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SUPERIOR COURT OF THE STATE OF CALIFORNIA

COUNTY OF LOS ANGELES

Coordination Proceeding **ANTELOPE VALLEY GROUNDWATER CASES** Los Angeles County Waterworks District No. 40 v. Diamond Farming Co. Los Angeles County Waterworks District No. 40 v. Diamond Farming Co. Wm. Bolthouse Farms, Inc. v. City of Lancaster Diamond Farming Co. v. City of Lancaster Diamond Farming Co. v. Palmdale Water District	Case No. 105 CV 049053 Judicial Council Coordination Proceeding No. 4408 Hon. Jack Komar **DECLARATION OF TIMOTHY DURBIN** Riverside County Superior Court Lead Case No. RIC 344436 Case No. RIC 344668 Case No. RIC 353840 Los Angeles Superior Court Case No. BC 325201 Kern County Superior Court Case No. S-1500-CV-254348

I, TIMOTHY DURBIN, declare as follows:

1, I am a groundwater hydrologist employed as an independent contractor. My education and experience are described on Exhibit A attached to this declaration.

2. I recently reviewed documents relating to the hydrology of the Antelope Valley groundwater basin. I reviewed a draft map prepared by the California Department of Water Resources that shows a proposed boundary of the Antelope Groundwater Basin, which is attached here as Exhibit B. I reviewed the report *Calibration of a Mathematical Model of the Antelope Valley Ground-Water Basin, California, U. S. Geological Survey Water-Supply Paper 2046, 1978*, which was prepared by me. In the following, I refer to this report as "my USGS report." I also reviewed the report *Simulation of Ground-Water Flow and Land Subsidence in the Antelope Valley Ground-Water Basin, California, U. S. Geological Survey Water-Resources Investigation 2003-4016, 2003*, which was prepared by David Leighton and Steven Phillips. In the following, I refer to this report as the "recent USGS report." Figures 2 and 17 from the recent USGS report are attached here respectively as Exhibits C and D.

3. As described in my USGS report, Antelope Valley is a large topographic and groundwater basin in the western part of the Mojave Desert, about 50 miles northeast of Los Angeles, California. Antelope Valley lies in a westerward-pointing wedge formed by the intersection of the San Andreas and Garlock Fault zones. The valley is bordered on the northwest and north by the Tehachapi Mountains, the Rosamond Hills, and the Bissell Hills; on the southwest and south by the San Gabriel Mountains; and on the east by low hills and divides that separate the valley from the upper Mojave Valley, Harper Valley, and Fremont Valley. Mountain and foothill land within Antelope Valley covers about 1,200 mi^2. Relatively flat valley land covers about 1,000 mi^2. The floor of the valley ranges from 2,300 to 3,000 ft above sea level, thus lying at an altitude higher than most of the nearby desert valleys and considerably higher than the coastal plain to the south and the San Joaquin Valley to the north.

4. Also as described by my USGS report and shown on Exhibit C, the Antelope Valley groundwater basin covers about 900 mi^2. The basin is intercepted by faults and other structural features. Subdivisions of the Antelope Valley groundwater basin defined by these faults include the Lancaster, Buttes, Pearland, Neenach, West Antelope, Finger Buttes, and North Muroc subbasins. The Antelope Valley groundwater basin occupies part of a structural

depression downfaulted between the Garlock and San Andreas fault zones. The downfaulting caused erosion of the hills and mountains surrounding the valley. The area presently occupied by the groundwater basin became the receptacle for the eroded materials. Economically important aquifers within the groundwater basin occur in the sedimentary deposits formed by the deposition of the eroded materials. These deposits have accumulated to a thickness locally of as much as 8,000 ft. Consolidated, virtually non-water-bearing rocks crop out in the watershed that surround the groundwater basin. These rocks also underlie and form the bottom of the groundwater basin.

5. The primary source of natural recharge to the Antelope Valley groundwater basin is precipitation runoff from the watershed areas adjacent to the southern and northwestern margins of the groundwater basins. As shown on Exhibit C, the southern watershed area occurs on the slopes of the San Gabriel Mountains, and the northwestern watershed occurs on slopes of the Tehachapi Mountains. Runoff generated on these slopes flows from the mountain-blocks onto valley-floor areas, where the streamflow infiltrates to produce recharge. As shown on Exhibit D, the resulting recharge is distributed geographically along the fronts of the San Gabriel and Tehachapi mountains. The distribution of recharge is similar to that described in my USGS report.

