Sole Source Aquifer Petition

Support Document

La Cienega Valley Area Aquifer

Santa Fe County

New Mexico

DATE: May 20, 2002

by **U.S. ENVIRONMENTAL PROTECTION AGENCY**
REGION 6, DALLAS, TEXAS

Table of Contents

I. Introduction

A. Statement of Section 1424 (e)

The Safe Drinking Water Act (SDWA), Public Law 93-523, of December 16, 1974 contains a provision in Section 1424(e), which states that:

> If the Administrator determines, on his own initiative or upon petition, that an area has an aquifer which is the sole or principal drinking water source for the area and which, if contaminated, would create significant hazard to public health, he shall publish notice of that determination in the Federal Register. After the publication of any such notice, no commitment for Federal financial assistance (through a grant, contract, loan guarantee, or otherwise) may be entered into for any project which the Administrator determines may contaminate such aquifer through a recharge zone so as to create a significant hazard to public health, but a commitment for Federal financial assistance may, if authorized under another provision of law, be entered into to plan or design the project to assure that it will not so contaminate the aquifer.

This section allows for the specific designation of areas which are dependent upon an aquifer as their drinking water source. Following designation, the review process ensures that federal agencies will not commit funds toward projects which may contaminate these ground water supplies so as to create a significant hazard to public health.

B. Receipt of Petition

On October 25, 2000, the La Cienega Valley Citizens for Environmental Safeguards (LCVCES) petitioned the Administrator of Region 6, United States Environmental Protection Agency (EPA), to designate the La Cienega Valley Area aquifer of New Mexico a sole or principal drinking water source for the area which, if contaminated, would create a significant hazard to health. The petition was assembled and submitted by Elaine Cimino, acting for the LCVCES, and the analysis of geology and hydrology for the petition was performed by Zane Spiegel who has conducted investigations in this area for professional reports.

The EPA solicited public comments on this request during a public comment period from January 16, 2001, to March 5, 2001, and at a public hearing and town meeting on February 15, 2001. The public comment period was reopened from April 11 to May 14, 2001, following receipt by EPA of revisions to the petition.

C. Area of Consideration

The proposed designation (Figure 1) covers an area approximately 20 miles in diameter which includes Eldorado and La Cienega in the south, the City of Santa Fe on the north, and, additionally, includes a strip of land two miles wide along the Santa Fe River extending 8 miles upstream from McClure Reservoir. The U.S. census for 2000 shows a total population in the petitioned area of nearly 100,000, including 62,203 in the City of Santa Fe.

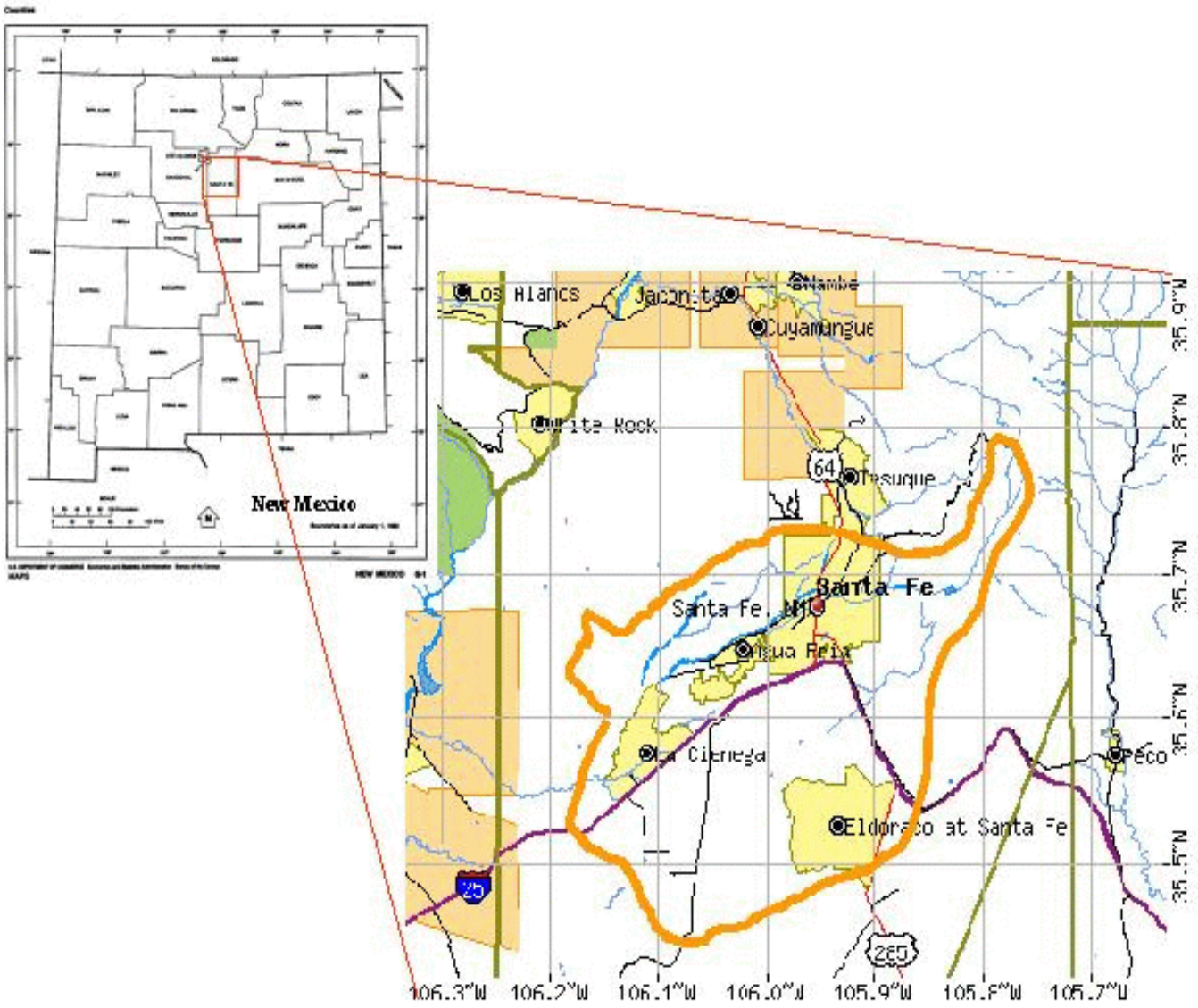


Figure 1. La Cienega Valley Area Sole Source Aquifer Petition
Boundary of petition area in orange

II. Hydrogeology

A. Regional Geologic Framework

Ground water underlying the proposed SSA area is contained primarily in sedimentary layers which form part of a larger aquifer complex known as the Rio Grande aquifer system (Fig. 2).

