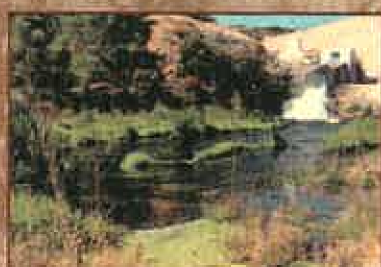
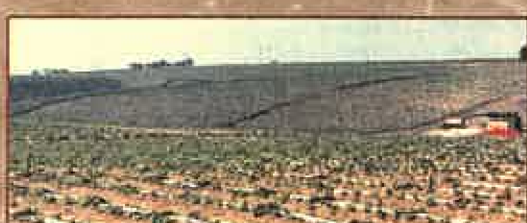
GERMAN CRIOLLO

SALINAS VALLEY
HISTORICAL BENEFITS ANALYSIS (HBA)

APPENDICES
APRIL 1998





MONTGOMERY WATSON

IN ASSOCIATION WITH CH2MHILL
AND SCHAAF AND WHEELER ASSOCIATES

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SALINAS VALLEY HISTORICAL BENEFITS ANALYSIS APPENDICES VOLUME

Appendix A

MONTGOMERY WATSON

Appendix A
SVIGSM Model Extension and Verification

INTRODUCTION

In May 1997, the Salinas Valley Integrated Ground Water and Surface Water Model (SVIGSM) was updated as part of the Salinas Valley Basin Management Plan (BMP). The update included revisions to crop acreage and land use data, modifications to the assumptions on various agricultural water use components, and refinements to several model parameters. The updates to the model required that it be recalibrated to ensure the proper simulation of historical hydrologic conditions for the period from October 1969 to September 1994. The documentation of the model update and recalibration is contained in the Salinas Valley Integrated Ground Water and Surface Water Model Update, Final Report, May 1997 (SVIGSM Update Report). Because all of the modifications to the model outlined in this appendix build upon the version updated in May 1997, the reader is encouraged to refer to the SVIGSM Update Report for information on the development of the SVIGSM up to this point.

The SVIGSM is used in the Salinas Valley Historical Benefits Analysis (HBA) to assess the hydrologic benefits of the operation of Nacimiento and San Antonio Reservoirs. Changes in ground water levels and in the volume and extent of seawater intrusion as a result of the operations of the reservoirs are analyzed and quantified. The results are used to quantify the economic benefits associated with the reservoir operations.

The operation of Nacimiento Reservoir began in February 1957, and the operation of San Antonio Reservoir began in December 1967. Because the simulation period of the existing model only extended from 1970 to 1994, the primary task in preparing the model for use in the HBA was to extend the simulation period to cover the entire period of reservoir operation. Although reservoir operations began in 1958, the model was extended back to water year 1949 because the 1949-1994 timespan appeared to be a relatively balanced hydrologic period, and because necessary data records were readily available beginning in this year.

Along with the extension of the model data sets back to 1949, refinements and a verification process also were performed to verify the performance of the model under the extended simulation period. This appendix describes the additional data collection and analysis performed under the model extension and verification task. The following sections will cover land and water use data, aquifer parameter refinements, and address water balance, ground water level, stream flow, and seawater intrusion issues related to model verification.

MODEL EXTENDED DATA SET

Land Use

Department of Water Resources (DWR) land use surveys (1968, 1976, 1982, and 1991) and Monterey County Water Resources Agency (MCWRA) Geographical Information System-based (GIS) land use coverages (1991 and 1995) were used to develop the land use data set for the simulation period from 1970 to 1994. The 1995 land use coverage was developed by MCWRA from the 1991 GIS coverage, with modifications based on stakeholder input and digital ortho photos. To extend the data back to 1949, land use surveys developed by the Monterey County Flood Control and Water Conservation District were used for 1944 and 1963, and a MCWRA GIS-based land use coverage was developed for 1953. The 1953 GIS-based land use coverage is based on land use maps developed as part of the 1953 land use survey by the Monterey County Flood Control and Water Conservation District. These maps were digitized by MCWRA and rectified to match GIS coverages. The acreages were then extracted and recalculated. Table A-1 shows the land use acreages used for specific years in the historical simulation period. Land use acreages between the specified years are linearly interpolated. Figures A-1a through A-1e show the annual irrigated acreages graphically for each subarea and for the total Salinas Valley.