6. I reviewed the map prepared by the California Department of Water Resources with respect to the proposed boundary for the Antelope Valley groundwater basin (Exhibit B). In reviewing the proposed boundary, I evaluated boundary segments based on the question: Does the boundary enclose the smallest area for which groundwater pumping outside the boundary essentially will have no long-term impact within the enclosed area? With respect to Exhibit B, the proposed boundary everywhere meets this condition.

7. In reaching this conclusion, an important consideration was the occurrences of natural hydrologic boundaries. The proposed boundary (Exhibit B) mostly coincides with the boundary between the water-bearing geologic deposits that form the groundwater basin and the essentially non-water-bearing rocks that comprise the mountains and hills surrounding the basin (Exhibit C). Because of the low permeability of the non-water-bearing rocks, the long-term groundwater conditions within those rocks can have essentially no influence on groundwater

conditions within Antelope Valley groundwater basin. Faults that retard groundwater movement occur within the proposed boundary, such as the Neenach, Randsburg Mojave, and Willow Springs faults (Exhibit C). However, the proposed groundwater basin boundaries appropriately do not coincide with those faults. While the faults affect the timing of pumping effects, they do not prevent such impacts from crossing the faults. While the faults can appear as short-term hydraulic boundaries, they do not represent long-term boundaries.

8. Another important consideration was the geographic distribution of recharge. The proposed boundary contains essentially the recharge areas for the Antelope Valley groundwater basin. Comparing Exhibits B and D, distribution of recharge identified in the recent USGS report, which is similar to that described in my USGS report, is located within the proposed boundary. Exhibit D shows recharge shows recharge along the San Gabriel and Tehachapi mountain fronts, but it also shows recharge along the Willow Spring Faults and its extension northwestward across the Randsburg Mojave Fault (Exhibit D). However, that recharge actually represents recharge that occurs north on the fault and then moves southward across the fault. The recharge occurs within the Oak Creek Basin subbasin (Exhibit D) along the Tehachapi mountain front. The proposed boundary encloses this area of mountain-front recharge.

9. My conclusion is that the proposed boundary shown on Exhibit A appropriately defines the boundary of the Antelope Valley groundwater basin.

I declare under penalty of perjury under the laws of the United States of America and the State of California that the foregoing is true and correct and that this Declaration was executed at Sacramento, California, on June 28, 2006.

Timothy J. Durbin

TIMOTHY J. DURBIN

EXHIBIT A

TIMOTHY J. DURBIN, INC.
CONSULTING HYDROLOGISTS

5330 Primrose Drive, Suite 228
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Timothy J. Durbin

Publications

Durbin, T.J., 1974, Digital simulation of the effects of urbanization on runoff in the upper Santa Ana Valley, California: U.S. Geological Survey Water-Resources Investigations 41-73, 44 p.

Durbin, T.J., and Hardt, W.F., 1974, Hydrologic analysis of the Mojave River, California, using a mathematical model: U.S. Geological Survey Water-Resources Investigation 17-74, 50 p.

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Van Denburgh, A.S., Seitz, H.R., *Durbin, T.J.,* and Harrell, J.R., 1982, Proposed monitoring network for ground-water quality, Las Vegas Valley, Nevada: U.S. Geological Survey Open-File Report 80-1286, 25 p.

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Kapple, G.W., Mitten, H.T., *Durbin, T.J.,* and Johnson, M.J., 1984, Analysis of Carmel Valley alluvial ground-water basin, California, using digital flow model techniques: U.S. Geological Survey Water-Resources Investigation 83-4280, 45 p.

Hromadka, T.V., and *Durbin, T.J.,* 1984, Adjusting the nodal point distribution in domain ground-water flow numerical models: in Proceedings of Fifth International Conference on Finite Elements in Water Resources, p. 265-284.

Durbin, T.J., and Berenbrock, C., 1985, Three-dimensional simulation of free-surface aquifers by the finite-element method: U.S. Geological Survey Water-Supply Paper 2270, p. 51-67.

