

Appendix G: Supplemental Water Supply Information

- West Basin Adjudication Order
- Water Replenishment District of Southern California 2015 Engineering Survey and Report
- DWR Groundwater Bulletin 118

West Basin Adjudication Order

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John J. Corcoran, County Clerk
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SUPERIOR COURT OF THE STATE OF CALIFORNIA
FOR THE COUNTY OF LOS ANGELES

CALIFORNIA WATER SERVICE) NO. 506,806
COMPANY, et al.,)
) AMENDED JUDGMENT
Plaintiffs)
) (DECLARING AND ESTABLISHING
vs.) WATER RIGHTS IN THE WEST COAST
) BASIN, IMPOSING A PHYSICAL
CITY OF COMPTON, et al.,) SOLUTION THEREIN AND ENJOINING
) EXTRACTIONS THEREFROM IN EXCESS
Defendants.) OF SPECIFIED QUANTITIES.)
)

1
2 AMENDED JUDGMENT

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1 INTRODUCTION

2 The above - entitled matter came on regularly for further
3 trial before the Honorable George Francis, Judge of the Superior
4 Court of the State of California, assigned by the Chairman of
5 the Judicial Council to sit in this case, on Friday the 21st day
6 of July, 1961. Thereupon plaintiffs filed a dismissal of the
7 action as to certain defendants named in the Complaint and in
8 the Amended Complaint herein who are not mentioned or referred
9 to in Paragraph III of this Judgment, and the further trial of
10 the action proceeded in respect to the remaining parties.

11 The objections to the Report of Referee and to all sup-
12 plemental Reports thereto, having been considered upon ex-
13 ceptions thereto filed with the Clerk of the Court in the manner
14 of and within the time allowed by law, were overruled.

15 Oral and documentary evidence was introduced, and the
16 matter was submitted to the Court for decision. Findings of
17 Fact, Conclusions of Law and Judgment herein have heretofore been
18 signed and filed.

19 Pursuant to the reserved and continuing jurisdiction
20 of the Court under the Judgment herein, certain amendments to
21 said Judgment and temporary Orders have heretofore been made
22 and entered.

23 Continuing jurisdiction of the Court under said Judgment
24 is currently assigned to the HONORABLE JULIUS M. TITLE.

25 The motion of defendant herein, DOMINGUEZ WATER CORPOR-
26 ATION, for further amendments to the Judgment, notice thereof
27 and of the hearing thereon having been duly and regularly given
28 to all parties, came on for hearing in Department 48 of the

1 above-entitled Court on March 21, 19~~80~~, at 1:30
2 o'clock P.M., before said HONORABLE JULIUS M. TITLE. Defendant,
3 DOMINGUEZ WATER CORPORATION, was represented by its attorneys,
4 Helm, Budinger & Lemieux, and Ralph B. Helm. Various other
5 parties were represented by counsel of record appearing on the
6 Clerk's records. Hearing thereon was concluded on that date.
7 The within "Amended Judgment" incorporates amendments and orders
8 heretofore made to the extent presently operable and amendments
9 pursuant to said last mentioned motion. To the extent this
10 Amended Judgment is a restatement of the Judgment as heretofore
11 amended, it is for convenience in incorporating all matters
12 in one document, it is not a readjudication of such matters and
13 is not intended to reopen any such matters. As used hereinafter
14 the word "Judgment" shall include the original Judgment as
15 amended to date.

16 NOW, THEREFORE, IT IS HEREBY ORDERED, ADJUDGED AND
17 DECREED AS FOLLOWS:

18 I.

19 Existence of Basin and Boundaries Thereof.

20 There exists in the County of Los Angeles, State of Cali-
21 fornia, an underground water basin or reservoir known and herein-
22 after referred to as "West Coast Basin", "West Basin" or the
23 "Basin", and the boundaries thereof are described as follows:

24 Commencing at a point in the Baldwin Hills
25 about 1300 feet north and about 100 feet west of
26 the intersection of Marvale Drive and Northridge
27 Drive; thence through a point about 200 feet
28 northeasterly along Northridge Drive from the

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intersection of Marvale and Northridge Drives to the base of the escarpment of the Potrero fault; thence along the base of the escarpment of the Potrero fault in a straight line passing through a point about 200 feet south of the intersection of Century and Crenshaw Boulevards and extending about 2650 feet beyond this point to the southerly end of the Potrero escarpment; thence from the southerly end of the Potrero escarpment in a line passing about 700 feet south of the intersection of Western Avenue and Imperial Boulevard and about 400 feet north of the intersection of El Segundo Boulevard and Vermont Avenue and about 1700 feet south of the intersection of El Segundo Boulevard and Figueroa Street to the northerly end of the escarpment of the Avalon-Compton fault at a point on said fault about 700 feet west of the intersection of Avalon Boulevard and Rosecrans Avenue; thence along the escarpment of the Avalon-Compton fault to a point in the Dominguez Hills located about 1300 feet north and about 850 feet west of the intersection of Central Avenue and Victoria Street; thence along the crest of the Dominguez Hills in a straight line to a point on Alameda Street about 2900 feet north of Del Amo Boulevard as measured along Alameda Street; thence in a straight line extending through a point located on Del Amo Boulevard about 900 feet west of the

1 Pacific Electric Railway to a point about 100
2 feet north and west of the intersection of Bixby
3 Road and Del Mar Avenue; thence in a straight
4 line to a point located about 750 feet west and
5 about 730 feet south of the intersection of Wardlow
6 Road and Long Beach Boulevard at the escarpment
7 of the Cherry Hill fault; thence along the escarp-
8 ment of the Cherry Hill fault through the inter-
9 section of Orange Avenue and Willow Street to a
10 point about 400 feet east of the intersection of
11 Walnut and Creston Avenues; thence to a point on
12 Pacific Coast Highway about 300 feet west of its
13 intersection with Obispo Avenue; thence along
14 Pacific Coast Highway easterly to a point located
15 about 650 feet west of the intersection of the
16 center line of said Pacific Coast Highway with
17 the intersection of the center line of Lakewood
18 Boulevard; thence along the escarpment of the
19 Reservoir Hill fault to a point about 650 feet
20 north and about 700 feet east of the intersection
21 of Anaheim Street and Ximeno Avenue; thence along
22 the trace of said Reservoir Hill fault to a point
23 on the Los Angeles - Orange County line about
24 1700 feet northeast of the Long Beach City limit
25 measured along the County line; thence along said
26 Los Angeles - Orange County line in a southwesterly
27 direction to the shore line of the Pacific Ocean;
28 thence in a northerly and westerly direction along

1 the shore line of the Pacific Ocean to the in-
2 tersection of said shore line with the southerly
3 end of the drainage divide of the Palos Verdes
4 Hills; thence along the drainage divide of the
5 Palos Verdes Hills to the intersection of the
6 northerly end of said drainage divide with the
7 shore line of the Pacific Ocean; thence northerly
8 along the shore line of the Pacific Ocean to the
9 intersection of said shore line with the westerly
10 projection of the crest of the Ballona escarpment;
11 thence easterly along the crest of the Ballona
12 escarpment to the mouth of Centinela Creek; thence
13 easterly from the mouth of Centinela Creek across
14 the Baldwin Hills in a line encompassing the en-
15 tire watershed of Centinela Creek to the point of
16 beginning.

17 All streets, railways and boundaries of Cities and
18 Counties hereinabove referred to are as the same existed at
19 12:00 o'clock noon on August 20, 1961.

20 The area included within the foregoing boundaries is
21 approximately 101,000 acres in extent.

22 II.

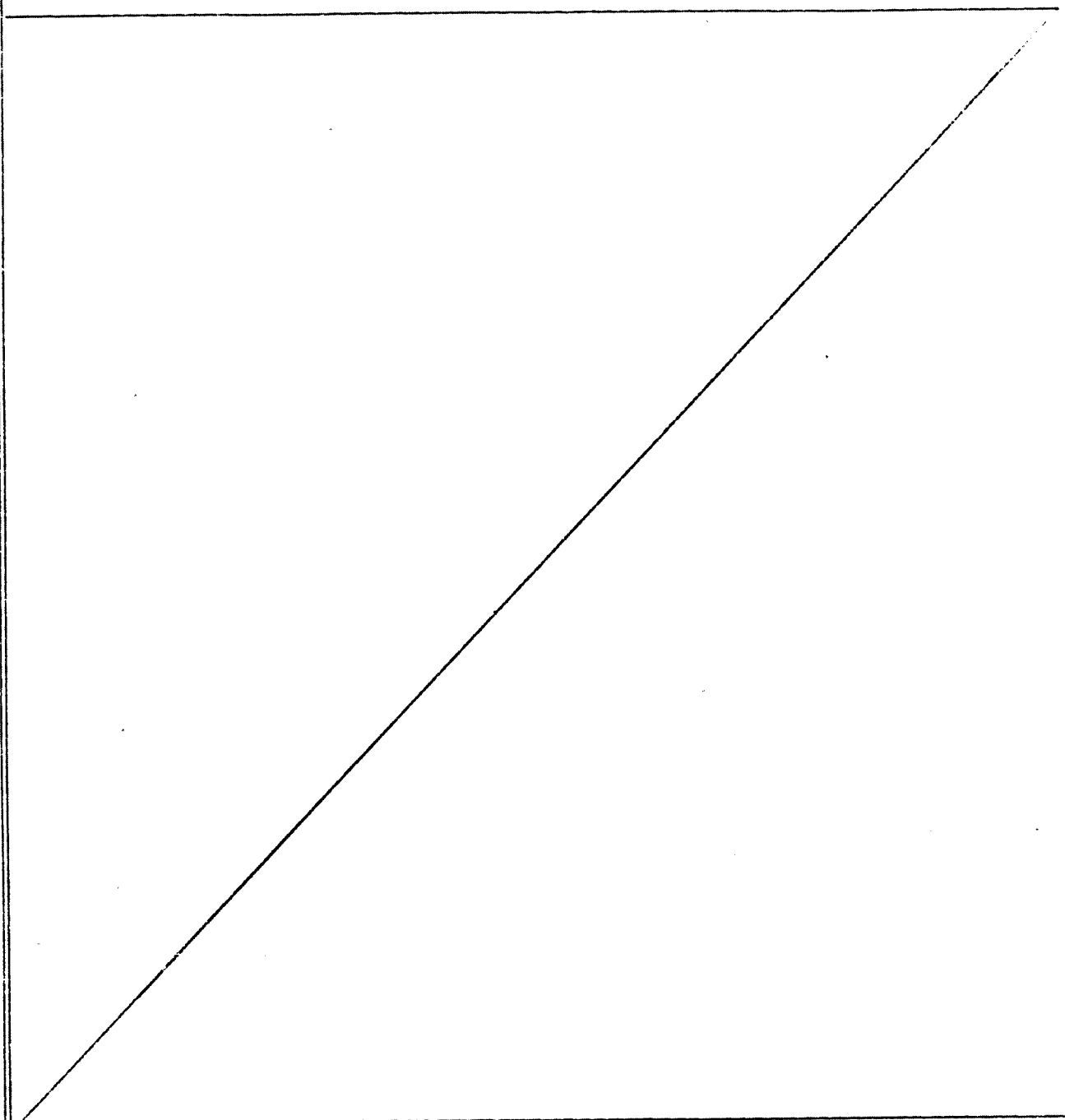
23 Definitions:

24 1. Basin, West Coast Basin and West Basin, as these terms
25 are interchangeably used herein, mean the ground water basin
26 underlying the area described in Paragraph I hereof.

27 2. A fiscal year, as that term is used herein, is a
28 twelve month period beginning July 1 and ending June 30.

1 shall be subject to the condition that the water, when used, shall
2 be put to beneficial use through reasonable methods of use and
3 reasonable methods of diversion; and provided further that the
4 exercise of all of said Rights shall be subject to a pro rata
5 reduction, if such reduction is required, to preserve said Basin
6 as a common source of water supply.

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1	PARTY AND SUCCESSOR, IF ANY	ADJUDICATED RIGHT IN ACRE FEET, ANNUALLY
2		
3	ABC NURSERY, INCORPORATED	24.1
4	Successor to Harry C. Jenkins	1.8
5	Successor to Sidney R. Title and Charlotte W. Title	13.6
6	Successor to William Verburg and Clara B. Verburg	6.7
7	Successor in Part to United California Bank	2.0
8		
9	ABEGG, JOE	0
10	ABELL, FRANK	1.8
11	Sold to City of Inglewood	<u>-1.8</u>
12	ABERCROMBY, ALEXANDER	0
13	Henry Abercromby	
14	one Fred Roland Cooper	
15	one Ted R. Cooper	
16	one Roy F. Knapp	
17	ALCAST FOUNDRY, ET AL.	0
18	Successor to Charles L. Draper	
19	et al.	7.2
20	Sold to City of Torrance	<u>-7.2</u>
21		
22	AIRWAYS WATER COMPANY (Incorporated)	0
23	ALLEN, H.A.	0
24	ALLIED CHEMICAL CORPORATION, a corpora-	0
25	tion, formerly General Chemical	
26	Company	
27	(See Industrial Chemical Division)	
28		
29	ALUMINUM COMPANY OF AMERICA	0
30	(See U.S. Navy Department)	
31	AMERICAN RADIATOR & STANDARD SANITARY	0
32	CORPORATION, a corporation	
33	ALWAG, HILARIO S. AND EMMA ALWAG	0
34	Successor to T.C. Navarro	53.9
35	Successor to Peggy Swick	5.5
36	Sold to Torrance Unified	<u>-59.4</u>
37	School District	

	<u>PARTY</u> <u>AND SUCCESSOR, IF ANY</u>	<u>ADJUDICATED RIGHT IN</u> <u>ACRE FEET, ANNUALLY</u>
3	AMERICAN PLANT GROWERS, INCORPORATED	10.0
4	Carl H. Tasche	
4	Second West Coast Basin Judgment	2.6
5	Successor to Ben Cluff Dairy	<u>7.4</u>
6	ANDERSON, REMBERT C.	80.5
7	Allen W. Ashburn	
7	Ann F. Ashburn	
8	Martha D. Bingham	
8	Laura Bonanno	
9	Louise Casey also known as	
9	Louise Casey Gibson	
10	Ruby Decius sued as Jane Doe 19	
10	Ruby F. Joel	
11	Catherine Lass sued as Jane Doe 18	
11	Catherine B. Maddox	
12	Louisa Watson sued as Jane Doe 17	
12	Hazel Parsons	
13	J.W. Parsons	
13	Myrtle Mae Parsons	
14	Alexander Poggi	
14	One Freda E. Poggi	
15	Mary Richley sued as Jane Doe 16	
15	Devises of Gurney E. Newlin, deceased, to wit:	
16	Helen Newlin Hastings	
17	Robert Pusey Hastings	
17	Thomas Newlin Hastings	
18	Helen Hastings Schribner	
18	Edith Hastings Murphy	
19	George R. Bell, Jr.	
19	Thomas Elwood Bell	
20	Sold to Sparkletts Drinking Water Corp.	<u>-80.5</u>
22	ASAHI FANCY KOI, INCORPORATED	2.0
23	Successor in part to Jake Engelsma	
24	ASHBROOK, KATHLEEN formerly	0
25	Kathleen M. Davies	
25	One J & E Investment Co.	
26	ASSOCIATED SOUTHERN INVESTMENT COMPANY	0
27	(formerly Edison Securities Company) 46.7	
27	Sold to Southern California Edison Company	<u>-46.7</u>

1	<u>PARTY</u> <u>AND SUCCESSOR, IF ANY</u>	<u>ADJUDICATED RIGHT IN</u> <u>ACRE FEET, ANNUALLY</u>
2		
3	ATCHISON, TOPEKA & SANTA FE RAILWAY COMPANY, (The), a corporation	0
4		
5	ATLANTIC RICHFIELD COMPANY (formerly Richfield Oil Company)	4428.0
6		
7	AUTOMATION INDUSTRIES, INC.-HARRIS TUBE Successor to Harris Tube,	0.7
8	Incorporated <u>0.7</u>	
9	AZEVEDO ESTATE COMPANY, a corporation	0
10	AZVEDO, JOHN	0
11	BAILEY, WM. D.	0
12	Harry C. Cain	
13	Jesse E. Cain	
14	Dorothy Luther sued as Dorothy F.	
15	Luther	
16	Harold M. Luther	
17	BALDWIN, E.W.	0
18	BALLMAN, FRANK A. AND ROSEMARY N. 7.0	0
19	BALLMAN	
20	Sold to United California Bank <u>-7.0</u>	
21	BANK OF AMERICA NATIONAL TRUST AND SAVINGS ASSOCIATION, as Trustee	0
22	(under its Trust BI-100)	
23	BANK OF AMERICA NATIONAL TRUST AND SAVINGS ASSOCIATION, as Trustee	0
24	(under its Trust BI-51) 0.1	
25	Released to Michael L. Rockwell <u>-0.1</u>	
26	BARCLAY HOLLANDER CURCI, INC. 3.33	3.33
27	Successor in Part to Joughin	
28	Torrance Ranch	
29	BARCLAY, RICHARD AND R.A. WATT 32.66	0
30	Successors to Emma J. Osborn	
31	Successors in part to Isabela 13.55	
32	J. Granz Estate	
33	Successors in part to George R. 13.75	
34	Murdock <u>-59.96</u>	
35	Sold to City of Torrance	

1	<u>PARTY</u> <u>AND SUCCESSOR, IF ANY</u>	<u>ADJUDICATED RIGHT IN</u> <u>ACRE FEET, ANNUALLY</u>
2		
3	BARNARD, GEORGE W. AND JOSEPH A. BARNARD, as Trustees under the last will and testament of ANNIE E. BARNARD one Fritz B. Burns	0
5		
6	BARNES, ANNA T. (MRS.) one Alfred O. Barnes	0
7		
8	BAUMAN, GUS A. Transferred to Palos Verdes Begonia Farm	0
9		
10	BECHTEL, JOHN H. one Riverside Cement Company	0
11		
12	BEGO CORPORATION, a corporation one Arthur S. Delaney 4.1 Sold to Estate of Golda Delaney <u>-4.1</u>	0
13		
14	BELLES, J.W. one L.W. Mason one S.M. Mason	0
15		
16	BELVIDERE MUTUAL WATER COMPANY 33.4 Sold to City of Torrance <u>-33.4</u>	0
17		
18	BERARDINO, JAMES, sued as James Bernardino and Jim Bernardino, sued as Jim Bernardino	0
19		
20	BERDOLLT, P. T.J. Heithold	0
21		
22	BERNARD, A.M. one Moneta Gardens, Inc., a corporation	0
23		
24	BEST, H.W.	0
25	BIZEGO, LOUIS	0
26	BLACK, ALEXANDER R. one Liberty Investment Company	0
27		
28	BLAIN, SR., ARTHUR A., sued as A.A. Blain	0

	<u>PARTY</u> <u>AND SUCCESSOR, IF ANY</u>	<u>ADJUDICATED RIGHT IN</u> <u>ACRE FEET, ANNUALLY</u>
3	BLAIS, N.J. one Michael Chuchor	0
4	one Albert J. Sahn	
5	BLAKE, H.H. one Pearl E. Grady	0
6		
7	BLOEMSMA, ARNOLD sued as Arnold Bloesma	0
8		
9	BODGER REALTY COMPANY, (The), a corporation	0
10		
11	BOISE CASCADE BUILDING COMPANY Successor in part to Joughin	0
12	Torrance Ranch	16.92
13	Sold to Inglewood, City of	<u>-16.92</u>
14	BOONE, COLIN J. Clarence J. Lamb	0
15	Lora Lamb	
16	BOONSTRA, ANNA Tedde Boonstra	0
17	one M.V. Deniz	
18	BOWMAN, CHARLES P. sued as Pat Bowen Ann Bowman	0
19	one Harlan T. Maples	
20	BROOKS, WAYNE E. one Artie Waller	0
21	one V.W. Waller	
22	BROWN, CARL L.	0
23	BUCKMASTER, EDA Rose Faure	0
24	Frank X. Girard	
25	Julia Girard	
26	John Oddoris	
27	Paul Oddoris	
28	Marie Girard Seal sued as Marie Girard one Frank Girard	

1	<u>PARTY</u> <u>AND SUCCESSOR, IF ANY</u>	<u>ADJUDICATED RIGHT IN</u> <u>ACRE FEET, ANNUALLY</u>
2		
3	BULTRY CORPORATION, a corporation one Paul E. Black	0
4	one Ronald L. Black	
5	BURKE, E.D., sued as BURKE, E.W.	0
6	BURKE, W.F. Lois Price Burke, sued as Jane	0
7	Doe 14	9.5
8	Sold to H.S. Scott	<u>-9.5</u>
9	BURNS, FRITZ B. Second West Coast Basin Judgment	0
10		
11	BUTTE, M.P.	0
12	CBS INC. (Formerly Columbia Broadcasting Systems Inc.)	9.5
13		
14	CALIFORNIA, STATE OF Successor to Robert L. Fullilove	1.0
15	Successor to Joe Moniz, Jr.	2.2
16	Successor in part to Kelly Pipe Company	16.3
17	Successor in part to Flavio Rodriguez	4.0
18	Successor in part to A.H. Smith, Sam Surber, and Freda Smith	2.6
19	Sold to Sparkletts Drinking Water Corporation	<u>-26.1</u>
20	CALIFORNIA WATER SERVICE COMPANY, a corporation	4070.0
21	Successor to Palos Verdes Water Company	3071.0
22		<u>999.0</u>
23	CAMERON, HUGH N. Ysaburo Mishima	0
24	Satsuki Mishima	
25	CARLTON, JACK C.	0
26	CARRELL, ELOISE	0
27	CARRELL, FRANK R. (Estate of) Tom Ware and James Blake, as co-	0
28	executors of the Last Will & Testament of Frank R. Carrell, deceased.	

	<u>PARTY</u> <u>AND SUCCESSOR, IF ANY</u>		<u>ADJUDICATED RIGHT IN</u> <u>ACRE FEET, ANNUALLY</u>
1			
2			
3	CARSON ESTATE COMPANY	130.0	0
4	Sold to Dominguez Water Corp.	<u>-130.0</u>	
5	CARSON-HARBOR VILLAGE MOBILE HOME PARK		8.2
6	Successor to Etchemendy, Caroline	8.2	
7	Estate of		
8	CARSON-MADRONA COMPANY		104.0
9	Successor to Chanslor-Western	104.0	
10	Oil and Development Co.		
11	CAVANAUGH, J.F.		0
12	CENTINELA VALLEY UNION HIGH SCHOOL		0
13	DISTRICT		
14	CHAMBERS, MARY RIORDAN, sued as Mary		0
15	R. Chambers		
16	CHANDLERS PALOS VERDES SAND AND		294.2
17	GRAVEL CORP.		
18	Second West Coast Basin Judgment	95.2	
19	Successor to Southwestern Portland		
20	Cement Company	15.0	
21	Successor to Torrance Sand and		
22	Gravel Corp.	<u>184.0</u>	
23	CHANSLOR-WESTERN OIL & DEVELOPMENT		0
24	COMPANY		
25	(Formerly Chanslor-Canfield Midway		
26	Oil Co.)	104.0	
27	Sold to Carson-Madrona Company	<u>-104.0</u>	
28	CHEVRON, U.S.A., INC.		4541.7
29	(Formerly Standard Oil Company		
30	of California)		
31	CHRISTIE, CLEM		0
32	CHRISTIE, CLEM, DON C. FOHL AND		0
33	LEON LARSON	0.02	
34	As Trustees of the Wilmington		
35	Cemetery Association		
36	(Abandoned water right)	<u>-0.02</u>	

	<u>PARTY</u> <u>AND SUCCESSOR, IF ANY</u>		<u>ADJUDICATED RIGHT IN</u> <u>ACRE FEET, ANNUALLY</u>
1			
2	CHUCHUA, MICHAEL		0
3	Second West Coast Basin Judgment		
4	CLARK, JENNIE M.		0
5	CLARK, WILFORD H. sued as W.H. Clark		0
6	and Ida E. Clark, sued as Jane Doe 1		
7	CLIFT, LOIS (MRS.)		0
8	COAST FOREST PRODUCTS	3.4	0
9	Sold to Georgia-Pacific Corpora- tion	<u>-3.4</u>	
10	COAST INVESTMENT COMPANY, a corporation		0
11			
12	CLUFF, BEN DAIRY		0
13	Successor to Edward and Emily Cost	7.4	
13	Sold to American Plant Growers, Inc.	-7.4	
14	Successor to Southwest Steel Rolling Mills	3.4	
15	Sold to Georgia-Pacific Corporation	<u>-3.4</u>	
16	COLLINS, EDMOND S.		0
17	COLLISTER, CAMERON	136.82	0
18	Quitclaimed to Normandie Park	<u>-136.82</u>	
19	COLTRIN, LILY		0
20	COLUMBIA BROADCASTING SYSTEMS, INC.		0
21	sued as Columbia Broadcasting Co.	18.5	
21	Sold to Ronald F. Moran	-9.0	
22	Changed name to CBS, Inc. (See CBS, Inc.)	<u>-9.5</u>	
23	COMMUNITY AIRPORTS, INC., a corporation		0
24			
25	COMPARETTE, V.G.		0
26	COMPTON BRICK & TILE COMPANY, a corporation		0
27			
28	COMPTON, CITY OF		0
	COMPTON UNION HIGH SCHOOL DISTRICT		0

1	<u>PARTY</u> <u>AND SUCCESSOR, IF ANY</u>	<u>ADJUDICATED RIGHT IN</u> <u>ACRE FEET, ANNUALLY</u>
2	CONOVER, F.A.	0
3	CONTINENTAL PRODUCTION COMPANY Second West Coast Basin Judgment	0
4		
5	CORTRITE, A.	0
6	COST, EDWARD AND EMILY COST, sued as Emily Costa	0
7	Sold to Ben Cluff Dairy	7.4 <u>-7.4</u>
8	COST, ERNEST	0
9	CROWLEY, DANIEL	0
10	CURTIS, OWEN W. Sold to Southern California	3.8
11	Water Company	<u>-3.44</u>
12	DALLAPE, LOUIS sued as Louis Dallapi	0
13	DALLAPE, TOM	0
14	DARBEAIAN, MIKE sued as John Doe 25	0
15		
16	DeBARNARDI, LUIGI	0
17	DEFTERIOS, GERASIMOS K. one Anna G. Defterios	0
18		
19	DEL AMO ESTATE COMPANY Sold to Dominguez Water Corp.	121.0 <u>-121.0</u>
20		
21	DELANEY, GOLDA (ESTATE OF) (Formerly Arthur J. Delaney)	4.1
22	Successor to Rego Corporation	4.1
23	DENISON, HENRY M. one Frank A. Basso	0
24		
25	DENNIS, ESTHER M. SHEETS (Formerly Esther M. Sheets)	5.5
26		
27	DERMODY, FRANK	0
28	DESSER ENTERPRISES Second West Coast Basin Judgment	0

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28	<u>PARTY</u> <u>AND SUCCESSOR, IF ANY</u>	<u>ADJUDICATED RIGHT IN</u> <u>ACRE FEET, ANNUALLY</u>
	DIBLE, G.	0
	DIE CAST PRODUCTS, INC. Second West Coast Basin Judgment	0
	DIEGO, H. (MRS.)	0
	DIONNE, JOHN one Eleanor G. Dreher	0
	DOMBROWSKI, LEESA one Darthmouth Homes, Inc.	0
	DOMINGUEZ ESTATE COMPANY Sold to Dominguez Water Corp.	254.0 <u>-254.0</u>
	DOMINGUEZ WATER CORPORATION Successor to Carson Estate Co.	9477.8 130.0
	Successor to Del Amo Estate Co.	121.0
	Successor to Dominguez Estate Co.	254.0
	Successor to Don Wilson Builders	32.6
	Successor to Jeanette R. Heydenbeck	0.7
	Successor to Kikuno Nakano, et al.	19.3
	Successor in part to H.J. Early	91.0
	Successor in part to R.A. Watt, Inc.	61.85
	Sold in part to Watson Land Co.	<u>-37.6</u>
	10150.65	
	DONALD, RAY (MRS.) one Pauline H. Wilson	0
	DOUGLAS AIRCRAFT COMPANY, INC. (See McDonnell Douglas Corp.)	0
	DOW CHEMICAL CO., (THE), a corporation	0
	DRALE, CRISTINA O. O'Brien Z. Drale	0
	XXX	
	XXX	

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28	<u>PARTY AND SUCCESSOR, IF ANY</u>		<u>ADJUDICATED RIGHT IN ACRE FEET, ANNUALLY</u>
	DRAPER, CHARLES L.	7.2	0
	one James H. Alleman		
	one Flora M. Draper		
	one Bernice Alleman		
	Bess M. Feder		
	Ben T. Johnston		
	Genevieve K. Miles		
	Ikuko Nakawatse		
	Frank Wirz		
	Sold to Allcast Foundry, et al	<u>-7.2</u>	
	DURAND, A.J.		0
	EARLY, DAISY		0
	H.J. Early and one Vickers, Inc.	111.0	
	Sold to Samuel R. Fujimoto and		
	Raymond S. Fujimoto	-20.0	
	Sold to Dominguez Water Corp.	<u>-91.0</u>	
	EAST GARDENA WATER COMPANY		0
	EDISON SECURITIES COMPANY, a corpora-		0
	tion sued as Richard Roe Company 13		
	(now known and shown herein as		
	Associated Southern Investment Co.)	46.7	
	Sold to Southern California Edison		
	Company	<u>-46.7</u>	
	EDWARDS, C.O.		0
	W.J. Edwards		
	EL CAMINO JUNIOR COLLEGE DISTRICT		0
	ELLINWOOD, LATHROP M.	32.6	0
	Sold to Isamu Kita, Kazuo Kita		
	and Yoshiki R. Kita	<u>-32.6</u>	
	ELLIOTT, CLINTON sued as C.C. Eliot		0
	Georgia M. Elliott		
	Juluis G. Elliott		
	Frank M. Elliott		
	EL SEGUNDO, CITY OF		953.0
	EL SEGUNDO LAND & IMPROVEMENT COMPANY,		0
	a corporation		

	<u>PARTY AND SUCCESSOR, IF ANY</u>		<u>ADJUDICATED RIGHT IN ACRE FEET, ANNUALLY</u>
1			
2	ENGELSMA, JAKE		12.1
3	Successor to Wilbur Hornstra	14.1	
4	Sold to Asahi Fancy Koi, Incorporated	<u>-2.0</u>	
5	ENGLAND, GEORGE		0
6	ETCHEMENDY, CAROLINE (ESTATE OF)	8.2	0
7	(formerly Caroline Etchemendy, sued as Jane Doe 12		
8	Mariana T. Etchemendy, sued as Jane Doe 11)		
9	Sold to Carson-Harbor Village Mobile Home Park	<u>-8.2</u>	
10	EWING, CARMELITA ROSECRANS, sued as		0
11	C.F. Rosecrans and W.S. Rosecrans	91.3	
12	Sold to Southern California Water Co.	<u>-91.3</u>	
13	EWING, NED, ET AL.		0
14	Successor in part to Isabel J. Granz Estate	6.50	
15	Sold to R.A. Watt, Incorporated	<u>-6.50</u>	
16	FALCINELLA, OSCAR AND MIKE FALCINELLA		0
17	FIESEL, FRED		0
18	FITTINGER, JAMES L.		0
19	FLESH, LESLIE R. AND ANDOR PASTERNAK		0
20	ET AL. Successors to Alfred D. Seaback and Ruth Seaback	3.5	
21	Sold to Stanley C. Lagerlof	<u>-3.5</u>	
22	FLETCHER OIL AND REFINING COMPANY,		90.0
23	a corporation (Formerly Fletcher Oil	86.3	
24	Co., a corporation) composed of D.S. Fletcher, F.O. Fletcher, Helen Fletcher O'Connell and Idaho Fidelity Corpora- tion		
25	Successor to Fletcher, Robert G., et al.	<u>3.7</u>	
26			
27	FLETCHER, ROBERT G., DANIEL S. FLETCHER AND WILFRED O. FLETCHER		0
28	Successor to Fred A. Jungquist Sold to Fletcher Oil and Refin- ing Company	3.7 <u>-3.7</u>	

1	<u>PARTY</u>		<u>ADJUDICATED RIGHT IN</u>
2	<u>AND SUCCESSOR, IF ANY</u>		<u>ACRE FEET, ANNUALLY</u>
3	FORD, ROLLA		0
4	FOX HILLS COUNTRY CLUB		0
5	FRIEDMAN, MARY M.		0
6	Second West Coast Basin Judgment		
7	FRIETAS, TONY		0
8	FROGGE, W.J.	12.5	0
9	Sold to Sigmund S. Hockwold and Lionel S. Hockwold	<u>-12.5</u>	
10	FUKUWA, HERBERT SAKAYE		0
11	(dba Mayflower Nurseries)		
12	FULLER, A.O.		0
13	Helene M. Fuller		
14	FULLILOVE, ROBERT L.	1.0	0
15	Sold to State of California	<u>-1.0</u>	
16	FUJIMOTO, SAMUEL R. AND RAYMOND S.		20.0
17	FUJIMOTO		
18	Successor in part to H.J. Early and Daisy Early	20.0	
19	FUTURA INDUSTRIES, INCORPORATED		44.4
20	Successor to Spanish American Institute	44.4	
21	GALDARISI, JOE		0
22	Brody Investment Company		
23	GARCIA, AMADOR		0
24	Eva Garcia		
25	GARCIA, ARTHUR B. sued as Arthur		0
26	D. Garcia		
26	June Garcia		
27	GARCIA, JOSE H.		0
28	GARDENA SYNDICATE NO. 2		0

1	<u>PARTY</u> <u>AND SUCCESSOR, IF ANY</u>	<u>ADJUDICATED RIGHT IN</u> <u>ACRE FEET, ANNUALLY</u>
2		
3	GARDENA WATER SUPPLY COMPANY	0
4	GARRETT CORPORATION (THE) Successor to Shinoda Brothers, Inc. 22.5	22.5
5		
6	GATEX TANK STORAGE TERMINAL CORP. Successor to Phillips Petroleum Co. 167.0	167.0
7		
8	GAY LAND COMPANY LTD., a corporation	0
9	GEORGIA-PACIFIC CORPORATION Successor to Coast Forest Products 3.4 sold to Inglewood, City of <u>-3.4</u>	0
10		
11	GERAGOSIAN, V.M. one Stanley N. Lewis	0
12		
13	GERAHUE LAND COMPANY Successor and Assignee for A.S. Johnston Drilling Co. 11.9 Abandoned Water Right <u>-11.9</u>	0
14		
15		
16	GETTY, GEORGE F., INC.	0
17	GIACIOMAZZI, CAROLINA, sued as Mrs. C. Giacomagzi	0
18		
19	GIANNI, ALBERT	0
20	GILLINGHAM, AMANDA L., sued as Jane Doe 20 Floyd W. Gillingham, sued as John Doe 24 Josephine Gillingham, sued as Jane Doe 21	0
21		
22		
23		
24	GILLINGHAM, FLORENCE R. Thora Pursche Nellie P. Smith Anna M. Pursche	2.4
25		
26		
27	GIMINEZ, MATEA (MRS.)	0
28	GODDARD, LALLA D. Ralf Goddard	0

	<u>PARTY</u> <u>AND SUCCESSOR, IF ANY</u>	<u>ADJUDICATED RIGHT IN</u> <u>ACRE FEET, ANNUALLY</u>
3	GOLDSMITH, WM. H. Cliff Ralph	0
5	GONZALEZ, FELIPE Gabriela Gonzales	34.3
7	GOOSSEN, T.B.	0
8	GORDON, WILLIAM W., sued as John Doe Gordon	0
10	GOSS, BERTHA one Property Management Corporation	0
12	GRAND LAND COMPANY Successor in part to Smith, A.H.	0
13	et al.	5.7
14	Abandoned Water Rights 1961-62	<u>-5.7</u>
15	GRANDE, GEORGE	0
16	GRANT, JOHN (Estate of)	59.0
17	GRANZ, ISABELA J. (Per Judgment) Partitioned to Heirs	380.0
18	Isabela J. Granz Estate	-33.8
19	Joughin Torrance Ranch	-212.42
20	George R. Murdock	-15.12
21	Emma J. Osborn	-32.66
22	Subject to Long Term Lease Standard Oil Company of Calif.	59.60*
23	Superior Oil Company	<u>26.40*</u>
24	GRANZ, ISABELA J. (ESTATE OF) Successor in part to Isabela J. Granz	33.80
25	Sold in part to Richard Barclay and R.A. Watt	-13.55
26	Sold in part to Ned Ewing, et al.	-6.5
27	Sold in part to R.Watt, Inc.	<u>-13.75</u>
28	XXX	
29	XXX	

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PARTY
AND SUCCESSOR, IF ANY

ADJUDICATED RIGHT IN
ACRE FEET, ANNUALLY

GREEN, EDWARD I. sued as E.J. Green one Florence D. Green	0
GRESHAM, PRICE W. Walter G. Gresham Comer J. Lewis Voleta A. Lewis	0
GRIFFITH, BEATRICE S. W.P. Griffith one Otto K. Olessen	0
GRIGGS, B.H. Olive W. Griggs	0
GROSS, JOSEPH M. sued as Joseph Gross Myron J. Glauber, sued as John Doe 20, Clarence L. Brown, sued as John Doe 21, and Perfect Properties Inc., a corporation sued as Richard Roe Co. 20.	0
GUENSER, HENRY M. Sophia E. Guenser	0
GUIDOTTI, DANIEL	0
HADLEY, DON C. one D.W. Sleet one Virgie Sleet	0
HAIGHT, CHARLES N. one Grace P. Warden	0
HAILS, RAYMOND R.	0

	PARTY AND SUCCESSOR, IF ANY	ADJUDICATED RIGHT IN ACRE FEET, ANNUALLY
1		
2	HAMMOND, WALTER	0
3	one Contractor's Asphalt Products Co.	
4	HANCOCK CHEMICAL COMPANY,	0
5	a corporation	
6	HANSEN, BETTY	0
7	HANSEN, DONALD J. Second West Coast Basin Judgment	
8	HARBOR CITY DEVELOPMENT COMPANY	0
9	HARDING, R.B.	0
10	HARRIS, ROY W.	0
11	HARRIS, R. AND L. HARRIS	0
12	Successor to Lawrence I. Liston Disclaimed Water Right	0.7 <u>-0.7</u>
13	HARRIS PUMPING PLANT	0
14	Leesa Dombrowski	
15	Carl G. Pursche	
16	Anna M. Pursche	
17	Harry Krumdick	
18	Anna Doherty	
19	Mrs. Frank Cota	
20	Holly Corporation, a corporation	
21	Homer Bales and Ernest Haughton dba and sued as Pursche Water Co.	
22	HARRIS TUBE INCORPORATED	0
23	Successor in part to B. Robinson & Associates	0.7
24	Transferred to Automation Ind. Inc.-Harris Tube	<u>-0.7</u>
25	HASEGAWA, W.	0
26	one Kauffman, Milton, Construction Company, successor	
27	HASKINS, C.R.	0
28	HATFIELD, BESSIE M. Second West Coast Basin Judgment	0
29	HAUT, FRED M. one Ivy H. Haut	0
30	HAWTHORNE, CITY OF	1882.0

