

**TIER-1 APPLICATION TO THE NEW MEXICO INTERSTATE STREAM COMMISSION
FOR NEW MEXICO UNIT OR WATER UTILIZATION ALTERNATIVE
UNDER THE ARIZONA WATER SETTLEMENTS ACT**

APPLICANT INFORMATION (PRINT OR

DATE: 4-29-11

1. Legal Name: City of Deming	2. Organization: City of Deming			
3. Address (street, city, county, state, and zip code): P.O. Box 706 Deming, New Mexico 88031	4. Name, email, and phone number of contract person: Lawrence Brookey (575) 546-8848 lbrookey@cityofdeming.org			
5. TYPE OF APPLICATION (check one): <input type="checkbox"/> Final <input checked="" type="checkbox"/> Preliminary for review <input type="checkbox"/> Revised	6. TYPE OF APPLICANT (CHECK BOX): <input checked="" type="checkbox"/> local governments or municipalities <input type="checkbox"/> soil and water conservation districts, irrigation districts or commissions, acequias, or other political subdivision of the State of New Mexico <input type="checkbox"/> institutions of higher education or a consortium of such institutions <input type="checkbox"/> non-profit organizations or associations <input type="checkbox"/> private individual/s <input type="checkbox"/> federal agency (ies) <input type="checkbox"/> Other (specify)			
7. BRIEF PROJECT DESCRIPTION: Conduct a feasibility/mapping/survey study with the design, construction, and testing of a deep exploratory well in the Mimbres Basin near Deming, and analyze and interpret collected data. Based on results, project scope could be expanded to include new supply wells and/or deepening of existing supply wells.	(Continuation of 6. TYPE OF APPLICANT)			
8. AREAS AFFECTED (describe by county, municipality, township, etc. as applicable): City of Deming, Luna County, New Mexico	(Continuation of 6. TYPE OF APPLICANT)			
9. TOTAL FUNDING REQUESTED (in \$1,000):				
2012: \$500	2013: \$1,000	2014: TBD	2015:	2016:
2017:	2018:	2019:	2020:	2021:
10a. TO THE BEST OF MY KNOWLEDGE AND BELIEF, ALL DATA IN THIS APPLICATION ARE TRUE AND CORRECT, THE DOCUMENT HAS BEEN DULY AUTHORIZED BY THE GOVERNING BODY OF THE APPLICANT AND THE APPLICANT WILL COMPLY WITH THE ATTACHED REQUIREMENTS AND ASSURANCES IF THE PROPOSAL IS ACCEPTED.				
10b. TYPED OR PRINTED NAME OF AUTHORIZED REPRESENTATIVE: Richard F. McInturff	11. TITLE: City Administrator	12. PHONE NUMBER: (575) 546-8848		
13. SIGNATURE: /S/ Richard F. McInturff			DATE: 4-29-11	

14. Evaluation criteria. Comprehensive responses to criteria A through D should be supported where possible by the best available science and scientific data, studies, models, and, where applicable, cite state, regional, or other water plans. Where such data and information is not available, applications should include best estimates and describe how such information would be obtained. Applications that do not include the requested information will not satisfy Tier-1 standards and, therefore, will not be eligible for Tier-2 consideration. Use Form 14a if needed. Print or type only.

A. State whether the proposal is for the "New Mexico Unit," a "water utilization alternative," or both.

The deep well feasibility study would be for a "water utilization alternative." The Mimbres Basin groundwater is the only current and likely future source for the Deming municipal/industrial supply. In planning for long-term growth, it is vital that the City determine the water quality, transmissivity, and approximate cost of developing production wells in the Mimbres Basin beneath the depth of their existing supply wells. See attached work plan and cost estimate for additional details on the feasibility/mapping/survey study. Based on results with the exploratory well, the project scope could be expanded to include new supply wells and/or deepening of existing supply wells.

B. Describe how the proposal will meet a "water supply demand" in the Southwest New Mexico Water Planning Region, comprised of Catron, Grant, Hidalgo and Luna Counties.

The deeper groundwater in the Mimbres Basin, which is potentially brackish, is a critical part of regional reserves and, therefore, water resource solutions. It is expected that total dissolved solids content of the groundwater may increase and the transmissivity of the aquifer may decrease with depth. Because these changes with depth are likely to be similar within and adjacent to the existing City well field in the Mimbres Basin, a deep exploratory well that can be used to characterize the change in water quality and aquifer properties with depth would provide valuable information on the long-term available supply. Particularly, data on the need for treatment and the expected yield of deeper wells that will be required in the future would be extremely useful for City of Deming water planning and would also benefit other existing and future water users.

