

Chowchilla Water District Water Management Plan Five Year Update

2008 Criteria

**Date of first draft – (12-15-2009)
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Section 1: Description of the District

District Name: Chowchilla Water District

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A. History

1. *Date district formed:* February 7, 1949 *Date of first Reclamation contract:* 1939

Original size (acres): 63,254 *Current year (last complete calendar year):* 2009

2. *Current size, population, and irrigated acres*

	(2009)
<i>Size (acres)</i>	88,115
<i>Population served</i>	NA
<i>Irrigated acres</i>	65,000

3. *Water supplies received in current year*

<i>Water Source</i>	<i>AF</i>
<i>Federal urban water (Tbl 1)</i>	
<i>Federal agricultural water (Tbl 1)</i>	118,396
<i>State water (Tbl 1)</i>	
<i>Other Wholesaler (define) (Tbl 1)</i>	
<i>Local surface water (Tbl 1)</i>	
<i>Upslope drain water (Tbl 1)</i>	
<i>District ground water (Tbl 2)</i>	
<i>Banked water (Tbl 1)</i>	
<i>Transferred water (Tbl 6)</i>	1,868
<i>Recycled water (Tbl 3)</i>	
<i>Other (define) (Tbl 1)</i>	
<i>Total</i>	120,264

4. *Annual entitlement under each right and/or contract*

	<i>AF</i>	<i>Source</i>	<i>Contract #</i>	<i>Availability period(s)</i>
<i>Reclamation Urban AF/Y</i>				
<i>Reclamation Agriculture AF/Y Class 1</i>	55,000	USBR	175r-2358-LTR1	March 1 to February 28

<i>Class 2</i>	160,000	USBR		
<i>Buchanan</i>	24,000	USBR	14-06-200-3844A-LTR1-2	March 1 to February 28
<i>Other AF/Y Appropriative</i>	50,000	Ash Slough	L8577	November 1 to May 1
<i>Other AF/Y</i>	1,000	LeGrand-Athelon WD	Flood Flows	Surplus years only

5. *Anticipated land-use changes*

The district is anticipating a small amount of agricultural acreage to be developed for housing in the City of Chowchilla. Most of this acreage has already been taken out of production.

6. *Cropping patterns (Agricultural only)*

List of current crops (crops with 5% or less of total acreage) can be combined in the 'Other' category.

<i>Original Plan (1993)</i>		<i>Previous Plan (2002)</i>		<i>Current Plan</i>	
<i>Crop Name</i>	<i>Acres</i>	<i>Crop Name</i>	<i>Acres</i>	<i>Crop Name</i>	<i>Acres</i>
Alfalfa	11,900	Alfalfa	13,267	Alfalfa	13,306
Almonds	15,092	Almonds	14,620	Almonds	25,978
Cotton	16,520	Cotton	7,663	Cotton	522
Corn/silage	5,771	Corn/Silage	8,998	Corn	10,628
Grapes	6,789	Grapes	8,109	Grapes	6,029
Wheat	3,214	Sorghum	4,999	Wheat	4,360
				Figs	2,294
				Pistachios	2,129
<i>Other (<5%)</i>	6,602	<i>Other (<5%)</i>	7,769	<i>Other (<5%)</i>	8,707
<i>Total</i>	65,888	<i>Total</i>	65,506	<i>Total</i>	73,953

(See Planner, Chapter 2, Appendix A for list of crop names)

7. *Major irrigation methods (by acreage) (Agricultural only)*

<i>Original Plan (1993)</i>		<i>Previous Plan (2002)</i>		<i>Current Plan</i>	
<i>Irrigation Method</i>	<i>Acres</i>	<i>Irrigation Method</i>	<i>Acres</i>	<i>Irrigation Method</i>	<i>Acres</i>
Furrow	61,082	Furrow	57,982	Furrow	49,213
Low Volume	4,763	Low Volume	7,443	Low Volume	24,740
<i>Other</i>		<i>Other</i>		<i>Other</i>	
<i>Total</i>	65,888	<i>Total</i>	65,425	<i>Total</i>	73,953

(See Planner, Chapter 2, Appendix A for list of irrigation system types)

B. Location and Facilities

See Attachment A for points of delivery, turnouts (internal flow), and outflow (spill) points, measurement locations, conveyance system, storage facilities, operational loss recovery system, wells, and water quality monitoring locations

1. Incoming flow locations and measurement methods

<i>Location Name</i>	<i>Physical Location</i>	<i>Type of Measurement Device</i>	<i>Accuracy</i>
Madera Canal	Madera Canal Mile 33.6	Rated structure	+/- 2 percent
Buchanan Dam	Buchanan Dam weir	Rated structure	+/- 5 percent
LeGrand-Athelon	Serrano Check	Water Meter	+/- 2 percent

2. Current year Agricultural Conveyance System

<i>Miles Unlined – Canal</i>	<i>Miles Lined - Canal</i>	<i>Miles Piped</i>	<i>Miles – Other Natural Channels</i>
159.6	0.8	45.8	48

3 Current year Urban Distribution System

<i>Miles AC Pipe</i>	<i>Miles Steel Pipe</i>	<i>Miles Cast Iron Pipe</i>	<i>Miles – Other</i>

4. Storage facilities (tanks, reservoirs, regulating reservoirs)

<i>Name</i>	<i>Type</i>	<i>Capacity (AF)</i>	<i>Distribution or Spill</i>
Berenda Reservoir	Regulating Reservoir	1,400	Distribution
Califa Pond	Regulating Reservoir	510	Distribution
Dairyland Pond	Regulating Reservoir	300	Distribution
Central Pipeline Pond	Regulating Reservoir	40	Distribution
Berenda Pond	Regulating Reservoir	30	Distribution
Siphon 3 Pond	Regulating Reservoir	60	Distribution
Asken Pond	Regulating Reservoir	30	Distribution
Vera Pond	Regulating Reservoir	40	Distribution
Rutherford Pond	Regulating Reservoir	40	Distribution
Gregory Pond	Regulating Reservoir	40	Distribution
Haynes Pond	Regulating Reservoir	40	Distribution
Townsend Pond	Regulating Reservoir	50	Distribution
Lateral 3 Pond	Regulating Reservoir	80	Distribution
Lateral 4 Pond	Regulating Reservoir	80	Distribution

5. Outflow locations and measurement methods (Agricultural only)

Provide this information in Section 2 F.

6. Description of the agricultural spill recovery system

Spill from Califa Canal, Central Pipeline and Dairyland Pipeline is spilled into the Dairyland Pond and pumped back into the Califa Canal and Dairyland Pipeline.

7. *Agricultural delivery system operation (check all that apply)*

<i>On-demand</i>	<i>Scheduled</i>	<i>Rotation</i>	<i>Other (describe)</i>
	X		

8. *Restrictions on water source(s)*

<i>Source</i>	<i>Restriction</i>	<i>Cause of Restriction</i>	<i>Effect on Operations</i>
USBR	Limited water supply	San Joaquin River Settlement	Increase in groundwater overdraft

9. *Proposed changes or additions to facilities and operations for the next 5 years*

The District will continue to upgrade metered gates to propeller meters, construct groundwater recharge basins, construct regulating ponds, install ITRC Flap Gates, expand the SCADA system, construct long-crested weirs, construct broad-crested weirs.

C. Topography and Soils

1. *Topography of the district and its impact on water operations and management*

Land surfaces in the District are relatively flat and slope to the southwest at 8 feet per mile. Elevation is 150 to 325 feet above sea level. Topography does not negatively affect District water management.

2. *District soil association map (Agricultural only)*

See Attachment B, District Soils Map

Soil Association	Estimated Acres	Effect on Water Operations and Management
Pachappa-Grangevilla	56,100	none
San Joaquin-Madera	15,880	none
Fresno-Traver	5,900	none
Fresno-El Peco-Ponzo	1,120	none
Lewis-Landlow-Burchell	1,000	none

3. *Agricultural limitations resulting from soil problems (Agricultural only)*

<i>Soil Problem</i>	<i>Estimated Acres</i>	<i>Effect on Water Operations and Management</i>
Salinity	0	None
High-water table	0	None
High or low infiltration rates	0	None
Other (define)	0	None

D. Climate

1. *General climate of the district service area*

	<i>Jan</i>	<i>Feb</i>	<i>Mar</i>	<i>Apr</i>	<i>May</i>	<i>Jun</i>	<i>Jul</i>	<i>Aug</i>	<i>Sep</i>	<i>Oct</i>	<i>Nov</i>	<i>Dec</i>	<i>Annual</i>
<i>Avg Precip.</i>	2.09	1.81	1.89	1.12	0.49	0.10	0.01	0.02	0.17	0.61	1.30	1.71	11.32
<i>Avg Temp.</i>	44.7	50.0	54.3	59.9	67.3	74.4	79.7	78.3	72.8	64.1	52.8	44.5	61.9
<i>Max. Temp.</i>	54	61.2	66.9	74.9	83.7	91.8	98.0	96.1	90.8	80.7	65.9	54.7	76.6
<i>Min. Temp</i>	36.0	38.9	41.9	45.6	51.6	57.2	61.8	60.2	55.8	47.9	40.0	35.4	47.7
<i>ETo</i>	0.73	2.12	4.01	5.56	7.32	7.58	7.98	6.76	5.39	3.47	1.05	0.99	52.96

Weather station ID Madera 045233 *Data period: Year* 1948 *to Year* 2005

Average wind velocity 7 *Average annual frost-free days:* 355

2. *Impact of microclimates on water management within the service area* *None*

E. Natural and Cultural Resources

1. *Natural resource areas within the service area*

<i>Name</i>	<i>Estimated Acres</i>	<i>Description</i>
None		

2. *Description of district management of these resources in the past or present*

3. *Recreational and/or cultural resources areas within the service area*

<i>Name</i>	<i>Estimated Acres</i>	<i>Description</i>
None		

F. Operating Rules and Regulations

1. *Operating rules and regulations*

See Attachment C, District Rules and Regulations (water related)

2. *Water allocation policy (Agricultural only)*

See Attachment C, Rule 4

Summary – The District’s water allocation policy considers factors such as water supply, distribution system capacities, crop water demands and maximization of delivery efficiencies. The policy is described in Attachment C, Rule 4, Rules and Regulations Governing Water Delivery.

3. *Official and actual lead times necessary for water orders and shut-off (Agricultural only)*

See Attachment C, Rule 6

Summary - Official requests for water orders and shutoffs must be received by 1:00 pm, for the following day. Actual lead times may vary depending on when on requests and off requests are received, most can be accommodated when requested.

4. *Policies regarding return flows (surface and subsurface drainage from farms) and outflow (Agricultural only)*

See Attachment C, Rule 13

Summary – The District’s distribution system is not used to collect surface and subsurface drainage from farms.

5. *Policies on water transfers by the district and its customers*

Summary – The District can exercise the option to transfer water to other CVP contractors pursuant to current contract provisions. In-district transfers among District water users are allowed.

G. Water Measurement, Pricing, and Billing

1. *Agricultural Customers*

- a. *Number of farms* 304
- b. *Number of delivery points (turnouts and connections)* 948
- c. *Number of delivery points serving more than one farm* 5
- d. *Number of measured delivery points (meters and measurement devices)* 948
- e. *Percentage of delivered water that was measured at a delivery point* 100

f. *Delivery point measurement device table (Agricultural only)*

<i>Measurement Type</i>	<i>Number</i>	<i>Accuracy (+/- %)</i>	<i>Reading Frequency (Days)</i>	<i>Calibration Frequency (Months)</i>	<i>Maintenance Frequency (Months)</i>
<i>Metered Gates</i>	472	3-6%	Daily		As required**

<i>Propeller meter</i>	354	2%	Daily	As required**	Annual
<i>Weirs</i>	8	2%	Daily		
<i>Flumes</i>					
<i>Rated Pumps</i>	114	5%	daily	As required**	
<i>Metered gates</i>					
<i>Acoustic doppler</i>					
<i>Other (define)</i>					
<i>Total</i>	948				

** whenever problems arise, District operations personnel respond to either repair, replace or service meters. Calibrations are conducted as repairs or replacements are completed.

2. Urban Customers

- a. Total number of connections _____ 0 _____
- b. Total number of metered connections _____
- c. Total number of connections not billed by quantity _____
- d. Percentage of water that was measured at delivery point _____
- e. Percentage of delivered water that was billed by quantity _____
- f. Measurement device table

<i>Meter Size and Type</i>	<i>Number</i>	<i>Accuracy (+/-percentage)</i>	<i>Reading Frequency (Days)</i>	<i>Calibration Frequency (Months)</i>	<i>Maintenance Frequency (Months)</i>
<i>5/8-3/4"</i>					
<i>1"</i>					
<i>1 1/2"</i>					
<i>2"</i>					
<i>3"</i>					
<i>4"</i>					
<i>6"</i>					
<i>8"</i>					
<i>10"</i>					
<i>Compound</i>					
<i>Turbo</i>					
<i>Other (define)</i>					
<i>Total</i>					

3. Agriculture and Urban Customers

- a. Current year agriculture and /or urban water charges - including rate structures and billing frequency

The current rate structure is \$54 per acre-foot for agricultural water which is billed monthly.

b. See Attachment C for current year rate ordinance

c. Annual charges collected from customers (current year data)

<i>Fixed Charges</i>			
<i>Charges (\$ unit)</i>	<i>Charge units (\$/acre), (\$/customer) etc.</i>	<i>Units billed during year (acres, customer) etc.</i>	<i>\$ collected (\$ times units)</i>
\$1.50/\$100	\$ assessed value	\$132,973,928	\$1,994,609
\$16	\$/acre	75,495 acres	\$1,207,920

<i>Volumetric charges</i>			
<i>Charges (\$ unit)</i>	<i>Charge units (\$/AF), (\$/HCF), etc.</i>	<i>Units billed during year (AF, HCF) etc.</i>	<i>\$ collected (\$ times units)</i>
\$54	\$/AF	84,881 AF	\$4,583,574

See Attachment D, District Sample Bills

d. Water-use data accounting procedures

The District uses STORM, a multifunction computer program for water and assessment billing. Water delivery data is entered into a hand held Palm device and downloaded to the District’s server. Water billing is done on a monthly basis. Farmers can request detailed printouts of water delivery history on an individual turnout basis. Data is available for the past 10 years.

H. Water Shortage Allocation Policies

1. *Current year water shortage policies or shortage response plan - specifying how reduced water supplies are allocated*

Water supply forecasts are reviewed to determine the date when District water deliveries begin. Determination of a beginning date takes into account crop water demands and maximization of delivery efficiencies. If forecasts indicate water will be available throughout the year, deliveries are scheduled to begin on or about the first of March and continue until late fall. When forecasts indicate water will not be available throughout the year, the period of mid-June thru mid-August is given priority when scheduling water for delivery. When in the opinion of the District, water demands exceed the design or actual capacity of the distribution system or the supply of water, the district reserves the right to rotate the use of water by basic time and quantity method in order to deliver approximately equal amounts of water in acre-feet per acre. Waterusers rely on their private deep wells to irrigate crops when District water is not available.

See Attachment E, District Water Shortage Plan

2. *Current year policies that address wasteful use of water and enforcement methods*

See Attachment C, District Rules and Regulations, Rule 7 Waste of Water

Section 2: Inventory of Water Resources

A. Surface Water Supply

1. *Acre-foot amounts of surface water delivered to the water purveyor by each of the purveyor's sources*

See Water Inventory Tables, Table 1

2. *Amount of water delivered to the district by each of the district sources for the last 10 years*

See Water Inventory Tables, Table 8

B. Ground Water Supply

1. *Acre-foot amounts of ground water pumped and delivered by the district*

See Water Inventory Tables, Table 2

2. *Ground water basin(s) that underlies the service area*

<i>Name</i>	<i>Size (Square Miles)</i>	<i>Usable Capacity (AF)</i>	<i>Safe Yield (AF/Y)</i>
Chowchilla Groundwater Basin	250	NA	18,000

3. *Map of district-operated wells and managed ground water recharge areas*

See Attachment F, District Map of Ground Water Facilities

The District does not operate any deep wells.

4. *Description of conjunctive use of surface and ground water*

Water users in Chowchilla Water District utilize both surface water and groundwater conjunctively. The District's canal system is unlined and is a major means of groundwater recharge. The District's conjunctive use program is described in detail in the CWD Groundwater Management Plan.

5. *Ground Water Management Plan*

See Attachment G, Ground Water Management Plan

6. *Ground Water Banking Plan*

See Attachment H, Ground Water Banking Plan

The District does not have a groundwater banking program.

C. Other Water Supplies

1. *"Other" water used as part of the water supply*

See the Water Inventory Tables, Table 1

D. Source Water Quality Monitoring Practices

1. Potable Water Quality (Urban only)

See Attachment I – District Annual Water Quality Report

The District does not deliver water to urban customers.

2. *Agricultural water quality concerns:* Yes _____ No X
 (If yes, describe)

3. *Description of the agricultural water quality testing program and the role of each participant, including the district, in the program*

The District does not have an agricultural water quality testing program. There are no known problems associated with use of surface water or groundwater for irrigation of agricultural crops.

4. *Current water quality monitoring programs for surface water by source (Agricultural only)*

<i>Analyses Performed</i>	<i>Frequency</i>	<i>Concentration Range</i>	<i>Average</i>
None			

Current water quality monitoring programs for groundwater by source (Agricultural only)

<i>Analyses Performed</i>	<i>Frequency</i>	<i>Concentration Range</i>	<i>Average</i>
None			

E. Water Uses within the District

1. *Agricultural*

See Water Inventory Tables, Table 5 - Crop Water Needs

2. *Types of irrigation systems used for each crop in current year*

<i>Crop name</i>	<i>Total Acres</i>	<i>Level Basin - acres</i>	<i>Furrow - acres</i>	<i>Sprinkler - acres</i>	<i>Low Volume - acres</i>	<i>Multiple methods - acres</i>
Corn	10,628		10,628			
Oats	1,704		1,704			
Wheat	4,360		4,360			
Alfalfa Hay	13,306		13,306			
Figs	2,294				2,294	
Grapes	6,029		2,015		4,014	
Almonds	25,978		12,200		13,778	
Pistachios	2,129				2,129	
Walnuts	242				242	
Miscellaneous	7,283		5,000		2,283	

3. Urban use by customer type in current year

<i>Customer Type</i>	<i>Number of Connections</i>	<i>AF</i>
<i>Single-family</i>		
<i>Multi-family</i>		
<i>Commercial</i>		
<i>Industrial</i>		
<i>Institutional</i>		
<i>Landscape irrigation</i>		
<i>Wholesale</i>		
<i>Recycled</i>		
<i>Other (specify)</i>		
<i>Other (specify)</i>		
<i>Other (specify)</i>		
<i>Unaccounted for</i>		
<i>Total</i>		

4. Urban Wastewater Collection/Treatment Systems serving the service area – current year

<i>Treatment Plant</i>	<i>Treatment Level (1, 2, 3)</i>	<i>AF</i>	<i>Disposal to / uses</i>
	<i>Total</i>		
<i>Total discharged to ocean and/or saline sink</i>			

5. Ground water recharge/management in current year (Table 6)

<i>Recharge Area</i>	<i>Method of Recharge</i>	<i>AF</i>	<i>Method of Retrieval</i>
	<i>Total</i>		

6. Transfers and exchanges into or out of the service area in current year (Table 6)

<i>From Whom</i>	<i>To Whom</i>	<i>AF</i>	<i>Use</i>
Madera Irrigation District	Chowchilla Water District	1,808	Agriculture
Gravelly Ford Water District	Chowchilla Water District	60	Agriculture

7. Trades, wheeling, wet/dry year exchanges, banking or other transactions in current year (Table 6)

<i>From Whom</i>	<i>To Whom</i>	<i>AF</i>	<i>Use</i>

8. *Other uses of water in current year*

<i>Other Uses</i>	<i>AF</i>

F. Outflow from the District (Agricultural only)

*Districts included in the drainage problem area, as identified in “A Management Plan for Agricultural Subsurface Drainage and Related Problems on the Westside San Joaquin Valley (September 1990),” should also complete **Water Inventory Table 7 and Appendix B (include in plan as Attachment L)***

See Facilities Map, Attachment A, for the location of surface and subsurface outflow points, outflow measurement points, outflow water-quality testing locations

1. *Surface and subsurface drain/outflow in current year*

<i>Outflow point</i>	<i>Location description</i>	<i>AF</i>	<i>Type of measurement</i>	<i>Accuracy (%)</i>	<i>% of total outflow</i>	<i>Acres drained</i>
1	Lateral 3 Spill	4.0	weir	+/- 2	13.3	NA
2	Lateral 4 spill	26.0	weir	+/- 2	86.7	NA

<i>Outflow point</i>	<i>Where the outflow goes (drain, river or other location)</i>	<i>Type Reuse (if known)</i>
1	Merced Irrigation District Canal	Irrigation of agricultural crops
2	Merced Irrigation District Canal	Irrigation of agricultural crops

2. *Description of the Outflow (surface and subsurface) water quality testing program and the role of each participant in the program*

The District does not perform water quality testing on canal spills. There is no subsurface drainage from the District.

3. *Outflow (surface drainage & spill) Quality Testing Program*

<i>Analyses Performed</i>	<i>Frequency</i>	<i>Concentration Range</i>	<i>Average</i>	<i>Reuse limitation?</i>
None				

Outflow (subsurface drainage) Quality Testing Program

<i>Analyses Performed</i>	<i>Frequency</i>	<i>Concentration Range</i>	<i>Average</i>	<i>Reuse limitation?</i>
NA				

4. Provide a brief discussion of the District’s involvement in Central Valley Regional Water Quality Control Board programs or requirements for remediating or monitoring any contaminants that would significantly degrade water quality in the receiving surface waters.

The District is tracking Central Valley Regional Water Quality Control Board programs. The District is a member of the East San Joaquin Water Quality Coalition.

G. Water Accounting (Inventory)

1. Water Supplies Quantified

- a. Surface water supplies, imported and originating within the service area, by month (Table 1)*
- b. Ground water extracted by the district, by month (Table 2)*
- c. Effective precipitation by crop (Table 5)*
- d. Estimated annual ground water extracted by non-district parties (Table 2)*
- e. Recycled urban wastewater, by month (Table 3)*
- f. Other supplies, by month (Table 1)*

2. Water Used Quantified

- a. Agricultural conveyance losses, including seepage, evaporation, and operational spills in canal systems (Table 4) or
Urban leaks, breaks and flushing/fire uses in piped systems (Table 4)*
- b. Consumptive use by riparian vegetation or environmental use (Table 6)*
- c. Applied irrigation water - crop ET, water used for leaching/cultural practices (e.g., frost protection, soil reclamation, etc.) (Table 5)*
- d. Urban water use (Table 6)*
- e. Ground water recharge (Table 6)*
- f. Water exchanges and transfers and out-of-district banking (Table 6)*
- g. Estimated deep percolation within the service area (Table 6)*
- h. Flows to perched water table or saline sink (Table 7)*
- i. Outflow water leaving the district (Table 6)*
- j. Other*

3. Overall Water Inventory

- a. Table 6*

H. Assess Quantifiable Objectives:

Identify the Quantifiable Objectives that apply to the District (Planner, chapter 10) and provide a short narrative describing past, present and future plans that address the CALFED Water Use Efficiency Program goals identified for the District.

All of the Quantifiable Objectives for the Chowchilla Water District relate to on-farm water use.

<i>QO #</i>	<i>QO Description</i>	<i>Past, Present & Future Plans</i>
147	Provide flow to improve ecosystem conditions	District lands are not hydrologically connected to Merced River
148	Provide flow to improve ecosystem conditions	District lands are only hydrologically connected to San Joaquin River during flood releases from Buchanan Dam
159	Provide long-term diversion flexibility to increase the water supply for beneficial uses	District lands are not hydrologically connected to Merced National Wildlife Reserve
161	Provide long-term diversion flexibility to increase the water supply for beneficial uses	District lands are not hydrologically connected to salt affected soils
149	Reduce group A pesticides to enhance and maintain beneficial uses of water	District lands are not hydrologically connected to Merced River
150	Reduce group A pesticides to enhance and maintain beneficial uses of water	District lands are only hydrologically connected to San Joaquin River during flood releases from Buchanan Dam
151	Reduce pesticides to enhance and maintain beneficial uses of water	District lands are not hydrologically connected to Merced River
152	Reduce pesticides to enhance and maintain beneficial uses of water	District lands are only hydrologically connected to San Joaquin River during flood releases from Buchanan Dam
154	Reduce salinity to enhance and maintain beneficial uses of water	District lands are only hydrologically connected to San Joaquin River during flood releases from Buchanan Dam
155	Reduce temperatures to enhance and maintain aquatic species populations	District lands are not hydrologically connected to Merced River

District is a member and encourages its landowners to be members of the East San Joaquin Water Quality Coalition.

Section 3: Best Management Practices (BMPs) for Agricultural Contractors

A. Critical Agricultural BMPs

1. Measure the volume of water delivered by the district to each turnout with devices that are operated and maintained to a reasonable degree of accuracy, under most conditions, to +/- 6%

Number of turnouts that are unmeasured or do not meet the standards listed above: 0

Number of measurement devices installed last year: 11

Number of measurement devices installed this year: 15

Number of measurement devices to be installed next year: 10

Types of Measurement Devices Being Installed	Accuracy	Total Installed During Current Year
Propeller meter	+/- 2%	15

2. Designate a water conservation coordinator to develop and implement the Plan and develop progress reports

Name: Douglas Welch

Title: General Manager

Address: 327 S. Chowchilla Blvd. Chowchilla, CA 93610

Telephone: 559-665-3747

E-mail: dwelch@cwdwater.com

3. Provide or support the availability of water management services to water users
See Attachment J, Notices of District Education Programs and Services Available to Customers.

a. On-Farm Evaluations

- 1) On farm irrigation and drainage system evaluations using a mobile lab type assessment

	Total in district	# surveyed last year	# surveyed in current year	# projected for next year	# projected 2 nd yr in future
Irrigated acres	65,000	160	133	160	160
Number of farms	304	3	2	3	3

- 2) Timely field and crop-specific water delivery information to the water user

Friant Waterline Newsletter is provided to all District customers. Local newspapers report daily ET use and crop irrigation data. Numerous County Ag department fliers and newsletters provide crop water use

data to all farming interests. All of the above are readily available to District waterusers and they are encouraged to use the sources at hand. District includes fliers on water conservation from County Ag Department, NRCS, CIT Fresno, ITRC with water billing. Monthly reports are mailed to waterusers with summaries of water delivered to each of their turnouts. See Attachment D, District Sample Bills

b. Real-time and normal irrigation scheduling and crop ET information

Friant Water Users website contains daily CIMIS data and irrigation information for locally grown crops. ITRC normal year irrigation scheduling guides are available to all water users. Waterusers are informed about CIMIS ETo data available online.

c. Surface, ground, and drainage water quantity and quality data provided to water users

USBR has surface water quality data. District provides no groundwater and does not allow drainage into District delivery system.

d. Agricultural water management educational programs and materials for farmers, staff, and the public

<i>Program</i>	<i>Co-Funders (If Any)</i>	<i>Yearly Targets</i>
Grower information meetings	County Ag Department	200 participants
ITRC evaluations reviews	USBR	3 to 6 farms
Irrigation Tech-Line	Friant Water Users Authority	Mailed to all waterusers
CIT Fresno Seminar Series		unknown

See Attachment J for samples of provided materials and notices

e. other

4. Pricing structure - based at least in part on quantity delivered

Describe the quantity-based water pricing structure, the cost per acre-foot, and when it became effective.

The District has charged waterusers for water on a per acre-foot of use basis since the creation of the District. The water rate is set based on the melded rate of the various water supplies to the District. The water rate for 2009 was \$54 per acre-foot.

5. Evaluate and describe the need for changes in policies of the institutions to which the district is subject

NA

6. Evaluate and improve efficiencies of district pumps

Describe the program to evaluate and improve the efficiencies of the contractor’s pumps.

District pump testing provided for District low-lift pumps when required.

B. Exemptible BMPs for Agricultural Contractors

(See Planner, Chapter 2, Appendix C for examples of exemptible conditions)

1. Facilitate alternative land use

<i>Drainage Characteristic</i>	<i>Acreage</i>	<i>Potential Alternate Uses</i>
<i>High water table (<5 feet)</i>		
<i>Poor drainage</i>		
<i>Ground water Selenium concentration > 50 ppb</i>		
<i>Poor productivity</i>		

Describe how the contractor encourages customers to participate in these programs.

NA – District has no irrigable lands that have exceptionally high water tables or whose irrigation contributes to significant problems.

2. Facilitate use of available recycled urban wastewater that otherwise would not be used beneficially, meets all health and safety criteria, and does not cause harm to crops or soils

The District is investigating the potential to use recycled urban wastewater. The City of Chowchilla currently discharges wastewater into city’s groundwater recharge basins to offset city’s groundwater use.

<i>Sources of Recycled Urban Waste Water</i>	<i>AF/Y Available</i>	<i>AF/Y Currently Used in District</i>
City of Chowchilla	1,000	0

3. Facilitate the financing of capital improvements for on-farm irrigation systems

<i>Funding source Programs</i>	<i>How provide assistance</i>
NRCS	District refers waterusers to Madera County NRCS office for design and cost-sharing on conservation practices.
District	The District cost shares 25% of the cost of a water meter, installs the meter at no cost and maintains the meter forever.

4. Incentive pricing

<i>Structure of incentive pricing</i>	<i>Related goal</i>
Free or reduced price in wet years during winter and spring	Encourage use of surface water which results in in-lieu recharge of groundwater

5. a) *Line or pipe ditches and canals*

NA – Water users in Chowchilla Water District utilize both surface water and groundwater conjunctively. The District’s canal system is unlined and is a major means of groundwater recharge. The District’s conjunctive use program is described in detail in the CWD Groundwater Management Plan.

<i>Canal/Lateral (Reach)</i>	<i>Type of Improvement</i>	<i>Number of Miles in Reach</i>	<i>Estimated Seepage (AF/Y)</i>	<i>Accomplished/Planned Date</i>

b) *Construct regulatory reservoirs*

The District has constructed numerous regulating reservoirs and continues to investigate locations that would improve the efficiency of the District and provide more flexible and consistent deliveries. The reduction in spill that has resulted from the construction of the regulating reservoirs is not known. See listing of regulating reservoirs in Section B - Location and Facilities.