Mitten, H.T., Lines, G.C., Berenbrock, C., and *Durbin, T.J.*, 1988, Water resources of Borrego Valley and vicinity, San Diego County, California: Phase 2, Development of ground-water flow model: Water Resources Investigations 87-4199.

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Hromadka, T.V., and *Durbin, T.J.,* 1986, Two-dimensional dam-break analysis for Orange County Reservoir: Water Resources Bulletin, v. 22, n. 2, p. 249-256.

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Avon, L., and *Durbin, T.J.*, 1994, Evaluation of the Maxey-Eakin method for estimating recharge to ground-water basins in Nevada: Water Resources Bulletin, v. 30, n. 1, pp. 99-112.

Durbin, T.J., Bond, L.D., 1997, *FEMFLOW3D*: A finite-element program for the simulation of three-dimensional aquifers, Version 1.0: U.S. Geological Survey Open-File Report 97-810, 338 p.

Hromadka, T. V., *Durbin, T.J.*, 2000, Estimating changes in sediment transport trends due to catchment changes: in Proceedings of Floodplain Management Association Conference on Non-Structural Solutions to Floodplain Management, San Diego, Calif.

Books

Hromadka, T.V., *Durbin, T.J.*, and DeVries, J.J., 1984, Computer methods in water resources: Lighthouse Publications, Mission Viejo (California), 344 p.

Hromadka, T.V., McCuen, R.H., Devries, J.J., and *Durbin, T.J.*, 1993, Computer methods in environmental and water resources engineering: Lighthouse Publications, Mission Viejo (California), 590 p.

TIMOTHY J. DURBIN, INC.
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Timothy J. Durbin

Principal Groundwater and Surface-Water Hydrologist

Education	Master of Science in Civil Engineering, 1971 Stanford University, Stanford, California
	Bachelor of Science in Civil Engineering, 1967 Stanford University, Stanford, California
Licenses	Civil Engineer, California Civil Engineer, Oregon Civil Engineer, Texas
Professional Societies	American Society of Civil Engineers American Geophysical Union International Association of Hydrogeologist National Ground Water Association

Professional Experience

February 1999 to Present

Timothy J. Durbin, Inc., Fair Oaks, California, Principal. Directs projects relating to groundwater and surface-water hydrology. Areas of expertise include design of multidisciplinary investigations, design of large-scale programs for the collection and interpretation of hydrologic data, and application of mathematical modeling to the analysis of problems in groundwater and surface-water hydrology. Examples of such projects include:

- Seaside Groundwater Basin, California. The Seaside groundwater basin was adjudicated to balance the threat of seawater intrusion against the need for groundwater production to supply water to communities overlying the basin and within the Monterey Peninsula area. Developed a groundwater model to assess the relation between groundwater production and seawater intrusion. Work was done in support of litigation related to the adjudication.

- Carbonate Aquifer System, Eastern Nevada. Analyzed the water-related impacts of groundwater development within the regional Carbonate Aquifer System that underlies central and eastern Nevada. The Southern Nevada Water Authority, which delivers water to Las Vegas and neighboring communities, is considering a project to import of groundwater from the Carbonate Aquifer. The analysis is focused on the possible impacts of the project on springs and phreatophytes. The work includes developing a groundwater model of the Carbonate Aquifer System. The model extends over an area covering 20,000 square miles. The work was done in support of hearings before the Nevada State Engineer on water-right applications by the Authority. The work was done also in support of the environmental compliance for the project.

- North Platte River, Wyoming and Nebraska. Analyzed the impacts of water-resource development and reservoir operations on water supply, streamflows, regional economics, and wildlife resources within the North Platte River Basin, Nebraska and Wyoming. Designed and directed a multi-disciplinary investigation involving agricultural engineers, groundwater hydrologists, surface-water hydrologists, agricultural economists, and environmental scientists in six different consulting firms. Work was done in support of litigation before the U.S. Supreme Court between the states of Nebraska and Wyoming.

- Santa Monica Groundwater Basin, California. Analyzed the occurrence of MTBE in the Santa Monica groundwater basin, California. MTBE contamination from multiple sites has resulted in abandonment of public-supply wells. An analysis of the sources and fate of MTBE within the Santa Monica groundwater basin is being conducted. Work was done within the context of State and Federal regulatory proceedings and litigation.

