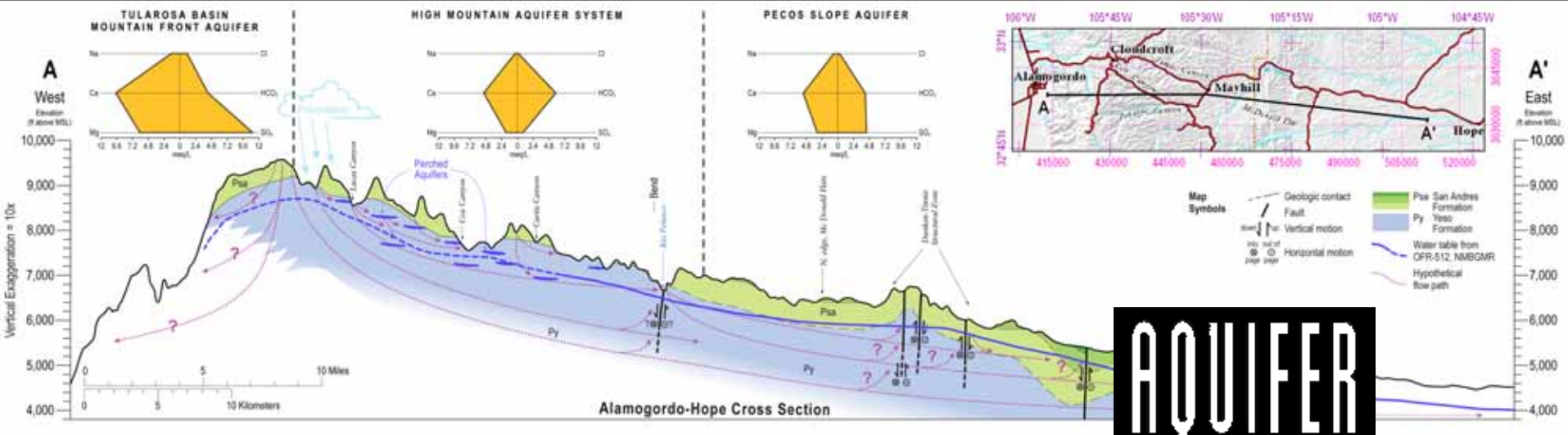


# Aquifer Mapping in New Mexico

## A Status Report

### for Interim Committee on

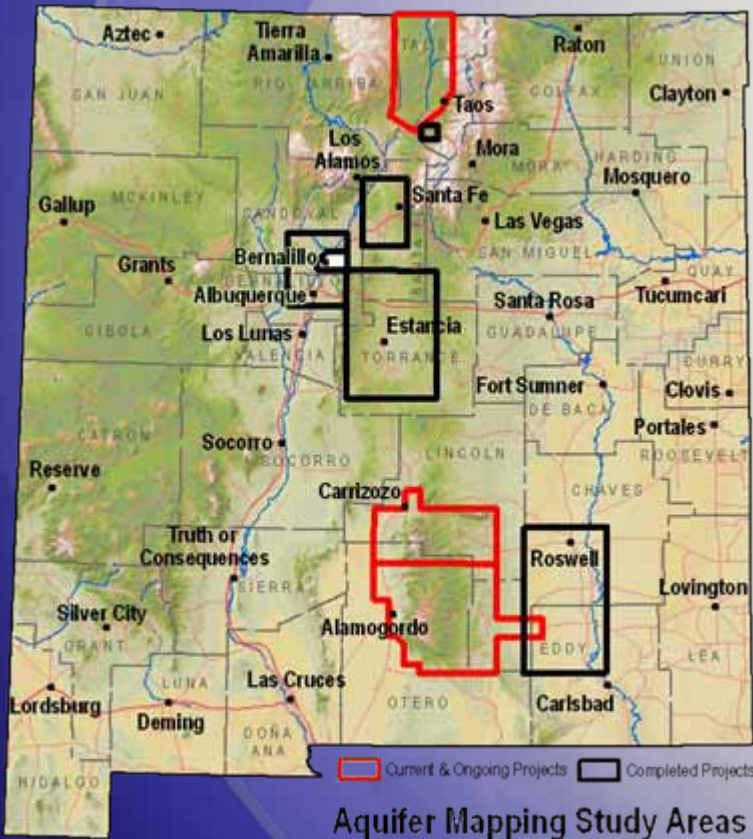
### Water & Natural Resources



**AQUIFER  
MAPPING  
PROGRAM**

Peggy Johnson  
 Associate Director, Hydrogeologic Programs  
 July 2009

# Multi-Disciplinary Science



- Geologic Mapping (STATEMAP)
- Geophysical Surveys (NMBG&MR, USGS)
- Drill Holes (NMBG&MR Subsurface Data Center)
- 3-D Geologic Model
- Hydrologic Data
- Geochemical Data
- Ground-Water Flow Models – conceptual, computer

**WHAT IS AQUIFER MAPPING?** – A scientific process wherein a combination of geologic, geophysical, hydrologic, and chemical field and laboratory analyses are applied to characterize the quantity, quality, and distribution of ground water in aquifers.