<i>Reservoir Name</i>	<i>Annual Spill in Section (AF/Y)</i>	<i>Estimated Spill Recovery (AF/Y)</i>	<i>Accomplished/Planned Date</i>

6. *Increase flexibility in water ordering by, and delivery to, water users*

See Attachment - C District Rules and Regulations

The District has a scheduled demand irrigation delivery system. Waterusers order water before 1:00 pm and receives it on the following day for the period of time requested. Wateruser notifies District of shutoff time before 1:00 pm and shuts off at requested time on next day. Flexibility in start time and shutoff time are explained in detail in Rule 6 of Rules & Regulations During periods of high demand some customers may experience short delay (usually less than 6 hours) in receiving water. The SCADA system improvements installed in 2009 will allow increased flexibility in water ordering and deliveries while reducing canal spill.

7. *Construct and operate district spill and tailwater recovery systems*

Drainage of tailwater into District canal system is not permitted. All tailwater must be contained on farm. District spill has been reduced by conservation practices to less than 0.1 percent.

<i>Distribution System Lateral</i>	<i>Annual Spill (AF/Y)</i>	<i>Quantity Recovered and reused (AF/Y)</i>
Lateral 3	4	0
Lateral 4	26	0
Total		

<i>Drainage System Lateral</i>	<i>Annual Drainage</i>	<i>Quantity Recovered</i>

	<i>Outflow (AF/Y)</i>	<i>and reused (AF/Y)</i>
NA		
Total		

8. Plan to measure outflow.

Total # of outflow (surface) locations/points 2

Total # of outflow (subsurface) locations/points 0

Total # of measured outflow points 2

Percentage of total outflow (volume) measured during report year 100%

Identify locations, prioritize, determine best measurement method/cost, submit funding proposal

<i>Location & Priority</i>	<i>Estimated cost (in \$1,000s)</i>				
	<i>2009</i>	<i>2010</i>	<i>2011</i>	<i>2012</i>	<i>2013</i>

The District has water level recorders that are located at the last check structure at the end of the two canals that spill water out of the District. The water level recorder charts are changed weekly and the acre-feet of spill is then computed from the charts.

9. *Optimize conjunctive use of surface and ground water*

On-going. Depends on wet/dry cycle, flood releases. District is a conjunctive use district. Delivery system is used to recharge groundwater and deliver water to farms. During wet years water is also delivered to sloughs and other recharge areas to promote groundwater recharge. During dry years water previously stored as groundwater is pumped by farmers for irrigation.

10. *Automate canal structures*

District just completed \$729,000 SCADA Improvement project where 13 deliveries were automated and 12 locations where water flow is now remotely monitored. District will continue investigating expansion of SCADA system.

11. *Facilitate or promote water customer pump testing and evaluation*

See Attachment J, Notices of District Education Programs and Services Available to Customers

12. Mapping

District will investigate the benefit and cost of GIS mapping.

<i>GIS maps</i>	<i>Estimated cost (in \$1,000s)</i>				
	<i>2009</i>	<i>2010</i>	<i>2011</i>	<i>2012</i>	<i>2013</i>
<i>Layer 1 – Distribution system</i>				\$1	
<i>Layer 2 – Drainage system</i>					
<i>Suggested layers:</i>					
<i>Layer 3 – Ground water information</i>					
<i>Layer 4 – Soils map</i>					
<i>Layer 5 – Natural & cultural resources</i>					
<i>Layer 6 – Problem areas</i>					

C. Provide a 3-Year Budget for Implementing BMPs

1. Amount actually spent during current year.

<i>BMP #</i>	<i>BMP Name</i>	<i>Actual Expenditure (not including staff time)</i>	<i>Staff Hours</i>
<i>A 1</i>	<i>Measurement</i>	<i>\$16,000</i>	<i>120</i>
<i>2</i>	<i>Conservation staff</i>	<i>\$1,000</i>	<i>12</i>
<i>3</i>	<i>On-farm evaluation /water delivery info</i>	<i>\$1,000</i>	<i>8</i>
	<i>Irrigation Scheduling</i>	<i>\$250</i>	<i>10</i>
	<i>Water quality</i>	<i>\$100</i>	<i>1</i>
	<i>Agricultural Education Program</i>	<i>\$100</i>	<i>10</i>
<i>4</i>	<i>Quantity pricing</i>	<i>\$100</i>	<i>1</i>
<i>5</i>	<i>Policy changes</i>	<i>\$0</i>	<i>0</i>
<i>6</i>	<i>Contractor's pumps</i>	<i>\$0</i>	<i>10</i>
<i>B 1</i>	<i>Alternative land use</i>	<i>\$0</i>	<i>0</i>
<i>2</i>	<i>Urban recycled water use</i>	<i>\$0</i>	<i>5</i>
<i>3</i>	<i>Financing of on-farm improvements</i>	<i>\$0</i>	<i>40</i>
<i>4</i>	<i>Incentive pricing</i>	<i>\$0</i>	<i>10</i>
<i>5</i>	<i>Line or pipe canals/install reservoirs</i>	<i>\$0</i>	<i>0</i>
<i>6</i>	<i>Increase delivery flexibility</i>	<i>\$0</i>	<i>0</i>
<i>7</i>	<i>District spill/tailwater recovery systems</i>	<i>\$1,000</i>	<i>0</i>
<i>8</i>	<i>Measure outflow</i>	<i>\$500</i>	<i>10</i>
<i>9</i>	<i>Optimize conjunctive use</i>	<i>\$900,000</i>	<i>10</i>
<i>10</i>	<i>Automate canal structures</i>	<i>\$525,000</i>	<i>300</i>
<i>11</i>	<i>Customer pump testing</i>	<i>\$1,000</i>	<i>24</i>
<i>12</i>	<i>Mapping</i>	<i>\$0</i>	<i>0</i>
	<i>Total</i>	<i>\$1,447,050</i>	<i>562</i>

2. Projected budget summary for the next year.

<u>BMP #</u>	<u>BMP Name</u>	<u>Budgeted Expenditure (not including staff time)</u>	<u>Staff Hours</u>
A 1	Measurement	\$15,000	100
2	Conservation staff	\$1,000	12
3	On-farm evaluations/water delivery info	\$1,000	80
	Irrigation Scheduling	\$250	10
	Water quality	\$100	1
	Agricultural Education Program	\$100	10
4	Quantity pricing	\$100	1
5	Policy changes	\$0	0
6	Contractor's pumps	\$0	10
B 1	Alternative land use	\$0	0
2	Urban recycled water use	\$0	5
3	Financing of on-farm improvements	\$0	40
4	Incentive pricing	\$0	10
5	Line or pipe canals/install reservoirs	\$0	0
6	Increase delivery flexibility	\$50,000	400
7	District spill/tailwater recovery systems	\$1,000	0
8	Measure outflow	\$500	10
9	Optimize conjunctive use	\$900,000	10
10	Automate canal structures	\$0	0
11	Customer pump testing	\$1,000	240
12	Mapping	\$0	0
	<i>Total</i>	\$970,050	723

3. Projected budget summary for 3rd year.

<u>BMP #</u>	<u>BMP Name</u>	<u>Budgeted Expenditure (not including staff time)</u>	<u>Staff Hours</u>
A 1	Measurement	\$15,000	100
2	Conservation staff	\$1,000	12
3	On-farm evaluations/water delivery info	\$1,000	80
	Irrigation Scheduling	\$250	10
	Water quality	\$100	1
	Agricultural Education Program	\$100	10
4	Quantity pricing	\$100	1
5	Policy changes	\$0	0
6	Contractor's pumps	\$0	10

(continued)

<i>BMP #</i>	<i>BMP Name</i>	<i>Budgeted Expenditure (not including staff time)</i>	<i>Staff Hours</i>
<i>B 1</i>	<i>Alternative land use</i>	\$0	0
<i>2</i>	<i>Urban recycled water use</i>	\$0	5
<i>3</i>	<i>Financing of on-farm improvements</i>	\$0	40
<i>4</i>	<i>Incentive pricing</i>	\$0	10
<i>5</i>	<i>Line or pipe canals/install reservoirs</i>	\$0	0
<i>6</i>	<i>Increase delivery flexibility</i>	\$0	0
<i>7</i>	<i>District spill/tailwater recovery systems</i>	\$1,000	0
<i>8</i>	<i>Measure outflow</i>	\$500	10
<i>9</i>	<i>Optimize conjunctive use</i>	\$900,000	10
<i>10</i>	<i>Automate canal structures</i>	\$0	0
<i>11</i>	<i>Customer pump testing</i>	\$1,000	24
<i>12</i>	<i>Mapping</i>	\$0	0
	<i>Total</i>	\$920,050	323

Section 5

District Water Inventory Tables

Year of Data **Enter data year here**

Table 1

Surface Water Supply

2009 Month	Federal Ag Water (acre-feet)	Federal non- Ag Water. (acre-feet)	State Water (acre-feet)	Local Water (acre-feet)	Other Water (acre-feet)	Upslope Drain Water (acre-feet)	Total (acre-feet)
Method							
January	0	0	0	0	0	0	0
February	0	0	0	0	0	0	0
March	0	0	0	0	0	0	0
April	347	0	0	0	0	0	347
May	25735	0	0	0	0	0	25,735
June	23686	0	0	0	0	0	23,686
July	41761	0	0	0	0	0	41,761
August	19193	0	0	0	0	0	19,193
September	0	0	0	0	0	0	0
October	841	0	0	0	0	0	841
November	6833	0	0	0	0	0	6,833
December	0	0	0	0	0	0	0
TOTAL	118,396	0	0	0	0	0	118,396

Table 2
Ground Water Supply

2009 Month	District Groundwater (acre-feet)	Private Groundwater *(acre-feet)
Method		
January	0	0
February	0	0
March	0	17,000
April	0	21,000
May	0	28,000
June	0	28,000
July	0	32,000
August	0	26,000
September	0	20,000
October	0	3,000
November	0	0
December	0	0
TOTAL	0	175,000

*normally estimated

Table 3

Total Water Supply

2009 Month	Surface Water Total (acre-feet)	District Groundwater (acre-feet)	Recycled M&I (acre-feet)	Total District (acre-feet)
Method				
January	0	0	0	0
February	0	0	0	0
March	0	0	0	0
April	347	0	0	347
May	25,735	0	0	25,735
June	23,686	0	0	23,686
July	41,761	0	0	41,761
August	19,193	0	0	19,193
September	0	0	0	0
October	841	0	0	841
November	6,833	0	0	6,833
December	0	0	0	0
TOTAL	118,396	0	0	118,396

*Recycled M&I Wastewater is treated urban wastewater that is used for agriculture.

Table 4

Distribution System

2009								
Canal, Pipeline, Lateral, Reservoir	Length (feet)	Width (feet)	Surface Area (square feet)	Precipitatio (acre-feet)	Evaporation (acre-feet)	Spillage (acre-feet)	Seepage (acre-feet)	Total (acre-feet)
Earth Canal	841,632	15	12,624,480	193	1,420	30	15,650	(16,907)
Conc. lined Canal	4,320	20	86,400	1	10	0	2	(11)
			0	0	0	0	0	0
Natural Channels	84,480	40	3,379,200	52	380	0	4,189	(4,517)
Berenda Reservoir	800	8,000	6,400,000	98	720	0	7,934	(8,556)
Ponds	466	4,660	2,171,560	33	244	0	2,692	(2,903)
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
TOTAL			24,661,640	378	2,774	30	30,468	28,102

Table 6

2009 District Water Inventory

Water Supply	Table 3		118,396
Riparian ET	(Distribution and Drain)	minus	2,000
Groundwater recharge	intentional - ponds, injection	minus	0
Seepage	Table 4	minus	30,468
Evaporation - Precipitation	Table 4	minus	2,396
Spillage	Table 4	minus	30
Transfers/exchanges/trades/wheel	(into or out of the district)	plus/minus	1,868
Non-Agri deliveries	delivered to non-ag customer	minus	0
Water Available for sale to agricultural customers			85,371
<i>Compare the above line with the next line to help find data gaps</i>			
2005 Actual Agricultural Water Sales	From District Sales Records		84,881
Private Groundwater	Table 2	plus	175,000
Crop Water Needs	Table 5	minus	246,001
Drainwater outflow	(tail and tile not recycled)	minus	0
Percolation from Agricultural Land	(calculated)		13,880

Table 7

Influence on Groundwater and Saline Sink

2009

Agric Land Deep Perc + Seepage + Recharge - Groundwater Pumping = District Influence	30,468
Estimated actual change in ground water storage, including natural recharge)	(20,000)
Irrigated Acres (from Table 5)	73,953
Irrigated acres over a perched water table	0
Irrigated acres draining to a saline sink	0
Portion of percolation from agri seeping to a perched water table	0
Portion of percolation from agri seeping to a saline sink	0
Portion of On-Farm Drain water flowing to a perched water table/saline sink	0
Portion of Dist. Sys. seep/leaks/spills to perched water table/saline sink	0
Total (AF) flowing to a perched water table and saline sink	0

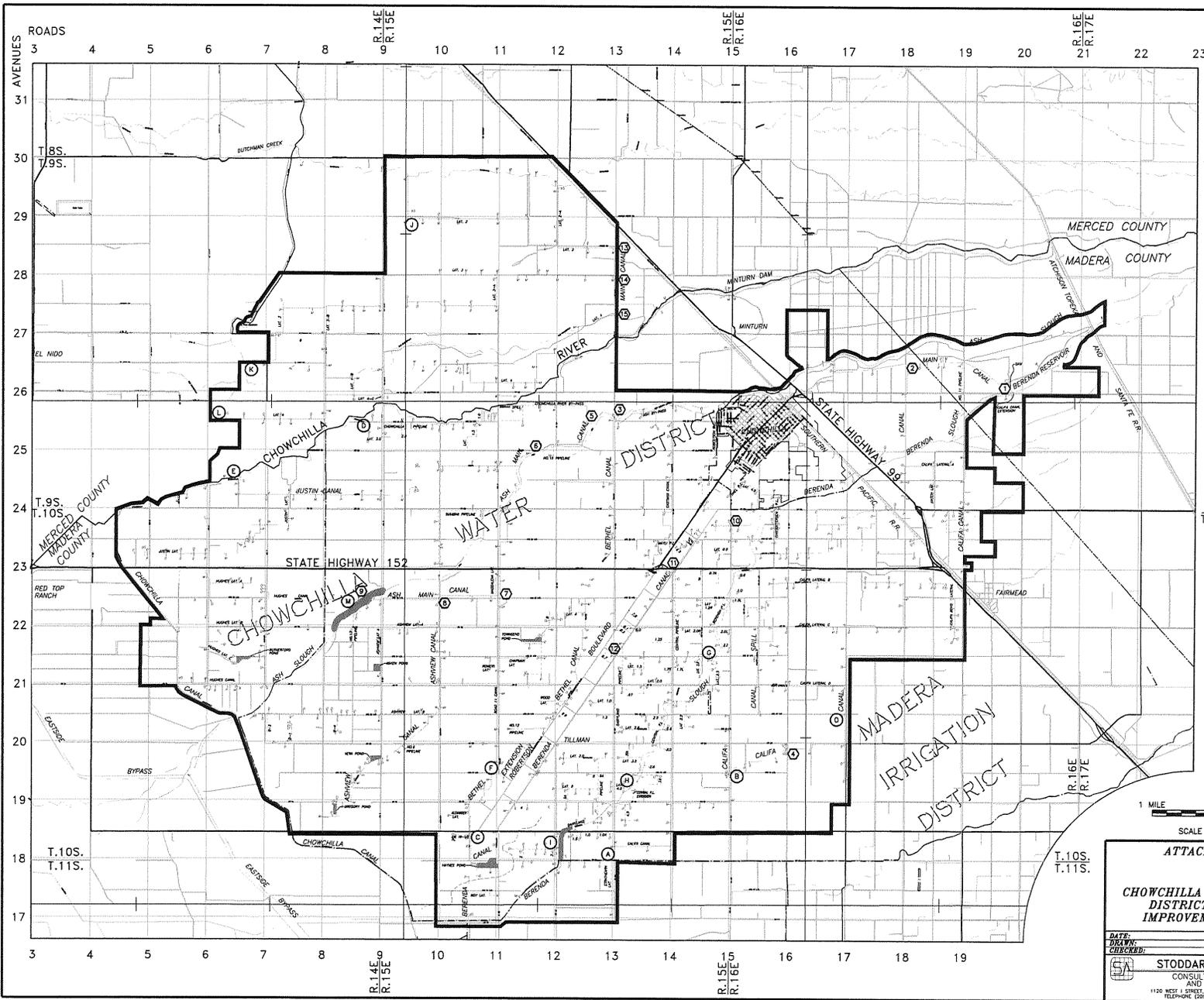
Table 8

Annual Water Quantities Delivered Under Each Right or Contract

Year	Federal Ag Water (acre-feet)	Federal non-Ag Water. (acre-feet)	State Water (acre-feet)	Local Water (acre-feet)	Other Water (acre-feet)	Upslope Drain Water (acre-feet)	Total (acre-feet)
2000	166,322	0	0	14,816	992	0	182,130
2001	126,652	0	0	12,884	1,877	0	141,413
2002	90,063	0	0	735	1,359	0	92,157
2003	101,390	0	0	508	10,815	0	112,713
2004	88,629	0	0	155	2,688	0	91,472
2005	161,115	0	0	15,255	72	0	176,442
2006	148,559	0	0	81,894	540	0	230,993
2007	107,917	0	0	173	855	0	108,945
2008	87,871	0	0	18	1,700	0	89,589
2009	118,396	0	0	0	0	0	118,396
Total	1,196,914	0	0	126,438	20,898	0	1,344,250
Average	119,691	0	0	12,644	2,090	0	134,425

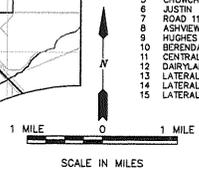
Attachment A

District Facilities Map



- T.8S.
T.9S.
- LEGEND**
- DISTRICT BOUNDARY
 - ROADS
 - MAJOR ROADS & HIGHWAYS
 - TRANSMISSION LINES
 - LOCAL & COUNTY BOUNDARIES
 - SECTION LINES

- T.9S.
T.10S.
- CANAL AND PIPELINE SPILL MONITORING
 - A CALIFA
 - B CALIFA D/S POND
 - C BETHEL
 - D CHOWCHILLA P/L
 - E JUSTIN
 - F ROAD 11
 - G BERENDA P/L
 - H CENTRAL P/L
 - I DAIRYLAND P/L
 - J LATERAL 2
 - K LATERAL 3
 - L LATERAL 4
 - M SIPHON 3
 - CANAL AND PIPELINE HEADING AUTOMATION
 - 1 CALIFA
 - 2 BERENDA
 - 3 BETHEL
 - 4 CALIFA POND OUTLET
 - 5 CHOWCHILLA P/L
 - 6 JUSTIN
 - 7 ROAD 11
 - 8 ASHVIEW
 - 9 HUGHES
 - 10 BERENDA P/L
 - 11 CENTRAL P/L
 - 12 DAIRYLAND P/L
 - 13 LATERAL 2
 - 14 LATERAL 3
 - 15 LATERAL 4



ATTACHMENT B-1

**CHOWCHILLA WATER DISTRICT
DISTRICT WIDE SCADA
IMPROVEMENT PROJECT**

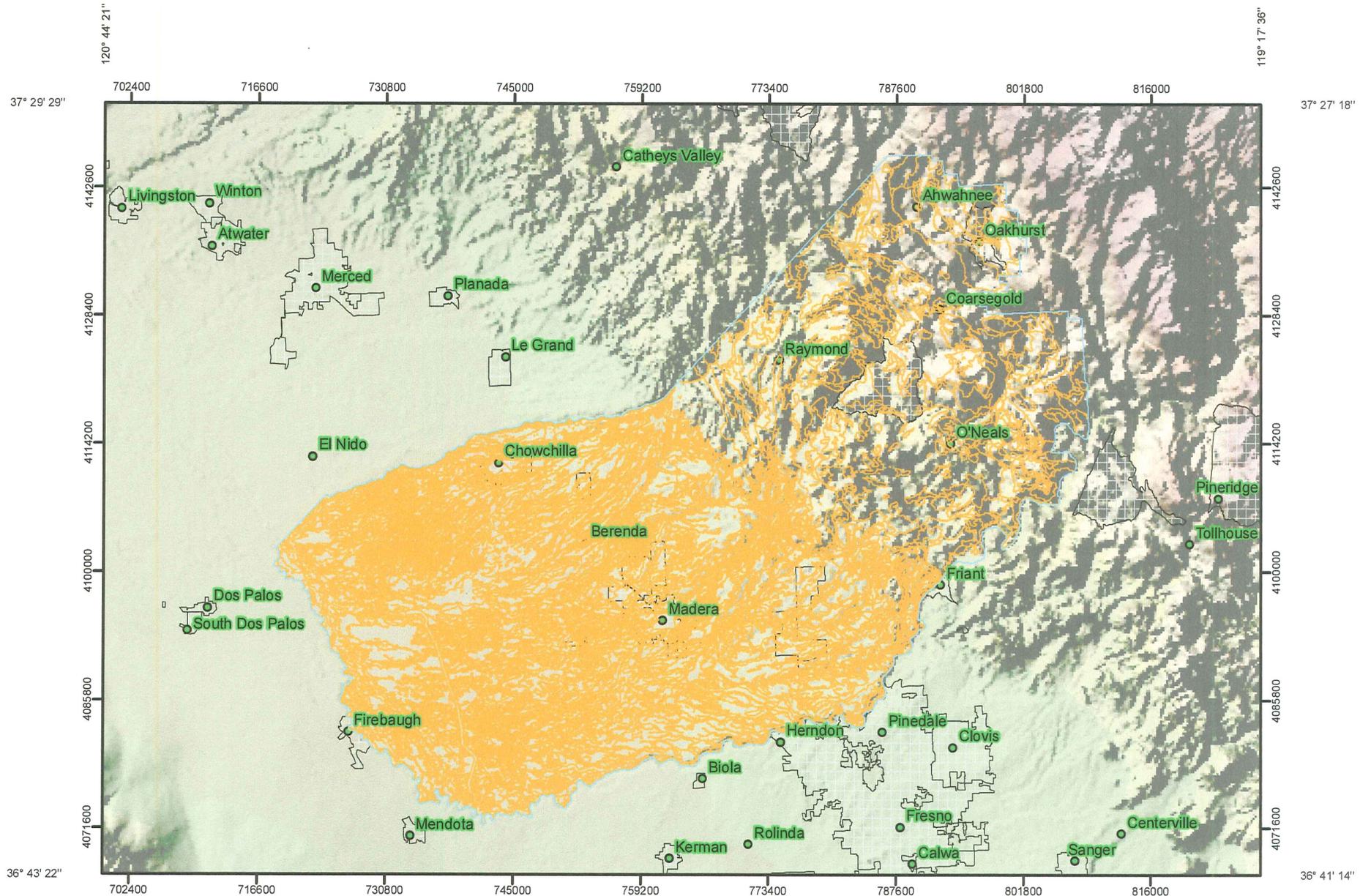
DATE:	APPROVED:
DRAWN:	R.L.
CHECKED:	DRAWING NO.:

STODDARD & ASSOCIATES
CONSULTING CIVIL ENGINEERS
AND LAND SURVEYORS
1120 WEST I STREET, SUITE C • LOS BANOS, CALIFORNIA 93825
TELEPHONE (209) 826-9100 • FAX (209) 826-3307

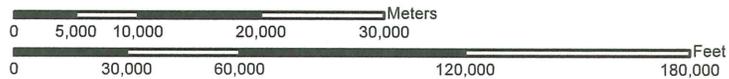
Attachment B

District Soils Map

Soil Map—Madera Area, California



Map Scale: 1:611,000 if printed on A size (8.5" x 11") sheet.



MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

 Soil Map Units

 Blowout

 Borrow Pit

 Clay Spot

 Closed Depression

 Gravel Pit

 Gravelly Spot

 Landfill

 Lava Flow

 Marsh or swamp

 Mine or Quarry

 Miscellaneous Water

 Perennial Water

 Rock Outcrop

 Saline Spot

 Sandy Spot

 Severely Eroded Spot

 Sinkhole

 Slide or Slip

 Sodic Spot

 Spoil Area

 Stony Spot

 Very Stony Spot

 Wet Spot

 Other

 Gully

 Short Steep Slope

 Other

Political Features

 Urban Areas

 Cities

Water Features

 Oceans

Transportation

 Interstate Highways

 US Routes

MAP INFORMATION

Map Scale: 1:611,000 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:20,000.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
 Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>
 Coordinate System: UTM Zone 10N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Madera Area, California
 Survey Area Data: Version 5, Jan 2, 2008

Date(s) aerial images were photographed: Data not available.

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Madera Area, California (CA651)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
AaC	Ahwahnee and Auberry coarse sandy loams, 8 to 15 percent slopes	3,494.8	0.4%
AaD	Ahwahnee and Auberry coarse sandy loams, 15 to 30 percent slope	12,238.1	1.4%
AbB	Ahwahnee and Auberry rocky coarse sandy loams, 3 to 8 percent slopes	59.3	0.0%
AbD	Ahwahnee and Auberry rocky coarse sandy loams, 8 to 30 percent slopes	16,953.8	2.0%
AbE	Ahwahnee and Auberry rocky coarse sandy loams, 30 to 45 percent slopes	12,671.3	1.5%
AcD	Ahwahnee and auberry very rocky coarse sandy loams, 15 to 30 percent slopes	1,209.2	0.1%
AcF	Ahwahnee and auberry very rocky coarse sandy loams, 30 to 75 percent slopes	3,875.4	0.4%
AdB	Ahwahnee and Vista coarse sandy loams, 3 to 8 percent slopes	112.1	0.0%
AdC	Ahwahnee and Vista coarse sandy loams, 8 to 15 percent slopes	8,101.7	0.9%
AdD	Ahwahnee and Vista coarse sandy loams, 15 to 30 percent slopes	28,005.6	3.3%
AeB	Ahwahnee and Vista rocky coarse sandy loams, 3 to 8 percent slopes	142.1	0.0%
AeD	Ahwahnee and Vista rocky coarse sandy loams, 8 to 30 percent slopes	97,558.8	11.3%
AeE	Ahwahnee and Vista rocky coarse sandy loams, 30 to 45 percent slopes	30,944.4	3.6%
ArD	Ahwahnee and Vista very rocky coarse sandy loams, 15 to 30 percent slopes	7,091.8	0.8%
ArF	Ahwahnee and Vista very rocky coarse sandy loams, 30 to 75 percent slopes	12,541.6	1.5%
AsA	Alamo clay, 0 to 1 percent slopes	1,980.6	0.2%
AtA	Atwater loamy sand, 0 to 3 percent slopes	3,297.1	0.4%
AtB	Atwater loamy sand, 3 to 8 percent slopes	2,552.9	0.3%
AwA	Atwater loamy sand, moderately deep and deep over hardpan, 0 to 3 percent slopes	4,404.1	0.5%
AwB	Atwater loamy sand, moderately deep and very deep over hardpan, 3 to 8 percent slopes	1,576.5	0.2%
BeA	Bear Creek loam, 0 to 3 percent slopes	575.2	0.1%
BfA	Borden fine sandy loam, 0 to 1 percent slopes	1,151.7	0.1%
BkA	Borden fine sandy loam, slightly saline-alkali, 0 to 1 percent slopes	1,262.7	0.1%
BmA	Borden loam, 0 to 1 percent slopes	288.4	0.0%

Madera Area, California (CA651)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
BoA	Borden loam, slightly saline-alkali, 0 to 1 percent slopes	357.0	0.0%
BuA	Buchenau fine sandy loam, 0 to 3 percent slopes	105.0	0.0%
BvA	Buchenau fine sandy loam, slightly saline-alkali, 0 to 3 percent slopes	73.4	0.0%
ByA	Buchenau fine sandy loam, strongly saline-alkali, 0 to 3 percent slopes	22.4	0.0%
BzA	Buchenau loam, 0 to 3 percent slopes	249.2	0.0%
CaA	Cajon loamy sand, 0 to 1 percent slopes	1,919.4	0.2%
CaaA	Cajon loamy sand, slightly saline-alkali, 0 to 1 percent slopes	2,674.6	0.3%
CabA	Cajon loamy sand, moderately saline-alkali, 0 to 1 percent slopes	197.5	0.0%
CacA	Cajon loamy sand, strongly saline-alkali, 0 to 1 percent slopes	490.9	0.1%
CbaB	Calhi loamy sand, slightly alkali, 0 to 8 percent slopes	938.5	0.1%
CbbB	Calhi loamy sand, moderately alkali, 0 to 8 percent slopes	1,046.0	0.1%
CcaA	Calhi loamy sand, moderately deep and deep over silt, slightly saline-alkali, 0 to 3 percent slopes	110.7	0.0%
CcaB	Calhi loamy sand, moderately deep and deep over silt, slightly saline-alkali, 3 to 8 percent slopes	104.5	0.0%
CcbA	Calhi loamy sand, moderately deep and deep over silt, moderatel saline-alkali, 0 to 3 percent slopes	239.1	0.0%
CcbB	Calhi loamy sand, moderately deep and deep over silt, moderatel saline-alkali, 3 to 8 percent slopes	158.3	0.0%
CccA	Calhi loamy sand, moderately deep and deep over silt, strongly saline-alkali, 0 to 3 percent slopes	130.8	0.0%
CdaA	Calhi loamy sand, shallow over hardpan variant, moderately saline-alkali, 0 to 1 percent slopes	622.1	0.1%
CeA	Chino clay loam, 0 to 1 percent slopes	338.7	0.0%
CeaA	Chino clay loam, slightly saline-alkali, 0 to 1 percent slopes	2,271.5	0.3%
CebA	Chino clay loam, moderately saline-alkali, 0 to 1 percent slope	407.3	0.0%
CfA	Chino fine sandy loam, 0 to 1 percent slopes	2,149.6	0.2%
CfaA	Chino fine sandy loam, slightly saline-alkali, 0 to 1 percent slopes	5,385.2	0.6%
CfbA	Chino fine sandy loam, moderately saline-alkali, 0 to 1 percent slopes	52.4	0.0%