The U.S. Geological Survey (USGS) has eight monitor wells within 4 miles of Deming with water level measurements recorded as early as 1940. Water levels in these USGS-monitored wells have decreased at an average rate of 0.74 foot per year (ft/yr). In the recent 40-year water plan (DBS&A, 2009), historical water level trends in one of the monitor wells located within the City limits were projected to 2050, showing that about 100 feet of water column would remain in 2050 if current trends continue. Water levels in the vicinity of Deming are also impacted by irrigation wells.

Most of the wells in the vicinity of Deming are less than 500 feet deep. Salinity of groundwater within the Mimbres Basin aquifer near Deming is expected to increase with depth, so Deming could face water quality issues in the future as groundwater levels decline. Deepening of existing supply wells and/or drilling of new, deeper supply wells will likely be required sometime in the future at the Deming well field. From 2004 to 2008, total production by the City ranged from approximately 4,000 to 4,550 acre-feet per year (ac-ft/yr) (DBS&A, 2009). By 2050, City water demand is projected to increase by 1,387 ac-ft/yr (low projection) to 5,017 ac-ft/yr (high projection), for a total of 5,489 and 9,119 ac-ft/yr, respectively (DBS&A, 2009).

Reference:

Daniel B. Stephens & Associates, Inc. (DBS&A). 2009. *City of Deming 40-year water plan*. Prepared for City of Deming, New Mexico. July 20, 2009.

C. Describe how the proposal considers the Gila environment and describe how any negative impacts might be mitigated.

The project is located in the Mimbres Basin and will have no impact to the Gila environment. No negative impacts to the Mimbres basin are anticipated from the feasibility study and drilling of a deep exploratory well. The drilling contractor would be required to remove all debris, tools, equipment, supplies, and excess wastes from the site and restore the site to its original condition.

If the project is expanded to include deepening of existing supply wells and/or drilling of new wells, an increase in pumping cost and energy consumption would occur. In addition, the byproducts of brackish water treatment would need to be disposed of properly to not negatively impact the environment. Studying the environmental impacts as a result of new or deepened wells would be a component of the feasibility/mapping/survey study. The objective would be to design a project that has minimal impacts so as to avoid the need for mitigation.

D. Describe how the proposal considers the historic uses of and future demands for water in the Southwest New Mexico Water Planning Region and the traditions, cultures and customs affecting those uses.

The long-term goal of this project is to extend the viability of current groundwater supplies to meet future demands in the Deming area. The Mimbres Basin has significant agricultural water rights, some of which involve irrigation from relatively shallow wells in the Mimbres groundwater basin. Exploring the possibility of developing deep municipal wells for future supply could reduce the pressure on the shallower aquifer. This option could potentially decrease water level declines, thereby protecting and preserving agricultural and other traditional uses of water resources in the Mimbres Basin near Deming.

Scope of Work
City of Deming Mimbres Basin Deep Well Feasibility Study
November 5, 2010

The City of Deming (the City) is submitting this Deep Well Feasibility Study application in response to the New Mexico Interstate Stream Commission (ISC) request for projects to implement portions of the Arizona Water Settlement Act. This scope of work outlines the components of the study to assess water quality and water availability in the deeper portions of the aquifer (500 to 4,000 feet below ground surface [bgs]) in the Mimbres Basin near Deming in Luna County, New Mexico. The Mimbres Basin groundwater is the only current and future source for the Deming municipal/industrial supply. In planning for long-term growth, it is vital that the City determine the water quality, transmissivity, and approximate cost to develop a production well in the Mimbres Basin beneath the depth of their existing supply wells. This scope of work includes a preliminary budget for the design, construction, and testing of a deep exploratory well (that can be completed as a monitor well), as well as analysis and interpretation of the test data.

