's geothermal heat include recreational soaking, heating green houses and fish farms, and heating and cooling buildings.

High Temperature Geothermal (>150°C) for Electricity



natural fractures

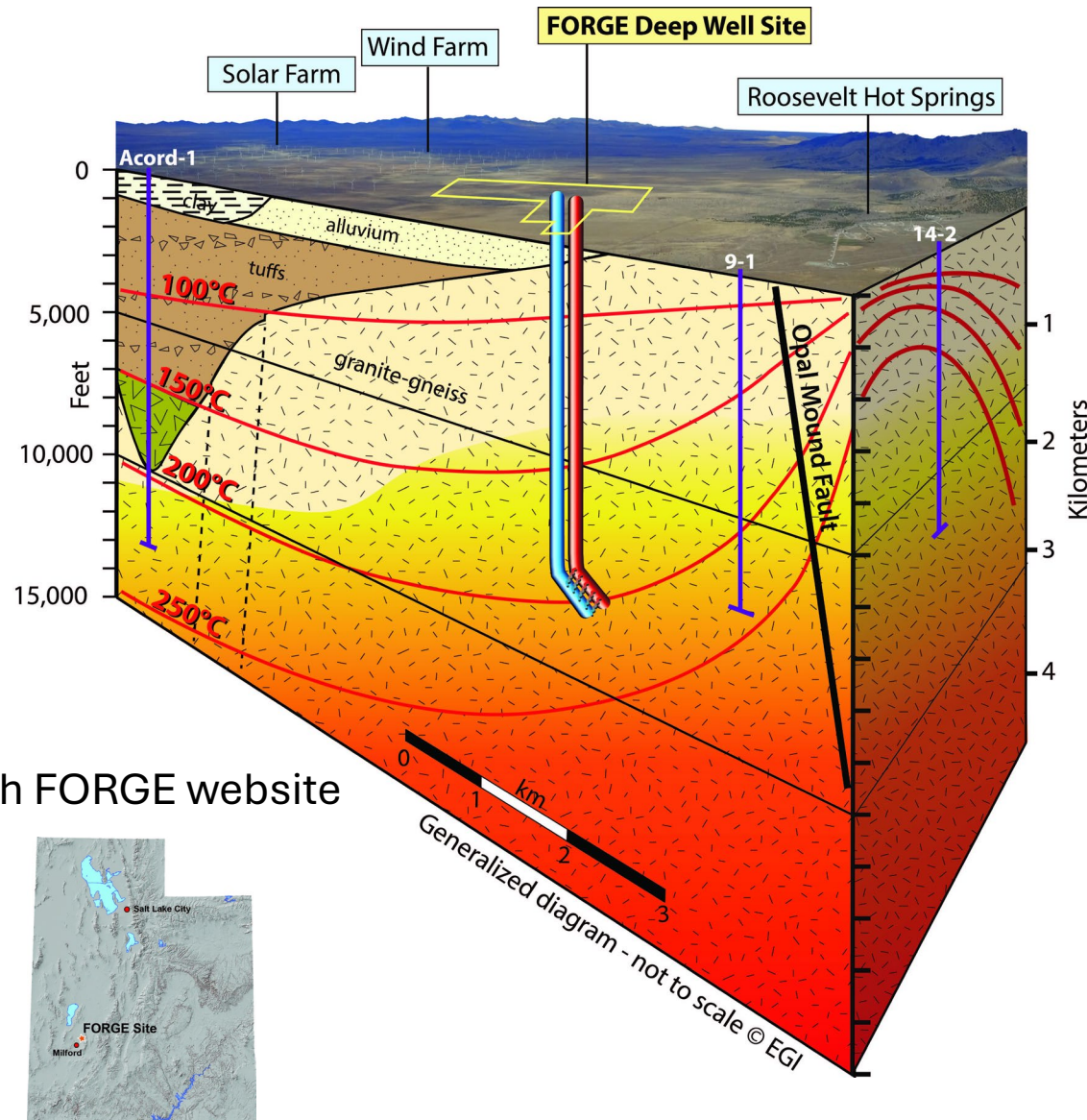


engineered fractures

saves water

visionary energy source