Madera Area, California (CA651)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
CgA	Chino loam, 0 to 1 percent slopes	500.8	0.1%
CgaA	Chino loam, slightly saline-alkali, 0 to 1 percent slopes	5,142.4	0.6%
CgbA	Chino loam, moderately saline-alkali, 0 to 1 percent slopes	544.3	0.1%
CgcA	Chino loam, strongly saline-alkali, 0 to 1 percent slopes	47.9	0.0%
ChD	Coarsegold loam, 8 to 30 percent slopes	3,787.5	0.4%
ChF	Coarsegold loam, 45 to 75 percent slopes	28,135.1	3.3%
CkD	Coarsegold rocky loam, 15 to 30 percent slopes	1,432.3	0.2%
CkF	Coarsegold rocky loam, 30 to 75 percent slopes	2,611.1	0.3%
CmA	Columbia fine sandy loam, 0 to 1 percent slopes	1,007.6	0.1%
CmdA	Columbia fine sandy loam, moderately deep and deep over hardpan 0 to 1 percent slopes	492.8	0.1%
CmtA	Columbia fine sandy loam, moderately deep and deep over temple soils, 0 to 1 percent slopes	1,334.5	0.2%
CoA	Columbia loamy sand, 0 to 1 percent slopes	211.7	0.0%
CotA	Columbia loamy sand, over temple soils, 0 to 1 percent slopes	196.8	0.0%
CpA	Columbia sandy loam, 0 to 1 percent slopes	26.2	0.0%
CpdA	Columbia sandy loam, moderately deep over sand, 0 to 1 percent slopes	72.6	0.0%
CrB	Columbia soils, channeled, 0 to 8 percent slopes	153.9	0.0%
CsB	Cometa gravelly sandy loam, 3 to 8 percent slopes	1,675.4	0.2%
CtB	Cometa loam, 3 to 8 percent slopes	930.1	0.1%
CuA	Cometa sandy loams, 0 to 3 percent slopes	481.9	0.1%
CuB	Cometa sandy loams, 3 to 8 percent slopes	36,227.8	4.2%
CuC	Cometa sandy loams, 8 to 15 percent slopes	6,230.0	0.7%
CwB	Cometa-Whitney sandy loams, 3 to 8 percent slopes	2,075.3	0.2%
CwC	Cometa-Whitney sandy loams, 8 to 15 percent slopes	1,152.1	0.1%
CyA	Corning gravelly loam, 0 to 3 percent slopes	136.7	0.0%
CyB	Corning gravelly loam, 3 to 8 percent slopes	207.2	0.0%
DaB	Daulton fine sandy loam, 3 to 8 percent slopes	457.3	0.1%
DaD	Daulton fine sandy loam, 8 to 30 percent slopes	12,559.1	1.5%

Madera Area, California (CA651)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
DaE	Daulton fine sandy loam, 30 to 45 percent slopes	1,020.6	0.1%
DAM	Dams	48.6	0.0%
DbD	Daulton loam, 8 to 30 percent slopes	10,698.8	1.2%
DcB	Daulton rocky fine sandy loam, 3 to 8 percent slopes	130.2	0.0%
DcE	Daulton rocky fine sandy loam, 30 to 45 percent slopes	4,340.1	0.5%
DeA	Delhi sand, 0 to 3 percent slopes	678.7	0.1%
DeB	Delhi sand, 3 to 8 percent slopes	426.7	0.0%
DfA	Delhi sand, moderately deep and deep over hardpan, 0 to 3 percent slopes	632.8	0.1%
DmA	Dinuba fine sandy loam, 0 to 1 percent slopes	1,806.9	0.2%
DoA	Dinuba loam, 0 to 1 percent slopes	98.9	0.0%
DpA	Dinuba-EI Peco fine sandy loams, slightly saline alkali, 0 to 1 percent slopes	7,125.6	0.8%
DsA	Dinuba-EI Peco fine sandy loams, moderately saline alkali, 0 to 1 percent slopes	3,379.8	0.4%
DtA	Dinuba-EI Peco loams, slightly saline alkali, 0 to 1 percent slopes	168.5	0.0%
DuA	Dinuba-EI Peco loams, moderately saline alkali, 0 to 1 percent slopes	127.3	0.0%
EdA	EI Peco-Dinuba fine sandy loams, strongly saline alkali, 0 to 1 percent slopes	7,297.7	0.8%
FaA	Foster clay loam, 0 to 1 percent slopes	333.0	0.0%
FaaA	Foster clay loam, slightly saline-alkali, 0 to 1 percent slopes	923.8	0.1%
FabA	Foster clay loam, moderately saline-alkali, 0 to 1 percent slopes	318.6	0.0%
FacA	Foster clay loam, strongly saline-alkali, 0 to 1 percent slopes	150.3	0.0%
FbA	Foster loams, 0 to 1 percent slopes	1,747.1	0.2%
FbaA	Foster loams, slightly saline-Alkali, 0 to 1 percent slopes	328.9	0.0%
FbbA	Foster loams, moderately saline-Alkali, 0 to 1 percent slopes	470.2	0.1%
FbcA	Foster loams, strongly saline-Alkali, 0 to 1 percent slopes	336.0	0.0%
FbdA	Foster loams, sandy substratum, 0 to 1 percent slopes	20.1	0.0%
FbeA	Foster loams, moderately deep and deep over temple soils, 0 to percent slopes	299.5	0.0%
FcbA	Foster loams, moderately deep and deep over temple soils, moderately saline-Alkali, 0 to 1 percent slopes	38.4	0.0%

Madera Area, California (CA651)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
FdcA	Foster-Chino loams, strongly saline alkali, 0 to 1 percent slopes	642.4	0.1%
FeaA	Fresno and El Peco fine sandy loams, slightly saline-alkali, 0 to 1 percent slopes	4,516.0	0.5%
FebA	Fresno and El Peco fine sandy loams, moderately saline-alkali, to 1 percent slopes	5,636.8	0.7%
FecA	Fresno and El Peco fine sandy loams, strongly saline-alkali, 0 to 1 percent slopes	30,835.7	3.6%
FfaA	Fresno and El Peco loams, slightly saline-alkali, 0 to 1 percent slopes	3,786.2	0.4%
FfbA	Fresno and El Peco loams, moderately saline-alkali, 0 to 1 percent slopes	5,165.4	0.6%
FfcA	Fresno and El Peco loams, strongly saline-alkali, 0 to 1 percent slopes	6,765.1	0.8%
FgaA	Fresno, El Peco, and Chino soils, slightly saline-alkali, 0 to percent slopes	2,554.8	0.3%
FgbA	Fresno, El Peco, and Chino soils, moderately saline-alkali, 0 to 1 percent slopes	377.0	0.0%
FhbA	Fresno, El Peco, and Lewis soils, moderately saline-alkali, 0 to 1 percent slopes	5,003.9	0.6%
FhcA	Fresno, El Peco, and Lewis soils, strongly saline-alkali, 0 to 1 percent slopes	537.0	0.1%
FkaA	Fresno, El Peco, and Pozo soils, slightly saline-alkali, 0 to 1 percent slopes	692.6	0.1%
FkbA	Fresno, El Peco, and Pozo soils, moderately saline-alkali, 0 to 1 percent slopes	481.9	0.1%
GaA	Grangeville fine sandy loam, 0 to 1 percent slopes	12,300.5	1.4%
GbA	Grangeville fine sandy loam, slightly saline-alkali, 0 to 1 percent slopes	4,540.7	0.5%
GcA	Grangeville fine sandy loam, over traver soils, 0 to 1 percent slopes	11,513.3	1.3%
GdA	Grangeville fine sandy loam, over traver soils, slightly saline alkali, 0 to 1 percent slopes	1,812.7	0.2%
GeA	Grangeville fine sandy loam, moderately deep and deep over temple soils, 0 to 1 percent slopes	500.9	0.1%
GfA	Grangeville fine sandy loam, deep over hardpan, 0 to 1 percent slopes	914.4	0.1%
GhA	Grangeville fine sandy loam, deep over alkali hardpan, 0 to 1 percent slopes	1,268.7	0.1%
GkA	Grangeville fine sandy loam, deep over alkali hardpan, slightly saline-alkali, 0 to 1 percent slopes	556.5	0.1%

Madera Area, California (CA651)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
GmA	Grangeville sandy loam, 0 to 1 percent slopes	1,048.4	0.1%
GnA	Grangeville sandy loam, slightly saline-alkali, 0 to 1 percent slopes	777.9	0.1%
Gp	Gravel pits	156.8	0.0%
GrA	Greenfield coarse sandy loam, 0 to 3 percent slopes	3,506.9	0.4%
GrB	Greenfield coarse sandy loam, 3 to 8 percent slopes	384.3	0.0%
GsA	Greenfield fine sandy loam, 0 to 3 percent slopes	3,169.8	0.4%
GsB	Greenfield fine sandy loam, 3 to 8 percent slopes	45.4	0.0%
GuA	Greenfield sandy loam, 0 to 3 percent slopes	735.1	0.1%
GuB	Greenfield sandy loam, 3 to 8 percent slopes	737.5	0.1%
GvA	Greenfield sandy loam, moderately deep and deep over hardpan, 0 to 3 percent slopes	1,225.8	0.1%
GvB	Greenfield sandy loam, moderately deep and deep over hardpan, 3 to 8 percent slopes	854.1	0.1%
HaA	Hanford fine sandy loam, 0 to 1 percent slopes	7,470.2	0.9%
HbA	Hanford fine sandy loam, moderately deep and deep over hardpan, 0 to 1 percent slopes	3,352.8	0.4%
HcA	Hanford (ripperdan) fine sandy loam, shallow variant, 0 to 3 percent slopes	143.9	0.0%
HdA	Hanford (ripperdan) fine sandy loam, moderately deep and deep over silt, 0 to 3 percent slopes	20,007.2	2.3%
HeB	Hanford gravelly sandy loam, 3 to 8 percent slopes	625.5	0.1%
HfA	Hanford sandy loam, 0 to 3 percent slopes	3,368.5	0.4%
HgA	Hanford sandy loam, moderately deep and deep over hardpan, 0 to 3 percent slopes	2,262.3	0.3%
HhA	Hanford sandy loam, moderately deep over sand, 0 to 3 percent slopes	420.6	0.0%
HkB	Hideaway very stony loam, 0 to 8 percent slopes	1,136.2	0.1%
HkD	Hideaway very stony loam, 15 to 30 percent slopes	175.7	0.0%
HmA	Hildreth sandy clay, 0 to 3 percent slopes	1,691.9	0.2%
HnB	Hildreth-San Joaquin complex, 0 to 8 percent slopes	252.3	0.0%

Madera Area, California (CA651)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
HoD	Holland sandy loam, 15 to 30 percent slopes	6,149.2	0.7%
HoE	Holland sandy loam, 30 to 45 percent slopes	6,873.5	0.8%
HrE	Holland rocky sandy loam, 30 to 45 percent slopes	3,974.7	0.5%
HsB	Hornitos gravelly sandy loam, 3 to 8 percent slopes	509.2	0.1%
HsD	Hornitos gravelly sandy loam, 8 to 30 percent slopes	404.1	0.0%
HvD	Hornitos very rocky sandy loam, 8 to 30 percent slopes	1,691.5	0.2%
JeA	Jesbel clay, 0 to 3 percent slopes	80.8	0.0%
JgB	Jesbel gravelly clay, 3 to 8 percent slopes	26.2	0.0%
JyA	Jesbel gravelly clay loam, 0 to 3 percent slopes	176.0	0.0%
LeA	Lewis loam, slightly saline-alkali, 0 to 1 percent slopes	958.5	0.1%
LwA	Lewis loam, moderately saline-alkali, 0 to 1 percent slopes	796.5	0.1%
MaA	Madera fine sandy loam, 0 to 3 percent slopes	14,002.4	1.6%
MbA	Madera loam, 0 to 3 percent slopes	2,746.7	0.3%
McA	Madera-Alamo complex, 0 to 1 percent slopes	295.4	0.0%
MdA	Madera-Lewis complex, slightly saline alkali, 0 to 1 percent slopes	1,417.8	0.2%
MmA	Marguerite clay loam, 0 to 3 percent slopes	242.2	0.0%
MnA	Marguerite clay loam, moderately saline-alkali, 0 to 3 percent slopes	24.3	0.0%
MoA	Marguerita loam, 0 to 3 percent slopes	605.8	0.1%
MrA	Marguerite loam, slightly saline-alkali, 0 to 3 percent slopes	8.8	0.0%
MsA	Marguerite loam, moderately saline-alkali, 0 to 3 percent slope	78.4	0.0%
MtB	Montpellier coarse sandy loam, 3 to 8 percent slopes	572.0	0.1%
MtC	Montpellier coarse sandy loam, 8 to 15 percent slopes	1,487.4	0.2%
PaA	Pachappa fine sandy loam, 0 to 1 percent slopes	7,831.1	0.9%
PbA	Pachappa fine sandy loam, slightly saline-alkali, 0 to 1 percent slopes	8,503.6	1.0%
PcA	Pachappa sandy loam, 0 to 1 percent slopes	719.1	0.1%
PdA	Pachappa sandy loam, slightly saline-alkali, 0 to 1 percent slopes	4,185.1	0.5%

Madera Area, California (CA651)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
PeA	Pachappa sandy loam, moderately deep and deep over hardpan, slightly saline-alkali, 0 to 1 percent slopes	388.4	0.0%
PfA	Porterville clay, 0 to 3 percent slopes	321.0	0.0%
PfB	Porterville clay, 3 to 8 percent slopes	592.8	0.1%
PgB	Porterville rocky clay, 3 to 8 percent slopes	171.2	0.0%
PhA	Pozo clay loam, 0 to 1 percent slopes	968.1	0.1%
PkA	Pozo clay loam, slightly saline, 0 to 1 percent slopes	1,059.6	0.1%
PmA	Pozo clay loam, moderately saline, 0 to 1 percent slopes	206.0	0.0%
PnA	Pozo clay loam, strongly saline, 0 to 1 percent slopes	113.2	0.0%
PoA	Pozo loam, 0 to 1 percent slopes	2,511.2	0.3%
PsA	Pozo loam, slightly saline, 0 to 1 percent slopes	5,744.8	0.7%
PtA	Pozo loam, moderately saline, 0 to 1 percent slopes	2,975.8	0.3%
PvA	Pozo loam, strongly saline, 0 to 1 percent slopes	1,611.6	0.2%
RaA	Ramona sandy loam, 0 to 3 percent slopes	13,221.0	1.5%
RaB	Ramona sandy loam, 3 to 8 percent slopes	730.2	0.1%
RbA	Ramona sandy loam, deep over hardpan, 0 to 3 percent slopes	429.8	0.0%
RcA	Raynor clay, 0 to 3 percent slopes	207.6	0.0%
RcB	Raynor clay, 3 to 8 percent slopes	1,213.4	0.1%
RdA	Redding gravelly loam, 0 to 3 percent slopes	929.1	0.1%
RdC	Redding gravelly loam, 3 to 15 percent slopes	1,705.3	0.2%
RfC	Redding gravelly sandy loam, 3 to 15 percent slopes	1,006.9	0.1%
RgC	Redding-Raynor complex, 3 to 15 percent slopes	1,735.6	0.2%
Rh	Riverwash	3,762.5	0.4%
Rk	Rockland, hornitos soil material	236.4	0.0%
RmB	Rocklin rocky sandy loam, pumiceous variant, 3 to 8 percent slopes	38.0	0.0%
RmD	Rocklin rocky sandy loam, pumiceous variant, 8 to 30 percent slopes	574.8	0.1%
RoA	Rossi clay loam, slightly saline-alkali, 0 to 1 percent slopes	1,006.2	0.1%
RpA	Rossi clay loam, strongly saline-alkali, 0 to 1 percent slopes	193.4	0.0%
RrA	Rossi silt loam, slightly saline-alkali, 0 to 1 percent slopes	356.1	0.0%

Madera Area, California (CA651)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
RsA	Rossi silt loam, moderately saline-alkali, 0 to 1 percent slope	571.2	0.1%
RtA	Rossi silt loam, strongly saline-alkali, 0 to 1 percent slopes	640.3	0.1%
SaA	San Joaquin sandy loams, 0 to 3 percent slopes	60,567.2	7.0%
SbA	San Joaquin-Alamo complex, 0 to 3 percent slopes	1,092.8	0.1%
ScB	San Joaquin-Whitney sandy loams, 0 to 8 percent slopes	393.8	0.0%
SeB	Sesame loam, 3 to 8 percent slopes	297.1	0.0%
SeC	Sesame loam, 8 to 15 percent slopes	69.9	0.0%
SkC	Sesame rocky loam, 8 to 15 percent slopes	101.5	0.0%
SnB	Sesame rocky sandy loam, 3 to 8 percent slopes	43.8	0.0%
SyB	Sesame sandy loam, 3 to 8 percent slopes	1,086.3	0.1%
TaA	Temple clay, 0 to 1 percent slopes	265.0	0.0%
TbA	Temple clay loam, 0 to 1 percent slopes	999.1	0.1%
TcA	Temple clay loam, slightly saline, 0 to 1 percent slopes	629.3	0.1%
TdA	Temple loam, 0 to 1 percent slopes	44.1	0.0%
TeA	Temple loam, slightly saline, 0 to 1 percent slopes	117.6	0.0%
Tf	Terrace escarpments	372.0	0.0%
TgF	Tollhouse rocky coarse sandy loam, 30 to 75 percent slopes	3,132.8	0.4%
ThE	Trabuco loam, 15 to 45 percent slopes	463.0	0.1%
TkC	Trabuco rocky loam, 8 to 15 percent slopes	176.6	0.0%
TkF	Trabuco rocky loam, 45 to 75 percent slopes	1,526.7	0.2%
TmA	Traver loam, slightly saline-alkali, 0 to 1 percent slopes	6,983.2	0.8%
TnA	Traver loam, moderately saline alkali, 0 to 1 percent slopes	8,229.4	1.0%
ToA	Traver loam, strongly saline-alkali, 0 to 1 percent slopes	7,267.0	0.8%
TpA	Traver-Chino complex, slightly saline alkali, 0 to 1 percent slopes	1,193.1	0.1%
TrA	Traver-Chino complex, moderately saline alkali, 0 to 1 percent slopes	2,211.7	0.3%
TsA	Traver, Fresno, and El Peco fine sandy loams, moderately saline alkali, 0 to 1 percent slopes	212.3	0.0%
TtA	Traver, fresno, el peco fine sandy loams, strongly saline-alkal , 0 to 1 percent slopes	178.5	0.0%

Madera Area, California (CA651)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
TuB	Trigo fine sandy loam, 3 to 8 percent slopes	1,716.0	0.2%
TuC	Trigo fine sandy loam, 8 to 15 percent slopes	552.9	0.1%
TvB	Trigo-Cometa sandy loams, 3 to 8 percent slopes	599.1	0.1%
TwA	Tujunga loamy sand, 0 to 3 percent slopes	20,631.9	2.4%
TwB	Tujunga loamy sand, 3 to 8 percent slopes	243.9	0.0%
TxA	Tujunga loamy sand, moderately deep and deep over hardpan, 0 to 3 percent slopes	639.8	0.1%
TyA	Tujunga loamy sand, moderately deep and deep over silt, 0 to 3 percent slopes	91.6	0.0%
TzB	Tujunga and Hanford soils, channeled, 0 to 8 percent slopes	2,660.9	0.3%
URB	Towns (not surveyed)	1,741.5	0.2%
VaA	Visalia fine sandy loam, 0 to 1 percent slopes	4,846.7	0.6%
VdA	Visalia sandy loam, 0 to 3 percent slopes	2,152.3	0.2%
VnA	Visalia sandy loam, moderately deep over sand, 0 to 3 percent slopes	316.9	0.0%
VsB	Vista-Sesame complex, 3 to 8 percent slopes	921.0	0.1%
W	Water	10,764.4	1.2%
WaB	Whiterock rocky fine sandy loam, 3 to 8 percent slopes	55.7	0.0%
WaE	Whiterock rocky fine sandy loam, 30 to 45 percent slopes	133.4	0.0%
WbD	Whiterock very rocky fine sandy loam, 8 to 30 percent slopes	460.7	0.1%
WfB	Whitney fine sandy loam, 3 to 8 percent slopes	7,093.0	0.8%
WfC	Whitney fine sandy loam, 8 to 15 percent slopes	1,030.5	0.1%
WmA	Whitney loam, 0 to 3 percent slopes	54.6	0.0%
WmB	Whitney loam, 3 to 8 percent slopes	86.7	0.0%
WmC	Whitney loam, 8 to 15 percent slopes	18.9	0.0%
WnD	Whitney sandy loam, 15 to 30 percent slopes, eroded	712.8	0.1%
WoC	Whitney and Rocklin gravelly sandy loams, 3 to 15 percent slope	462.8	0.1%
WrB	Whitney and Rocklin sandy loams, 3 to 8 percent slopes	6,131.1	0.7%
WrC	Whitney and Rocklin sandy loams, 8 to 15 percent slopes	5,286.6	0.6%
WtB	Whitney-Trigo fine sandy loams, 3 to 8 percent slopes	5,108.3	0.6%

Madera Area, California (CA651)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
WuA	Wunjeý very fine sandy loam, slightly saline-alkali, 0 to 1 percent slopes	555.2	0.1%
WvA	Wunjeý very fine sandy loam, moderately saline-alkali, 0 to 1 percent slopes	594.9	0.1%
WxA	Wunjeý very fine sandy loam, strongly saline-alkali, 0 to 1 percent slopes	876.5	0.1%
WyB	Wunjeý very fine sandy loam, strongly saline-alkali, channeled, 1 to 8 percent slopes	374.0	0.0%
ZaB	Zaca clay, 3 to 8 percent slopes	638.9	0.1%
Totals for Area of Interest		861,651.4	100.0%

Attachment C

District Rules and Regulations

**CHOWCHILLA WATER DISTRICT
RULES AND REGULATIONS
GOVERNING WATER DELIVERY**

RULE 1: CONTRACTS WITH THE UNITED STATES

- 1.01 All water distributed by the District pursuant to contracts between the United States and the District shall be subject to the restrictions, terms and conditions of said contracts and applicable Reclamation Law.
- 1.02 Copies of said contracts are on file and available for reference at the District Office and the provisions therein pertaining to use and distribution of, and payment for, water are incorporated as a part of these rules and regulations.

RULE 2: OPERATION AND CONTROL OF DISTRICT FACILITIES

- 2.01 All diversion works, canals, ditches, headgates and other facilities belonging to the District will be operated and maintained by the District. The control and operation will be conducted by only authorized agents of the District.

RULE 3: ACCESS TO LANDS

- 3.01 As provided by Section 35404 of the California Water Code, the "District may enter for the purposes of the District upon any land." Generally, this right of entry will be restricted to entry for the purpose of operation and maintenance of district facilities, determination of cropping patterns, control of District water deliveries and well measurements where authorized by a landowner.
- 3.02 If the District holds a right-of-way or easement across private land for the operation of a canal or other facility, the law provides that the District has, and the District shall exercise certain secondary rights and easements, such as the right-of-way or easement to make repairs and do such other things as are necessary for the full exercise of the easement rights.

RULE 4: ALLOCATION OF WATER AND SCHEDULING OF WATER YEAR:

- 4.01 The Directors of the District will evaluate available water forecasts and annually determine the date when District water deliveries will begin. Determination of a beginning date shall take into account crop water demands and maximization of delivery efficiencies. If forecasts indicate water will be available throughout the year, deliveries will be scheduled to begin on or about the first of March and continue till late fall. When forecasts indicate water will not

be available throughout the year, the period of mid-June thru mid-August will be given priority when scheduling water for delivery.

- 4.02 When in the opinion of the District, water demands exceed the design or actual capacity of the distribution system or the supply of water, the district reserves the right to rotate the use of water by basic time and quantity method.

RULE 5: APPLICATIONS FOR WATER SERVICE

- 5.01 Applications for crop water will not be accepted until all delinquent assessments, custom bills and crop water charges have been paid and Reclamation Law requirements have been satisfied.
- 5.02 All applications shall state the property description or parcel number, acreage to be served and acreage of crops to be grown thereupon.
- 5.03 Parcels of land consisting of less than five (5) acres may be billed on a Flat Rate Basis as determined by the District. In the event of excessive use by a Flat Rate User, the District reserves the right to levy an additional charge for such excessive use. Tenant growers falling under flat rate criteria shall be required to make payment in full prior to delivery of water. Landowners will be billed in one installment due and payable per District Credit Policy.

RULE 6: WATER DELIVERIES

- 6.01 Water orders will not be accepted for properties or growers with delinquent assessments or water charges.
- 6.02 All water orders shall be placed through the District Office, phone 665-3747 between the hours of 8:00 a.m. and 5:00 p.m.
- 6.03 Orders for water, change of quantity, or shutoff orders may be placed on any day of the week.
- 6.04 Orders received before 1:00 p.m. will be eligible to begin delivery the following day. Orders received after 1:00 p.m. will be considered as having been received the following day.
- 6.05 Preliminary notice of shutoff must be made before 1:00 p.m. on the preceding day. Waterusers should attempt to make their preliminary notice within two hours of the actual shutoff time. Orders for shutoff received after 1:00 p.m. may result in appropriate action by the Board of Directors to prevent unnecessary cost to the rest of the constituents of the District.
- 6.06 Following the preliminary notice, specific notice of shutoff must be made between 6:00 a.m. and 8:00 a.m. on the day of the shut off. If the water user has not notified the District of

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the specific time that the delivery will be shutoff by 8:00 a.m., the preliminary notice time will serve as the specific notice time.

- 6.07 Water users will be notified between 3:00 p.m. and 5:00 p.m. if they will receive water on the following day. A preliminary notice of starting time will be given at that time. After several unsuccessful attempts to notify a wateruser are made, the water order listing will be consulted and the next wateruser on the list will be called.
- 6.08 Between 7:00 a.m. and 9:00 a.m., water users will be given specific notice of the time to start their delivery.
- 6.09 Orders will not be accepted for deliveries scheduled for more than three days in advance.
- 6.10 Orders must identify canal, turnout number, earliest time delivery can be taken, quantity desired and estimated shutoff time.
- 6.11 Unauthorized adjustment of a turnout or the check structure serving a turnout may result in appropriate action by the Board of Directors to prevent unnecessary cost to the rest of the constituents of the District. Unauthorized adjustment includes, but is not limited to, opening or closing a delivery gate without authorization or at an unauthorized time, starting or stopping a canal lift pump without authorization or at an unauthorized time.
- 6.12 Water users may request authorization to adjust the turnout from their ditchtender. Authorization will be granted on a case by case basis.
- 6.13 Water must be used continuously until the irrigation is completed.
- 6.14 Water users terminating deliveries on weekends and requesting water on the same parcel again on Monday will be charged on a continuous service basis as though water delivery had not been interrupted.
- 6.15 A minimum flow of one cfs (450 gpm) may be imposed at any delivery point when the District deems necessary.
- 6.16 All deliveries through head gate structures shall be controlled by the ditchtender, who may lock these gates open or closed. The ditchtender is to be notified to request any changes.
- 6.17 The District reserves the right to refuse service when an unreasonably large or small quantity of water is ordered.

RULE 7: WASTE OF WATER

- 7.01 The District reserves the right to refuse or terminate delivery of water to any lands when the proposed use, method of use or irrigation practice require such excessive quantities of water as will constitute waste.

- 7.02 Users wasting water, either willfully, carelessly or because of defective or inadequate on-farm facilities, or inadequate preparation of the land for irrigation shall be subject to immediate termination of service and refusal of future service until such conditions are remedied.
- 7.03 Waste pollution or other improper use of water shall be reported to the appropriate District authorities.

RULE 8: IRRIGATION OF EXCESSIVELY HIGH GROUND

- 8.01 The District shall not be required to raise water to an excessive height in canals or ditches to provide service to lands or ditches of excessive elevations. Such excessive elevation shall be determined by the particular conditions which could jeopardize District ditches and interfere with water user's service below or above said diversions.

RULE 9: PUMPING RULES

- 9.01 Users shall be responsible for keeping turnouts free of trash and debris to insure full flow of water to their lift pumps.
- 9.02 The District will not be held responsible for any debris which may accumulate in stream flow which may tend to decrease the full operative capacity of pumps or pipelines nor will the District be held responsible for any damage which may occur to pumping equipment from accumulated debris in District Canals.

RULE 10: OBSTRUCTIONS OF CANALS, USE OF CANALS AND RIGHTS-OF-WAY, AND TAMPERING WITH AND DAMAGE TO DISTRICT FACILITIES.

- 10.01 No fences shall be built, trees planted or structures placed on any right-of-way or other property of the District without a District encroachment permit.
- 10.02 Trash, rubbish, debris, fences and crops, including vines or trees, shall be deemed to be an obstruction and upon notification from the District, the user shall immediately remove said obstruction. If the obstruction is not removed within a reasonable time, as determined by the District, the District will remove the obstruction and bill the user for any costs incurred by the District.
- 10.03 The user shall be responsible for keeping turnouts free of trash and debris to insure adequate water delivery.
- 10.04 The District will not be responsible for any damage to machinery, equipment or motor vehicles which are either operated or stored on District rights-of-way. (See Rule 12 for Encroachment Permits.)

- 10.05 Any user or his authorized agent or employee who may use the right-of-way or other property of the District does so at his own risk and any person using any canal right-of-way for any purposes assumes all risk of doing so and by use accepts responsibility for any damage to District property resulting therefrom, and for any damage to private property caused by such damage to District property.
- 10.07 Under no circumstances shall any person modify any District facility. If such modifications are made, the District shall remove the installation and bill the responsible party for any cost incurred.

RULE 11: TAMPERING WITH WATER CONTROLS

- 11.01 No person who is not an employee of the District shall change, alter or disturb any valve, gate, weir boards, pump or other device used by the District to control the flow of the water. Violation of this rule is a criminal act punishable by fine or imprisonment, or both.
- 11.02 Section 592 of the Penal Code of the State of California provides as follows: Canals, ditches, flumes, or reservoirs. "Every person who shall without authority of the owner or managing agent, and with intent to defraud, take water from any canal, ditch, flume, or reservoir used for the purpose of holding or conveying water for manufacturing, agriculture, mining, irrigating, generation of power, or domestic uses is guilty of a misdemeanor."

**RULE 12: ENCROACHMENTS ON DISTRICT'S RIGHTS-OF-WAY AND PROPERTY,
EXCLUDING DRAINS:**

- 12.01 A permit will be required before crossings, fences, structures, access use or other encroachments will be permitted to be used or installed upon the District's rights-of-way. Application for encroachment must be made at the District Office after payment of the applicable filing fee. Encroachment permits issued for the purpose of access shall be subject to the terms and conditions of the agreement under which the subject right-of-way was transferred to the District.
- 12.02 All encroachments must be approved by the General Manager and if works are required, they shall be constructed to the District's specifications at the sole expense of the applicant and maintained under the supervision and to the satisfaction of the District. No encroachments for trees will be approved.
- 12.03 If a permit is granted, the applicant shall be solely responsible for and shall indemnify and hold the District harmless from any and all liability for injuries to persons or damage to property caused or resulting in any manner from the applicant's exercise of the rights and privileges given in the Encroachment Permit.
- 12.04 All encroachment permits are subject to the conditions and specifications delineated on each individual permit.