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28	<u>PARTY</u> <u>AND SUCCESSOR, IF ANY</u>		<u>ADJUDICATED RIGHT IN</u> <u>ACRE FEET, ANNUALLY</u>
	HAYES, CHARLES R. one Robert W. Colby one Fern M. Colby		0
	HAYES FURNACE MFG. & SUPPLY Second West Coast Basin Judgment		0
	HENDERSON, BEATRICE, M. Abandoned Water Right	1.3 <u>-1.3</u>	0
	HEREDIA, DAVID P.		0
	HERMAN, E.N.		0
	HERMANSEN, JULIA		0
	HERRBECK, MIKE L. Second West Coast Basin Judgment		0
	HERZOG, AUGUST one Martha Herzog		0
	HEYDENBECK, JEANETTE R. (Formerly Jeanette R. Reifsnyder) Sold to Dominguez Water Corp.	0.7 <u>-0.7</u>	0
	HILLSIDE MEMORIAL PARK Successor to Sigmund S. Hockwald and Lionel S. Hockwald Successor to W.J. Frogge Successor to Santa Fe Land Improvement Company	16.7 12.5 <u>39.5</u>	68.7
	HILYARD, MARY N. sued as Jane Doe 55 Mrs. Monta Templeton, sued as Jane Doe 56		0
	HIMMELFARB, HENRY Wm. Pirk one Western Air Compressor Company		0
	HOCKWALD, SIGMOND S. AND LIONEL S. HOCKWALD Successor to W.J. Frogge Second West Coast Basin Judgment Sold to Hillside Memorial Park	12.5 <u>-12.5</u>	0

1	PARTY AND SUCCESSOR, IF ANY	ADJUDICATED RIGHT IN ACRE FEET, ANNUALLY
2		
3	HODNEFIELD, T.E	0
4	HOFFMAN, MARIE C. Los Angeles City School District, successor	0
5		
6	HOEPTNER, J.P. Ida B. Hoeptner one Jack I. Gantz One Lillian H. Gantz	0
7		
8		
9	HOLLIDAY, CLIFFORD	0
10	HOLLINGSWORTH, W.I. one Julius L. Jenkins one Evelyn M. Jenkins	0
11		
12	HOLLYWOOD TURF CLUB, a corporation	282.0
13	HONSTRA, WILBUR Sold to Jake Engelsma	14.1 <u>-14.1</u>
14		
15	HUBER, FRANK S. Second West Coast Basin Judgment	0
16		
17	HUDSON, C.L.	0
18	HUNT, DONALD G. Successor to James Scanda	0
19	Sold to Kenichi Inose	<u>1.9</u> <u>-1.9</u>
20		
21	HURT, ARTHUR C. one Truman Enterprises, Inc.	0
22	CHEMICALS COMPANY INDUSTRIAL CHEMICAL DIVISION, ALLIED CHEMICAL CORP. (Formerly Allied Chemical Corp. Gen. Chemical Co.)	255.0
23		
24		
25	INGLEWOOD, CITY OF Successor to Frank Abell	4382.0 1.8
26	Successor to Boise Cascade Building Co.	16.92 3.4
27	Successor to Georgia-Pacific Corp. Successor in part to George R. Murdock	3.4 <u>1.37</u>
28		

	<u>PARTY</u> <u>AND SUCCESSOR, IF ANY</u>		<u>ADJUDICATED RIGHT IN</u> <u>ACRE FEET, ANNUALLY</u>
1			
2	INGLEWOOD PARK CEMETERY ASSOCIATION,		0
3	a corporation, sued as Inglewood Park Mortuary Assoc.		
4	INOSE, YOSHI		0
5	one Seiji Inose		
6	INOSE, KENICHI		5.4
7	Successor to Donald G. Hunt	1.9	
8	Successor to Thaxter Ralph and Lois A. Lenoir	<u>3.5</u>	
9	IRVINE, F.C.		0
10	ISAMU, KASUO AND YOSHIKI R. KITA		0
11	Successor to Lathrop M. Ellinwood	32.6	
	Sold to Don Wilson Builders	<u>-32.6</u>	
12	ISHIDA, HENRY J.		0
13	Second West Coast Basin Judgment		
14	ITO, CHIYEKO		0
	Second West Coast Basin Judgment		
15	IWATA, FRED		0
16	John Iwata		
17	J.B. D. HOLDING CORP., a corporation		0
18	JENKINS, HARRY C.		0
19	Successor to H.L. Perry	1.8	
	Sold to ABC Nursery, Incorporated	<u>-1.8</u>	
20	JOHNS-MANVILLE PRODUCTS CORPORATION		881.0
21	JOHNSON, C.F.	12.2	0
22	sold to Kaoru Wada and Satoru Wada	<u>-12.2</u>	
23	JOHNSTON, A.S. DRILLING COMPANY	11.9	0
24	Assigned to Gerahue Land Company	<u>-11.9</u>	
25	JOHNSON, O.T. CORPORATION		0
26	A.P. Johnson Company sued as Richard Roe Company one		
27	JONES, ANNA MAE, successor to Anne Taylor, deceased (sued herein as Anna Taylor)	50.2	0
28	Sold to City of Torrance	<u>-50.2</u>	

1	<u>PARTY</u>		<u>ADJUDICATED RIGHT IN</u>
2	<u>AND SUCCESSOR, IF ANY</u>		<u>ACRE FEET, ANNUALLY</u>
3	JONES, E.F.		0
4	JONES, W.H.		0
5	one Leon A. Carpenter and Darline N. Carpenter, successors		
6	JOSHUA-HENDY IRON WORKS		0
7	JOUGHIN TORRANCE RANCH		0
8	Successor in part to Isabela J. Granz	212.47	
9	Sold in part to Barclay Hollander Curci, Inc.	-3.33	
10	Sold in part to Boise Cascade Building Co.	-16.92	
11	Sold in part to Cameron Collister	-136.82	
	Sold in part to R.A. Watt, Inc.	<u>-56.35</u>	
12	JUNGQUIST, FRED A.		0
13	(Formerly Katherine P. Woodman Jungquist)	3.7	
14	Sold to Robert G. Fletcher, Daniel S. Fletcher and Wilfred O. Fletcher	<u>-3.7</u>	
15	KAHLER, DORA A.		0
16	KAHLERT, ET AL.		0
17	Successor in part to Kelly Pipe Co.	18.9	
18	Sold to Sparkletts Drinking Water Corp.	<u>-18.9</u>	
19	KARR, OSCAR E.		0
20	Sherley Karr		
21	KEHN, CHESTER L.		0
22	K.L. KELLOGG & SONS, a corporation		0
23	KELLY PIPE COMPANY	49.0	0
24	Sold in part to State of California	-16.3	
25	Sold in part to Kahlert, et al	-18.9	
26	Sold in part to Sparkletts Water Corp.	<u>-13.8</u>	
27	KELTON, LOUIS		0
28	KETTLER AND WILSEY, INC.		0
	Second West Coast Basin Judgment		

	<u>PARTY</u> <u>AND SUCCESSOR, IF ANY</u>		<u>ADJUDICATED RIGHT IN</u> <u>ACRE FEET, ANNUALLY</u>
1			
2	KILLINGER, W.G.		0
3	one Esther N. Lee		
4	KINCAID, JEANETTE B.		0
5	one Fred F. Hoyt		
	one Yvonne A. Hoyt		
6	KING, MAXWELL C.		0
7	KING, SARAH S.		0
8	one Crawford Building Corporation		
9	KITA, ISAMU, KAYUO KITA, AND YOSHIKI		
	R. KITA	32.6	0
10	Successor to Lathrop M. Ellinwood		
	Sold to Don Wilson Builders	<u>-32.6</u>	
11	KRAUSS, JOHN		0
12	Dan E. Vail and Barbara M. Vail		
13	KULL, CHARLES		0
14	KURTZ, GLADYS	3.5	0
15	Sold to Sparkletts Drinking	<u>-3.5</u>	
	Water Corp.		
16	LAGERLOF, STANLEY C.		0
17	Successor to Leslie R. Flesh and	3.5	
	Andor Pasternak, et al.		
18	Sold to Shell Oil Company	<u>-3.5</u>	
19	LAMPC, JOHN		0
20	LARSEN, MAGNUS C. sued as		0
21	M. Larsen		
22	LAUTRUP, NELS		0
23	LAWLER, JAMES K. (Estate of)	3.1	0
24	Sold to B. Robinson and Associates	<u>-3.1</u>	
25	LAWNDALE (CITY) SCHOOL DISTRICT OF		0
26	LOS ANGELES COUNTY, sued as		
	Richard Roe Company 12		
27	LEACH, ANNA		0
28	LEONARDO, JOE		0

	<u>PARTY</u> <u>AND SUCCESSOR, IF ANY</u>		<u>ADJUDICATED RIGHT IN</u> <u>ACRE FEET, ANNUALLY</u>
1			
2			
3	LERMENS, EVELYN (Formerly Alfred Lermens)		0.7
4			
5	LENZINER, EMMA L. sued as Mrs. E.L. Leuziner		1.4
6			
7	LINDERMAN, ABRAHAM Second West Coast Basin Judgment		0
8			
9	LISTON, LAWRENCE Sold to R. Harris and L. Harris	0.7 <u>-0.7</u>	0
10			
11	LITTLE, WILLIAM Sold to Watt Industrial Properties	0.1 <u>-0.1</u>	0
12			
13	LIZZA, PAT		0
14	LOCHMAN, ERNEST C. LOCHMAN, WALTER Second West Coast Basin Judgment		0
15			
16	LONG, BEN Persilla Long, sued as Pricilla Long		0
17			
18	LONG, JOHN		0
19	LONG BEACH, CITY OF		0.7
20	LOPES, FRANK		3.7
21	LOPEZ, MANUEL one Rudolph E. Lopez		0
22			
23	LOS ANGELES, CITY OF		1503.0
24	LOS ANGELES CITY SCHOOL DISTRICT		0
25	LOS ANGELES COUNTY (ALONDRA PARK) Successor to Los Angeles	28.7	67.7
26	County Flood Control District	<u>39.0</u>	
27	LOS ANGELES COUNTY FLOOD CONTROL DISTRICT	37.6	0
28	Successor in part to A.H. Smith et al Sold to Los Angeles County- Alondra Park	1.4 <u>-39.0</u>	

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28	<u>PARTY AND SUCCESSOR, IF ANY</u>	<u>ADJUDICATED RIGHT IN ACRE FEET, ANNUALLY</u>
	LOS ANGELES COUNTY SANITATION DISTRICT No. 2, sued as Los Angeles County Sanitary District No. 2	102.0
	LOS ANGELES COUNTY WATER WORKS DISTRICT NO. 1	0
	LOS ANGELES COUNTY WATER WORKS DISTRICT NO. 13	1352.0
	LOS ANGELES COUNTY WATER WORKS DISTRICT NO. 22	551.0
	LOS ANGELES COUNTY (WESTERN AVENUE GOLF COURSE) Second West Coast Basin Judgment listed as Board of Retirement of the Los Angeles County Employee's Retirement System	296.0
	LOS ANGELES EXTENSION COMPANY	0
	LOS ANGELES INVESTMENT COMPANY	0
	LOS NIETOS COMPANY, a corporation	0
	LOYOLA UNIVERSITY FOUNDATION	0
	LOYOLA MARYMOUNT UNIVERSITY (Formerly Loyola University of Los Angeles)	48.1
	MAC LEAN, LORENA one Torrance Land Company	0
	MADRIGAL, PETE	0
	MAGALLANES, S.W.	0
	MANCHESTER AVENUE COMPANY, a corporation one Inglewood Golf Course, a partnership	0
	MANHATTAN BEACH, CITY OF	1131.2
	MARCH, H.C. one Victory Oil Company	0

	<u>PARTY</u> <u>AND SUCCESSOR, IF ANY</u>	<u>ADJUDICATED RIGHT IN</u> <u>ACRE FEET, ANNUALLY</u>
3	MARTIN BROTHERS BOX CO. OF CALIF. Second West Coast Basin Judgment	0
5	MARTIN, EARL Second West Coast Basin Judgment	0
7	MARTIN, P.T. one Arlington Garden Homes Company	0
9	MARTZ, HOWARD DOUGLAS James L. Martz Louise H. Martz	0
11	MATSON, RAY F. sued as R.F. Matson Florence M. Nielsen	0
13	MAU, FRED	0
14	MAYFLOWER NURSERIES (See also under Herbert Sakaye Fukuwai)	0
16	McCANDLESS, JAMES Sold to Sparkletts Drinking Water Corp.	6.7 <u>-6.7</u>
18	McCLAIN, ETHEL	0
19	McCRACKIN, G.A. sued as G.A. McCracken	0
21	McDONNELL DOUGLAS CORPORATION (Formerly Douglas Aircraft Company, Inc.) Long Term Lease from U.S. Navy Dept.	1.7* 1.7*
24	McCULLEY, M.F.	0
25	McGRANAGHAN, J.J.	0
26	McKERNON, IVAN J. one Doris E. Parks one L. Kenneth Parks	0

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28	PARTY AND SUCCESSOR, IF ANY	ADJUDICATED RIGHT IN ACRE FEET, ANNUALLY
	MEANS, AIMEE R. one Prarie Company	0
	MESPLOU, PAUL	0
	METZLER, J.J. one Kenji Yokoyama and one Miyeko Yokoyama	0
	MILBURN, E.B. one M.Y. Yamane	0
	MILLER, CARL H.	0
	MINNEAPOLIS-HONEYWELL REGULATOR COMPANY, APPLIANCE CONTROLS DIVISION	0
	MISHIMA, YSABURO and SATSUKI MISHIMA Hugh N. Cameron	0
	MOBIL OIL CORPORATION (Formerly Socony Mobil Oil Company)	2570.0
	MOEN, O.	0
	MOLINE, P.E.	0
	MONETA MUTUAL WATER COMPANY Sold to City of Torrance	916.0 <u>-916.0</u>
	MONIZ, JOE JR., sued as Joe Moniz one Rose Moniz Sold to State of California	2.2 <u>-2.2</u>
	MOODY, B.R. one Opal B. Edwards	0
	MOORE, J.B.	0
	MOORE, MAMIE S.	0
	MORAN, RONALD F. Successor in part to CBS, Inc. Sold to City of Torrance	9.0 <u>-9.0</u>

1	<u>PARTY</u> <u>AND SUCCESSOR, IF ANY</u>	<u>ADJUDICATED RIGHT IN</u> <u>ACRE FEET, ANNUALLY</u>
2		
3	MORI, ROY H. AND KENJI MORI Second West Coast Basin Judgment	3.60
4	Sold to Nozaki, Sumikichi	5.60 <u>-2.00</u>
5	MORRISON, ALICE Ethel Morrison	0
6		
7	MORSE, A.H. one J.J. Lapidus one B.C. Investment Co., Inc.	0
8		
9	MORTON, HAROLD C. sued as Harold Morton one Allied Gardens Corporation	0
10		
11	MOTT, V.G.	0
12	MUELLER, ARNOLD W. Ruth Mueller	0
13		
14	MURDOCK, GEORGE R. Successor in part to Isabela J.	0
15	Granz Estate	15.12
16	Sold in part to R. Barclay and R.A. Watt	-13.75
17	Sold in part to City of Inglewood	<u>- 1.37</u>
18	MURAKAMI, JAMES Murakami, Jean M. Second West Coast Basin Judgment	0
19		
20	NAGAO, SUMIYE	0
21	NAKAMURA, HIROSHIMA	0
22	NAKANO, KIKUNO	19.3
23	Ben Nakano	0
24	George Nakano	
25	Helen Nakano	
26	Kan Nakano	
27	Mary Nakano	
28	Taka Nakano	
29	Misao Nakano Nakashima	
30	Sold to Dominguez Water Corp.	<u>-19.3</u>
31	NARBONNE RANCH WATER CO. NO. 2	0
32	NARBONNE RANCH WATER CO. NO. 3	0

1	<u>PARTY</u> <u>AND SUCCESSOR, IF ANY</u>	<u>ADJUDICATED RIGHT IN</u> <u>ACRE FEET, ANNUALLY</u>
2		
3	NATIONAL ELECTRIC PRODUCTS CORP.	0
4	NATIONAL ROYALTIES, INC., a corporation	0
5	NAVARRO, T.C. Sold to Hilario S. Alwag and Emma Alwag	53.9 <u>-53.9</u>
6		
7	NELSON, A.L. Olaf Nelson one George C. Orr	0
8		
9	NEWELL, CALVIN Newell, Linda Second West Coast Basin Judgment	0
10		
11	NICKEL, EDWARD	0
12	NICKEN, HENRY W. sued as H.W. Nielsen one Kenneth D. Durian	0
13		
14	NORAIR, A DIVISION OF NORTHROP AIRCRAFT, INCORPORATED)	38.15
15		
16	NORMANDIE PARK Successor to Collister, Cameron	136.82
17	Sold to City of Torrance	<u>-136.82</u>
18	NORMINGTON, J.E.	0
19	NORRIS, HAZEL F. Second West Coast Basin Judgment	0
20		
21	NORTH AMERICAN AVIATION, INC., a corporation	0
22		
23	NOZAKI, SUMIKICHI Successor in part to Mori, Roy H.	7.0
24	and Kenji Mori	2.0
25	Successor in part to United California Bank	<u>5.0</u>
26	OGLE, WARREN J.	0
27	ORESKOVICH, JACK Harold Walsh one Harold D. Walsh one Marie L. Walsh	0
28		

1	<u>PARTY</u> <u>AND SUCCESSOR, IF ANY</u>	<u>ADJUDICATED RIGHT IN</u> <u>ACRE FEET, ANNUALLY</u>
2		
3	OSBORN, EMMA J. Successor in part to Isabela J. Granz Estate	32.66
4	Sold to R. Barclay and R.A. Watt	<u>-32.66</u>
5		
6	OTANI, CHISATO, sued as John Doe 57	0
7	PACIFIC CREST CEMETERY COMPANY, INC. Successor to H.S. Scott	17.7 9.5
8	Successor to Wada, Kaoru and Satoru Wada	<u>12.2</u>
9		
10	PACIFIC ELECTRIC RAILWAY COMPANY	0
11	PACIFIC WESTERN OIL CORPORATION, a corporation	0
12		
13	PALISADES DEL REY WATER COMPANY (Included in City of Los Angeles)	0
14		
15	PALMER, E.	0
16	PALOS VERDES BEGONIA FARM Successor to Gus A. Bauman	0
17		
18	PALOS VERDES WATER COMPANY, a corporation	999.0
19	Sold to California Water Service Co.	<u>-999.0</u>
20		
21	PARCELL, G.L. AND MARGARET PARCELL one Rosie L. Kent	0
22		
23	PARK WATER COMPANY	160.0
24	PARKE, MRS. ZORAIDA Sold to H.L. Perry	1.8 <u>-1.8</u>
25		
26	PASCHKE, WM. JOSEPH Abandoned Water Right	.02 <u>-.02</u>
27		
28		

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28	<u>PARTY AND SUCCESSOR, IF ANY</u>	<u>ADJUDICATED RIGHT IN ACRE FEET, ANNUALLY</u>
	PATTERSON, ROY	0
	PAULIC, JOHN one John W. Taylor	0
	PEREZ, DAVID Apuleyo Villagomez, sued as A. Villagomez	0
	PERRY, H.L. Successor to Zoraida Parke Sold to Harry C. Jenkins	0 1.8 <u>-1.8</u>
	PERRY SCHOOL DISTRICT OF LOS ANGELES COUNTY	0
	PETERSON, WM. C.	0
	PHILLO, A.E.	0
	PHILLIPS PETROLEUM CO. (Formerly Tidewater Oil Co.) Sold to Gatex Tank Storage Term. Corp.	0 167.0 <u>-167.0</u>
	PIONEER DRILLING COMPANY, a corporation one Southern Heater Corp.	0
	PITTS, EDWARD A. one Clarence E. Harrison one Martha E. Harrison	0
	PLUNKETT, F.D. Second West Coast Basin Judgment	0
	POPSON, JOHN S. Second West Coast Basin Judgment	0
	PRICE, FRANK X.	0
	PRODUCING PROPERTIES, INC. Second West Coast Basin Judgment	0

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PARTY
AND SUCCESSORS, IF ANY

ADJUDICATED RIGHT IN
ACRE FEET, ANNUALLY

PURSCHE, CAROL G. AND CARL P. PURSCHE dba Pursche Pumping Plant Carl G. Pursche Thora Pursche Anna M. Pursche one Guarantee Development Co.	0
QUANDT, CHARLES H. sued as CHARLES A. QUANDT	0
QUINN, RICHARD Martha Quinn	0
RAMOS, JOE B.	0
RANCHO MUTUAL WATER COMPANY	0
RAVEN, J.K. one Andrea S. Teran	0
REED, ELIZABETH E. sued and formerly known as Elizabeth Edna Baker and Josephine Eilers for whom Dominguez Estate Company has been substituted	0
REHOR, FRANK one Josephine P. Rehor	2.2 2.2
REID, LUCILLE G. Ogden G. Reid	0
REIFSNYDER, JEANETTE R., also known as Jeanette Avant, and also known as Jeanette R. Heydenbeck Calvin Wilson Edward E. Wilson, Jr. Harry R. Wilson Harry R. Wilson and Jeanette Reifsnyder, also known as Jeanette Avant, as executors of the estate of Jeanette C. Wilson, deceased. Harry R. Wilson and Jeanette Reifsnyder, also known as Jeanette Avant, as executors of the estate of Robert A. Wilson, deceased (Now known as Jeanette R. Heydenbeck See Heydenbeck, Jeanette R.	0

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28	PARTY <u>AND SUCCESSOR, IF ANY</u>	ADJUDICATED RIGHT IN <u>ACRE FEET, ANNUALLY</u>
	REPUBLIC PETROLEUM COMPANY	0
	RICHARD, LEONCIE, devisee of Anna Richard, deceased, and Edward Richard, sued as John Doe Richard	0
	RICHARDSON, ROSE A. AND WM. T. RICHARDSON one South Normandie Manor, Inc.	0
	RICHFIELD OIL CORPORATION (now known as Atlantic Richfield Co.)	0
	RING OIL COMPANY	0
	ROBINSON, B. AND ASSOCIATES Successor to James K. Lawler Sold in part to Harris Tube Inc. Sold in part to Southern Calif- Water Company	0 3.1 -0.7 <u>-2.4</u>
	ROCKWELL, MICHAEL L. Successor to Bank of America NT & SA (Trust B1-51) Sold to Little, William	0 0.1 <u>-0.1</u>
	RODRIGUEZ, FLAVIO Sold to State of California Abandoned Water Right	0 6.1 -4.0 <u>-2.1</u>
	ROMAN CATHOLIC ARCHBISHOP OF LOS ANGELES (THE), a corporation, sued as Holy Cross Cemetery	72.3
	ROOSEVELT MEMORIAL PARK ASSOCIATION	0
	ROSE, R.E. Clara M. Rose, sued as Jane Doe 8	0
	ROSSER, L.D.	0
	ROYAL MUTUAL WATER COMPANY, a corporation one Delmer D. Kern	0
	RUDD, HOMER E. one Kiyor Ide	0

1	<u>PARTY</u> <u>AND SUCCESSOR, IF ANY</u>	<u>ADJUDICATED RIGHT IN</u> <u>ACRE FEET, ANNUALLY</u>
2		
3	RUFFNER CORPORATION Successor to Louis M. Sepulveda Abandoned Water Right	0 0.7 <u>-0.7</u>
5		
6	RUSS, F.J. one Ted Shpall one Sam H. Shpall	0
7		
8	RYAN AERONAUTICAL COMPANY, a corporation Sold to Southern California Water Co.	0 20.2 <u>-20.2</u>
10		
11	SANDOVAL, YGNACIO	0
12	SAHM, ALBERT J. Second West Coast Basin Judgment	0
13		
14	SANGER, C.W. One Gardena Valley Homes, Inc.	0
15		
16	SANTA FE LAND IMPROVEMENT COMPANY Sold to Hillside Memorial Park	39.5 <u>-39.5</u>
17		
18		
19	SCANDA, JAMES sued as James Scander George Nasim Sold to Donald G. Hunt	0 1.9 <u>-1.9</u>
20		
21		
22	SCHENK, FLOYD H., JR. Cora A. Schenk	0
23		
24	SCHLAEGEL, KEITH W. Opal B. Schlaegel Sold to Sidney R. Title and Charlotte W. Title	13.6 <u>-13.6</u>
26		
27	SCHLAEGETER, EDYTHE L. one James Murakami	0
28		

	<u>PARTY</u> <u>AND SUCCESSOR, IF ANY</u>	<u>ADJUDICATED RIGHT IN</u> <u>ACRE FEET, ANNUALLY</u>
1		
2	SCHRECKENGAST, C.	0
3	SCHULTZ, W.C.	0
4	SCOTT, H.S.	0
5	Successor to W.F. Burke and Lois Price	9.5
6	Quitclaimed to Pacific Crest Cemetery Co.	<u>-9.5</u>
7	SEABACK, ALFRED D. AND RUTH SEABACK	3.5
8	Sold to Leslie R. Flesh and Andor Pasternak, et al.	<u>-3.5</u>
9		
10	SELOVER, MARVIN AND MARY ZWEITER	0
11	one Hitoshi Fujii one Toshije Fujii	
12	SENTOUS HOLDING COMPANY	0
13	SEPULVEDA, L.M.	0
14	SEPULVEDA, LOUIS M. AND SECURITY-FIRST	0.7
15	NATIONAL BANK, as Trustees under the last will and testament of Roman D. Sepulveda, deceased.	
16	Acquired by Ruffner Corporation	<u>-0.7</u>
17	SERVIAN, P.C.	0
18	Ruby H. Renfro	
19	SEWARD, W.H.	0
20	one R.A. Watt Construction Co.	
21	SHAW, JOHN	0
22	Phillip G. Shaw	
23	SHEETS, CLYDE L.	0
24	Esther M. Sheets (see Dennis, Esther M. Sheets)	
25	SHELL OIL COMPANY	4516.0
26	Successor to Lagerlof, Stanley C.	<u>3.5</u>
27	SHEPARD, CHARLES W.	0
28	Second West Coast Basin Judgment	

1	PARTY	ADJUDICATED RIGHT IN
2	<u>AND SUCCESSOR, IF ANY</u>	<u>ACRE FEET, ANNUALLY</u>
3	SHEPHERD, J.M.	0
4	SHIPMAN, JAMES W.	0
5	one Osie R. Shipman	
6	SHINODA BROTHERS, INCORPORATED	0
7	San Lorenzo Nursery Company	
8	Second West Coast Basin Judgment	22.5
9	Sold to Garrett Corporation (The),	
10	et al	<u>-22.5</u>
11	SHORT, SAM, sued as Sam Sciortino	0
12	SHURTLEFF, ELDON B.	0
13	Marcelle Shurtleff	
14	one Barrett Development Corporation	
15	SIDEBOTHAM, EDWARD ROY AND EDWARD	0
16	SIDEBOTHAM & SON., INC., sued as	
17	Edward Sidebotham	
18	SILVA, MRS. MARY	0
19	one Norman A. Leiman	
20	SIMMONS, E.E.	0
21	Second West Coast Basin Judgment	
22	SLOAN, JAMES	0
23	SMITH, A.H.	0
24	Sam Surber and Freda Smith,	9.7
25	sued as Jane Doe 9	
26	Sold in part to the State of Calif.	-2.6
27	Sold in part to Grand Land Company	-5.7
28	Sold in part to L.A. County Flood	
	Control District	<u>-1.4</u>
	SMITH, EUNICE P.	0
	SOCONY MOBIL OIL COMPANY, INC.	0
	(Successor by Merger to General	
	Petroleum Corporation)	
	(See Mobil Oil Corporation)	

	<u>PARTY</u> <u>AND SUCCESSOR, IF ANY</u>		<u>ADJUDICATED RIGHT IN</u> <u>ACRE FEET, ANNUALLY</u>
1			
2			
3	SOUTH BAY UNION HIGH SCHOOL OF LOS ANGELES COUNTY, sued as Redondo Union High School District		0
4			
5	SOUTHERN CALIFORNIA ASSOCIATION OF SEVENTH DAY ADVENTIST Second West Coast Basin Judgment		0
6			
7			
8	SOUTHERN CALIFORNIA EDISON COMPANY Successor to Associated Southern Investment Co.	10.4 <u>46.7</u>	57.1
9			
10	SOUTHERN CALIFORNIA WATER COMPANY Successor to Carmelita Rosecrans Ewing	6265.3 91.3	6548.64
11	Successor to Ryan Aeronautical Company	20.2	
12	Successor to Southern Pacific Company	166.0	
13	Successor in part to Owen W. Curtis	3.44	
14	Successor in part to B. Robinson & Associates	<u>2.4</u>	
15			
16			
17	SOUTHERN PACIFIC COMPANY, sued as Southern Pacific Railroad Co. Sold to So. California Water Co.	166.0 <u>-166.0</u>	0
18			
19			
20	SOUTHWEST PROPERTIES, INC., a corporation		0
21			
22	SOUTHWEST STEEL ROLLING MILLS Successor to A.K. Wilson Lumber Co. Sold to Coast Forest Products	3.4 <u>-3.4</u>	0
23			
24			
25	SOUTHWESTERN PORTLAND CEMENT COMPANY, a corporation Sold to Chandler's Palos Verdes Sand and Gravel Corp.	15.0 <u>-15.0</u>	0
26			
27			
28	SPANISH-AMERICAN INSTITUTE Sold to Futura Industries, Inc.	44.4 <u>-44.4</u>	0

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28	<u>PARTY</u> <u>AND SUCCESSOR, IF ANY</u>	3.5 6.7 18.9 80.5 26.1 3.1 <u>13.8</u>	<u>ADJUDICATED RIGHT IN</u> <u>ACRE FEET, ANNUALLY</u>
	SPARKLETTS DRINKING WATER CORPORATION		152.6
	Successor to Gladys Kurtz	3.5	
	Successor to James McCandless	6.7	
	Successor to Kahlert, et al.	18.9	
	Successor to Rembert C. Anderson, et al,	80.5	
	Successor to State of California	26.1	
	Successor to Wechsler, B.A.	3.1	
	Successor in part to Kelly Pipe Company	<u>13.8</u>	
	STANDARD OIL COMPANY OF CALIFORNIA (See Chevron U.S.A., Inc.)		0
	STAUFFER CHEMICAL COMPANY		521.0
	STEPHENSON, E.R. sued as E.R. Stevenson L.F. Stephenson		0
	STEWART, MRS. A.V.		0
	STRUBLE, CLYDE C. one Ames L. Avers one Clara Avers		0
	SUNSET OIL COMPANY, a corporation		0
	SUPERIOR OIL COMPANY (THE)		0
	SUTHERLAND, LOUISE A., sued as Bertha L. Sutherland		0
	SWICK, PEGGY Sold to Hilario Alwag and Emma Alwag	5.5 <u>-5.5</u>	0
	TAIX, MARIE D. Edith T. Violen, sued as Edith T. Violi		0
	TAMURA, TAKATOSHI one State of California, successor		0

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28	PARTY AND SUCCESSOR, IF ANY	ADJUDICATED RIGHT IN ACRE FEET, ANNUALLY
	TANAKA, GEORGE Reiko Tanaka one Susumu Katsuda	0
	TAYLOR AUTO TRANSPORT Second West Coast Basin Judgment	0
	TEMPLETON, J.A.	0
	TERRY, RUBY one Reldon G. Pinney and one Nellie B. Pinney	0
	TEXACO INC. (formerly The Texas Company)	3432.0
	THAXTER, RALPH, sued as R.F. Thaxter and Lois A. Lenoir Sold to Kenichi Inose	3.5 -3.5
	THORSON HOMES, INC., a corporation J.B. Investment Company, a corporation Anaheim Construction Company, a corporation	0
	TIDEWATER OIL CO., sued as Tide-Water Associated Oil Company (See Phillips Petroleum Company)	0
	TITLE, SIDNEY R. AND CHARLOTTE W. TITLE Successor to Keith W. and Opal B. Schlaegel Sold to ABC Nursery, Inc.	13.6 -13.6
	TORINO, JOSEPH Second West Coast Basin Judgment	0
	XXX	
	XXX	
	XXX	
	XXX	

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28	PARTY AND SUCCESSOR, IF ANY		ADJUDICATED RIGHT IN ACRE FEET, ANNUALLY
	TORRANCE, CITY OF	2519.0	3804.73
	Successor to Alcast Foundry, et al.	7.2	
	Successor to Richard Barclay and R.A. Watt	59.96	
	Successor to Belvidere Mutual Water Company	33.4	
	Successor to Anna Mae Jones	50.2	
	Successor to Moneta Water Company	916.0	
	Successor to Ronald E. Moran	9.0	
	Successor to Normandie Park	136.82	
	Successor to Torrance Unified School District	59.4	
	Successor to R.A. Watt, Inc.	<u>13.75</u>	
	TORRANCE SAND AND GRAVEL CORPORATION		0
	Successor to Weston Investment Co.	184.0	
	Sold to Chandler's Palos Verdes Sand-Gravel Corp.	<u>-184.0</u>	
	TORRANCE UNIFIED SCHOOL DISTRICT		0
	Successor to Hilario S. Alwag and Emma Alwag	59.4	
	Sold to City of Torrance	<u>-59.4</u>	
	TOY, YING		0
	TRAUB, ALBERT A.		0
	Jane P. Traub one Baron Traub		
	TRIMBLE, CLYFF A.		0
	one Mary E. Trimble		
	TUNE, MATES, ET AL.		0
	Successor to Josephine Watkinson	3.1	
	Sold to B.A. Wechsler	<u>-3.1</u>	
	TURNER, OSCAR E.		0
	one Elizabeth Miller Kolf		
	UCHINO, BRUCE		0
	UCHINO, SAKIYO		
	Second West Coast Basin Judgment		

1	<u>PARTY</u> <u>AND SUCCESSOR, IF ANY</u>	<u>ADJUDICATED RIGHT IN</u> <u>ACRE FEET, ANNUALLY</u>
2		
3	UEDA, ALICE M. Second West Coast Basin Judgment	0
4		
5	UNION NURSERY, INCORPORATED Second West Coast Basin Judgment	4.7
6		
7	UNION OIL COMPANY OF CALIFORNIA	2670.0
8	UNION PACIFIC RAILROAD COMPANY Second West Coast Basin Judgment	0
9		0
10	UNITED CALIFORNIA BANK Successor to Ballman, Rosemary N. 7.0	
11	Sold to ABC Nursery, Inc. -2.0	
12	Sold to Nozaki, Sumikichi <u>-5.0</u>	
13	UNITED STATES NAVY DEPARTMENT Transferred from Aluminum Company of America 1.7	*
14	*Long Term Lease to McDonnell Douglas Corp. <u>-1.7</u>	
15		
16	UNITED STATES STEEL CORPORATION Columbia-Geneva Steel Div., successor	1791.0
17	by merger to Columbia Steel Company	
18	UNIVERSAL-CONSOLIDATED OIL COMPANY, a corporation	0
19		
20	URBIE, JOSE	0
21	USSERY, ANNA MAE AND LAWRENCE USSERY one Mike L. Herrback	0
22	one Rae Herrback	
23	VALDEZ, HENRY	0
24	VAN VLIET, A. one Jake Zwaagstra and	0
25	one Jessie M. Zwaagstra	
26	VAN CAMP SEA FOOD COMPANY	0
27	VERBURG, WILLIAMS, sued as Menlo Verburg and	0
28	Clara B. Verburg 6.7 Sold to ABC Nursery, Inc. <u>-6.7</u>	

1	<u>PARTY</u> <u>AND SUCCESSOR, IF ANY</u>	<u>ADJUDICATED RIGHT IN</u> <u>ACRE FEET, ANNUALLY</u>
2		
3	VETTER, MARY	0
4	VILLAGOMEZ, ENRIQUE, A. Ysabel F. Villagomez	0
5		
6	VOLLMER, FRANK J.	0
7	WADA, KARU AND SATORU WADA Transferred from C.F. Johnson Sold to Pacific Crest Cemetery Company	12.2 <u>-12.2</u>
9		
10	WAGNER, EDWIN E.	0
11	WAGNER, J.F. one Orville N. Crafts	0
12		
13	WAGNER, JOSEPH F.	0
14	WAIT, E.J.	0
15	WALKER, PAUL E. Second West Coast Basin Judgment	0
16		
17	WARD, EARL C.	0
18	WARNER, DANIEL E.	0
19	WATKINSON, JOSEPHINE Sold to Mates Tune, et al.	3.1 <u>-3.1</u>
20		
21	WATSON LAND CO., sued as Watson Estate Company Successor in part to Dominguez Water Corporation	80.2 42.6 <u>37.6</u>
22		
23		
24	WATT INDUSTRIAL PROPERTIES Successor to William Little	0.1 0.1
25		
26		
27	XXX	
28	XXX	

	<u>PARTY</u> <u>AND SUCCESSOR, IF ANY</u>	<u>ADJUDICATED RIGHT IN</u> <u>ACRE FEET, ANNUALLY</u>
1		
2	WATT, R.	0
	WATT, R.A.	
3	WATT, R.A., INCORPORATED	
	Watt, R.A. Construction Company	
4	Successor to Ned Ewing, et al	6.5
	Successor in part to Isabela	
5	J. Granz Estate	13.75
	Successor in part to Joughin	
6	Torrance Ranch	55.35
	Sold to Dominguez Water Corp.	-61.85
7	Sold to City of Torrance	<u>-13.75</u>
8	WECHSLER, B.A.	0
	Successor to Mates Tune, et al.	3.1
9	Sold to Sparkletts Drinking	
	Water Corp.	<u>-3.1</u>
10		
11	WEEKS, M.E.	0
12	WESCOTT, FRANK	0
13	WESTON INVESTMENT COMPANY, sued as	184.0
	Richard Roe Co. 2	0
14	one K.S. Senness	
	one Charles W. Shepard	
15	Sold to Torrance Sand and	
	Gravel Corp.	<u>-184.0</u>
16		
17	WESTON, BEN	0
18	WILSON, DON, BUILDERS	0
	Successors to Kasuo Isamu and	
19	Yoshiki R. Kita	32.6
	Sold to Dominguez Water Corp.	<u>-32.6</u>
20		
21	WILSON, A.K., LUMBER COMPANY,	0
	a corporation	
22	one Martin Bros. Box Company	
	of California	3.4
23	Sold to Southwest Steel Rolling	
	Mills	<u>-3.4</u>
24		
25	WIRZ, FRANK	0
26	WISEBURN SCHOOL DISTRICT	8.2
27	XXX	
28		

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PARTY
AND SUCCESSOR, IF ANY

ADJUDICATED RIGHT IN
ACRE FEET, ANNUALLY

WITTSTROM, P.J.	0
WOOLLEY, CORA B. sued as Cora B. Wooley	0
WOODLAND, T.W.	0
WOODLAND CEMETERY ASSOCIATION	0
WOODMAN, KATHERINE P. sued as F.T. Woodman (See Fred A. Jungquist)	0
WOOLNER, HENRY S.	0
WREDEN, MINNIE V. one Golden Monroe Homes, Inc.	0
WRIGHT, A.P. sued as Paul Wright	0
ZIEGLER, MAXWELL	0
ZWEITER, MARY	0

Total 64,468.25

1 IV.

2 Adjudicated Rights Transferable.

3 Any rights decreed and adjudicated herein may be trans-
4 ferred, assigned, licensed or leased by the owner thereof pro-
5 vided, however, that no such transfer shall be complete until
6 compliance with the appropriate notice procedures established
7 by the Watermaster herein.

8 Rights adjudicated herein which are temporarily trans-
9 ferred, licensed or leased shall be considered the production
10 from the Basin on behalf of such transferee, licensee or
11 lesseewhich next follows his production of released exchange
12 pool water, if any.

13 V.

14 Physical Solution - Carry-Over, Excess Production
15 and Drought Carry-Over.

16 1. Carry-over. In order to add flexibility to the
17 operation of this Judgment and to assist in a physical solution
18 to meet the water requirements in the West Basin, each of the
19 parties to this action who is adjudged in Paragraph III here-
20 of to have an Adjudicated Right and who, during a water year,
21 does not extract from the Basin all of such party's Adjudicated
22 Right, is permitted to carry over from such water year the
23 right to extract from the Basin in the next succeeding water
24 year an amount of water equivalent to the excess of his Ad-
25 judicated Right over his extraction during said water year
26 not to exceed, however, 10% of such party's Adjudicated Right
27 or two acre-feet, whichever is the larger.