Advanced Geothermal Technology

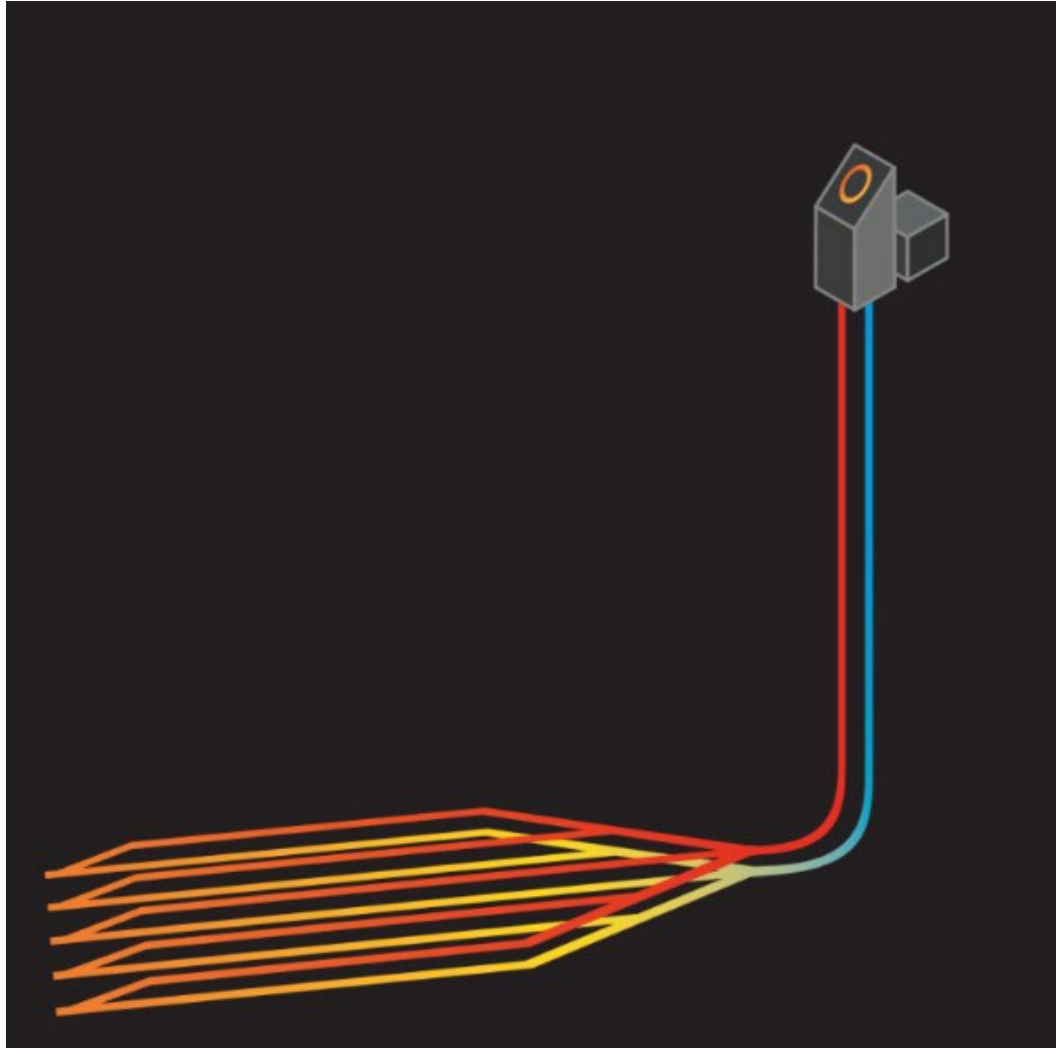


Engineered Geothermal Systems

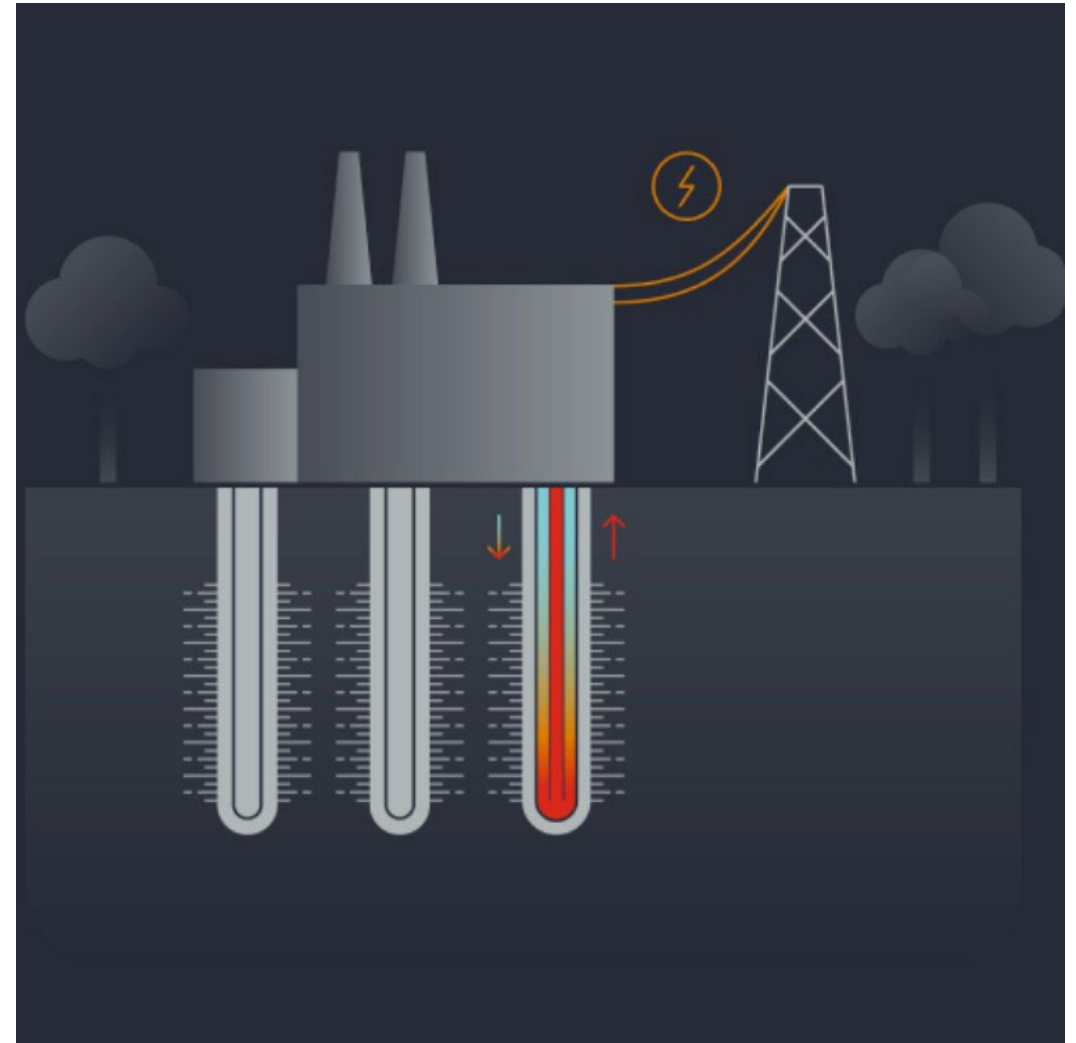
Researchers at the DOE FORGE site in Utah are using technologies developed by the oil and gas industry during the “shale revolution” to reduce drilling costs.