- 12.05 Issuance of an Encroachment Permit in no way grants a permanent right, and if the District determines at a future date that said works do in fact interfere with its operation, the said works shall be removed, and the District's ditch or other right-of-way restored to its original state at the sole expense of the applicant.
- 12.06 Granting a permit does in no way and to no extent surrender or subordinate the District's control or supervision over the encroachment and rights-of-way involved.
- 12.07 Existing encroachments for which there are no written permits are subject to all of the above conditions. Failure to comply with District instructions shall constitute grounds for removal of said encroachment. Costs of required removal shall be billed to the owner thereof.

RULE 13: DRAINAGE ENCROACHMENTS

- 13.01 Encroachment Permits for drainage to District Canals shall be required for all discharges of water into the District's irrigation water distribution system.
- 13.02 Discharge of tailwater into the District's irrigation water distribution system will not be allowed when the District is delivering water to water users.
- 13.03 Discharge of backflush water containing fertilizer or pesticides into the District's irrigation water distribution system will not be allowed.
- 13.04
- 13.02 Existing drainage encroachments, except for those for which written contractual agreements exist, will be removed at the landowner's expense on or before March 1, 1993; however, the District reserves the right to require immediate removal of any drainage encroachments causing operational, maintenance or water quality problems to the District's distribution system.
- 13.04 Existing encroachments consisting of drains to District facilities shall have screens installed at the inlet of said drain so as prevent passage of material greater in size than one half inch in diameter. Screens shall be cleaned periodically to prevent buildup and introduction of foreign material into the District Facilities. Following notification of the requirement of installation of a screen, growers shall have fifteen days to install said screen. Failure to install within the fifteen day period shall result in removal of the drain by the District without further notice and the landowner will be billed for the expense thereof.
- 13.05 Existing drainage encroachments shall be under the control and supervision of the District and failure to comply with District instructions regarding operation of same shall constitute grounds for removal at the owner's expense.

RULE 14: LIABILITY FOR DAMAGES

- 14.01 Any claim for damages resulting from the District's acts or omissions of its employees requires that a verified claim giving full particulars on date, occurrence, at the District office. Claim forms are available at the District office.
- 14.02 No suit shall be brought against the District for monetary damages unless a claim is presented and acted upon.

RULE 15: WATER CHARGES AND DISTRICT CREDIT POLICY

- 15.01 Charge for water shall be payable at the District Office, mailing address P.O. Box 905, (327 South Chowchilla Boulevard), Chowchilla, 93610 in accordance with the current District Credit Policy as announced by the District prior to each water season.
- 15.02 Water charges shall be determined on an annual basis and announced prior to the water season.
- 15.03 Charges for water shall be payable at the District Office, mailing address P.O. Box 905, (327 South Chowchilla Boulevard), Chowchilla, California 93610 in accordance with the current Credit Policy:

RULE 16: DISCHARGE OF DAIRY WASTE

Discharge of dairy wastewater into the District's irrigation water distribution system is prohibited. Landowners are required to take appropriate action to install backflow prevention devices immediately downstream of District turnouts to eliminate the possibility of dairy wastewater back flowing into the District's irrigation water distribution system. This requirement applies to any farm irrigation system that transports dairy wastewater and is connected to a District turnout. The deadline for installing anti-backflow devices is March 1, 2002. If anti-backflow devices are not installed on effected irrigation systems by March 1, 2002, the District may take action to prevent dairy wastewater from back flowing into the District's canal and pipeline system. Landowners will be responsible for reimbursing the District for costs it incurs in doing so. Following are two possible configurations to prevent backflow:

- 1 Install lift pump with air gap between pump discharge and farm irrigation system.
- 2 Install line gate immediately downstream of District turnout.

Option (1) eliminates any possibility of backflow. Option (2) reduces the possibility of backflow but does not eliminate it. Landowners may install other configurations, but should consult with the District prior to their installation. If a landowner installs option (2) or another configuration and it is determined that backflow is still occurring the District will require that option (1) be installed.

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RULE 16: PENALTY FOR NON-COMPLIANCE

- 16.01 Refusal to comply with the requirements hereof or transgression of any of the foregoing Rules and Regulations may be sufficient cause for termination of District services until full compliance has been made and reimbursement of any monetary loss to the District and/or private property owners has occurred.
- 16.02 All of these Rules and Regulations are subject to change as deemed by the Board of Directors.

Attachment D

District Sample Bills

CHOWCHILLA WATER DISTRICT

Post Office Box 905 -- 327 S. Chowchilla Blvd.
Chowchilla, CA 93610
(559) 665-3747

JULY WATER ACCOUNT STATEMENT

DATE	ACTIVITY	OUTLET	ACRE FEET	RATE	AMOUNT
07/02/2002	Previous Balance				3,120.00
07/12/2002	Payment				-3,120.00
08/01/2002	July 2002 Crop Water	Berenda Canal	19.29	40.00	771.60
08/01/2002	July 2002 Crop Water	Bethel Canal	29.43	40.00	1,177.20
08/01/2002	July 2002 Crop Water	Berenda Canal	40.18	40.00	1,607.20
08/01/2002	July 2002 Crop Water	Road Eleven Canal	55.27	40.00	2,210.80
TOTAL			144.17		5,766.80

TOTAL ACRE FEET
USED TO DATE
222.17

PAYMENT DUE ON OR BEFORE AUGUST 25, 2002

TOTAL ALL OUTLETS \$5,766.80

DELINQUENT ACCOUNTS WILL BE CHARGED AN INTEREST RATE OF 1.5% PER MONTH

PLEASE DETACH AND
RETURN THIS PORTION

REMIT TO:
Chowchilla Water District
P.O. Box 905
Chowchilla, CA 93610

Attachment E

District Water Shortage Plan

Chowchilla Water District Water Shortage Plan

The water supply available to the District is extremely variable. In wet years as much as 121,000 acre-feet (1.9 acre-foot per acre) is available for delivery to the 65,000 of irrigated land in the District. In average years the water supply is about 68,000 acre-feet (1.1 acre-foot per acre). In critically dry years the water supply is less than 8,000 acre-feet (0.12 acre-foot per acre). Waterusers in the District must have a private deep well in order to supplement surface water available from the District.

Water supply forecasts are reviewed to determine the date when District water deliveries begins. Determination of a beginning date takes into account crop water demands and maximization of delivery efficiencies. If forecasts indicate water will be available throughout the year, deliveries are scheduled to begin on or about the first of March and continue until late fall. When forecasts indicate water will not be available throughout the year, the period of mid-June thru mid-August is given priority when scheduling water for delivery. When in the opinion of the District, water demands exceed the design or actual capacity of the distribution system or the supply of water, the district reserves the right to rotate the use of water by basic time and quantity method in order to deliver approximately equal amounts of water in acre-feet per acre to each water user requesting water deliveries.

Attachment F

District Map of Groundwater Facilities

Not Applicable

Attachment G

Groundwater Management Plan

CWD-RED TOP RCD
JOINT POWERS AUTHORITY



Groundwater Management Plan

In accordance with AB 3030

1997

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SECTION 1

INTRODUCTION

1.1 Groundwater Management Act

Groundwater is relied upon to meet water supply requirements in many areas throughout the state. In some locations, excessive use of groundwater has led to groundwater overdraft, land subsidence and groundwater quality degradation. For these reasons, the California State Legislature has declared groundwater a valuable natural resource, and has determined groundwater should be managed to ensure both its safe production and its quality. The Groundwater Management Act (AB 3030) was passed by the State Legislature in 1992; it became law January 1, 1993. The act is codified as Sections 10750 *et seq.* of the California Water Code. This groundwater management plan has been developed pursuant to the provisions of AB 3030.

1.2 Plan Components

According to California Water Code Section 10753.7, a groundwater management plan may include components relating to all of the following:

- The control of saline water intrusion
- Identification and management of wellhead protection areas and recharge areas
- Regulation of the migration of contaminated groundwater
- The administration of a well abandonment and well destruction program
- Mitigation of conditions of overdraft
- Replenishment of groundwater extracted by water producers
- Monitoring of groundwater levels and storage
- Facilitating conjunctive use operations
- Identification of well construction policies
- The construction and operation by the local agency of groundwater contamination cleanup, recharge, storage, conservation, water recycling and extraction projects
- The development of relationships with state and federal regulatory agencies
- The review of land use plans and coordination with land use planning agencies to assess activities which create a reasonable risk of groundwater contamination

1.3 Agency Authorization

California Water Code Section 10753 (a) authorizes any local agency, whose service area includes a groundwater basin, or a portion of a groundwater basin, that is not already subject to groundwater management, to adopt and implement a groundwater management plan, which is defined by Section 10752 (e) as "a document that describes the activities intended to be included in a groundwater management program." A groundwater management program is defined by Section 10752 (d) as "a coordinated and ongoing

activity undertaken for the benefit of a groundwater basin, or a portion of a groundwater basin, pursuant to a groundwater management plan adopted pursuant to this part.”

“Local agency” is defined as any local public agency that provides water service to all or a portion of its service area (Section 10752 (g)). The definition also includes a local public agency that provides flood control, groundwater management, or groundwater replenishment, or a local agency formed pursuant to the Water Code for the principal purpose of providing water service that has not yet provided that service (Section 10753 (b)). These local agencies may exercise the authority of this part, and are authorized by Section 10752 (g) to form Joint Powers Authorities in order to work cooperatively in establishing a groundwater management program.

According to Water Code Section 10754, for purposes of groundwater management, a local agency that adopts a groundwater management plan has the authority of a water replenishment district pursuant to Part 4 (commencing with Section 60220) of Division 18 and may fix and collect fees and assessments for groundwater management in accordance with Part 6 (commencing with Section 60300) of Division 18, subject to the approval of voters within the agency’s boundaries.

1.4 Eligible Groundwater Basins

The act applies to all groundwater basins in the state of California, except those already subject to groundwater management by a local agency or watermaster pursuant to other provisions of law or a court order, judgment or decree, unless the local agency or watermaster agrees to the applications of the act. The Chowchilla Groundwater Basin is eligible for groundwater management under AB 3030.

1.5 Objective

The Chowchilla Water District (“CWD” or “District”) and Chowchilla-Red Top Resource Conservation District (“RCD”) value the importance of groundwater in the state of California. The two Districts recognize that proper management of groundwater basins is necessary to sustain the environmental, social and economic conditions that prevail in today’s society. More importantly, the well-being of future societies is dependent on the effectiveness of current groundwater resources planning. For these reasons, the Chowchilla Water District and Chowchilla-Red Top Resource Conservation District have decided to protect the groundwater in their area. As shown in Appendix 1, the agencies adopted a resolution of intention to draft a groundwater management plan on November 13, 1996. In order to complete and administer a groundwater management plan, the agencies formed a Joint Powers Authority on October 30, 1997 (see Appendix 2). The resulting agency is known as the CWD-Red Top RCD Joint Powers Authority (“Authority”).

The objective of this groundwater management plan is to identify, formulate and implement effective groundwater management practices in order to maintain the long-term availability of groundwater resources throughout the Chowchilla Basin.

SECTION 2

THE DISTRICTS

2.1 Chowchilla Water District

The Chowchilla Water District was formed in 1949 for the purpose of furnishing a supplemental water supply for lands within its boundaries. Until that time, the District had been a part of the original Madera Irrigation District. In 1989, the La Branza Water District and Chowchilla Water District consolidated. The consolidated district is known as the Chowchilla Water District. The District consists of approximately 80,000 acres, including lands in Madera and Merced counties.

2.2 Chowchilla-Red Top Resource Conservation District

The Chowchilla Resource Conservation District and Red Top Resource Conservation District were formed by California State Law for the purpose of providing local leadership and guidance regarding resource conservation issues. The two Districts were combined in the late 1970s, resulting in the Chowchilla-Red Top Resource Conservation District. The combined District works closely with the United States Department of Agriculture National Resources Conservation Service; the two agencies address topics relating to soil, water, air quality, environmental assessment, conservation education, and wildlife preservation. The RCD encompasses the entire Chowchilla Groundwater Basin, excepting that portion of the Basin located in Merced County.

THE CHOWCHILLA GROUNDWATER BASIN

3.1 Boundaries

The Chowchilla Basin encompasses approximately 250 square miles and includes lands in both Madera and Merced counties. The Basin is bounded on the west by the San Joaquin River and the eastern boundary of the Columbia Canal Company service area and on the north by the southern boundary of the Merced Groundwater Basin. (The northern boundary runs Westerly along the Chowchilla River, then along the southern boundary of the Le Grand-Athlone Water District. The boundary then follows the northern boundaries of the former La Branza Water District and El Nido Irrigation District. The boundary turns southerly and follows the western boundary of El Nido Irrigation District, then runs westerly along the northern boundary of the Sierra Water District, to the San Joaquin River.) The southern boundary of the Chowchilla Basin runs along the southern boundary of Township 11 South, Range 14 East and the southern boundary of Progressive Water District, then northerly along the eastern boundary of Progressive Water District and Sections 9 and 16 of Township 11 South, Range 15 East. The boundary then runs northeasterly along the southern and eastern boundaries of the Chowchilla Water District, then northeasterly following Berenda Slough and Ash Slough to the Chowchilla River.

3.2 Agencies Within

Besides the Chowchilla Water District and the Chowchilla-Red Top Resource Conservation District, five other agencies exist wholly within the boundaries of the Chowchilla Basin, as shown in Appendix 3. The City of Chowchilla is considering entering into a Memorandum of Understanding with the Authority regarding this groundwater management plan. The other four agencies include El Nido Irrigation District, Sierra Water District, Clayton Water District and Progressive Water District. Lands within the boundaries of these four agencies are excluded from this plan.

3.3 Major Streams

As shown in Appendix 4, the Chowchilla Bypass, Fresno River, Chowchilla River and Dutchman Creek are the major natural stream channels that flow into the groundwater basin.

As previously described, the San Joaquin River forms the western boundary of the basin. Although it does not flow directly into the basin, one of its bypasses does. The

Chowchilla Bypass of the San Joaquin River crosses the southern boundary of the basin and flows northwesterly. At the southern basin boundary, the San Joaquin River and Chowchilla Bypass are separated by approximately six miles of land.

The Fresno River enters the southeastern portion of the Basin and flows westerly. Several miles into the basin, the Chowchilla Bypass and Fresno River merge, forming the Eastside Bypass. The Eastside Bypass continues northwesterly, exiting the basin. Eventually, the bypass rejoins the San Joaquin River.

Near the easternmost basin boundary, the Chowchilla River divides into three distributary channels. The northern channel continues as the Chowchilla River, which comprises the northern basin boundary for approximately nine miles, then flows through the basin. The other two channels, Ash Slough and Berenda Slough, flow southwestwardly through the basin to the Eastside Bypass.

Dutchman Creek enters the eastern side of the most northerly tip of the basin. It flows westwardly through the basin approximately three miles, then exits. Outside the boundaries of the basin, Dutchman Creek merges with Deadman Creek.

Although manmade, the Madera Canal is another channel that enters the basin. The Madera Canal is used to transport surface water from Friant Dam on the San Joaquin River. The Madera Canal terminates when it reaches the heading of the CWD conveyance system.

SECTION 4

DESCRIPTION OF STUDY AREA

4.1 Climate

The study area is characterized by hot, dry summers and fairly mild winters, accompanied by low to moderate precipitation. Fogs are common during the cool winter months; snow is very rare. Winds are gentle throughout most of the year, prevailing from the northwest.

The dry Mediterranean climate is well suited for irrigated agriculture. The long, warm-to-hot, dry summers allow ripening of crops without the threat of mildew. The summers are virtually rainless, permitting the attainment of high irrigation efficiencies. The mild, wet winters provide some water for winter crops, as well as leaching water to flush salts that may accumulate during dry periods.

4.2 Topography

The eastern side of the survey area is located on old alluvial terraces; the central portion, recent alluvial fans. The mid-westerly portion of the area is located on the basin rim of the east side of the San Joaquin Valley. Overflow lands occur in a nearly flat plain along the San Joaquin River, which constitutes the western boundary of the area.

The alluvial fans are the largest geomorphic features in the area. They are gently sloping with gradients toward the west. The area generally slopes westwardly about 9 feet per mile; however, the overflow lands slope only 2 feet per mile. The elevation is close to 110 feet above sea level at the northwestern edge of the study area, and 325 feet near the northeast corner.

4.3 Geology

The geologic features of the area were formed by alluvium deposited from streams originating in the nearby Sierra Nevada mountains. The older alluvium is believed to be of Pleistocene age and contains indurated hardpans cemented by iron and silica. The recent alluvium on the alluvial fans may also contain developed compact layers, but these layers are lime cemented and are not as hard as the iron silica hardpans. Both the older and younger alluvium are of granitic origin and tend to be coarse textured and nonsaline.

Under natural conditions, many areas were underlain by the aforementioned slowly permeable hardpans. Most of these areas have now been ripped, which has greatly improved the internal soil drainage. The material underlying the hardpan is typically softly consolidated sandy loam.

4.4 Subsurface Conditions

The stratigraphy of the area includes a non-water bearing complex (which underlies most of the study area), and various water bearing sediments on top of the basement complex. The basement complex consists of granitic and schistose rocks which do not yield water freely to wells. The basement complex outcrops in the Sierra Nevada foothills east of the area, yet is more than 10,000 feet deep under the western edge of the area. The basement complex dips to the southwest.

The basement complex is overlain by marine and continental sedimentary rocks (sandstone, claystone, siltstone, and shale) of pre-Tertiary and Tertiary age. The marine and continental rocks are not penetrated by water wells. These rocks are overlain by the continental deposit of Tertiary and Quaternary age. The top of the continental deposit ranges from about 100 to 1,000 feet deep and ranges in thickness from 1,000 to 2,200 feet. The deposit consists of interbedded, poorly-sorted sand, silt, clay and conglomerate with layers of hardpan and traces of volcanic glass and andesitic tuff. The deposit becomes finer grained with depth and distance from the foothills.

The older alluvium overlies the continental deposit and varies in thickness up to 1,000 feet. The older alluvium consists mostly of intercalated lenses of clay, silt, sand and some gravel. Near the surface of the older alluvium, a cemented-sediment hardpan occurs throughout the area. Within the older alluvium is an extensive clay bed called the E-clay or Corcoran clay of Pleistocene age. The E-clay varies in depth from 80 feet below the town of Chowchilla to 200 feet below the southwest corner of the area. The E-clay underlies all of the area except that portion east of highway 99. The E-clay divides the aquifer into the confined and unconfined zones. The thickness of the E-clay varies up to 80 feet. The E-clay consists mostly of clay, silty clay and silt. It is virtually impermeable and is considered an aquiclude. Nearly all ground water wells in the area tap the older alluvium. The base of fresh water (water less than 2,000 p/m) under the area is about 1,400 feet deep.

The younger alluvium is a thin-sedimentary, mostly-oxidized deposit of interbedded, poorly-to-well-sorted clay, silty clay, silt, silty sand, and fine to coarse grained sand. Because it is not as weathered as the older alluvium, the younger alluvium does not contain a hardpan. This feature distinguishes it from the older alluvium. The thickness of the younger alluvium varies up to 50 feet. Due to these characteristics, the younger alluvium is more permeable than the older alluvium.

SECTION 5

WATER SUPPLY

5.1 Precipitation

The heaviest rainfall in the Chowchilla Basin occurs between December and March. No significant amount falls from May through September. Precipitation increases with elevation; therefore, there is a gradual increase in total rainfall from west to east across the basin. The western area receives about 8.5 inches per year, while the eastern area receives about 12 inches per year. Most of the moisture falls as steady rain in winter storms that cover broad areas.

5.2 Surface Water

The Chowchilla Water District delivers surface water to lands within its boundaries, and administers the delivery of most local riparian water rights.

The District's first water contract was signed in 1951 for supply from the Friant Unit of the Central Valley Project. An additional contract for water from Buchanan Dam on the Chowchilla River was signed in 1967. The dam was completed in 1977 and deliveries began in 1978.

First deliveries of project water were through natural channels and ditches constructed by District farmers. Major construction of delivery facilities occurred in the early 1960s. The District now operates approximately 160 miles of unlined canals and laterals, and 46 miles of pipeline.

The District's present contract provides for an annual maximum of 55,000 acre-feet of class 1 water, an annual average of 77,000 acre-feet of class 2 water, and an annual maximum of 160,000 acre-feet of class 2 water (all via the Madera Canal from the Friant Unit, CVP). In addition to this, the District also receives an average of 24,000 acre-feet per year from the Buchanan Dam on the Chowchilla River.

5.3 Groundwater

The general movement of groundwater in the area is southwestward. Most irrigation wells tap the older alluvium. Well depths range from approximately 75 to 700 feet and average 260 feet. The capacity of wells ranges from 40 gallons per minute to 4,750 gallons per minute. The specific capacity of wells ranges from approximately 8 to 136 gallons per minute per foot of draw down and averages about 40 gallons per minute per foot of draw down. The specific capacities are generally greater in the western portion of

the study area. Table 1 contains statistical information describing groundwater conditions in the Chowchilla Basin. The statistics were derived from a sample of 222 wells.

Table 1

LEVEL OF DEVELOPMENT
CHOWCHILLA BASIN
1990

Extraction	252,000	ac-ft/yr
Perennial Yield	239,000	ac-ft/yr
Overdraft	13,000	ac-ft/yr
Usable Storage	1,043,000	ac-ft
Pump Lift	150	est. feet

Source: California Department of Water Resources

Appendix 5 shows the average depth to groundwater in both spring and fall since 1971. The data was derived from a sample of approximately 175 wells in the Chowchilla Water District. The chart shows obvious changes in depths to groundwater due to periods of drought and seasons of extensive rainfall. Groundwater levels recovered after the 1977 drought, then declined with the continuance of the late eighties/early nineties drought. There has not been a significant amount of recovery since this most recent drought.

Appendix 6 consists of thirteen groundwater contour maps, containing spring groundwater measurements. The first two maps show lines of equal depth to water in wells for the years 1988 and 1995. The remaining maps show lines of equal elevation of water in wells for the years 1986 through 1996. Again, the most recent period of drought is evident from these maps.

SECTION 6

WATER QUALITY

6.1 TOTAL DISSOLVED SOLIDS

Table 2 shows average water qualities described by total dissolved solids. Water in intermittent streams (i.e. Chowchilla River) generally contains more dissolved solids than does water in perennial streams (i.e. San Joaquin River). The quality of all surface water supplies in the basin is excellent. Due to factors such as differing well depths and locations, the quality of groundwater varies, but is good overall. The averages are shown below:

Table 2

TOTAL DISSOLVED SOLIDS IN WATER SOURCES

Source	TDS Parts Per Million
San Joaquin River (Madera Canal)	40
Chowchilla River	150
Groundwater	385

Source: United States Bureau of Reclamation

6.2 CHEMISTRY

Surface waters in the area are dominated by the bicarbonate ion and are very low in sulfate. Well waters are also dominated by bicarbonate, while the dominant cation is usually calcium. The bicarbonate ion does not concentrate in drainage waters as the chloride ion does; therefore, the effective salinity of this water is reduced. The bicarbonate ion tends to precipitate with calcium in the form of calcium carbonate.

Well waters within the boundaries of the Chowchilla Water District are considered safe from a trace element perspective. In the western part of the study area, however, larger concentrations of sodium and chloride increase the amount of total dissolved solids.

SECTION 7

PLAN COMPONENTS

The following plan components describe the actions that will be taken by the Authority.

7.1 Monitor Groundwater Levels and Storage

In the spring and fall of each year, the Chowchilla Water District measures 143 wells in the area. The Authority plans to continue and improve this practice.

To ensure a representative sample of wells, the Authority first intends to plot and analyze the current network. The integrity of the current sample of wells will be judged according to factors such as location, well depth, depth to groundwater, water quality, tapped aquifer zones, and other groundwater characteristics. From this analysis, the Authority will modify the existing network as needed.

Most of the wells currently measured are within the boundaries of the District; therefore, wells outside the District (yet still within the Chowchilla Basin) will need to be identified so they may be included in the sample. The United States Bureau of Reclamation maintains information that will be useful in locating and choosing new wells; the Authority plans to obtain assistance from the Bureau with respect to this matter.

As data is collected, it will be entered into a computer database to enable further analysis. The analysis will include a series of maps, charts and graphs. It is the intention of the Authority to track changing groundwater patterns and trends.

7.2 Facilitate Conjunctive Use Operations

Department of Water Resources Bulletin 118-80 defines conjunctive operation as:

“operation of a groundwater basin in coordination with a surface water reservoir system. The purpose is to artificially recharge the basin during years of above-average precipitation so that the water can be withdrawn during years of below-average precipitation, when surface supplies are below normal.”

7.2.1 Conjunctive Use Program

On the spectrum of limited to comprehensive conjunctive use programs (limited being a program that uses surplus water for recharge only when it is readily available; comprehensive, a program that aggressively secures water for recharge, meters groundwater extraction, and utilizes other groundwater control methodologies), the policy of the Chowchilla Water District has leaned more toward the limited operations end in the

past. The District does purchase water for recharge when available, but is not able to secure an additional water supply solely for recharge. However, with the increasing price and decreasing availability of water, the District foresees the possibility of formulating a more comprehensive conjunctive use plan in the future.

7.2.2 Recharge

Recharge is imperative to conjunctive use operations. The underground aquifer must be recharged in order to maintain an adequate groundwater supply. Recharge helps alleviate the strain on the underground aquifer and prevents other groundwater problems caused by excessive extractions.

Recharge prepares the underground aquifer for unfavorable conditions, such as drought. Prolonged periods of below normal precipitation usually result in reduced surface water supplies, thereby necessitating heavy groundwater extraction. During these times, water is borrowed from the underground reservoir. This water must be returned in order to refill the basin and prepare for the next drought or water shortage.

Since the recent drought of the late eighties/early nineties, wet winters have enabled a considerable amount of groundwater recharge. The Chowchilla Water District took advantage of the surplus water supplies during this time; the District sent water through its conveyance system solely for recharge for many months. More information regarding groundwater recharge is given in Section 7.3, Groundwater Recharge.

7.2.3 Standby Charge

In 1995, the Chowchilla Water District instituted a standby charge on lands being irrigated for agriculture within its boundaries. The purpose of this charge is to increase the amount of surface water being used, thereby decreasing the amount of groundwater being pumped.

7.2.4 Expand Conjunctive Use Area

To increase conjunctive use operations near the Chowchilla Water District, the District plans to annex approximately 10,000 acres during late 1997. In the past, these lands have relied solely on groundwater for irrigation. Once annexed, these lands will be eligible to receive federal project water. The annexation will expand the conjunctive use area and decrease the pumping strain on the underground aquifer.

As a simple example, suppose that currently 3.0 acre-feet per acre per year of groundwater is applied to each of the 10,000 acres. Substituting 2.0 acre-feet per acre of surface water will result in a groundwater savings of 20,000 acre-feet per year.

7.3 Groundwater Recharge

Groundwater recharge is an integral component of the replenishment of groundwater extracted by producers, the mitigation of conditions of overdraft, and the facilitation of

conjunctive use operations. Due to groundwater extraction, recharge must be performed in order to maintain an adequate groundwater supply. In the Chowchilla Basin, there are three methods of groundwater recharge: natural, incidental and intentional.

7.3.1 Natural Recharge

Natural recharge is defined as rain, runoff, and natural stream flows. All three of these occurrences contribute to groundwater recharge within the Chowchilla Basin.

7.3.2 Incidental Recharge

Incidental recharge occurs as a by-product of another event. For example, the Chowchilla Water District delivers surface water for irrigation through a system of unlined canals. During this process, seepage losses occur; water is absorbed by the canals in which it travels. This water then percolates to the underground basin. Of all water that flows through the District's conveyance system, it is estimated that as much as 30 percent of it is lost to seepage. An average of 43,000 acre-feet of water is recharged through the District's conveyance system each year. During years of above average precipitation, the amount of recharge is considerably higher. Recharge is lower during years of below normal precipitation.

As irrigation water is applied to crops, a portion of the applied water percolates past the root zone and continues downward, also recharging the groundwater basin. Irrigation seepage (and resulting percolation) is estimated to be as much as 20 percent of total applied water. Assuming 140,000 acres in the Chowchilla Basin are irrigated at a rate of 3.0 acre-feet per acre per year, it can be concluded that 84,000 acre-feet of applied water is returned to the underground aquifer.

Another form of incidental recharge within the basin is the City of Chowchilla Sewer Treatment Plant. The plant process 500,000 gallons of sewage per day. A very small portion of this is treated and re-used within the plant. The rest of the water is spread on 120 acres of ponds.

7.3.3 Intentional Recharge

Intentional recharge is purposely performed in order to combat the effects of excessive groundwater usage. Groundwater Management Facilities (such as percolation basins, injection wells, or spreading grounds) are necessary to operate intentional recharge programs.

Within the Chowchilla Basin, the following areas exist that promote intentional groundwater recharge:

- ◊ Surface water conveyance system
- ◊ Four natural stream channels
 - Chowchilla River Ash Slough
 - Dutchman Creek Berenda Slough
- ◊ Two surface water retention reservoirs
 - Berenda Reservoir Minturn Dam
- ◊ Eight regulating/recharge basins
 - Dairyland Pond Askew Pond
 - Haynes Pond Vera Pond
 - Townsend Pond Gregory Pond
 - Rutherford Pond Berenda Pond

Although use of the surface water conveyance system and natural stream channels results in incidental and natural recharge, they are also used as intentional recharge vehicles. As mentioned previously, in years of above normal precipitation, water is delivered through these systems for the sole purpose of recharging the underground aquifer. Stream channels are naturally favorable for groundwater recharge.

The reservoirs and basins are intended for recharge, storage and surface water regulation. The subsurface conditions of several of these recharge basins make them favorable for groundwater recharge, as well.

During seasons of extreme precipitation, water is purposely diverted into the Fresno River and Chowchilla and Eastside Bypasses to control flooding. Water seeps into these stream beds and percolates to the underground aquifer. This activity could be considered natural, incidental, or intentional recharge.

The Authority plans to research the possibility of constructing new recharge facilities and locating sites for new basins. As situations arise, warranting additional or improved groundwater recharge, feasible solutions will be determined and implemented.

7.4 Construct Groundwater Management Facilities

In order to regulate surface water and promote groundwater recharge, the Chowchilla Water District is in the process of constructing two additional recharge basins. The first basin has a capacity of 35 acre-feet. Construction of this facility began in May of 1996 and is expected to be completed in late 1997.

The District also purchased over 20 acres for a recharge basin in August 1997. The future basin site is located in the east side of the groundwater basin; it is removed from any

natural channels or other recharge basins. Construction of the facility is expected to be completed before 1999.