# Partners and Users

**Academic Institutions:** NMT, UNM, NMSU, Highlands

**State Agencies:** NMOSE/NMISC, NMEMNRD, NMED

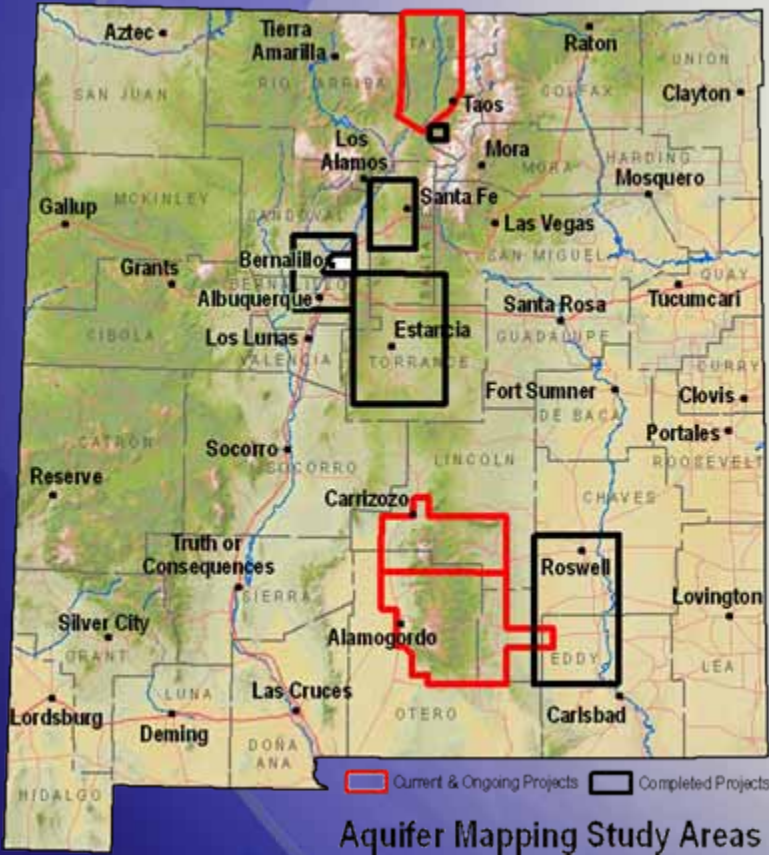
**Federal Agencies & National Laboratories:** US Geological Survey, Los Alamos NL, Sandia NL, US Bureau of Indian Affairs, US Fish & Wildlife Service, US Bureau of Land Management, US Forest Service, NASA

**Counties, Municipalities, Irrigation Districts, Water Utilities:** Sandoval, Taos, Otero, Lincoln, Bernalillo, Albuquerque, Santa Fe, Town of Taos, PVACD