The U.S. Geological Survey describes this system as a "network of hydraulically interconnected aquifers in basin-fill deposits located along the Rio Grande Valley and nearby valleys" (Ground Water Atlas of the the United States). In New Mexico the Rio Grande is bordered by an irregular terrain of mountains and high tablelands which close in and constrict the river at various points, producing natural segments or basins along the river. Santa Fe and the area proposed for designation lie within the Española Basin which covers parts of Santa Fe County and two adjacent counties to the north.

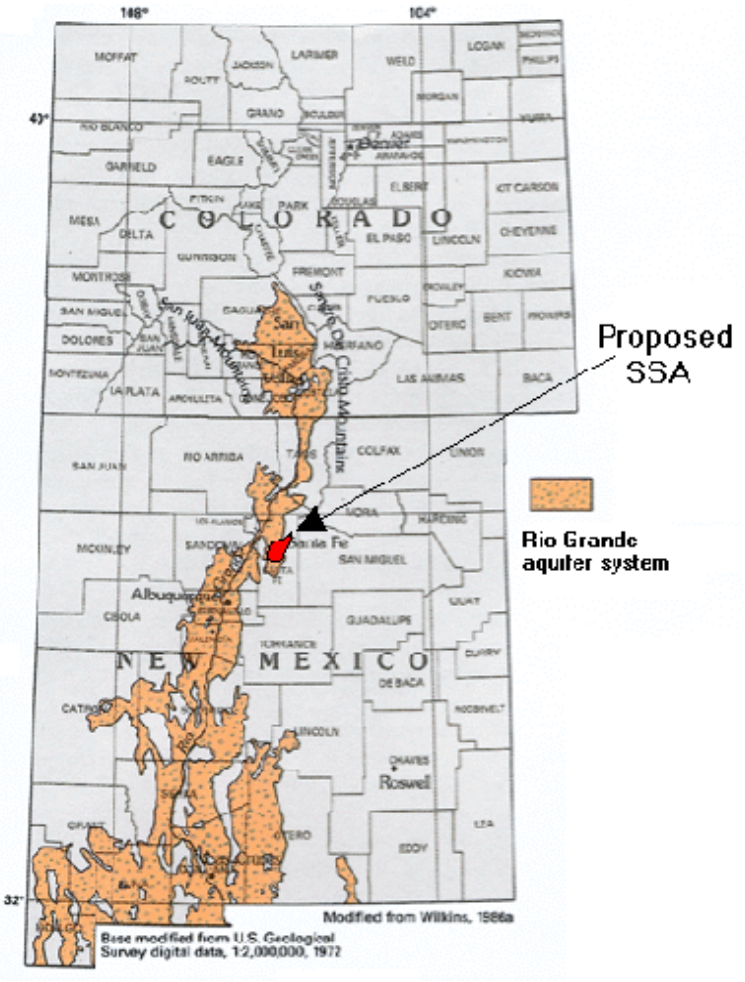


Figure 2. Rio Grande Aquifer System
(from USGS Ground Water Atlas of the United States)

The Rio Grande aquifer system and the course of the Rio Grande are controlled by a structural feature called the Rio Grande Rift. Faulting and vertical movement of large blocks of the earth's crust in the Rift control the location of the River and the sedimentary basins along the River. Figure 3 shows the Rift at Albuquerque and illustrates the nature of the processes acting all along the Rio Grande in New Mexico.

Downward movements of fault blocks have created a valley between uplifted fault blocks on the east and west. Vertical displacements have been in the thousands of feet for some of the blocks, creating a valley which has been filled with volcanic rocks and sediments shed from the adjacent highlands.

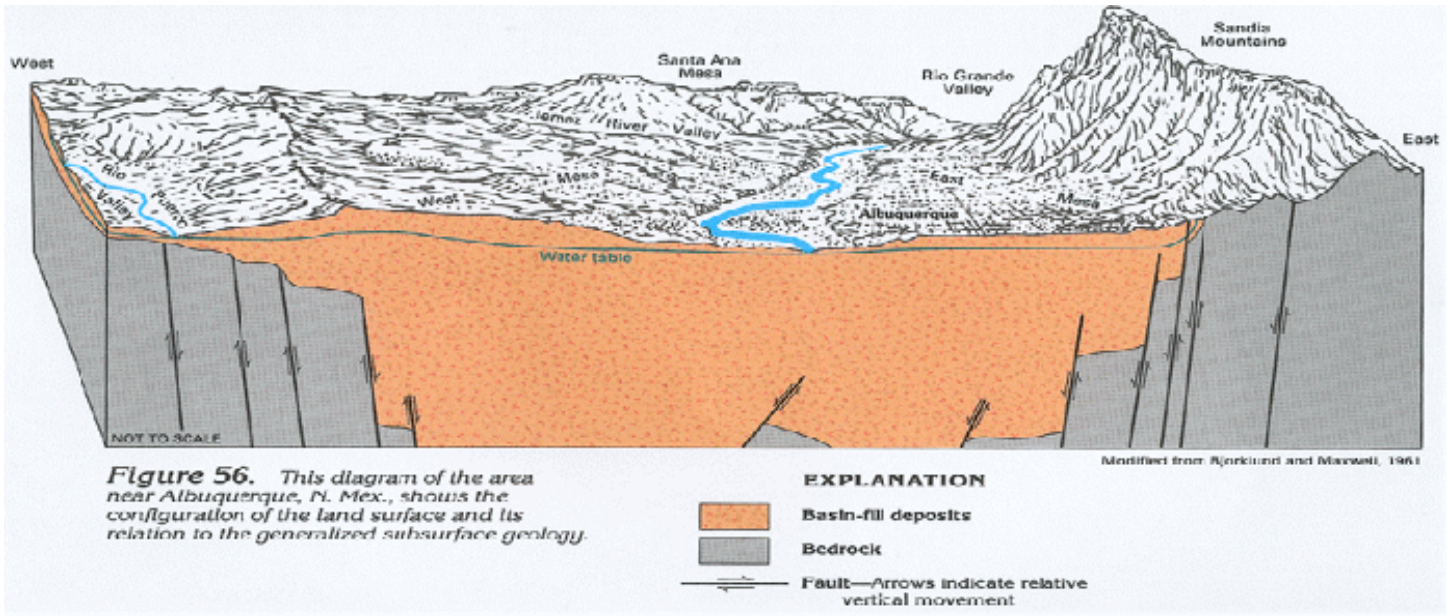


Figure 56. This diagram of the area near Albuquerque, N. Mex., shows the configuration of the land surface and its relation to the generalized subsurface geology.