polycrystalline diamond carbide drill bits = faster drilling rates = lower upfront costs

Closed Loop Systems

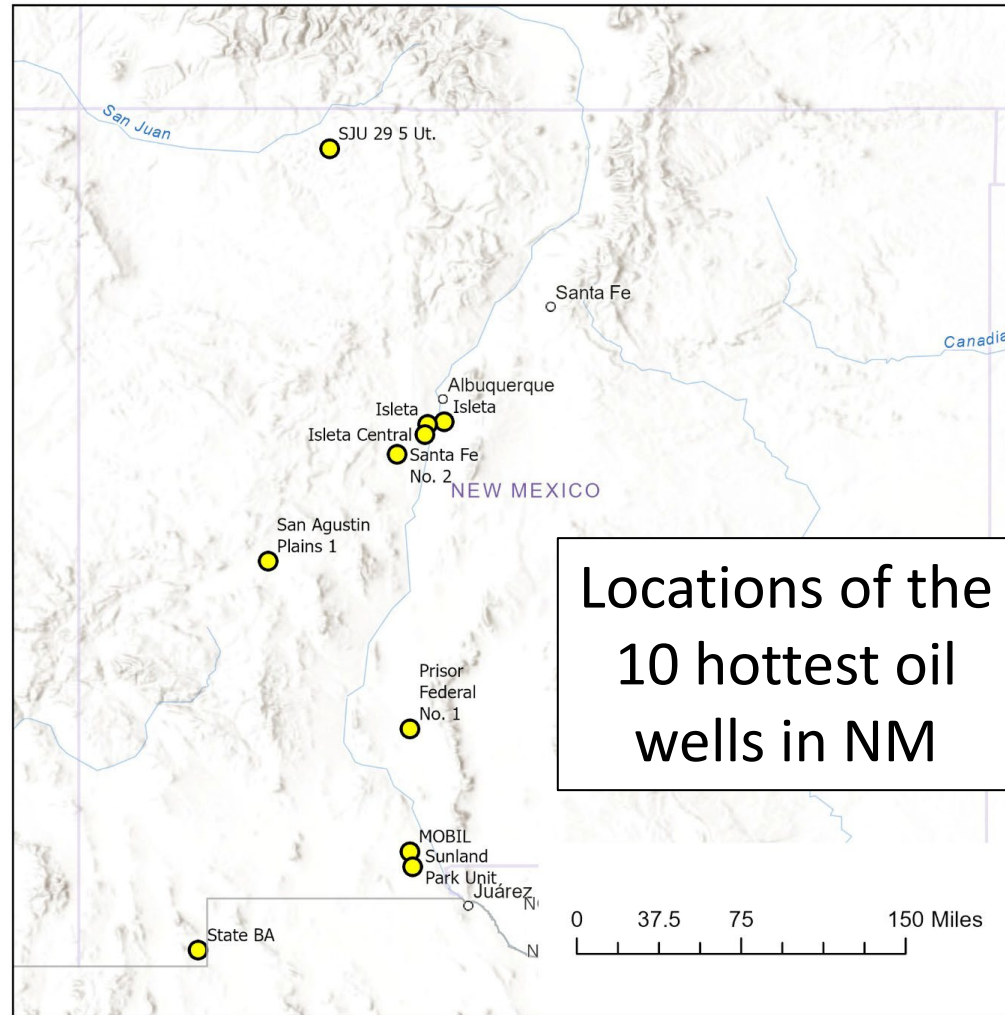


Eavor Loop

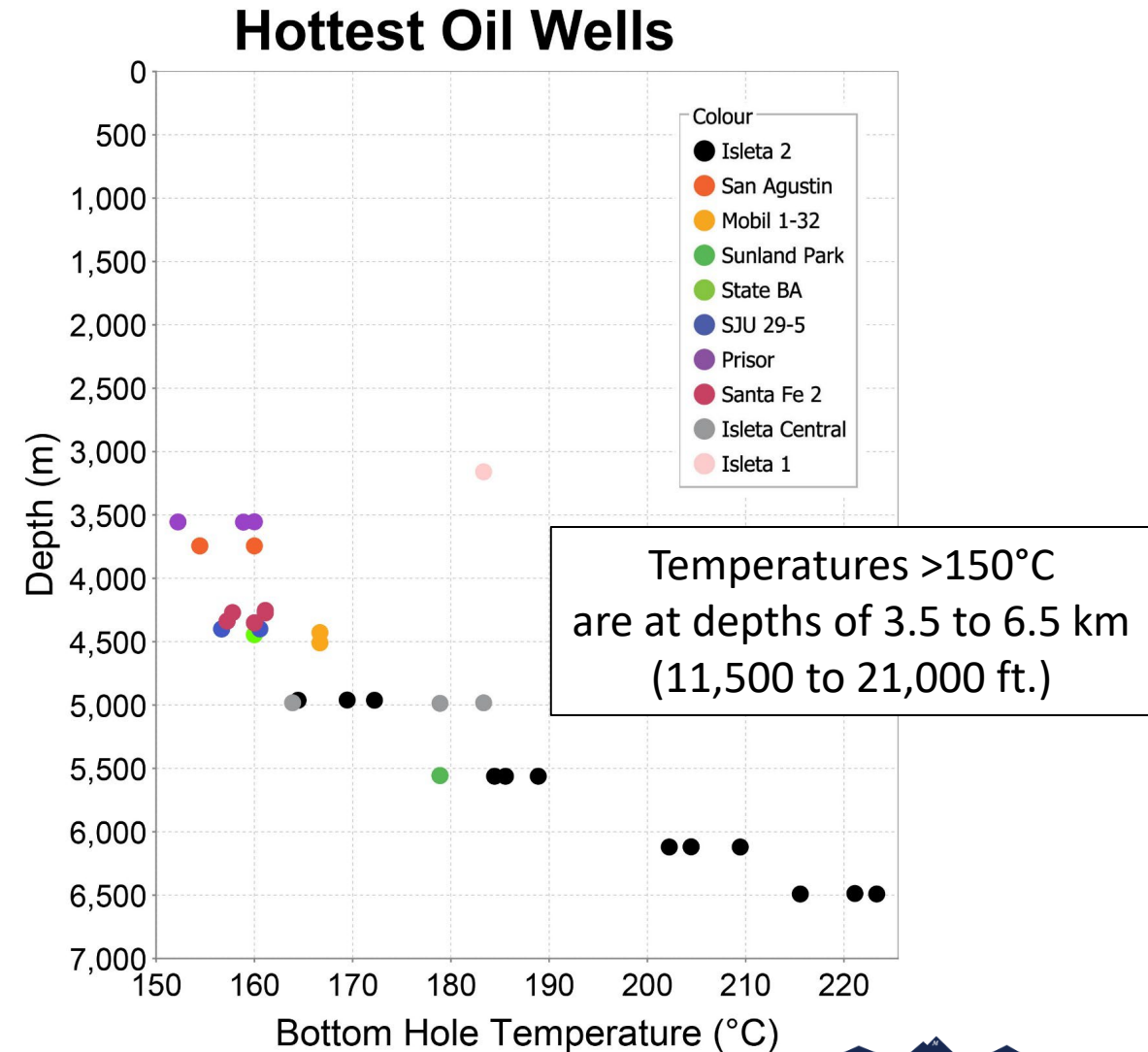