Although all of the land use surveys and GIS coverages provide crop acreages on a detailed crop or land use basis, the acreages were aggregated into 10 crop/land use categories: pasture, sugar beets, field crops, truck crops, orchard, grain, vineyard, urban, native vegetation, and riparian vegetation. Crop categories for truck, field, and non-irrigated crops are defined as shown in Table A-2. Because the majority of the grain grown in the Salinas Valley is dry farmed, and to be consistent with the assumption for the 1970-1994 period, all grain in the 1949-1969 period is assumed to be non-irrigated.

As in the 1970-1994 period, multiple cropping also is assumed to occur in the 1949-1969 period, resulting in "in-between rotation" acreages. Although these "in-between rotation" acreages are documented as "fallow/idle" crop acreages in the land use surveys, they may be fallow only for short periods between multiple croppings. Therefore, the "in-between rotation" acreages are included in the gross irrigated truck crop acreages used in the model. Appropriate reductions are made in the truck crop water use to account for the idle periods between multiple croppings.

According to growers in the Salinas Valley, cropping intensity has increased over time. For the 1970-1994 period, the valley-wide average cropping intensity was assumed to be 2.0 crops/year. This value was reduced to 1.75 and 1.4 for the 1960s and 1950s, respectively. Slight adjustments for each subarea are made to

Table A-1

Salinas Valley Historical Benefits Analysis
Summary of Land Use Data

	PRESSURE SUBAREA							
CROP TYPE	1944 (1)	1953 (2)	1963 (1)	1968 (3)	1976 (3)	1982 (3)	1991 (4)	1995 (5)
Pasture	1,978	4,247	2,370	1,566	375	381	352	352
Sugar Beets	2,443	4,626	4,816	1,753	3,439	19	0	0
Field Crops	6,604	8,695	11,772	2,980	2,552	435	876	876
Truck Crops	30,391	27,548	29,372	43,160	44,819	50,306	50,696	51,103
Orchard	21	19	6	0	0	0	29	29
Grain	0	973	0	0	853	728	233	110
Vineyard	0	0	0	0	741	732	740	740
Total Irrigated Ag. Acreage	**41,437**	**46,108**	**48,336**	**49,459**	**52,779**	**52,601**	**52,927**	**53,211**
Urban	5,008	6,032	7,170	7,739	8,987	9,576	13,354	13,354
Riparian Veg	7,796	7,796	6,780	6,272	5,459	4,849	3,936	3,936
Non-Irrigated Ag. & Native Veg	36,576	30,881	28,531	27,347	23,592	23,791	20,600	20,316
Total Land Area	**90,817**	**90,817**	**90,817**	**90,817**	**90,817**	**90,817**	**90,817**	**90,817**

	EAST SIDE SUBAREA							
CROP TYPE	1944 (1)	1953 (2)	1963 (1)	1968 (3)	1976 (3)	1982 (3)	1991 (4)	1995 (5)
Pasture	2,201	4,610	3,485	2,798	1,575	772	535	440
Sugar Beets	1,689	3,679	4,975	3,409	4,991	0	0	0
Field Crops	10,023	8,405	12,356	5,505	3,623	525	2,733	2,733
Truck Crops	8,997	7,689	11,352	21,492	21,503	30,474	30,197	30,501
Orchard	510	485	474	274	113	42	26	26
Grain	387	3,733	1,368	85	1,390	1,930	634	537
Vineyard	0	0	0	0	4,962	3,760	3,117	3,117
Total Irrigated Ag. Acreage	**23,807**	**28,601**	**34,010**	**33,563**	**38,157**	**37,503**	**37,242**	**37,354**
Urban	2,790	3,979	5,075	5,623	6,500	7,566	11,723	11,723
Riparian Veg	0	0	0	0	0	0	0	0
Non-Irrigated Ag. & Native Veg	47,904	41,921	35,416	35,315	29,844	29,432	25,536	25,424
Total Land Area	**74,501**	**74,501**	**74,501**	**74,501**	**74,501**	**74,501**	**74,501**	**74,501**