Figure 3. The Rio Grande Rift at Albuquerque

(from USGS Ground Water Atlas of the United States)

The bedrock that forms the boundary of the basins consists primarily of dense igneous and metamorphic rocks and some sedimentary and volcanic rocks. Most of these rocks have low permeability, and the bedrock as a whole is considered to form an impermeable base to the Rio Grande aquifer system. However, in local areas some volcanic rocks, carbonate rocks or extensively fractured beds can yield water.

The Rio Grande aquifer consists of several elements. A large amount of the sediment fill near the basin boundaries is formed predominantly of coarse sand and gravel which was deposited in alluvial fans by streams flowing off the mountains. Moving inward toward the basin center, these alluvial fan deposits generally grade into and intertongue with, either fine-grained playa deposits in closed valleys or medium-to coarse-grained sediments deposited by the Rio Grande.

The principal water-yielding materials of the basin-fill are divided into two major aquifer groups. The older (Tertiary-Quaternary) basin fill is made up of the Santa Fe Group over most of the area, with a lateral equivalent, the Gila Conglomerate, occupying the southwestern part of the aquifer system. The Santa Fe Group consists of unconsolidated or moderately consolidated lenticular deposits of gravel, sand, and clay interbedded in some areas with lava flows, tuffs, and breccias. The younger basin fill of Quaternary age consists of unconsolidated, poorly to well-sorted layers of gravel, sand, silt, and clay. Terrace deposits of gravel, sand and silt stand 30 to 175 feet above the level of the present floodplain of the Rio Grande.

B. Geology and Hydrology of the Santa Fe Area

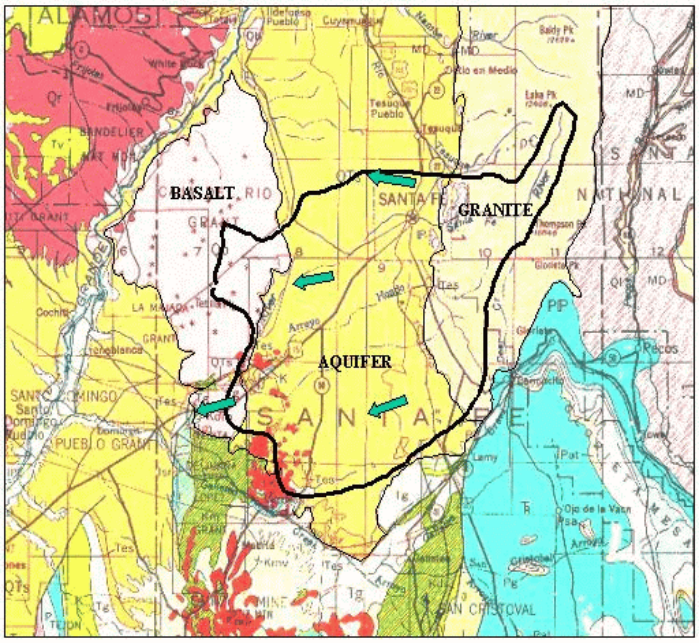


Figure 4. Geology of the Petitioned Area
Modified from Dane and Bachman, 1965
Green arrows indicate ground water flow

A generalized geologic map of the Santa Fe area, modified from the Geologic Map of New Mexico (Dane and Bachman, 1965) is shown at left. Flow directions for ground water are inferred from water level elevations shown in Spiegel and Baldwin, 1963.

The geology and hydrology of this area are described in detail by Spiegel and Baldwin (1963). Mr. Spiegel authored the portion of the petition dealing with these topics and has provided additional details of the geology which are discussed in the next section.

The major geologic and hydrologic elements of the area consist of an aquifer (termed "Aquifer" hereafter) which occurs in the central and southwest portions of the proposed sole source aquifer area, with granitic basement rocks on the eastern side and volcanic rocks on the west. The general relationships of these elements in the subsurface and the flow of ground water is indicated diagrammatically in the cross-section below (Figure 5).

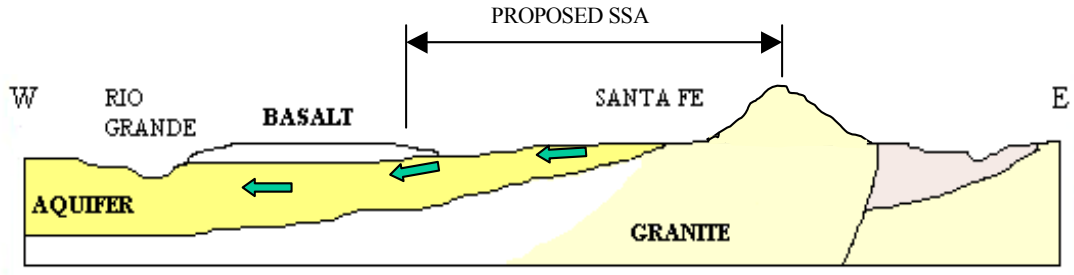


Figure 5. Diagrammatic Cross-Section, Santa Fe Area
Not to scale

The east side of the area includes a portion of the Sangre De Christo Mountains. The geology is dominated by Precambrian crystalline basement rocks, mostly in the form of granite, with minor amounts of metamorphic rock. Fractured basement rocks and thin alluvial deposits along streams may produce some water.