- Special Master, California. Assigned as Special Master in a technical dispute between City of San Bernardino, California and the Regional Water Quality Control Board. The issue is the cause of a wastewater discharge to the Santa Ana River. The work was being done within the context of a State regulatory proceeding.

May 1998 to January 1999

Bookman-Edmonston Engineering, Inc., Sacramento, California. Vice President. Directed projects related to groundwater and surface-water hydrology. Directed a staff of about 30 engineers, hydrologists, biologists, and geologists. Examples of such projects include:

- Flooding, Arizona. Analyzed the causes of flooding near Phoenix, Arizona. Residential and commercial areas were flooded during a summer storm. The analysis involved assessing the effect of irrigation ditches and other facilities on the depth of flooding. The work was done in support of litigation.

- Pipeline Break, California. Analyzed the impact of floodflows on the failure of a stream pipeline crossing within Thousand Oaks, California. A large sewer line failed owing to channel erosion during an extreme flood event. The recurrence interval of the erosion event was analyzed. The work was done within the context of a State regulatory proceeding.

March 1989 to May 1998

Hydrologic Consultants, Inc., Sacramento, California. President. Directed projects related to groundwater and surface-water hydrology. Directed a staff of about 10 hydrologists, geologists, and engineers. Examples of such projects include:

- Lake Tahoe, California and Nevada. Analyzed the impacts of urban development on the water quality of Lake Tahoe, California. Work involved the analysis of sediment and nutrient transport in streams tributary to the lake and nutrient cycling within the lake. Work was done for litigation.

- Streamflow Temperature, California. Analyzed streamflow temperature within the Owens River, Owens Valley, California. Work was done to evaluate the hydrologic feasibility of reestablishing a fishery within the Owens River.

- Groundwater Salinity, California. Analyzed the source and management of surface-water and groundwater salinity within the Lompoc groundwater basin. Work involved developing groundwater and surface-water models of the Santa Ynez River basin, including salinity models. Work was done in support of litigation.

- Agricultural Drainage, California. Analyzed the causes and management of drainage water discharges from the Firebaugh and Central California Water District to natural watercourses and the San Joaquin River. Work was done in support of litigation.

- FERC Re-licensing, California. Developed a model for the optimal use of ground water and surface water within the Turlock and Modesto Irrigation Districts for the benefit of water supply and environmental resources. Work was done in support of the FERC re-licensing of New Don Pedro Reservoir.

- Seawater Intrusion, California. Analyzed seawater intrusion in the Salinas Valley. Analyzed the impacts of groundwater pumping on seawater intrusion. Analyzed the impacts of reservoir operations on streamflow recharge and seawater intrusion. Work was done in support of litigation.

- Petroleum Contamination, California. Analyzed the source of soil and groundwater contamination by petroleum hydrocarbons at Santa Barbara, California. Work was done in support of litigation. Analyzed the source of soil and groundwater contamination by petroleum hydrocarbons at Oxnard, California. Work was done in support of litigation.

- San Bernardino Groundwater Basin, California. Analyzed the occurrence of high groundwater levels in the San Bernardino Valley, California using surface-water and groundwater models. High groundwater levels resulted from excess artificial recharge and other factors. Work was done in support of litigation.

- Arkansas River, Colorado and Kansas. Analyzed the effects of groundwater pumping and other factors in the depletion of streamflow in the Arkansas River at the Colorado-Kansas state line using surface-water, groundwater, and institutional models. Work was done in support of litigation in the U.S. Supreme Court between the states of Kansas and Colorado.

- Geothermal Development, California. Analyzed the effects of geothermal development on thermal-spring discharges in the Mammoth Lakes area, California using groundwater and heat-transport models. Work was done in support of litigation.

October 1985 to March 1989

S.S. Papadopulos & Associates, Inc., Davis, California. Vice President, and Manager of Davis office. Directed and conducted investigations of numerous aspects of groundwater hydrology. Examples of such projects include:

- Love Canal, New York. Analyzed the migration of groundwater contaminants at the Love Canal hazardous waste site in Niagara Falls, New York using a groundwater model. The Love Canal site is a Superfund Site. Work was done in support of litigation.