XGS

Subsurface Geothermal Data in New Mexico

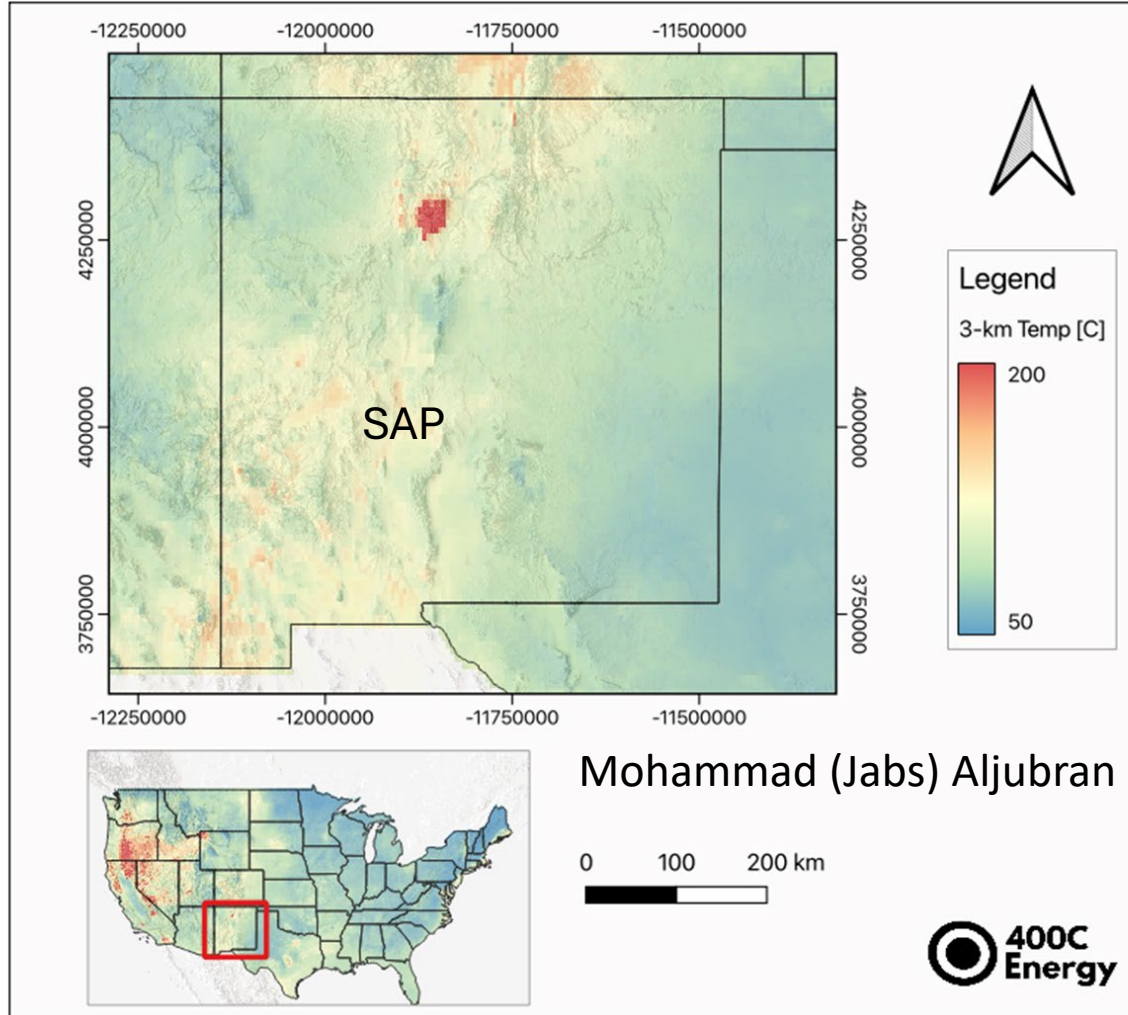


Deep oil wells provide data indicating temperatures > 150°C at attainable depths (current technology)