**Tribes:** Taos, Picuris, Santo Domingo, Tesuque, Sandia, Isleta, Santa Ana, etc.

**Soil & Water Conservation Districts:** Otero, Taos, Ciudad

# Active and Completed Projects



Albuquerque Basin – NMOSE, USGS, NMBGMR

Placitas – Legislative funding to Sandoval County, NMBGMR

Roswell Artesian Basin – PVACD, NMBGMR

Santa Fe Area – NMOSE, NMBGMR, Santa Fe County

Sacramento Mountains – Legislative funding to NMDA/NMSU, Otero SWCD

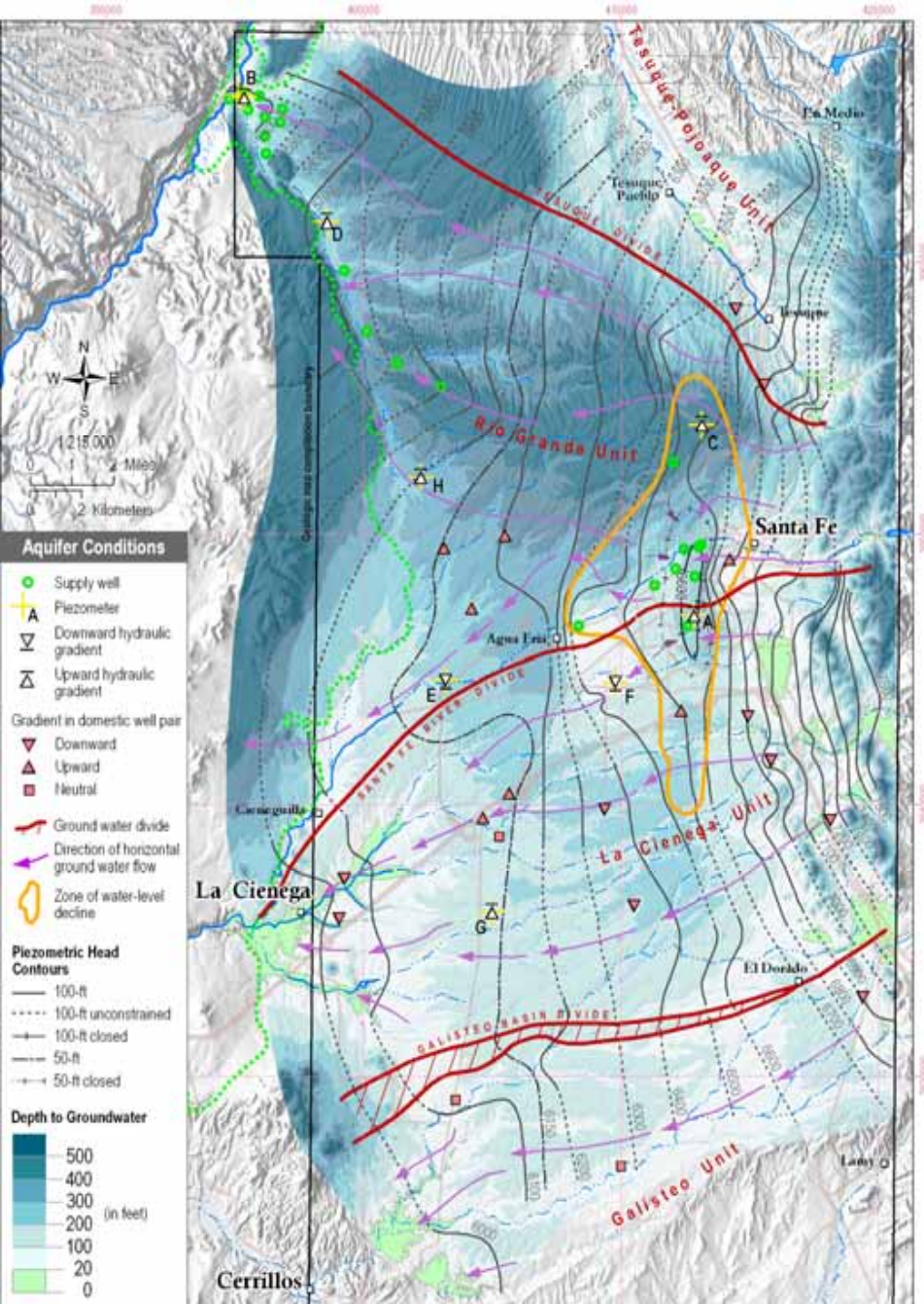
Taos County – NMOSE/NMISC, NMBGMR, Taos County, Healy Foundation

**Each area is unique in its hydrogeologic setting and the driving water policy issues**

# The Santa Fe Area

**THE ISSUES:** NMOSE administrative needs and the City/County water utilities' search for sustainable, potable water sources.

**THE GOAL:** Update hydrogeologic information on the basin aquifer and support development of tools for water rights administration and long-term sustainable development of aquifers.