- Groundwater Contamination, New Jersey. Analyzed the migration of groundwater contaminants at the Lone Pine landfill near Freehold, New Jersey. The Lone Pine landfill is a Superfund site. Work was done as part of a remedial investigation.

- Modeling Code. Developed a computer program for the simulation of soil-water movement within and near a land-disposal facility. Work was done for the U.S. Environmental Protection Agency in support of the preparation regulations relating to the design of cover, liner, and leak-detection systems for land-disposal facilities.

- Sediment Transport, California. Analyzed the impacts of urban development on flooding and sediment transport for streams in Orange County, California. Work was done to support the permitting of a large residential and commercial development project.

July 1984 to October 1985

Williamson and Schmid, Hydrotec Division, Davis, California. Manager of Davis office. Directed and conducted investigations for evaluation of groundwater resources, management of regional groundwater systems, and evaluation of hazardous waste sites. Studies involved identification of essential hydrologic issues, collection of hydrologic data, and application of quantitative methods to evaluate alternatives and to select an optimal solution. Examples of such projects include:

- Groundwater Contamination, California. Developed a three-dimensional groundwater model of a physical barrier at a hazardous waste landfill in order to evaluate performance of the existing barrier and proposed modifications. Work was done for regulatory compliance.

- Isotope Geochemistry, California. Analyzed a hazardous waste site using isotope geochemistry and groundwater models as investigative tools. Work was done for regulatory compliance.

- Groundwater Salinity, Nevada. Analyzed the utilization of fresh water body overlying saline water using surface geophysical techniques and a density-dependent groundwater flow model.

August 1982 to July 1984

U.S. Geological Survey, Water Resources Division, California District. District Chief (GS-15). Managed California District (350 persons in 14 offices) with annual budget of $25 million (in 1995 dollars) for hydrologic investigations. Responsible for developing plans for hydrologic investigations and ensuring plans were implemented. Provided organizational and technical input to development of large scale, multi-agency investigations. Examples of such projects include:

- Agricultural Drainage, California. Investigation of water quality related to agricultural drainage from the west side of San Joaquin Valley, California.

- San Francisco Bay, California. Investigation of hydrodynamics of San Francisco Bay and Sacramento-San Joaquin, California Delta hydrologic systems.

- Groundwater Exports, California. Investigation of the effects of exporting water from Owens Valley groundwater basin, California, including both hydrologic and biological impacts.

- Central Valley Groundwater, California. Assessment of the groundwater resources of the Central Valley, California. Work was part of the Central Valley Regional Aquifer System Analysis (RASA).

- Modeling Code. Development of numerical finite element codes (now used within the U.S. Geological Survey) for simulation of two- and three-dimensional groundwater flow and solute transport.

July 1977 to August 1982

U.S. Geological Survey, Water Resources Division, Nevada District. District Chief (GS-14) from 1/80 to 8/82 and Assistant District Chief (GS-13) from 7/77 to 1/80. Managed Nevada District (80 persons in three offices) with annual budget of $10 million (in 1995 dollars) for hydrologic investigations. Projects included:

- Truckee River, Nevada. Design and organization of Truckee-Carson River Quality Assessment and Great Basin Regional Aquifer System Analysis (RASA).