28 2. Excess Production. In order to meet possible

1 emergencies, each of the parties to this action who is ad-
2 judged in paragraph III hereof to have an Adjudicated Right
3 is permitted to extract from the Basin in any water year for
4 beneficial use an amount in excess of each such party's Ad-
5 judicated Right not to exceed 2 acre-feet or ten per cent
6 (10%) of such party's Adjudicated Rights, whichever is the
7 larger, and in addition thereto, such greater amount as may
8 be approved by the Court. If such greater amount is recom-
9 mended by the Watermaster, such order of Court may be made
10 ex parte. Each such party so extracting water in excess of
11 his Adjudicated Rights shall be required to reduce his ex-
12 tractions below his Adjudicated Rights by an equivalent amount
13 in the water year next following. Such requirement shall be
14 subject to the proviso that in the event the Court determines
15 that such reduction will impose upon such a party, or others
16 relying for water service upon such party, an unreasonable
17 hardship, the Court may grant an extension of time within
18 which such party may be required to reduce his extractions by
19 the amount of the excess theretofore extracted by such party.
20 If such extension of time is recommended by the Watermaster,
21 such order of Court may be granted ex parte.

22 3. Drought Carry-over. By reason of this Court's
23 Orders dated June 2, 1977, and September 29, 1977, for the
24 water years 1976-77 and 1977-78 any party herein (including
25 any successor in interest) can "carry-over" until utilized,
26 any Adjudicated Right (including any authorized carry-over
27 rights from prior years) unexercised during said water years.

28 /

VI.

Physical Solution- Exchange Pool Provisions.

As a further part of said physical solution herein imposed:

1. Mandatory Offer to Exchange Pool. Not less than sixty (60) days prior to the beginning of each water year, each party having supplemental water available to him through then existing facilities, other than water which any such party has the right to extract hereunder, shall file with the Watermaster the offer of such party to release to the Exchange Pool the amount by which such party's Adjudicated Right exceeds one-half of the estimated total required use of water by such party during the ensuing water year, provided that the amount required to be so offered for release shall not exceed the amount such party can replace with supplemental water so available to him.

(a) Basis of Offer to Exchange Pool- Redetermination of Offer by Watermaster. Such estimate of total required use and such mandatory offer shall be made in good faith and shall state the basis on which the offer is made, and shall be subject to review and redetermination by the Watermaster, who may take into consideration the prior use by such party for earlier water years and all other factors indicating the amount of such total required use and the availability of replacement water.

(b) Voluntary Offer to Exchange Pool. Any party filing an offer to release water under the mandatory provisions of this Paragraph VI may also file a voluntary offer to release

1 any part or all of any remaining amount of water which such
2 party has the right under this Judgment to pump or otherwise
3 extract from the Basin, and any party who is not required to
4 file an offer to release water may file a voluntary offer to
5 release any part or all of the amount of water which such party
6 has the right under this Judgment to pump or otherwise extract
7 from the Basin. All such voluntary offers shall be made not
8 less than sixty (60) days prior to the beginning of each water
9 year.

10 2. Price of Water Offered to Exchange Pool. Each offer
11 to release water under the foregoing subparagraph [1 (a) and 1 (b)]
12 shall be the price per acre-foot declared and determined at the
13 time of the filing of such offer by the releasing party; provided:

14 (a) Replacement Cost. That such price per acre-
15 foot shall not exceed the price which the releasing party would
16 have to pay to obtain from others, in equal monthly amounts,
17 through existing facilities, a quantity of supplemental water
18 equal in amount to that offered to be released; or

19 (b) Maximum Price. If any such releasing party has
20 no existing facilities through which to obtain water from others,
21 such price shall not exceed the sum of the price per acre-foot
22 charged by The Metropolitan Water District of Southern Cali-
23 fornia to West Basin Municipal Water District plus the addition-
24 al amount per acre-foot charged by the latter to municipali-
25 ties and public utilities for water received from said Metro-
26 politan Water District.

27 3. Price Dispute-Objection - Watermaster Determination-
28 Court Determination. In the event of a dispute as to any price

1 at which water is offered for release, any party affected
2 thereby may, within thirty (30) days thereafter, by an ob-
3 jection in writing, refer the matter to the Watermaster for
4 determination. Within thirty (30) days after such objection
5 is filed the Watermaster shall consider said objection and
6 shall make his finding as to the price at which said water
7 should be offered for release and notify all interested
8 parties thereof. Any party in compliance to these Exchange
9 Pool Provisions may file with the Court, within thirty (30)
10 days thereafter, any objection to such finding or determin-
11 ation of the Watermaster and bring the same on for hearing
12 before the Court at such time as the Court may direct, after
13 first having served said objection upon each of the interested
14 parties. The Court may affirm, modify, amend or overrule such
15 finding or determination of the Watermaster. Pending such
16 determination if the water so offered has been allocated, the
17 party making the offer shall be paid the price declared in his
18 offer, subject to appropriate adjustment upon final determin-
19 ation. The costs of such determination shall be apportioned or
20 assessed by the Watermaster in his discretion between or to the
21 parties to such dispute, and the Watermaster shall have the
22 power to require, at any time prior to making such determin-
23 ation, any party or parties to such dispute to deposit with the
24 Watermaster funds sufficient to pay the cost of such determin-
25 ation, subject to final adjustment and review by the Court as
26 provided in this Paragraph.

27 4. Request For Water From Exchange Pool. Not less than
28 sixty (60) days prior to the beginning of each water year any

1 party whose estimated required use of water during the ensuing
2 water year exceeds the sum of the quantity of water which such
3 party has the right under this Judgment to extract from the
4 Basin and the quantity available to him through then existing
5 facilities, may file with the Watermaster a request for the
6 release of water in the amount that his said estimated use ex-
7 ceeds his said available supply. Such request shall be made
8 in good faith and shall state the basis upon which the request
9 is made, and shall be subject to review and redetermination by
10 the Watermaster. Within thirty (30) days thereafter the Water-
11 master shall advise, in writing, those requesting water of the
12 estimated price thereof. Any party desiring to amend his re-
13 quest by reducing the amount requested may do so after the service
14 of such notice. Prior to the first day of each water year the
15 Watermaster shall determine if sufficient water has been of-
16 fered to satisfy all requests. If he determines that sufficient
17 water has not been offered he shall reduce such requests pro
18 rata in the proportion that each request bears to the total
19 of all requests. Thereupon, not later than said first day of
20 each water year, he shall advise all parties offering to re-
21 lease water of the quantities to be released by each and ac-
22 cepted in the Exchange Pool and the price at which such water
23 is offered. Simultaneously, he shall advise all parties re-
24 questing water of the quantities of released water allocated
25 from the Exchange Pool and to be taken by each requesting party
26 and the price to be paid therefor.

27 5. Allocation of Exchange Pool Water by Watermaster.

28 In allocating water which has been offered for release to the

1 Exchange Pool under subparagraph 1 hereof, the Watermaster
2 shall first allocate that water required to be offered for
3 release and which is offered at the lowest price pursuant to
4 subparagraph 2 hereof, and progressively thereafter at the next
5 lowest price or prices. If the aggregate quantity of water
6 required to be released is less than the aggregate quantity
7 of all requests for the release of water made pursuant to
8 subparagraph 4 hereof, he shall then allocate water volun-
9 tarily offered for release and which is offered at the lowest
10 price and progressively thereafter at the next lowest price
11 or prices, provided that the total allocation of water shall
12 not exceed the aggregate of all such requests.

13 Any water offered for release under subparagraph 1
14 hereof and not accepted in the Exchange Pool and not allocated
15 therefrom shall be deemed not to have been offered for release
16 and may be extracted from the Basin by the party offering the
17 same as if such offer had not been made.

18 Each party requesting the release of water for his
19 use and to whom released water is allocated from the Exchange
20 Pool may thereafter, subject to all of the provisions of this
21 Judgment, extract such allocated amount of water from the Basin,
22 in addition to the amount such party is otherwise entitled to
23 extract hereunder during the water year for which the allocation
24 is made.

25 6. Exchange Pool Water Pumped Before Pumper's Own Right.
26 From and after the first day of each water year, all water ex-
27 tracted from the Basin by any party requesting the release of
28 water and to whom such water is allocated shall be deemed to have

1 been water so released until the full amount released for
2 use by him shall have been taken, and no such party shall be
3 deemed to have extracted from the Basin any water under his
4 own right so to do until said amount of released water shall
5 have been extracted. Water extracted from the Basin by parties
6 pursuant to their request for the release of water shall be
7 deemed to have been taken by the offerors of such water under
8 their own rights to extract water from the Basin.

9 7. Price and Payment For Water Released for Exchange
10 Pool. All parties allocated water under subparagraph 4 here-
11 of shall pay a uniform price per acre-foot for such water,
12 which price shall be the weighted average of the prices at
13 which all the water allocated was offered for release.

14 Each party shall pay to the Watermaster, in five equal
15 monthly installments during the applicable water year, an
16 amount equal to the quantity of water allocated to him multi-
17 plied by said uniform price. The Watermaster shall bill each
18 such party monthly for each such installment, the first such
19 billing to be made on or before the first day of the second
20 month of the water year involved, and payment therefor shall
21 be made to the Watermaster within thirty (30) days after the
22 service of each such statement. If such payment be not made
23 within said thirty (30) days such payment shall be delinquent
24 and a penalty shall be assessed thereon at the rate of 1% per
25 month until paid. Such delinquent payment, including penalty,
26 may be enforced against any party delinquent in payment by
27 execution or by suit commenced by the Watermaster or by any
28 party hereto for the benefit of the Watermaster.

1 Promptly upon receipt of such payment, the Watermaster
2 shall make payment for the water released and allocated, first,
3 to the party or parties which offered such water at the lowest
4 price, and then through successive higher offered prices up
5 to the total allocated.

6 VII.

7 Additional Pumping Allowed Under Agreement With
8 Central and West Basin Water Replenishment District, During
9 Periods of Emergency.

10 Central and West Basin Water Replenishment District,
11 a public corporation of the State of California, (Division 18,
12 commencing with Section 60,000 of the Water Code), hereinafter
13 "Replenishment District" , overlies West Basin and engages in
14 activities of replenishing the ground waters thereof.

15 During an actual or threatened temporary shortage of the
16 imported water supply to West Basin, Replenishment District may,
17 by resolution, determine to subsequently replenish the Basin
18 for any water produced in excess of a party's adjudicated rights
19 hereunder, within a reasonable period of time , pursuant to
20 agreements with such parties (to a maximum of 10,000 acre feet),
21 under the terms and conditions hereinafter set forth.

22 (a) Notwithstanding any other provision of this
23 Judgment, parties (including successors in interest) who are
24 water purveyors, as hereinabove defined, are authorized to
25 enter into agreements with Replenishment District under which
26 such water purveyors may exceed their Adjudicated Rights for
27 a particular water year when the following conditions are met:

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- (1) Replenishment District is in receipt of a resolution of the Board of Directors of The Metropolitan Water District of Southern California ("MWD") stating there is an actual or immediately threatened temporary shortage of MWD's imported water supply compared to MWD's needs, or a temporary inability to deliver MWD's imported water supply throughout its area, which will be alleviated in part by over-pumping from West Basin.
- (2) The Board of Directors of both Replenishment District and West Basin Municipal Water District (WBMWD), by resolutions, concur in the resolution of MWD's Board of Directors and each determine that the temporary overproduction in West Basin will not adversely affect the integrity of the Basin or the sea water barrier maintained along the Coast of West Basin.
- (3) In said resolution, Replenishment District's Board of Directors shall set a public hearing, and notice the time, place and date thereof (which may be continued from time to time without further notice) and which said notice shall be given by First Class Mail to the current designees of the parties, filed and served in accord-

1 ance with Paragraph IX of this Judgment.
2 Said notice shall be mailed at least
3 ten (10) days before said scheduled
4 hearing date.

5 (4) At said public hearing, parties (includ-
6 ing successors in interest) shall be
7 given full opportunity to be heard, and
8 at the conclusion thereof the Board of
9 Directors of Replenishment District by
10 resolution decides to proceed with agree-
11 ments under this Paragraph VII.

12 (b) All such agreements shall be subject to the
13 following requirements, and such reasonable others as Replenish-
14 ment District's Board of Directors shall require:

15 (1) They shall be of uniform content except
16 as to the quantity involved, and any special
17 provisions considered necessary or de-
18 sirable with respect to local hydrologi-
19 cal conditions or good hydrologic practice.

20 (2) They shall be offered to all water pur-
21 veyors, excepting those which Replenish-
22 ment District's Board of Directors de-
23 termine should not over-pump because such
24 over-pumping would occur in undesirable
25 proximity to a sea water barrier project
26 designed to forestall sea water intrusion,
27 or within, or in undesirable proximity to,
28 an area within West Basin wherein ground-

1 water levels are at an elevation where
2 over-pumping is, under all the circum-
3 stances, then undesirable.

4 (3) The maximum terms for the agreements shall
5 be four months, all of which said agree-
6 ments shall commence and end on the same
7 day (and which may be executed at any time
8 within said four month period), unless an
9 extension thereof is authorized by the
10 Court, under this Judgment.

11 (4) They shall contain provisions that the
12 water purveyor executing the agreement
13 pay to the Replenishment District a price,
14 in addition to the applicable replenish-
15 ment assessment, determined on the follow-
16 ing formula: The price per acre foot of
17 WEMWD's treated domestic and municipal water for
18 the water year in which the agreement is
19 to run, less the total of: (a) an amount
20 per acre foot as an allowance on account
21 of incremental cost of pumping, as de-
22 termined by Replenishment District's
23 Board of Directors; and (b) the rate of
24 the replenishment assessment of Replenish-
25 ment District for the same fiscal year.
26 If the term of the agreement is for a period
27 which will be partially in one fiscal year
28 and partially in another, and a change in

1 either or both the price per acre foot
2 of WBMWD's treated domestic and municipal
3 water and rate of the replenishment
4 assessment of Replenishment District is
5 scheduled, the price formula shall be de-
6 termined by averaging the scheduled changes
7 with the price and rate then in effect,
8 based on the number of months each will
9 be in effect during the term of the agree-
10 ment. Any price for a partial acre foot
11 shall be computed pro rata. Payments shall
12 be due and payable on the principle that
13 over-extractions under the agreement are
14 the last water pumped in the fiscal year,
15 and shall be payable as the agreement
16 shall provide.

17 (5) They shall contain provisions that:

18 (a) All of such agreements (but not less
19 than all) shall be subject to termination
20 by Replenishment District if, in the Judg-
21 ment of Replenishment District's Board of
22 Directors, the conditions or threatened
23 conditions upon which they were based have
24 abated to the extent over-extractions are
25 no longer considered necessary; and

26 (b) that any individual agreement or
27 agreements may be terminated if the Re-
28 plenishment District's Board of Directors

1 finds that adverse hydrologic circum-
2 stances have developed as a result of
3 over-extractions by any water purveyor
4 or purveyors which have executed said
5 agreements, or for any other reason that
6 Replenishment District's Board of Di-
7 rectors finds good and sufficient.

8 (c) Other matters applicable to such agreements
9 and over-pumping thereunder are as follows, and to the extent
10 they would affect obligations of the Replenishment District they
11 shall be anticipated in said agreements:

- 12 (1) The quantity of over-pumping permitted
13 shall be additional to that which the
14 water purveyor could otherwise over-pump
15 under this Judgment.
- 16 (2) The total quantity of permitted over-
17 pumping under all said agreements during
18 said four months shall not exceed ten
19 thousand (10,000) acre feet, but the
20 individual water purveyor shall not be
21 responsible or affected by any violation
22 of this requirement. That total is ad-
23 ditional to over-extractions otherwise
24 permitted under this Judgment.
- 25 (3) Only one four month period may be utilized
26 by Replenishment District in entering into
27 such agreements, as to any one emergency
28 or continuation thereof declared by MWD's

1 Board of Directors under sub-paragraph
2 6 (a) hereof.

3 (4) The ex parte provisions of this Judgment
4 may be utilized in lieu of the authority
5 contained herein (which ex parte pro-
6 visions are not limited as to time, nature
7 or relief, or terms of any agreements),
8 but neither Replenishment District nor
9 any other party shall utilize both as to
10 any one such emergency or continuation
11 thereof.

12 (5) If any party claims that it is being damaged
13 or threatened with damage by the over-ex-
14 tractions by any party to such an agree-
15 ment, the Watermaster or any party hereto
16 may seek appropriate action of the Court
17 for termination of any such agreement upon
18 notice of hearing given by the party com-
19 plaining, to the party to said agreement,
20 to the Replenishment District, and to all
21 parties who have filed a request herein
22 for such special notice. Any such term-
23 ination shall not affect the obligation
24 of the terminated party to make payments
25 under the agreement for over-extractions
26 which previously occurred thereunder.

27 (6) Replenishment District shall maintain
28 separate accounting and a separate fund

1 of the proceeds from payments made pur-
2 suant to agreements entered into under
3 this Paragraph VII. Said fund shall be
4 utilized solely for purposes of replenish-
5 ment and the replacement of waters in
6 West Basin. Replenishment District shall,
7 as soon as practicable, cause replenish-
8 ment in West Basin by the amounts to be
9 overproduced pursuant to this Paragraph
10 VII, whether through spreading, injection,
11 or in-lieu agreements.

12 (7) Over-extractions made pursuant to the
13 said agreements shall not be subject to
14 the "make up" provisions of this Judgment,
15 as amended, provided, that if any party
16 fails to make payments as required by the
17 agreement, Watermaster may require such
18 "make up" under Paragraph V hereof.

19 (8) Water Purveyor under any such agreement
20 may, and is encouraged to, enter into ap-
21 propriate arrangements with customers who
22 have water rights in West Basin under or
23 pursuant to this Judgment, whereby the
24 Water Purveyor will be assisted in meet-
25 ing the objectives of the agreement.

26 (9) Nothing in this Paragraph VII limits the
27 exercise of the reserved and continuing
28 jurisdiction of the court as provided in
29 Paragraph XIV hereof.

VIII.

Injunction.

On and after the date hereof, each of the parties hereto, their successors and assigns, and each of their agents, employees, attorneys, and any and all persons acting by, through, or under them or any of them, are and each of them is hereby perpetually enjoined and restrained from pumping or otherwise extracting from the Basin any water in excess of said party's Adjudicated Rights, except as provided in Paragraphs V, VI, and VII hereof.

IX.

Order of Pumping Credit.

Production of water from the Basin for the use or benefit of the parties hereto shall be credited to each such party in the following order:

1. Exchange Pool production (Paragraph VI).
2. Leased or licensed production (Paragraph IV).
3. Normal carry-over (Paragraph V, 1).
4. Adjudicated Right (Paragraph III).
5. Drought carry-over (Paragraph V, 3).
6. Emergency Production under Agreement with Replenishment District (Paragraph VII).

X.

Loss of Decreed Rights.

It is in the best interests of the parties herein and the reasonable beneficial use of the Basin and its water supply that no party be encouraged to take and use more water than is actually required. Failure to produce all of the water to which a party is entitled hereunder shall not, in and of itself, be

1 deemed or constitute an abandonment of such party's right in
2 whole or in part.

3 No taking of water under Paragraphs III, V, VI and VII here-
4 of, by any party to this action shall constitute a taking adverse
5 to any other party; nor shall any party to this action have
6 the right to plead the statute of limitations or an estoppel
7 against any other party by reason of his said extracting of
8 water from the Basin pursuant to a request for the release of
9 water; nor shall such release of water to the Exchange Pool by
10 any party constitute a forfeiture or abandonment by such party
11 of any part of his Adjudicated Right to water; nor shall such
12 release in anywise constitute a waiver of such right although
13 such water, when released under the terms of this Judgment may
14 be devoted to a public use; nor shall such release of water by
15 any such party in anywise obligate any party so releasing to
16 continue to release or furnish water to any other party or his
17 successor in interest, or to the public generally, or to any
18 party thereof, otherwise than as provided herein.

19 XI.

20 Watermaster Appointment.

21 The Watermaster shall be the Department of Water Re-
22 sources of the Resources Agency of the State of California,
23 to serve at the pleasure of the Court, and said Watermaster shall
24 administer and enforce the provisions of this Judgment and the
25 instructions and subsequent orders of this Court, and shall have
26 the powers and duties hereinafter set forth. If any such pro-
27 visions, instructions or orders of the Court shall have been dis-
28 obeyed or disregarded, said Watermaster is hereby empowered and

1 directed to report to the Court such fact and the circumstances
2 connected therewith and leading thereto.

3 XII.

4 Watermaster- Powers and Duties.

5 In order to assist the Court in the administration and en-
6 forcement of the provisions of this Judgment and to keep the
7 Court fully advised in the premises, the Watermaster shall have
8 the following duties in addition to those provided for elsewhere
9 herein:

10 1. Parties to Measure and Record Static Water Level
11 of Each Well. The Watermaster may require each party, at such
12 party's own expense, to measure and record not more often than
13 once a month, the elevation of the static water level in such of
14 his wells in the Basin as are specified by the Watermaster.

15 2. Parties to Install Meters on Wells and Record Pro-
16 duction Therefrom. The Watermaster may require any party hereto
17 owning any facilities for pumping or otherwise extracting water
18 from the Basin, at such party's own expense, to install and at
19 all times maintain in good working order, mechanical measuring
20 devices, approved by the Watermaster, and keep records of water
21 production, as required by the Watermaster, through the use of
22 such devices. However, if in the opinion of the Watermaster
23 such mechanical devices are not practicable or feasible, the
24 Watermaster may require such party to submit estimates of his
25 water production, together with such information and data as is
26 used by such party in making such estimate. Upon the failure
27 of any party to install such device or devices on or before the
28 date the Watermaster shall fix for such installation, or to

1 provide the Watermaster with estimates of water production and
2 information on which such estimates are based, the Watermaster
3 may give the Court and the party notice of such failure for
4 proper action in the premises.

5 3. Watermaster to Assemble Records and Data and Evaluate
6 Same. The Watermaster shall collect and assemble the records
7 and other data required of the parties hereto, and evaluate such
8 records and other data. Such records and other data shall be
9 open to inspection by any party hereto or his representative
10 during normal business hours.

11 4. Watermaster's Annual Budget. The Watermaster shall pre-
12 pare a tentative budget for each water year, stating the estimated
13 expense for administering the provisions of this Judgment. The
14 Watermaster shall mail a copy of said tentative budget to the
15 designee of each of the parties hereto having an Adjudicated
16 Right, at least sixty (60) days before the beginning of each water
17 year. If any such party has any objection to said tentative
18 budget or any suggestions with respect thereto, he shall present
19 the same in writing to the Watermaster within fifteen (15) days
20 after service of said tentative budget upon him. If no object-
21 ions are received, the tentative budget shall become the final
22 budget. If objections to said tentative budget are received,
23 the Watermaster shall, within ten (10) days thereafter, consider
24 such objections, prepare a final budget, and mail a copy there-
25 of to each such party's designee, together with a statement of
26 the amount assessed to each such party, computed as provided in
27 subparagraph 5 of this Paragraph XII. Any such party whose ob-
28 jections to said tentative budget are denied in whole or in part

1 by the Watermaster may, within fifteen (15) days after the service
2 of the final budget upon him, make written objection thereto by
3 filing his objection with the Court after first mailing a copy of
4 such objection to each party's designee, and shall bring such
5 objection on for hearing before the Court at such time as the
6 Court may direct. If objection to such budget be filed with
7 the Court as herein provided, then the said budget and any and
8 all assessments made as herein provided may be adjusted by the
9 Court following said hearing.

10 5. Watermaster's Fees as Parties' Costs. The fees,
11 compensation or other expenses of the Watermaster hereunder
12 shall be borne by the parties hereto having Adjudicated Rights
13 in the proportion that each such party's Adjudicated Right
14 bears to the total Adjudicated Rights of all such parties, and
15 the Court or Watermaster shall assess such costs to each such
16 party accordingly.

17 Payment thereof, whether or not subject to adjustment by
18 the Court as provided in this Paragraph XII, shall be made by
19 each such party, on or prior to the beginning of the water year
20 to which said final budget and statement of assessed costs is
21 applicable. If such payment by any party is not made on or be-
22 fore said date, the Watermaster shall add a penalty of 5% there-
23 of to such party's statement. Payment required of any party
24 hereunder may be enforced by execution issued out of the Court,
25 or as may be provided by any order hereinafter made by the Court,
26 or by other proceedings by the Watermaster or by any party hereto
27 on the Watermaster's behalf.

28 All such payments and penalties received by the Watermaster

1 shall be expended by him for the administration of this Judgment.
2 Any money remaining at the end of any water year shall be avail-
3 able for such use in the following water year.

4 6. Watermaster's Annual Report. The Watermaster shall
5 prepare an annual report within ninety (90) days after the end
6 of each water year covering the work of the Watermaster during
7 the preceding water year and a statement of his receipts and
8 expenditures.

9 7. Watermaster Report to Contain All Basin Production.
10 The Watermaster shall report separately, in said annual report,
11 all water extractions in the Basin, including that by producers
12 who have no "Adjudicated Right."

13 8. Watermaster Rules and Regulations. The Watermaster
14 may prescribe such reasonable Rules and Regulations as will
15 assist him in the performance of his duties hereunder.

16 9. Other Watermaster Duties. The Watermaster shall per-
17 form such other duties as directed by the Court and as may be
18 otherwise provided by law.

19 XIII.

20 Objection to Watermaster Determination -Notice Thereof
21 and Hearing Thereon.

22 Any party hereto having an Adjudicated Right who has
23 objection to any determination or finding made by the Watermaster,
24 other than as provided in Paragraphs VI and XII hereof, may make
25 such objection in writing to the Watermaster within thirty (30)
26 days after the date the Watermaster gives written notice of the
27 making of such determination or finding, and within thirty (30)
28 days thereafter the Watermaster shall consider said objection

1 and shall amend or affirm such finding or determination and
2 shall give notice thereof to all parties hereto having Adjudi-
3 cated Rights. Any such party may file with the Court within
4 thirty (30) days from the date of said notice any objection to
5 such final finding or determination of the Watermaster and bring
6 the same on for hearing before the Court at such time as the
7 Court may direct, after first having served said objection upon
8 each of the parties hereto having an Adjudicated Right. The
9 Court may affirm, modify, amend or overrule any such finding or
10 determination of the Watermaster.

11 XIV.

12 Reserved and Continuing Jurisdiction of Court.

13 The Court hereby reserves continuing jurisdiction and,
14 upon application of any party hereto having an Adjudicated Right
15 or upon its own motion, may review (1) its determination of the
16 safe yield of the Basin, or (2) the Adjudicated Rights, in the
17 aggregate, of all of the parties as affected by the abandonment
18 or forfeiture of any such rights, in whole or in part, and by
19 the abandonment or forfeiture of any such rights by any other
20 person or entity, and, in the event material change be found,
21 to adjudge that the Adjudicated Right of each party shall be
22 ratably changed; provided, however, that notice of such review
23 shall be served on all parties hereto having Adjudicated Rights
24 at least thirty (30) days prior thereto. Except as provided
25 herein, and except as rights decreed herein may be abandoned
26 or forfeited in whole or in part, each and every right decreed
27 herein shall be fixed as of the date of the entry hereof.

28 /

XV.

Judgment Modifications and Further Orders of Court.

The Court further reserves jurisdiction so that at any time, and from time to time, upon its own motion or upon application of any party hereto having an Adjudicated Right, and upon at least thirty (30) days notice to all such parties, to make such modifications of or such additions to, the provisions of this Judgment, or make such further order or orders as may be necessary or desirable for the adequate enforcement, protection or preservation of the Basin and of the rights of the parties as herein determined.

XVI.

Subsequent Change From Water Year to Fiscal Year.

"Water year" as used in Paragraphs V, VI, VII and XII hereof shall, beginning with the first "fiscal year" (July 1 - June 30) commencing at least four months after this "Amended Judgment" becomes final, and thereafter, mean the "fiscal year". Since this changeover will provide a transitional accounting period of nine months, October 1 - June 30, notwithstanding the findings and determinations in the annual Watermaster Report for the last preceding water year, the Adjudicated Right of each of the parties hereto permitted to be extracted from the West Basin for said transitional accounting period shall be on the basis of three-quarters of each said party's otherwise Adjudicated Right. The Watermaster herein shall convert the times of his duties hereunder, including the rendition of a nine month report for the said transitional accounting period (October 1 - June 30), to coincide with the changeover from the water year to the fiscal

1 year hereunder.

2 XVII.

3 Designees of Parties For Future Notice and Service.

4 Service of this "Amended Judgment" on those parties who
5 have executed and filed with the Court "Agreement and Stipula-
6 tion for Judgment" or otherwise have named a designee, filed
7 the same herein and have therein designated a person there-
8 after to receive notices, requests, demands, objections, reports,
9 and all other papers and processes in this cause, shall be made
10 by first class mail, postage prepaid, addressed to such de-
11 signees (or their successors) and at the address designated for
12 that purpose.

13 Each party who has not heretofore made such a designa-
14 tion shall, within thirty (30) days after the Amended Judgment
15 herein shall have been served upon that party or his designee,
16 file with the Court, with proof of service of a copy thereof
17 upon the Watermaster, a written designation of the person to
18 whom and the address at which all future notices, determinations,
19 requests, demands, objections, reports and other papers and
20 processes to be served upon that party or delivered to that
21 party, are to be so served or delivered.

22 A later substitute or successor designation filed and
23 served in the same manner by any party shall be effective from
24 the date of such filing as to the then future notices, determin-
25 ations, requests, demands, objections, reports and other papers
26 and processes to be served upon or delivered to that party.

27 Delivery to or service upon any party by the Watermaster,
28 by any other party, or by the Court, of any item required to be

1 served upon or delivered to a party under or pursuant to this
2 Judgment, may be by deposit in the mail, first class, postage
3 prepaid, addressed to the latest designee and at the address
4 in said latest designation filed by that party.

5 Parties hereto who have not entered their appearance or
6 whose default has been entered and who are adjudged herein to
7 have an Adjudicated Right, and who have not named a designee
8 for service herein, shall be served with all said future notices,
9 papers and process herein, and service herein shall be ac-
10 complished, by publication of a copy of such said notice, paper
11 or process addressed to, "Parties to the West Basin Adjudication";
12 said publication shall be made once each week for two succes-
13 sive weeks in a newspaper of general circulation, printed and
14 published in the County of Los Angeles, State of California,
15 and circulated within the West Basin Area; the last publication
16 of which shall be at least two weeks and not more than five
17 weeks immediately preceding the event for which said notice is
18 given or immediately preceding the effective date of any order,
19 paper or process; in the event an effective date other than the
20 date of its execution is fixed by the Court in respect of any
21 order, paper or process, said last publication shall be made
22 not more than five weeks following an event, the entry of an
23 order by the Court, or date of any paper or process with respect
24 to which such notice is given.

25 XVIII.

26 Intervention of Successors In Interest and New Parties.

27 Any person who is not a party herein or successor to
28 such party and who proposes to produce water from the Basin may

1 seek to become a party to this Judgment, through a Stipulation
2 In Intervention entered into with the Watermaster. Watermaster
3 may execute said Stipulation on behalf of the other parties here-
4 in, but such Stipulation shall not preclude a party from op-
5 posing such intervention at the time of the court hearing there-
6 on. Said Stipulation for Intervention must thereupon be filed
7 with the Court, which will consider an order confirming said
8 intervention following thirty (30) days notice thereof to the
9 parties, served as herein provided. Thereafter, if approved
10 by the Court, such Intervenors shall be a party herein, bound
11 by this Judgment and entitled to the rights and privileges
12 accorded under the physical solution imposed herein.

13 XIX.

14 Judgment Binding on Successors.

15 Subject to the specific provisions hereinbefore con-
16 tained, this Judgment and all provisions thereof are applicable
17 to, binding upon and inure to the benefit of not only the parties
18 to this action, but as well to their respective heirs, ex-
19 ecutors, administrators, successors, assigns, lessees, licensees
20 and to the agents, employees and attorneys-in-fact of any such
21 persons.

22 XX.

23 Effect of Amended Judgment on Orders Heretofore Made
24 and Entered Herein.

25 This Amended Judgment shall not abrogate the rights of
26 any additional carry-over of unused Adjudicated Rights of the
27 parties herein, as may exist pursuant to the Orders herein
28 filed June 2, 1977, and September 29, 1977.

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XXI.

Costs.

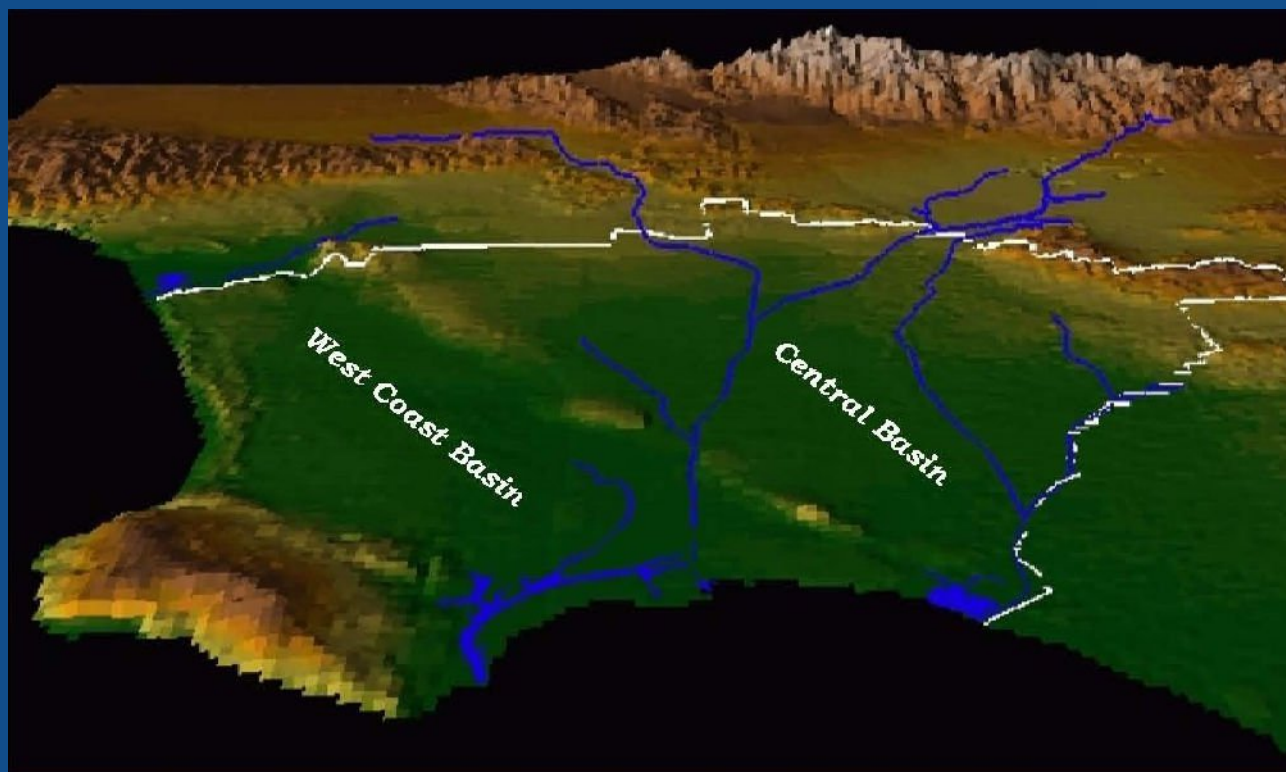
None of the parties hereto shall recover his costs as against any other party.

The Clerk shall enter this Amended Judgment forthwith.

Dated: March 21, 1980.

Julius A. Title
Judge Specially Assigned

Water Replenishment District of Southern California



Engineering Survey and Report



2015

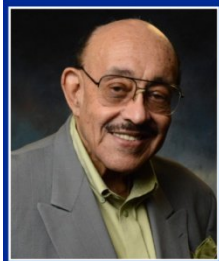
March 5, 2015

Updated:
May 1, 2015

Water Replenishment District Of Southern California

ENGINEERING SURVEY AND REPORT, 2015 Updated May 1, 2015

Board of Directors



Willard H. Murray, Jr.
Division One



Robert Katherman
Division Two



John D. S. Allen
Division Three



Sergio Calderon
Division Four



Albert Robles
Division Five

Management Staff

Robb Whitaker, PE
Ken Ortega, PE
Ted Johnson, PG/CHG
Scott Ota, CPA
Francisco Leal

General Manager
Assistant General Manager
Chief Hydrogeologist
Chief Financial Officer
Interim District Counsel

Professional Certification

This Engineering Survey and Report has been prepared under the direct supervision of the California Professional Geologist whose signature appears below. This individual certifies that the information contained in the report has been prepared in accordance with the generally accepted principles and practices of his profession.



Theodore A. Johnson, PG, CHG
Chief Hydrogeologist





MEMORANDUM

DATE: MAY 1, 2015

TO: INTERESTED PARTIES

FROM: ROBB WHITAKER, GENERAL MANAGER

SUBJECT: UPDATED 2015 ENGINEERING SURVEY AND REPORT

The Water Replenishment District of Southern California (“WRD” or “District”) is the groundwater management agency responsible for safe and reliable groundwater in the Central Basin and West Coast Basin in southern coastal Los Angeles County. Groundwater constitutes nearly 40% of the total water demand used by the 4 million residents and businesses in the 43 cities in the WRD service area.

On March 5, 2015, WRD completed an Engineering Survey and Report (“ESR”) as required by the California Water Code (Section 60300) to present information on the past, current, and anticipated future conditions in the two groundwater basins. Information is presented on groundwater pumping, groundwater conditions (water levels, overdraft, changes in storage), projects related to groundwater supply and quality, and the amount, sources, and cost of replenishment water needed to replace the annual pumping overdraft.

According to Water Code Section 60305, the ESR must be completed by March of each year. However, the annual Replenishment Assessment (“RA”) assessed on groundwater production is set later in April or May. During the time frame between the March ESR and the adoption of the RA, new and updated information is sometimes received that results in necessary edits to the ESR after adoption of the RA. To document any changes, the District publishes an updated ESR following adoption of the RA. This May 1, 2015 ESR updates and replaces the earlier March 5, 2015 report and contains the latest information on replenishment water sources and costs within the District.

Updated information includes the following:

- On May 1, 2015, the WRD Board of Directors adopted the 2015/2016 RA at \$283 per acre foot (AF) of groundwater pumped within the WRD Service area, which is a 5.6% increase from the current rate of \$268. This new RA will go into effect July 1, 2015 and will be in effect through June 30, 2016. This information was added to the report as appropriate.

- Several formatting changes to the March report were made, including Table of Contents edits and font changes.
- No other significant changes were made to the report.

My staff and I welcome any comments or questions you may have regarding this updated ESR. Additional copies are available by calling the District at (562) 921-5521 or by downloading it from our web site at <http://www.wrd.org>. Thank you for your interest on groundwater conditions in the WRD Service Area.