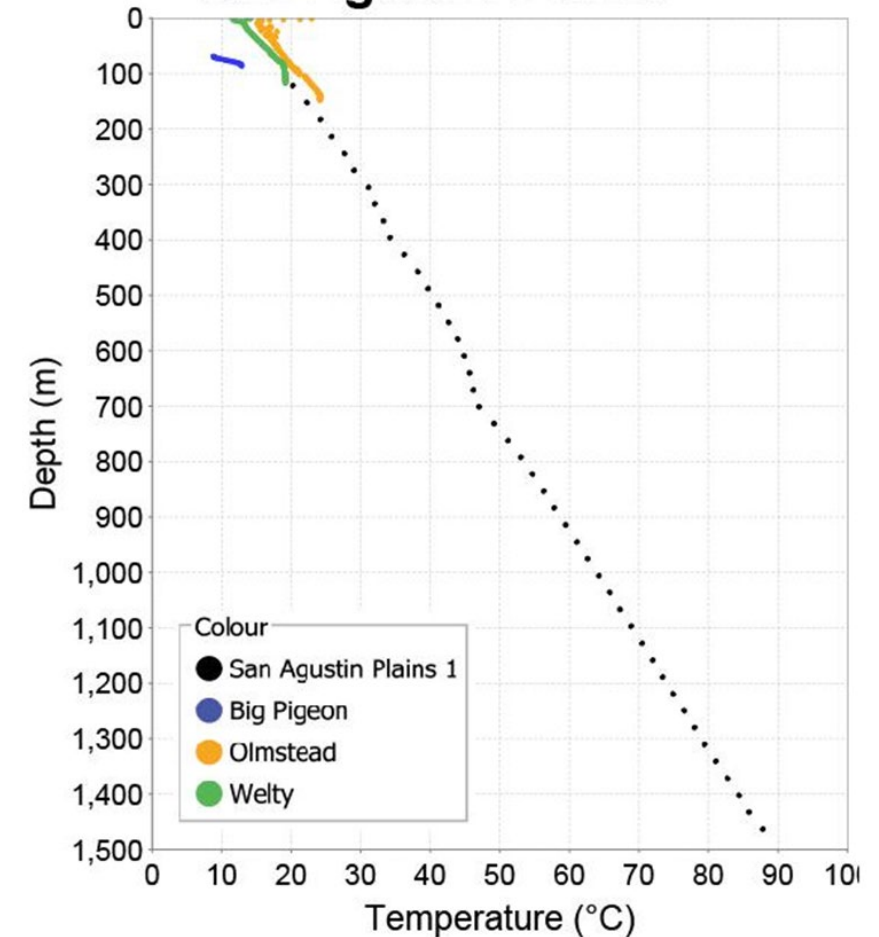
Geothermal Potential in New Mexico

3-km Temperature across New Mexico