7.5 Wellhead Protection/Well Abandonment/Well Destruction

Serious groundwater problems can result if wellhead areas are contaminated or if wells are not properly destroyed. In these situations, wells can become conduits for contaminants, pollutants, and poor quality water. All situations relating to wells, wellhead protection and contamination resulting therefrom are currently administered by divisions of Madera and Merced counties, or other state and local agencies. The Authority is willing to provide these agencies with any relevant information upon request. The Authority is also ready to assist with any public education efforts these agencies may attempt.

7.6 Water Conservation

In 1995, the Chowchilla Water District submitted a Water Conservation Plan to the Bureau of Reclamation, which has been approved. The District must submit yearly updates detailing the continuation of water conservation practices. The issues addressed in the plan include:

- ♦ Measurement
- ♦ Pricing
- ♦ Conservation Staff
- ♦ Conservation Service
 - On Farm Evaluations
 - Real Time Evapotranspiration Information
- ♦ Construction of Reservoirs
- ♦ Tiered Block Pricing
- ♦ Flexible Deliveries
- ♦ Spill Reuse Systems
- ♦ Financial Incentives
- ♦ Increasing Conjunctive Use
- ♦ Measuring by Crop and Field
- ♦ Facilitating Transfers
- ♦ Pump Efficiencies

Water conservation measures reduce the amount of surface and groundwater being utilized inefficiently. Conservation is a beneficial practice that directly or indirectly reduces the amount of groundwater being pumped.

SECTION 8

IMPLEMENTATION

Upon adoption, several issues must be addressed by the Authority in order to implement the plan effectively.

8.1 Rules and Regulations

According to Water Code Section 10753.8 (a), a local agency shall adopt rules and regulations to implement and enforce an adopted groundwater management plan. The local agency is not authorized to make a binding determination of the water rights of any person or entity (Section 10753.8 (b)). The local agency is also not authorized to limit or suspend extractions unless the local agency has determined through study and investigation that groundwater replenishment programs or other alternative sources of water supply have proved insufficient or infeasible to lessen the demand for groundwater (Section 10753.8 (c)).

In adopting rules and regulations, the local agency shall consider the potential impact of those rules and regulations on business activities, including agricultural operations, and to the extent practicable and consistent with the protection of the groundwater resources, minimize any adverse impacts on those business activities (Section 10753.9).

8.2 Prioritize Plan Components

The Authority shall prioritize plan components according to urgency, time constraints, budget constraints, general feasibility and other conditions. From this, the Authority may present an estimated time frame of when the described plan components will be addressed and when results are to be expected.

8.3 Monitor Plan Progress

The Authority shall monitor the degree of progress made regarding groundwater management plan components. To do this, the Authority shall meet annually to review, discuss and evaluate activities previously undertaken and/or completed and to coordinate future groundwater management planning efforts. From this assessment, the Authority will determine if the plan and its implementation are achieving desired results, or if any adjustments are necessary.

8.4 Adjust Plan

The Authority shall establish a procedure to amend, adjust or alter the groundwater management plan or activities derived therefrom as conditions change. From the evaluation of groundwater management activities at the annual meeting, it may be determined that certain continuing efforts are ineffective, or that other situations have arisen demanding priority treatment. As a result of this information, the plan and its time frame may be modified. The Authority intends to maintain a plan that is flexible to changing conditions and emerging situations, in order to effectively manage and protect the Chowchilla Groundwater Basin.

LIST OF SOURCES

- Mitten, Hugh T., et al. United States Geological Survey, Water Resources Division. "Geology, Hydrology and Quality of Water in the Madera Area, San Joaquin Valley, California." 1970.
- State of California, Department of Water Resources. "Ground Water Basins in California, Bulletin 118-80." January 1980.
- State of California, Department of Water Resources. "California Water Plan Update, Bulletin 160-93." October 1994.
- United States Bureau of Reclamation, Land Suitability Section, Denver Office. "Land Classification Report - Chowchilla Water District." March 1991.
- United States Soil Conservation Service. "Soil Survey - Madera Area, California." 1962.

APPENDIX 1

Resolution of Intention to Draft a Groundwater Management Plan

CHOWCHILLA WATER DISTRICT
RESOLUTION NO. 96-12

WHEREAS, the Chowchilla Water District is considering whether or not to adopt a Groundwater Management Plan with the Chowchilla-Red Top Resource Conservation District pursuant to a Joint Power Authority to be established between the Water District and the Conservation District, and

WHEREAS, Water Code Section 10753.2 requires that prior to adopting a resolution of intention to draft a groundwater management plan the District must hold a public hearing, after publication of notice thereof, on whether or not to adopt a resolution of intention to draft a groundwater management plan, and

WHEREAS, the Water District and the Conservation District published notices as required by law that a public hearing on whether or not the Water District and the Conservation District should adopt resolutions of intention to draft a groundwater management plan pursuant to Part 2.75 of Division 6 of the Water Code of the State of California which said hearing would be held at the District Office, 327 South Chowchilla Blvd. on November 13, 1996 at the hour of 1:30 p.m.. At such hearing the Board of Directors of the District would hear evidence from landowners in favor of or against whether such resolution should be adopted, and

WHEREAS, said hearing was held and the Boards of Directors of the Water District and the Conservation District heard evidence from landowners as to whether or not such resolution should be adopted, and

WHEREAS, after hearing such evidence the Board of Directors of both the Water District and the Conservation District determined that it was to the best interests of the lands within both Districts that a resolution of intention to form a Joint Power Authority to draft a groundwater management plan be adopted,

NOW THEREFORE BE IT RESOLVED:

The Chowchilla Water District shall enter into an agreement with the Chowchilla-Red Top Resource Conservation District to form a Joint Power Authority pursuant to Water Code Section 10755.2 (b).

BE IT FURTHER RESOLVED:

That upon the establishment of a Joint Power Authority, the Authority adopt a groundwater management plan pursuant to the provisions of Part 2.75 Division 6 of the Water Code of the State of California.

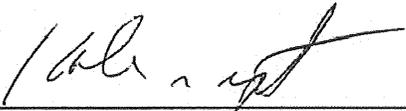
The foregoing Resolution was adopted at a regular meeting of the Board of Directors of the Chowchilla Water District held on the 13th day of November, 1996 upon the motion of Director Tarabini seconded by Director Mandala on the following vote:

Ayes: Directors, Mandala, Tarabini, Thiel and Upton.

Noes: None

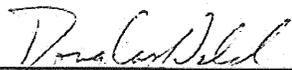
Abstain: None

Absent: Capehart



Kole M. Upton, President

ATTEST:



Douglas Welch, Secretary

APPENDIX 2

Joint Exercise of Powers Agreement

JOINT EXERCISE OF POWERS AGREEMENT
BY AND BETWEEN
CHOWCHILLA WATER DISTRICT AND
CHOWCHILLA-RED TOP RESOURCE CONSERVATION DISTRICT
FORMING THE
CWD-RED TOP RCD JOINT POWERS AUTHORITY

This Agreement, dated for convenience as of October 30, 1997 by and between the CHOWCHILLA WATER DISTRICT, a California Water District in the State of California ("CWD") and the CHOWCHILLA-RED TOP RESOURCE CONSERVATION DISTRICT, a Resource Conservation District ("Chowchilla-Red Top RCD").

WITNESSETH

WHEREAS, CWD and Chowchilla-Red Top RCD are empowered by law to adopt and enforce Groundwater Management Plans, and

WHEREAS, it is to the best interest of CWD and Chowchilla-Red Top RCD that they join in adopting a Groundwater Management Plan so as to cover the area embraced within both districts, and

WHEREAS, the formation of a Joint Powers Authority makes such a Plan available;

NOW, THEREFORE, CWD and Chowchilla-Red Top RCD, for and in consideration of the mutual agreements and covenants herein contained, do agree as follows:

SECTION 1. Definitions

1.01 Unless the context otherwise requires, the terms defined in this section shall for all purposes of the Agreement have the meanings herein specified.

Agreement

The term "Agreement" shall mean this joint exercise of powers agreement as originally executed and as it may from time to time be amended by all supplemental agreements entered into pursuant to the provisions hereof.

Authority

The term "Authority" shall mean the CWD-Red Top RCD Joint Powers Authority, being a separate entity consisting of a joint exercise of powers authority created by the Members pursuant to the Agreement.

Board of Directors, or Board

"Board of Directors" or "Board" shall mean governing body of the Authority.

CWD

The term "CWD" shall mean the Chowchilla Water District, a California Water District, duly organized and existing under the Constitution and laws of the State of California.

Groundwater Management Plan

The term "Groundwater Management Plan" shall mean a plan adopted by the Authority pursuant to the Groundwater Management Act.

Law

The term "Law" shall mean Articles 1 and 2 of Chapter 5 of Division 7 of Title 1 of the Government Code of the State of California, and all laws amendatory thereof or supplemental thereto.

Member

The term "Member" shall be either CWD or Chowchilla-Red Top RCD.

Chowchilla-Red Top RCD

The term "Chowchilla-Red Top RCD" shall mean the Chowchilla-Red Top Resource Conservation District duly organized and existing under the Constitution and laws of the State of California.

SECTION 2. Formation of the Authority

2.01 There is hereby created pursuant to the Law an agency and public entity to be known as the "CWD-Red Top RCD Joint Powers Authority." As provided in the Law, the Authority shall be a public entity separate from the Members, and the debts, liabilities and obligations of the Authority shall not constitute debts, liabilities or obligations of the

Members or either of them. The Authority shall own and hold title to all funds, property and works acquired by it during the term of this Agreement.

SECTION 3. Contributions to and Revenues from the Authority

3.01 The Members shall pay for the costs and expenses associated with the maintenance and operation of the Authority in such amounts as are agreed to be contributed to the Authority, and are entitled to all the revenues of the Authority in the following percentages:

CWD: 100% unless and until Chowchilla-Red Top RCD can secure funds to contribute to the Authority.

Chowchilla-Red Top RCD: 0% unless and until Chowchilla-Red Top RCD can secure funds to contribute to the Authority.

If Chowchilla-Red Top RCD secures funds which it can contribute to the Authority, to the extent that funds are available, it shall make contributions until its contributions equal the contributions of CWD.

SECTION 4. Term

4.01 The Agreement shall become effective as of the date hereof and shall continue in full force and effect until terminated by a member giving ninety (90) days notice of termination to the other member.

SECTION 5. Powers; Restrictions Upon Exercise

5.01 The Authority shall have power to adopt and enforce a Groundwater Management Plan, subject, however, to the conditions and restrictions contained in the Agreement.

5.02 The Authority is authorized, in its own name, to do all acts necessary or convenient for the exercise of such powers for such purposes that each of its Members could do separately, including but not limited to any or all of the following: to make and enter into contracts; to exercise the power of eminent domain for the acquisition of property for Projects; to employ agents and employees; to acquire, construct, manage, maintain and operate any buildings, works or improvements; to acquire, hold or dispose of property; to incur debts, liabilities or obligations (which do not constitute debts,

liabilities or obligations of the Members or either of them); and to sue and be sued in its own name.

5.03 Such powers shall be exercised subject only to such restrictions upon the manner of exercising such powers as are imposed upon CWD as set forth in Division 13 of the California Water Code and other applicable statutes in the exercise of similar powers.

SECTION 6. Termination of Powers

6.01 The Authority shall continue to exercise the powers herein conferred upon it until the termination of the Authority under the provisions of Section 5 hereof. Upon such termination, the groundwater management plan adopted by the Authority shall remain in force and effect for the lands within CWD until modified or rescinded by CWD and shall remain in force and effect for the lands within Chowchilla-Red Top RCD outside of the boundaries of CWD until modified or rescinded by Chowchilla-Red Top RCD.

6.02 Upon the termination of the Authority, CWD shall have no power to adopt a groundwater management plan outside of its boundaries and within the boundaries of Chowchilla-Red Top RCD without the written consent of Chowchilla-Red Top RCD.

6.03 Upon the termination of the Authority, Chowchilla Red-Top RCD shall have no power to adopt a groundwater management plan within the boundaries of CWD without the written consent of CWD.

SECTION 7. Board of Directors

7.01 The Authority shall be administered by the Board of Directors which shall consist of ten members, each serving in his or her individual capacity as a member of the Board, constituting the members of the Board of Directors of CWD and five members of the Board of Directors of Chowchilla-Red Top RCD. The term of office of each member of the Board shall continue only so long as such member is a member of either of said boards of directors, and shall terminate if such member of the Board shall cease to be a member of either of said boards of directors.

7.02 Members of the Board shall receive such compensation or serving as such is set by the Board from time to time, and shall be entitled to reimbursement for any

expenses actually incurred in connection with serving as a member if the Board shall determine that such expenses shall be reimbursed and there are unencumbered funds available for such purpose.

SECTION 8. Officers; Duties

8.01 The Board shall annually elect a President and Vice President of the Authority from among its members and shall appoint a General Manager of the Authority and a Secretary of the Authority, neither of whom shall be a member of the Board.

8.02 The General Manager of the Authority may be designated pursuant to the Law as Auditor-Treasurer of the Authority or at the pleasure of the Board a separate Auditor-Treasurer may be appointed. The Auditor-Treasurer is designated as the depository of the Authority to have custody of all money of the Authority from whatever source and to draw checks to pay demands against the Authority when such demands have been approved by the Authority, and such officer shall have the powers, duties and responsibilities of the offices of auditor and treasurer specified in the law.

8.03 The Auditor-Treasurer of the Authority is designated as the public officer or person who has charge of, handles, or has access to any property of the Authority, and such officer shall file an official bond with the Authority in the amount of \$100,000, the expense thereof to be paid by the Authority.

8.04 The Board shall have the power to appoint such other officers and employees as it may deem necessary, and to retain independent accountants, counsel, engineers and their consultants, and to determine the salary or compensation of all such persons.

SECTION 9. Meetings of the Board

9.01 The Board shall hold at least one regular meeting each year, and, by resolution, may provide for the holding of regular meetings at more frequent intervals. The date upon which, and the hour and place at which, each such regular meeting shall be held shall be fixed by resolution of the Board.

9.02 Special meetings of the Board may be called in accordance with the provisions of Section 54956 of the Government Code of the State of California, or as said section may be amended or superseded.

9.03 All meetings of the Board shall be called, noticed, held and conducted subject to the provisions of Sections 54950-54962 of the Government Code of the State of California, or as said Sections may be amended or superseded.

9.04 The Secretary of the Authority shall cause minutes of all meetings of open sessions of the Board to be kept and shall, as soon as possible after each meeting, cause a copy of the minutes to be forwarded to each member of the Board and to the Secretary of the Board of Directors of each Member.

9.05 Three members of the Board of Directors of CWD and three members of the Board of Directors of Chowchilla-Red Top RCD shall constitute a quorum for the transaction of business, except that less than a quorum may adjourn from time to time. The Board shall take no other action except upon the affirmative vote of at least three members of the board of directors of each Member.

SECTION 10. Fiscal Year

10.01 Unless and until changed by resolution of the Board, the fiscal year of the Authority shall be the period from January 1 of each year to and including the following December 31.

SECTION 11. Disposition of Assets

11.01 In the event of termination of the Authority, all assets of the Authority shall be distributed to the respective member grantor or assignor thereof, and any surplus money or other assets on hand shall be returned to the members in proportion to their contributions to the Authority.

SECTION 12. Adoption of Groundwater Management Plan

12.01 Immediately following the adoption of this Agreement, the Authority shall institute the formulation of a Groundwater Management Plan for the area embraced within the boundaries of both CWD and Chowchilla-Red Top RCD, within the Chowchilla Groundwater Basin, excluding therefrom, unless consent is given to include the area, any portions within the combined boundaries that is governed by a political agency which is authorized by law to adopt its own Plan.

SECTION 13. Agreement Not Exclusive

13.01 This Agreement shall not be exclusive and shall not be deemed to amend or alter the terms of other agreements by and between the Members.

SECTION 14. Contributions and Advances

14.01 Contributions or advances of public funds, or funds from their respective treasuries, and of personnel, equipment or property may be made to the Authority by either Member for any of the purposes of the Agreement. Any such advance may be made subject to repayment, and in such case shall be repaid in the manner agreed upon by the Member making such advance and the Authority at the time of making such advance.

SECTION 15. Accounts and Reports

15.01 The Authority shall establish and maintain such funds and accounts as may be required by good accounting practice. The books and records of the Authority shall be open to inspection at all reasonable times by the members and their representatives.

15.02 The Auditor-Treasurer of the Authority, subject to the approval of the Board, shall contract with a certified public accountant or public accountant to make an annual audit of the accounts and records of the Authority, and in each case the minimum requirements of the audit shall be those prescribed by the State Controller for special districts under Section 26909 of the Government Code of the State of California, or as the same may be amended or superseded, and shall conform to generally accepted auditing standards; except that the Members may, by unanimous request of the Boards of Directors thereof, replace the annual special audit with an audit covering a two-year period. A report of each such audit shall be filed as a public record with each Member and with the County Auditor of Madera County, the county in which both Members are located, which such report shall be filed within twelve (12) months of the end of the fiscal year or years under examination. All costs of such audit shall be borne by the Authority and shall be a charge against any unencumbered funds of the Authority available for the purpose.

SECTION 16. Breach

16.01 If default shall be made by either member in any covenant contained in the Agreement, such default shall not excuse the other Member from fulfilling its obligations

under the Agreement and such other Member shall continue to be liable for the payment of all contributions and the performance of all obligations herein contained. The Members hereby declare that the Agreement is entered into for the benefit of the Authority created hereby and the Members hereby grant to the Authority the right to enforce by whatever lawful means the Authority deems appropriate all of the obligations of each member hereunder. Each and all of the remedies given to the Authority hereunder or by any law now or hereafter enacted are cumulative and the exercise of any one right or remedy shall not impair the right of the Authority to any or all other remedies.

SECTION 17. Severability

17.01 Should any part, term or provision of the Agreement be decided by the courts to be illegal or in conflict with any law of the State of California, or otherwise be rendered unenforceable or ineffectual, the validity of the remaining parts, terms or provisions hereof shall not be affected thereby.

SECTION 18. Successors: Assignment

18.01 The Agreement shall be binding upon and shall inure to the benefit of the successors of each Member. Neither Member may assign any right or obligation hereunder without the consent of the other Member.

SECTION 19. Amendment of the Agreement

19.01 The Agreement may be amended by a supplemental agreement executed by the members at any time.

SECTION 20. Office

20.01 The office of the Authority shall be maintained at 327 South Chowchilla Boulevard, Chowchilla, CA 93610, until such time as the location thereof is changed by the Board.

SECTION 21. Notices

21.01 Any notice authorized or required to be given pursuant to this Agreement shall be in writing and shall be deemed to have been given when mailed, postage prepaid, or delivered during working hours to the following address, or to such changed address as are communicated to the Authority and the member entities in writing:

CWD:

P.O. Box 905, Chowchilla, CA 93610

Chowchilla-Red Top RCD:

c/o John Wolfshorndl, 11791 Avenue 22, Chowchilla, CA 93610.

SECTION 22. Section Headings

22.01 All section headings contained herein are for convenience of reference only and are not intended to define or limit the scope of any provision of the Agreement.

IN WITNESS WHEREOF the parties hereto have caused the Agreement to be executed and attested by their proper officers thereunto duly authorized, and their official seals to be hereto affixed, as of the day and year first above written.

CHOWCHILLA WATER DISTRICT

By: _____
Kole M. Upton, President

ATTEST:

Douglas Welch, Secretary

[Seal]

CHOWCHILLA-RED TOP
RESOURCE CONSERVATION
DISTRICT

By: _____
Norman Kuhr, Chairman

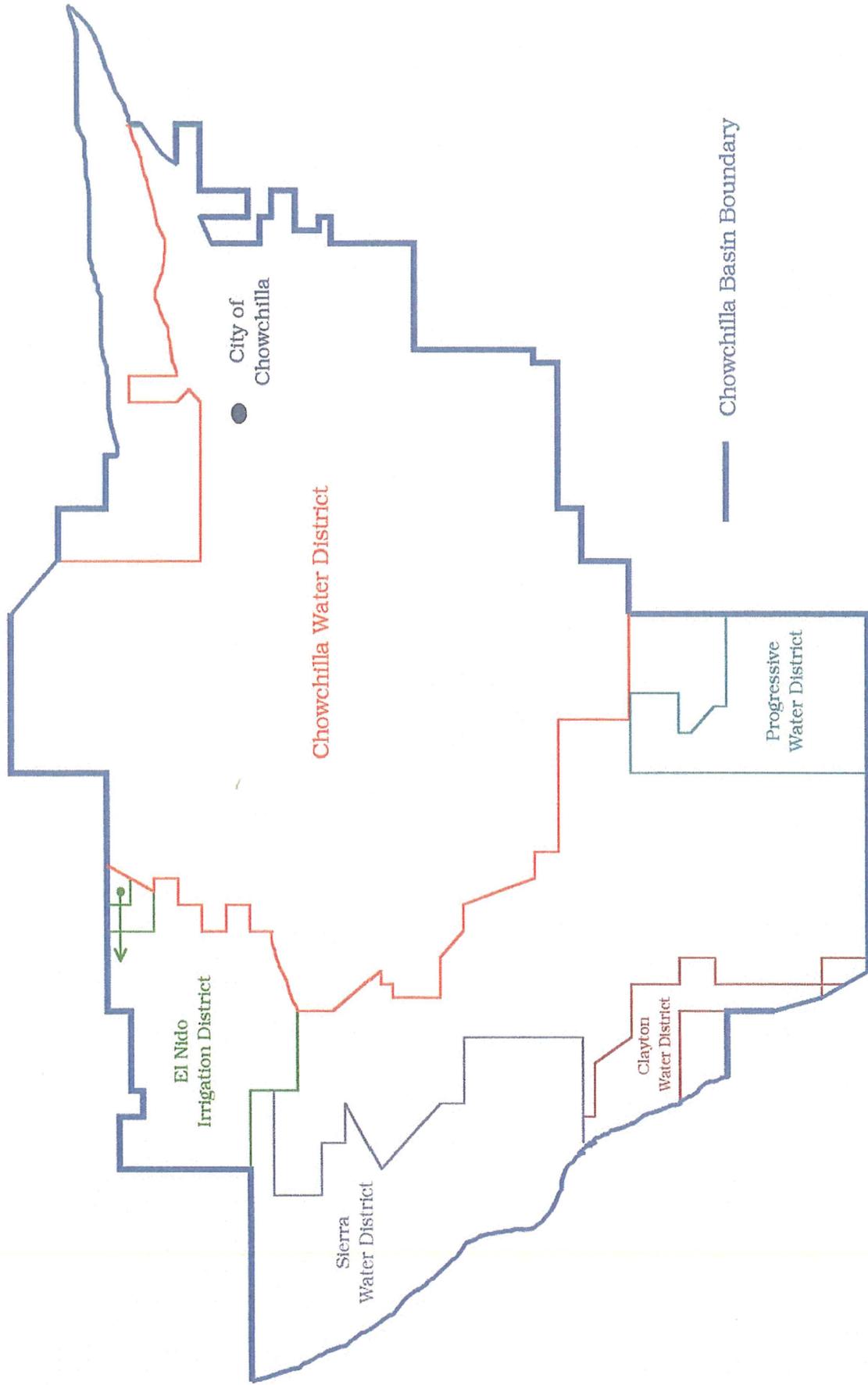
ATTEST:

John Wolfshorndl, Secretary

[Seal]

APPENDIX 3

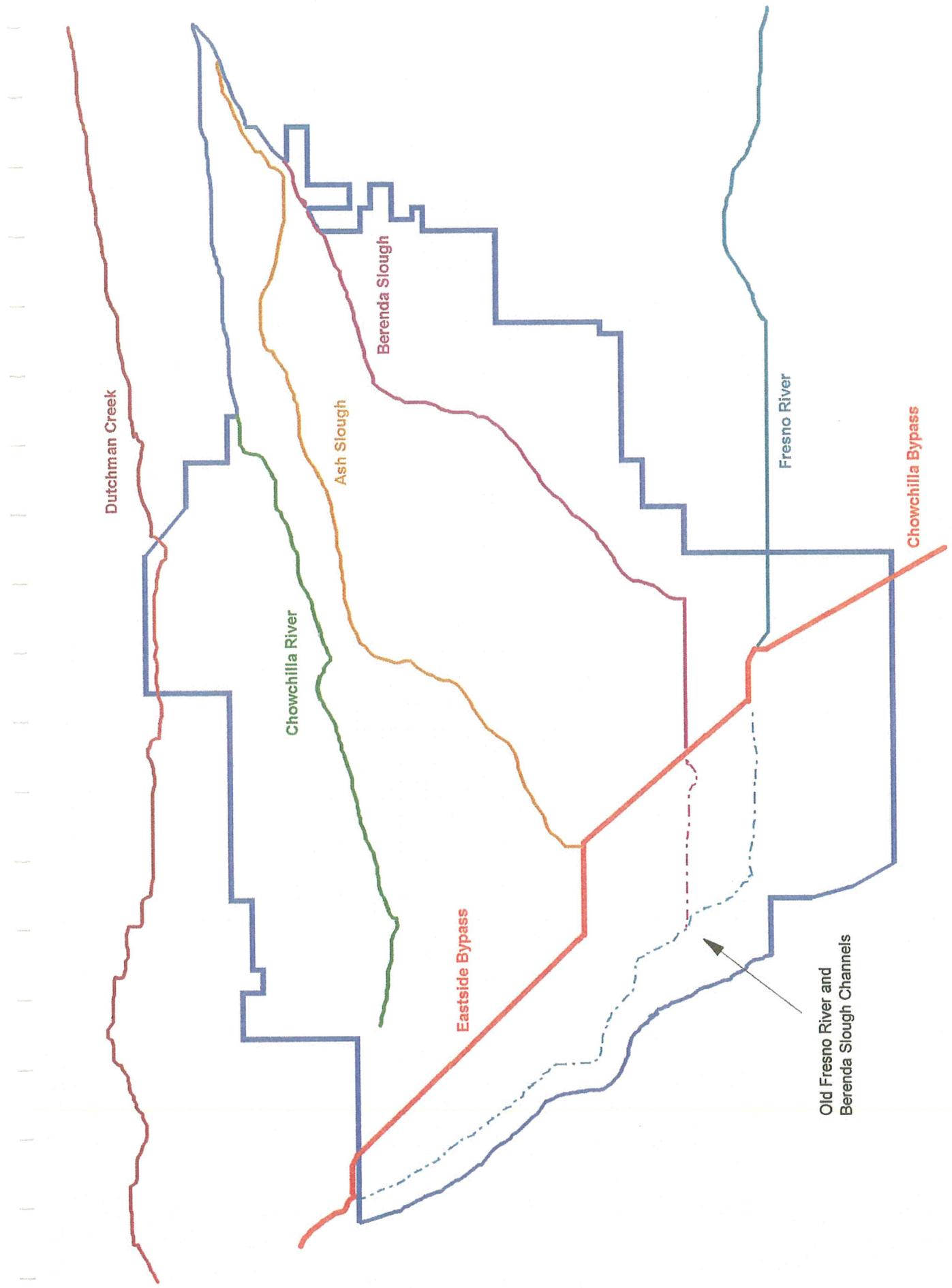
Agencies Within the Chowchilla Basin Map