West of Santa Fe, and located partly within the proposed SSA area are a series of volcanic rocks labeled "Basalt" for convenience in the figures above. Although basalt dominates, andesite is common among the many flows which have contributed to the volcanic complex that forms a broad layer over the Aquifer (Dane and Bachman, 1965).

The area identified as "aquifer" in the petition is comprised of several units, described there as follows:

> "The 'aquifer' is not a single unit (element) but an assemblage of three principal aquifer elements and several older elements, all hydraulically connected, thus forming a single aquifer system, termed herein the La Cienega Valley Area Sole Source Aquifer System..."

The principal Aquifer elements, as described in the petition are:

> "...the Tesuque and Ancha formations of the Santa Fe group (upper Tertiary and Pleistocene age, respectively; Baldwin, 1963, p. 86-89), and in some arroyo channels and fringe areas, Quaternary sediments."
>
> "The principal aquifer elements of the LCVASSA are simple in stratigraphy and structure–a generally westerly dipping sequence of interfingering beds of clay, siltstone, and sandstone, called the Tesuque formation (Miocene to Pliocene age), overlain unconformably by a thick sheet-like layer (Ancha Formation, of Pleistocene age) of poorly cemented, pebbly and bouldery piedmont deposit, with an irregular base deposited on an erosional surface with several well-defined buried valleys that had been cut into the tilted sequence of the underlying Tesuque Formation."

The Aquifer ranges up to about 300 feet thick at Cieneguilla on the western side of the area proposed for designation.

C. Petitioner's Basis for Boundaries of Proposed Sole Source Aquifer

Figure 6 combines several elements including the proposed boundaries, surface- water flow directions and the major geological elements in the area, in order to illustrate the nature of the proposed boundaries. As shown in the map, the boundaries of the proposed designation coincide with surface watershed boundaries. The proposed sole source aquifer thus

covers the watershed for the Santa Fe River from its origin to a point on the west side of La Cienega, and the watershed for San Marcos Arroyo (a subunit of the Galisteo Creek watershed) from its origin to a point about two miles from its confluence with Galisteo Creek.

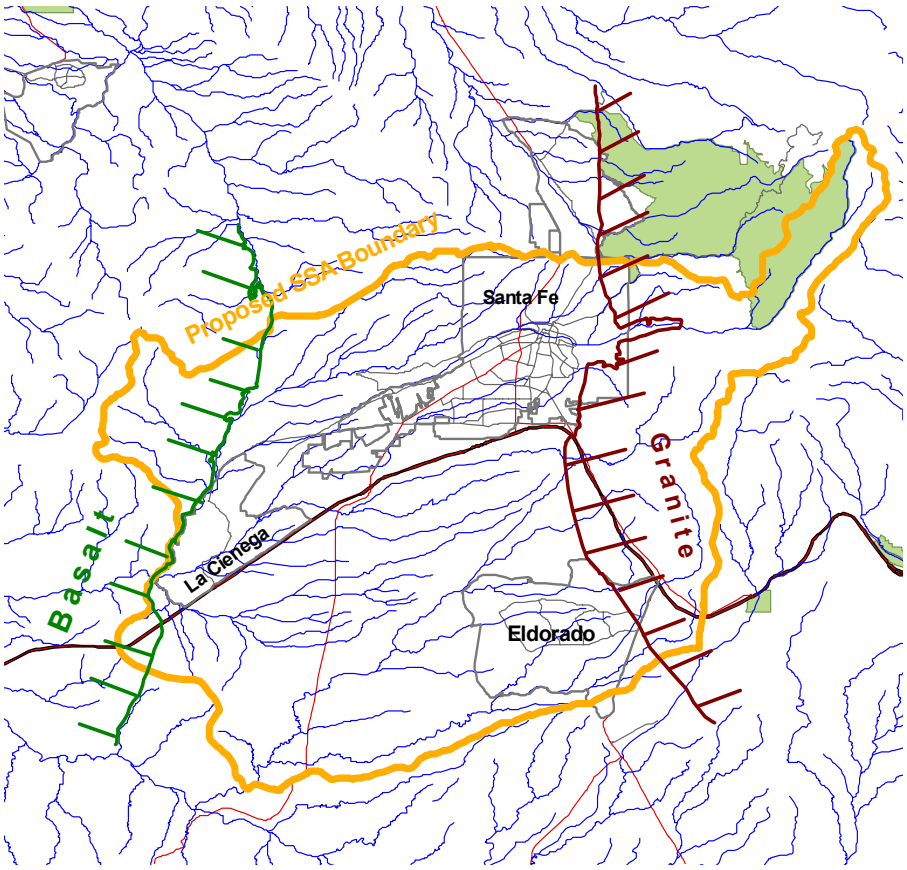
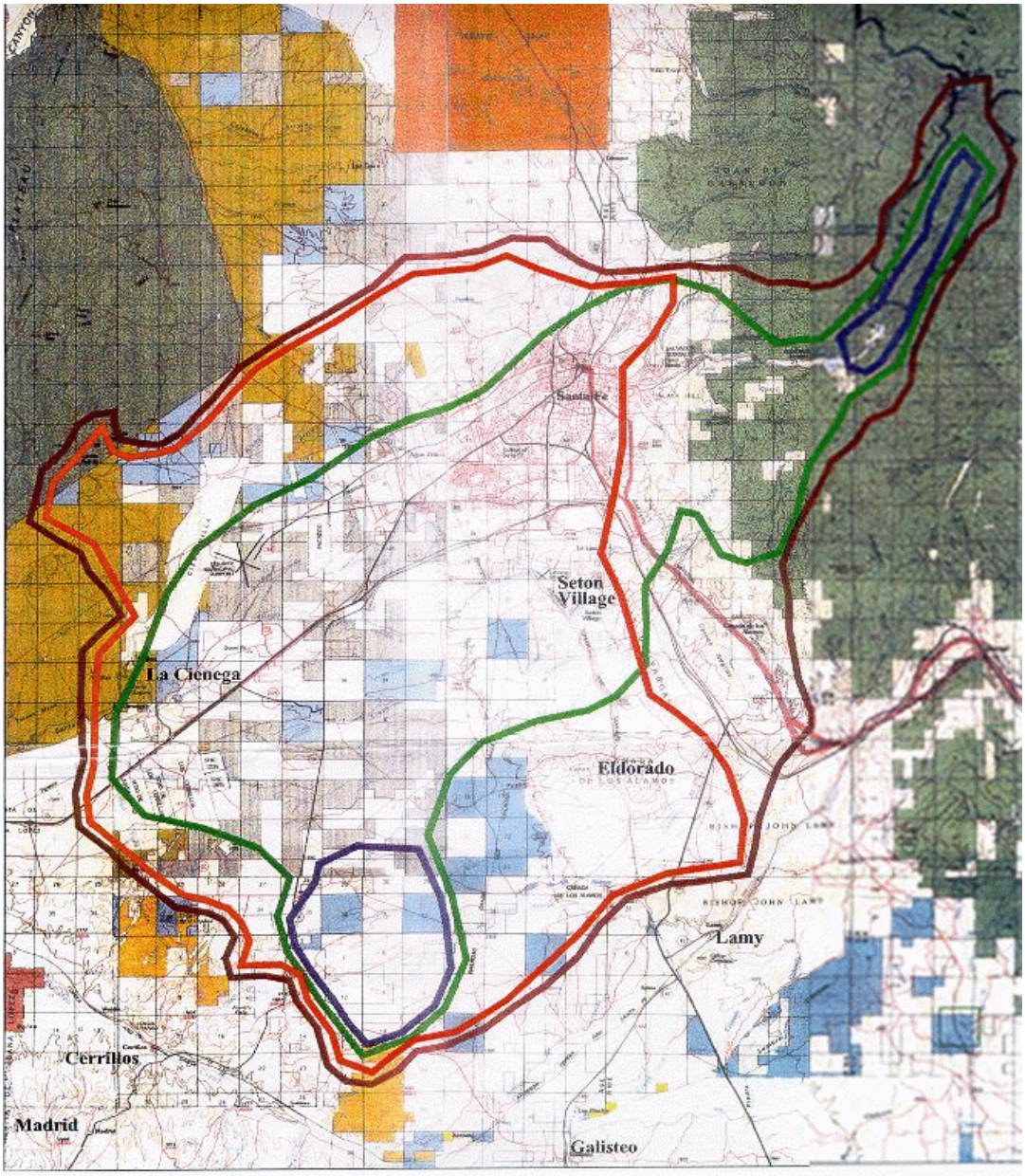