1. Background

The Arizona Water Settlements Act of 2004 allows New Mexico to develop up to 14,000 acre-feet per year (ac-ft/yr) to meet present and future water demand in southwestern New Mexico. Beginning in 2012, the Secretary of the Interior will

. . . make deposits totaling \$66,000,000, adjusted to reflect changes since January 1, 2004, in the construction cost indices applicable to the types of construction involved in the construction of the New Mexico Unit. . . (Public Law 108-451 Section 107 Lower Colorado River Basin Development Fund) From this fund the state of New Mexico will receive 10 equal annual payments (adjusted to reflect increases in construction cost). Expenditures from the funds are for the purpose of paying costs of the New Mexico Unit or other water utilization alternatives to meet water supply demands in the Southwest Water Planning Region of New Mexico as determined by the New Mexico Interstate Stream Commission in consultation with the Southwest New Mexico Water Study Group or its successor, including cost associated with planning and environmental compliance

activities and environmental mitigation and restoration. (Pub. L. 108-451, Dec. 10, 2004, 118 Stat. 3527)

Since the passage of the legislation in 2004, a multi-stakeholder planning process has been in place to determine the best approach to implement the settlement legislation. As part of the process, proposals for water-related projects to benefit the four-county area of Grant, Luna, Hidalgo, and Catron Counties in southwestern New Mexico continue to be sought by the Arizona Water Settlements Act planning process.

2. Current Water Supply

The City of Deming is located within the Mimbres Groundwater Basin, which is the only source of municipal water supply. The Deming well field has 15 active wells (DBS&A, 2009) and is located in the vicinity of some of the deepest basin fill deposits (over 4,200 feet) found in the Mimbres Basin (Johnson et al., 2002). The City's water storage and distribution system includes two 500,000-gallon elevated storage tanks, one 3,000,000-gallon ground-level storage tank, and more than 150 miles of distribution pipeline of various materials, ranging in diameter from 2 to 12 inches (City of Deming, 2003). Table 1 lists the construction details of the wells. Most of the wells are about 500 feet deep with static depth to water ranging from 101 to 166 feet (Table 1), and pumping levels range from 135 to 277 feet (DBS&A, 2009). Yields for individual wells range from 300 to 650 gallons per minute (gpm), and the total well field yield is 5,900 gpm (Johnson et al., 2002).

Static depth to water measurements in the City's wells over the past 9 years do not reveal discernable trends. However, the U.S. Geological Survey (USGS) has eight monitor wells within 4 miles of Deming with water level measurements recorded as early as 1940. Water levels in these USGS-monitored wells have decreased at an average rate of 0.74 foot per year (ft/yr). In the recent 40-year water plan (DBS&A, 2009), historical water level trends in one of the monitor wells located within the City limits were projected to 2050, and showed that about 100 feet of water column would remain in 2050 if current trends continue. Water levels in the vicinity of Deming are also impacted by irrigation wells. Most of the wells in the vicinity of Deming are less than 500 feet deep.

Table 1. City of Deming Water Supply Wells

Well Number ^a	OSE File Number	Well Name	Address	Location	Year Drilled	Well Depth (feet)	Depth to Water Measured 3/17/2009 (feet)	Water Column (feet)
Well 1	M-299-S-6	Water Plant	8th & Cedar	23.09.33.222	1966	569	154	415
Well 2	M-299-S-7	N. Zinc	North Zinc & 4th	23.09.27.134	1966	493	148	345
Well 3 ^b	M-299-S-2	Poplar	Poplar & Country Club	23.09.35.422	1966	571	148	423
Well 4	M-299-S-15	Donaldson	2901 Donaldson Rd	23.09.25.324	1968	500	120	380
Well 5	M-299-S-5	Martin	Platinum & 2nd	23.09.27.412	1951	400	141	259
Well 6	M-299-S	S. Iron	Iron & Buckeye	23.09.34.324	1954	400	126	274
Well 7	M-299-S-8	Boy Scout	Granite & Ash	23.09.34.312	1966	500	147	353
Well 8	M-299-S-11	Fairground	Raymond Reed & D St	24.08.06.111	1985	597	125	472
Well 9	M-299-S-12	Ash & Grand	Ash & Grand	23.09.35.133	1980	500	155	345
Well 10	M-299-S-10	Swig	Atlantic & Cardenas	24.09.01.142	1960	500	149	351
Well 11	M-299-S-4	Florida	Florida & Santa Clara	23.09.35.343	1963	484	166	318
Well 12	M-299-S-13	Cemetery	3100 E. Pine	23.09.36.213	1951	445	133	312
Well 14	M-214	Luchsinger	El Portal Rd SE	23.08.32.1.2	1972	352	101	251
Well 15	M-271	Peru	Peru Mill	23.09.18.412	1961	525	115	410
Well 17	M-49 M-109 M-127	Bilbo	W. Ash St	24.9.8.2	1984	1,500	130	1,370

^a Well 13 has been plugged and abandoned and disconnected from the system.