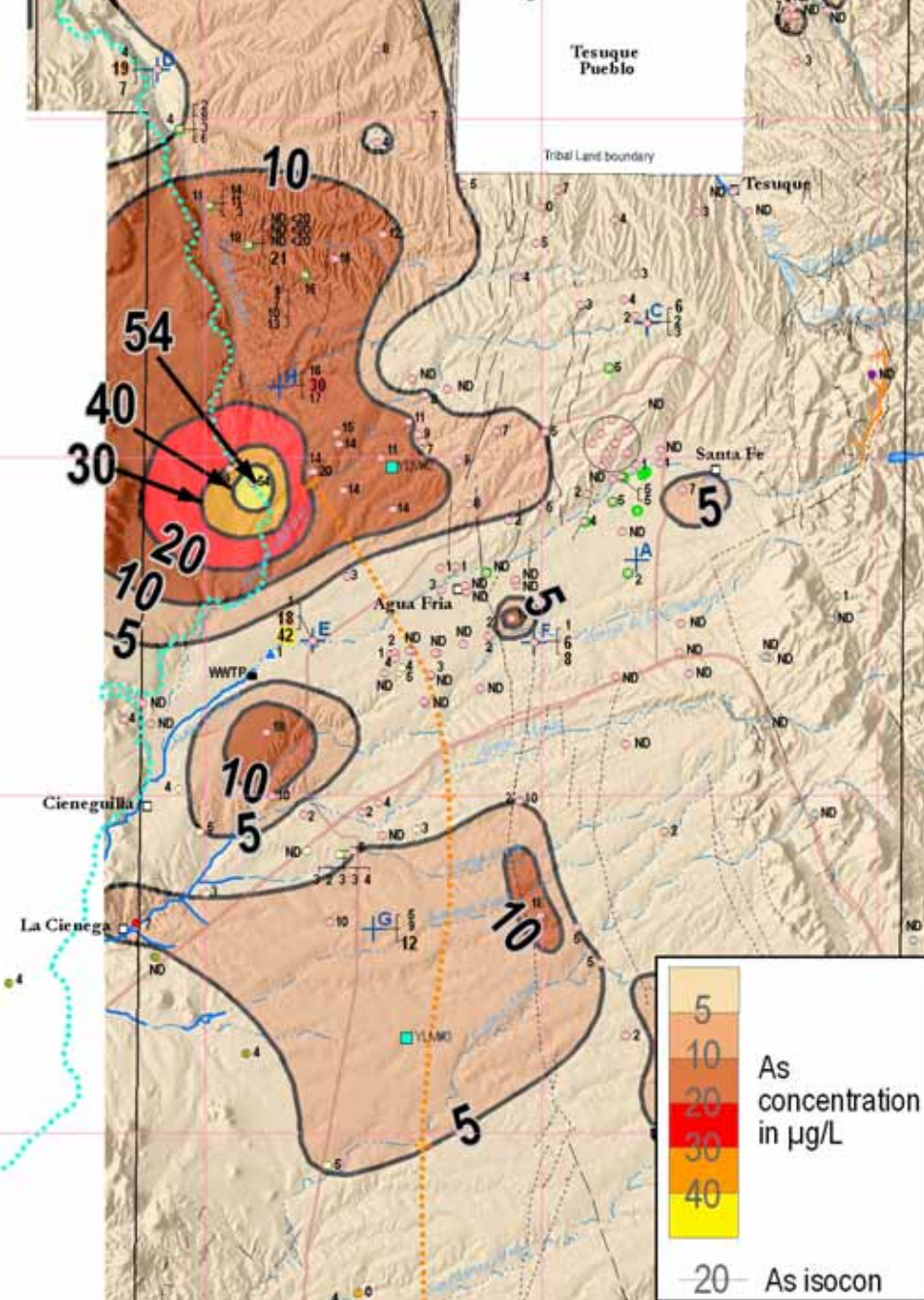
# The Santa Fe Area

## THE PRODUCTS:

- Geologic framework – maps, cross sections and 3-D model of aquifers
- Developed long-term regional water-level monitoring networks for NMOSE and City
- Analyzed water quality and the chemical character of aquifers
- Parameters for City/County ground-water model: aquifer layers, aquifer properties, and updated water levels for model calibration

## THE FUNDING:

- NMBGMR AQUIFERMAP Program
- NMBGMR STATEMAP Program – \$300K Federal funding since 2000
- NMOSE Hydrology Bureau – \$175K
- Santa Fe County – \$10K



# Santa Fe Area Reports

*Influence of Basement Structure on Shallow Aquifer Geochemistry in the Santa Fe Embayment of the Española Basin, Northern Rio Grande Rift*

Peggy S. Johnson and Daniel J. Koning, NMBGMR; V.J.S. Grauch and A. Manning, USGS

*Geophysical Interpretations of the Southern Española Basin, New Mexico, That Contribute to Understanding Its Hydrogeologic Framework*