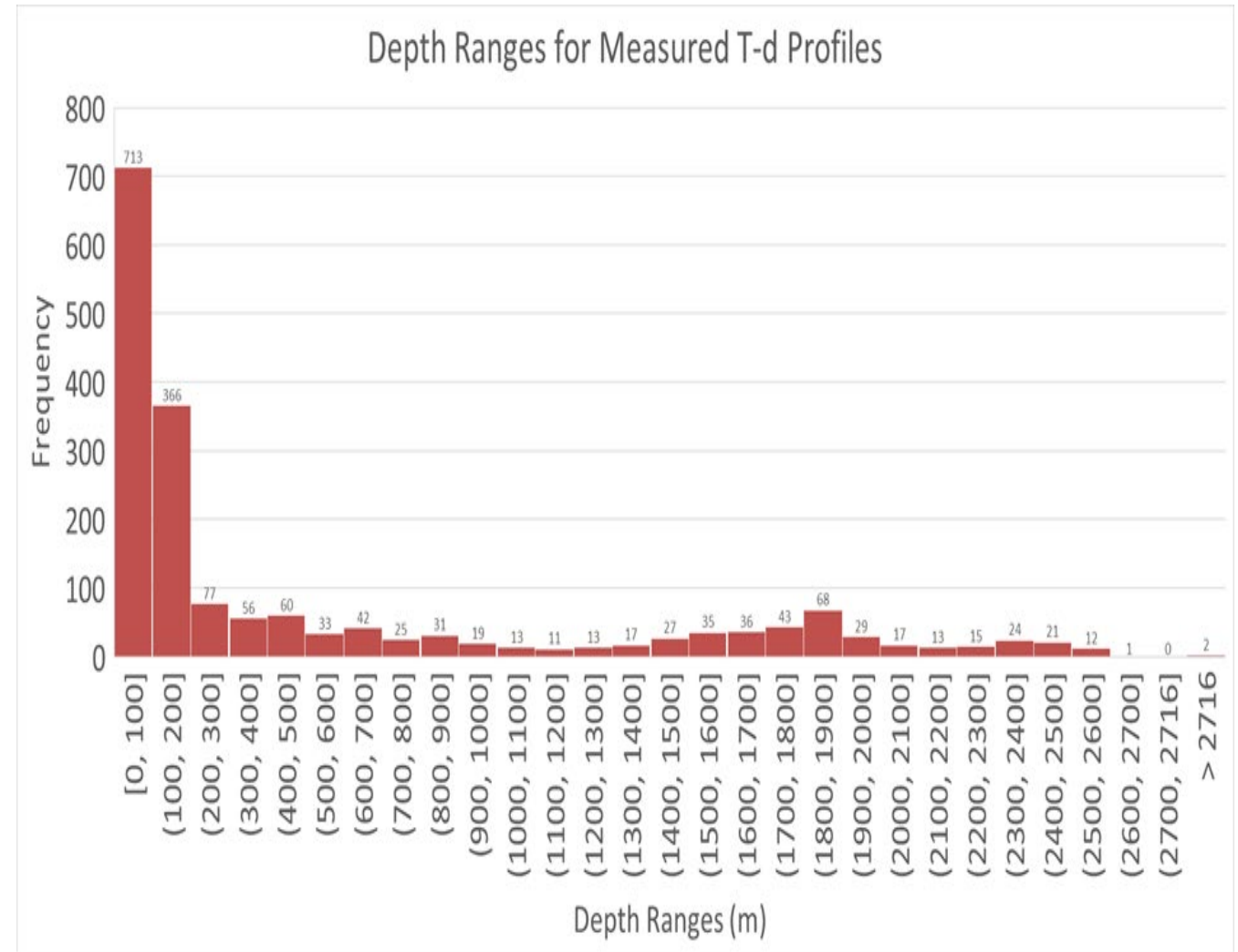
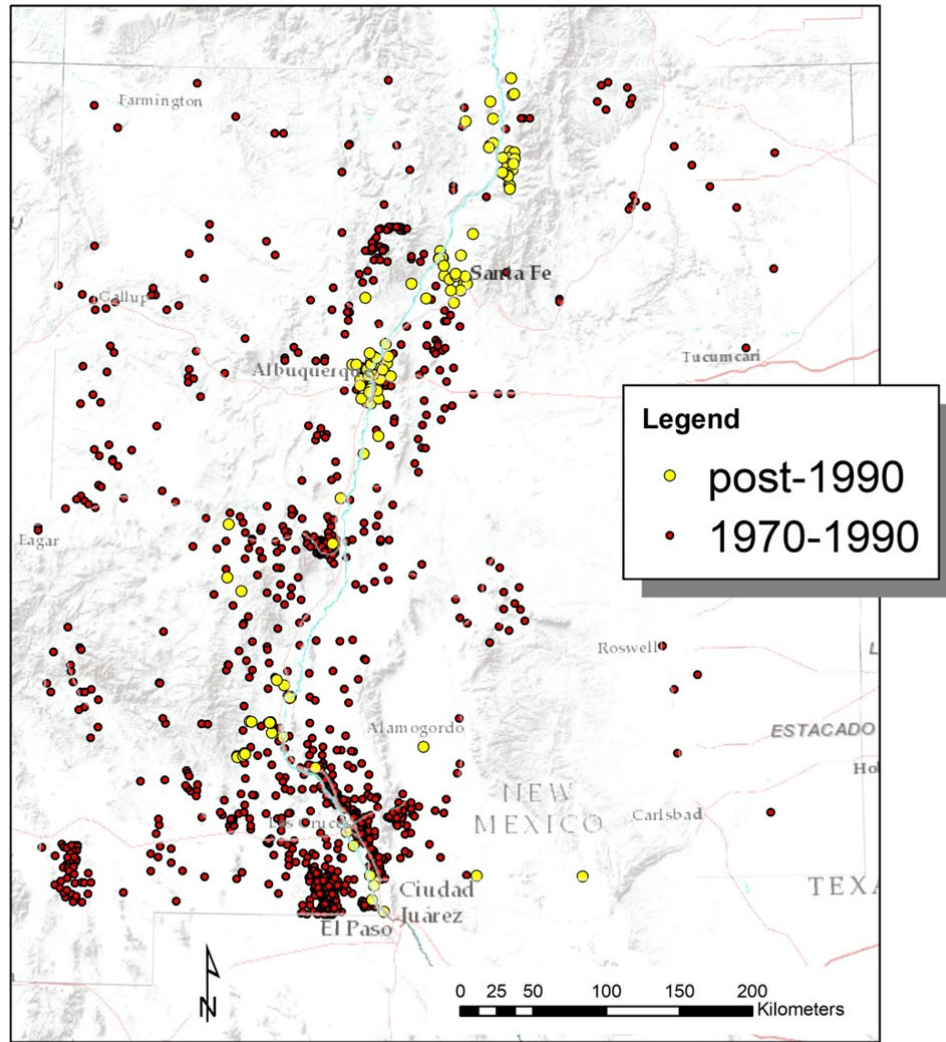
Map of modeled temperatures at 3Km (~10,000 ft)