^b Well 16 contained elevated arsenic levels and was never connected to the municipal system or brought into production.

^c Not part of municipal water system; used only for golf course watering.

Review of Deming water quality data indicates that water quality is good and water quality standard exceedances are rare. Salinity of groundwater within the Mimbres Basin aquifer near Deming is expected to increase with depth, so Deming could face water quality issues in the future as groundwater levels decline. Deepening of existing supply wells and/or drilling of new, deeper supply wells will likely be required sometime in the future at the Deming well field.

3. Recent and Projected Water Demand

From 2004 to 2008, total production by the City ranged from approximately 4,000 to 4,550 ac-ft/yr (DBS&A, 2009). By 2050, City water demand is projected to increase by 1,387 ac-ft/yr (low projection) to an additional 5,017 ac-ft/yr (high projection), for a total of 5,489 and 9,119 ac-ft/yr, respectively (DBS&A, 2009).

4. Potential Industrial Water Requirements

An additional unquantified demand for water supplied by the City could come from industrial development that exceeds the projected demands estimated in the City's 40-year plan. One factor that strengthens Deming's potential industrial growth is its location on a major energy transmission line of the national power transmission grid. Luna County and Deming are areas identified as having the greatest amount of sunlight in the U.S. and therefore are ideal locations for solar power development. A New Mexico study identified the area north of Deming as a potential site for a concentrating solar energy plant (Black & Veatch, 2005). The City of Deming routinely receives inquiries from potential industrial developers regarding the ability of the City to supply their water needs. Eleven such inquiries were made in the last 12 months. A recent report to Congress indicates that consumptive water use by a concentrating solar energy plant can range from 20 to 1,000 gallons per megawatt-hour produced (U.S. DOE, 2009). Installation of solar power production facilities could potentially increase the need for water supplies by 3,000 ac-ft/yr, but actual water use would vary depending on the type and size of plant. The City of Deming currently uses about 4,000 ac-ft/yr and the City's water rights are currently limited to 6,120 ac-ft/yr.

5. Current Water Rights

The City of Deming has sufficient permitted water rights to pump additional supplies to meet projected near-term demand (DBS&A, 2009). All of the City of Deming's water rights are diverted from the declared Mimbres Groundwater Basin, which encompasses parts of Grant, Sierra, Doña Ana, and Luna Counties. The Mimbres Basin is a mined groundwater basin, which means it is subject to stringent criteria regarding water right applications and transfers. The New Mexico Office of the State Engineer (OSE) administers the Mimbres Basin in accordance with criteria issued in 1982, which are based on a hydrologic model developed in the 1970s. Depending on location, the administrative criteria can place significant restrictions on groundwater pumping by specifying an allowable rate and cumulative amount of drawdown within an OSE-defined administrative block.

6. Project Proposal

The City proposes to drill an exploratory (or monitor) well to test the quality and quantity of the deep groundwater resources in the Mimbres Basin. The lithology varies across the basin and with depth. It is expected that total dissolved solids content of the groundwater will increase, and the permeability of the aquifer may decrease, with depth. A deep test hole that can be used to characterize the change in water quality and aquifer properties with depth would provide valuable information for developing additional supplies for the City of Deming from the deeper aquifer. Particularly, data on the need for treatment and the expected yield of deeper wells that will be required in the future would be extremely useful for City of Deming water planning, and would also benefit other existing and future water users. Information that will be gained from this feasibility study and exploratory well is critical for evaluating the long-term water resources in the Mimbres Basin. The feasibility study would include the following activities:

- Review currently available hydrogeologic information to determine preferred location for exploratory well.
- Drill a 12-inch (minimum) borehole to target depth of up to 4,000 feet bgs using mud-rotary techniques.

- Collect geologic samples for lithology descriptions and particle size analyses.
- Perform geophysical analyses to the total depth of the borehole.
- Complete the borehole as a monitor well with three discrete screen intervals for zone testing.
- Collect and submit water samples for laboratory analyses for major and trace cations and anions.
- Isolate and test productive zones for yield after monitor well has been completed.
- Prepare a hydrogeologic report examining the collected data.

The following sections provide a task breakdown and cost estimate to complete the feasibility study.