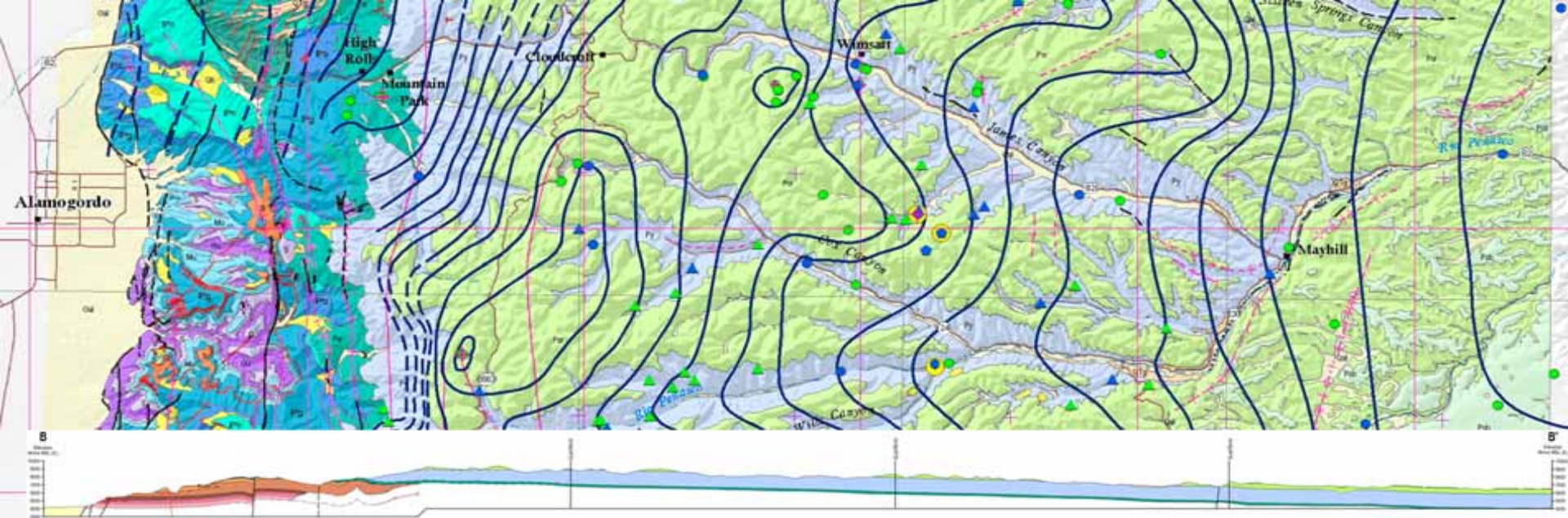
V.J.S. Grauch, J.D. Phillips, V. Bankey, USGS; D.J. Koning and P.S. Johnson, NMBGMR

*Geochemical Characterization of Ground Water In the Southern Española Basin, Santa Fe County, New Mexico*

Peggy S. Johnson, Daniel J. Koning, Stacy W. Timmons, and Brigitte Felix, NMBGMR

*Report of Findings from 2003 and 2004 Hydrogeologic Studies, Española Basin, New Mexico, Technical Completion Report for NMOSE*

Peggy S. Johnson, Daniel J. Koning, and Adam S. Read

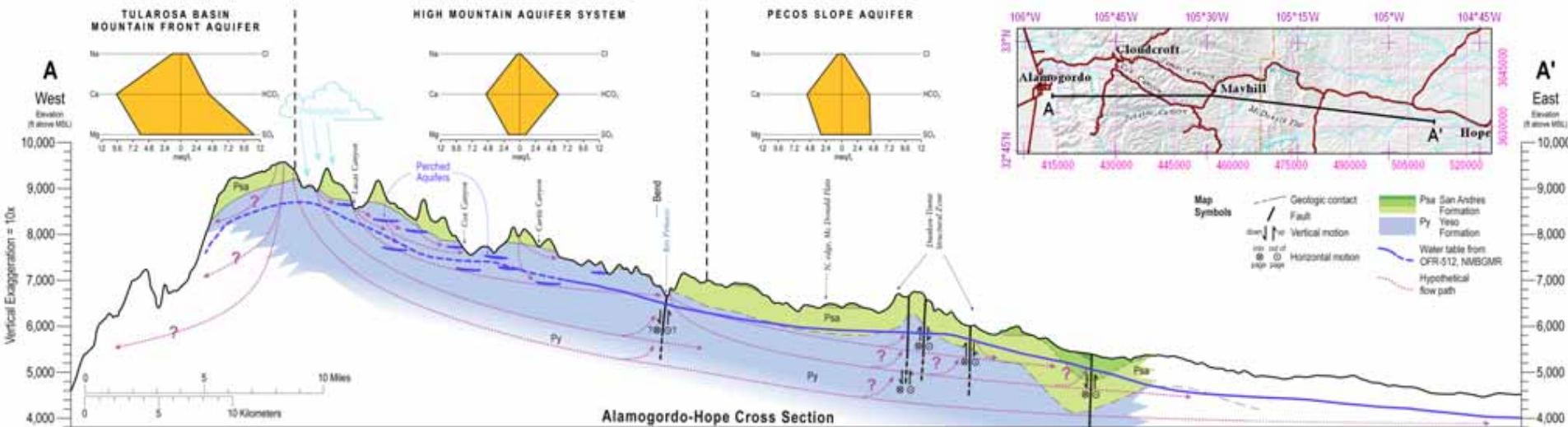


# Southern Sacramento Mountains

**THE ISSUES:** What are the effects of tree thinning and climate variability on the local hydrologic balance; the hydrogeology of the mountain block and its connection with adjacent aquifers (Pecos Slope and Salt Basin).

**THE GOAL:** Support scientifically sound decisions regarding vegetation and watershed management, and ground water development in mountain and adjacent aquifers.