San Agustin Plains



Limitations of the extrapolation of shallow data to 3 Km

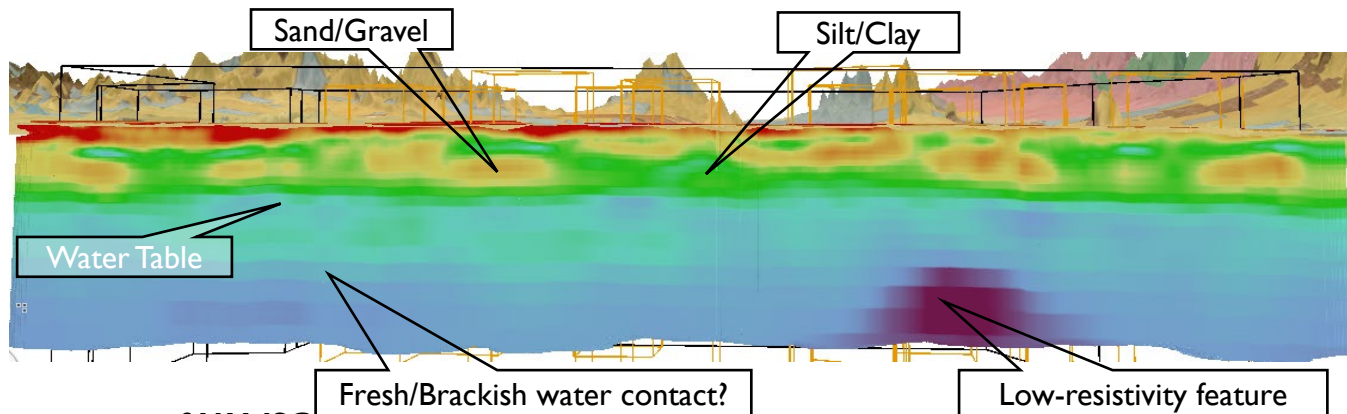
Temperature-Depth Data Measured in Water Wells



Water wells with temperature profiles are predominantly shallow
(an incomplete picture of temperatures at depth)

EXAMPLE AEM survey in New Mexico: Santa Teresa study

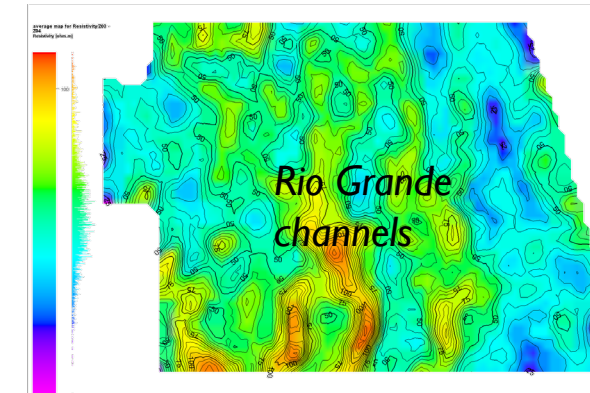
- **Identify brackish water sources in the Mesilla Basin**
 - Santa Teresa Border Area Brackish Groundwater Availability study (Intera, 2025, funded by NM-ISC)
- **Key hydrogeological characteristics discovered**
 - Buried river channels representing ancient Rio Grande pathways
 - Possible geothermal anomalies detected
- **Next steps involve additional geophysics and drilling exploratory wells to validate findings of a geothermal resource**



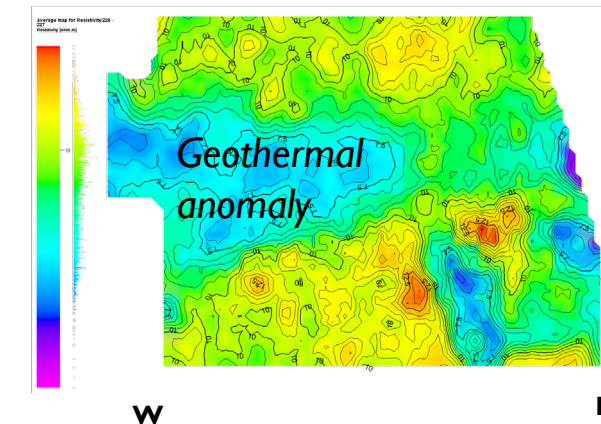
Data courtesy of NM ISC

Resistivity Maps

Shallow: 100 ft bgs



Deep: 950 ft bgs



Geothermal Partnerships

Sandia National Laboratories

- Evaluate current geothermal industry workforce needs and compare against available academic and training programs.
- Design and conduct a survey of geothermal industry needs
- Lessons learned from NMT Geothermal Certificate Program
- Help develop recommendations for program-level and course-level curricula