AGENCIES WITHIN THE CHOWCHILLA BASIN

APPENDIX 4

Chowchilla Basin - Major Streams Map



Dutchman Creek

Chowchilla River

Ash Slough

Berenda Slough

Fresno River

Eastside Bypass

Chowchilla Bypass

Old Fresno River and
Berenda Slough Channels

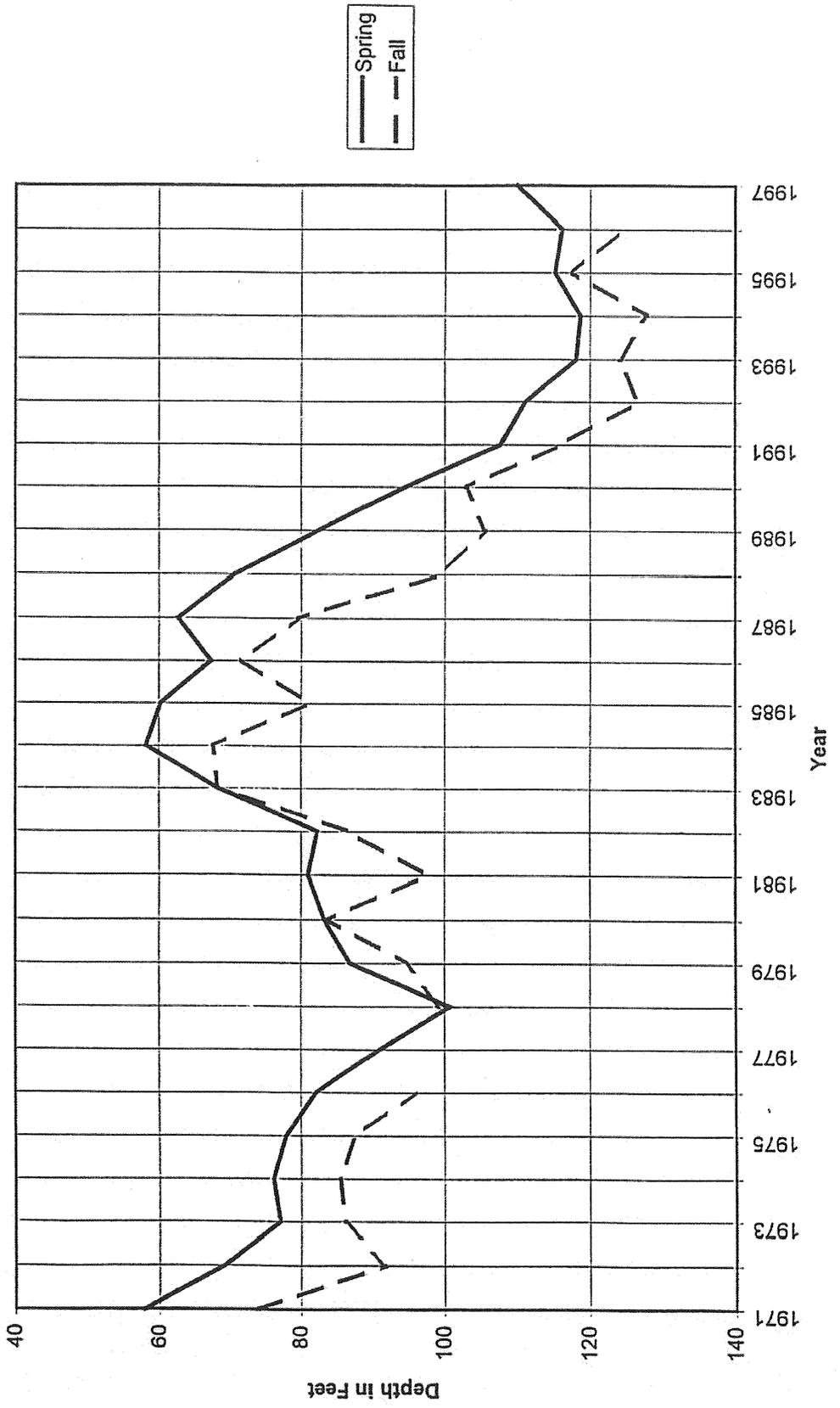
CHOWCHILLA BASIN - MAJOR STREAMS

APPENDIX 5

Average Depth to Groundwater Chart

Chowchilla Water District

Average Depth to Groundwater



APPENDIX 6

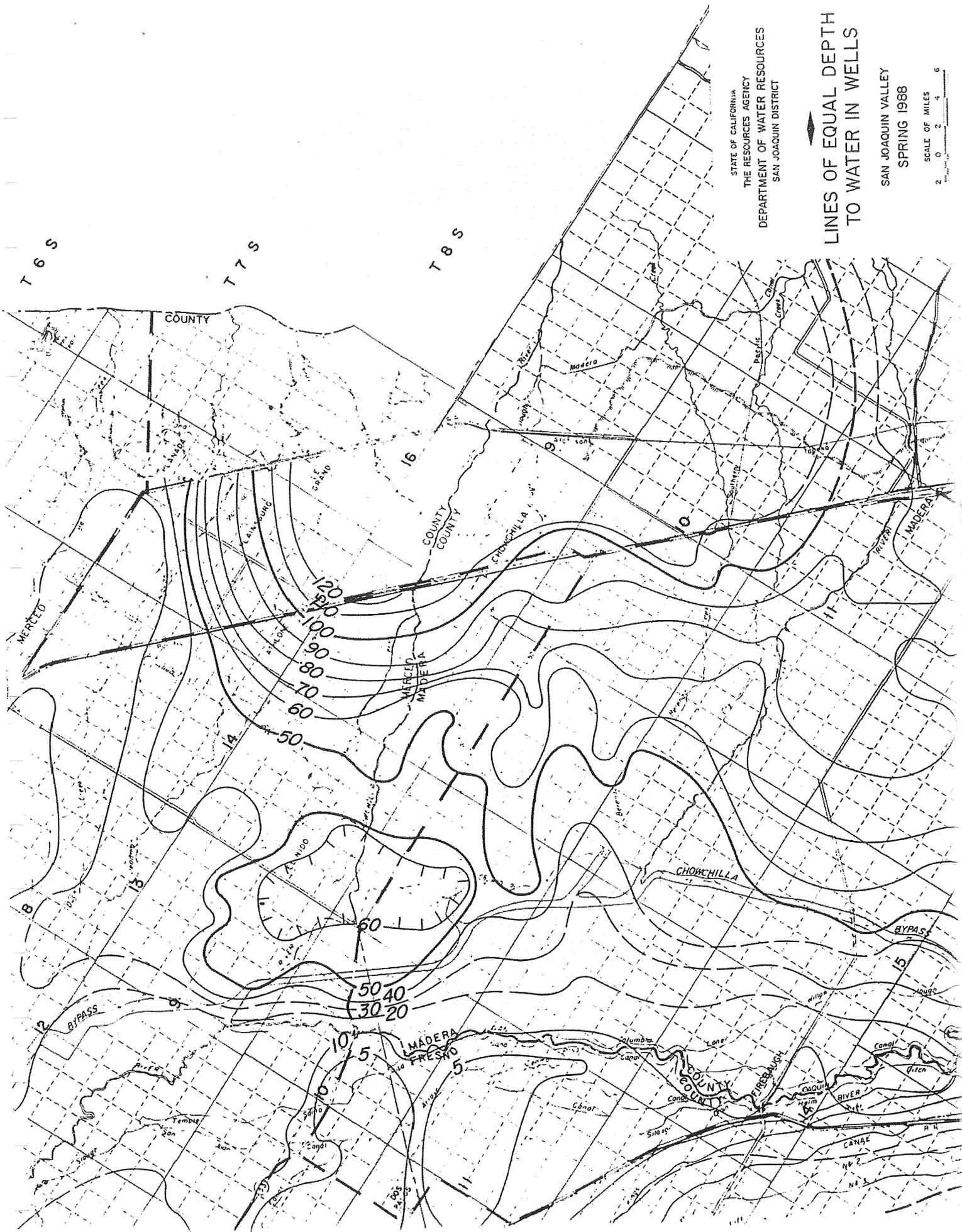
Groundwater Contour Maps

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
SAN JOAQUIN DISTRICT

LINES OF EQUAL DEPTH TO WATER IN WELLS

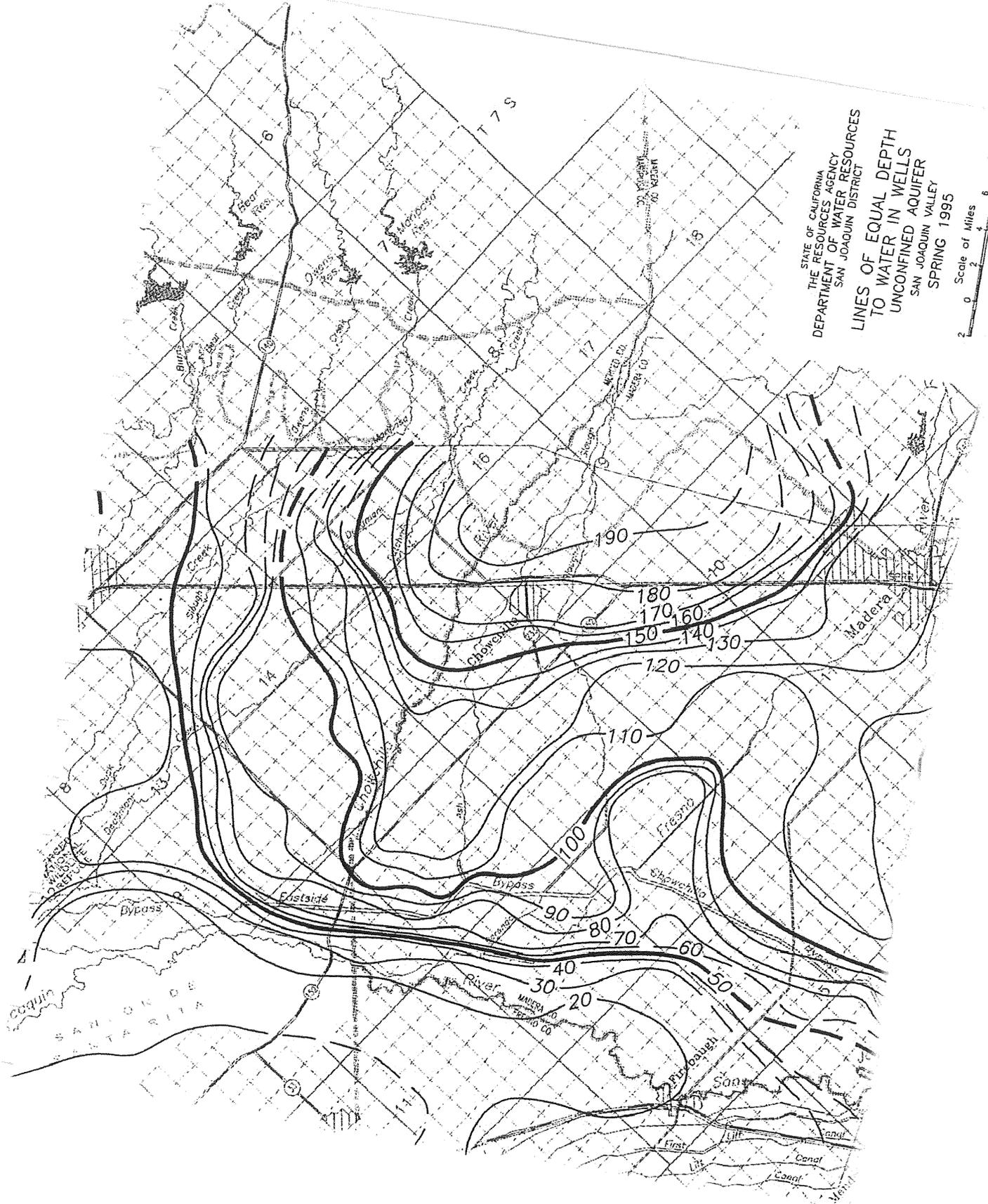
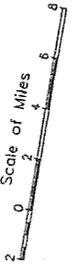
SAN JOAQUIN VALLEY
SPRING 1968

SCALE OF MILES
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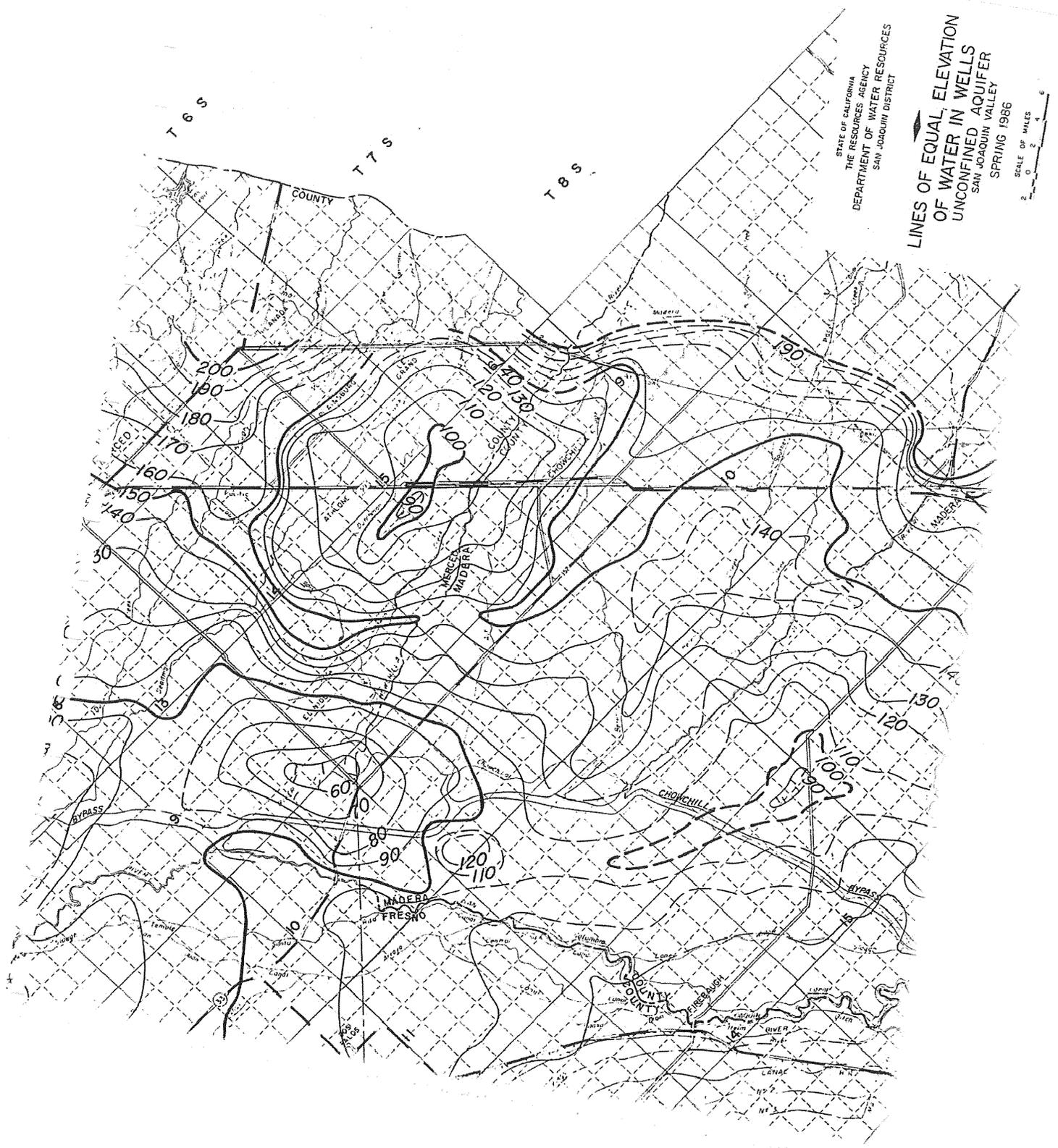
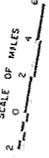
STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
SAN JOAQUIN DISTRICT

LINES OF EQUAL DEPTH
TO WATER IN WELLS
UNCONFINED AQUIFER
SAN JOAQUIN VALLEY
SPRING 1995



STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
SAN JOAQUIN DISTRICT

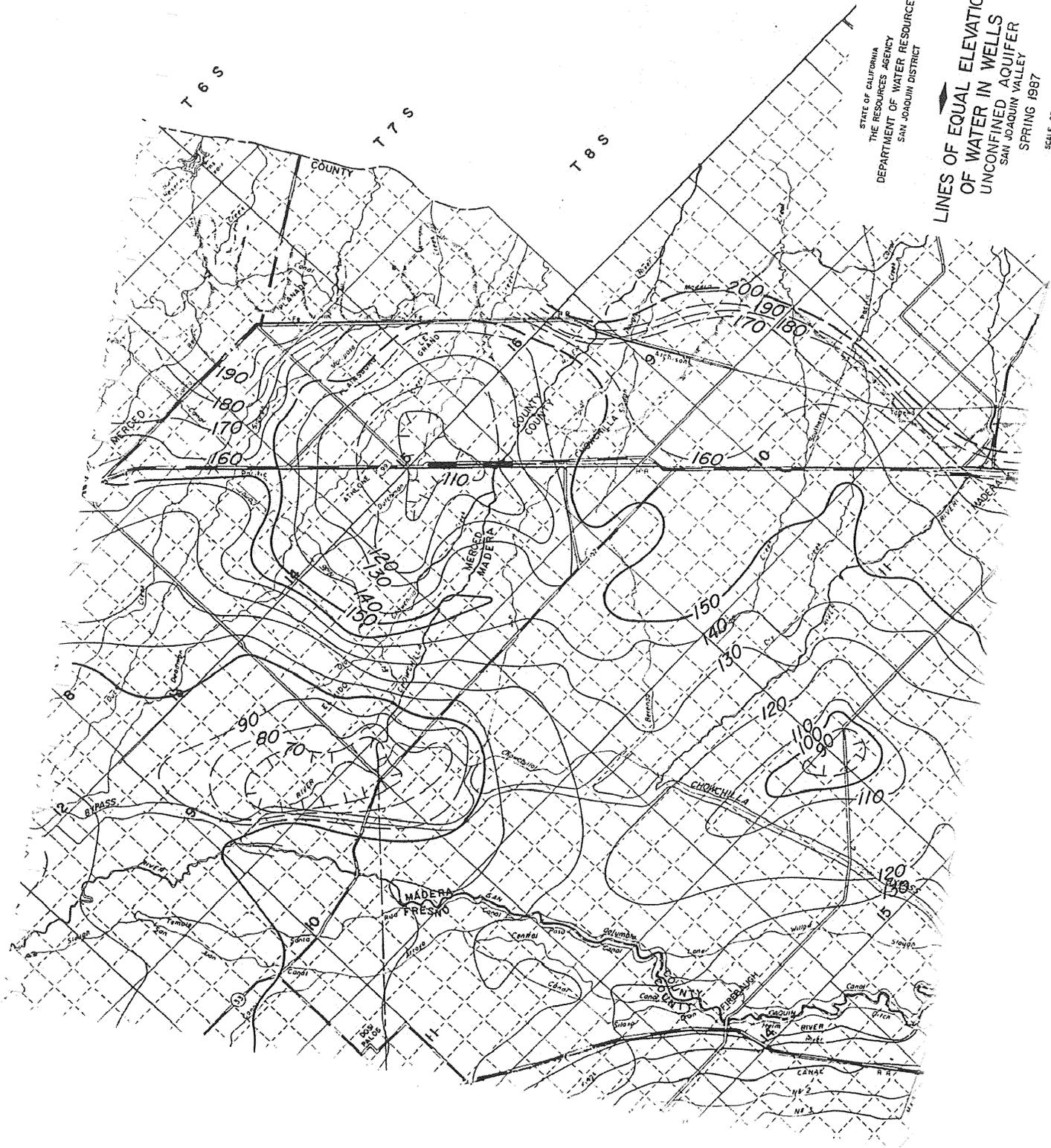
**LINES OF EQUAL ELEVATION
OF WATER IN WELLS
UNCONFINED AQUIFER
SAN JOAQUIN VALLEY
SPRING 1986**



STATE OF CALIFORNIA
THE RESOURCE AGENCY
DEPARTMENT OF WATER RESOURCES
SAN JOAQUIN DISTRICT

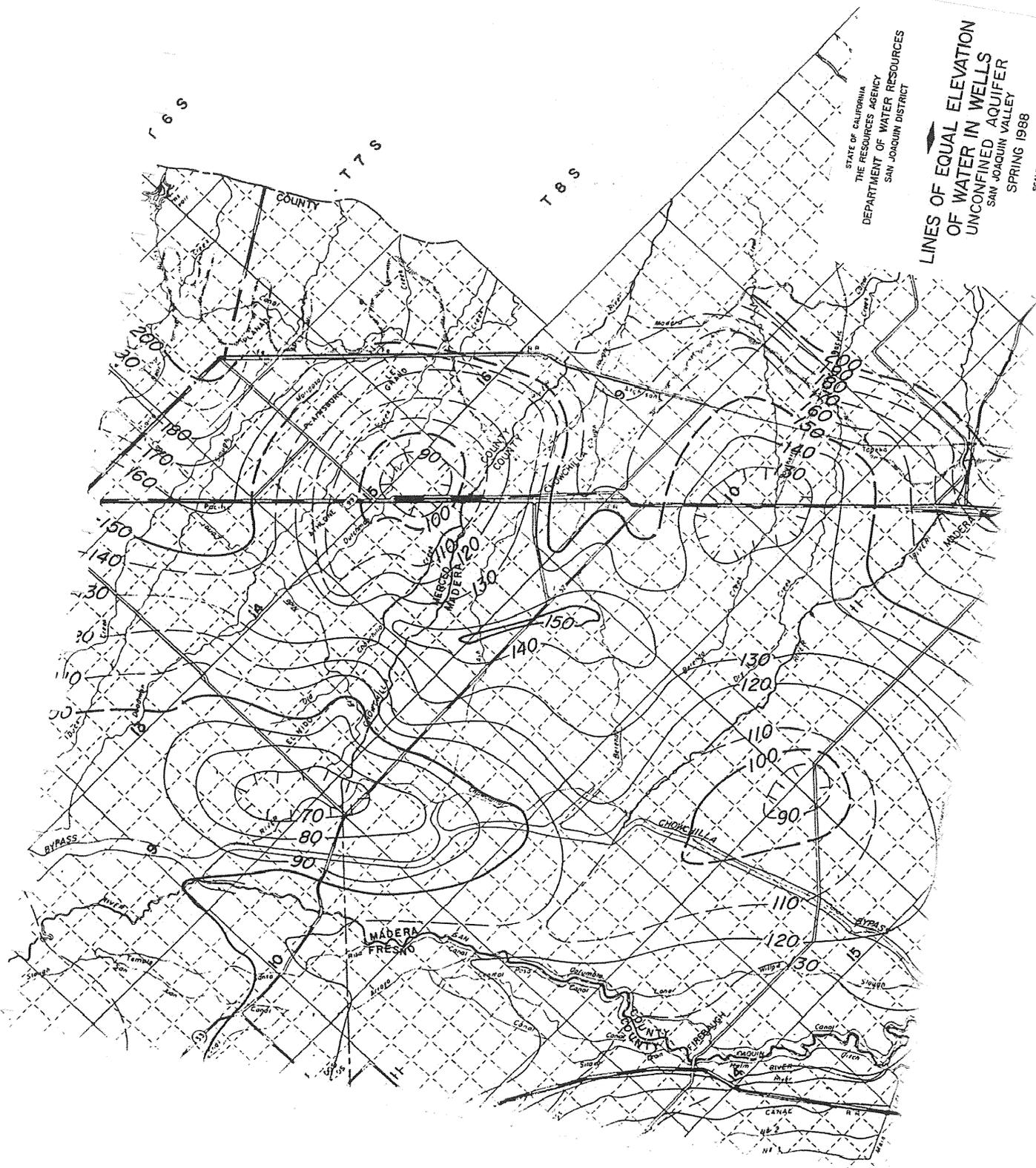
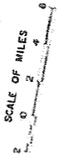
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SAN JOAQUIN VALLEY
SPRING 1987**

SCALE OF MILES
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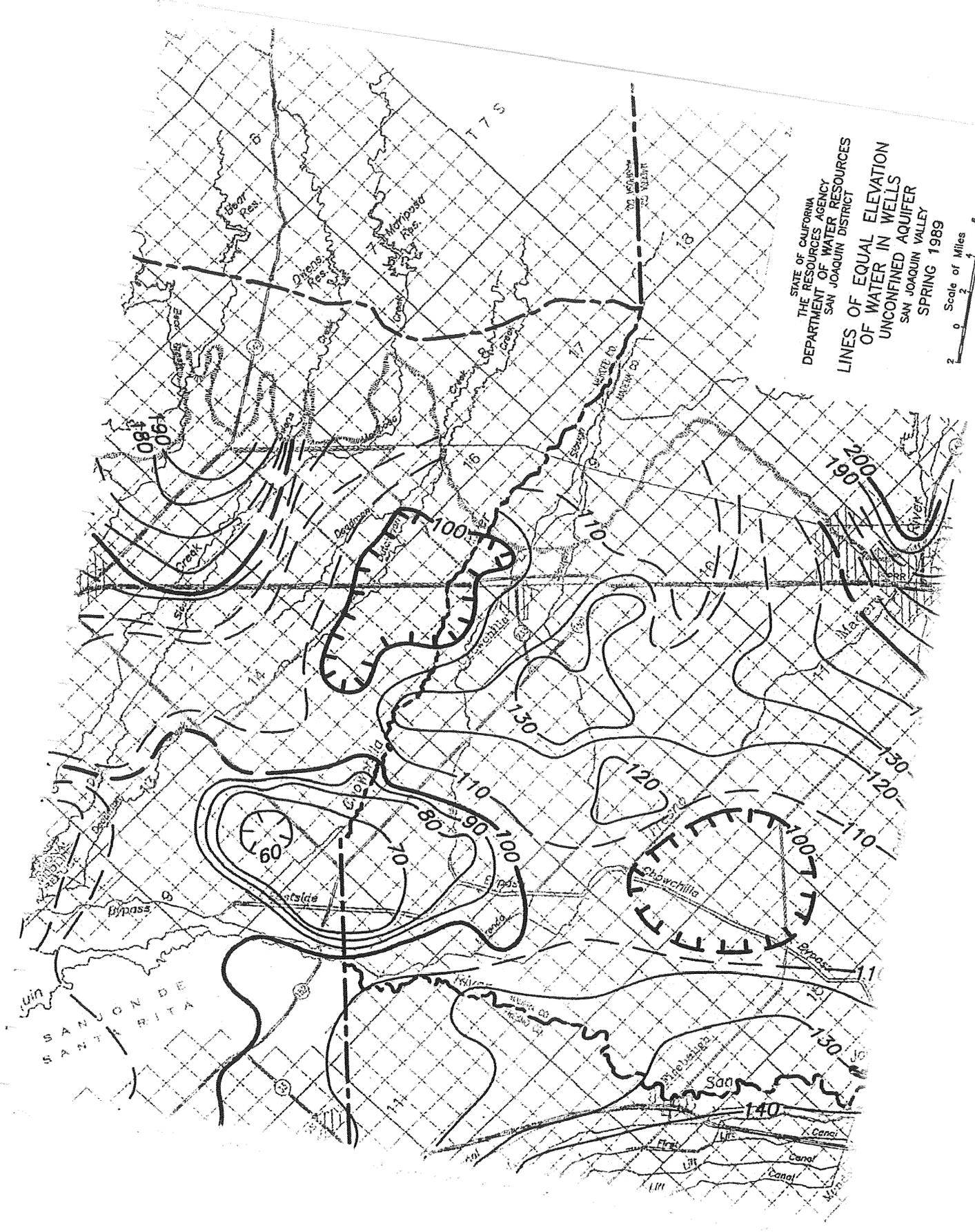
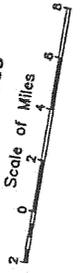


STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
SAN JOAQUIN DISTRICT

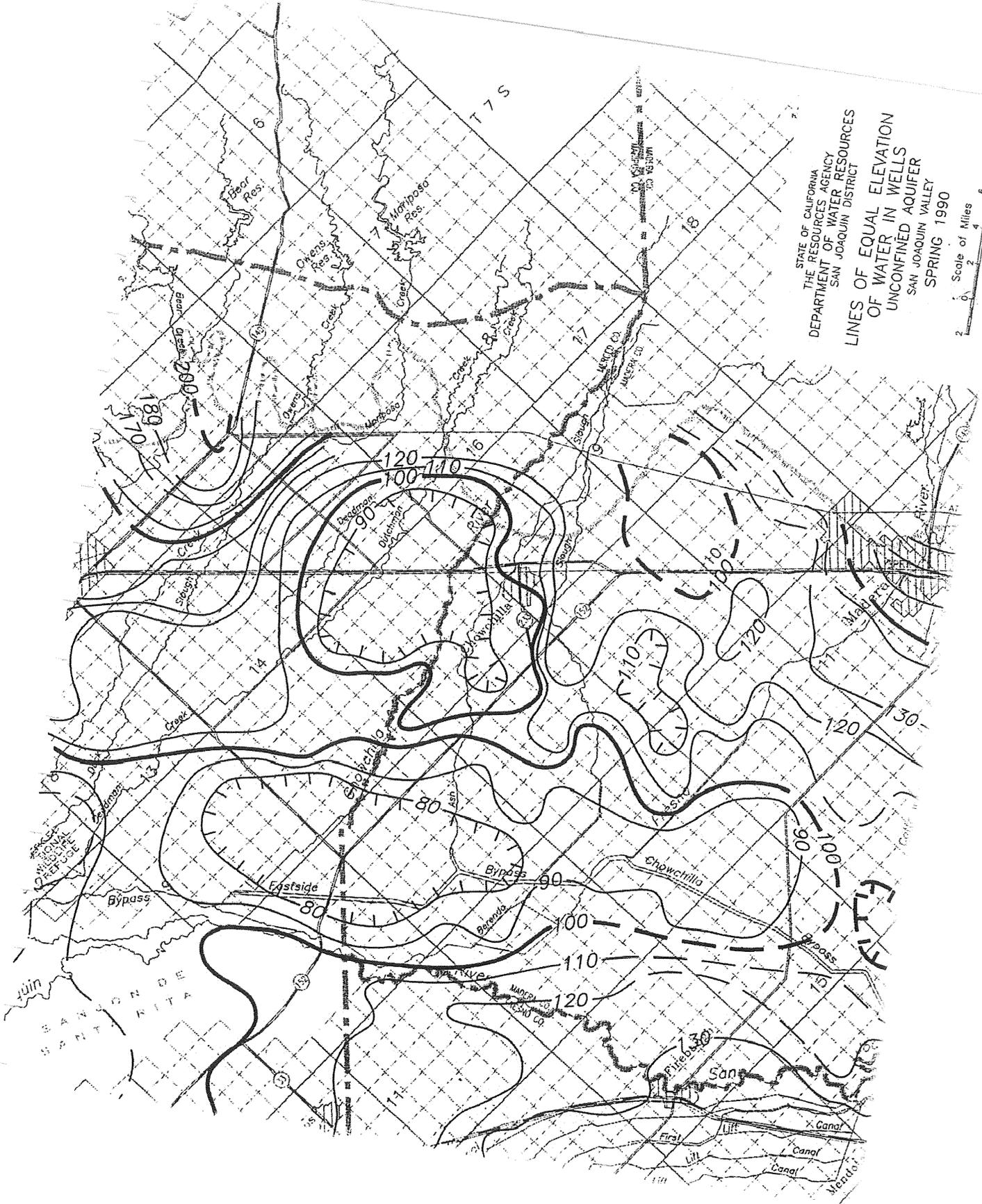
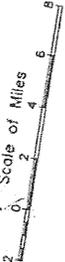
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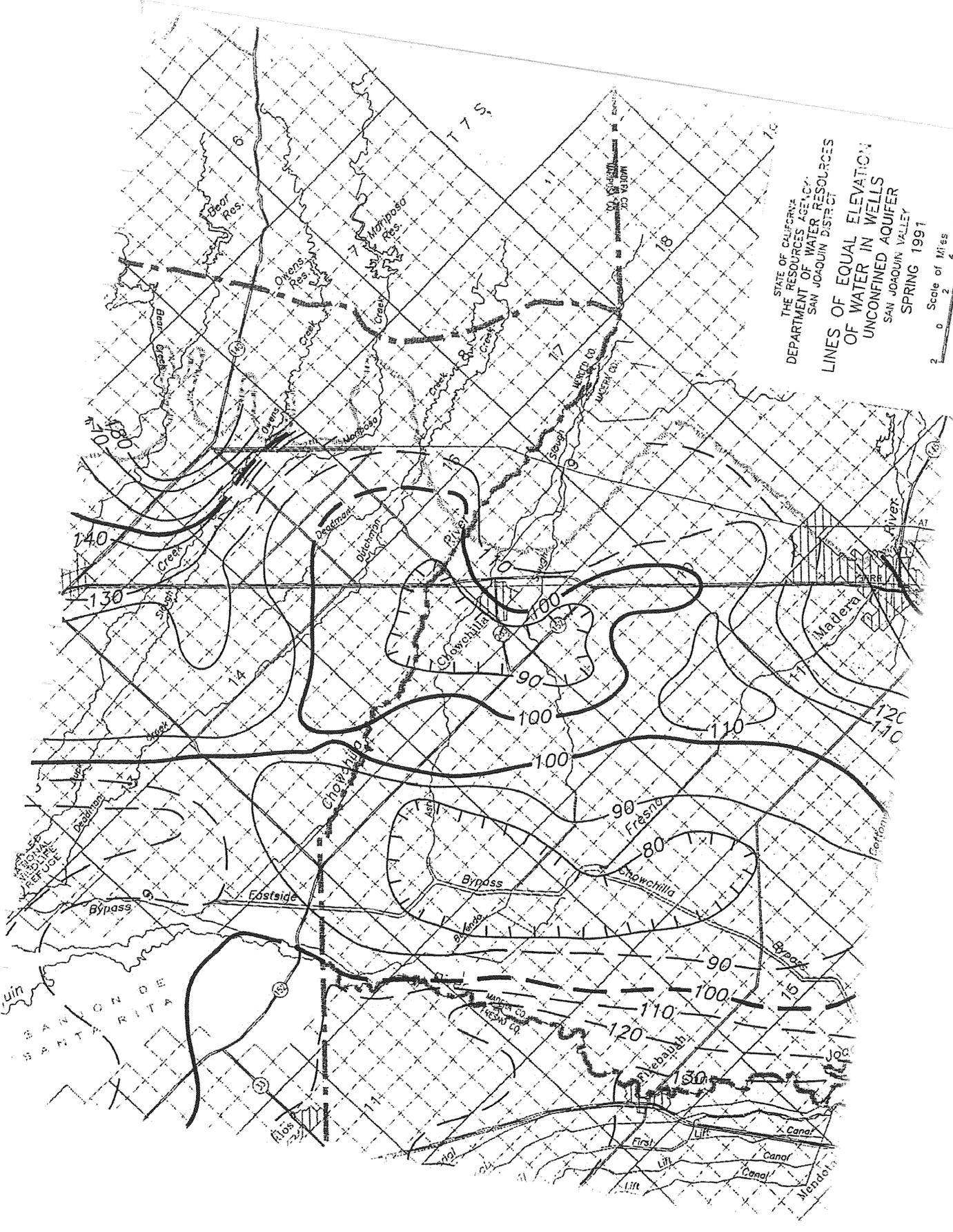