# Southern Sacramento Mountains

## THE PRODUCTS:

- Geologic framework – maps, cross sections and 3-D model of aquifers
- Developed long-term regional water-level monitoring network
- Analyzed water quality and the chemical character of aquifers
- Conceptual model of ground-water flow, recharge to adjacent aquifers
- Watershed study – effects of tree thinning on local water balance

## THE FUNDING:

- NM Legislature (NMDA/NMSU and Otero SWCD) – \$2.362M
- NMBGMR STATEMAP Program – \$297K Federal funding since 2004
- NMISC – \$150K to watershed study

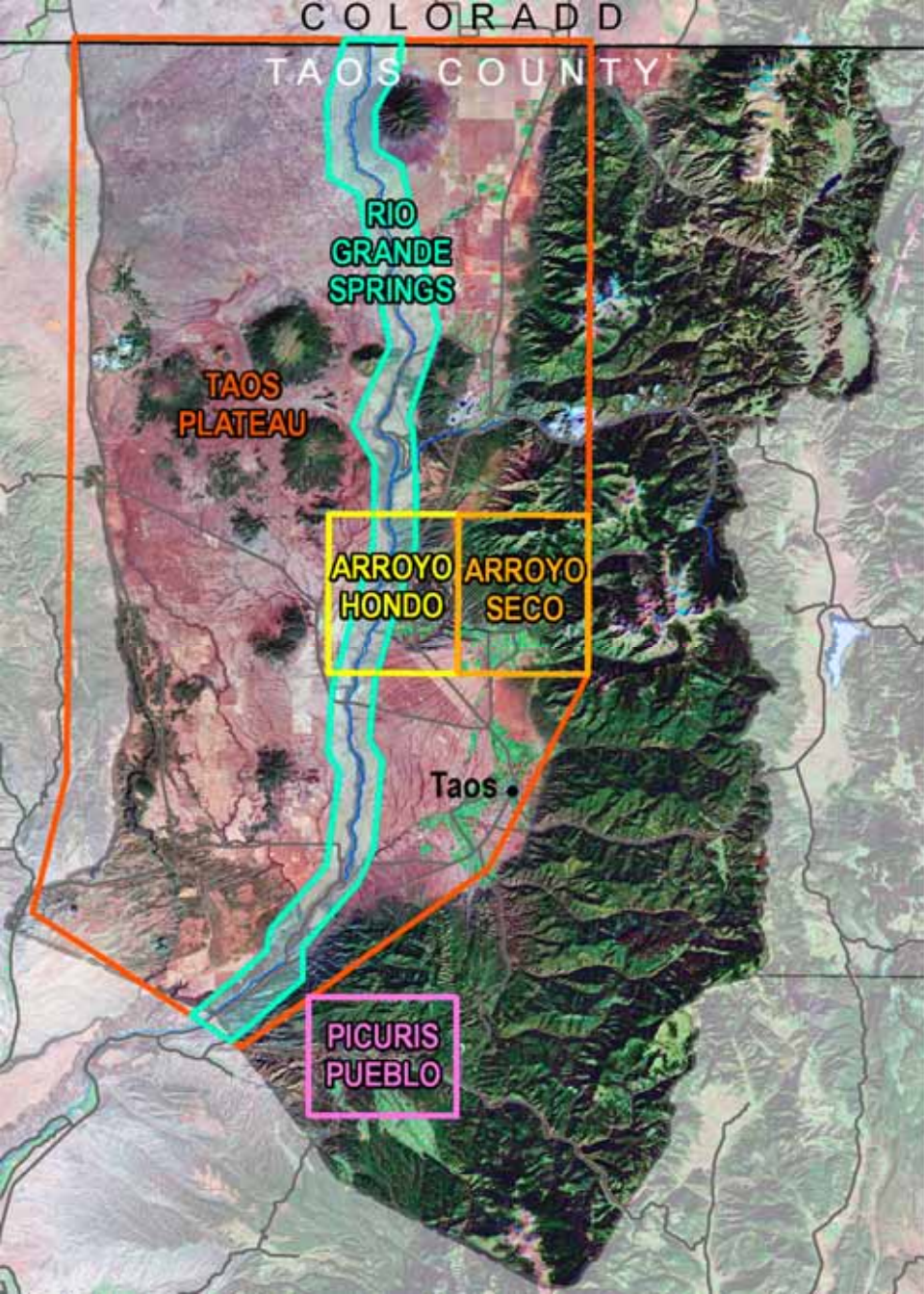
# Sacramento Mountains Reports

*2009, Sacramento Mountains hydrogeology study*, Update of Open-File Report 512

*2009, Sacramento Mountains hydrogeology study*, T. Newton, G. Rawling, S. Timmons, F. Partey, and B. Felix, NMGMR June 2009 Progress Report