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Plate 2: Groundwater Elevation Contour Map for Fall 2014

Plate 3: Change in Groundwater Levels Fall 2013 to Fall 2014

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GLOSSARY OF ACRONYMS

ABP	Alamitos Barrier Project
AF	Acre-Feet (equivalent to 325,851 gallons)
AFY	Acre-Feet per Year
APA	Allowed Pumping Allocation
BAC	Budget Advisory Committee
BoS	Bureau of Sanitation (City of Los Angeles Dept. of Public Works)
CB	Central Basin
CBMWD	Central Basin Municipal Water District
CDPH	California Department of Public Health (now Division of Drinking Water)
CEC	Constituents of Emerging Concern
CEQA	California Environmental Quality Act
CHG	California Certified Hydrogeologist
CIP	Capital Improvement Program
CPI	Consumer Price Index
CBWCB	Central Basin and West Coast Basin
DDW	State Water Resources Control Board – Division of Drinking Water
DGBP	Dominguez Gap Barrier Project
DTSC	California Department of Toxic Substances Control
DWR	California Department of Water Resources
EIR	Environmental Impact Report
EPA	U.S. Environmental Protection Agency
ESR	Engineering Survey and Report
FY	Fiscal Year (July 1 – June 30)
GAC	Granular Activated Carbon
GIS	Geographic Information System
GRIP	Groundwater Reliability Improvement Program
IRWMP	Integrated Regional Water Management Plan
LACDHS	Los Angeles County Department of Health Services
LACDPW	Los Angeles County Department of Public Works (Flood Control)
LADWP	City of Los Angeles Department of Water and Power
LBWD	City of Long Beach Water Department
MAR	Managed Aquifer Recharge
Met	Metropolitan Water District of Southern California
MCL	Maximum Contaminant Level
MF	Microfiltration
MFI	Modified Fouling Index

Glossary of Acronyms

mgd	Million Gallons per Day
MOU	Memorandum of Understanding
msl	Mean Sea Level
MWD	Metropolitan Water District of Southern California
NDMA	N-Nitrosodimethylamine
O&M	Operations and Maintenance
PG	California Professional Geologist
ppb	Parts Per Billion ($\mu\text{g/L}$)
ppm	Parts Per Million (mg/L)
PRC	Program Review Committee
PWRP	Pomona Water Reclamation Plant
RA	Replenishment Assessment
RO	Reverse Osmosis
RTS	Readiness-to-Serve Charge
RWQCB	Regional Water Quality Control Board (Los Angeles Region)
SAT	Soil Aquifer Treatment
SDLAC	Sanitation Districts of Los Angeles County
SDWP	Safe Drinking Water Program
SGVMWD	San Gabriel Valley Municipal Water District
SJCWRP	San Jose Creek Water Reclamation Plant
TAC	Technical Advisory Committee
TITP	Terminal Island Treatment Plant
USGS	United States Geological Survey
USGVMWD	Upper San Gabriel Valley Municipal Water District
UV	Ultraviolet Light Treatment
VOC	Volatile Organic Compound
WAS	Water Augmentation Study
WBMWD	West Basin Municipal Water District
WCB	West Coast Basin
WCBBP	West Coast Basin Barrier Project
WIN	Water Independence Now program
WNWRP	Whittier Narrows Water Reclamation Plant
WRD	Water Replenishment District of Southern California
WRP	Water Reclamation Plant
WY	Water Year (October 1 – September 30)

BOARD SUMMARY

District Staff is pleased to present the 2015 Engineering Survey and Report (“ESR”). It was prepared pursuant to the California Water Code, Section 60300 et seq. and determines the past, current, and ensuing year groundwater conditions in the Central Basin and West Coast Basin (“CBWCB”). The report contains information on groundwater production, annual and accumulated overdraft, water levels, quantity, source, and cost of replenishment water, and a discussion of necessary projects and programs to protect and preserve the groundwater resources of the basins.

The ESR provides the Board of Directors with the necessary information to justify the setting of a replenishment assessment (“RA”) for the ensuing fiscal year (July 1 – June 30) to purchase replenishment water and to fund projects and programs related to groundwater replenishment and groundwater quality over the water year (October 1 – September 30).

The following is a summary of the required ESR elements from the Water Code, and **Plates 1, 2, and 3** provide illustrations of pumping and groundwater conditions for Water Year 2013/2014.

1. Groundwater Production

- Adjudicated Amount: 281,835.25 acre-feet (AF)
- Previous Water Year: 241,105 AF
- Current Water Year: 242,400 AF (estimated)
- Ensuing Water Year: 244,000 AF (estimated)

2. Annual Overdraft

- Previous Water Year: 149,000 AF
- Current Water Year: 97,200 AF (estimated)
- Ensuing Water Year: 98,800 AF (estimated)

3. Accumulated Overdraft

- Previous Water Year: 819,600 AF
- Current Water Year: 813,300 AF (estimated)

4. Groundwater Levels

Because of the continued drought during the previous year 2013/2014 that caused below normal storm water and imported water recharge, groundwater levels over the WRD Service area dropped on average 4 feet and 62,100 AF were removed from storage. Most of this storage loss (49,200 AF or 79%) occurred in the Montebello Forebay, where water levels fell on average 11 feet, but up to 25 feet in some areas near the spreading grounds. The groundwater basins fortunately are enormous underground reservoirs that are able to accommodate large swings in storage and water level changes, so there remains plentiful groundwater in the CBWCB. However, because of the extended drought, the Water Year ended with groundwater levels near their lows in the 1960s and 1970s. WRD manages water levels in the basins utilizing an Optimum Quantity and Accumulated Overdraft approach. So far, the basins are operating within range and there should not be any problems with the groundwater supply meeting the needs of the overlying users in the current and ensuing years. Details of the groundwater levels in the CBWCB are described in Chapter 3.

5. Quantity of Replenishment Water Required in the Ensuing Year

The District determines replenishment water needs based on averages from a long-term (30 year) hydrologic record and computer models, meaning extremely wet years and extremely dry years in addition to average precipitation years are accounted for in deriving the average replenishment needs. Other considerations by the Board are also incorporated into replenishment water needs. Chapter 4 details the quantity of water that WRD plans to purchase in the ensuing water year. A summary is below:

- Spreading Water: 71,000 AF (55,000 recycled; 16,000 imported)
- Seawater Barrier Water: 32,300 AF (7,600 AF imported; 24,700 AF recycled)
- In-Lieu Program Water: 0 AF (suspended due to lack of MWD seasonal water)
- Total Water: 103,300 AF

6. Source of Replenishment Water

The sources of replenishment water to the District for the ensuing water year are detailed in Chapter 4. Discounted replenishment water from MWD has not been available for In-Lieu or spreading since October 2011. MWD has not yet adopted a new replenishment program and for now only the more expensive Tier 1 or Tier 2 water is potentially available. WRD is budgeting for Tier 1 water in the ensuing year. In the previous year, Tier 1 water was not sold to WRD due to low MWD supplies as a result of the drought. In the current water year, some Tier 1 is being sold to WRD for replenishment. For the ensuing year, it is currently assumed that Tier 1 water will be available. A summary of all of the sources of replenishment water available to WRD is as follows:

- Recycled Water: Tertiary water for spreading is available from the Sanitation Districts of Los Angeles County (SDLAC). Advanced-treated recycled water for the West Coast Basin Barrier Project (WCBBP) is available from the West Basin Municipal Water District. Advanced-treated recycled water for the Dominguez Gap Barrier Project (DGBP) is available from the City of Los Angeles. Advanced-treated recycled water for the Alamitos Barrier Project (ABP) is available from WRD.
- Imported Water: Raw river water (untreated) Tier 1 is assumed to be available for spreading from MWD and its member agencies. For the seawater barrier wells, treated potable imported water Tier 1 is assumed to be available for the WCBBP and DGBP from the West Basin Municipal Water District, and for the ABP from the City of Long Beach.

7. Cost of Replenishment Water

WRD has estimated it will need 103,300 AF of replenishment water in the ensuing year to help overcome the annual overdraft. WRD purchases replenishment water from MWD member agencies and recycled water providers. These agencies set the price for the replenishment water that WRD buys for the spreading grounds, seawater barrier injection wells, and In-Lieu water when available. The cost for replenishment water is a direct pass-through from WRD to the water suppliers on WRD's replenishment assessment.

Using currently available information and estimates for the cost of replenishment water to WRD in the ensuing year, the estimated cost of water for the ensuing year is \$42,125,595. **Tables 1 and 2** provide a detailed breakdown of these costs.

These estimated costs are for water purchases only and do not include the additional costs for water replenishment and water quality projects and programs. These projects and programs are discussed in detail in Chapter 5. The anticipated costs of these projects and programs will be further discussed in

District budget workshops, Budget Advisory Committee (BAC) meetings, and other public meetings before the Board of Directors adopts the 2015/2016 Replenishment Assessment in May.

8. Projects and Programs

A list of the projects and programs in which WRD is involved related to groundwater replenishment and the protection and preservation of water quality is shown on **Table 3**. Funds are required to finance these projects and programs. Sections 60221, 60230 and 60224 of the Water Code authorize the WRD to undertake a wide range of capital projects and other programs aimed at enhancing groundwater replenishment and improving groundwater quality.

These projects and programs address any existing or potential problems related to the basin's groundwater, and may extend beyond the District's boundaries if the threat of contamination is outside those boundaries. The programs span all phases of planning, design, and construction and are financed by the collection of a replenishment assessment. A more detailed description of each project and program is presented in Chapter 5 of the report.

9. Conclusions

Based upon the information presented in the ESR, a replenishment assessment is necessary in the ensuing year to purchase replenishment water and to finance projects and programs to perform replenishment and water quality activities. These actions will ensure sufficient supplies of high quality groundwater within the District for the benefit of the residents and businesses in the Central Basin and West Coast Basin.

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CHAPTER 1 - INTRODUCTION

Purpose of the Engineering Survey & Report

To facilitate the Board of Directors' decisions and actions, the Water Replenishment District Act requires that an engineering survey and report (“ESR”) be prepared each year. This *Engineering Survey and Report 2015* is in conformity with the requirements of Section 60300 et seq. Water Replenishment District Act and presents the necessary information on which the Board of Directors can declare whether funds shall be raised to purchase water for replenishment during the ensuing year, as well as to finance projects and programs aimed at accomplishing groundwater replenishment. With the information in this ESR, the Board can also declare whether funds shall be collected to remove contaminants from the groundwater supplies or to exercise any other power under Section 60224 of the California Water Code. The information presented in this report along with the District’s strategic planning and budget preparation presents the necessary information on which the Board of Directors can base the establishment of a replenishment assessment for the ensuing fiscal year effective July 1, 2015 through June 30, 2016.

Scope of Engineering Survey & Report

This report contains specific information outlined in Chapter I, Part 6 of Division 18 of the Water Code (the Water Replenishment District Act, § 60300 and § 60301). The following is a brief description of the contents of this report:

- 1) *a discussion of groundwater production within the District (Chapter 2);*
- 2) *an evaluation of groundwater conditions within the District, including estimates of the annual overdraft, the accumulated overdraft, changes in water levels, and the effects of water level fluctuations on the groundwater resources (Chapter 3);*
- 3) *an appraisal of the quantity, availability, and cost of replenishment water required for the ensuing water year (Chapter 4); and*
- 4) *a description of current and proposed programs and projects to accomplish replenishment goals and to protect and preserve high quality groundwater supplies within the District (Chapter 5).*

Schedule for Setting the Replenishment Assessment

The following actions are required by the Water Code to set the Replenishment Assessment:

- 1) *The Board shall order the preparation of the ESR no later than the second Tuesday in February each year (see Section 60300).*
- 2) *The Board shall declare by resolution whether funds shall be collected to purchase replenishment water and to fund projects and programs related to replenishment and/or water quality activities on or before the second Tuesday in March each year and after the ESR has been completed (see Section 60305).*
- 3) *A Public Hearing will be held for the purpose of determining whether District costs will be paid for by a replenishment assessment. The Public Hearing will be opened on the second Tuesday in April and may be adjourned from time to time but will be completed by the first Tuesday in May (see Sections 60306 and 60307).*
- 4) *The Board by resolution shall levy a replenishment assessment for the ensuing fiscal year no later than the second Tuesday in May (see Sections 60315, 60316 and 60317).*

Introduction

Although dates specified in the code refer generally to ‘on or before certain Tuesdays’, the Water Code (Section 60043) also states that “*Whenever any act is required to be done or proceeding taken on or set for a particular day or day of the week in any month, the act may be done or proceeding set for and acted upon a day of the month otherwise specified for a regular meeting of the board*”. Therefore, there is flexibility as to the actual dates when Board actions are taken regarding the ESR, adopting resolutions, conducting public hearings, and the setting the replenishment assessment.

The ESR is generally completed in March of each year to comply with the Water Code and to provide the Board with the necessary information to determine whether a replenishment assessment will be needed in the ensuing year to purchase replenishment water and to fund projects and programs related to water quality and replenishment activities. However, in the subsequent months leading up to the adoption of the replenishment assessment, new information is normally received that affects the findings presented in the March ESR. This new information is typically related to the amount of water and price that WRD expects to pay for replenishment water in the ensuing water year. The final information used by the Board when they adopt the replenishment assessment is reflected in an updated ESR that is published after adoption of the replenishment assessment.

CHAPTER 2 - GROUNDWATER PRODUCTION

Adjudication and Demand

Prior to the adjudication of groundwater rights in the early 1960s, annual production (pumping) reached levels as high as 259,400 AF in the Central Basin (“CB”) and 94,100 AF in the West Coast Basin (“WCB”). This total of 353,500 AF was more than double the natural safe yield of the basins as determined by the California Department of Water Resources in 1962 (173,400 AF). Due to this serious overdraft, water levels declined, groundwater was lost from storage, and seawater intruded into the coastal aquifers. To remedy this problem, the courts adjudicated the two basins to put a limit on pumping. The West Coast Basin adjudication was set at 64,468.25 acre-feet per year (“AFY”). The Central Basin “Allowed Pumping Allocation” (“APA”) was set at 217,367 AFY. Therefore, the current amount allowed to be pumped from both basins is 281,835.25 AFY, plus any carryover or other provisions as described at the end of this Section.

The adjudicated pumping amounts were set higher than the natural replenishment amounts, creating an annual deficit known as the “Annual Overdraft”. WRD is enabled under the California Water Code to purchase and recharge additional water to make up this overdraft, which is known as artificial replenishment or managed aquifer recharge (MAR). WRD has the authority to levy a replenishment assessment on all pumping within the District to raise the monies necessary to purchase the artificial replenishment water and to fund projects and programs necessary for replenishment and groundwater quality activities.

Groundwater Production

Under the terms of Section 60326.1 of the Water Replenishment District Act, each groundwater producer must submit a report to the District summarizing their monthly production activities (quarterly for smaller producers). The information from these reports is the basis by which each producer pays the replenishment assessment.

Previous Water Year:

Per the Water Code, WRD tracks and reports on groundwater production (pumping) on a Water Year (“WY”) basis covering the time frame of October 1 - September 30 of each year. For the previous WY (2013/2014), groundwater production in both basins totaled 241,105 AF, of which 198,585 AF was pumped from the CB and 42,520 AF was pumped from the WCB. Because the adjudicated rights are 281,835.25 AF, there were about 40,730 AF of available rights that were not pumped in the previous year.

Plate 1 illustrates the groundwater production in the CBWCB during the previous water year and **Table A-5** presents historical pumping amounts.

Current Water Year:

For the first two months of the current WY (October through November), production was 38,701 AF (32,315 AF in the CB and 6,386 AF in the WCB). This is 2,277 AF (6.2%) more than the same period of the year earlier. Because these numbers represent only 2 months of data out of 12, they are difficult to use to forecast through the rest of the year. In addition, the City of Long Beach is participating in WRD’s In-Lieu program, and will not pump up to 10,000 AF between December 2014 and April 2015. Therefore, taking into account averages over the past 3 to 5 years, excluding the anomalously low year of 2010/2011 due to the special In-lieu program, and recognizing the current In-Lieu Program, plus the continued drought, the early forecast for total pumping for the entire Water Year is 242,400 AF (200,000 AF in the CB and 42,400 AF in the WCB).

Groundwater Production

Ensuing Water Year:

To estimate production for the ensuing year, recent averages are used in addition to knowledge of changing conditions that might affect pumping. Actual pumping patterns can vary considerably throughout the year based on a pumper's individual operational needs, water demands, conservation efforts and hydrology.

To estimate the ensuing year's groundwater pumping, WRD used the averages over the past 3 to 5 years, not including the anomalously low year of 2010/2011, and made adjustments based on anticipated conditions such as a continuing drought, conservation efforts, and reports by some pumpers that they plan on drilling new wells or bringing back online other wells, plus the continued recent trend of elevated pumping in the CB (not counting the effect of the In-Lieu Program). Using these methods produced a forecast for pumping in the ensuing WY of 244,000 AF (200,000 AF in the CB and 44,000 AF in the WCB).

Table 1 shows the groundwater production amounts for the previous, current, and ensuing water years.

Measurement of Production

With few exceptions, meters installed and maintained by the individual producers measure the groundwater production from their wells. Through periodic testing by Watermaster to verify the accuracy of individual meters, corrective measures are required when necessary. The production of the few wells that are not metered is estimated on the basis of electrical energy consumed by individual pump motors or other reasonable means.

Carryover and Drought Provisions

The carryover of unused pumping rights in any given year influences the actual amount of production for the ensuing year. In the 2014-2015 Administrative Year for the Central Basin Judgment (July 1 – June 30), the Central Basin carryover is 40% of the allotted pumping right, increasing to 50% in 2015-2016, 60% in 2016-2017 and each year thereafter. Beginning in the 2014-2015 Administrative Year for the West Coast Basin Judgment (July 1 – June 30) and each year thereafter, the West Coast Basin carryover is 100% of allotted pumping rights. In both the Central and West Coast Basins, the amount of carryover is reduced by the quantity of water held in a pumper's storage account, but in no event is carryover than 20% of the allotted pumping right. These provisions of the Judgments extend the flexibility with which the pumpers can operate.

During emergency or drought conditions, WRD can allow under certain conditions an additional 27,000 AF of extractions for a four-month period (17,000 for CB and 10,000 for WCB). This provision has yet to be exercised but offers the potential use of an additional 7.8% pumping in the CB and 15% in the WCB.

The Central Basin Judgment also contains an additional Drought Carryover provision available to all Central Basin water rights holders after a declaration of a Water Emergency by the WRD Board of Directors. The Drought Carryover allows water rights holders to carryover an additional 35% of their APA (or 35 AF, whichever is larger) beyond the annual carryover described above during the period the Declared Water Emergency is in effect.

The intent of the action is prevent further degradation of the groundwater basins by helping to restore groundwater levels and improving the water supply in the aquifers by providing an incentive to groundwater producers in the Central Basin to reduce pumping for a particular period of time.

A Declared Water Emergency is defined in the Central Basin Judgment as:

"A period commencing with the adoption of a resolution of the Board of Directors of the Central and West Basin Water Replenishment District [renamed Water Replenishment District of Southern California] declaring that conditions within the Central Basin relating to natural and imported supplies of water are such that, without implementation of the water emergency provisions of this Judgment, the water resources of the Central Basin risk degradation. In making such declaration, the Board of Directors shall consider any information and requests provided by water producers, purveyors and other affected entities and may, for that purpose, hold a public hearing in advance of such declaration. A Declared Water Emergency shall extend for one (1) year following such resolution, unless sooner ended by similar resolution."

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CHAPTER 3 - GROUNDWATER CONDITIONS

Introduction

The California Water Code Section 60300 requires WRD to determine annually in the Engineering Survey and Report (“ESR”) the following items related to groundwater conditions in the Central Basin and West Coast Basin (“CBWCB”):

- 1) Total groundwater production for the previous water year and estimates for the current and ensuing water years;
- 2) The Annual Overdraft for the previous water year and estimates for the current and ensuing water years;
- 3) The Accumulated Overdraft for previous water year and an estimate for the current water year;
- 4) Changes in groundwater levels (pressure levels or piezometric heights) within the District and the effects these changes have on groundwater supplies within the District; and
- 5) An estimate of the quantity, source, and cost of water available for replenishment during the ensuing water year;

To meet these requirements, WRD’s hydrogeologists and engineers closely monitor and collect data to manage the groundwater resources of the District throughout the year. They track groundwater levels from WRD’s network of specialized monitoring wells and from groundwater producers’ production wells. They update and run computer models developed by the United States Geological Survey (“USGS”) and others to simulate groundwater conditions and to predict future conditions. They use their geographic information system (“GIS”) and database management system to store, analyze, map, and report on the information required for the ESR. They work closely with the Los Angeles County Department of Public Works (“LACDPW”) on spreading grounds and seawater barrier wells to determine current and future operational impacts to groundwater supplies. They work closely with the Metropolitan Water District of Southern California (“MWD” or “Met”), the local MWD member agencies, and the Sanitation Districts of Los Angeles County (“SDLAC”) on the current and future availability of replenishment water. They also work with regulators on replenishment criteria for water quality and recycled water use, and with the groundwater pumpers, the pumpers’ Technical Advisory Committee (“TAC”), the Budget Advisory Committee (“BAC”), and other stakeholders to discuss the current and future groundwater conditions and beneficial projects and programs within the District and neighboring basins.

The information on Annual Overdraft, Accumulated Overdraft, water levels, and change in storage are discussed in the remainder of this chapter. Groundwater production was previously discussed in Chapter 2. The estimated quantity, source, and cost of replenishment water will be discussed in Chapter 4. Projects and programs are discussed in Chapter 5.

Annual Overdraft

Section 60022 of the Water Replenishment District Act defines Annual Overdraft as *"...the amount...by which the quantity of groundwater removed by any natural or artificial means from the groundwater supplies within such replenishment district during the water year exceeds the quantity of non-saline water replaced therein by the replenishment of such groundwater supplies in such water year by any natural or artificial means other than replenishment under the provisions of Part 6 of this act or by any other governmental agency or entity."* (Part 6 of the Act pertains to water that WRD

purchases for replenishment). Therefore, the Annual Overdraft equals the natural inflows to basins (not including WRD purchased water) minus all of the outflows (mostly pumping). There is an Annual Overdraft almost every year for the simple fact that the groundwater extractions typically exceed the natural groundwater replenishment. It has been one of the District's main responsibilities since 1959 to help make up this Annual Overdraft by purchasing artificial replenishment water to recharge the aquifers and supplement the natural recharge.

To determine the Annual Overdraft for the previous water year, WRD determines the inflows and outflows of the CBWCB. In the previous Water Year 2013/2014, natural inflows (storm water capture, areal recharge, and net groundwater underflow) totaled 92,095 AF and WRD or others contributed 86,910 AF of recharge water at the seawater barrier wells and spreading grounds. Total natural and artificial inflows, therefore, equaled 179,005 AF. Total pumping in the basins was 241,105 AF, partially reduced due to WRD's In-Lieu incentive program. The Annual Overdraft is the natural inflows minus total outflows, or 149,010 AF (rounded to 149,000 AF).

For the current and ensuing WY estimates for Annual Overdraft, the concept of "Average Annual Groundwater Deficiency" is utilized. The Average Annual Groundwater Deficiency is the long-term average of natural inflows minus total outflows and represents the long term average deficit (Annual Overdraft) in the basins. The development of the USGS/WRD computer model derived these long term average inflow and outflow terms. **Table 4** presents this information, which concluded that the Average Annual Groundwater Deficiency is 105,385 AFY. Values of the average deficiency are based on the 30-year average inflows and outflows as calculated by the computer model which ran from October 1970 through September 2000. Long-term average inflows are influenced by the amount of precipitation falling on the District as well as for storm water capture at the spreading grounds. **Table 5** and **Figure A** show the historical precipitation at LACDPW Station #107D, located in Downey near the Montebello Forebay, or alternate stations nearby if Station #107D data are not reliable or available.

The calculation of the Average Annual Groundwater Deficiency represents in general that WRD needs to replenish about 105,385 AFY assuming long-term average conditions over that 30 year period for the water balance to reach equilibrium, the overall change in storage to equal zero, and groundwater levels to remain relatively constant. As shown in **Table 6**, adjustments are made to the long term average inflows and outflows for the current and ensuing WY to reflect estimates of the Annual Overdraft for those particular years. The current year has been average to dry to date, and pumping is expected to be less than the model period average in the current and ensuing years. Therefore, the projected Annual Overdrafts for the current and ensuing years are expected to be less than the long term average. Based on these adjustments, the current year Annual Overdraft is estimated at 97,200 AF and the ensuing year is estimated at 98,800 AF.

Accumulated Overdraft

Section 60023 of the Water Replenishment District Act defines "*Accumulated Overdraft*" as "...*the aggregate amount...by which the quantity of ground water removed by any natural or artificial means from the groundwater supplies...during all preceding water years shall have exceeded the quantity of non-saline water replaced therein by the replenishment of such ground water supplies in such water years by any natural or artificial means...*"

In connection with the preparation of Bulletin No. 104-Appendix A (1961), the DWR estimated that the historically utilized storage (Accumulated Overdraft) between the high water year of 1904 and 1957¹ was 1,080,000 AF (780,000 in CB, 300,000 in WCB). Much of this storage removal was from the forebay areas (Montebello Forebay and Los Angeles Forebay), where aquifers are merged, unconfined and serve as the "headwaters" to the confined pressure aquifers. Storage loss from the

¹ DWR Bulletin 104-A did not refer to the ending year for the storage determination. WRD has assumed it to be the year 1957, as this is the end year for their detailed storage analysis presented in Bulletin 104-B – Safe Yield Determination.

confined and completely full, deeper aquifers was minimal in comparison or was replaced by seawater intrusion, which cannot be accounted for under the language of the Water Code since it is considered saline water.

The goal of groundwater basin management by WRD is to ensure a sufficient supply of safe and reliable groundwater in the basins for annual use by the pumpers, to keep a sufficient supply in storage for times of drought when imported water supplies may be curtailed for several consecutive years as well as to keep suitable room available in the basins to receive natural water replenishment in very wet years, such as an El Niño type year.

To compute the Accumulated Overdraft since this initial amount of 1,080,000 AF, WRD takes each consecutive year's Annual Overdraft and replenishment activities and determines the change in storage. It adds to or subtracts the corresponding value from the Accumulated Overdraft. Since the base level, the aggregate excess of extractions over recharge from the basins has been reduced due to the replenishment by LACDPW in the earlier years and WRD since 1959, the reduction of pumping established by the adjudications, and the replenishment from the seawater barrier well injection. The Accumulated Overdraft at the end of the previous WY was determined to be 819,600 AF. For the current year, the Accumulated Overdraft is forecast to improve to 813,300 AF due to the purchase of imported water for spreading and the average to dry precipitation to date. This could change if hydrology or pumping patterns or planned artificial replenishment activities vary considerably in the near future.

Table 7 presents information for the previous and current Accumulated Overdraft estimate. The annual changes in storage are presented on **Table 8**.

Groundwater Levels

A groundwater elevation contour map representing water levels within the District in fall 2014 (end of the water year) was prepared for this report and is presented as **Plate 2**. The data for the map were collected from wells that are screened in the deeper basin aquifers where the majority of groundwater pumping occurs. These deeper aquifers include the Upper San Pedro Formation aquifers, including the Lynwood, Silverado, and Sunnyside. Water level data was obtained from WRD's network of monitoring wells and from groundwater production wells that are screened in the deeper aquifers.

As can be seen on **Plate 2**, groundwater elevations range from a high of about 170 feet above mean sea level (msl) in the northeast portion of the basin above the spreading grounds in the Whittier Narrows to a low of about 120 feet below mean sea level (msl) in the Gardena and Long Beach areas. With the exception of the Montebello Forebay and along the West Coast Basin Barrier Project, the majority of groundwater levels in the District are below sea level (red colored contours on **Plate 2**), which is why continued injection at the seawater barriers is needed to prevent saltwater intrusion.

Plate 2 also shows the location of the key wells used for long-term water level data. These long-term hydrographs have been presented in the ESR for years, and provide a consistent basis from which to compare changing water levels. A discussion of water levels observed in the key wells is presented below.

Los Angeles Forebay

The Los Angeles Forebay occupies the westerly portion of the Central Basin Non-Pressure Area. Historically a recharge area for the Los Angeles River, this forebay's natural recharge capability has been substantially reduced since the river channel was lined and open areas paved over. Recharge is now limited to deep percolation of precipitation in limited areas, In-Lieu replenishment when available, subsurface inflow from the Montebello Forebay, the northern portion of the Central Basin outside of WRD's boundary, and the San Fernando Valley through the Los Angeles Narrows.

Groundwater Conditions

Key well #2778 (2S/13W-10A01) represents the water level conditions of the Los Angeles Forebay (see **Figure B**). The water level high was observed in 1938 at an elevation of approximately 70 feet msl and by 1962 water levels had fallen nearly 180 feet to an elevation of -109 ft msl due to basin over-pumping and lack of sufficient natural recharge. Since then, basin adjudication and managed aquifer recharge by WRD and others have improved water levels in this area. At the end of WY 2013/2014, groundwater levels were at an elevation of -21.7 feet msl and were 2.3 feet lower than the previous year. The average water level change throughout the entire Los Angeles Forebay was a drop of 5.5 feet.

Montebello Forebay

The Montebello Forebay lies in the northeastern portion of the Central Basin and connects with the San Gabriel Basin to the north through the Whittier Narrows. The Rio Hondo and San Gabriel River Coastal Spreading Grounds (often called the “Montebello Forebay Spreading Grounds”) provide a substantial amount of recharge water to the CBWCB since the aquifers there are unconfined and allow easy infiltration of surface water impounded at the spreading grounds to the deeper groundwater.

Three key wells help describe the groundwater level conditions in the Montebello Forebay, a northern well, a middle well, and a southeastern well (**Plate 2**). The historic water levels in these three key wells are discussed below:

- Well Pico1_4 (2S/11W-18C07) is in the northern part of the Montebello Forebay. The upper chart on **Figure C** shows the water levels for this well. Historic water levels at this well or its predecessors have ranged from a high elevation of 164.7 feet above mean sea level in April 1944 to a low of 42.8 feet msl in December 1957. At the end of WY 2013/2014, groundwater levels in this well were at an elevation of 82.7 feet msl and were 14.4 feet lower than the previous year.
- Well 1601T (2S/12W-24M08) is centrally located between the Rio Hondo and San Gabriel spreading grounds. This well is monitored weekly to assess water levels in the middle of the forebay. The center chart on **Figure C** shows the water levels for this well. The historic water level high was observed in 1942 at an elevation of 137.8 feet above mean sea level, but by 1957 it had fallen 117 feet to an all-time low elevation of 20.9 feet msl due to basin over-pumping and insufficient natural recharge. As described above for the Los Angeles Forebay, adjudication of pumping rights and managed aquifer recharge helped restore water levels in the Montebello Forebay. At the end of WY 2013/2014, groundwater levels in this well were at an elevation of 60.3 feet msl and were 12.5 feet lower than the previous year. So far in the current year, water levels have risen about 5 feet due to December rains and imported water for spreading being purchased by WRD. As of February 2015, water levels are at an elevation of 65 feet msl.
- Well 1615P (3S/12W-01A06) is located downgradient and southeast of the spreading grounds near the southern end of the Montebello Forebay. Water level responses in this well are typically less pronounced than the other two wells because it is further from the spreading grounds and the recharge that occurs there. The lower chart on **Figure C** shows the water level history for this well. The historic water level high was observed in 1947 at an elevation of 113.6 feet above mean sea level but by 1957 had dropped 102 feet to an all-time low elevation of 11.4 feet msl. Since then, water levels have recovered. At the end of WY 2013/2014, groundwater levels were at an elevation of 42.1 feet msl and were 10.8 feet lower than the previous year.

The average water level change throughout the entire Montebello Forebay during the previous water year was a decline of 11 feet due to the continued drought and lack of imported water for spreading.

Central Basin Pressure Area

The District monitors key wells 906D (4S/13W-12K01) and 460K (4S/12W-28H09) which represent the conditions of the pressurized groundwater levels in the Central Basin Pressure Area. The hydrographs for these two wells are shown on **Figure D**.

Groundwater highs were observed in these wells in 1935 when they began to continually drop over 110 feet until their lows in 1961 due to the over-pumping and insufficient natural recharge. Groundwater levels recovered substantially during the early 1960s as a result of replenishment operations and reduced pumping. Between 1995 and 2007 there were 100-foot swings in water levels each year between winter and summer caused by pumping pattern changes by some of the Central Basin producers who operate with more groundwater in the summer months and less groundwater in the winter months, and took advantage of the MWD and WRD In-Lieu programs. From May 2007 to March 2011 the In-Lieu water was not available, so pumping remained more constant throughout those years and water levels remain low. Since then, In-Lieu with the City of Long Beach has occurred on several occasions, with resulting water levels rising as the pumps go off, and falling when the pumps come on.

At the end of WY 2013/2014, groundwater levels in well 906D were at an elevation of -73.2 ft msl and were 11.3 feet lower than the previous year. Water levels in well 460K were at an elevation of -108.2 ft msl and were 17.3 feet lower than the previous year. The average change in water levels in the entire Central Basin Pressure Area during the previous water year was a drop of 9.2 feet.

West Coast Basin

The West Coast Basin is adjacent to the Central Basin along the Newport-Inglewood Uplift, which is a series of discontinuous, sub-parallel hills and faults that act as a partial barrier to groundwater flow. Groundwater moves across the uplift based on water levels on both sides and the “tightness” (permeability) of the uplift along its various reaches, both horizontally and vertically.

Figure E shows the hydrographs of key well Wilmington1_3 and well Lawndale1_4 (which replaces historic well 760C from now on since 760C does not have regular readings, and Lawndale 1_4 is a dedicated monitoring well installed by WRD in 2013 in the same zone as 760C and 3,000 feet away to represent similar water levels and trends). These two wells represent the general conditions of the water levels in the West Coast Basin. In 1955, the control of groundwater extractions in the West Coast Basin resulted in stabilizing and reversal of the declining water levels in the center of the basin whereas at the eastern end near the Dominguez Gap Barrier water levels continued to decline until about 1971, when a recovery began due mostly to the startup of the Dominguez Gap Barrier Project.

At the end of the previous WY 2013/2014, water levels in well Lawndale1_4 were at an elevation of -15.9 ft msl and were 1.3 feet higher than the previous year. Water levels in well Wilmington1_3 were at an elevation of -36.5 ft msl and were 2.2 feet higher than the previous year. Over the entire West Coast Basin, the average water level change was a drop of 1.6 feet.

Plate 3 shows the water level changes over the entire CBWCB over the previous water year. Because of the dry year and reduced replenishment water, the WRD service area saw on average a decrease in water levels of 4 feet, with specific regions having greater or lesser amounts as described above.

For the current WY, October through December saw above normal precipitation, but January and February have been below normal, producing an overall pattern or average to slightly below average precipitation so far. WRD is maximizing recycled water replenishment within regulatory limits, and is currently purchasing imported water for spreading. Therefore, the District expects water levels to stay the same or decrease somewhat in the current water year.

Because the current groundwater levels in the CBWCB are within historic ranges and the anticipated replenishment activities by WRD will continue as planned, the District anticipates that there will continue to be sufficient supplies of safe and reliable groundwater to meet the demands of the pumpers in our service area in the current and ensuing years.

Change in Storage

The District determines the annual change in groundwater storage by comparing water levels from one year to the next, and factoring in the storage coefficients of the major aquifer layers. Rising groundwater means there is an increase in the amount of groundwater in storage whereas a drop in groundwater levels means there is a decrease in storage. Using groundwater elevation data collected from WRD's monitoring well network and selected production wells, the District constructs a groundwater level change map showing water level differences from one year to the next (**Plate 3**). The data from this map are converted to grids in the District's Geographic Information System (GIS) and multiplied by the storage coefficient value grids for the aquifer layers as obtained from the USGS calibrated Modflow computer model of the District. This calculation produces the change in storage value for the previous water year.

For WY 2013/2014, there was an overall drop in water levels with a resulting loss from storage in the amount of 62,100 AF. Most of this storage loss (49,200 AF or 79%) occurred in the Montebello Forebay, which is the gateway for large amounts of recharge water to enter the aquifer systems and flow into the rest of the District. This loss from storage occurred due to the dry year resulting in reduced replenishment water from a lack of both storm water and imported water. However, the groundwater basins are operating properly as an enormous underground reservoir – accepting water and rising when replenishment water is plentiful and pumping demands are low, and draining to meet the demands when replenishment water is lacking and pumping is high. **Table 8** provides the historical groundwater storage changes in the CBWCB.

Optimum Groundwater Quantity

In response to a 2002 State audit of the District's activities, the Board of Directors adopted an Optimum Quantity for groundwater amounts in the CBWCB. The Optimum Quantity is based on the Accumulated Overdraft (AOD) concept described in the Water Code and this ESR. The historic maximum groundwater drawdown due to over pumping reported in the CBWCB between 1904 and 1957 was 1,080,000 AF. This is defined as the historic maximum AOD. As pumping eased and artificial replenishment occurred, more water was put back into the basins and the AOD was reduced resulting in rising water levels.

After considerable analysis and discussion, the Board of Directors on April 19, 2006 established an Optimum Quantity of an AOD of 612,000 AF. This value was based on an extensive review of over 70 years of water level fluctuations in the District and recognizing that at the end of WY 1999/2000 groundwater amounts were at an acceptable quantity to sustain the adjudicated pumping rights in the basins. The AOD at that time was 611,900 AF (rounded to 612,000 AF), and therefore was set by the Board of Directors as the Optimum Quantity.

The Board of Directors on April 19, 2006 also adopted a policy to make up the Optimum Quantity should it fall too low. The policy is as follows:

An Accumulated Overdraft greater than the Optimum Quantity is a deficit. WRD will make up the deficit within a 20 year period as decided by the Board on an annual basis. If the deficit is within 5 percent of the Optimum Quantity, then no action needs to be taken to allow for natural replenishment to makeup the deficit.

The Accumulated Overdraft at the end of WY 2013/2014 was 819,600 AF, or 207,600 AF below the Optimum Quantity.

CHAPTER 4 - GROUNDWATER REPLENISHMENT: QUANTITIES, AVAILABILITY, AND COSTS

As discussed in the previous chapter, the Central Basin and West Coast Basin (“CBWCB”) have an annual overdraft because more groundwater is pumped out than is naturally replaced. The District purchases supplemental water (artificial replenishment water) each year to help offset this overdraft through managed aquifer recharge. The purchased water enters the groundwater basins at the Montebello Forebay spreading grounds, at the seawater barrier injection wells, and through the District's In-Lieu Program. The purpose of this Chapter is to determine the quantities of water needed for purchase in the ensuing year and to determine the availability and cost of that water.

Sources of Replenishment Water

The District currently has available to it recycled and imported water sources for use as artificial replenishment water. These two sources are described below:

- **Recycled Water:** Recycled water is wastewater from the sewer systems that is reclaimed through extensive treatment at water reclamation plants (“WRP”s). The water is treated to high quality standards so that it can be reused safely, and offsets the need to use more expensive and sometimes less available imported water. Some agencies and businesses use recycled water for non-potable purposes, such as for irrigation of parks, golf courses, and street medians, or for industrial purposes (known as “purple-pipe projects”). WRD has successfully used recycled water for groundwater recharge since 1962. In semi-arid areas such as Southern California where groundwater and imported water are in short supply, recycled water has proven to be a safe and reliable additional resource to supplement the water supply. Recycled water is used at the spreading grounds and the seawater barrier wells. Although recycled water is high quality, relatively low cost, and a reliable supply all year long, the District is limited by regulatory agencies in the amount it can use for replenishment. Therefore, imported water is also used for recharge.
- **Imported Water:** Raw river water from northern California (State Water Project) and the Colorado River is imported into Southern California by the Metropolitan Water District of Southern California (“MWD” or “Met”) and the City of Los Angeles Department of Water and Power (DWP). MWD sells this water as raw or treated to their member agencies for multiple uses, including potable water and groundwater recharge. WRD uses raw (untreated) imported water at the spreading grounds and uses treated potable water for injection at the seawater barrier wells and the In-Lieu program. Because of treatment and transportation costs, imported water is the most expensive type for groundwater replenishment. Prior to October 2011, MWD offered seasonally-available discounted water that could be purchased for replenishment. In turn for the discount, it was considered by MWD to be interruptible and they could stop deliveries at any time. But due to a lack of surplus supplies caused by drought and other factors, MWD has eliminated offering this type of discounted interruptible water. Instead, replenishment agencies such as WRD must now purchase what is known as “Tier 1” or “Tier 2” water from MWD member agencies for spreading and In-Lieu. This water is at a higher price and relies on available allocation from the member agency, but supposed to be firm delivery water (not interruptible); although during extreme droughts MWD can reduce or halt sales to replenishment agencies, as it did in 2014/2015. The seawater barrier injection water has been Tier 1 treated water for decades and has to date not been interrupted by MWD.