DOE Proposals Submitted (*Drilling geothermal wells*)

- Three related to industry and lab requests in New Mexico (Ormat, XGS, LANL)
- One proposal to drill on the NMT campus
- One in California (China Lake)

Geothermal Outreach and Education



Geological Society of America Rocky Mountain Section field trip



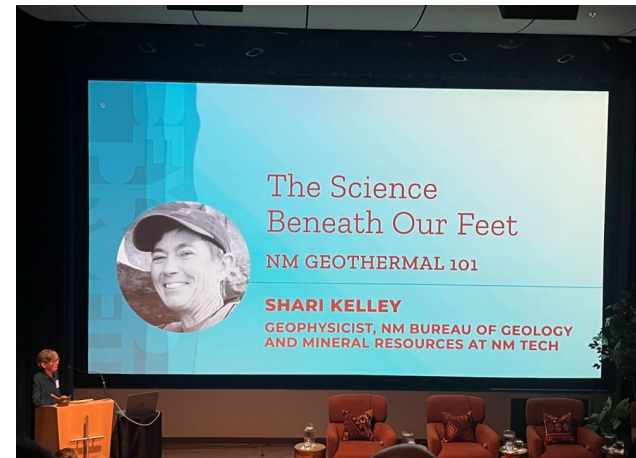
4th Annual NM Geothermal Workshop (100+ registrations!)



Capitol Hill Day
Washington, D.C.



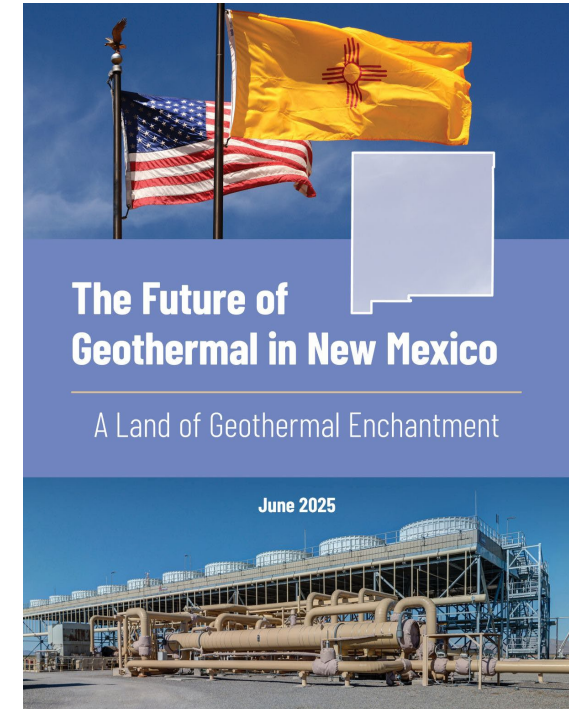
Geothermal Certificate Program students at
Lightning Dock



Beyond Profit program in Santa Fe

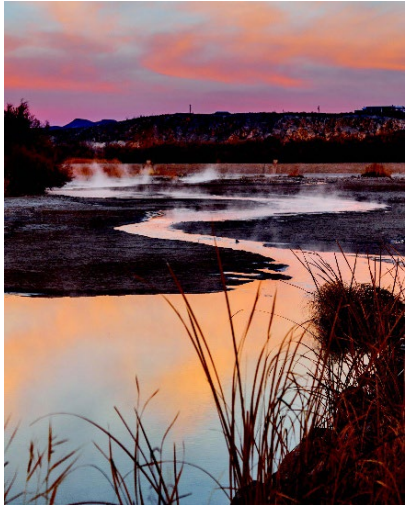


Stanford Geothermal Workshop



<https://geoinfo.nmt.edu/resources/geothermal/futureOfGeothermal/home.html>

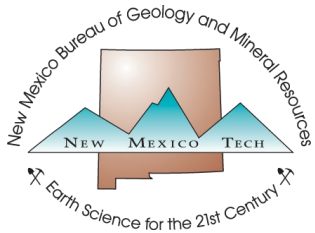
What have we accomplished and where are we going?



- Through the geothermal workshops, we have established strong connections among industry, state agencies, universities, National Labs, and geothermal enthusiasts with a goal of increasing geothermal development in New Mexico. *This task will continue.*
- The geothermal certificate program at NMT is training the workforce of tomorrow. *This task will continue and will **grow**.*
- Outreach, by serving on panels at conferences, talking to K-12 teachers, giving seminars at universities, speaking to legislators, and providing information to start-up companies, is increasing the awareness of the positive outcomes of tapping into geothermal resources. *This task will continue and will **grow**.*
- Research has revealed the need to acquire much-needed publicly available subsurface data (geophysics leading to drilling wells) for New Mexico, not only to identify geothermal resources, but to characterize water resources and locate critical mineral deposits.

This is the goal ahead and will require the support of several NMT programs.

Thank you for helping us do this important work for New Mexico



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