Figure 6. Proposed Boundaries and Area Streams

The petitioner performed a detailed study of the aquifer in the petitioned area, which has lead to a more refined map of the hydrology (Figure 7). The following discussion concerns those elements of the local hydrology and geology which relate to the boundaries of the proposed Sole Source Aquifer.

The area protected by an EPA sole source aquifer designation may include not only the aquifer, but also the a "stream flow source area" which drains onto the aquifer. In the area here proposed for designation, the petitioner does not define a stream flow source area but says that the whole area outlined in the petition, including the granitic area, is occupied by aquifers, some principal, some minor. This is described in the petition as follows:



La Cienega Valley Area
Sole Source Aquifer

Principal Aquifer	
Sub-aquifer	
Recharge Area	
Sole Source Aquifer Area	

> "There are no 'non-aquifer units' in the LCVASSAS area, as some springs and wells exist, even in the least likely geologic units, and if wells had not been drilled in them the original springs and occasional wet season flows now, would have continued to contribute to lateral recharge or overflow into the three principal aquifer elements."

On the east, the boundary of the system is located on the granite of the Sangre de Cristo Range, and separates the watershed of the Santa Fe River from the watersheds of the Pecos River and most of the Galisteo Creek watershed. Ground water along this border is contained in the fractured granite, and the surface watershed defines the boundary of ground water flow as well as surface flow.

The southern boundary, along the watershed for San Marcos Creek, separates the proposed designation area from the Galisteo valley which contains a thick sequence of low transmissivity rocks with water of generally poor chemical quality. As stated in the petition, "The south edge of the aquifer system is formed by a thinning of the principal aquifer elements on a northwesterly-sloping base of older, low transmissivity aquifer elements (which formerly supplied only small amounts of water to the pincipal aquifer elements) which has been truncated by downfaulting of large blocks and subsequent erosion by Galesteo River." The low transmissivity of the rocks beyond this point exercises some control on ground water flow which here is approximately parallel to the watershed boundary.

On the west the boundary is controlled by the high mesas of basaltic and andesitic lava flows. In this area the boundary lies partly on the basalt where it defines a watershed boundary for an area which drains eastward to the Santa Fe River. In terms of ground water flow this boundary is distinguished by a change in hydrologic environment for the aquifer beneath the basalts. The petitioner argues that ground water flow beneath the mesas is restricted because of the presence of an uplifted block of low transmissivity rocks and by barriers in the form of vertical dikes which served as feeders for the volcanic rocks of the area. As described, the restriction on ground water flow has resulted in discharge to the surface in this area, which explains the presence of springs in the La Cienega area.

The northern boundary is defined by the watershed of the Santa Fe River. North of this boundary surface water flows in a northwestly direction, circumventing the elevated basaltic area, and ultimately moves to the Rio Grande River. As described in the petition, "Although the Tesuque Formation continues northward beyond the Santa Fe River, it lacks the thick section of better-sorted and poorly-cemented sandstones found along the present river, which is one reason that Santa Fe River is effectively the north boundary of the LCVASSAS." The petition goes on to say that this boundary is appropriate because of the lack of access to any alternative water supplies to the north and because of institutional constraints resulting from the presence of several Pueblos north of Santa Fe.

D. EPA Region 6 Assessment of Petitioned Boundaries

The Safe Drinking Water Act does not contain specific criteria for defining the boundaries of sole source aquifers. However, the "Sole Source Aquifer Designation Petitioner's Guidance" issued by EPA in 1987 says:

> "A petitioner may request designation for part of an aquifer, an entire aquifer or an aquifer system. This follows from the definition of an aquifer as a geological formation, group of formations or part of a formation capable of yielding a significant amount of water to a well or spring. A petitioner can petition for part of an aquifer if that portion is hydrogeologically separated from the rest of the aquifer."

The proposed designation covers parts of the Tesuque and Ancha formations along with associated Tertiary alluvium along stream courses (the three principal aquifer elements, as described in the petition). These three elements are in direct physical contact over a broad area and they form a unit which contains numerous wells and is locally a highly productive aquifer.