Recommended Quantities of Replenishment Water

With the information presented in the preceding chapters regarding the pumping demands in the CBWCB and the overall condition of the groundwater basins, WRD can estimate its projected need for replenishment water in the ensuing year.

Spreading

Groundwater recharge through surface spreading occurs in the Montebello Forebay Spreading Grounds adjacent to the Rio Hondo and the San Gabriel River, within the unlined portion of the San Gabriel River, and behind the Whittier Narrows Dam in the Whittier Narrows Reservoir. Owned and operated by the Los Angeles County Department of Public Works (“LACDPW”), they were originally constructed in 1938 for flood control and conservation of local storm water, but have been used since the 1950s to replenish the basins with imported water and since 1962 with recycled water.

Since recycled water is a high quality, less expensive, and available year-round source of replenishment water, the District maximizes its use within established regulatory limits. These limits are discussed below under “Expected Availability of Replenishment Water”. The District has historically targeted 50,000 AFY of recycled water for spreading to meet regulatory limits. However, with the recent modifications to the District’s permit to allow 45% recycled water over a running 10-year average (see below under Expected Availability of Replenishment Water), the District can now target 55,000 AFY of recycled water as long as sufficient dilution water is available from storm water and imported water.

Additional replenishment water is needed beyond the 55,000 AFY of recycled water and will have to come from imported water. In 2003, the WRD Board adopted the long term average of 27,600 AFY of imported water to purchase for spreading. This value was based on long-term (30 year) averages of the overall water budget of the basins using the USGS computer model. The 2003 ESR discusses the derivation of this value in more detail.

Since that time, the District has invested in cooperative projects with the LACDPW to capture more storm water and to lessen the need for imported water as part of WRD’s Water Independence Now program, or WIN. Improvements to the Whittier Narrows Conservation Pool are expected to conserve an additional 3,000 AFY of storm water on average. Two new rubber dams were built in the San Gabriel River near Valley Boulevard and are expected to conserve an additional 3,600 AFY on average. And with the revisions to the recycled water permit discussed in the previous paragraph, 5,000 additional AF of recycled water can be planned thus lowering imported water by 5,000 AFY. Therefore, the new Long Term Average for imported spreading demands is 16,000 AFY, which is the targeted amount for the ensuing year.

Table 9 presents the anticipated imported water replenishment needs at the spreading grounds.

Injection

Another way of replenishing the groundwater supply is to inject water at the three seawater intrusion barriers owned and operated by the LACDPW, including the West Coast Basin Barrier, Dominguez Gap Barrier, and Alamitos Barrier. Although the primary purpose of the barriers is for seawater intrusion control, groundwater replenishment also occurs as the freshwater is injected into the CBWCB aquifers and then moves inland towards pumping wells.

To determine the amount of barrier water estimated for the ensuing year, WRD under an Agreement with LACDPW gets annual estimates from the expected demand at the barriers. WRD reviews these estimates; reviews recent 5-year averages of actual injection amounts, and makes adjustments as necessary. For the ensuing year, WRD estimates the West Coast Basin Barrier Project will require 19,000 AF, of which the majority (14,300 AF) will be recycled water from WBMWD’s Edward C.

Groundwater Replenishment

Little Water Recycling Facility and the remaining 14,300 AF will be imported water. For the Dominguez Gap Barrier Project, a total of 8,000 AF is expected to be needed, of which 5,600 AF will be recycled water from the City of Los Angeles' Terminal Island Treatment Plant (maximum amount currently allowed by permit) and 2,400 of imported water. For the Alamitos Barrier Project, a total of 5,300 AF will be required by WRD (does not include barrier water purchased by Orange County Water District for their side of the barrier), which includes 4,800 AF of recycled water from the expanded Leo J. Vander Lans Water Treatment Facility plant and 500 AF of imported water.

The total barrier demand for WRD in the ensuing year is estimated at 32,300 AF, including 7,600 AF imported water (24%) and 24,700 AF of recycled water (76%) (see **Table 9**).

In-Lieu Replenishment Water

The basic premise of WRD's In-Lieu Program is to offset the pumping in the basin to lower the annual overdraft and reduce the artificial replenishment needs. It helps provide an alternate means of replenishing the groundwater supply by encouraging basin pumpers to purchase imported water when available instead of pumping groundwater. This can help raise water levels in areas that are otherwise more difficult to address. MWD has ceased providing seasonally discounted water for the In-Lieu program since 2011, so WRD's program has been put on hold with the exception of a few localized projects with the City of Long Beach. For the previous year, WRD had an In-Lieu Program with Long Beach for 4,371 AF, which helped keep groundwater in the CBWCB. For the ensuing year, WRD is not budgeting for the In-Lieu program, although may consider new programs if opportunities arise.

Expected Availability of Replenishment Water

The availability of water supplies for the ensuing water year has been taken into account when determining how funds should be raised. If a particular resource is expected to be unavailable during a given year, money can still be raised to fund the purchase of that quantity of water in a succeeding year.

Recycled Water

Recycled water is reliable all year round but its use for recharge is capped by regulatory limits. The current limits for recycled water spreading in the Montebello Forebay are established by the Los Angeles Regional Water Quality Control Board ("RWQCB") and are detailed in Order No. 91-100 adopted on September 9, 1991 with amendments on April 2, 2009 under Order No. R4-2009-0048 and June 4, 2013 (letter approval from RWQCB Executive Officer). On April 10, 2014, under Order No. R4-2009-0048-A-01, the RWQCB approved a request by WRD to increase the allowable percentage of recycled water to be recharged at the Montebello Forebay spreading grounds from 35% to 45% over a 10-year running average as a drought relief measure. This major action will allow continued use of historic amounts of recycled water for longer periods of time should the dry conditions continue, and might allow for additional recycled water for recharge should normal to wet hydrologic conditions return. This will allow WRD to continue to maximize use of recycled water for groundwater recharge as part of its Water Independence Now, or WIN, initiative.

The Sanitation Districts of Los Angeles County ("SDLAC") provides the recycled water to WRD for spreading by LACDPW. This water comes from the Whittier Narrows Water Reclamation Plant ("WNWRP"), San Jose Creek Water Reclamation Plant ("SJCWRP"), and Pomona Water Reclamation Plant ("PWRP"). For planning purposes, the District assumes purchasing 55,000 AFY of recycled water in the ensuing year, although this amount can vary based on percentage limits and availability of the recycled water and the spreading grounds.

Groundwater Replenishment

Recycled water for injection into the seawater barrier wells comes from different agencies depending on the specific barrier. At the WCBBP, the water is provided by WBMWD's Edward C. Little Water Recycling Facility. Per regulatory limits, this resource can provide up to 100% recycled water to the Barrier under their Phase V construction activities, although the volumes produced from the plant have not reached 100%, partially due to the barrier requiring more water than the plant can produce and partially due to the continued ramping up of deliveries from the Phase V plant and conditions imposed by the barrier's owner/operator, the LACDPW.

Recycled water for the DGBP is typically available from the City of Los Angeles' Terminal Island Treatment Plant (Harbor Recycled Water Project). The plant is permitted to provide the barrier with a maximum of 5 million gallons per day (mgd), averaged daily (equivalent to 5,600 AFY if running at 5 mgd for the full year), or 50% of the total barrier supply over a 5-year averaging period, calculated by a running monthly average over the preceding 60 months, whichever is less. For the ensuing year, it is estimated that of the 8,000 AF demand next year, 5,600 AF will be recycled water and 2,400 AF will be imported water. Efforts are underway to expand the plant's treatment capabilities and increase the recycled percentage amount to 100% to eliminate the need for imported water.

Recycled water for the ABP is available from WRD's Leo J. Vander Lans Water Treatment Facility. This treatment plant was permitted to provide up to 100% of the barrier with recycled water in 2014 and is expected to run at this rate starting in early 2015. For the ensuing year, of the 5,300 AF estimated to be injected at the barrier on the WRD-side of the barrier (not including the Orange County side), an estimate of 4,800 AF will be recycled water and 500 AF will be imported water to make up any plant shut downs for maintenance or other issues.

Imported Water

Since October 2011, MWD terminated its discounted replenishment water program which the District utilized since 1959, and has not yet offered a new replenishment program. Replenishment agencies must rely on the more expensive Tier 1 water if it is available from MWD-member agencies, or pay the even higher priced Tier 2 water if Tier 1 water is unavailable. Over the past few years, WRD has budgeted for Tier 1 water for the spreading grounds and the In-Lieu program.

For the imported water used for injection at the seawater barrier wells, the District had paid the treated Tier 1 rate for decades to ensure availability. Because of the increasing price of Tier 1 water, the District is looking at ways to reduce costs. Methods such as reduction of pumping near the barriers, increased recycled water to offset imported water, or banking water at lower seasonal rates are being explored or implemented. At the ABP, the City of Long Beach and WRD have entered into an agreement to bank seasonal treated water and Tier 1 water through inland injection wells and then extract the water for injection at the barriers when needed, thus saving considerable costs on barrier water. In 2009/2010, the 2,000 AF of Tier 1 water banked in 2008/2009 was utilized. The seasonal water banked in 2004/2005 through 2006/2007 has 2,160 AF remaining and can be called at any time that serves the District most effectively.

Projected Cost of Replenishment Water

WRD has estimated it will need 103,300 AF of replenishment water in the ensuing year. Using currently available information and estimates for the cost of replenishment water to WRD from the various water suppliers, this water will cost WRD approximately \$42,125,595. Costs may change over the next few months as the other agencies adopt their budgets, and any changes will be incorporated into an updated ESR.

Groundwater Replenishment

Tables 1 and 2 provide a detailed breakdown of the estimated replenishment water costs for the ensuing water year. These estimated costs are for water purchases only and do not include the additional costs for water replenishment and water quality projects and programs. These projects and programs are discussed in detail in Chapter 5. The anticipated costs of these projects and programs will be further discussed in District budget workshops, Budget Advisory Committee (“BAC”), and other public meetings before the Board of Directors adopts the 2015/2016 Replenishment Assessment in May.

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CHAPTER 5 - PROJECTS AND PROGRAMS

California Water Code Sections 60220 through 60226 describe the broad purposes and powers of the District to perform any acts necessary to replenish, protect, and preserve the groundwater supplies of the District. In order to meet its statutory responsibilities, WRD has instituted numerous projects and programs in a continuing effort to effectively manage groundwater replenishment and groundwater quality in the Central Basin and West Coast Basin (“CBWCB”). These projects and programs include activities that enhance the replenishment program, increase the reliability of the groundwater resources, improve and protect groundwater quality, and ensure that the groundwater supplies are suitable for beneficial uses.

These projects and programs have had a positive influence on the basins, and WRD anticipates continuing these activities into the ensuing year. The following is a discussion of the projects and programs that WRD intends to continue or initiate during the ensuing year.

001 – Leo J. Vander Lans Water Treatment Facility Project

The Leo J. Vander Lans Water Treatment Facility provides advanced treated recycled water to the Alamitos Seawater Intrusion Barrier. The facility receives tertiary-treated water from the Sanitation Districts and provides the advanced treatment through a process train that includes microfiltration (MF), reverse-osmosis (RO), and ultraviolet light (UV). The facility’s operations permit was approved by the Los Angeles Regional Water Quality Control Board (“RWQCB”) on September 1, 2005, and the replenishment operations of this facility started in October 2005. The product water has since been discharging to the barrier to replace up to 50% of the potable imported water formerly used, thereby improving the reliability and quality of the water supply to the barrier. The plant has been producing 3 million gallons a day (“MGD”) for delivery to the barrier. The Long Beach Water Department (“LBWD”) is responsible for operation and maintenance of the treatment plant under contract with WRD.

The facility was expanded in late 2015 to increase the capacity to 8 MGD, with the operations permit amended by the RWQCB for the expanded facility. It is capable of providing up to 100% of the barrier demand with advanced treated recycled water, thereby eliminating altogether the need for imported water. The facility expansion added unique treatment process enhancements to reduce facility’s waste generations. The process enhancements include (1) a third-stage RO to increase recovery from the original 85% to 92.5%; and (2) a MF backwash waste treatment system that recovers approximately 95% of the backwash waste stream through dissolve air flotation (DAF) treatment and a follow-up polishing MF. With these process enhancements, the facility has been expanded to almost triple the production capacity without any increases in waste generations.

Expected operations costs for the coming year will involve operation and maintenance of the plant and groundwater monitoring at the barrier. Because the primary purpose of this project is to provide a more reliable means of replenishing the basin through injection, 100% of the costs are drawn from the Replenishment Fund. The capital costs for the expansion are funded by federal and state grants as well as the District’s bond proceeds.

002 – Robert W. Goldsworthy Desalter Project

The Robert W. Goldsworthy Desalter has been operating since 2002 to remove over 20,000 AF of brackish groundwater from a seawater intrusion plume (aka “saline plume”) in the Torrance area that was stranded inland of the West Coast Basin Barrier after the barrier project was put into operation in the 1950s and 1960s. The production well and desalting facility are located within the City of Torrance and the product water is delivered for potable use to the City’s distribution system. The treatment plant capacity is about 2,200 AFY. The City is responsible for operation and maintenance of the treatment plant under contract with WRD.

The District has completed a final design for expanding the Goldsworthy Desalter. The expansion project includes an increase of treatment capacity to a total 4,800 AFY, the addition of two new source water wells, and associated conveyance pipelines and pump stations. Construction of these new facilities is expected to begin in the middle of 2015. The purpose of the desalter expansion is directly related to remediating degraded groundwater quality and costs will be funded through WRD’s Capital Improvement Program. Expected costs for the coming year will involve capital improvements for the plant expansion as well as operation and maintenance of the plant.

Additional measures may be necessary in the future to fully contain and remediate the saline plume, which extends outside of the Torrance area. WRD is completing work on a groundwater master plan for the West Coast Basin to determine long-term solutions to this problem. The District continues to work with the City of Torrance Municipal Water Department, the pumpers’ Technical Advisory Committee, and other West Coast Basin stakeholders on the future of the saline plume removal in the West Coast Basin.

004 – Recycled Water Program

Recycled water or reclaimed municipal wastewater has been successfully used for groundwater recharge by WRD since 1962. Recycled water provides a reliable source of high quality water for surface spreading in the Montebello Forebay and for injection at the seawater intrusion barriers. In light of the recurring drought conditions in California and uncertainties about future water availability and increasing cost of imported water supplies, recycled water has become increasingly vital as a replenishment source.

In order to ensure that the use of recycled water for groundwater recharge remains a safe and reliable practice, WRD participates in various research and monitoring activities, proactively contributes to the regulatory and legislative development processes, and engages in information exchange and dialogue with regulatory agencies and other recycled water users. The District continues to closely coordinate with the Sanitation Districts of Los Angeles County (SDLAC), which produces the recycled water used for surface spreading in the Montebello Forebay, on permit compliance activities, including groundwater monitoring, assessment, and reporting. Many monitoring and production wells are sampled frequently by WRD staff, and the results are reported to the regulatory agencies.

In addition to compliance monitoring and sampling associated with the spreading grounds, WRD is partnering with others to more fully investigate the effectiveness of soil aquifer treatment (SAT) during groundwater recharge. A recent research conducted at the test basin adjacent to the spreading grounds augmented past research efforts by characterizing the percolation process and by quantifying the filtering and purifying properties of the underlying soil with respect to constituents of concern, such as nitrogen, total organic carbon, and chemicals of emerging concern (CECs). The District

continues to be vigilant in monitoring research on the occurrence, significance, attenuation, and removal of CECs, including pharmaceuticals, endocrine disruptors, and personal care products.

Three separate groundwater tracer studies were performed in 2003-2005, 2005-2006, and 2010-2011 for the purpose of tracking and verifying the movement of recycled water from the spreading grounds by testing the monitoring wells and the production wells. Results showed that the depth rather than the horizontal distance from the recharge ponds is the key factor influencing arrival times of recycled water to wells. Travel time to deeper wells is greater than to shallower wells, even if the deeper wells are located much closer to the spreading grounds than shallower wells. In some cases, WRD made modifications to wells to seal off their shallow perforations so that the wells would only produce from the deeper aquifers. Tracer tests conducted subsequent to well modification demonstrated an increased travel time compared to earlier results. These efforts, in addition to periodic studies assessing health effects and toxicological issues, are necessary to provide continued assurances that the use of recycled water for groundwater recharge remains safe and compliant with all regulatory standards.

In response to the prolonged drought, WRD worked closely with the regulatory agencies to allow a greater amount of recycled water to be used for spreading at the Montebello Forebay Spreading Grounds, through an amendment of the existing permit in 2014. This amendment will allow WRD to continue to utilize recycled water even when storm water and imported water become scarce or unavailable. As required by the permit amendment, WRD will implement additional monitoring when the recycled water contribution reaches forty percent. In addition, WRD, in concert with other stakeholders, worked closely with the State Water Resources Control Board's Division of Drinking Water (DDW; formerly, California Department of Public Health) to review, update, and help shape the regulations on groundwater recharge using recycled water, which became effective in June 2014.

Recycled water is also injected into the Los Angeles County Department of Public Works' three seawater intrusion barriers located along the coast of Los Angeles County (Alamitos, West Coast, and Dominguez Gap barriers). Highly purified recycled water used for injection at the Alamitos Barrier is produced at WRD's Leo J. Vander Lans Water Treatment Facility. The recycled water for the Dominguez Gap Barrier is generated at the City of Los Angeles' Terminal Island Water Reclamation Plant. And the recycled water for the West Coast Barrier is produced at the West Basin Municipal Water Districts' Edward C. Little Water Recycling Facility. Extensive recycled water monitoring and regular groundwater modeling are performed to ensure that the treatment plants are operating as intended and that the injected water is making a positive contribution to the groundwater basins. All three barrier projects are in various phases of expanding the recycled water produced for the barrier operations, with the ultimate goal of completely phasing out the potable water used at the barriers. Alamitos Barrier will reach the goal of 100% recycled water recharge in 2015, with the other two barriers following in the near future.

Projects under this program help improve the reliability and utilization of an available local resource, i.e. locally produced recycled water. This resource is used to improve replenishment capabilities and is thus funded from the Replenishment Fund.

005 – Groundwater Resources Planning Program

The Groundwater Resources Planning Program was instituted to evaluate basin management issues and to provide a means of assessing project impacts in the District's service area. Prior to moving forward with a prospective project, an extensive evaluation is undertaken. Within the Groundwater Resources Planning Program, new projects and programs are analyzed based on benefits to overall basin management. This analysis includes performing an extensive economic evaluation to compare

estimated costs with anticipated benefits. As part of this evaluation process, all capital projects are brought to the District's Technical Advisory Committee for review and recommendation. The culmination of this review and evaluation process is the adoption of the five - year Capital Improvement Program ("CIP") by the District's Board of Directors.

Under this program, District staff will continue to monitor state and federal funding programs to determine applicability to the District's list of prospective projects. In the coming year, the District will continue participation in Integrated Regional Water Management Planning ("IRWMP") for Greater Los Angeles County. Collaborative development of the region's IRWM plan is a requirement for entities to secure grant funding under Proposition 84 that was passed in November 2006 and Proposition 1 that was passed in November 2014. Grant applications for Proposition 84, Round 4 are expected to be submitted to the California Department of Water Resources in the upcoming year. The District anticipates submitting an application for the Groundwater Reliability Improvement Program ("GRIP") under this program.

Projects under the Groundwater Resources Planning Program serve to improve replenishment operations and general basin management. Accordingly, this program is also wholly funded through the Replenishment Fund.

006 – Groundwater Quality Program

This program is an ongoing effort to address water quality issues that affect WRD projects and the pumpers' facilities. The District monitors and evaluates the impacts of proposed, pending and recently promulgated drinking water regulations and legislation. The District assesses the justification and reasoning used to draft these proposals and, if warranted, joins in coordinated efforts with other interested agencies to resolve concerns during the early phases of the regulatory and/or legislative process.

Annually, the District offers a groundwater quality workshop to water purveyors. At the workshop, field experts and regulators provide information on the latest water quality regulations, state of the groundwater in the local basins, information on the cutting edge technology for contaminant removal or well rehabilitation, and other topics that are of key interest to the District's water purveyors. This year's annual workshop is anticipated to feature speakers from the State Water Resources Control Board to help deconstruct the requirements of the 2014 Statewide Permit for Drinking Water Discharges and to help respond to questions from the purveyors. The annual workshop also gives a comprehensive overview of the resources provided under the District's Groundwater Quality Program.

The District continually evaluates compliance with current and anticipated water quality regulations in production wells, monitoring wells, and spreading/injection waters of the basins. WRD proactively investigates any potential non-compliance situations to confirm or determine the causes of noncompliance, develops recommended courses of action and estimates their associated costs to address the problem, and implements the best alternative to achieve compliance.

Effective January 1, 2007, the District assumed responsibility for the Central Basin Title 22 Groundwater Monitoring Program. The program involves working with participating pumpers to comply with regulatory requirements for well water monitoring, including: (1) scheduling the collection and analysis of samples for Title 22 compliance required by the State Water Resources Control Board (SWRCB) Division of Drinking Water (DDW) and special sampling such as the Unregulated Contaminant Monitoring Rule ("UCMR") required by the United States Environmental

Protection Agency (“EPA”); (2) coordinating the submittal of results to the SWRCB DDW; and 3) preparing the annual Consumer Confidence Reports for the pumpers. This program is available to pumpers who choose to participate and agree to reimburse the District the actual monitoring costs, including District staff time in administering the program. The District presently has 22 pumpers/participants in this program, which involves a total of 84 wells.

In recent years, new Chemicals of Emerging Concern (CECs) have been identified nationwide as potentially impacting surface water and groundwater. CECs can be broadly defined as any synthetic or naturally occurring chemical or any microorganism that is not commonly monitored in the environment but has been recently detected in the environment. CECs such as pharmaceuticals and personal care products, perfluorinated compounds, polybrominated diphenyl ethers, and others may pose a potential threat to water resources. Their detection in the environment does not necessarily mean that they pose a health threat at their measured concentrations. WRD is actively monitoring surface spreading and injection activities for water quality constituents, including many CECs. In addition, the District supports research evaluating CEC removals using innovative treatment technologies.

WRD’s service area contains a large and diverse industrial and commercial base. Consequently, many potential groundwater contamination sources exist within District boundaries. Examples of potential contamination sources include leaking underground storage tanks, petroleum pipeline leaks at refineries and petrochemical plants, and discharges from dry cleaning facilities, auto repair shops, metal works facilities, and others. Such contamination sources may pose a threat to the drinking water aquifers. Accordingly, WRD established its Groundwater Contamination Prevention Program as a key component of the Groundwater Quality Program in an effort to minimize or eliminate threats to groundwater supplies. The Groundwater Contamination Prevention Program includes several ongoing efforts:

- Central Basin and West Coast Basin Groundwater Contamination Forum: More than 10 years ago, WRD established this data-sharing and discussion forum with key stakeholders including the EPA, the California Department of Toxic Substances Control (“DTSC”), the RWQCB, the SWRCB DDW, the United States Geological Survey (“USGS”), and various cities and purveyors. Stakeholders drafted and signed a Memorandum of Understanding (“MOU”) agreeing to meet regularly and share data on contaminated groundwater sites within the District. WRD acts as the meeting coordinator and data repository/distributor, helping stakeholders to characterize the extent of contamination to identify potential pathways for contaminants in shallow aquifers to reach deeper drinking water aquifers and develop optimal methods for remediating contaminated groundwater.
- With the cooperation and support of all stakeholders in the Groundwater Contamination Forum, WRD developed a list of high-priority contaminated groundwater sites located within the District. This list is a living document, subject to cleanup and “closure” of sites, as well as discovery of new sites warranting further attention. Currently, the list includes 48 sites across the CBWCB. WRD works with the lead regulatory agencies for each of these sites to keep abreast of their status, offer data collection, review and recommendations as needed, and facilitate progress in site characterization and cleanup.
- In 2012, WRD formed the Los Angeles Forebay Groundwater Task Force to coordinate and align regulators and water purveyors/agencies to collaboratively address groundwater contamination in the Los Angeles Forebay that is a threat to drinking water resources. The Task Force members currently include WRD, DTSC, EPA, RWQCB, SWRCB DDW, USGS, City of Vernon, City of

Los Angeles and others. WRD and DTSC are investigating and collecting data to assess the extent of regional volatile organic compound and perchlorate plumes and find the source(s) of this contamination. This data will be utilized by the regulatory agencies to eventually facilitate remediation of the plumes.

WRD remains committed to projects seeking opportunities and innovative project concepts to enhance capture and recharge of local stormwater runoff in order to augment local groundwater resources, as follows:

- For over a decade, the District has participated on the Technical Advisory Committee (“TAC”) for the Water Augmentation Study (“WAS”) of the Los Angeles and San Gabriel Rivers Watershed Council. WAS is a multi-year investigation into the feasibility of capturing more local storm runoff, which would otherwise discharge into the storm drains, channels, and ultimately be lost to the ocean. Local stormwater captured from small-scale sites (e.g. neighborhoods, parks, ball fields, etc.) using various infiltration practices (e.g. bioswales, infiltration basins, and porous pavements) represents a potential source of new replenishment water, above and beyond the stormwater currently captured and used for percolation at the existing spreading grounds. As a TAC member, WRD helps to steer the study to examine and ensure that this new source of recharge water does not degrade groundwater quality if allowed to percolate at local sites. In 2012, with financial contributions from the District, two lysimeters were installed as part of the WAS investigation to evaluate the potential impacts of the locally captured stormwater on groundwater quantity and quality at the Elmer Avenue neighborhood BMP demonstration project constructed in 2009. Monitoring of the lysimeters began in early 2013 and extended through 2014. The results of the water quality sampling at Elmer Avenue is summarized in Council for Watershed Health’s 2014 Annual Monitoring Report for Prop 84 Storm Water Grant Program Agreement #12-425-550 (*Assessing the Effect of Long-Term Stormwater Infiltration on Groundwater Quality; Continued Monitoring of the Los Angeles Basin Water Augmentation Study Infiltration Best Management Practices (BMPs)*).
- The Stormwater Recharge Feasibility Study, which began mid-2011 and was completed in August 2012, investigated regional and distributed alternatives to capture more stormwater from parcels within the District service area for groundwater recharge. To identify and prioritize catchments or parcels with greatest potential to provide additional groundwater recharge and reduce pollutant loading to surface water bodies, an in-depth, regional assessment was conducted using spatial analysis and locally developed models, including the Structural Best management practices Prioritization and Analysis Tool (“SBPAT”), the Groundwater Augmentation Model (“GWAM”), and the WRD/USGS MODular three-dimensional finite-difference ground-water FLOW model (“MODFLOW”). The assessment considered a suite of factors important to siting groundwater recharge projects (e.g. surface flows, soil conditions, depth to water, and subsurface geologic conditions, preexisting contamination, and permanent dewatering activities) as well as local water quality objectives.

The study identified 17 high priority catchments within the District service area where expected water supply benefits were estimated at 4,300 AFY if appropriate infiltration facilities are installed and maintained. A single 100 acre catchment was selected, and concept designs for a catchment-wide pilot stormwater capture and recharge facilities were completed. Results from the analyses and pilot project are scalable to inform future decisions about widespread implementation of distributed and regional stormwater capture projects. Findings of the study were presented to

various audiences, including water purveyors, regulators, local environmental groups, and at regional and national stormwater conferences. The benefit cost analyses, which examined multiple factors including but not limited to water quality improvements, water supply benefits, and social benefits garnered wide interest from water quality agencies, water supply agencies, and policymakers.

In 2012, the District partnered with the City of Los Angeles Bureau of Sanitation (the lead applicant) to pursue Proposition 84 funding (Safe Drinking Water, Water Quality and Supply, Flood Control, River and Coastal Protection Bond Act of 2006) to implement a portion of the concept design to increase stormwater infiltration and to assist the City of Los Angeles in its compliance with total maximum daily load (water quality-related) requirements. The proposed project area is located in the City of Los Angeles south of the 10 freeway and east of the 110 freeway. The combined watershed of all proposed stormwater infiltration projects is approximately 228 acres with mixed land uses. In 2013, the City was awarded \$2,939,361 by the State Water Resources Control Board to construct and monitor the project. Known as the “Broadway Neighborhood Stormwater Greenway (Broadway) Project, this project is pending completion in 2015.

Much of the work for the coming year will involve additional investigations at well sites known to have contaminated water, continued tracking of water quality regulations and policies affecting production and replenishment operations, further characterization of contaminant migration into the deeper aquifers, and monitoring and expediting cleanup activities at contaminated sites. All work under this program is related to water quality and cleanup efforts and is funded from the Clean Water Fund.

010 – Geographic Information System (“GIS”)

The District maintains an extensive in-house database and Geographic Information System (GIS). The database includes water level and water quality data for WRD’s service area with information drawn not only from the District’s Regional Groundwater Monitoring Program and permit compliance monitoring, but also from water quality data obtained from the DDW. The system requires continuous update and maintenance but serves as a powerful tool for understanding basin characteristics and overall basin health.

The GIS is used to provide better planning and basin management. It is used to organize and store an extensive database of spatial information, including well locations, water level data, water quality information, well construction data, production data, aquifer locations, and computer model files. In the coming year, this information will be further integrated with readily available data from other state and federal agencies, as well as other District departments. Staff uses the system daily for project support and database management. Specific information is available upon request to any District pumper or stakeholder and can be delivered through the preparation of maps, tables, reports, or in other compatible formats. Additionally, the District has made its web-based Interactive Well Search tool available to selected users. This web site provides these users with limited access to WRD’s water quality and production database.

District staff will continue to streamline and refine the existing data management system and website as well as satisfy both internal and external data requests. As part of the streamlining of the data, staff will work closely with other District departments to evaluate and implement updates to the District’s existing system to facilitate the seamless transfer of data and access to that data. Additionally, District staff will continue the development of applications to more efficiently manage and report groundwater

production information. Continued use, upkeep, and maintenance of the GIS are planned for the coming year. The use of the system supports both replenishment activities and groundwater quality efforts. Accordingly, the cost for this program is equally split between the Replenishment and Clean Water Funds.

011 – Regional Groundwater Monitoring Program

WRD has been monitoring groundwater quality and water levels in the CBWCB for over 50 years. The Regional Groundwater Monitoring Program provides for the collection of basic information used for groundwater basin management including groundwater level data and water quality data. It currently consists of a network of over 300 WRD and USGS-installed monitoring wells at over 55 locations throughout the District, supplemented by the existing groundwater production wells operated by the water purveyors. The information generated by this program is stored in the District's GIS and provides the basis to better understand the dynamic changes in the Central Basin and West Coast Basin. WRD hydrogeologists and engineers, provide the in-house capability to collect, analyze and report groundwater data.

Water quality samples from the monitoring wells are collected twice a year and analyzed for numerous common constituents such as general minerals, volatile organic compounds, metals, and general physical properties, as well as “special study constituents” on a case by case basis such as perchlorate, n-nitrosodimethylamine (“NDMA”), hexavalent chromium, 1,4-dioxane, and CECs. Water levels are measured in most monitoring wells with automatic data loggers daily, while water levels in all monitoring wells are measured by WRD field staff a minimum of four times per year. On an annual basis, staff prepares the Regional Groundwater Monitoring Report that documents groundwater level and groundwater quality conditions throughout the District. This report is distributed to the stakeholders in WRD and is also available on the District's website. In 2011, the National Groundwater Association presented WRD with the “2011 Groundwater Protection Project Award” in recognition of the regional groundwater monitoring program.

WRD is also the designated groundwater monitoring entity for the CBWCB under the State of California's CASGEM program (California Statewide Groundwater Elevation Monitoring). WRD collects water level data from 28 of its nested monitoring wells and uploads it to the State's CASGEM website on a regular basis for seasonal and long-term water level trend tracking. Public access to the CASGEM website is at www.water.ca.gov/groundwater/casgem.

Most of the work during the ensuing year will involve the on-going collection of water levels and water quality samples from the WRDs monitoring wells, continuous well and equipment maintenance, and annual reporting activities. Work associated with the Regional Groundwater Monitoring Program also supports activities relating to both replenishment and water quality projects. The program is funded equally by the Replenishment and Clean Water Funds.

012 – Safe Drinking Water Program

WRD's Safe Drinking Water Program (“SDWP”) has operated since 1991 and is intended to promote the cleanup of groundwater resources at specific well locations. Through the installation of wellhead treatment facilities at existing production wells, the District removes contaminants from the underground supply and delivers the extracted water for potable purposes. Projects implemented through this program are accomplished in collaboration with well owners.

One component of the program focuses on the removal of VOCs and offers financial assistance for the design, equipment and installation at the selected treatment facility. Another component offers zero-interest loans for secondary constituents of concern that affect a specific production well. The capital costs of wellhead treatment facilities range from \$800,000 to over \$2,000,000. Due to financial constraints, the initial cost is generally prohibitive to most pumpers. Financial assistance through the District's SDWP makes project implementation much more feasible.

There are several projects in various stages of implementation and new candidates for participation are under evaluation. A total of 16 facilities have been completed and are online and one facility has successfully completed removal of the contamination and no longer needs to treat. While continued funding of this program is anticipated for next year, the District has revised the guidelines of the SDWP to place a greater priority on projects involving VOC contamination or other anthropogenic (man-made) constituents, now classified as Priority A Projects. Treatment projects for naturally-occurring constituents are classified as Priority B Projects and funded as a secondary priority, on a case-by-case basis and only if program monies are still available during the fiscal year. While such projects are of interest to WRD, availability of funding for them will not be determined until after the budget process is completed.

The District recently revised the Safe Drinking Water Program to include a revolving fund plan for Priority B Projects and implementation of a revitalization plan to maximize program participation. The Safe Drinking Water Program now includes a third component, the Disadvantage Communities (DAC) Outreach Assistance Program, which will provide assistance to water systems in Disadvantaged areas with applying for State funding.

Projects under the SDWP involve the treatment of contaminated groundwater for subsequent beneficial use. This water quality improvement assists in meeting the District's groundwater cleanup objectives.

018 – Dominguez Gap Barrier Recycled Water Injection

This Project involves the delivery of recycled water from the City of Los Angeles Department of Public Works - Bureau of Sanitation (BOS) Terminal Island Water Reclamation Plant/Advanced Water Treatment Facility (AWTF) to the Dominguez Gap Barrier (DGB). Delivery of recycled water to the barrier, which commenced in late February 2006, was temporarily interrupted for about a year starting November 2011 when the AWTF shut down for plant upgrade and maintenance. Recycled water delivery to the DGB resumed in December 2012.

Prior to injection at the barrier, the recycled water produced at the AWTF undergoes advanced treatment processes including microfiltration, reverse osmosis, and chlorination. The DGB injection project was permitted by LARWQCB in conjunction with DDW for up to 5 mgd of recycled water and 50% recycled water contribution (meaning recycled water may not exceed 50% of the total injected volume with the remainder consisting of potable water). Water quality requirements, including turbidity and modified fouling index (MFI), must also be satisfied to minimize potential fouling of DGB injection wells owned and operated by the County of Los Angeles Department of Public Works. WRD is working with BOS to expand the amount of recycled water produced for the DGB, with the ultimate goal of eliminating all potable water used for barrier injection.

While BOS is responsible for the treatment and the water quality monitoring of the recycled water and LADWP for the delivery of the recycled water to the DGB, WRD has responsibility for groundwater monitoring and compliance. As part of the DGB injection permit requirements, WRD conducts

groundwater monitoring to measure and track water quality conditions, evaluate potential impact of recycled water on groundwater, and identify potential problems well before recycled water arrives at any downgradient drinking water wells. In addition, an extensive tracer study was conducted from the start of recycled water injection in February 2006 through fall 2010 to determine the extent of travel and movement of the recycled water blend through the aquifers. The tracer study confirmed that after injection, adequate mixing and further blending of recycled water with diluent water occurs in the ground and that groundwater samples collected were representative of the recycled water blend. Recycled water use at the seawater intrusion barriers in Los Angeles County improves the reliability of a supply in continuous demand. Traditionally, water purchases for the barriers have been viewed as a replenishment function. Therefore, this program is funded 100% through the Replenishment Fund.

023 – Replenishment Operations

WRD actively monitors the operation and maintenance practices at the LACDPW-owned and operated spreading grounds and seawater barriers within the District. Optimizing replenishment opportunities is fundamentally important to WRD, in part because imported and recycled water deliveries directly affect the District’s annual budget. Consequently, the District seeks to ensure that the conservation of stormwater is maximized, and that imported and recycled water replenishment is optimized.

Due to the reduction and unreliability of imported water for replenishment, WRD is working on its Water Independence Now (“WIN”) program to eventually become independent from imported water for groundwater recharge. Currently, the District needs about 21,900 AF of imported water for recharge; 16,000 AF for spreading and 5,900 AF for injection at the seawater barriers. By maximizing the use of recycled water and stormwater, the amount of imported water needed can eventually be reduced or eliminated, thereby providing the groundwater basins with full replenishment needs through locally-derived water.

WRD coordinates regular meetings with LACDPW, MWD, SDLAC, and other water interests to discuss replenishment water availability, spreading grounds operations, barrier operations, scheduling of replenishment deliveries, seawater barrier improvements, upcoming maintenance activities, and facility outages or shutdowns. The District tracks groundwater levels in the Montebello Forebay weekly to assess general basin conditions and determine the level of artificial replenishment needed. WRD also monitors the amount of recycled water used at the spreading grounds and seawater barriers to maximize use while complying with pertinent regulatory limits.

While improvements undertaken in recent years by LACDPW/WRD (e.g., expansion of Whittier Narrows Conservation Pool, installation of rubber dams on San Gabriel River, Interconnection Pipeline) have considerably increased the stormwater portion of WRD’s supply portfolio, the potential for further increasing the use of stormwater for groundwater augmentation remains significant. Working with the Army Corps of Engineers and LACDPW on additional improvements to the Whittier Narrows Conservation Pool will allow capture of more stormwater, as will development of Montebello Forebay projects to lower the water table through increased pumping and delivery downgradient to free up underground space to capture more storm water and/or recycled water. WRD has submitted a request to the Army Corps of Engineers for a temporary deviation for the Whittier Narrows Conservation Pool to increase the operational water surface elevation (WSE) from 201.6 feet to 205 feet for three years beginning WY 2015-16. During this period, WRD will pursue a permanent Army Corps of Engineers operational change from WSE 201.6 feet to WSE 205 feet.

The District plans to continue working with the LACDPW on several design projects for the Rio Hondo and San Gabriel Coastal Spreading Grounds with the goal of increasing the volume of recycled water conserved. The District is continually looking for opportunities to work with the LACDPW on improvement projects at the recharge facilities. Several potential projects have been identified and are being further evaluated to determine if they should be pursued. Two such projects are planned for completion this fiscal year. These projects consist of the construction of turnout structures along the San Gabriel River which will allow the delivery of increased recycled water to 1) the San Gabriel Coastal Spreading Grounds – Basin #2 & Interconnection Pipeline and 2) the portion of the unlined San Gabriel River south of Rubber Dam #4. Together these two turnout structures will help increase the spreading of recycled water at the San Gabriel Coastal and Rio Hondo Coastal Spreading Grounds and minimize the loss of recycled water to the ocean.

As its name implies, the Replenishment Operations Program deals primarily with replenishment issues and therefore its costs are borne by the Replenishment Fund.

025 – Hydrogeology Program

This program accounts for the projects and programs related to hydrogeologic investigations of the District and surrounding areas to ensure safe and reliable groundwater. Work performed under this program includes the preparation of the annual Engineering Survey and Report, which incorporates the calculation and determination of annual overdraft, accumulated overdraft, changes in storage, pumping amounts, and replenishment water availability into a document to help the District assess its replenishment needs and costs in the ensuing year. Extensive amounts of data are compiled and analyzed by staff to determine these values. Maps are created showing water levels in the basins and production patterns and amounts. Much of this information is published in Technical Bulletins – easy to read two-page documents that summarize groundwater issues of importance in the District.