6.1 Task 1: Hydrogeologic Review

This task will include review of available Mimbres Basin hydrogeologic information that will be used to screen potential sites for a deep exploratory well location. Regional hydrogeologic and water quality conditions, engineering considerations, regulatory requirements, proximity to the existing City of Deming well field, stakeholder support, and environmental issues will provide a road map for identification of potential exploratory well locations. Throughout this task, the contracted hydrogeologist will need to identify and evaluate any additional issues that may be relevant to siting an exploratory well, including technical, legal, economic, political, and public policy considerations. The contracted hydrogeologist should coordinate with universities and other government and non-government organizations regarding their research activities in the Mimbres Basin.

Specific subtasks for the contracted hydrogeologist include:

- a. Develop potential site locations for a deep exploratory well.

- b. Participate in site visits to examine proposed well locations and evaluate local conditions that could affect access, availability of water for drilling, and other logistical and safety issues.
- c. Select preferred exploratory well location.
- d. Assist with filing an exploratory well application with the OSE.

6.2 Task 2: Prepare Plans and Specifications for Exploratory Well

This task will include preparation of the exploratory well design, bid specifications, and permit application for the deep exploratory well. The technical specifications will likely cover the following topics:

- Methods of drilling
- Site safety plan
- Storm water pollution prevention plan
- Utilities
- Equipment
- Penetration rate log
- Daily driller's reports
- Drilling fluid control program
- Sample collection
- Surface casing installation and materials
- Borehole drilling
- Geophysical logging
- Temporary well construction
- Zonal water sample collection
- Well completion materials
- Well development
- Monitor well completion
- Well testing

6.3 Task 3: Contractor Bidding and Selection Process Assistance

The City will need to procure the services of qualified drilling, geophysical logging, and water quality testing contractors. Technical assistance will also be required from a qualified hydrogeologist to guide the overall data collection efforts and assist in the interpretation of the test results.

A contract will be negotiated with the drilling contractor that provides the best offer for the drilling, geophysical logging, and water quality and quantity testing services required to complete this project. The drilling contractor must have or be able to obtain a drilling license from the State of New Mexico, and comply with state and local ordinances and regulations as applicable. The contractor must also have experience in water exploration projects similar to the one proposed in the Mimbres Basin.

Specific subtasks for the contracted hydrogeologist would include:

- a. Plan and conduct a pre-bid meeting in Deming, New Mexico and organize and conduct a site walk for potential bidders.
- b. Assist with bid evaluation, ranking, and contractor selection as needed. The City of Deming will be the legal entity that contracts with the driller, but the contracted hydrogeologist will assist with contracting with the driller.
- c. Assist with additional miscellaneous contractor bidding and selection items as needed.

6.4 Task 4: Exploratory Well Construction and Testing

The exploratory boring will be drilled for the purpose of studying water quality and determining the thickness and characteristics of all materials from the ground surface to the bottom of the hole, location of water-bearing strata, aquifer properties at different depths, and other geologic and hydrologic information. To obtain accurate depth determinations and representative cutting samples, the drilling contractor shall maintain a relatively slow rate of drilling and maintain

adequate facilities for collection of representative cutting samples. The boring will be advanced using conventional air-/mud-rotary drilling methods.

The contracted hydrogeologist will provide oversight of borehole drilling, well development, and aquifer testing activities for the exploratory well. It is assumed for this project proposal that the borehole will be drilled to a depth of up to approximately 4,000 feet bgs. The expected geologic section will be basin fill that includes several units of Quaternary alluvial and lacustrine deposits, as well as the Tertiary Gila Group. Basaltic volcanics interbedded with basin fill can be locally important aquifers.

The drilling contractor shall collect two sets of cuttings samples at 10-foot intervals. Samples will be placed in cloth or plastic sample bags that are permanently identified with the boring name and the depth interval represented by the sample. These samples will be provided to the contracted hydrogeologist for detailed lithologic logging.

Upon completion of drilling the exploratory boring (and potentially during to assist water quality zone sampling), the hole shall be surveyed for its entire depth by means of calibrated geophysical well-log apparatus. Suggested logs include the following:

- Temperature
- Fluid resistivity
- Spontaneous potential
- Dual-induction laterolog and spherically focused resistivity or proximity log
- Caliper
- Acoustic velocity or sonic
- Formation density (gamma-gamma)
- Neutron (thermal or epithermal)
- Natural gamma-ray spectrum

Based on lithologic logging, water quality, and geophysical logging results, we propose that the borehole be completed as a monitor well, with several separate screened intervals. The

selected screened intervals in productive zones will then be subjected to aquifer testing for determination of aquifer properties.