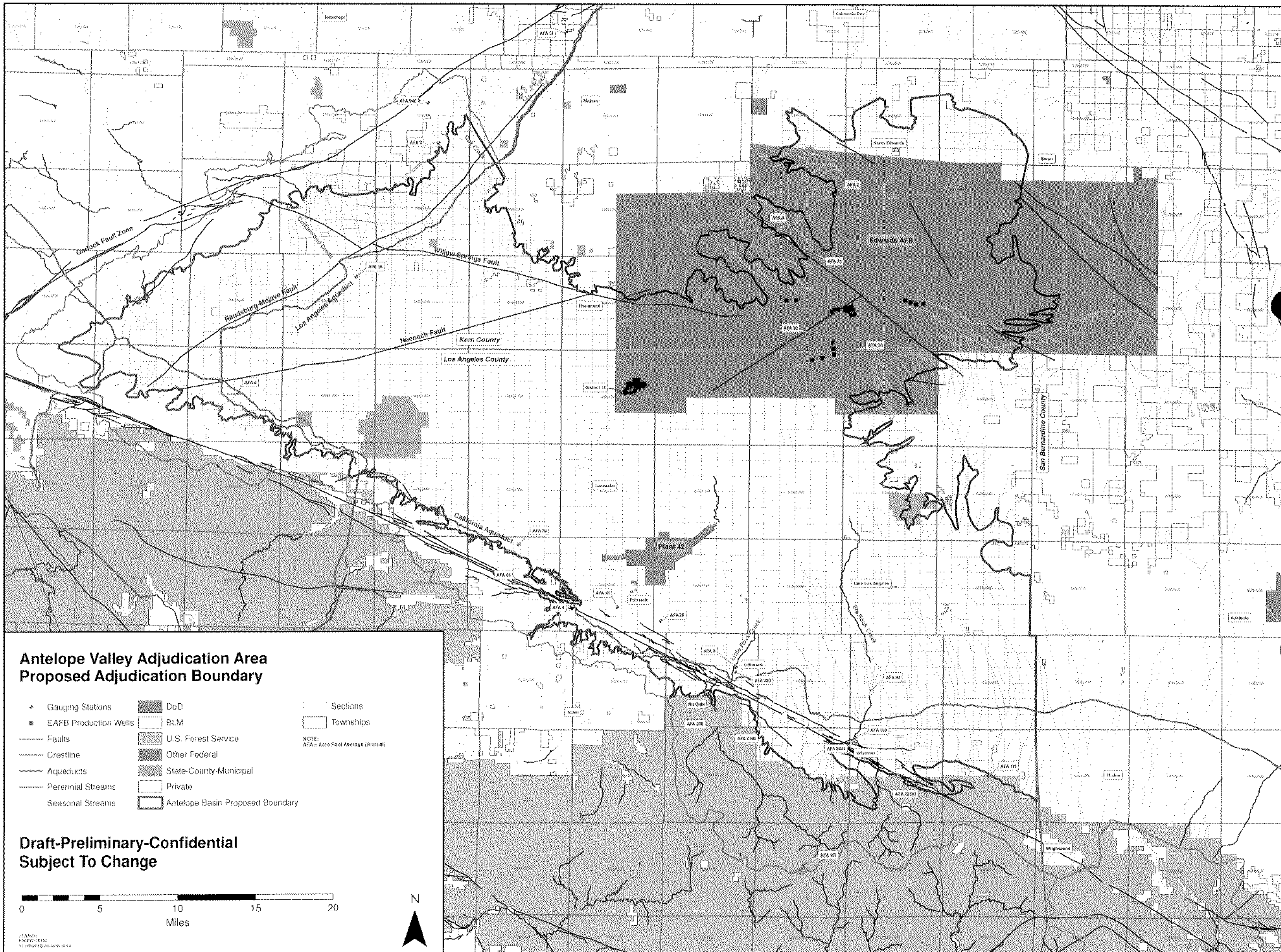
- Groundwater Management, Nevada. Development of groundwater and solute transport models for Washoe Valley, Galena Creek, Eagle Valley, and Carson Valley groundwater basins in Nevada.

- Geothermal Development, Nevada. Design and organization of regional geothermal investigations of areas throughout Nevada including Dixie Valley, Ruby Valley, Black Rock Desert, and Carson Desert.

July 1972 to July 1977

U.S. Geological Survey, Water Resources Division, California District. Hydrologist (GS-13; 12/75 to 7/77), Hydrologist (GS-12; 10/74 to 12/75), Hydrologist (GS-11; 9/73 to 10/74), and Hydrologist (GS-9; 7/72 to 9/73). Served as Project Chief for numerous groundwater projects involving hydrogeologic and geophysical investigations and groundwater modeling. Conducted research in development of finite-element models for simulation of groundwater flow and mass transport. Applied results of research to solution of management problems and provided assistance to hydrologists within USGS and other public agencies in use of these models.