An ongoing effort at the District to better characterize the hydrogeologic conditions across the Central and West Coast Basins is called the "Hydrogeologic Conceptual Model". This long-term project involves compiling and interpreting the extensive amounts of data generated during drilling and logging of the WRD/USGS monitoring wells and collected from historical information for production wells and oil wells within the District. In 2013, WRD obtained extensive seismic reflection data which is being analyzed to help fill in gaps in the geologic structure. The ultimate goal of this project is to incorporate the data in WRD's database/GIS and apply the system to generate aquifer surfaces and cross-sections for comparison with historical interpretations of basin hydrogeology. The final conceptual model will significantly improve the understanding of the aquifer depths, extents and thicknesses throughout the District and will assist staff, pumpers and stakeholders with planning for groundwater resource projects such as new well drilling, storage opportunities or modeling. The data will also be made available on WRD's website to be used as a reference source for hydrogeologic interpretations and to fill project-related data requests.

The conceptual model updates are being incorporated into the USGS numerical model updates. The updates to the numerical model are being performed based on the new information gleaned from the additional aquifer-specific WRD monitoring wells installed since 2000 and the extensive groundwater monitoring that the District has performed since then to identify trends in groundwater levels. The upgrades will also include refining the model's resolution to 1/8-mile square cells versus the previous model's 1/2 - mile cells, and creating more than 10 vertical layers to simulate groundwater flow in the various aquifers versus the previous model's 4 layers. The model has also been converted to the newest version of Modflow known as Unstructured Grids (USG), which allows better simulation of groundwater flow in the complex geology of the Central and West Coast Basins. New seismic

reflection data purchased by WRD in 2013 will also be incorporated into the model. Time frames for model calculation will improve from annual measurements to quarterly. All of these upgrades will lead to a much improved groundwater modeling simulator for the District's future management efforts. This model is a significant analytical tool utilized by WRD to determine basin benefits and impacts of changes proposed in the management of the Central Basin and West Coast Basin. It is anticipated that this model will be completed in 2015 or early 2016.

Hydrogeologic analysis is also needed for projects associated with groundwater quality concerns and specific cleanup projects. Staff work may include investigative surveys, data research, and oversight of specific project studies. Such efforts are used to relate water quality concerns with potential impact to basin resources. An example of this type of staff work is the District's Well Profiling Program. The District assists pumpers in evaluating drinking water supply well contamination. Services may include existing data collection and review and field tasks such as spinner logging and depth-discrete sampling. WRD's evaluation helps pumpers to determine the best course of action; e.g., sealing off a particular screened interval of a well, wellhead treatment, or well destruction.

Salt / Nutrient Management Plans are a new State requirement for all groundwater basins throughout California. The Plans are required as part of the Recycled Water Policy issued by the State Water Resources Control Board ("SWRCB") and effective as of May 14, 2009. As stated in the Policy, its purpose is to "establish uniform requirements for recycled water use and to develop sustainable water supplies throughout the state". The SWRCB therefore "supports and encourages every region...to develop a Salt / Nutrient Management Plan by 2014". WRD along with other stakeholders completed the SNMP in 2014 and the Regional Water Quality Control Board adopted a Basin Plan Amendment to incorporate the SNMP in February 2015. Follow up work will be to monitor the salt and nutrient concentrations in the District over time, and compare results to the model predictions in the SNMP.

Modeling of groundwater flow and movement of injected recycled water at the Alamitos and Dominguez Gap seawater barriers are also included in this program. These efforts are required under permits for the recycled water injection and will continue in the ensuing year.

In 2013, WRD received a grant from MWD through WBMWD to perform groundwater tracer tests using noble gasses at the three seawater barrier systems. Use of noble gasses instead of other compounds, if found effective, will provide a cost-effective means to reliably follow the movement of injected water through the aquifers. This project was initiated in 2014, and monitoring will continue in 2015 and 2016, with a final report issued in 2016.

The Hydrogeology Program addresses both groundwater replenishment objectives and groundwater quality matters. The cost of the program is evenly split between the Replenishment and Clean Water Funds.

033 – Groundwater Reliability Improvement Program ("GRIP")

The WRD continues to pursue projects through its Water Independence Now ("WIN") program to develop local and sustainable sources of water for use in groundwater replenishment activities. This has become increasingly important in light of persistent drought conditions in the state and environmental and regulatory issues that limit delivery of imported water to the Los Angeles area.

To address these issues, WRD is seeking alternative sources of water to offset the imported water used for replenishment in the Montebello Forebay. This program is referred to as the Groundwater Reliability Improvement Program ("GRIP"). The goal of GRIP is to offset the current use of imported

water by providing up to 21,000 AFY of recharge using reliable alternative supply sources (e.g., recycled water, storm water) for replenishment via the Montebello Forebay. The primary goals of GRIP are to:

- Provide a sustainable and reliable supply for replenishing the Basins;
- Protect groundwater quality;
- Minimize the environmental/energy footprint of any option or options selected;
- Comply with pertinent regulatory requirements employing an institutionally feasible approach;
- Minimize cost to agencies using ground water; and
- Engage stakeholders in the decision making process.

The GRIP Advanced Water Treatment Facility (AWTF) will provide 10,000 AFY of highly treated recycled water to the Montebello Forebay for groundwater recharge to better identify the design/operation parameters of GRIP. The additional 11,000 AFY of 21,000 AFY to be provided as part of the GRIP will come from tertiary treated recycled water from the SDLAC's San Jose Creek Water Reclamation Plant.

The District has recently purchased a 5.2 acre parcel in the City of Pico Rivera which will be the future site for the GRIP AWTF. As a result of this recent development, the previously completed Draft Environmental Impact Report ("DEIR") for GRIP and is being amended and will be made available for public review in early spring of 2015. Once public comments are incorporated in the document, the EIR will be presented to the WRD Board of Directors for adoption in the summer of 2015. Thereafter, full scale design and regulatory permitting efforts will commence to be followed by construction. Additional information related to GRIP may be found at www.wrd.org/grip.

GRIP efforts are part of WRD's capital improvement program and are funded primarily through bond proceeds.

035 – West Coast Seawater Barrier Monitoring Well Sampling Project

In a cooperative agreement with West Basin Municipal Water District ("WBMWD"), WRD has been contracted to sample eight West Coast Barrier monitoring wells to help satisfy WBMWD's permit compliance criteria for recycled water injection into the West Coast Barrier. WRD's hydrogeologists sample the eight wells quarterly and submit the samples to WBMWD's laboratory for analysis. Sampling of the monitoring wells is required by WBMWD's Regional Water Quality Control Board permit, which enforces the monitoring and testing of the recycled water that is injected into the West Coast Basin Barrier to prevent seawater intrusion. WBMWD fully reimburses WRD for its sample collection activities and therefore there are no impacts on the WRD replenishment assessment.

038 – Engineering Program

The Engineering Department provides technical, engineering, program management, and hands on support on capital improvement projects ranging from concept development through engineering design, project management and construction inspections. The engineering department is also responsible for developing, updating, and managing the capital improvement program (CIP) and its related projects. The engineering department prepares and/or oversees the preparation plans, specifications and engineer's estimates of probable construction costs (PS&E's), or creates request for proposals/qualifications (RFPs/RFQs) for professional engineering consultation and construction management services depending on the size and specific needs of the project.

Projects and Programs

This engineering department receives and reviews public bids and provides recommendations to various committees and the Board of Directors to award contracts. The engineering department also applies, secures, and administers/manages grants from various, Federal, State, and Local organizations to supplement funds allocated by WRD.

The engineering department also provides (oversees) project planning and environmental review/entitlement services for its CIP projects. The engineering department monitors construction work in progress, reviews/approves progress pay estimates, and provides quality assurance/control oversight services on approved development projects to ensure compliance with Board goals and objectives.

The Engineering Program is intended to provide a mechanism for engineering staff to plan and further develop alternatives for potential capital improvement projects. Not all CIP project concepts develop into multi-year capital improvement program projects, and more often than not require many months of advanced planning and concept development before being capitalized. The Engineering Program deals primarily with replenishment issues and therefore its costs are borne by the Replenishment Fund until such time as alternative capital improvement program funding is identified.

TABLES

Table 1
GROUNDWATER CONDITIONS AND REPLENISHMENT SUMMARY

	WATER YEAR		
	Oct 1 - Sep 30		
	<i>2013-2014</i>	<i>2014-2015 ^(a)</i>	<i>2015-2016 ^(a)</i>
Total Groundwater Production	241,105 AF	242,400 AF	244,000 AF
Annual Overdraft	(149,000) AF	(97,200) AF	(98,800) AF
Accumulated Overdraft	(819,600) AF	(813,300) AF	
Quantity Required for Artificial Replenishment for the Ensuing Year			
<u>Spreading</u>			
Imported for Spreading in Montebello Forebay			16,000 AF
Recycled for Spreading in Montebello Forebay			55,000
Subtotal Spreading			71,000
<u>Injection</u>			
Alamitos Seawater Barrier Imported Water (WRD side only)			500
Alamitos Seawater Barrier Recycled Water (WRD side only)			4,800
Dominguez Gap Seawater Barrier Imported Water			2,400
Dominguez Barrier Seawater Barrer Recycled Water			5,600
West Coast Seawater Barrier Imported Water			4,700
West Coast Seawater Barrier Recycled Water			14,300
Subtotal Injection			32,300
<u>In-lieu ^(b)</u>			
		Subtotal In-lieu	-
Total			103,300 AF

(a) Estimated values

(b) In-Lieu Program currently not established for ensuing year

Table 2

QUANTITY AND COST OF REPLENISHMENT WATER FOR THE ENSUING WATER YEAR

		Item	Quantity (AF)		Total Cost			
Summary - All Water		Spreading - Tier 1 Untreated Imported	16,000		\$	11,898,400		
		Spreading - Recycled	55,000		\$	3,485,000		
		Alamitos Barrier - Imported	500		\$	583,220		
		Alamitos Barrier - Recycled	4,800		\$	504,000		
		Dominguez Barrier - Imported	2,400		\$	3,041,923		
		Dominguez Barrier - Recycled	5,600		\$	5,101,600		
		West Coast Barrier - Imported	4,700		\$	6,253,352		
		West Coast Barrier - Recycled	14,300		\$	11,258,100		
		In-Lieu MWD Member	0		\$	-		
		In-Lieu WBMWD Customer	0		\$	-		
	TOTAL		103,300		\$	42,125,595		
Detailed Breakout of Water Costs and Surcharges to WRD								
		Item	Quantity	Oct-Dec	Jan-Jun	Jul-Sep	Melded	Total
Imported Water	CBMWD							
		MWD Untreated Tier 1 - Spreading (\$/af)	16,000	\$ 582	\$ 594	\$ 594	\$ 591	\$ 9,456,000
		MWD RTS (\$/af)	16,000	\$ 51	\$ 51	\$ 54	\$ 52	\$ 832,000
		CBMWD Administrative Surcharge (\$/af)	16,000	\$ 95	\$ 95	\$ 100	\$ 96	\$ 1,536,000
		CBMWD Water Service Charge (\$/month)	N/A	\$ 6,200	\$ 6,200	\$ 6,200	\$ 6,200	\$ 74,400
		Total to CBMWD						\$ 11,898,400
		LBWD						
		MWD Treated Tier 1 - Alamitos Barrier (\$/af)	500	\$ 923	\$ 942	\$ 942	\$ 937	\$ 468,500
		MWD Capacity Charge (\$/cfs/month)	5.0	\$ 925	\$ 908	\$ 908	\$ 912	\$ 54,720
		LBWD RTS (\$/af)	500	\$ 113	\$ 113	\$ 119	\$ 115	\$ 57,500
		LBWD Administrative Surcharge (\$/af)	500	\$ 5	\$ 5	\$ 5	\$ 5	\$ 2,500
		Total to LBWD						\$ 583,220
		WBMWD						
		MWD Treated Tier 1-DG/WC Barriers (\$/af)	7,100	\$ 923	\$ 942	\$ 942	\$ 937	\$ 6,652,700
		MWD RTS (\$/af)	7,100	\$ 112	\$ 112	\$ 112	\$ 112	\$ 795,200
	MWD Capacity Charge (\$/cfs/month)	46.8	\$ 733	\$ 718	\$ 718	\$ 722	\$ 405,475	
	WBMWD Administrative Surcharge (\$/af)	7,100	\$ 186	\$ 186	\$ 205	\$ 191	\$ 1,356,100	
	WBMWD Water Service Charge (\$/cfs/month)	130	\$ 54	\$ 54	\$ 57	\$ 55	\$ 85,800	
	Total to West Basin MWD						\$ 9,295,275	
	IN-LIEU							
	MWD Member Agency (\$/af)	0	-	-	-		No IL Program	
	WBMWD Member Agency (\$/af)	0	-	-	-		No IL Program	
	Total for In-Lieu Payments						\$ -	
Recycled Water	LADWP							
		Recycled Water for Dominguez Barrier (\$/af)	5,600	\$ 900	\$ 900	\$ 945	\$ 911	\$ 5,101,600
		Total to LADWP						\$ 5,101,600
		SDLAC						
		Tertiary Water - WN, SJC, Pomona (\$/af) ≤50k	50,000	\$ 40	\$ 40	\$ 45	\$ 41	\$ 2,050,000
		Tertiary Water - WN, SJC, Pomona (\$/af) >50k	5,000	\$ 284	\$ 284	\$ 294	\$ 287	\$ 1,435,000
		Total to SDLAC						\$ 3,485,000
		WBMWD						
		WBMWD Recycled Water Rate (\$/af) ≤4,500	4,500	\$ 1,160	\$ 1,160	\$ 1,196	\$ 1,169	\$ 5,260,500
		WBMWD Recycled Water Rate (\$/af) 4,500+	9,800	\$ 607	\$ 607	\$ 628	\$ 612	\$ 5,997,600
	Total to WBMWD						\$ 11,258,100	
	LBWD							
	Source Water for Vander Lans Plant (\$/af)	4,800	\$ 104	\$ 104	\$ 108	\$ 105	\$ 504,000	
	Total to WRD						\$ 504,000	
	TOTAL		103,300				\$ 42,125,595	

Table 3
WRD PROJECTS AND PROGRAMS

PROJECT / PROGRAM		DISTRICT FUNCTION	
		Replenishment	Clean Water
001	Leo J. Vander Lans Water Treatment Facility Project	100%	
002	Robert W. Goldsworthy Desalter Project		100%
004	Recycled Water Program	100%	
005	Groundwater Resources Planning Program	100%	
006	Groundwater Quality Program		100%
010	Geographic Information System	50%	50%
011	Regional Groundwater Monitoring Program	50%	50%
012	Safe Drinking Water Program		100%
018	Dominguez Gap Barrier Recycled Water Injection	100%	
023	Replenishment Operations (Spreading & Barriers)	100%	
025	Hydrogeology Program	50%	50%
033	Groundwater Resources Improvement Program (GRIP)	100%	0%
035	West Coast Seawater Barrier Monitoring Well Sampling	50%	50%
038	Engineering Program	100%	

Table 4
**30-YEAR AVERAGE GROUNDWATER BALANCE
 FROM USGS AND WRD REGIONAL MODEL**

INFLOWS	Average AFY	OUTFLOWS	Average AFY
Natural Inflows:		Artificial Outflows:	
Local water conserved at spreading grounds ⁽¹⁾	48,825	Pumping	250,590
Interior and mountain front recharge	47,900		
Net underflow from adjacent basins ⁽²⁾	48,480		
Subtotal Natural Inflows:			
Artificial Inflows:			
Imported and recycled spreading ⁽³⁾	74,075		
Barrier injection water ⁽⁴⁾	34,600		
Subtotal Artificial Inflows:			
Total Inflows:		Total Outflows:	250,590
	253,880		

Average Annual Groundwater Deficiency (afy) = Natural Inflows - Total Outflows = (105,385)

⁽¹⁾ includes stormwater and base flow water captured and recharged at the spreading grounds

⁽²⁾ does not include average of 7,100 afy of seawater intrusion, which can not be considered as replenishment per the water code

⁽³⁾ includes all imported purchased, all recycled purchased, and Pomona Plant (free) recycled water.

⁽⁴⁾ includes all injected water at the three barrier systems, including all of Alamitos Barrier. Model value may differ slightly from actual purchases.

Description of the model can be found in USGS, 2003, Geohydrology, Geochemistry, and Ground-Water Simulation - Optimization of the Central and West Coast Basins, Los Angeles County, California; Water Resources Investigation Report 03-4065 by Reichard, E.G., Land, M., Crawford, S.M., Johnson, T., Everett, R.R., Kulshan, T.V., Ponti, D.J., Halford, K.J., Johnson, T.A., Paybins, K.S., and Nishikawa, T.

Table 5
Annual Rainfall in the WRD Service Area

Water Year	Inches	Water Year	Inches	Water Year	Inches	Water Year	Inches
1925-26	12.63	1950-51	8.27	1975-76	9.55	2000-01	14.98
1926-27	16.92	1951-52	24.68	1976-77	11.23	2001-02	2.52
1927-28	11.97	1952-53	10.53	1977-78	33.85	2002-03	19.89
1928-29	11.52	1953-54	12.33	1978-79	18.68	2003-04	7.73
1929-30	10.84	1954-55	11.84	1979-80	28.29	2004-05	23.43
1930-31	10.45	1955-56	13.97	1980-81	8.74	2005-06	11.36
1931-32	14.52	1956-57	9.89	1981-82	13.41	2006-07	1.95
1932-33	10.02	1957-58	24.65	1982-83	30.3	2007-08	17.11
1933-34	11.1	1958-59	6.68	1983-84	11.96	2008-09	9.49
1934-35	21.94	1959-60	9.84	1984-85	12.44	2009-10	13.02
1935-36	9.65	1960-61	4.3	1985-86	19.47	2010-11	17.73
1936-37	22.11	1961-62	18.46	1986-87	6.49	2011-12	8.84
1937-38	21.75	1962-63	10.9	1987-88	11.47	2012-13	6.19
1938-39	18.69	1963-64	6.86	1988-89	7.82	2013-14	5.23
1939-40	12.81	1964-65	13.27	1989-90	7.87		
1940-41	34.21	1965-66	17.02	1990-91	12.22		
1941-42	14.66	1966-67	17.78	1991-92	16.07		
1942-43	17.91	1967-68	11.46	1992-93	26.55		
1943-44	17.89	1968-69	22.33	1993-94	9.26		
1944-45	11.25	1969-70	7.52	1994-95	26.82		
1945-46	10.31	1970-71	11.45	1995-96	10.68		
1946-47	15.24	1971-72	6.4	1996-97	13.95		
1947-48	8.62	1972-73	18.57	1997-98	32.47		
1948-49	9.04	1973-74	14.51	1998-99	7.29		
1949-50	10.14	1974-75	15.01	1999-00	9.21		
Period of Record				89 years			
Running 89 Year Average				14.05 inches			
Minimum				1.95 inches			
Maximum				34.21 inches			

Table 6
ANNUAL OVERDRAFT CALCULATION
for Current and Ensuing Water Years (in acre-feet)*

Item	WATER YEAR	
	2014-2015	2015-2016
Average Annual Groundwater Deficiency (from Table 4)	(105,385)	(105,385)
Adjustments/Variances to AAGD		
(1) Local Water at Spreading Grounds ^(a)	0 ^(d)	0 ^(d)
(2) Precipitation, mountain front recharge, applied water ^(a)	0 ^(d)	0 ^(d)
(3) Subsurface inflow ^(b)	0 ^(d)	0 ^(d)
(4) Groundwater Extractions ^(c)	(8,200) ^(d)	(6,600) ^(d)
ANNUAL OVERDRAFT [AAGD+(1)+(2)+(3)-(4)]	(97,200)	(98,800)

* Previous Year Annual Overdraft is derived in Chapter III

(a) Difference between actual and model average. Positive value indicates increased recharge.

(b) Difference between annual model value and average model value. Positive value indicates increased inflow.

Does not include seawater intrusion inflow

(c) Difference between actual and model average. Positive value indicates increased pumpage.

(d) Estimated Values. A value of zero indicates average year was assumed.

Table 7

ACCUMULATED OVERDRAFT CALCULATION (in acre-feet)

ITEM	AMOUNT
Accumulated Overdraft at End of Previous Water Year	(819,600)
Estimated Annual Overdraft for Current Year	(97,200)
Subtotal without artificial replenishment	(916,800)
Planned Artificial Replenishment for Current Year	
Imported Water Purchased for Spreading	16,250
Recycled Water Purchased for Spreading	56,000
Imported and Recycled Water Purchased for Barrier Wells	31,300
Replenishment Subtotal	103,550
PROJECTED ACCUMULATED OVERDRAFT FOR CURRENT YEAR	(813,300)

Table 8
CHANGES IN GROUNDWATER STORAGE

WATER YEAR	ANNUAL CHANGE IN STORAGE (AF)	CUMULATIVE CHANGE IN STORAGE (AF)	WATER YEAR	ANNUAL CHANGE IN STORAGE (AF)	CUMULATIVE CHANGE IN STORAGE (AF)	WATER YEAR	ANNUAL CHANGE IN STORAGE (AF)	CUMULATIVE CHANGE IN STORAGE (AF)
1961-62	88,500	88,500	1985-86	10,600	238,200	2009-10	27,000	141,500
1962-63	(11,100)	77,400	1986-87	4,000	242,200	2010-11	110,000	251,500
1963-64	10,300	87,700	1987-88	(11,700)	230,500	2011-12	(73,200)	178,300
1964-65	35,200	122,900	1988-89	10,400	240,900	2012-13	(68,000)	110,300
1965-66	21,100	144,000	1989-90	13,600	254,500	2013-14	(62,100)	48,200
1966-67	21,400	165,400	1990-91	28,400	282,900	2014-15	-	-
1967-68	11,400	176,800	1991-92	1,600	284,500	2015-16	-	-
1968-69	(7,500)	169,300	1992-93	45,800	330,300	2016-17	-	-
1969-70	(800)	168,500	1993-94	(28,500)	301,800	2017-18	-	-
1970-71	(3,400)	165,100	1994-95	19,400	321,200	2018-19	-	-
1971-72	(50,600)	114,500	1995-96	12,500	333,700	2019-20	-	-
1972-73	34,800	149,300	1996-97	15,700	349,400	2020-21	-	-
1973-74	(2,400)	146,900	1997-98	16,700	366,100	2021-22	-	-
1974-75	(14,100)	132,800	1998-99	(80,200)	285,900	2022-23	-	-
1975-76	(40,200)	92,600	1999-00	(30,000)	255,900	2023-24	-	-
1976-77	(32,900)	59,700	2000-01	(400)	255,500	2024-25	-	-
1977-78	88,600	148,300	2001-02	(36,500)	219,000	2025-26	-	-
1978-79	30,100	178,400	2002-03	(10,500)	208,500	2026-27	-	-
1979-80	(1,100)	177,300	2003-04	(43,000)	165,500	2027-28	-	-
1980-81	17,100	194,400	2004-05	89,100	254,600	2028-29	-	-
1981-82	18,400	212,800	2005-06	12,000	266,600	2029-30	-	-
1982-83	46,800	259,600	2006-07	(59,000)	207,600	2030-31	-	-
1983-84	(22,400)	237,200	2007-08	(41,600)	166,000	2031-32	-	-
1984-85	(9,600)	227,600	2008-09	(51,500)	114,500	2032-33	-	-

Note: Numbers in parentheses represent negative values.

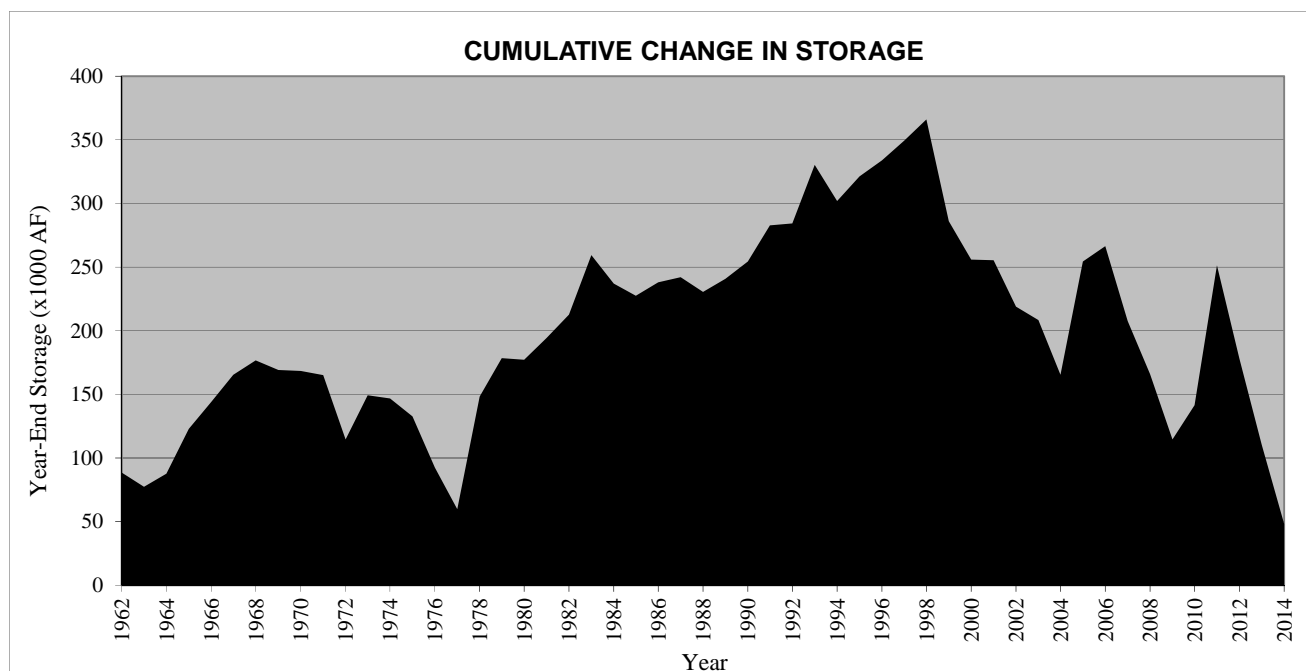


Table 9
QUANTITY OF WATER REQUIRED FOR ARTIFICIAL REPLENISHMENT

WATER TYPE	AMOUNT (AF)
Long Term Average for Imported Spreading (updated, see below)*	16,000
Recycled Water for Spreading (WRD Purchases)	55,000
Total Spreading	71,000
West Coast Barrier - Imported	4,700
West Coast Barrier - Recycled	14,300
Dominguez Gap - Imported	2,400
Dominguez Gap - Recycled	5,600
Alamitos Barrier - Imported - WRD portion only	500
Alamitos Barrier - Recycled - WRD portion only	4,800
Total Barriers	32,300
In-Lieu Central Basin	0
In-Lieu West Coast Basin	0
Total In-Lieu	0
Total Water Purchase Estimate for Ensuing Year	103,300
Less Other Actions	0
Total Water Purchase Estimate for Ensuing Year	103,300

* - Derivation of new Long Term Imported Spreading Requirement is possible due to new projects that will capture more storm/recycled water for conservation, and thus less imported needs:

1. Long Term Average of 27,600 af defined in 2003 ESR
2. Minus 3,000 afy for increasing Whittier Narrows Conservation Pool
3. Minus 3,600 afy for two new rubber dams on San Gabriel River
4. Minus 5,000 afy of imported due to 5,000 afy increase in recycled based on new averaging period effective 2013
5. Equals new Long Term Average of 16,000 afy imported spreading

**HISTORICAL AMOUNTS OF WATER RECHARGED IN
THE MONTEBELLO FOREBAY SPREADING GROUNDS ^{(a) (g)}**

(in acre-feet)

WATER YEAR	Imported Water			Recycled Water				Local Water	Make-up Water			TOTAL
	LACFCD or Other	WRD	TOTAL	Whittier WRP	San Jose Creek WRP	Pomona WRP	TOTAL	Stormwater and River Baseflow	USGVMWD & SGVMWD	CBMWD	TOTAL	
1959-60	80,900		80,900				-	20,064			-	100,964
1960-61	80,800	67,000	147,800				-	9,118			-	156,918
1961-62	39,500	168,622	208,122	1,178			1,178	39,548			-	248,848
1962-63	4,800	75,790	80,590	12,405			12,405	14,565			-	107,560
1963-64	-	104,900	104,900	13,258			13,258	9,992			-	128,150
1964-65	75,500	84,670	160,170	14,528			14,528	13,097			-	187,795
1965-66	67,800	53,900	121,700	15,056			15,056	45,754	6,500		6,500	189,010
1966-67	74,100	10,200	84,300	16,223			16,223	59,820	-		-	160,343
1967-68	66,600	28,800	95,400	18,275			18,275	39,760	-		-	153,435
1968-69	12,500	5,300	17,800	13,877			13,877	119,395	-		-	151,072
1969-70	25,800	43,100	68,900	17,158			17,158	52,917	-		-	138,975
1970-71	46,700	25,400	72,100	19,494		3,232	22,726	44,757	-		-	139,583
1971-72	-	34,400	34,400	17,543		4,456	21,999	17,688	-		-	74,087
1972-73	-	71,947	71,947	13,622	8,327	5,937	27,886	45,077	-	20,000	20,000	164,910
1973-74	-	68,237	68,237	13,385	7,064	3,003	23,452	29,171	-	23,921	23,921	144,781
1974-75	-	71,900	71,900	14,650	6,549	5,592	26,791	29,665	-	-	-	128,356
1975-76	-	50,800	50,800	12,394	9,062	6,231	27,687	22,073	-	-	-	100,560
1976-77	-	9,300	9,300	10,158	12,705	6,496	29,359	19,252	14,500	6,900	21,400	79,311
1977-78	-	39,900	39,900	13,104	5,997	6,621	25,722	147,317	7,800	-	7,800	220,739
1978-79	-	65,300	65,300	10,716	11,741	6,403	28,860	68,859	-	-	-	163,019
1979-80	-	10,200	10,200	14,568	9,815	5,023	29,406	106,820	10,900	-	10,900	157,326
1980-81	3,300	28,700	32,000	11,464	14,645	5,613	31,722	50,590	31,500	-	31,500	145,812
1981-82	-	4,600	4,600	14,133	15,285	4,634	34,052	47,930	30,900	-	30,900	117,482
1982-83	-	2,000	2,000	12,818	4,217	5,735	22,770	126,076	8,900	-	8,900	159,746
1983-84	-	1,500	1,500	13,194	14,590	4,457	32,241	60,710	20,800	-	20,800	115,251
1984-85	-	40,600	40,600	12,905	14,093	4,380	31,378	39,099	-	-	-	111,077
1985-86	-	21,500	21,500	13,827	11,487	3,965	29,279	66,966	-	-	-	117,745
1986-87	-	49,200	49,200	15,280	20,041	2,655	37,976	27,613	-	6,500	6,500	121,289
1987-88	-	23,300	23,300	14,585	27,182	1,582	43,349	50,068	5,800	-	5,800	122,517
1988-89	-	50,300	50,300	13,830	33,327	2,616	49,773	17,096	6,500	-	6,500	123,669
1989-90	-	52,700	52,700	15,043	33,498	1,568	50,109	9,388	13,600	-	13,600	125,797
1990-91	-	56,300	56,300	13,841	38,603	1,420	53,864	35,717	100	-	100	145,981
1991-92	-	43,100	43,100	12,620	31,326	2,957	46,903	136,357	-	-	-	226,360
1992-93	-	16,561	16,561	11,026	29,811	8,027	48,864	147,699	-	-	-	213,124
1993-94	-	20,411	20,411	10,249	40,768	2,965	53,981	55,896	-	-	-	130,288
1994-95	-	21,837	21,837	10,642	18,431	4,228	33,300	100,578	-	-	-	155,715
1995-96	-	18,012	18,012	9,971	40,922	2,969	53,862	62,920	-	-	-	134,794
1996-97	-	22,738	22,738	9,850	36,977	3,132	49,959	58,262	-	-	-	130,959
1997-98	-	952	952	8,378	26,483	2,156	37,017	96,706	-	-	-	134,675
1998-99	-	-	-	10,968	34,782	1,451	47,201	32,013	-	-	-	79,214
1999-00	-	45,037	45,037	8,950	30,481	3,839	43,270	20,607	-	-	-	108,914
2000-01	-	23,451	23,451	8,253	35,165	2,925	46,343	39,725	-	-	-	109,519
2001-02	-	42,875	42,875 ^(c)	8,474	50,194	1,928	60,596	17,000	-	-	-	120,471
2002-03	-	22,366	22,366 ^(d)	5,156	35,320	2,320	42,796	58,202	-	-	-	123,364
2003-04	-	27,520	27,520 ^(e)	8,195	34,033	2,697	44,925	30,467	-	-	-	102,912
2004-05	-	25,296	25,296 ^(e)	6,741	20,547	2,215	29,503	148,674	-	-	-	203,473
2005-06	-	33,229	33,229	8,868	30,180	2,973	42,022	60,377	-	-	-	135,628
2006-07	-	40,214	40,214	7,334	34,823	2,882	45,039	11,495	-	-	-	96,748
2007-08	1,510	-	1,510 ^(b)	6,212	29,131	4,424	39,767	54,518	-	-	-	95,795
2008-09	-	-	-	5,202	29,999	4,410	39,611	35,348	-	-	-	74,959
2009-10	-	26,286	26,286	5,431	45,538	4,762	55,731	35,398	-	-	-	117,415
2010-11	-	37,315	37,315	7,576	24,323	5,231	37,131	113,295	-	-	-	187,741
2011-12	-	-	-	7,558	43,479	4,760	55,797	36,155	-	-	-	91,952
2012-13	-	-	-	7,004	47,207	4,933	59,145	6,048	-	-	-	65,193
2013-14	-	-	-	7,733	43,556	4,357	55,646	0	-	-	-	55,646
TOTAL	579,810	1,887,565	2,467,375	604,903	1,091,704	174,156	1,870,764	2,843,703	157,800	57,321	215,121	7,396,963

(a) Imported and Recycled are purchased, local and Pomona WRP are incidental recharge. Purchased water may have losses to Main Basin before reaching the Spreading Grounds

(b) CBMWD purchased 1,510 af of imported water for spreading for Downey, Lakewood, and Cerritos.

(c) Includes 1,607 af of EPA extracted groundwater from Whittier Narrows considered imported water to WRD. Paid for in 2003.

(d) Includes 5,069 af of EPA extracted groundwater from W.N. considered imported water to WRD. Paid for in June 2005.

(e) Includes 13,000 af of water banked by Long Beach under a storage agreement with WRD (792 af 02/03, 12,210 af 3/04).

(g) Includes the Rio Hondo Spreading Grounds, Whittier Narrows Conservation Pool, San Gabriel Spreading Grounds and unlined San Gabriel River below Station F263.