*2008, Sacramento Mountains hydrogeology study*, G. Rawling, S. Timmons, T. Newton, P. Walsh, L. Land, T. Kludt, M. Timmons, P. Johnson, and B. Felix, NMBGMR Open-File Report 512

*2007, Water level responses and preliminary spring chemistry results: Progress report on the hydrogeologic study in the southern Sacramento Mountains*, S. Timmons, G. Rawling, P. Johnson, L. Land, and J. Morse (abs.), New Mexico Geological Society, 2007 Spring Conference, New Mexico Geology Journal



# Taos County

## THE ISSUES:

- NMISC administration of Rio Grande compact
- Taos County land use planning and rural development relying on shallow aquifers
- Taos SWCD programs to protect watersheds and recharge areas.

**THE GOAL:** Support scientifically sound policy decisions regarding regional ground water development, Rio Grande compact administration, and protection of recharge areas and watersheds.

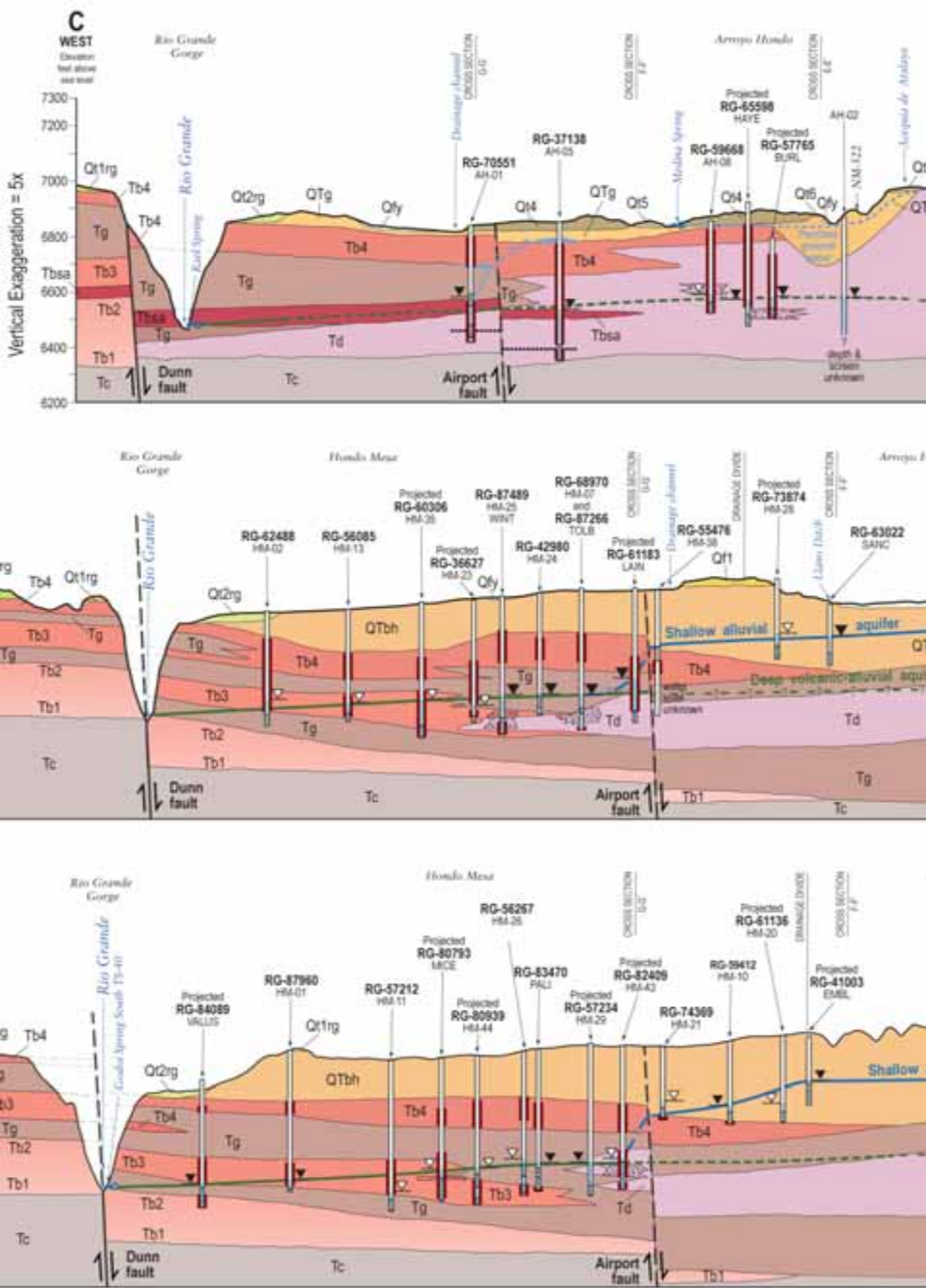
# Taos County

## THE PRODUCTS:

- Geologic framework – maps, cross sections and 3-D model of aquifers
- Regional and local water-level maps
- Age dating of Rio Grande springs and regional ground water
- Conceptual model of ground-water flow, stream/aquifer interconnection, and recharge/discharge