STATE OF CALIFORNIA
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SAN JOAQUIN VALLEY
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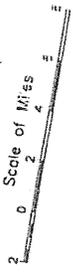
STATE OF CALIFORNIA
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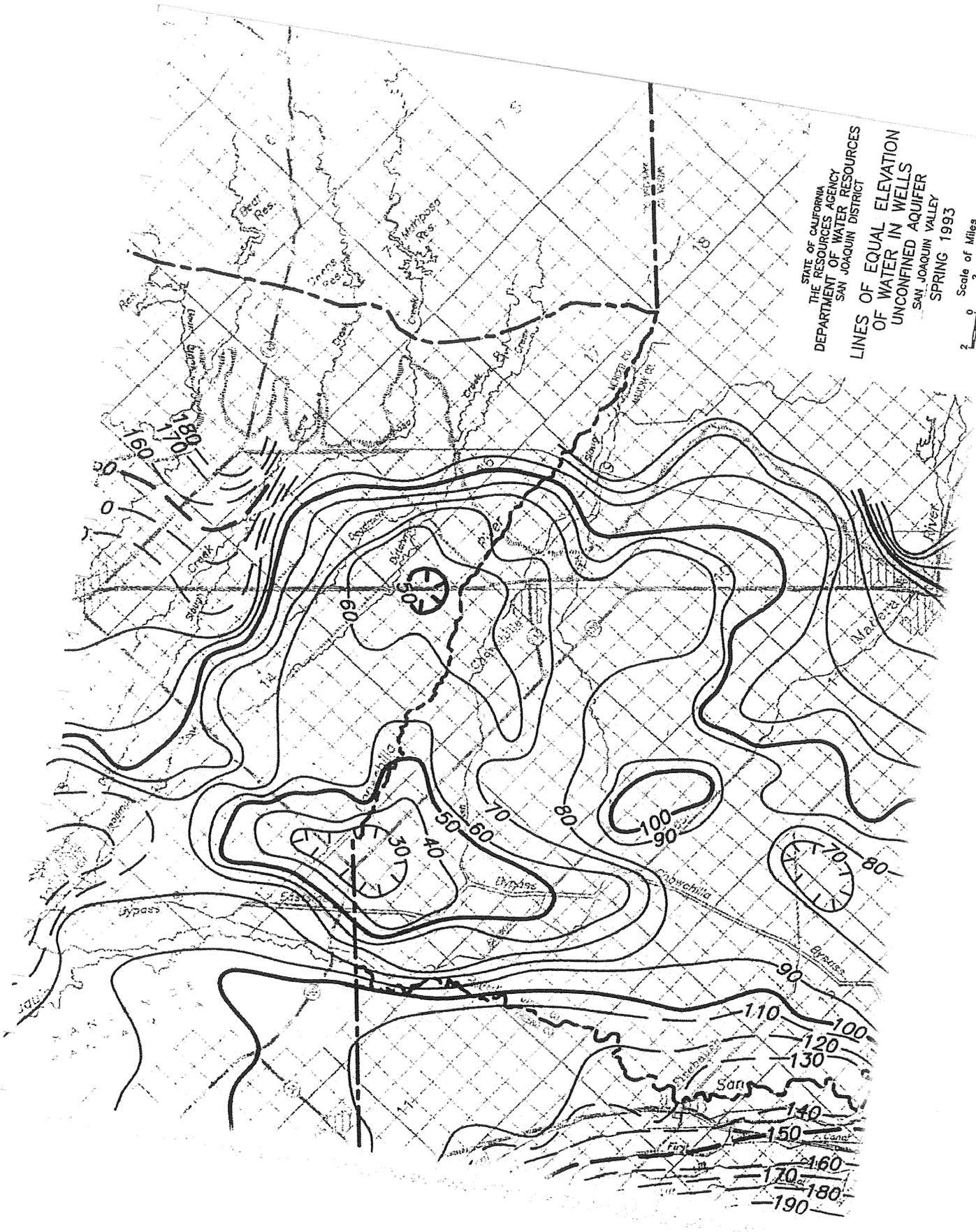


STATE OF CALIFORNIA
 THE RESOURCES AGENCY
 DEPARTMENT OF WATER RESOURCES
 SAN JOAQUIN DISTRICT

**LINES OF EQUAL ELEVATION
 OF WATER IN WELLS
 UNCONFINED AQUIFER
 SAN JOAQUIN VALLEY
 SPRING 1991**

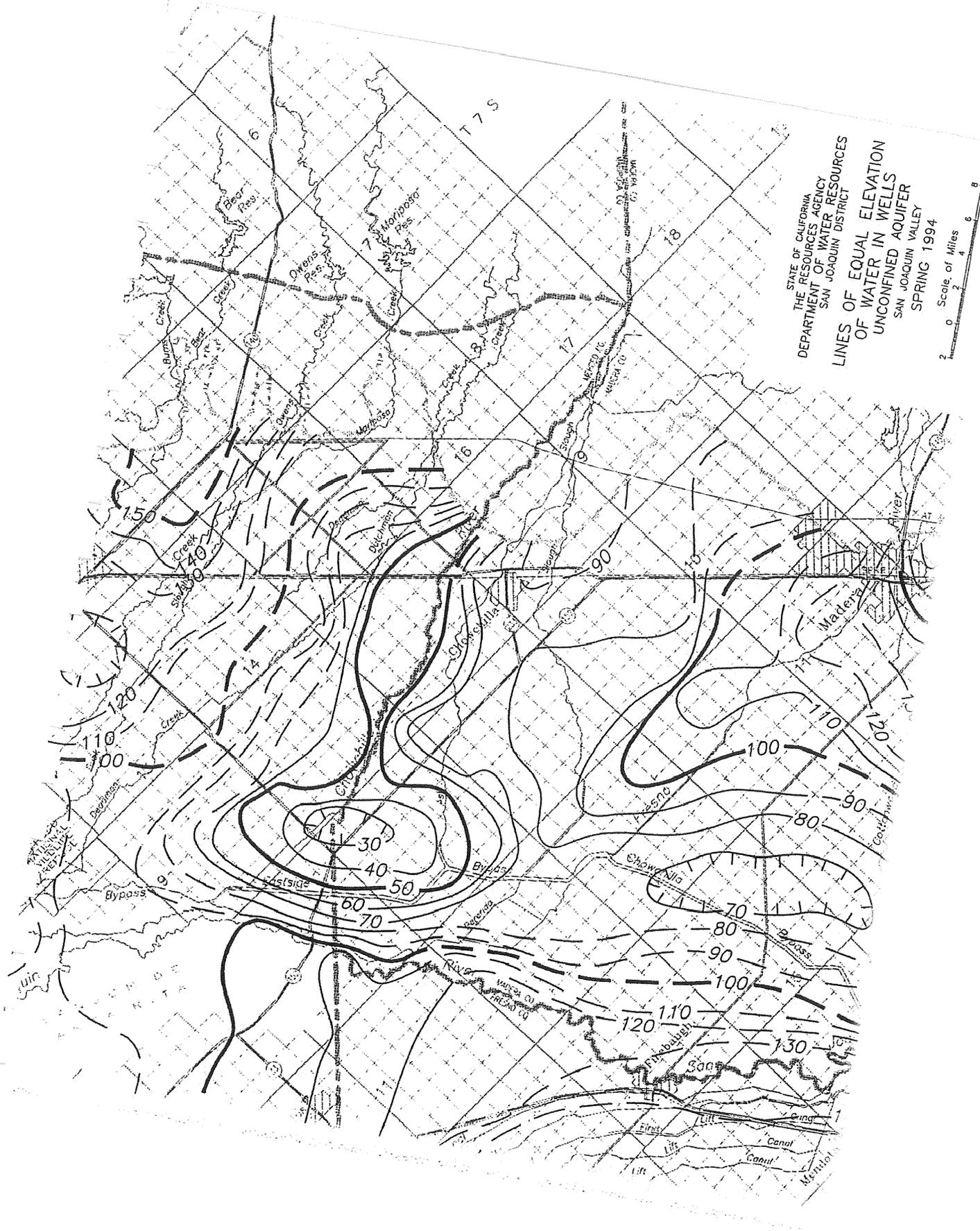


STATE OF CALIFORNIA
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SAN JOAQUIN DISTRICT
**LINES OF EQUAL ELEVATION
OF WATER IN WELLS
UNCONFINED AQUIFER
SAN JOAQUIN VALLEY
SPRING 1993**



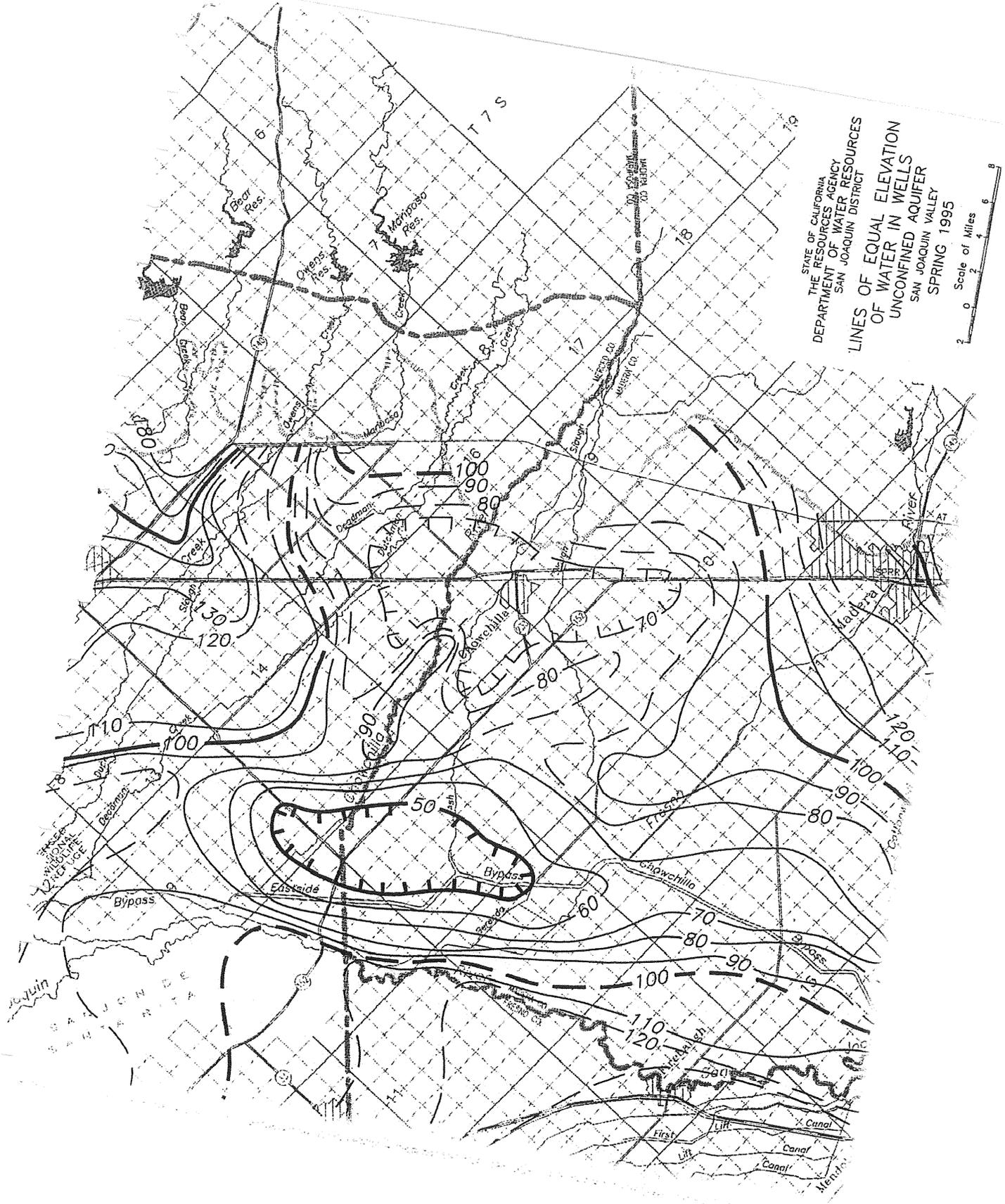
STATE OF CALIFORNIA
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SAN JOAQUIN DISTRICT

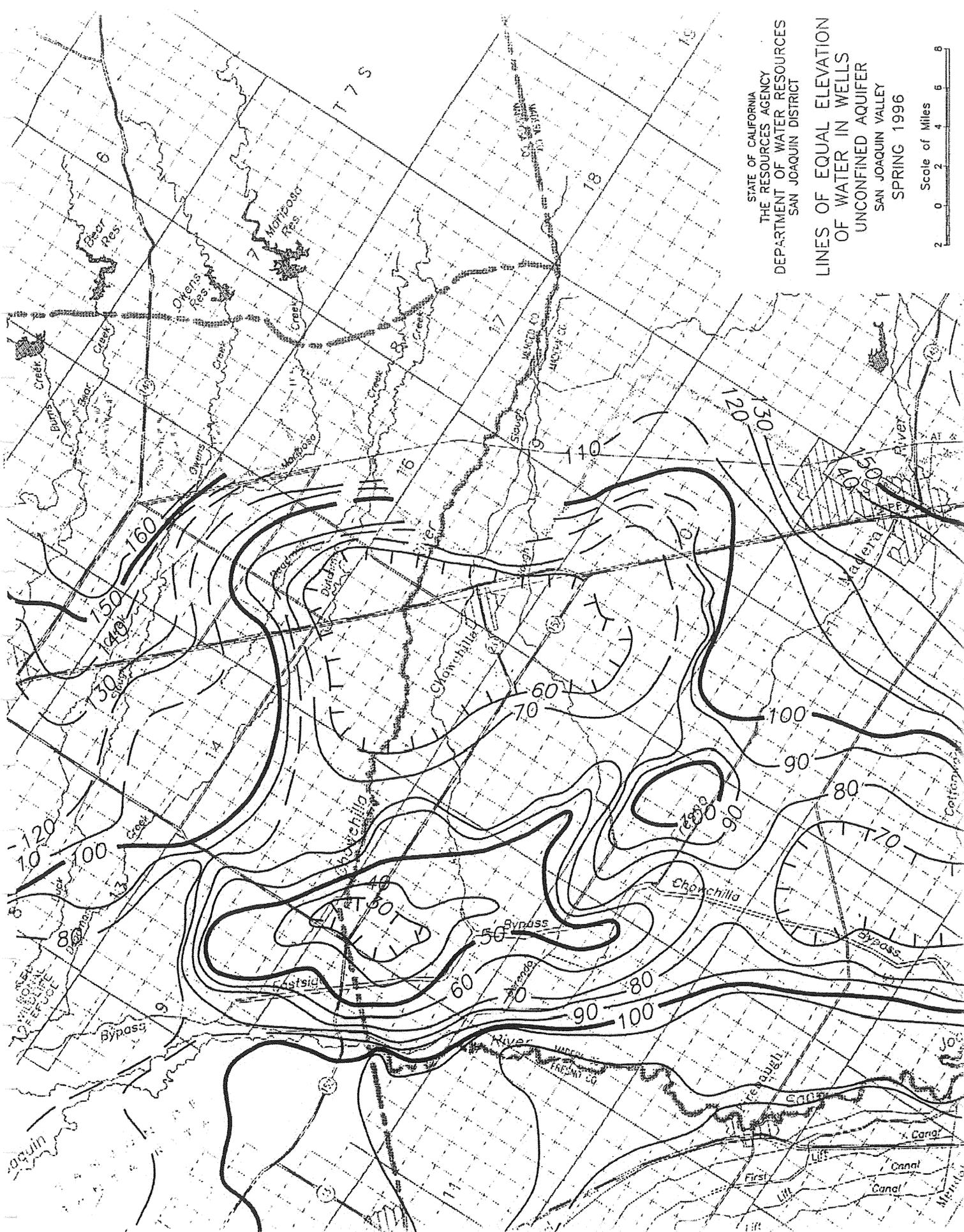
LINES OF EQUAL ELEVATION
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UNCONFINED AQUIFER
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SPRING 1994



STATE OF CALIFORNIA
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LINES OF EQUAL ELEVATION
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UNCONFINED AQUIFER
SAN JOAQUIN VALLEY
SPRING 1995





STATE OF CALIFORNIA
 THE RESOURCES AGENCY
 DEPARTMENT OF WATER RESOURCES
 SAN JOAQUIN DISTRICT

**LINES OF EQUAL ELEVATION
 OF WATER IN WELLS
 UNCONFINED AQUIFER
 SAN JOAQUIN VALLEY
 SPRING 1996**



APPENDIX 7

AMENDED Joint Exercise of Powers Agreement

(This Joint Exercise of Powers Agreement was amended January 1, 1999 to include the City of Chowchilla as a member agency of the Joint Powers Authority.)

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City

“City” shall mean the City of Chowchilla, a municipal corporation, duly organized and existing under the Constitution and laws of the State of California.

Chowchilla

The term “Chowchilla” shall mean the Chowchilla Water District, a California Water District, duly organized and existing under the Constitution and laws of the State of California.

Groundwater Management Plan

The term “Groundwater Management Plan” shall mean the CWD-Red Top RCD Joint Powers Authority Groundwater Management Plan adopted by the CWD-Red Top RCD Joint Powers Authority pursuant to the Groundwater Management Act on December 3, 1997.

Law

The term “Law” shall mean Articles 1 and 2 of Chapter 5 of Division 7 of Title 1 of the Government Code of the State of California, and all laws amendatory thereof or supplemental thereto.

Member

The term “Member” shall be either Chowchilla, Red Top or City.

Red Top

The term “Red Top” shall mean the Chowchilla-Red Top Resource Conservation District duly organized and existing under the Constitution and laws of the State of California.

SECTION 2. Amendment to Formation of the Authority

2.01 There is hereby created pursuant to the Law, an agency and public entity to be known as the “CWD-Red Top-City Joint Powers Authority.” which

1 is a successor to and continuation of the CWD-Red Top RCD Joint Powers
2 Authority. As provided in the Law, the Authority shall be a public entity sepa-
3 rate from the Members, and the debts, liabilities and obligations of the Author-
4 ity shall not constitute debts, liabilities or obligations of the Members or either
5 of them. The Authority shall own and hold title to all funds, property and
6 works acquired by it during the term of this Agreement.

7 SECTION 3. Contributions to and Revenues from the Authority

8 3.01 The Members shall pay for the costs and expenses associated with
9 the maintenance and operation of the Authority in such amounts as are agreed
10 to be contributed to the Authority, and are entitled to all the revenues of the
11 Authority in the following percentages:

12 Chowchilla: 100% unless and until Red Top and or City can secure
13 funds to contribute to the Authority.

14 Red Top and City: 0% unless and until Red Top and/or City can
15 secure funds to contribute to the Authority.

16 3.02 If Red Top or City secure funds which either can contribute to the
17 Authority, to the extent that funds are available, it shall make contributions until
18 its contributions equal the contributions of Chowchilla and any other member.

19 SECTION 4. Term

20 4.01 The Agreement shall become effective as of the date hereof and
21 shall continue in full force and effect until terminated by two members giving
22 ninety (90) days notice of termination to the other member. If one member
23 terminates its interest in the Authority, the Authority shall continue with the
24 other two members until terminated by ninety (90) notice by a remaining mem-
25 ber.

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SECTION 5. Powers: Restrictions Upon Exercise

5.01 The Authority shall have power to adopt and enforce a Groundwater Management Plan, subject, however, to the conditions and restrictions contained in the Agreement.

5.02 The Authority is authorized, in its own name, to do all acts necessary or convenient for the exercise of such powers for such purposes that each of its Members could do separately, including but not limited to any or all of the following: to make and enter into contracts; to exercise the power of eminent domain for the acquisition of property for Projects; to employ agents and employees; to acquire, construct, manage, maintain and operate any buildings, works or improvements; to acquire, hold or dispose of property; to incur debts, liabilities or obligations (which do not constitute debts, liabilities or obligations of the Members or either of them); and to sue and be sued in its own name.

5.03 Such powers shall be exercised subject only to such restrictions upon the manner of exercising such powers as are imposed upon the Chowchilla Water District as set forth in Division 13 of the California Water Code and other applicable statutes in the exercise of similar powers.

SECTION 6. Termination of Powers

6.01 The Authority shall continue to exercise the powers herein conferred upon it until the termination of the Authority under the provisions of Section 5 hereof. Upon such termination, the groundwater management plan adopted by the Authority shall remain in force and effect for the lands within Chowchilla until modified or rescinded by Chowchilla and shall remain in force and effect for the lands within Red Top outside of the boundaries of Chowchilla until

1 modified or rescinded by Red Top, and shall remain in force and effect for the
2 land within City until modified or rescinded by City. ;

3 6.02 Upon termination of the Authority, Chowchilla shall have no power
4 to adopt a groundwater management plan outside of its boundaries and within
5 the boundaries of Red Top or City without the written consent of Red Top or
6 City.

7 6.03 Upon termination of the Authority, Red Top shall have no power to
8 adopt a groundwater management plan within the boundaries of Chowchilla or
9 City without the written consent of Chowchilla or City.

10 6.04 Upon termination of the Authority, City shall have no power to
11 adopt a groundwater management plan outside of the boundaries of City and
12 within the boundaries of Chowchilla or Red Top without the written consent of
13 Chowchilla or Red Top.

14 SECTION 7. Board of Directors

15 7.01 The Authority shall be administered by the Board of Directors which
16 shall consist of twelve (12) members, each serving in his or her individual ca-
17 pacity as a member of the Board, constituting the five (5) members of the Board
18 of Directors of Chowchilla, five (5) members of the Board of Directors of Red
19 Top and two members from the City Council of City. The term of office of
20 each member of the Board shall continue only so long as such member is a
21 member of either of said boards of directors or council, and shall terminate if
22 such member of the Board shall cease to be a member of either of said boards
23 of directors or council.

24 7.02 Members of the Board shall receive such compensation or serving as
25 such as is set by the Board from time to time, and shall be entitled to reim-
26 bursement for any expenses actually incurred in connection with serving as a

1 member if the Board shall determine that such expenses shall be reimbursed
2 and there are unencumbered funds available for such purpose.

3 7.03 All directors shall take office on January 1, 1999 and hold office until
4 their successors are elected or appointed.

5 SECTION 8. Officers: Duties

6 8.01 The Board shall annually elect a President and Vice President of the
7 Authority from among its members and shall appoint a General Manager of the
8 Authority and a Secretary of the Authority, neither of whom shall be a member
9 of the Board.

10 8.02 The General Manager of the Authority may be designated pursuant
11 to the Law as Auditor-Treasurer of the Authority or at the pleasure of the Board
12 a separate Auditor-Treasurer may be appointed. The Auditor-Treasurer is des-
13 igned as the depository of the Authority to have custody of all money of the
14 Authority from whatever source and to draw checks to pay demands against the
15 Authority when such demands have been approved by the Authority, and such
16 officer shall have the powers, duties and responsibilities of the offices of auditor
17 and treasurer specified in the law.

18 8.03 The Auditor-Treasurer of the Authority is designated as the public
19 officer or person who has charge of, handles, or has access to any property of
20 the Authority, and such officer shall file an official bond with the Authority in
21 the amount of \$100,000, the expense thereof to be paid by the Authority.

22 8.04 The Board shall have the power to appoint such other officers and
23 employees as it may deem necessary, and to retain independent accountants,
24 counsel, engineers and there consultants, and to determine the salary or com-
25 pensation of all such persons.

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SECTION 9. Meetings of the Board

9.01 The Board shall hold at least one regular meeting each year, and, by resolution, may provide for the holding of regular meetings at more frequent intervals. The date upon which, and the hour and place at which, each such regular meeting shall be held shall be fixed by resolution of the Board.

9.02 Special meetings of the Board may be called in accordance with the provisions of Section 54956 of the Government Code of the State of California, or as said sections may be amended or superseded.

9.03 All meetings of the Board shall be called, noticed, held and conducted subject to the provisions of Sections 54950-54962 of the Government Code of the State of California, or as said Sections may be amended or superseded.

9.04 The Secretary of the Authority shall cause minutes of all meetings of open sessions of the Board to be kept and shall, as soon as possible after each meeting, cause a copy of the minutes to be forwarded to each member of the Board and to the Secretary of the Board of Directors of each Member.

9.05 Three members of the Board of Directors of Chowchilla, three members of the Board of Directors of Red Top and one director from City shall constitute a quorum for the transaction of business, except that less than a quorum may adjourn from time to time. The Board shall take no other action except upon the affirmative vote of at least three members of the board of directors of Chowchilla and Red Top and one member from City.

1 SECTION 10. Fiscal Year

2 10.01 Unless and until changed by resolution of the Board, the fiscal
3 year of the Authority shall be the period from January 1 of each year to and in-
4 cluding the following December 31.

5 SECTION 11. Disposition of Assets

6 11.01 In the event of termination of the Authority, all assets of the
7 Authority shall be distributed to the respective member grantor or assignor
8 thereof, and any surplus money or other assets on hand shall be returned to the
9 members in proportion to their contributions to the Authority.

10 SECTION 12. Adoption of Groundwater Management Plan

11 12.01 The Authority adopts as its Groundwater Management Plan the
12 CWD-Red Top RCD Joint Powers Authority Groundwater Management Plan
13 adopted on December 3, 1997 by the CWD-Red Top RCD Joint Powers
14 Authority.

15 SECTION 13. Agreement Not Exclusive

16 13.01 This Agreement shall not be exclusive and shall not be deemed to
17 amend or alter the terms of other agreements [except the Agreement forming
18 the CWD-Red Top RCD Joint Powers Authority] by and between the Mem-
19 bers.

20 SECTION 14. Contributions and Advances

21 14.01 Contributions or advances of public funds, or funds from their re-
22 spective treasuries, and of personnel, equipment or property may be made to the
23 Authority by any Member for any of the purposes of the Agreement. Any such
24 advance may be made subject to repayment, and in such case shall be repaid in
25 the manner agreed upon by the Member making such advance and the Author-
26 ity at the time of making such advance.

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SECTION 15. Accounts and Reports

15.01 The Authority shall establish and maintain such funds and accounts as may be required by good accounting practice. The books and records of the Authority shall be open to inspection at all reasonable times by the members and their representatives.

15.02 The Auditor-Treasurer of the Authority, subject to the approval of the Board, shall contract with a certified public accountant or public accountant to make an annual audit of the accounts and records of the Authority, and in each case the minimum requirements of the audit shall be those prescribed by the State Controller for special districts under Section 26909 of the Government Code of the State of California, or as the same may be amended or superseded, and shall conform to generally accepted auditing standards; except that the Members may, by unanimous request of the Boards of Directors thereof, replace the annual special audit with an audit covering a two-year period. A report of each such audit shall be filed as a public record with each Member and with the County Auditor of Madera County, the county in which both Members are located, which such report shall be filed within twelve (12) months of the end of the fiscal year or years under examination. All costs of such audit shall be borne by the Authority and shall be a charge against any unencumbered funds of the Authority available for the purpose.

SECTION 16. Breach

16.01 If default shall be made by any Member of any covenant contained in the Agreement, such default shall not excuse the other Members from fulfilling its obligations under the Agreement, and such other Member shall continue to be liable for the payment of all contributions and the performance of all obligations herein contained.

1 16.02 The Members hereby declare that the Agreement is entered into
2 for the benefit of the Authority created hereby and the Members hereby grant
3 to the Authority the right to enforce by whatever lawful means the Authority
4 deems appropriate all of the obligations of each member hereunder. Each and
5 all of the remedies given to the Authority hereunder or by any law now or
6 hereafter enacted are cumulative and the exercise of any one right or remedy
7 shall not impair the right of the Authority to any or all other remedies.

8 SECTION 17. Severability

9 17.01 Should any part, term or provision of the Agreement be decided
10 by the courts to be illegal or in conflict with any law of the State of California,
11 or otherwise be rendered unenforceable or ineffectual, the validity of the re-
12 maining parts, terms or provisions hereof shall not be affected thereby.

13 SECTION 18. Successors: Assignment

14 18.01 The Agreement shall be binding upon and shall inure to the benefit
15 of the successors of each Member. No Member may assign any right or obliga-
16 tion hereunder without the consent of the other Members.

17 SECTION 19. Amendment of the Agreement

18 19.01 The Agreement may be amended by a supplemental or amended
19 agreement executed by all of the Members at any time.

20 SECTION 20. Office

21 20.01 The office of the Authority shall be maintained at 327 South
22 Chowchilla Blvd., Chowchilla, CA. 93610, until such time as the location
23 thereof is changed by the Board.

24 SECTION 21. Notices

25 22.01 Any notice authorized or required to be given pursuant to this
26 Agreement shall be in writing and shall be deemed to have been given when

1 mailed, postage prepaid, or delivered during working hours to the following
2 address, or to such changed addresses as are communicated to the Authority
3 and the member entities in writing:

4 Chowchilla:
5 P.O. Box 905, Chowchilla, CA. 93610
6 Red Top:
7 c/o John Wolfshorndl, 11791 Ave. 22, Chowchilla, CA. 93610
8 City:
9 145 West Robinson Blvd., Chowchilla CA. 93610

10 SECTION 22. Section Headings

11 22.01 All section headings contained herein are for convenience of refer-
12 ence only and are not intended to define or limit the scope of any provision of
13 the Agreement.