HISTORICAL AMOUNTS OF WATER PURCHASED FOR INJECTION

(in acre-feet)

Water Year	West Coast Barrier (a)			Dominguez Gap Barrier (b)			Alamitos Barrier						TOTAL	
							WRD			OCWD				Total
	Imported	Recycled	Total	Imported	Recycled	Total	Imported	Recycled	Total	Imported	Recycled	Total		
1959-60	3,700		3,700											3,700
1960-61	4,420		4,420											4,420
1961-62	4,460		4,460											4,460
1962-63	4,150		4,150											4,150
1963-64	10,450		10,450											10,450
1964-65	33,020		33,020				2,760		2,760	200		200	2,960	35,980
1965-66	44,390		44,390				3,370		3,370	350		350	3,720	48,110
1966-67	43,060		43,060				3,390		3,390	490		490	3,880	46,940
1967-68	39,580		39,580				4,210		4,210	740		740	4,950	44,530
1968-69	36,420		36,420				4,310		4,310	950		950	5,260	41,680
1969-70	29,460		29,460				3,760		3,760	720		720	4,480	33,940
1970-71	29,870		29,870	2,200		2,200	3,310		3,310	822		822	4,132	36,202
1971-72	26,490		26,490	9,550		9,550	4,060		4,060	936		936	4,996	41,036
1972-73	28,150		28,150	8,470		8,470	4,300		4,300	883		883	5,183	41,803
1973-74	27,540		27,540	7,830		7,830	6,140		6,140	1,148		1,148	7,288	42,658
1974-75	26,430		26,430	5,160		5,160	4,440		4,440	716		716	5,156	36,746
1975-76	35,220		35,220	4,940		4,940	4,090		4,090	565		565	4,655	44,815
1976-77	34,260		34,260	9,280		9,280	4,890		4,890	885		885	5,775	49,315
1977-78	29,640		29,640	5,740		5,740	4,020		4,020	831		831	4,851	40,231
1978-79	23,720		23,720	5,660		5,660	4,220		4,220	898		898	5,118	34,498
1979-80	28,630		28,630	4,470		4,470	3,560		3,560	575		575	4,135	37,235
1980-81	26,350		26,350	3,550		3,550	3,940		3,940	524		524	4,464	34,364
1981-82	24,640		24,640	4,720		4,720	4,540		4,540	394		394	4,934	34,294
1982-83	33,950		33,950	6,020		6,020	3,270		3,270	1,943		1,943	5,213	45,183
1983-84	28,000		28,000	7,640		7,640	2,440		2,440	1,402		1,402	3,842	39,482
1984-85	25,210		25,210	7,470		7,470	3,400		3,400	1,446		1,446	4,846	37,526
1985-86	20,260		20,260	6,160		6,160	3,410		3,410	1,863		1,863	5,273	31,693
1986-87	26,030		26,030	6,230		6,230	4,170		4,170	2,754		2,754	6,924	39,184
1987-88	24,270		24,270	7,050		7,050	3,990		3,990	2,173		2,173	6,163	37,483
1988-89	22,740		22,740	5,220		5,220	3,900		3,900	2,173		2,173	6,073	34,033
1989-90	20,279		20,279	5,736		5,736	4,110		4,110	1,929		1,929	6,039	32,054
1990-91	16,039		16,039	7,756		7,756	4,096		4,096	1,799		1,799	5,895	29,690
1991-92	22,180		22,180	6,894		6,894	4,172		4,172	1,552		1,552	5,724	34,798
1992-93	21,516		21,516	4,910		4,910	3,350		3,350	1,565		1,565	4,915	31,341
1993-94	15,482		15,482	5,524		5,524	2,794		2,794	1,309		1,309	4,103	25,109
1994-95	14,237	1,480	15,717	4,989		4,989	2,883		2,883	890		890	3,773	24,479
1995-96	12,426	4,170	16,596	5,107		5,107	3,760		3,760	2,010		2,010	5,770	27,473
1996-97	11,372	6,241	17,613	5,886		5,886	3,854		3,854	1,750		1,750	5,604	29,103
1997-98	8,173	8,306	16,479	3,771		3,771	3,677		3,677	1,504		1,504	5,181	25,431
1998-99	10,125	6,973	17,097	4,483		4,483	4,012		4,012	1,689		1,689	5,700	27,280
1999-00	11,172	7,460	18,632	6,010		6,010	4,028		4,028	1,707		1,707	5,735	30,377
2000-01	13,988	6,838	20,826	3,923		3,923	3,710		3,710	1,964		1,964	5,674	30,423
2001-02	12,724	7,276	20,000	5,459		5,459	3,961		3,961	2,232		2,232	6,193	31,652
2002-03	10,419	6,192	16,611	8,056		8,056	3,445		3,445	1,197		1,197	4,642	29,309
2003-04	9,304	3,669	12,973	6,089		6,089	3,876		3,876	2,092		2,092	5,968	25,030
2004-05	4,548	3,920	8,468	8,557		8,557	2,870		2,870	1,685		1,685	4,555	21,580
2005-06	5,997	4,249	10,246	7,259	1,450	8,709	1,042	921	1,963	330	254	584	2,547	21,502
2006-07	4,373	10,960	15,333	5,510	1,733	7,243	1,568	219	1,787	543	165	708	2,495	25,071
2007-08	3,662	10,954	14,616	4,468	2,452	6,920	3,467	1,284	4,751	1,283	475	1,758	6,509	28,045
2008-09	7,178	6,434	13,612	4,550	2,414	6,964	4,145	1,275	5,420	1,518	535	2,053	7,473	28,049
2009-10	9,661	7,620	17,281	5,495	2,037	7,532	2,596	1,775	4,371	659	470	1,129	5,500	30,313
2010-11	7,466	7,440	14,906	3,929	2,363	6,292	1,968	1,482	3,450	638	875	1,513	4,963	26,161
2011-12	3,651	6,682	10,333	4,646	103	4,749	1,785	1,527	3,312	814	678	1,492	4,804	19,886
2012-13	9,095	7,761	16,856	2,973	2,170	5,143	2,639	1,309	3,948	1,145	537	1,683	5,631	27,630
2013-14	5,464	13,399	18,863	4,088	3,902	7,990	4,125	286	4,410	2,398	191	2,588	6,999	33,852
TOTAL	1,045,041	138,023	1,183,064	253,428	18,624	272,052	179,822	10,078	189,900	62,583	4,180	66,763	256,663	1,711,778

(a) Prior to 10/1/71, water was purchased by the State, West Basin Water Association, local water interests, Zone II of the LA County Flood Control District and WRD. After 10/1/71, all purchases have been by WRD
 (b) In 1970-71, purchases were shared by WRD and Zone II. After 10/1/71, all purchases have been by WRD

HISTORICAL AMOUNTS OF THE IN-LIEU PROGRAM

(in acre-feet)

WATER YEAR	CENTRAL BASIN	WEST COAST BASIN	TOTAL
1965-66	-	745	745
1966-67	-	851	851
1967-68	-	850	850
1968-69	-	850	850
1969-70	-	900	900
1970-71	-	881	881
1971-72	-	756	756
1972-73	-	901	901
1973-74	-	901	901
1974-75	-	400	400
1975-76	-	400	400
1976-77	-	400	400
1977-78	11,316	4,815	16,131
1978-79	9,723	8,655	18,378
1979-80	10,628	4,333	14,961
FISCAL YEAR			
1980-81	17,617	6,206	23,823
1981-82	14,050	4,833	18,883
1982-83	13,813	5,939	19,752
1983-84	29,216	12,524	41,740
1984-85	23,246	13,594	36,840
1985-86	15,505	10,627	26,132
1986-87	16,205	12,997	29,202
1987-88	15,518	12,893	28,411
1988-89	11,356	14,069	25,425
1989-90	16,858	12,293	29,151
1990-91	11,886	10,153	22,039
1991-92	13,000	6,104	19,104
1992-93	37,652	15,654	53,306
1993-94	83,488	26,093	109,581
1994-95	32,904	17,994	50,898
1995-96	37,517	13,816	51,333
1996-97	34,547	4,847	39,394
1997-98	22,995	7,335	30,330
1998-99	13,213	10,303	23,516
1999-00	18,799	3,479	22,278
2000-01	18,364	2,817	21,181
2001-02	11,931	8,789	20,720
2002-03	6,866	4,339	11,205
2003-04	-	-	-
2004-05	6,000	1,804	7,804
2005-06	7,475	2,414	9,889
2006-07	5,779	3,485	9,264
2007-08	-	-	-
2008-09	-	-	-
2009-10	-	-	-
2010-11	6,724	-	6,724
2011-12	7,815	-	7,815
2012-13	2,180	-	2,180
2013-14	4,371	-	4,371
TOTAL	588,558	272,040	860,598

HISTORICAL AMOUNTS OF REPLENISHMENT WATER

(in acre-feet)

WATER YEAR	MONTEBELLO FOREBAY SPREADING WATER					INJECTION WATER*			IN-LIEU	TOTAL
	IMPORTED WATER	RECYCLED WATER	LOCAL WATER	MAKEUP WATER	TOTAL	IMPORTED WATER	RECYCLED WATER	TOTAL	TOTAL	
1959-60	80,900	-	20,064	-	100,964	3,700	-	3,700		104,664
1960-61	147,800	-	9,118	-	156,918	4,420	-	4,420		161,338
1961-62	208,122	1,178	39,548	-	248,848	4,460	-	4,460		253,308
1962-63	80,590	12,405	14,565	-	107,560	4,150	-	4,150		111,710
1963-64	104,900	13,258	9,992	-	128,150	10,450	-	10,450		138,600
1964-65	160,170	14,528	13,097	-	187,795	35,980	-	35,980		223,775
1965-66	121,700	15,056	45,754	6,500	189,010	48,110	-	48,110	745	237,865
1966-67	84,300	16,223	59,820	-	160,343	46,940	-	46,940	851	208,134
1967-68	95,400	18,275	39,760	-	153,435	44,530	-	44,530	850	198,815
1968-69	17,800	13,877	119,395	-	151,072	41,680	-	41,680	850	193,602
1969-70	68,900	17,158	52,917	-	138,975	33,940	-	33,940	900	173,815
1970-71	72,100	22,726	44,757	-	139,583	36,202	-	36,202	881	176,666
1971-72	34,400	21,999	17,688	-	74,087	41,036	-	41,036	756	115,879
1972-73	71,947	27,886	45,077	20,000	164,910	41,803	-	41,803	901	207,614
1973-74	68,237	23,452	29,171	23,921	144,781	42,658	-	42,658	901	188,340
1974-75	71,900	26,791	29,665	-	128,356	36,746	-	36,746	400	165,502
1975-76	50,800	27,687	22,073	-	100,560	44,815	-	44,815	400	145,775
1976-77	9,300	29,359	19,252	21,400	79,311	49,315	-	49,315	400	129,026
1977-78	39,900	25,722	147,317	7,800	220,739	40,231	-	40,231	16,131	277,101
1978-79	65,300	28,860	68,859	-	163,019	34,498	-	34,498	18,378	215,895
1979-80	10,200	29,406	106,820	10,900	157,326	37,235	-	37,235	14,961	209,522
1980-81	32,000	31,722	50,590	31,500	145,812	34,364	-	34,364	23,823	203,999
1981-82	4,600	34,052	47,930	30,900	117,482	34,294	-	34,294	18,883	170,659
1982-83	2,000	22,770	126,076	8,900	159,746	45,183	-	45,183	19,752	224,681
1983-84	1,500	32,241	60,710	20,800	115,251	39,482	-	39,482	41,740	196,473
1984-85	40,600	31,378	39,099	-	111,077	37,526	-	37,526	36,840	185,443
1985-86	21,500	29,279	66,966	-	117,745	31,693	-	31,693	26,132	175,570
1986-87	49,200	37,976	27,613	6,500	121,289	39,184	-	39,184	29,202	189,675
1987-88	23,300	43,349	50,068	5,800	122,517	37,483	-	37,483	28,411	188,411
1988-89	50,300	49,773	17,096	6,500	123,669	34,033	-	34,033	25,425	183,127
1989-90	52,700	50,109	9,388	13,600	125,797	32,054	-	32,054	29,151	187,002
1990-91	56,300	53,864	35,717	100	145,981	29,690	-	29,690	22,039	197,710
1991-92	43,100	46,903	136,357	-	226,360	34,798	-	34,798	19,104	280,262
1992-93	16,561	48,864	147,699	-	213,124	31,341	-	31,341	53,306	297,771
1993-94	20,411	53,981	55,896	-	130,288	25,109	-	25,109	109,581	264,978
1994-95	21,837	33,300	100,578	-	155,715	22,999	1,480	24,479	50,898	231,092
1995-96	18,012	53,862	62,920	-	134,794	23,304	4,170	27,473	51,333	213,600
1996-97	22,738	49,959	58,262	-	130,959	22,862	6,241	29,103	39,394	199,456
1997-98	952	37,017	96,706	-	134,675	17,125	8,306	25,431	30,330	190,436
1998-99	-	47,201	32,013	-	79,214	20,308	6,973	27,280	23,516	130,010
1999-00	45,037	43,270	20,607	-	108,914	22,917	7,460	30,377	22,278	161,569
2000-01	23,451	46,343	39,725	-	109,519	23,585	6,838	30,423	21,181	161,123
2001-02	42,875	60,596	17,000	-	120,471	24,376	7,276	31,652	20,720	172,843
2002-03	22,366	42,796	58,202	-	123,364	23,117	6,192	29,309	11,205	163,878
2003-04	27,520	44,925	30,467	-	102,912	21,361	3,669	25,030	-	127,942
2004-05	25,296	29,503	148,674	-	203,473	17,660	3,920	21,580	7,804	232,857
2005-06	33,229	42,022	60,377	-	135,628	14,628	6,874	21,502	9,889	167,019
2006-07	40,214	45,039	11,495	-	96,748	11,994	13,077	25,071	9,264	131,083
2007-08	1,510	39,767	54,518	-	95,795	12,880	15,165	28,045	-	123,840
2008-09	-	39,611	35,348	-	74,959	17,391	10,658	28,049	-	103,008
2009-10	26,286	55,731	35,398	-	117,415	18,411	11,902	30,313	-	147,728
2010-11	37,315	37,131	113,295	-	187,741	14,001	12,160	26,161	6,724	220,626
2011-12	-	55,797	36,155	-	91,952	10,896	8,990	19,886	7,815	119,653
2012-13	-	59,145	6,048	-	65,193	15,852	11,777	27,630	2,180	95,002
2013-14	-	55,646	-	-	55,646	16,074	17,778	33,852	4,371	93,868
TOTAL	2,467,375	1,870,764	2,843,703	215,121	7,396,963	1,540,873	170,905	1,711,778	860,598	9,969,339

* - Including Orange County side of Alamitos Barrier

HISTORICAL AMOUNTS OF GROUNDWATER PRODUCTION*

(in acre-feet)

WATER YEAR	CENTRAL BASIN	WEST COAST BASIN	TOTAL
1959-60	245,400	66,600	312,000
1960-61	292,500	61,900	354,400
1961-62	275,800	59,100	334,900
1962-63	225,400	59,100	284,500
1963-64	219,100	61,300	280,400
1964-65	211,600	59,800	271,400
1965-66	222,800	60,800	283,600
1966-67	206,700	62,300	269,000
1967-68	220,100	61,600	281,700
1968-69	213,800	61,600	275,400
1969-70	222,200	62,600	284,800
1970-71	211,600	60,900	272,500
1971-72	216,100	64,800	280,900
1972-73	205,600	60,300	265,900
1973-74	211,300	55,000	266,300
1974-75	213,100	56,700	269,800
1975-76	215,300	59,400	274,700
1976-77	211,500	59,800	271,300
1977-78	196,600	58,300	254,900
1978-79	207,000	58,000	265,000
1979-80	209,500	57,100	266,600
1980-81	211,915	57,711	269,626
1981-82	202,587	61,874	264,461
1982-83	194,548	57,542	252,090
1983-84	196,660	51,930	248,590
1984-85	193,085	52,746	245,831
1985-86	195,972	53,362	249,334
1986-87	196,660	48,026	244,686
1987-88	194,704	43,837	238,541
1988-89	200,207	44,323	244,530
1989-90	197,621	48,047	245,668
1990-91	187,040	53,660	240,700
1991-92	196,400	56,318	252,718
1992-93	150,495	40,241	190,736
1993-94	156,565	41,826	198,392
1994-95	180,269	41,729	221,998
1995-96	182,413	52,222	234,636
1996-97	187,561	52,576	240,137
1997-98	188,305	51,859	240,164
1998-99	204,441	51,926	256,367
1999-00	198,483	53,599	252,082
2000-01	195,361	53,870	249,231
2001-02	200,168	50,063	250,231
2002-03	190,268	51,946	242,214
2003-04	200,365	48,013	248,378
2004-05	188,783	41,297	230,079
2005-06	191,123	36,808	227,931
2006-07	198,249	37,659	235,908
2007-08	206,297	38,472	244,768
2008-09	197,663	45,538	243,201
2009-10	197,390	44,013	241,403
2010-11	170,630	44,480	215,109
2011-12	195,820	45,597	241,417
2012-13	196,414	42,263	238,678
2013-14	198,585	42,520	241,105
TOTAL	11,196,046	2,904,893	14,100,939

* Numbers sometimes updated when pumping adjustments are required

**HISTORICAL AMOUNTS OF WATER USE
IN THE WRD SERVICE AREA***

(in acre-feet)

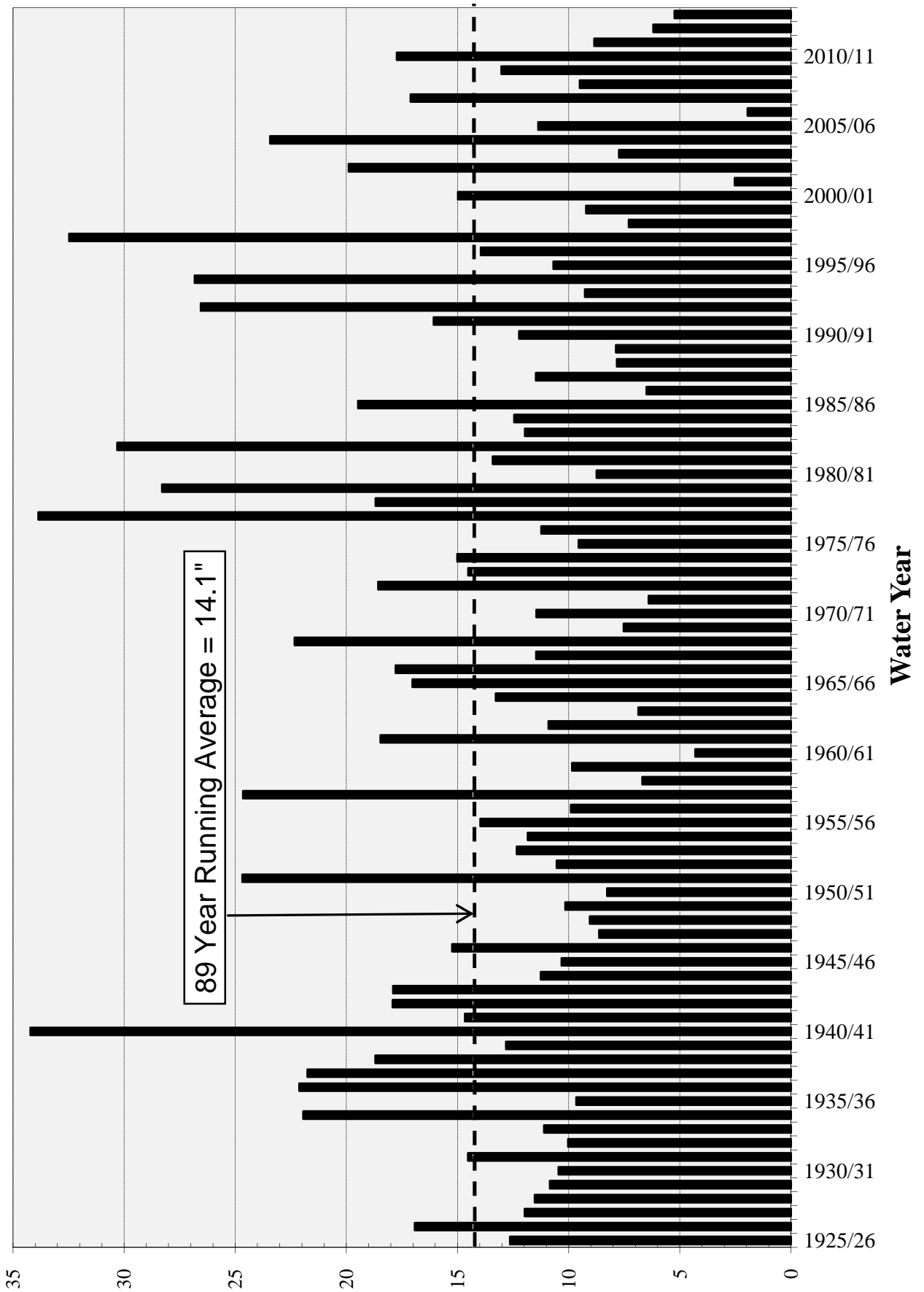
WATER YEAR	GROUNDWATER PRODUCTION	IMPORTED WATER FOR DIRECT USE*	RECLAIMED WATER FOR DIRECT USE*	TOTAL
1960-61	312,000	196,800		508,800
1961-62	334,900	178,784		513,684
1962-63	284,500	222,131		506,631
1963-64	280,400	257,725		538,125
1964-65	271,400	313,766		585,166
1965-66	283,600	308,043		591,643
1966-67	269,000	352,787		621,787
1967-68	281,700	374,526		656,226
1968-69	275,400	365,528		640,928
1969-70	284,800	398,149		682,949
1970-71	272,500	397,122		669,622
1971-72	280,900	428,713		709,613
1972-73	265,900	400,785		666,685
1973-74	266,300	410,546		676,846
1974-75	269,800	380,228		650,028
1975-76	274,700	404,958		679,658
1976-77	271,300	355,896		627,196
1977-78	254,900	373,116		628,016
1978-79	265,000	380,101	100 ^(a)	645,201
1979-80	266,600	397,213	200	664,013
1980-81	269,626	294,730	300	564,656
1981-82	264,461	391,734	300	656,495
1982-83	252,090	408,543	400	661,033
1983-84	248,590	441,151	1,800	691,541
1984-85	245,831	451,549	2,000	699,380
1985-86	249,334	427,860	2,400	679,594
1986-87	244,686	478,744	2,300	725,730
1987-88	238,541	479,318	3,500	721,359
1988-89	244,530	466,166	5,300	715,996
1989-90	245,668	448,285	5,900	699,853
1990-91	240,700	485,109	5,000	730,809
1991-92	252,718	395,191	4,900	652,809
1992-93	190,736	388,949	824	580,509
1993-94	198,392	483,287	3,413	685,092
1994-95	221,998	437,191	6,143	665,332
1995-96	234,636	426,699	19,804	681,139
1996-97	240,137	436,569	25,046	701,752
1997-98	240,164	375,738	27,075	642,976
1998-99	256,367	396,655	30,510	683,532
1999-00	252,082	395,681	33,589	681,352
2000-01	249,231	395,024	32,589	676,845
2001-02	250,231	395,799	38,694	684,723
2002-03	242,214	381,148	38,839	662,202
2003-04	248,378	389,233	36,626	674,237
2004-05	230,079	402,660	33,988	666,727
2005-06	227,931	366,815	35,301	630,047
2006-07	235,908	376,492	41,899	654,299
2007-08	244,768	346,035	45,120	635,923
2008-09	243,201	320,711	43,153	607,065
2009-10	241,403	278,857	43,547	563,808
2010-11	215,109	286,448	39,418	540,975
2011-12	241,417	282,746	42,138	566,301
2012-13	238,678	304,325	45,377	588,380
2013-14	241,105	304,501	55,311	600,917
TOTAL	13,746,539	20,236,861	752,805	34,736,204

(a) Los Coyotes on-line in 1979; Long Beach on-line in 1980

* - Includes imported & recycled at seawater barriers, but not spreading grounds.

FIGURES

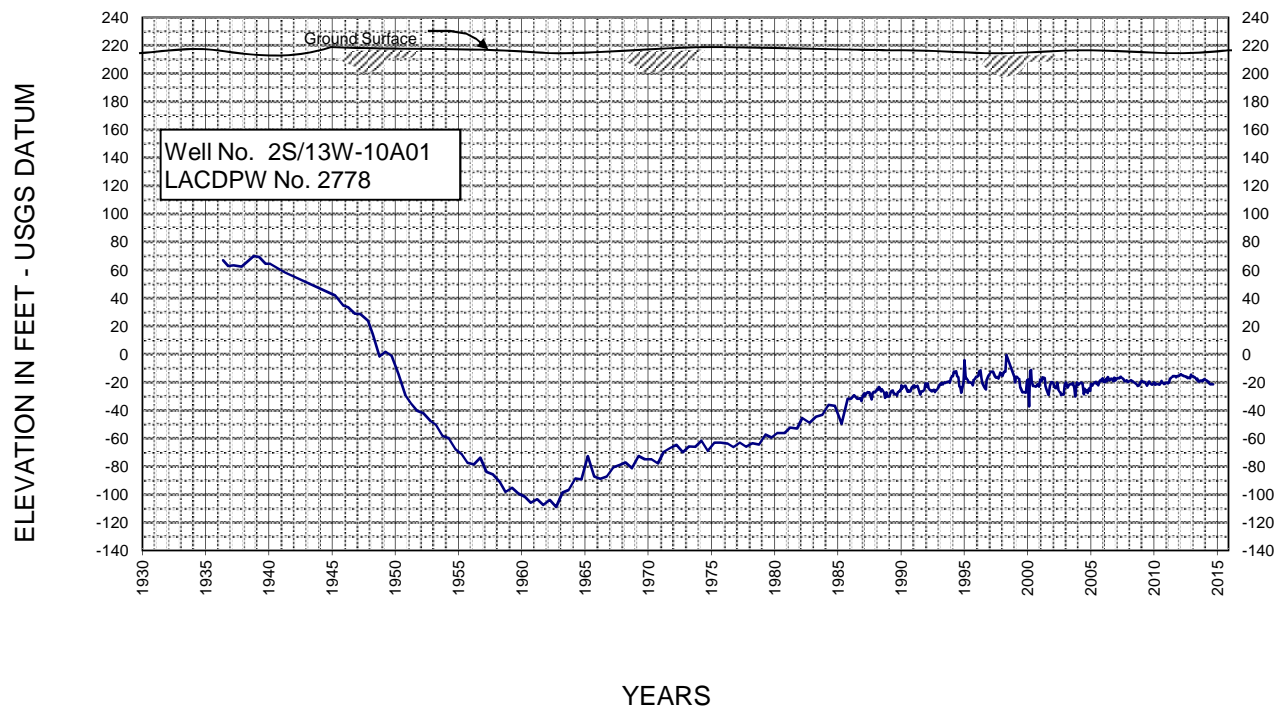
Annual Rainfall in WRD Service Area



89 Year Running Average = 14.1"

Rainfall (inches)

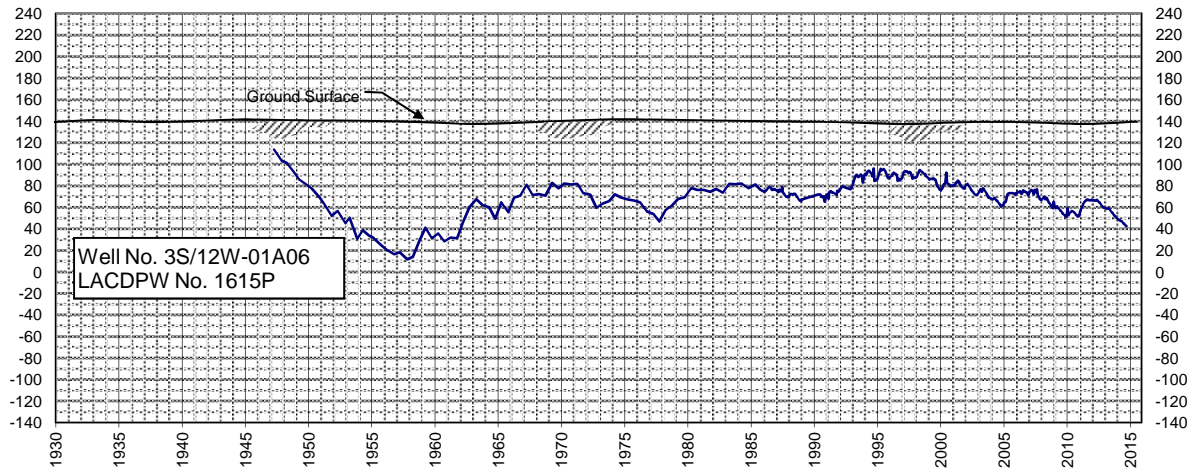
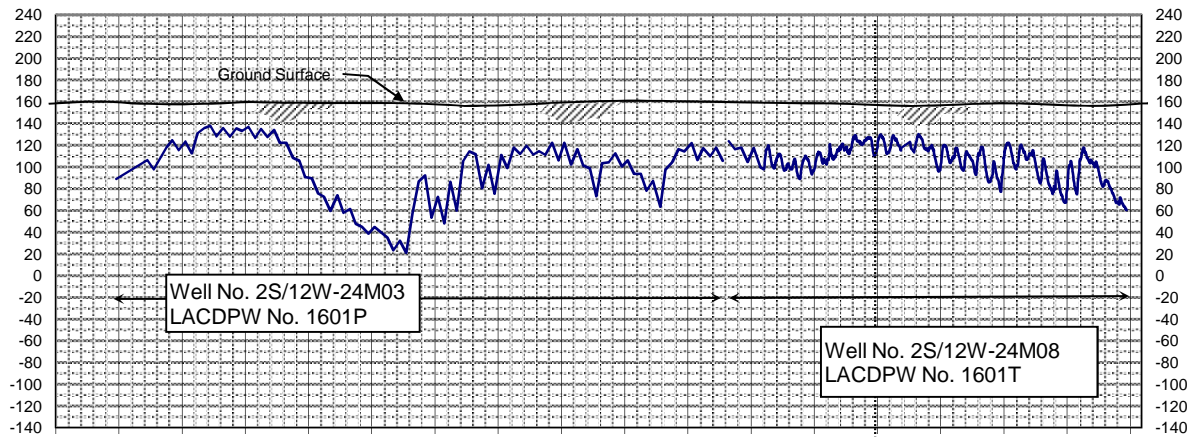
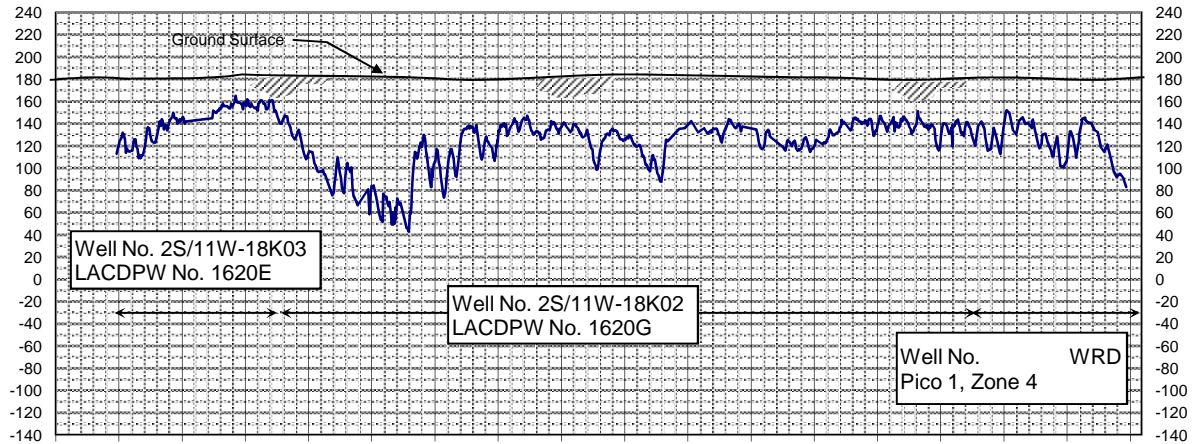
Figure A



**FLUCTUATION OF WATER LEVELS IN THE
LOS ANGELES FOREBAY**

Figure B

ELEVATION IN FEET - USGS DATUM

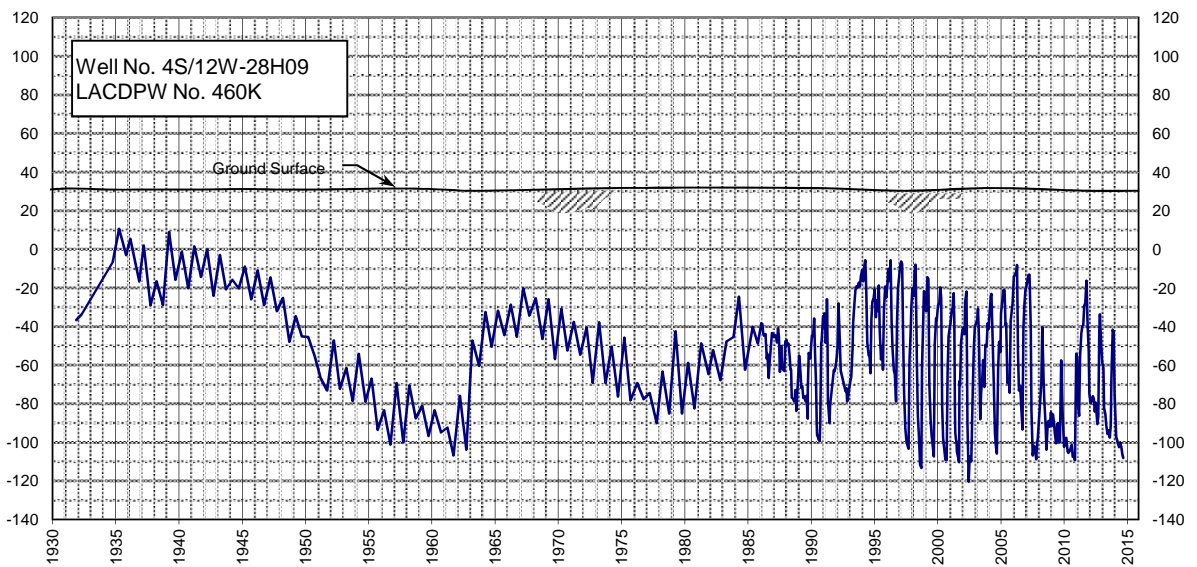
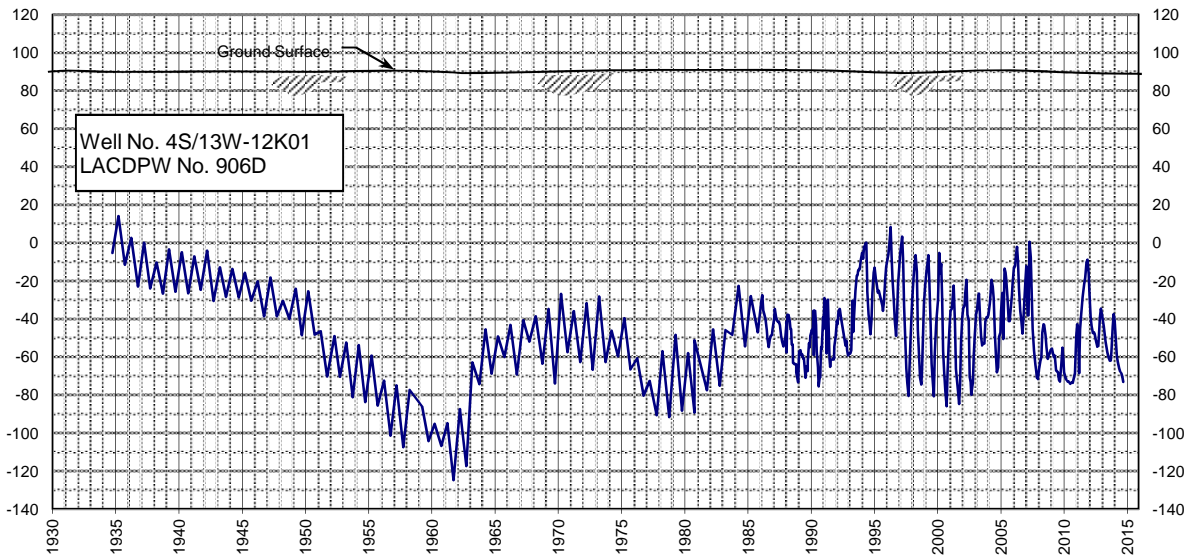


YEARS

FLUCTUATION OF WATER LEVELS IN THE MONTEBELLO FOREBAY

Figure C

ELEVATION IN FEET - USGS DATUM

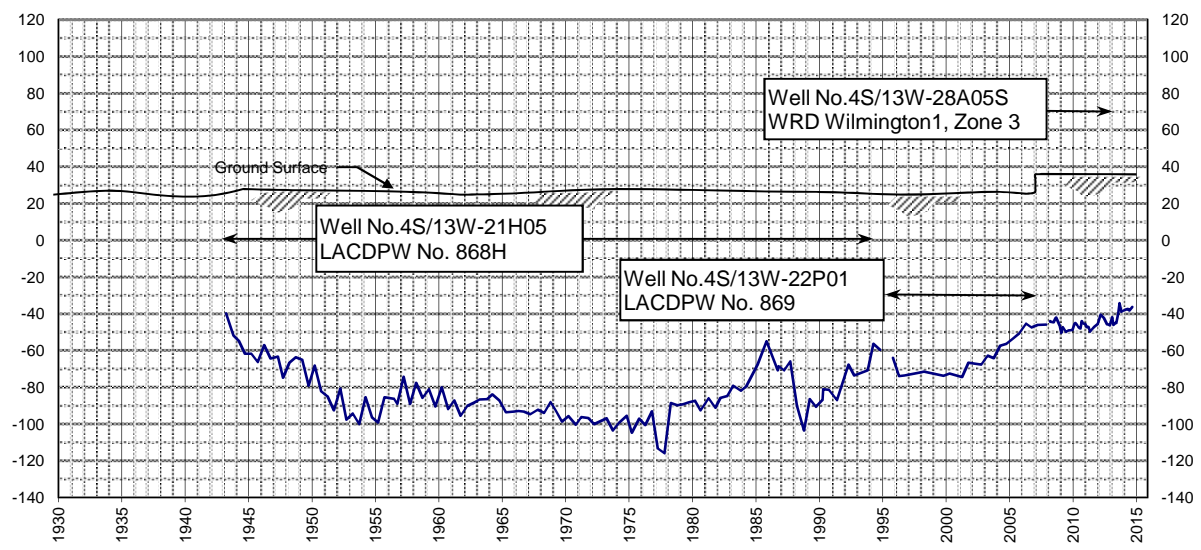
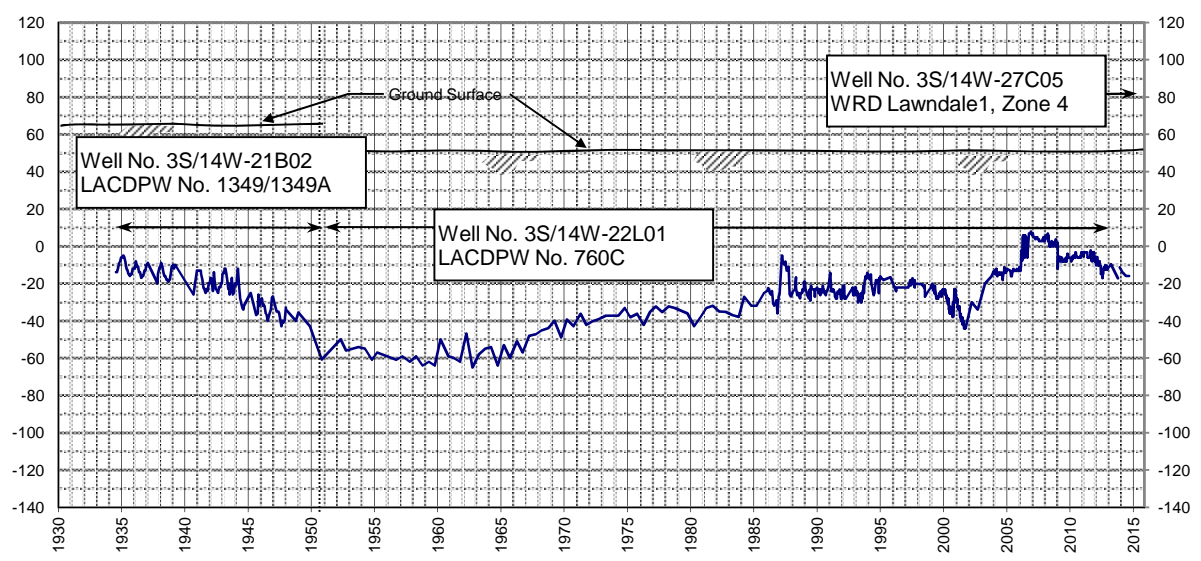


YEARS

**FLUCTUATION OF WATER LEVELS IN THE
CENTRAL BASIN PRESSURE AREA**

Figure D

ELEVATION IN FEET - USGS DATUM



YEARS

FLUCTUATION OF WATER LEVELS IN THE WEST COAST BASIN

Figure E

PLATES




PLATE 1
GROUNDWATER PRODUCTION
WATER YEAR
2013 - 2014

LEGEND

Groundwater Production (AF/Y)

- < 500 Acre Ft/Yr
- 500 - 2000 Acre Ft/Yr
- > 2000 Acre Ft/Yr

Data Source: WRD Production Database

-  Barrier Injection Wells
-  WRD Service Area Boundary
-  Forebay

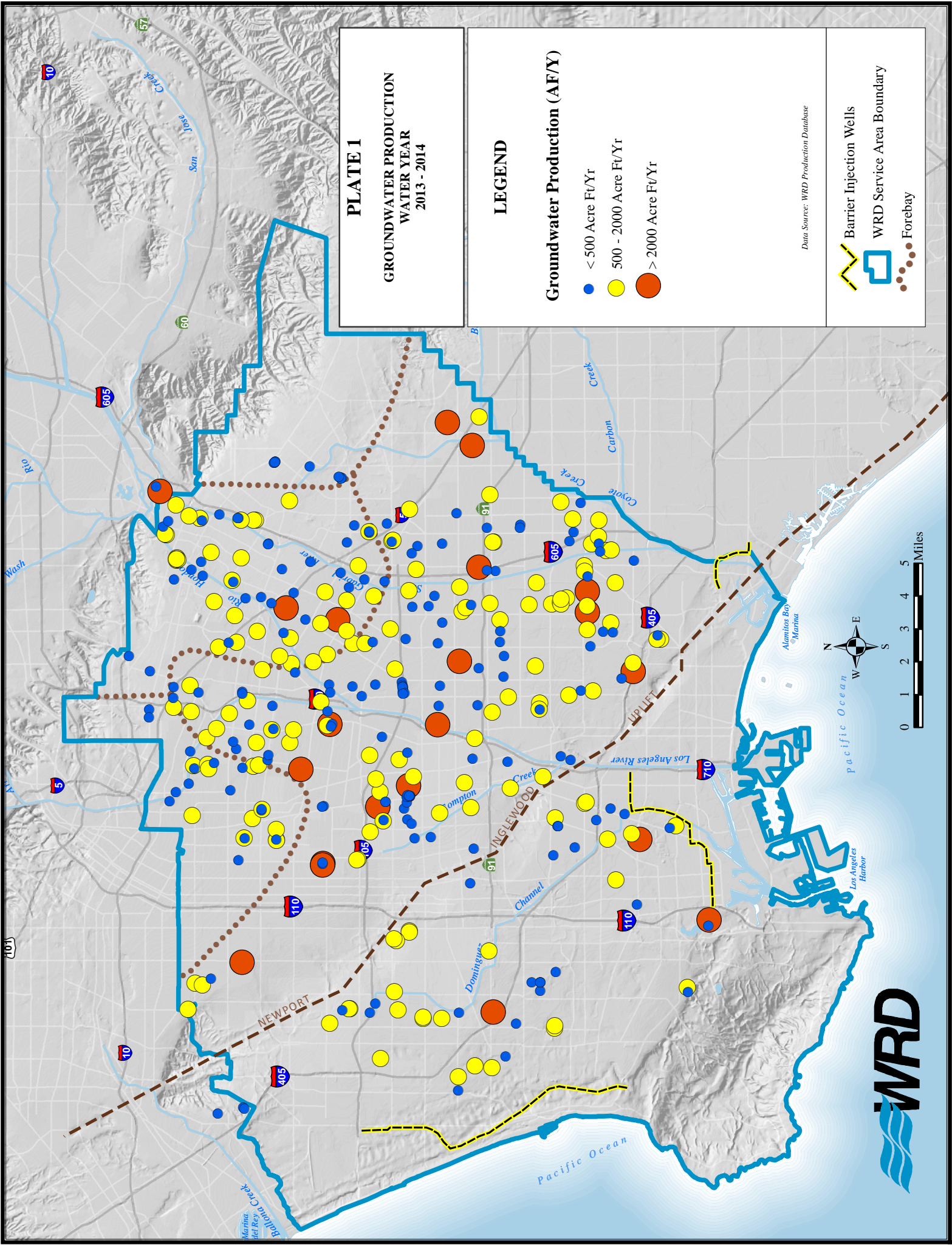






PLATE 2
GROUNDWATER
ELEVATION CONTOURS
FALL 2014

- LEGEND**
-  Above Sea Level
 -  Below Sea Level
 -  Key wells used for hydrographs (Figures B - E)
 -  Wells used for Contouring