The granitic rocks on the east side of the proposed designation are also proposed as a part of the aquifer unit. The granite does not appear to constitute an aquifer in the normal sense of the term but can serve as an aquifer locally where there are numerous fractures. However, there is no indication that such areas are widespread. In describing the granite in the area around Santa Fe Spiegel and Baldwin (1963) said, "Drilling is extremely difficult, and the probabilities of obtaining even small domestic supplies of water from wells are small except in valleys and other depressions, which may indicate presence of zones of fractured rocks and in which depths to water are generally less than 100 feet." Most of the granite in the proposed SSA is probably not capable of producing water of adequate quantity and in sufficient duration to supply domestic wells, as reflected by the fact that the State Engineer's inventory of water wells contains no entries for this area except along its westernmost edge. The hydraulic interconnection of the granites with the Santa Fe aquifer and the alluvium is indirect over most of the area because much of the water contained in the granite discharges to the surface before reaching the recharge area of the principal aquifer. Although the granites provide a portion of the baseflow for streams which recharge the Santa Fe aquifer, the hydrostatic regimes of these two areas are largely independent (e.g. changes in hydrostatic heads of the ground water in the Santa Fe group will have little or no affect on ground water in the granite). The granitic area occupying the eastern portion of the proposed designation does provide water which recharges the aquifer and is recognized here as a stream flow source area for the Aquifer to the west; as such it is eligible for inclusion in the project review area if designation should be granted.

The other boundaries of the Aquifer as described are related to geologic and hydrologic characteristics. The southern boundary of the Aquifer is parallel to changes in the physical character of the aquifer which influence the direction of ground water flow. For the western side of the proposed area the petition presents evidence that ground water flow is restricted by full or partial barriers. The northern boundary is described as representing a change in grain size in the

aquifer and is roughly parallel to flow lines for ground water but does not follow them in detail and is not defined by them.

Because the proposed Aquifer boundaries are not, in many places, barriers to ground water flow the proposed area does not strictly distinguish a part of the aquifer which is hydrogeologically separated on the basis of limits on flow. However, the area identified in the petition does appear to define a viable *management unit* for ground water, in that all of the recharge for the proposed area originates within the boundaries of that area. Protection of the ground water for that area could be accomplished by proper management of contaminant sources within the boundaries.

III. Water Use

A. Sources of Drinking Water in the Petitioned Area

In analyzing water use for the area two water user groups are identified; 1) those served by the municipal water supply system for the City of Santa Fe, and 2) those not served by the City's water system.

The water supply system for the city of Santa Fe makes use of three sources of water:

- Surface water is supplied by reservoirs on the Santa Fe River
- Ground water is supplied from wells within the proposed SSA and,
- Ground water is supplied from wells (Buckman Field) outside the proposed area

The population of the area outside the City depends on the Aquifer as a source of drinking water. This population relies on domestic wells or small water systems with wells in the Aquifer.

B. Population of the Petitioned Area

Census data for the year 2000 estimate the resident population in the City of Santa Fe as 62,203. The city also has a large nonresident temporary population of tourists and people attending meetings and conventions. The Santa Fe Convention and Visitor's Bureau estimates that the City has one to two million visitors annually, and that approximately 30% of those visitors are attendees at meetings who stay for 3 to 4 days, and 70% of the visitors are tourists ("transient population") who stay 4 to 5 days (personal communication, 10/1/2001). Taking the middle values for all these estimates leads to the following:

1.5 million visitors X 0.3 X 3.5 days = 1.575 million days/365 = 4,315 visitor years

+

1.5 million visitors X 0.7 X 4.5 days = 4.725 million days/365 = 12,945 visitor years

total = 17,260 visitor years

The population of the city, in terms of drinking water use, is thus:

Resident population, 62,203 + Transient population, 17, 260 visitors = 79,463

Based on census tract information for 2000, the population of the petitioned area outside the city is 36,803. There are no available estimates of transient population for the area outside the city. Because of the relatively great concentration of travel lodging within the city and its scarcity outside the city, transient population probably contributes little to drinking water consumption outside the city. The drinking water population estimated for the petitioned area is:

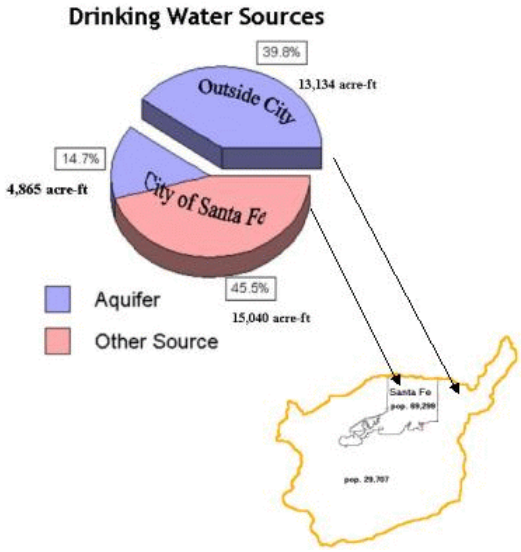
City of Santa Fe = 79,463
Outside of City = 36,803
total 116,266

C. Determination of Sole or Principal Source of Drinking Water

In order to qualify for designation as a sole source aquifer under Section 1424(e) of the Safe Drinking Water Act, the Aquifer must supply 50% or more of the drinking water in the petitioned area. The following discussion sets forth two methods for determining drinking water use in the La Cienega Valley aquifer area. The first method described is the one presented in the petition, and is based on water rights allocations. The second method is a modified form of a methodology proposed by the City of Santa Fe during the public comment period and makes use of recorded water use in the City of Santa Fe and estimated per capita consumption for the rest of the population in the petitioned area.

Method 1. Estimation Based on Water Rights Allocations

Description: In New Mexico the State Engineer controls water use by issuing water allocations for both surface water and ground water. The petitioner asserts that the Aquifer supplies more than 50% of the drinking water within the petitioned area on the basis of water rights which have been allocated by the State Engineer's Office. Figures supplied by the petitioner from the State Engineer's Office are summarized in Table 1.