EXHIBIT B



Antelope Valley Adjudication Area
Proposed Adjudication Boundary
Gauging Stations
EAFB Production Wells
Faults
Crestline
Aqueducts
Perennial Streams
Seasonal Streams
DoD
BLM
U.S. Forest Service
Other Federal
State-County-Municipal
Private
Antelope Basin Proposed Boundary
Sections
Townships
Draft-Preliminary-Confidential
Subject To Change
0
5
10
15
20
Miles
N
Edwards AFB
Plant 42
Kern County
Los Angeles County
San Bernardino County
Garlock Fault Zone
Willow Springs Fault
Neenach Fault
Randsburg-Mojave Fault
Los Angeles Aqueduct
California Aqueduct
Big Rock Creek

EXHIBIT C

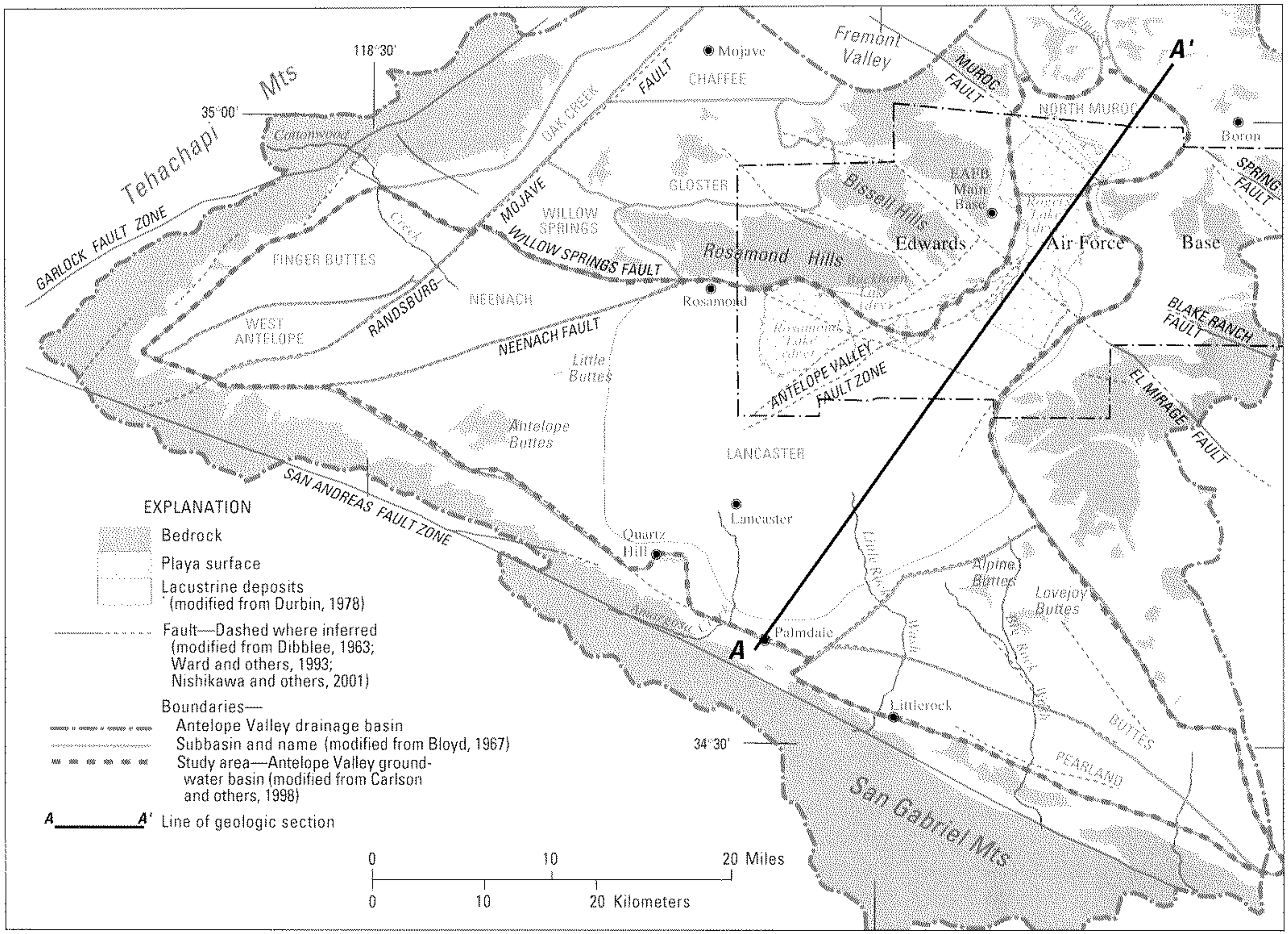


Figure 2. Location of faults, ground-water subbasins, line of geologic section, and approximate areal extent of lacustrine deposits in the Antelope Valley ground-water subbasin, California.