Data Source: WRD Production Database

-  Barrier Injection Wells
-  WRD Service Area Boundary
-  Forebay

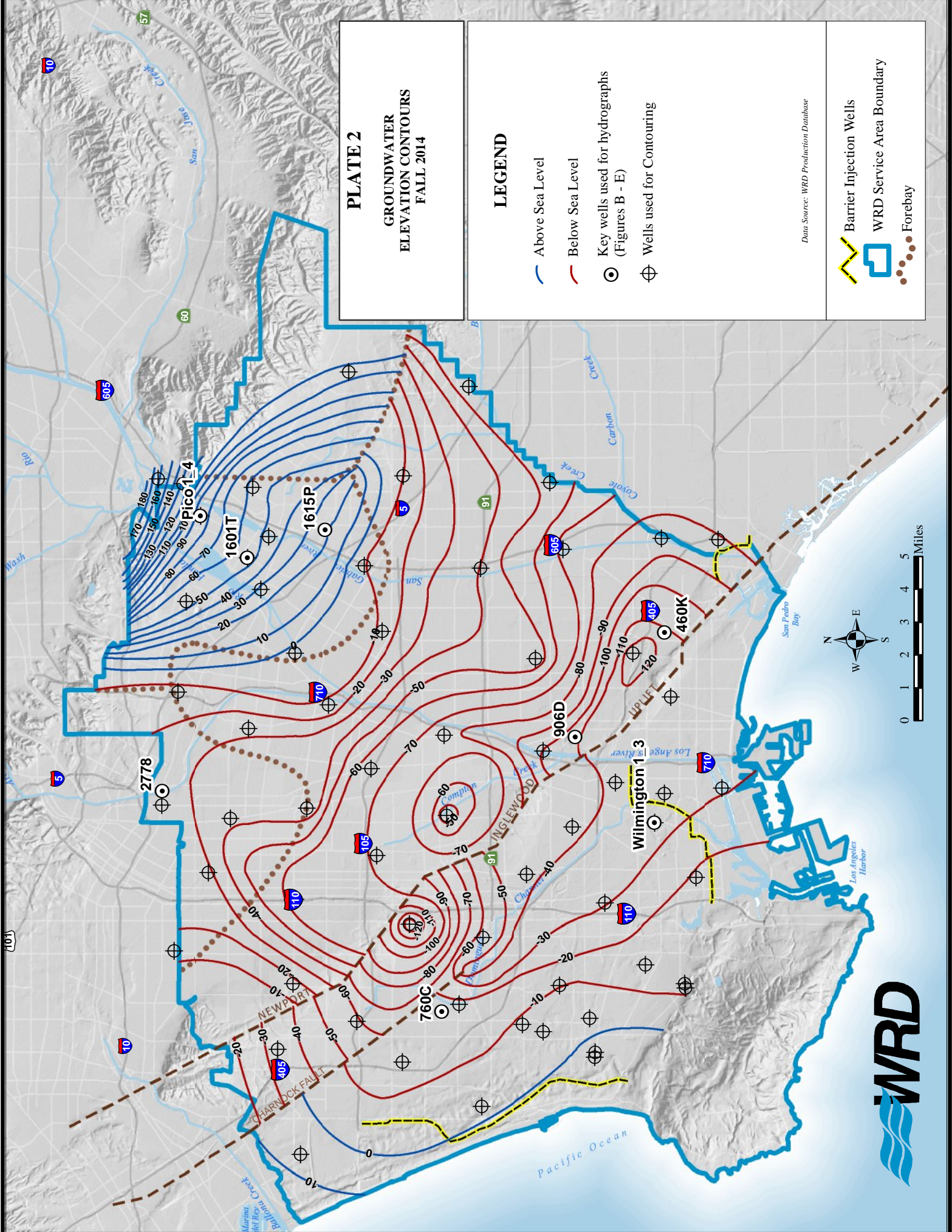


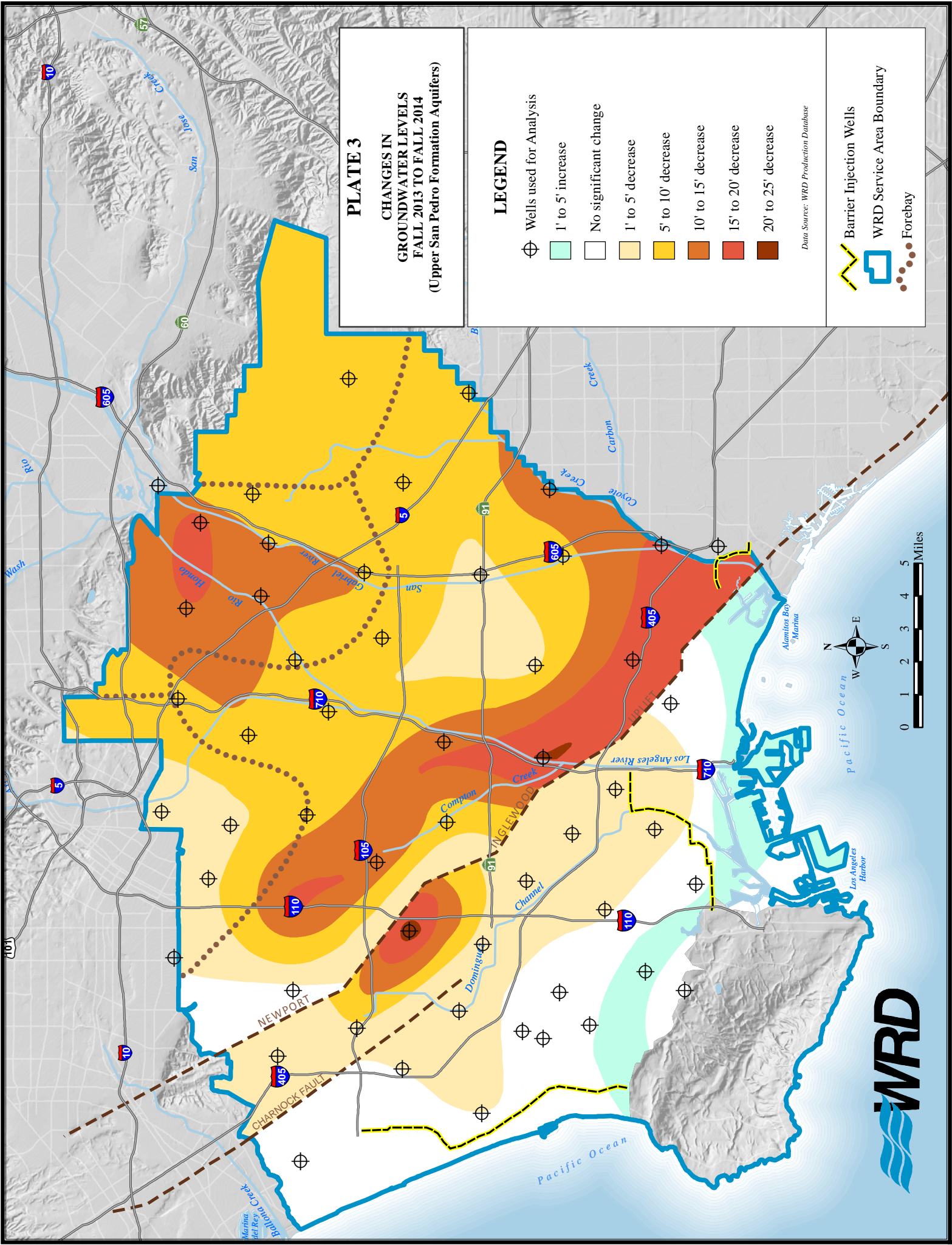
PLATE 3
CHANGES IN
GROUNDWATER LEVELS
FALL 2013 TO FALL 2014
(Upper San Pedro Formation Aquifers)

LEGEND

- ⊕ Wells used for Analysis
- Light Green: 1' to 5' increase
- White: No significant change
- Light Yellow: 1' to 5' decrease
- Yellow: 5' to 10' decrease
- Orange: 10' to 15' decrease
- Red: 15' to 20' decrease
- Dark Red: 20' to 25' decrease

Data Source: WRD Production Database

- Yellow dashed line: Barrier Injection Wells
- Blue outline: WRD Service Area Boundary
- Red dotted line: Forebay



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South Coast Hydrologic Region

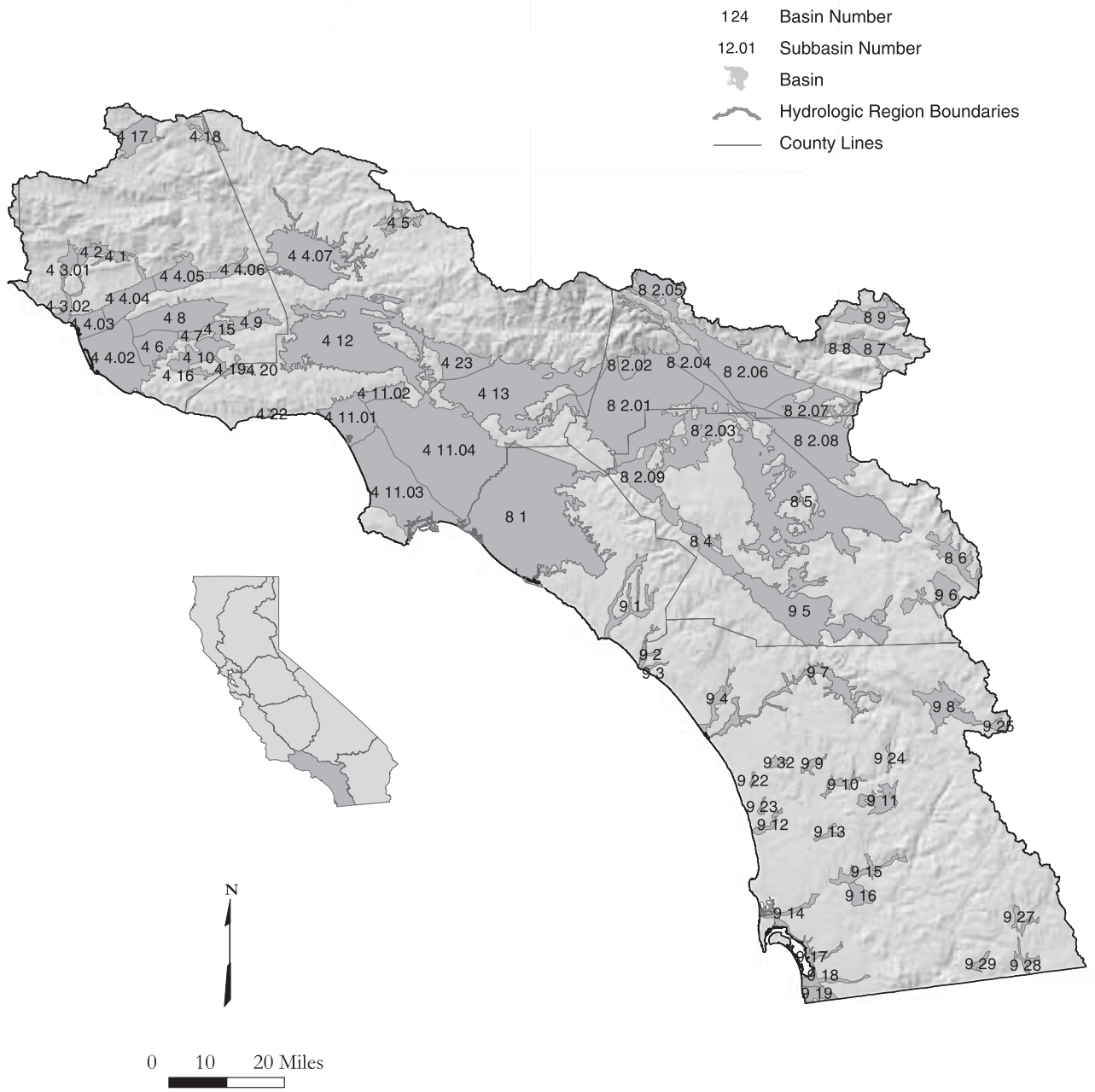


Figure 31 South Coast Hydrologic Region

Basins and Subbasins of the South Coast Hydrologic Region

Basin/subbasin	Basin name	Basin/subbasin	Basin name
4-1	Upper Ojai Valley	8-4	Elsinore
4-2	Ojai Valley	8-5	San Jacinto
4-3	Ventura River Valley	8-6	Hemet Lake Valley
4-3.01	Upper Ventura River	8-7	Big Meadows Valley
4-3.02	Lower Ventura River	8-8	Seven Oaks Valley
4-4	Santa Clara River Valley	8-9	Bear Valley
4-4.02	Oxnard	9-1	San Juan Valley
4-4.03	Mound	9-2	San Mateo Valley
4-4.04	Santa Paula	9-3	San Onofre Valley
4-4.05	Fillmore	9-4	Santa Margarita Valley
4-4.06	Piru	9-5	Temecula Valley
4-4.07	Santa Clara River Valley East	9-6	Coahuila Valley
4-5	Acton Valley	9-7	San Luis Rey Valley
4-6	Pleasant Valley	9-8	Warner Valley
4-7	Arroyo Santa Rosa Valley	9-9	Escondido Valley
4-8	Las Posas Valley	9-10	San Pasqual Valley
4-9	Simi Valley	9-11	Santa Maria Valley
4-10	Conejo Valley	9-12	San Dieguito Creek
4-11	Coastal Plain of Los Angeles	9-13	Poway Valley
4-11.01	Santa Monica	9-14	Mission Valley
4-11.02	Hollywood	9-15	San Diego River Valley
4-11.03	West Coast	9-16	El Cajon Valley
4-11.04	Central	9-17	Sweetwater Valley
4-12	San Fernando Valley	9-18	Otay Valley
4-13	San Gabriel Valley	9-19	Tijuana Basin
4-15	Tierra Rejada	9-22	Batiquitos Lagoon Valley
4-16	Hidden Valley	9-23	San Elijo Valley
4-17	Lockwood Valley	9-24	Pamo Valley
4-18	Hungry Valley	9-25	Ranchita Town Area
4-19	Thousand Oaks Area	9-27	Cottonwood Valley
4-20	Russell Valley	9-28	Campo Valley
4-22	Malibu Valley	9-29	Potrero Valley
4-23	Raymond	9-32	San Marcos Area
8-1	Coastal Plain of Orange County		
8-2	Upper Santa Ana Valley		
8-2.01	Chino		
8-2.02	Cucamonga		
8-2.03	Riverside-Arlington		
8-2.04	Rialto-Colton		
8-2.05	Cajon		
8-2.06	Bunker Hill		
8-2.07	Yucaipa		
8-2.08	San Timoteo		
8-2.09	Temescal		

Description of the Region

The South Coast HR covers approximately 6.78 million acres (10,600 square miles) of the southern California watershed that drains to the Pacific Ocean (Figure 31). The HR is bounded on the west by the Pacific Ocean and the watershed divide near the Ventura-Santa Barbara County line. The northern boundary corresponds to the crest of the Transverse Ranges through the San Gabriel and San Bernardino mountains. The eastern boundary lies along the crest of the San Jacinto Mountains and low-lying hills of the Peninsular Range that form a drainage boundary with the Colorado River HR. The southern boundary is the international boundary with the Republic of Mexico. Significant geographic features include the coastal plain, the central Transverse Ranges, the Peninsular Ranges, and the San Fernando, San Gabriel, Santa Ana River, and Santa Clara River valleys.

The South Coast HR includes all of Orange County, most of San Diego and Los Angeles Counties, parts of Riverside, San Bernardino, and Ventura counties, and a small amount of Kern and Santa Barbara Counties. This HR is divided into Los Angeles, Santa Ana and San Diego subregions, RWQCBs 4, 8, and 9 respectively. Groundwater basins are numbered according to these subregions. Basin numbers in the Los Angeles subregion are preceded by a 4, in Santa Ana by an 8, and in San Diego by a 9. The Los Angeles subregion contains the Ventura, Santa Clara, Los Angeles, and San Gabriel River drainages, Santa Ana encompasses the Santa Ana River drainage, and San Diego includes the Santa Maria River, San Luis Rey River and the San Diego River and other drainage systems.

According to 2000 census data, about 17 million people live within the boundaries of the South Coast HR, approximately 50 percent of the population of California. Because this HR amounts to only about 7 percent of the surface area of the State, this has the highest population density of any HR in California (DWR 1998). Major population centers include the metropolitan areas surrounding Ventura, Los Angeles, San Diego, San Bernardino, and Riverside.

The South Coast HR has 56 delineated groundwater basins. Twenty-one basins are in subregion 4 (Los Angeles), eight basins in subregion 8 (Santa Ana), and 27 basins in subregion 9 (San Diego).

The Los Angeles subregion overlies 21 groundwater basins and encompasses most of Ventura and Los Angeles counties. Within this subregion, the Ventura River Valley, Santa Clara River Valley, and Coastal Plain of Los Angeles basins are divided into subbasins. The basins in the Los Angeles subregion underlie 1.01 million acres (1,580 square miles) or about 40 percent of the total surface area of the subregion.

The Santa Ana subregion overlies eight groundwater basins and encompasses most of Orange County and parts of Los Angeles, San Bernardino, and Riverside counties. The Upper Santa Ana Valley Groundwater Basin is divided into nine subbasins. Groundwater basins underlie 979,000 acres (1,520 square miles) or about 54 percent of the Santa Ana subregion.

The San Diego subregion overlies 27 groundwater basins, encompasses most of San Diego County, and includes parts of Orange and Riverside counties. Groundwater basins underlie about 277,000 acres (433 square miles) or about 11 percent of the surface of the San Diego subregion.

Overall, groundwater basins underlie about 2.27 million acres (3,530 square miles) or about 33 percent of the South Coast HR.

Groundwater Development

Groundwater has been used in the South Coast HR for well over 100 years. High demand and use of groundwater in Southern California has given rise to many disputes over management and pumping rights, with the resolution of these cases playing a large role in the establishment and clarification of water rights law in California. Raymond Groundwater Basin, located in this HR, was the first adjudicated basin in the State. Of the 16 adjudicated basins in California, 11 are in the South Coast HR. Groundwater provides about 23 percent of water demand in normal years and about 29 percent in drought years (DWR 1998).

Groundwater is found in unconfined alluvial aquifers in most of the basins of the San Diego subregion and the inland basins of the Santa Ana and Los Angeles subregions. In some larger basins, typified by those underlying the coastal plain, groundwater occurs in multiple aquifers separated by aquitards that create confined groundwater conditions. Basins range in depth from tens or hundreds of feet in smaller basins, to thousands of feet in larger basins. The thickness of aquifers varies from tens to hundreds of feet. Well yields vary in this HR depending on aquifer characteristics and well location, size, and use. Some aquifers are capable of yielding thousands of gallons per minute to municipal wells.

Conjunctive Use

Conjunctive use of surface water and groundwater is a long-standing practice in the region. At present, much of the potable water used in Southern California is imported from the Colorado River and from sources in the eastern Sierra and Northern California. Several reservoirs are operated primarily for the purpose of storing surface water for domestic and irrigation use, but groundwater basins are also recharged from the outflow of some reservoirs. The concept is to maintain streamflow over a longer period of time than would occur without regulated flow and thus provide for increased recharge of groundwater basins. Most of the larger basins in this HR are highly managed, with many conjunctive use projects being developed to optimize water supply.

Coastal basins in this HR are prone to intrusion of seawater. Seawater intrusion barriers are maintained along the Los Angeles and Orange County sections of the coastal plain. In Orange County, recycled water is injected into the ground to form a mound of groundwater between the coast and the main groundwater basin. In Los Angeles County, imported and recycled water is injected to maintain a seawater intrusion barrier.

Groundwater Quality

Groundwater in basins of the Los Angeles subregion is mainly calcium sulfate and calcium bicarbonate in character. Nitrate content is elevated in some parts of the subregion. Volatile organic compounds (VOCs) have created groundwater impairments in some of the industrialized portions of the region. The San Gabriel Valley and San Fernando Valley groundwater basins both have multiple sites of contamination from VOCs. The main constituents in the contamination plumes are trichloroethylene (TCE) and tetrachloroethylene (PCE). Some of the locations have been declared federal Superfund sites. Contamination plumes containing high concentrations of TCE and PCE also occur in the Bunker Hill Subbasin of the Upper Santa Ana Valley Groundwater Basin. Some of these plumes are also designated as Superfund sites. Perchlorate is emerging as an important contaminant in several areas in the South Coast HR.

Groundwater in basins of the Santa Ana subregion is primarily calcium and sodium bicarbonate in character. Local impairments from excess nitrate or VOCs have been recognized. Groundwater and surface water in the Chino Subbasin of the Santa Ana River Valley Groundwater Basin have elevated nitrate concentrations, partly derived from a large dairy industry in that area. In Orange County, water from the Santa Ana River provides a large part of the groundwater replenishment. Wetlands maintained along the Santa Ana River near the boundary of the Upper Santa Ana River and Orange County Groundwater Basins provide effective removal of nitrate from surface water, while maintaining critical habitat for endangered species.

Groundwater in basins of the San Diego subregion has mainly calcium and sodium cations and bicarbonate and sulfate anions. Local impairments by nitrate, sulfate, and TDS are found. Camp Pendleton Marine Base, in the northwestern part of this subregion, is on the EPA National Priorities List for soil and groundwater contamination by many constituents.

Water Quality in Public Supply Wells

From 1994 through 2000, 2,342 public supply water wells were sampled in 47 of the 73 basins and subbasins in the South Coast HR. Analyzed samples indicate that 1,360 wells, or 58 percent, met the state primary MCLs for drinking water. Nine-hundred-eighty-two wells, or 42 percent, have constituents that exceed one or more MCL. Figure 32 shows the percentages of each contaminant group that exceeded MCLs in the 982 wells.

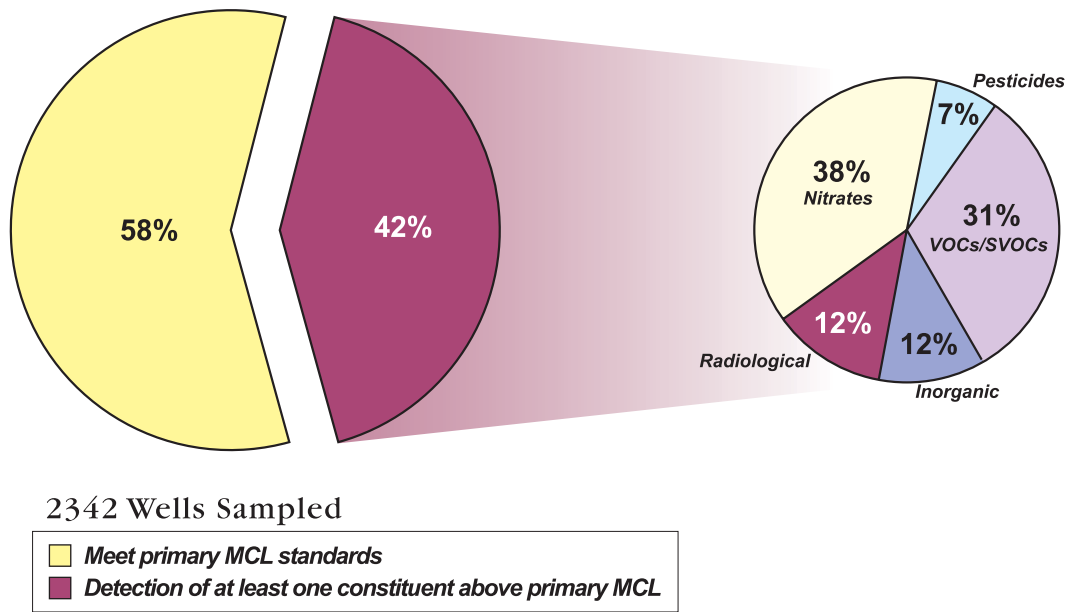


Figure 32 MCL exceedances in public supply wells in the South Coast Hydrologic Region

Table 22 lists the three most frequently occurring contaminants in each of the six contaminant groups and shows the number of wells in the HR that exceeded the MCL for those contaminants.

Changes from Bulletin 118-80

Several modifications from the groundwater basins presented in Bulletin 118-80 are incorporated in this report (Table 23). The Cajalco Valley (8-3), Jamul Valley (9-20), Las Pulgas Valley (9-21), Pine Valley (9-26), and Tecate Valley (9-30) Groundwater Basins have been deleted in this report because they have thin deposits of alluvium and well completion reports indicate that groundwater production is from underlying fractured bedrock. The Conejo Tierra Rejada Volcanic (4-21) is a volcanic aquifer and was not assigned a basin number in this bulletin. This is considered to be groundwater source area as discussed in Chapter 6.

Table 22 Most frequently occurring contaminants by contaminant group in the South Coast Hydrologic Region

Contaminant group	Contaminant - # of wells	Contaminant - # of wells	Contaminant - # of wells
Inorganics – Primary	Fluoride – 56	Thallium – 13	Aluminum – 12
Inorganics – Secondary	Iron – 337	Manganese – 335	TDS – 36
Radiological	Gross Alpha – 104	Uranium – 40	Radium 226 – 9 Radium 228 – 9
Nitrates	Nitrate (as NO ₃) – 364	Nitrate + Nitrite – 179	Nitrate Nitrogen (NO ₃ -N) – 14
Pesticides	DBCP – 61	Di(2-Ethylhexyl)phthalate – 5	Heptachlor – 2 EDB – 2
VOCs/SVOCs	TCE – 196	PCE – 152	1,2 Dichloroethane – 89

DBCP = Dibromochloropropane
 EDB = Ethylene Dibromide
 VOCs = Volatile Organic Compounds
 SVOCs = Semivolatile Organic Compounds

The Ventura River Valley (4-3), Santa Clara River Valley (4-4), Coastal Plain of Los Angeles (4-11), and Upper Santa Ana Valley (8-2) Groundwater Basins have been divided into subbasins in this report. The extent of the San Jacinto Groundwater Basin (8-5) has been decreased because completion of Diamond Valley Reservoir has inundated the valley. Paloma Valley has been removed because well logs indicate groundwater production is solely from fractured bedrock. The Raymond Groundwater Basin (4-23) is presented as an individual basin instead of being incorporated into the San Gabriel Valley Groundwater Basin (4-13) because it is bounded by physical barriers and has been managed as a separate and individual groundwater basin for many decades. In Bulletin 118-75, groundwater basins in two different subregions were designated the Upper Santa Ana Valley Groundwater Basin (4-14 and 8-2). To alleviate this confusion, basin 4-14 has been divided, with parts of the basin incorporated into the neighboring San Gabriel Valley Groundwater Basin (4-13) and the Chino subbasin of the Upper Santa Ana Valley Groundwater Basin (8-2.01). The San Marcos Area Groundwater Basin (9-32) in central San Diego County is presented as a new basin in this report.

Table 23 Modifications since Bulletin 118-80 of groundwater basins and subbasins in South Coast Hydrologic Region

Basin/subbasin name	Number	Old number	Basin/subbasin name	Number	Old number
Upper Ventura River	4-3.01	4-3	Cajon	8-2.05	8-2
Lower Ventura River	4-3.02	4-3	Bunker Hill	8-2.06	8-2
Oxnard	4-4.02	4-4	Yucaipa	8-2.07	8-2
Mound	4-4.03	4-4	San Timoteo	8-2.08	8-2
Santa Paula	4-4.04	4-4	Temescal	8-2.09	8-2
Fillmore	4-4.05	4-4	Cajalco Valley	deleted	8-3
Piru	4-4.06	4-4	Tijuana Basin	9-19	
Santa Clara River Valley East	4-4.07	4-4	Jamul Valley	deleted	9-20
Santa Monica	4-11.01	4-11	Las Pulgas Valley	deleted	9-21
Hollywood	4-11.02	4-11	Batiquitos Lagoon Valley	9-22	
West Coast	4-11.03	4-11	San Elijo Valley	9-23	
Central	4-11.04	4-11	Pamo Valley	9-24	
Upper Santa Ana Valley	Incorporated into 8-2.01 and 4-13	4-14	Ranchita Town Area	9-25	
Conejo-Tierra Rejada Volcanic	deleted	4-21	Pine Valley	deleted	9-26
Raymond	4-23	4-13	Cottonwood Valley	9-27	
Chino	8-2.01	8-2	Campo Valley	9-28	
Cucamonga	8-2.02	8-2	Potrero Valley	9-29	
Riverside-Arlington	8-2.03	8-2	Tecate Valley	deleted	9-30
Rialto-Colton	8-2.04	8-2	San Marcos Area	9-32	Not previously identified

Table 24 South Coast Hydrologic Region groundwater data

Basin/Subbasin	Basin Name	Area (acres)	Groundwater Budget Type	Well Yields (gpm)		Active Monitoring			TDS (mg/L)	
				Maximum	Average	Levels	Quality	Title 22	Average	Range
4-1	UPPER OJAI VALLEY	3,800	A	200	50	4	-	1	707	438-1,249
4-2	OJAI VALLEY	6,830	A	600	383	24	-	22	640	450-1,140
4-3	VENTURA RIVER VALLEY									
4-3.01	UPPER VENTURA RIVER	7,410	C	-	600	17	-	18	706	500-1,240
4-3.02	LOWER VENTURA RIVER	5,300	A	-	20	-	-	2	-	760-3,000
4-4	SANTA CLARA RIVER VALLEY									
4-4.02	OXNARD	58,000	A	1,600	-	127	127	69	1,102	160-1,800
4-4.03	MOUND	14,800	A	-	700	11	11	4	1,644	1,498-1,908
4-4.04	SANTA PAULA	22,800	A	-	700	60	60	10	1,198	470-3,010
4-4.05	FILLMORE	20,800	A	2,100	700	23	-	10	1,100	800-2,400
4-4.06	PIRU	8,900	A	-	800	19	-	3	1,300	608-2,400
4-4.07	SANTA CLARA RIVER VALLEY EAST	66,200	C	-	-	-	-	62	-	-
4-5	ACTON VALLEY	8,270	A	1,000	140	-	-	7	-	-
4-6	PLEASANT VALLEY	21,600	A	-	1,000	9	-	12	1,110	597-3,490
4-7	ARROYO SANTA ROSA VALLEY	3,740	A	1,200	950	6	-	7	1,006	670-1,200
4-8	LAS POSAS VALLEY	42,200	A	750	-	-	-	24	742	338-1,700
4-9	SIMI VALLEY	12,100	A	-	394	13	-	1	-	1,580
4-10	CONEJO VALLEY	28,900	A	1,000	100	-	-	3	631	335-2,064
4-11	COASTAL PLAIN OF LOS ANGELES									
4-11.01	SANTA MONICA	32,100	C	4,700	-	-	-	12	916	729-1,156
4-11.02	HOLLYWOOD	10,500	A	-	-	5	5	1	-	526
4-11.03	WEST COAST	91,300	A	1,300	-	67	58	33	456	-
4-11.04	CENTRAL	177,000	A	11,000	1,730	302	64	294	453	200-2,500
4-12	SAN FERNANDO VALLEY	145,000	A	3,240	1,220	1,398	2,385	126	499	176-1,116
4-13	SAN GABRIEL VALLEY	154,000	A	4,850	1,000	67	296	259	367	90-4,288
4-15	TIERRA REJADA	4,390	A	1,200	172	4	1	-	-	619-930
4-16	HIDDEN VALLEY	2,210	C	-	-	-	-	1	453	289-743
4-17	LOCKWOOD VALLEY	21,800	A	350	25	-	-	1	-	-
4-18	HUNGRY VALLEY	5,310	C	-	28	-	-	-	<350	-
4-19	THOUSAND OAKS AREA	3,110	C	-	39	2	-	-	1,410	1,200-2,300
4-20	RUSSELL VALLEY	3,100	A	-	25	-	-	-	-	-
4-22	MALIBU VALLEY	613	C	1,060	1,030	-	-	-	-	-
4-23	RAYMOND	26,200	A	3,620	1,880	88	-	70	346	138-780
8-1	COASTAL PLAIN OF ORANGE COUNTY	224,000	A	4,500	2,500	521	411	240	475	232-661
8-2	UPPER SANTA ANA VALLEY									
8-2.01	CHINO	154,000	A	1,500	1,000	12	8	187	484	200-600
8-2.02	CUCAMONGA	9,530	C	4,400	2,115	1	1	21	-	-
8-2.03	RIVERSIDE-ARLINGTON	58,600	A	-	-	11	3	43	-	370-756
8-2.04	RIALTO-COLTON	30,100	A	5,000	545	50	5	41	337	-
8-2.05	CAJON	23,200	C	200	60	-	-	5	-	-
8-2.06	BUNKER HILL	89,600	A	5,000	1,245	398	169	204	-	150-550
8-2.07	YUCAIPA	25,300	A	2,800	206	19	3	45	334	-

Table 24 South Coast Hydrologic Region groundwater data (continued)

Basin/Subbasin	Basin Name	Area (acres)	Groundwater Budget Type	Well Yields (gpm)		Active Monitoring			TDS (mg/L)	
				Maximum	Average	Levels	Quality	Title 22	Average	Range
8-2.08	SAN TIMOTEO	73,100	A	-	-	67	12	36	-	-
8-2.09	TEMESCAL	23,500	C	-	-	2	2	20	753	373-950
8-4	EL SINORE	25,700	C	5,400	-	1	1	18	-	-
8-5	SAN JACINTO	188,000	C	-	-	150	115	56	463	160-12,000
8-6	HEMET LAKE VALLEY	16,700	C	820	196	-	-	9	-	-
8-7	BIG MEADOWS VALLEY	14,200	C	120	34	-	-	8	-	-
8-8	SEVEN OAKS VALLEY	4,080	C	-	-	-	-	1	-	-
8-9	BEAR VALLEY	19,600	A	1,000	500	57	57	52	-	-
9-1	SAN JUAN VALLEY	16,700	C	1,000	-	-	-	8	760	430-12,880
9-2	SAN MATEO VALLEY	2,990	A	-	-	-	-	5	586	490-770
9-3	SAN ONOFRE VALLEY	1,250	A	-	-	-	-	2	-	600-1,500
9-4	SANTA MARGARITA VALLEY	626	A	1,980	-	4	-	-	-	337-9,030
9-5	TEMECULA VALLEY	87,800	C	1,750	-	140	4	67	476	220-1,500
9-6	COAHUILA VALLEY	18,200	C	500	-	2	-	1	-	304-969
9-7	SAN LUIS REY VALLEY	37,000	C	2,000	500	-	-	28	1,258	530-7,060
9-8	WARNER VALLEY	24,000	C	1,800	800	-	-	4	-	263
9-9	ESCONDIDO VALLEY	2,890	C	190	50	-	-	1	-	250-5,000
9-10	SAN PASQUAL VALLEY	4,540	C	1,700	1,000	-	-	2	-	500-1,550
9-11	SANTA MARIA VALLEY	12,300	A	500	36	3	-	2	1,000	324-1,680
9-12	SAN DIEGUITO CREEK	3,560	A	1,800	700	-	-	-	-	2,000
9-13	POWAY VALLEY	2,470	C	200	100	-	-	1	-	610-1,500
9-14	MISSION VALLEY	7,350	C	-	1,000	-	-	-	-	-
9-15	SAN DIEGO RIVER VALLEY	9,890	C	2,000	-	-	-	5	-	260-2,870
9-16	EL CAJON VALLEY	7,160	C	300	50	1	-	2,340	-	-
9-17	SWEETWATER VALLEY	5,920	C	1,500	300	7	7	9	2,114	300-50,000
9-18	OTAY VALLEY	6,830	C	1,000	185	-	-	-	-	500->2,000
9-19	TIJUANA BASIN	7,410	A	2,000	350	-	-	-	-	380-3,620
9-22	BATQUITOS LAGOON VALLEY	741	C	-	-	-	-	-	1,280	788-2,362
9-23	SAN ELIJO VALLEY	883	C	1,800	-	-	-	-	-	1,170-5,090
9-24	PAMO VALLEY	1,500	C	-	-	-	-	-	369	279-455
9-25	RANCHITA TOWN AREA	3,130	C	125	22	-	-	-	-	283-305
9-27	COITONWOOD VALLEY	3,850	C	-	-	-	-	1	-	-
9-28	CAMPO VALLEY	3,550	C	-	<40	-	-	4	-	800
9-29	POTRERO VALLEY	2,020	C	-	-	-	-	4	-	-
9-32	SAN MARCOS VALLEY	2,130	C	60	-	-	-	-	-	500-700

gpm - gallons per minute
 mg/L - milligram per liter
 TDS - total dissolved solids

Thousand Oaks Area Groundwater Basin

- Groundwater Basin Number: 4-19
- County: Ventura, Los Angeles
- Surface Area: 3,110 acres (4.9 square miles)

Basin Boundaries and Hydrology

This groundwater basin underlies a small valley between Lake Sherwood and Thousand Oaks in southeastern Ventura County and western Los Angeles County. The basin is bounded by semi-permeable rocks of the Santa Monica Mountains (CSWRB 1953; DWR 1959). The valley is drained by Conejo Creek and Triunfo Canyon. Average annual precipitation ranges from 16 to 20 inches.

Hydrogeologic Information

Water Bearing Formations

Groundwater is found mainly in alluvium, although it is also produced from other older rock units (VCPWA 2002). Groundwater in the basin is unconfined in the Quaternary age alluvium that fills Triunfo Canyon and underlying Conejo Creek. The Miocene age Modelo and Topanga Formations contain productive sandstone beds, and some groundwater is produced from fractures in the Modelo, Conejo, and Topanga Formations (CSWRB 1953; DWR 1959).

Restrictive Structures

Water levels indicate that a groundwater divide exists near Thousand Oaks coincident with a surface drainage divide (CSWRB 1953).

Recharge Areas

Recharge to the basin is by percolation of precipitation to the valley floor and stream flow.

Groundwater Level Trends

Hydrographs show that water levels remained fairly stable during 1979 through 1999. Seasonal change in water level ranges from about 10 to 20 feet. Groundwater moves northwest near Thousand Oaks and southward near Triunfo Canyon (CSWRB 1953).

Groundwater Storage

Groundwater Storage Capacity. The total storage capacity is estimated at 130,000 af (VCPWA 2002).

Groundwater in Storage. The basin is estimated to have been about 87 percent full in 1999 (Panaro 2000), or to have had about 113,000 af in storage.

Groundwater Budget (Type C)

No subsurface inflow is known to occur to the basin (CSWRB 1953).

Groundwater Quality

Characterization. Groundwater in the basin is magnesium-calcium-sodium sulfate in character. TDS content in the basin ranges from 1,200 to 2,300 mg/L with the average at 1,410 mg/L (VCPWA 1996).

Impairments. High alkalinity and hardness are prevalent in wells deeper than 100 feet, influencing taste and quality characteristics (VCPWA 1996). TDS is high in this basin

Well Characteristics

Well yields (gal/min)		
Municipal/Irrigation	Range:	Average: 39 gal/min (Panaro 2000)
Total depths (ft)		
Domestic	Range:	Average:
Municipal/Irrigation	Range:	Average:

Active Monitoring Data

Agency	Parameter	Number of wells /measurement frequency
Ventura County Public Works Agency	Groundwater levels	2

Basin Management

Groundwater management:

Water agencies

Public	Ventura County Public Works Agency, City of Thousand Oaks Public Works Department.
Private	California Water Service Company – Westlake District, California American Water Company

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Errata

Changes made to the basin description will be noted here.