Water Source:		Water Rights Allocated Acre-ft/yr	
		Aquifer	Other
City	Surface Water		5,040
	Wells out of SSA area		10,000
	Wells in SSA area	4,865	
Outside City	Wells in SSA area	13,134	
	total	17,999 (54%)	15,040 (46%)

Table 1. Drinking Water Use in Proposed SSA Area Based on Water Allocations

Water rights for wells within the petitioned area total 17,999 acre-feet, thus exceeding the 15,040 acre-feet allocated for other sources of water that supply the area. In addition, the petitioner says that a number of other domestic wells which predate the State Engineer's allocation system (which was begun in the 1950s) exist in the area and that they supply drinking water also, which would further increase the proportion of drinking water supplied by the Aquifer.

Evaluation of Method: The use of water allocations to estimate drinking water usage is subject to certain problems which distort the resulting estimates of water use. One source of error is that the inventory of wells does not accurately reflect the total number of wells in use. As noted above, the inventory does not include wells predating the creation of the State Engineer's inventory. Also, there is no evidence that all of the wells on the State Engineer's inventory are in use. Some of the wells may be rarely used, and abandoned wells may still be present in the data base.

The greatest problem in using allocations to estimate drinking water use is that the minimum allocation assigned by the State Engineer is 3 acre-ft per year (an average of 2,768 gallons per day) for each well, which appears to be unrealistically high as an indicator of drinking water use.

Actual and estimated drinking water use for this area from other sources sharply disagree with the estimates based on allocations. These disagreements are in several respects, as follow:

a) If all the water allocated for this area is divided by the total population (as determined above) the average per capita water consumption is 254 gallons per day (gpd). In contrast, per capita consumption estimated in State and Federal water use reports is generally in the range of 80 to 170 gpd (see discussion in following section).

b) Allocations suggest a per capita rate of 319 gpd for the area outside the City, and 224 gpd within the City. This suggests that per capita use in the City is 42% less in the City than in the area outside. In contrast, water use studies typically find that water use is greater for urban populations, and studies in the Santa Fe area show this to be the case in the area proposed for designation.

c) The City is allocated 19,905 acre-ft, but in the year 2000 used only12,218 acre-ft (61% of its allocation). This illustrates a wide difference between allocation and actual use.

For the reasons presented above it appears that estimated drinking water usages based on water allocations are unrealistically high and do not accurately represent the relative contributions of the different sources.

Method 2: Estimation Based on Reported Water Use and Per Capita Consumption

An estimate of the percentage of drinking water supplied by the Aquifer can also be made based on average per capita water use and records of withdrawals from the different sources by the City's water supply system. During the public comment period for the proposed designation the City of Santa Fe submitted an analysis of drinking water usage in the petitioned area which incorporated these two elements. The City's analysis includes metered water use in Santa Fe and for some areas outside the City along with estimated per capita rates from a report by Wilson and Lucero (1997). On the basis of these figures, the City concludes that the Aquifer supplies only 38% of the drinking water for the area.

The analysis presented below is a simplified version of the one submitted by the City. It makes use of the same general elements and some of the data used in the City's report but the method of calculation depends, in part, on average water use over a large area. This approach is presented in order to illustrate the method used by the city and to confirm the results that the City has presented.

Metered water use by the City of Santa Fe is summarized in the graph below which indicates the contribution of each source for the last 10 years of record.

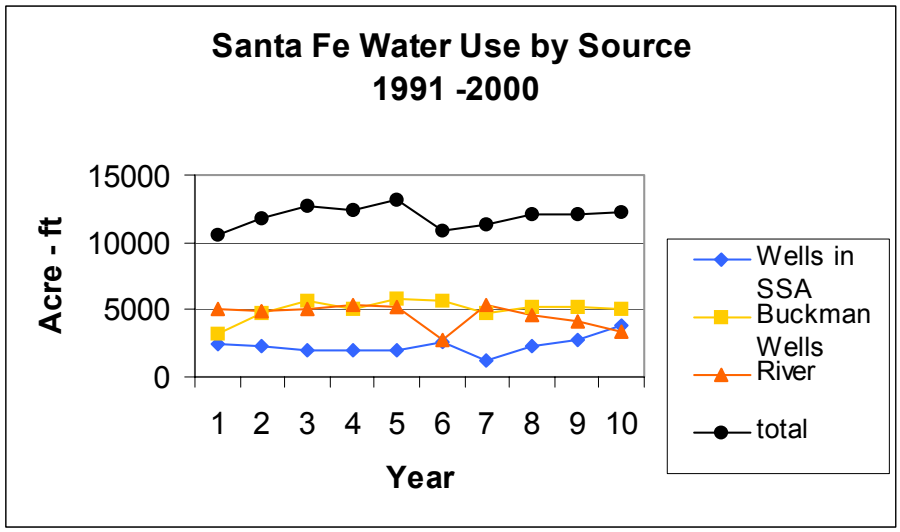


Figure 10. Water Use by Source, City of Santa Fe (based on information supplied by the City of Santa Fe)

The Santa Fe River shows the most fluctuation as a water supply source because the reservoirs are strongly subject to the effects of drought. During dry periods river water forms a smaller proportion of the supply, and the City relies more on its well fields to sustain the City's water needs. This can be seen on the graph, especially during 1996

when river supply fell sharply and use of the aquifer increased, and during the successive years when the amount of river water used is inversely related to use of the Aquifer.

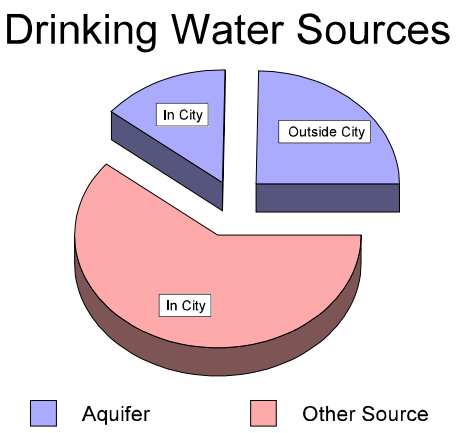
Over the ten year period shown above, the Aquifer provided an average of 2,283 acre-ft per year of water for the City, while the other sources (Buckman Field and the River) provided 9,591 acre-ft per year. The Aquifer thus provided 19.2% of the City's water, and other sources accounted for 80.8 % of the water.