14 SECTION 23. Prior Agreement and Merger

15 23.01 This Agreement supercedes the agreement dated October 30, 1997
16 Chowchilla and Red Top which formed the CWD-Red Top RCD Joint Pow-
17 ers Authority.

18 23.02 The CWD-Red Top RCD Joint Powers Authority is hereby
19 merged with the CWD-Red Top-City Joint Powers Authority formed
20 hereunder.

21 IN WITNESS WHEREOF the parties hereto have caused the Agreement
22 to be executed and attested by their proper officers thereunto duly authorized,
23 and their official seals to be hereto affixed, as of the day and year first above
24 written.

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CHOWCHILLA WATER DISTRICT

By: Robert Capehart
Robert Capehart, President

ATTEST:
Douglas Welch
Douglas Welch, Secretary

[Seal]

CITY OF CHOWCHILLA
By: Ronald Harris
Ronald Harris, Mayor

ATTEST:
Lori Stayner
Lori Stayner, City Clerk

CHOWCHILLA-RED TOP
RESOURCE CONSERVATION
DISTRICT

By: Norman Kuhr
Norman Kuhr, Chairman

ATTEST:
John Wolfshorn
John Wolfshorn, Secretary

[Seal]

[Seal]

Attachment H

Groundwater Banking Plan

Not Applicable

Attachment I

Annual Potable Water Quality Report – Urban

Not Applicable

Attachment J

Notices of District Education Programs and
Services Available to Customers



IRRIGATION TECH SEMINAR SERIES

AGENDA: Basic Micro Irrigation for Permanent Crops • October 29, 2008

- | | | | |
|--|-------------------------------|------------------|---------------|
| • Work Shop Registration and Manufacturer Displays | | 8:00 - 8:30 am | |
| • Welcome | David Zoldoske, Director CIT | 8:30 - 8:35 am | |
| • Drip Basics | Jim King, Eurodrip USA | 8:35 - 9:15 am | Pages 2 - 7 |
| • Other Equipment and Issues | Dennis Hannaford, Netafim USA | 9:15 - 9:55 am | Pages 8 - 14 |
| • Bottom Line Issues | Bill Green, CIT | 9:55 - 10:30 am | Pages 15 - 19 |
| • Break | Manufacturer Displays | 10:30 - 11:00 am | |
| • Tour - University Farm Field Trip | Almond and Olive Drip Systems | 11:00 - 12:30 pm | |

Participating Irrigation Equipment Manufacturers: Eurodrip USA • Netafim USA • Jain Irrigation Systems Ltd.
John Deere Water Technologies • Bowsmith • Toro

Brought to you by:





IRRIGATION TECH SEMINAR SERIES

AGENDA: Irrigation Performance - Tips & Tools • December 11, 2008

Presented by **Bill Green**, CIT

- Work Shop Registration
- Welcome
- Effective vs. Efficient Irrigations
- Distribution Uniformity vs. Irrigation Efficiency (DU vs. IE)
- Factors in Obtaining High DU in All Systems
- Irrigation System Evaluations
- Irrigation Management for Conserving Water and Obtaining High IE
- Irrigation Performance and Fertilizer/Chemicals/Yield/Water Quality/Conservation
- CIT Pump and Sprinkler Demonstration

Brought to you by:



**Irrigation Tech
Seminar Series**

California State University, Fresno



CIT
Center for Irrigation
Technology



IRRIGATION TECH SEMINAR SERIES

AGENDA: WATERIGHT Web-Based Irrigation Scheduling • January 15, 2009

- Work Shop Registration
- Welcome
- Introduction
- Overview of WATERIGHT
- Break
- Example
- Break
- More Examples

Bill Green, CIT

Pete Canessa, CIT



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**Irrigation Tech
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California State University, Fresno





IRRIGATION TECH SEMINAR SERIES

**AGENDA: Irrigation with Center Pivots: In the Field
at the Fresno State Campus Farm • November 20, 2009**

• 8:30 am	Welcome	Bill Green - CIT	Page 2
• 8:45 am	Center Pivot Basics	Ray Batten- Valmont	Page 3 - 15
• 9:30 am	Nozzles	Craig Stafford - Nelson	
• 9:40 am	Flow Meters	Tony Pereira- SeaMetrics	
• 9:50 am	Filtration	Steve Johnson- Jain	
• 10:00 am	Break		
• 10:15 am	Pivot Nozzles and Uniformity	Ed Norum - CIT	Page 16
• 10:45 am	Field Trip	Fresno State Center Pivot	

Brought to you by:



Irrigation Tech Seminar Series
California State University, Fresno





IRRIGATION TECH SEMINAR SERIES

AGENDA: Irrigation Water: Monitoring Tools to Make the Most Out of Every Drop **December 15, 2009**

• 8:00 - 8:30 am	Registration and Breakfast	CATI Conference Center	
• 8:30 - 8:45 am	Welcome	Bill Green - CIT	Page 2
• 8:45 - 9:30 am	Soil/Water/Crop Dynamics	Matt Angell Strategic Farming - Western Ag & Turf	Pages 3 - 14
• 9:30 - 10:15 am	Tensiometers and Electrical Resistance	Lanny Sewell - Irrrometer	Pages 15 - 27
• 10:15 - 10:30 am	Break		
• 10:30 - 11:15 am	Soil Moisture and Beyond	Chris Higgins - Netafim USA	Pages 28 - 33
• 11:15 - 11:30 am	Reducing Water Applied	Bill Green - CIT	Pages 34 - 36

Brought to you by:



Irrigation Tech Seminar Series
 California State University, Fresno



01-18-10 10:41 IN



moving water in new directions

Professional Education Opportunities at ITRC

Visit our website at www.itrc.org to obtain the latest information.

Pump Training – March 2-4, 2010 Sponsor: USBR Mid-Pacific Region

PUMPS I, Mar. 2: Basic pumps course covering types; terms; curves; pumps in series and parallel; system curves; TDH computations; efficiency; WHP, BHP, input HP; pump selection; trimming impellers; common pump questions and answers.

PUMPS II, Mar. 3-4: Class covering advanced topics such as: NPSH, submersible pumps; well screens and well development, shaft losses, shaft sizing; maintenance and troubleshooting; adjustable seed drive (ASD) basics; variable frequency drive (VFD) basics; retrofitting VFDs on existing motors; affinity laws for variable speed operation; estimating savings from VFDs; hands-on ASD applications; power factor correction; inlet and sump design.

Irrigation District School of Irrigation Winter 2010 Sponsor: USBR Mid-Pacific Region

ITRC is providing several training and educational opportunities for staff, engineers, and board members of agricultural irrigation districts, as well as water operators. These classes utilize the excellent indoor and outdoor facilities at Cal Poly.

<u>Water Operator Classes</u>	<u>1st session</u>	<u>2nd session</u>
FLOW MEASUREMENT – General & Pipeline	Jan. 12, 2010	Feb. 23, 2010
FLOW MEASUREMENT – Canals	Jan. 13, 2010	Feb. 24, 2010
CANAL OPERATION	Jan. 14, 2010	Feb. 25, 2010

Ag Irrigation System Evaluation Short Course - June 2010 Sponsor: DWR

ISE I: Theory and Laboratory Practice of Evaluations. This 2½-day course will be held **June 14-16, 2010**. The class combines classroom (50%) and outdoor laboratory (50%) activities. Efficiency definitions and techniques of evaluation are emphasized, ranging from how to take a pressure measurement to what specific measurements are needed for the evaluation of six distinct irrigation methods (furrow, border strip, hand move/side roll sprinkler, linear move sprinkler, undertree sprinkler, and drip/micro). The course is not mathematically oriented, since the calculations are manipulated by the new and revised Cal Poly/DWR expert system Irrigation Evaluation programs.

ISE II: San Joaquin Valley Field Evaluations of Drip/Micro Systems. This 2½-day class, held on **June 16-18, 2010**, travels to the San Joaquin Valley and performs the entire evaluations on 2 fields. Emphasis is on performing the field evaluations for drip and microspray irrigation systems on trees/vines. This class allows for more extensive field training to help with the comprehension of the materials from Class 1.

Drip Irrigation Workshop – February 11, 2010 Sponsor: Southern California Edison, AgTAC

This ½ day class is done to coincide with the World Ag Expo in Tulare. The class is designed for growers interested in drip irrigation. Topics covered include product selection, filter requirements, remote data collection, and energy requirements.

Irrigation District – Custom Classes

In addition to the classes offered throughout the year, the ITRC can provide training specifically tailored to the needs of individual districts or companies. For example, in the past, we have offered modified classes in flow measurement, canal operation, SCADA, and drip irrigation.

For more information, please contact:
Dr. Stuart Styles, sstyles@calpoly.edu

SCADA February 9-12, 2010 Sponsor: USBR Mid-Pacific Region

NEW MATERIAL

Training for individuals involved in planning, designing, installing, operating and maintaining SCADA systems. The four-day long class will introduce participants to more advanced SCADA topics and give them the opportunity to test their skills in the electronics lab at Cal Poly's BioResource and Agricultural Engineering Dept. Recent applications with **ClearSCADA** HMI will be highlighted. The class will also offer specialized topics on automation performance.

The lab has 10 complete SCADA work stations, allowing for unprecedented "hands-on" electronic training. The knowledge gained from the class will help make the participants better able to understand, plan, design, install, manage, and maintain the telemetry systems that have become so important to improving the efficient use of water and power in agriculture.

Designer/Manager School of Irrigation - August 2010 Sponsor: USBR Mid-Pacific Region

The Designer/Manger School is a comprehensive educational program offering a variety of classes designed for both agricultural and landscape irrigation professionals.

August 2010

Monday	Tuesday	Wednesday	Thursday	Friday
2	3	4 Basic Soil, Plant & Water Relationships	5 Irrigation Scheduling, Salinity & Drainage	6 Irrigation Scheduling, Salinity, & Drainage Certification Exam
9 Basic Pipeline Hydraulics I	10 Basic Pipeline Hydraulics II	11 Pumps I	12 Pumps II Chemigation	13 Pumps II Row Crop Drip Irrigation
16 Drip/Micro Irrigation Design	17 Drip/Micro Irrigation Design	18 Drip/Micro Irrigation Design	19	20

FRIANT WATER USERS AUTHORITY

MEMORANDUM

DATE: December 13, 2002
TO: Member Districts
FROM: John Roldan, Chief Engineer *JR*
SUBJECT: Summary of Services Provided for District Water Management Plans in 2002

ROUTE TO:	
<i>RV</i> MGR.	_____
ASST.	_____
SUPT.	_____
TAX COLL.	_____
BOOKER	_____
SECY.	_____
INITIAL & FORWARD	
DEC 16 2002	

In an effort to assist you with your USBR Water Management Plans and the Annual Updates, the following list is a summary of services available from the Authority and/or provided during the last year.

1. *Irrigation Tech-Line* – This educational water management newsletter is published approximately four (4) times per year. Articles typically feature grower success stories and a corresponding technical article (soil/water/plant) with each issue. The newsletter is distributed to those receiving the Friant *Waterline*.
2. Evapo-transpiration (ET) information – Normal year and real-time ET data for 12 local CIMIS stations are provided to the member districts on a weekly basis with the Water Data Report during the growing season. Crop coefficients, as developed by Kings River Conservation District, are also provided in the same report. Typically, the USBR requires that your water users be notified of the availability of this data at your office.
3. Surface Water Quality – Surface water quality for water conveyed through the FKC from Friant Dam is typically analyzed on an annual basis. To the extent that certain constituents are analyzed for the water supply report, this data is available to the districts and water users upon request. Water samples from two (2) locations on the Madera Canal and six (6) locations on the Friant-Kern Canal are analyzed.
4. Financial Assistance and On-Farm Water Management Lists – The Authority has compiled and maintains lists of:
 - A. Organizations providing loans, grants, and cost sharing.
 - B. Organizations performing irrigation pump efficiency testing.
 - C. On-farm irrigation management consultants.
 - D. Irrigation management software.
 - E. Sources of real-time CIMIS ET data.

Water users are notified annually regarding the availability of these lists by publishing a notice in the *Irrigation Tech-Line*.

5. Radio Public Service Water Conservation Program – The Authority participates in the annual United Broadcasting’s “Conserve America” community public service campaign on behalf of the member districts. The announcements are aired twice per day for seven days on KTIP – 1450 AM. This announcement was run during the week of Earth Day in 2002.
6. Educational Seminars - Local water related educational seminars are announced in the Friant Waterline. The Authority also participates, on the behalf of member districts, in educational sessions where possible.

Please do not hesitate to call if you have any questions.

cc: Dan Fults, General Manager
Mario Santoyo, Water, Environmental and Facilities Resources Manager
Ronald D. Jacobsma, Business Operations Manager

LOANS/GRANTS/COST SHARING

Farm Service Agency	Madera Co.	(559) 674-4628
	Fresno Co.	(559) 276-7494
	Tulare Co.	(559) 734-5814
	Kern Co.	(661) 861-4125

Natural Resources Conservation Service	Madera Co.	(559) 674-2108
	Fresno Co.	(559) 276-7494
	Tulare Co.	(559) 732-9163
	Kern Co.	(661) 861-4125

Fresno-Madera Farm Credit Services (Federal Land Bank Assn./ Production Credit Assn.)	Madera	(559) 674-2437
	Fresno	(559) 277-3276
	Selma	(559) 896-5040

Valley Farm Credit Services (Federal Land Bank Assn./ Production Credit Assn.)	Visalia	(559) 627-5050
	Hanford	(559) 584-2681
	Tipton	(559) 688-7844
	Wasco	(661) 758-5371
	Bakersfield	(661) 327-2741

Local Branches of Banks and Financial Institutions

Agricultural Energy Assistance Program (Energy Conservation)	Sacramento	(916) 654-4147
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Pacific Gas & Electric Company (Energy Conservation)	Fresno	(559) 263-5575
---	--------	----------------

Southern California Edison (Energy Conservation)	Tulare	(800) 634-9175
---	--------	----------------

IRRIGATION PUMP EFFICIENCY TESTING

Pacific Gas & Electric Company
(if funding is available)

Selma (559) 891-2147
Bakersfield (661) 321-4448

Southern California Edison

Tulare (800) 634-9175

Provost and Pritchard Engineering

Fresno (559) 449-2700

Local Pump and Irrigation Companies

LIST OF IRRIGATION MANAGEMENT CONSULTANTS

Dale Handley
16359 Ave 320
Visalia, CA 93292
(559) 798-2184

Pete Canessa, P.E.
P.O. Box 1721
Clovis, CA 93613
(559) 278-8449

Ag-Water Management
Andy Hensel
3635 E. Platt
Fresno, CA 93702
(559) 268-9158

ASI Consulting
Dean Striebich
1220 W. Fairmont
Fresno, CA 93705
(559) 221-7945

J.M. Lord, Inc.
267 N. Fulton St.
Fresno, CA 93701-1610
(559) 268-9755

Gabrielsen & Associates
Byron C. Gabrielsen
5921 W. Crowley Court
Visalia, CA 93291
(559) 739-7442

Pond-Shafter-Wasco Resources Conservation District
Brian Hockett
1601 New Stine Road, #270
Bakersfield, CA 93309
(661) 861-4129

Pacific Agronomics, Inc.
Gary Jorgensen
3435 West Shaw, #104
Fresno, CA 93711
(559) 276-0401

Dellavalle Laboratory, Inc.
1910 W. McKinley Ave., Suite #110
Fresno, CA 93728
(559) 233-6129
soillab@aol.com

Bryner Consulting
John Bryner
260 Asilomar Blvd.
Pacific Grove, CA 93950
(559) 438-7911
(559) 289-9930 Mobile

California AgQuest Consulting, Inc.
Ron Brase
4325 North Golden State Blvd., Ste. 105
Fresno, CA 93722
(559) 275-8095
ronebrase@agquest.com

Aguabono
Jacinto Gonzales, Sr.
P.O. Box 2408
Porterville, CA 93258
(559) 784-7060

Anderson Associates International
Doug Anderson
2130 Brandage Lane
Bakersfield, CA 93304
(661) 633-5400

Mobile Lab Unit - Irrigation Systems Evaluation only

LIST OF IRRIGATION MANAGEMENT SOFTWARE

Orange Enterprises, Inc.
Shlomo Pleban, PhD
2377 West Shaw, Suite 205
Fresno, CA 93711
(559) 229-2195

Computer programs for irrigation scheduling, CIMIS access, and record keeping.

Pete Canessa, P.E.
P.O. Box 1721
Clovis, CA 93613
(559) 278-8449

Custom Programmer to design programs to customers needs. Programs available for irrigation scheduling, irrigation system design, irrigation systems evaluation, and electrical energy cost evaluation.

Jerry Robb
2434 S. Pruess
Fresno, CA 93727
(559) 441-8468

Custom Programmer to design programs to customers needs. Programs available for irrigation management. Also specializing in customizing PDA's (personal digital assistants).

Center for Irrigation Technology, California State University, Fresno
Web page: <http://www.wateright.org> - Allows user to develop site-specific guidelines for scheduling irrigations. The program references CIMIS weather stations to provide irrigation schedule guidelines for local sites. The irrigation schedule produces estimates of plant/water requirements.

SOURCES OF REAL-TIME CIMIS ET DATA

Newspapers

Bakersfield Californian
Fresno Bee

Radio

KMJ 580AM - Fresno
J.M. Lord ETP report - 5:30 a.m.
KMPH 107.5FM - Fresno - 5:30 a.m.

Television

KMPH Channel 26 - Fresno - 5:30 a.m.

Telephone

KRCD Ag-Line - (559) 237-4800

Computer

CIMIS - Department of Water Resources
Call (800) 922-4647 to establish user ID and password.
On the web: <http://www.dla.water.ca.gov/cgi-bin/cimis/cimis/hq/main.pl>
Ceres Group
On-the-web: <http://www.ceresgroup.com/col/weather/index.html>

Other

ET and Crop Coefficients are provided weekly to districts by FWUA
U.C. Cooperative Extension Farm Advisor's Office

Madera County	(559) 675-7879
Fresno County	(559) 456-7285
Tulare County	(559) 733-6363
Kern County	(661) 868-6218

Waterline

IRRIGATION TECH-LINE

Water Saving Ideas From The Friant Water Users Authority

Both Drip And Furrow Irrigation Can Make Sense

When Paul Parvanian began farming 80 acres in Sanger in 1948, he never imagined that 50 years later the family would be irrigating 40 of the acres with a drip system.

On the other hand, the Parvanian ranch in Fresno County demonstrates clearly that drip irrigation and furrow irrigation can make sense to a grower, depending upon conditions.

DRIP SYSTEM

The 40 acres on the north side are planted on coarse sand," Paul says.

"To irrigate it properly, we have to run a big head to get the water out in a few hours. Irrigating it is a fulltime job. I would start the water in the spring and not shut off until harvest.

When his son Roger began taking over, the family considered all factors and decided that a drip system was the best way to irrigate the vineyards.

"We received many benefits from the drip system," says Roger. "We are now able to control the amount of water applied which saved water, fertilizer and relieved stress. Under the furrows, there were some vines that basically never produced a crop. That changed the very first year on drip."

Labor and equipment savings were significant.

"With furrows, it was costing us \$300 per month in labor to irrigate," says Roger. "The extra pumping costs for drip are much

less than that. We also saved several trips through the field with discing and furrowing equipment. With furrow irrigation, we had to work the field twice per month just to keep it in shape." Two battles faced by the Parvanians with drip irrigation are the amount of nutgrass that sprouted under vines as well as higher mildew levels.

"While our vines loved the drip system, it also made a great environment for weeds and mildew," Roger said.

FURROW IRRIGATION

The ranch's southerly 40 acres are a different story. These vines are on a heavier soil. Row lengths are uniform. It irrigates in a 12-hour set.

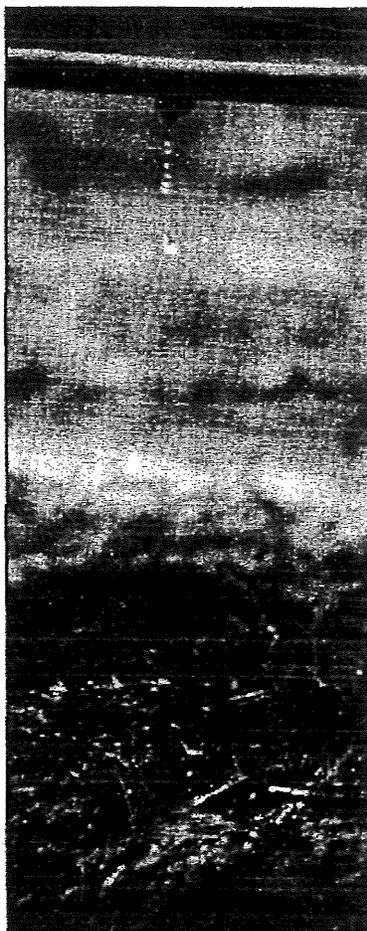
"The furrow irrigation system works well on that field," Paul said. "The labor requirements are reasonable and yield has been good."

In comparing the two fields, an argument can be made for the "best" irrigation system.

On ground such as sand, a drip system overcomes many of the problems associated with furrow irrigation.

On relatively level fields that have uniform soil and the right row length for the soil type, furrow irrigation can be quite efficient.

The bottom line is that drip systems will usually have the most benefits when irrigation conditions are challenging. □



A drip emitter at work.

High Irrigation Performance Recorded

A three-year study by the Kings River Conservation District not only found generally good average irrigation uniformity and efficiency on four Fresno County farms, it demonstrated that making improvements results in even better performance.

TERMS THAT MEASURE PERFORMANCE

Two terms used to measure the performance of an irrigation system are *distribution uniformity* (DU) and *irrigation efficiency* (IE).

DU is a measure of how evenly water is spread on a field.

IE is an estimate of how much of that water was used beneficially for crop production.

Irrigation scheduling or the timing of irrigations has a big influence on the IE estimate.

In a typical irrigated field, IE is usually lower than DU. If irrigations are perfectly timed and there is no uncollected tailwater, IE and DU are the same. When under irrigation occurs, IE can be higher than DU.

Each field was under irrigated at some point during the season, usually just before or after harvest.

ALMONDS

Using border (or flood) irrigation, this 30-acre field had severe water penetration problems. No tailwater was allowed and water would sit at the end of the field for three days after the irrigation. While the average DU was 74%, individual irrigations ranged from 57%-95%. The highest DU was achieved when water advance down the check was slowed by a cover crop, a reduced flow rate and gypsum injection. Poor water penetration led to severe under irrigation in July and August, resulting in IE that was higher than the DU.

STONE FRUIT

Irrigated by a low volume system with two jets per tree, this 35-acre field had excellent DU and IE. The soil is mostly sandy loam with a few acres of sandier soil that holds less water. Initially irrigated weekly, the set was changed to twice per week to avoid deep percolation on the sandier area.

The farms were all equipped with flow meters and soil moisture measuring systems.

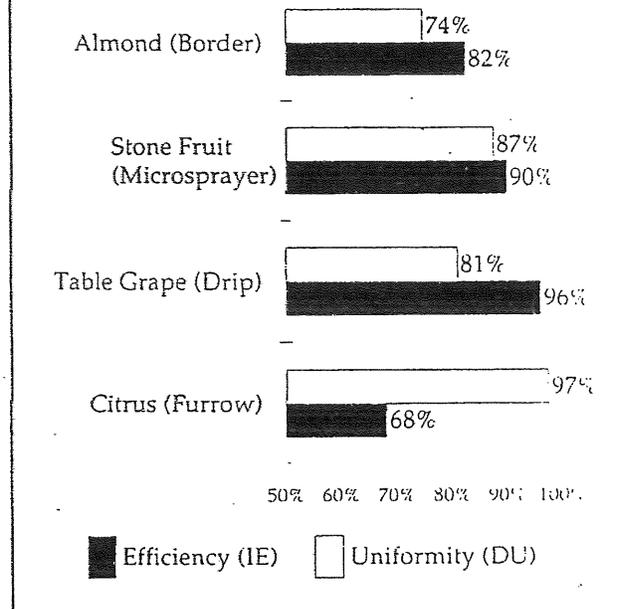
Rainfall was also monitored. Growers irrigated normally although as they learned of improvements that could be made, these were incorporated into their operations.

Some characteristics were shared by all of the farms.

Poor water penetration was a handicap on each field. Very little or no deep percolation of irrigation water occurred.

Winter rainfall completely recharged all soil moisture deficits and provided leaching of salts.

AVERAGE UNIFORMITY AND EFFICIENCY



Kings River Conservation District / 1998

TABLE GRAPES

Drip irrigated by two 0.5 gpm emitters per vine, this 28-acre vineyard initially had a DU of 77%. Replacement of the original emitters with others of a higher flow rate and also a variable row spacing of 11 and 12 feet were the main factors. Standardizing the emitter flow rate led to an improved DU of 84%. The IE was a high 96% due to severe cutbacks in irrigations just before and during the eight-week harvest in September and October. While usually not recommended, the severe under irrigation seems to have worked to aid color and sugar levels in the grapes. Sizing has not been a problem. Yields have averaged 15 tons per acre over a three-year span.

CITRUS

Irrigated by furrows on a field of steeply sloping Porterville clay, this 36-acre navel orange grove had an average DU of 97%. Water penetration is so limited on this clay soil that irrigation sets of 36 hours were needed every 10-14 days. Even with this strategy, the trees are deficit irrigated in the summer and fruit sizing is difficult. IE is low because about 28% of the applied water ends up as uncollected tailwater. Using alternate furrow irrigation in the spring and fall was effective in reducing the amount of tailwater and may have discouraged *phytophthora* root rot problems.

The Friant Water Users Authority contributed to these articles which are otherwise condensed from the Kings River Conservation District's Irrigation News.

Attachment K

District Agricultural Water Order Form

Chowchilla Water District
Daily Order Report

Tuesday, April 20, 2010

Car 15

Canal/Gate	Water User	CFS	Requested Time	Assigned Time	Hours	Comment
ASH MAIN CANAL						
8	Fagundes Dairy	1.16				
13	Martens, Herbert Henry	1.20				
14-A	Bruce Chapman Farms	2.88				
ASHVIEW CANAL						
2	Bruce Chapman Farms	2.29				
18	Costa View Farms #2	1.40	08:00			
20	Costa View Farms #2	0.68				
21	Costa View Farms #2	1.28	08:00		0800	
25-A	Bruce Chapman Farms	3.40	18:00			
32	K & T Ranches	2.24				
39	Haynes Precision Spreading, Inc.	1.62				
ASHVIEW LATERAL-B						
25	Roduner, W.P. Cattle & Farming Co.	5.00				
IUGHES CANAL						
16	L & L Ranch	1.62	07:00		0700	
29	Carter, James E.	1.83	07:00		0700	
31	Carter, James E.	2.12	07:00		0700	
IUGHES LATERAL-C						
3	L & L Ranch	2.42	07:00		0700	

Attachment L

Drainage Problem Area Report

Not Applicable

Stamped

Chowchilla Water District

Post Office Box 905 ♦ 327 S. Chowchilla Blvd. ♦ Chowchilla, CA 93610
Phone (559) 665-3747 ♦ Fax (559) 665-3740 ♦ Email dwelch@cwdwater.com

Board of Directors

Dan Maddalena ♦ Michael Mandala ♦ Vince Taylor ♦ Kole M. Upton ♦ Mark Wolfshorndl

June 8, 2011

Bureau of Reclamation
Ms. Melissa Crandell
2800 Cottage Way, MP-410
Sacramento, CA 95825

Subject: Water Management Plan 5-Year Update

Dear Ms. Crandell:

Enclosed is an electronic copy of Chowchilla Water District's Water Management Plan Five Year Update. Also enclosed is a resolution by the CWD Board of Directors adopting the Plan.

Sincerely,

Douglas Welch
General Manager

BUREAU OF RECLAMATION OFFICIAL FILE COPY RECEIVED		
JUN 17, 2011		
CODE	ACTION	SURNAME & DATE
410	✓	

NOTICE: IF YOU DETACH
ENCLOSURE PLEASE INSERT

CODE NO. _____
INITIAL _____
DATE _____

Classification	PRJ 23100
Project	214
Control No.	110 50161
Order I.D.	1148007
Input & Initials	6-17-2011

CHOWCHILLA WATER DISTRICT

RESOLUTION NO. 2011-04

**A RESOLUTION APPROVING ADOPTION OF A
WATER MANAGEMENT PLAN UPDATE**

WHEREAS, Section No. 3405(e) of the Central Valley Project Improvement Act of 1992 (Title XXXIV, public Law 102-575, 106 Stat. 4713) requires the Secretary of the Interior to establish an office to develop criteria for evaluating water management plans developed by CVP contractors, and to evaluate the adequacy of plans submitted by project contractors; and

WHEREAS, Section 210 of the Reclamation Reform Act of 1982 (Public Law 97-293; 43 U.S. § 390jj) requires districts with repayment or water supply contracts to develop and maintain water management plans containing definite goals, appropriate water conservation measures, and time schedules for meeting conservation objectives; and

WHEREAS, this updated plan pursuant to California Water Code Section 10820, also satisfies the requirements of Water Code Section 10800 et seq. for the preparation of an Agricultural Water Management Plan.

NOW, THEREFORE, BE IT RESOLVED that the draft Water Management Plan Five Year Update for the Chowchilla Water District is adopted and the General Manager is directed to submit the Plan to the United States Bureau of Reclamation.

PASSED, ADOPTED AND APPROVED at a regular Board meeting of the Board of Directors of the Chowchilla Water District held on June 8, 2011, by the following vote :

AYES: Directors: Maddalena, Mandala, Upton, Taylor and Wolfshorndl

NOES: none

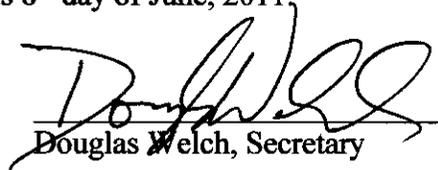
ABSTAINING: none

ABSENT: none

I HEREBY CERTIFY that the foregoing resolution is the resolution of the Chowchilla Water District as duly passed and adopted by said board of directors at a meeting thereof, duly and regularly held on June 8, 2011 at which meeting a quorum of the board of directors was at all times present and acting.

IN WITNESS WHEREOF, I have set my hand this 8th day of June, 2011,




Douglas Welch, Secretary