## THE FUNDING:

- NMBGMR AQUIFERMAP Program
- NMBGMR STATEMAP Program – \$260K Federal funding since 1995
- NMISC – \$55K
- Taos County – \$75K
- Healy Foundation – \$75K
- US BOR - \$61K



NEW MEXICO BUREAU OF GEOLOGY AND MINERAL RESOURCES

# Taos County Reports

*2009, Hydrogeologic Investigation of the Arroyo Hondo Area, Taos County, New Mexico*, Final Technical Report Prepared for Taos County, P. Johnson, P.W. Bauer, and B. Felix, NMBGMR Open-File Report 505

*2007, Springs of the Rio Grande Gorge, Taos County, New Mexico: Inventory, data report, and preliminary geochemistry*, P.W. Bauer, P.S. Johnson, and S. Timmons, NMBGMR Open-File Report 506

*2005, Geology and Hydrogeology of the Arroyo Seco Area, Taos County, New Mexico*, G. Rawling, NMBGMR Open-File Report 492, CD-Rom

# Benefits and Products of AQUIFERMAP Program

- Baseline geologic and hydrologic information
- Long-term water-level monitoring networks
- Databases of existing hydrogeologic information
- Interpretive reports and maps publicly available
- Scientifically defensible decision making

# Possible Future Projects

- Continue local- to regional-scale hydrogeologic assessments to meet State, County, Municipal, and Rural water needs
  - Alamosa Creek and Plains of San Agustin (NMISC, NMED, NMEMNRD)
  - Miranda Canyon, southern Taos County (Taos County)
  - White Sands National Monument, Tularosa Basin (National Park Service)
- Deep aquifer characterization – NMBGMR's Subsurface Data Center (NMISC)
- Uranium and mining legacy issues – impacts to ground water (NMED)
- Carbon sequestration

## Aquifer Mapping Program - Staff Needs (Permanent Recurring)

	PROGRAM STAFF
NMBGMR Base Budget	Senior Hydrogeologist, Project Manager
	Field Geologist
Current Soft-Money Staff	Staff Hydrologist
	Hydrogeochemist, Lab Manager
	Field Geologist
	Hydrologic Field Technician
	Hydrologic Field Technician
	ArcGIS & Graphics Technician
	Student
Future Staff Needs	Senior Hydrogeologist
	DataBase Manager



Program Staff	Aquifer Mapping Program - Annual Funding Needs (Permanent Recurring)						
	Full-Time Equivalent	Base Salary	Benefit (38%)	Travel	Lab	Supplies & Misc	Property / Vehicle
Senior Hydrogeologist, Project Manager	1	\$80,000	\$30,400	\$4,000	\$65,000	\$5,000	\$20,000
DataBase Manager	0.5	\$20,000	\$7,600			\$2,500	
Staff Hydrologist	1	\$60,000	\$22,800	\$3,000			\$10,000
Hydrogeochemist, Lab Manager	1	\$60,000	\$22,800	\$3,000		\$2,000	
Field Geologist	1	\$55,000	\$20,900	\$3,000		\$2,000	
Hydrologic Field Technician	1	\$45,000	\$17,100	\$3,000		\$2,000	
Hydrologic Field Technician	1	\$45,000	\$17,100	\$3,000		\$2,000	
ArcGIS & Graphics Technician	1	\$38,000	\$14,440	\$1,000		\$2,000	
Student	1	\$25,000	\$0	\$500			
<b>Sub-Totals</b>	<b>9.5</b>	<b>\$428,000</b>	<b>\$153,140</b>	<b>\$20,500</b>	<b>\$65,000</b>	<b>\$17,500</b>	<b>\$30,000</b>
		<b>\$581,000</b>		<b>\$20,500</b>	<b>\$112,500</b>		
	<b>\$714,000 full program funding</b>						
Current Soft Money Hire	<b>\$259,000 current program funding</b>						
Future Staff Needs	<b>\$455,000 additional funding needed</b>						

# NMBGMR and AQUIFERMAP Web Links

- [www.geoinfo.nmt.edu](http://www.geoinfo.nmt.edu)
- [www.geoinfo.nmt.edu/resources/water](http://www.geoinfo.nmt.edu/resources/water)



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