As drilling advances, productive zones will be identified for further testing in the constructed monitor well. Three separate intervals will be screened to obtain discrete quality water samples. Water samples would be collected and properly preserved in containers provided by the analytical laboratory for a suite of water quality analyses. Proposed water sample analytical analyses include general chemistry, major cations and ions, trace metals (dissolved and total), and isotopes, as well as field parameters (pH, temperature, and electrical conductivity).

Suggested subtasks for the contracted hydrogeologist are as follows, and will be revised as necessary during Task 1:

- a. Pre-construction meeting: Hold and attend pre-construction meeting with selected well drilling contractor.
- b. Exploratory well construction oversight: Provide coverage during drilling and logging, running casing, well development, and other critical points in the construction of the well.
- c. Aquifer testing oversight: Provide coverage during aquifer testing and provide appropriate level of monitoring before and after testing.

6.5 Task 5: Feasibility Study and Well Completion Report

The contracted hydrogeologist will prepare a summary report that describes the completed work, provides an analysis of the collected data, and provides recommendations regarding future deep well field development in the Mimbres Basin near Deming. The report will include copies of the following:

- All field notes
- A detailed well completion log (as-built diagram and documentation)
- Lithologic and geophysical logs
- Geologic interpretations

- Zone pump test results
- Aquifer testing data, analysis, and interpretation
- Analytical results for water quality of tested zones
- Supporting text, figures, and tables as appropriate

This well completion and aquifer testing report can serve as a reference regarding well completion, expected well yield, and aquifer parameter estimates. If analytical results for the deep groundwater samples indicate that treatment would be required for potable supply, potential treatment options will be presented. The report will also include an interpretation of isotope results as they relate to groundwater age with depth within the aquifer. This information will support the contracted hydrogeologist's interpretation of deep groundwater flow within the basin.

6.6 Cost Estimate

The total estimated cost for the feasibility study and exploratory deep well construction and testing is shown in Table 2. Actual expenditures will vary according to when the project is authorized and conditions encountered in the field.

Table 2. Estimated Cost for Mimbres Basin Deep Well Feasibility Study

Task	Description	Estimated Cost
1	Hydrogeologic review	\$25,000
2	Develop plans and specifications	\$15,000
3	Driller procurement assistance	\$20,000
4	Exploratory drilling, well construction, testing	
	Mobilization/demobilization	\$80,000
	Drilling (12-inch-diameter minimum)	\$400,000
	Geophysics	\$20,000
	Well construction (6-inch-diameter)	\$200,000
	Well development	\$50,000
	Zone sampling and production testing	\$120,000
	Oversight	\$150,000
5	Feasibility study and well completion report	\$50,000
	Subtotal	\$1,130,000
	20% Contingency	\$226,000
	Total	\$1,356,000
	New Mexico GRT at 7%	\$94,920
	Grand Total	\$1,450,920

References

Black & Veatch. 2005. *New Mexico concentrating solar plant feasibility study, Draft final report.*

Prepared for New Mexico Energy, Minerals and Natural Resources Department. February 9, 2005. Available at <<http://www.emnrd.state.nm.us/ECMD/RenewableEnergy/documents/NMCSP-draft-final-rpt-02-05.pdf>>.

City of Deming. 2003. *City of Deming comprehensive plan.* January 2003.

Daniel B. Stephens & Associates, Inc. (DBS&A). 2009. *City of Deming 40-year water plan.*

Prepared for City of Deming, New Mexico. July 20, 2009.

Hawley, J.W., B.J. Hibbs, J.F. Kennedy, B.J. Creel, M.D. Remmenga, M. Johnson, M.M. Lee, and P. Dinterman. 2000. *Trans-international boundary aquifers in southwestern New Mexico*. New Mexico Water Resources Research Institute Technical Completion Report, Interagency contract no. X-996350-01-3. Prepared for U.S. Environmental Protection Agency, Region 6 and International Boundary and Water Commission, U.S. Section. March 2000.

Johnson, M.S., L.M. Logan, and D.H. Rappuhn. 2002. *Analysis of effects of ground-water development to meet project demands in Regional Planning District 4, Southwest New Mexico*. Draft Hydrology Report 02-X, New Mexico Office of the State Engineer, Hydrology Bureau. March 2002.

U.S. Department of Energy (U.S. DOE). 2009. *Concentrating solar power commercial application study: Reducing water consumption of concentrating solar power electricity generation*. Available at <http://www1.eere.energy.gov/solar/pdfs/csp_water_study.pdf>.