The Aquifer is the source of all drinking water in the area outside the City. Some of this water is supplied by public water supply systems and some by domestic wells. Wilson and Lucero (1997) provide a detailed listing for all drinking water sources in Santa Fe County and include estimates of population and volumes of water consumed for each. These figures show a wide range of per capita usage, varying from 42 gpd for the Madrid Water Co-op to 220 gpd for La Vista Homeowners Association. The average per capita consumption outside the City of Santa Fe is 0.10767 acre-ft/year or about 96.1 gpd. This value is consistent with generalized estimates of water use in New Mexico, which are given by the USGS (1990) as 80 gpd for self supplied sources, and 135 gpd for public water supplies.

Applying the per capita rate derived from the figures of Lucero and Wilson to the population in the proposed SSA outside the City of Santa Fe yields the following:

0.10767 acre-ft/yr x 36,733 = 3,955 acre-ft/yr

The Table below and the graphic at left summarize drinking water use in the petitioned area.



AREA	Water Use (acre-ft/yr)	
	Aquifer	Other Sources
City	2,283	9,591
Outside City	3,955	
Total	6,238 (39.4%)	9,591 (60.6%)

Table 2. Drinking Water Use by Source in the Proposed SSA Area Based on Per Capita Consumption and Reported Water Use.

Using Method 2, the aquifer accounts for 39% of the total drinking water used in the proposed SSA area. The simplified method presented here agrees well with the estimation of the City, based on more detailed data, which concludes that the aquifer supplies 38% of the drinking water in the petitioned area.. These results indicate that the area is not eligible for designation under Section 1424(e) of the Safe Drinking Water Act.

Evaluation of Method: For estimating drinking water use this method provides some control in that it makes use of metered sources in the City of Santa Fe. The estimated per capita consumption rate for the area outside the City might be in error to some degree but is based, in part, on metered sources and is consistent with generalized estimates by the U.S. Geological Survey.

In balance, Region 6 believes that the method based on per capita consumption and reported water use is more accurate as a predictor of drinking water usage than the water allocation method. The petition does not show that the Aquifer is the principal source of drinking water in the petitioned area as required by the statute, and the available evidence indicates that it is not.

IV. Alternate Sources of Drinking Water

The Buckman wells, mentioned previously, are located near the Rio Grande River for the purpose of capturing induced flow from the River. The Rio Grande River is thus an intended source of drinking water for the City of Santa Fe as part of a project called the San Juan-Chama Diversion. Under this project the US Bureau of Reclamation has diverted water from the San Juan River and its tributaries to the Rio Grande Valley. A number of cities along the Rio Grande River, including Santa Fe, pay an annual lease to the Bureau for rights to the additional water. Santa Fe has not been able to divert all of the water allowed under its lease through the Buckman field, and there has been discussion of alternative methods to bring water from the River to the City. At this point it is not clear that the necessary legal, technical and political issues involved in providing a new source for the River water will be resolved in the near future.

Any increase in the amount of water provided to the City from this alternate source would further reduce the reliance on the Aquifer in the petitioned area, and would thus have no effect on the conclusion, stated above, that the petitioned La Cienega Valley Area aquifer is not eligible for designation as a sole source aquifer.

V. Summary

In October, 2000, EPA Region 6 received a petition for designation of the La Cienega Valley Area aquifer as a sole source aquifer under Section 1424(e) of the Safe Drinking Water Act. Following a public hearing and receipt of information during two public comment periods the Region has evaluated all of the pertinent information as summarized here.

In its review of sole source aquifer petitions EPA considers 1) the nature of the proposed boundaries for the sole source aquifer, 2) whether the aquifer provides at least half of the drinking water for the area and 3) whether there are any financially feasible alternative sources of water in the area that could replace the aquifer if it were contaminated.

The boundaries of the area proposed for designation are based on surface watershed limits. The proposed boundaries delineate a portion of the Santa Fe group which serves as the aquifer for the area, and watershed areas which drain onto the aquifer. The boundaries do not define a hydrologically separate and distinct unit but they define an area which might be effectively managed to protect ground water within its borders.

The petition presents data to show that water rights allocated by the State Engineer's Office permit more water withdrawal from the Aquifer than from other sources (surface water and imported water) in the area proposed for designation. However, these allocations probably do not reflect the actual amounts of water used in the area. Water use records for the City of Santa Fe and calculations based on estimated per capita water usage rates indicate that the aquifer supplies approximately 39% of the drinking water for the area.

No economically feasible alternate source of water is currently available which could replace the aquifer if it were contaminated.

Based upon the information available, the La Cienega Valley Area aquifer does not meet the technical requirements for SSA designation. Less than fifty (50) percent of the drinking water for the aquifer service area is supplied by the aquifer. Therefore, it is recommended that the petition for designation be denied.

VI. References Cited

Baldwin, Brewster, 1963, "Geology," *in* Spiegel and Baldwin, 1963, Geology and Water Resources of the Santa Fe Area, New Mexico USGS Water Supply Paper 1525, p. 21-90.

Dane, Carle H, and Bachman, George O., 1965, Geologic Map of New Mexico, U.S. Geological Survey.

Longmire, Patrick, 1985, A Hydrogeolchemical Study Along the Valley of the Santa Fe River, Santa Fe and Sandoval Counties, New Mexico: New Mexico Environmental Improvement Division, EID/GWH-85/3, 35 pp.

Spiegel, Zane, and Brewster Baldwin, 1963, Geology and Water Resources of the Santa Fe Area, New Mexico. U.S. Geological Survey Water Supply Paper 1525, 258 p.

U.S. Geological Survey, Estimated Use of Water in the United States in 1990, http://water.usgs.gov/watuse/tables/dotab.st.html

U.S. Geological Survey, GROUND WATER ATLAS of the UNITED STATES; Arizona, Colorado, New Mexico, Utah, HA 730-C, http://capp.water.usgs.gov/gwa/ch_c/C-text4.html

Wilson, Brian, and Anthony A. Lucero, 1997. Water Use by Categories in New Mexico Counties and River Basins, and Irrigated Acreage in 1995, State Engineer Technical Report 49, 149 p.