EXHIBIT D

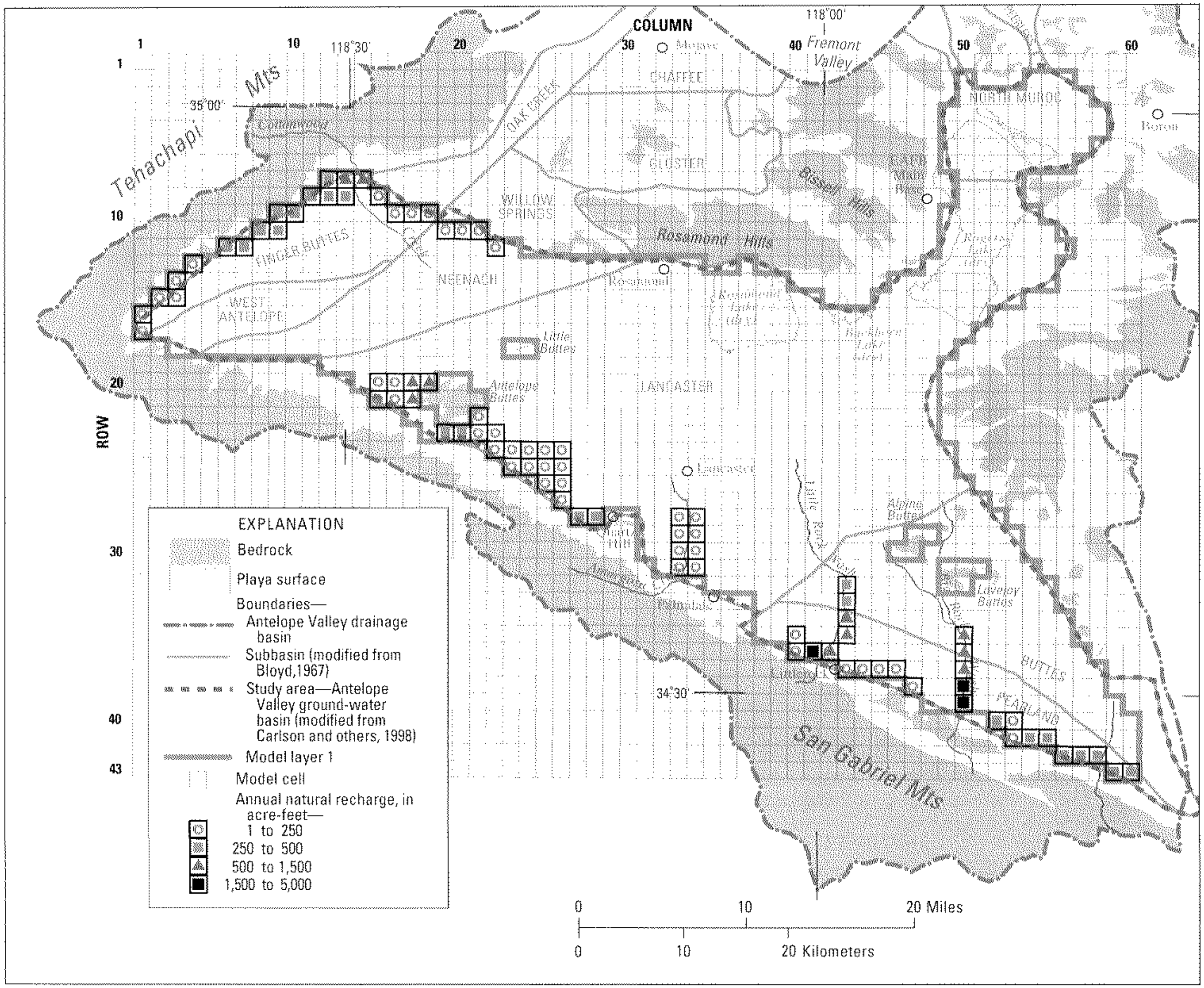


Figure 17. Areal distribution of natural recharge specified in the ground-water flow model of the Antelope Valley ground-water basin, California.