Footnotes:
1) Monterey County Flood Control and Water Conservation District Land Use Surveys
2) MCWRA GIS Land Use Coverage (6/97)
3) DWR Land Use Surveys
4) MCWRA 1991 "Verified Land Use" (3/97)
5) MCWRA Projected Land Use (3/97)

General Notes:
1) All grain acreage assumed to be non-irrigated for the SVIGSM simulation
2) Acreage values are gross acreages, which include irrigated fallow and/or idle crop acreages.
3) Riparian veg values are interpolated between the 1953 and 1991 values.
4) Total land area is based on the total land area estimated in the MCWRA 1991 data set.
5) Urban acreages include urban, suburban, lawn, road, railroad, farmstead, feedlot, and dairy acreages.
6) For the Pressure Subarea, urban acreages include Marina.
7) For the East Side Subarea, urban acreages include the portions of urban area in DWR Detailed Analysis Unit (DAU) that are in the SVIGSM East Side Subarea.
8) Crop acreages reflect current subarea boundaries.
9) Non-irrigated Ag. includes non-irrigated grain and dry farm acreages.
10) 1944 Pressure urban acr. is lin. extrapolated based on 1953 and 1968 data. Survey reported value is 6,469 acres.
11) 1963 Pressure urban acr. is lin. interpolated based on 1953 and 1968 data. Survey reported value is 4,011 acres.
12) 1963 East Side urban acr. is lin. interpolated based on 1953 and 1976 data. Survey reported value is 5,429 acres.
13) 1968 East Side urban acr. is lin. interpolated based on 1953 and 1976 data. Survey reported value is 3,794 acres.

Table A-1 (continued)

Salinas Valley Historical Benefits Analysis
Summary of Land Use Data

	FOREBAY SUBAREA							
CROP TYPE	1944 (1)	1953 (2)	1963 (1)	1968 (3)	1976 (3)	1982 (3)	1991 (4)	1995 (5)
Pasture	8,205	11,152	6,305	3,238	2,515	2,032	1,959	1,545
Sugar Beets	1,736	4,038	6,785	5,188	5,973	1,755	0	0
Field Crops	13,621	10,929	14,987	14,633	10,101	4,493	3,152	3,095
Truck Crops	13,387	14,908	15,998	24,727	21,704	31,362	36,673	36,387
Orchard	1,101	973	789	724	398	389	521	637
Grain	154	2,933	560	20	1,481	1,038	1,466	1,351
Vineyard	0	0	0	1,584	15,830	15,831	13,678	15,171
Total Irrigated Ag. Acreage	**38,204**	**44,933**	**45,424**	**50,114**	**58,002**	**56,900**	**57,450**	**58,186**
Urban	1,741	1,899	2,075	2,163	2,521	2,827	3,864	3,864
Riparian Veg	8,843	8,843	7,901	7,430	6,677	6,112	5,267	5,267
Non-Irrigated Ag. & Native Veg	37,924	31,037	31,312	27,005	19,512	20,873	20,131	19,395
Total Land Area	**86,712**	**86,712**	**86,712**	**86,712**	**86,712**	**86,712**	**86,712**	**86,712**

	UPPER VALLEY SUBAREA							
CROP TYPE	1944 (1)	1953 (2)	1963 (1)	1968 (3)	1976 (3)	1982 (3)	1991 (4)	1995 (5)
Pasture	2,018	5,860	4,566	4,370	3,827	3,147	1,898	2,040
Sugar Beets	9,893	4,660	6,690	5,010	5,897	701	0	0
Field Crops	6,587	7,068	11,183	9,587	6,114	4,800	728	458
Truck Crops	1,613	3,423	10,530	14,305	13,018	22,821	26,508	25,832
Orchard	1,322	1,190	1,295	1,383	160	160	258	454
Grain	509	3,076	157	401	1,986	573	3,339	2,989
Vineyard	0	0	0	0	14,427	17,422	15,128	16,366
Total Irrigated Ag. Acreage	**21,942**	**25,277**	**34,421**	**35,056**	**45,429**	**49,624**	**47,859**	**48,140**
Urban	1,897	2,034	2,187	2,263	3,710	3,780	3,878	3,878
Riparian Veg	12,120	12,120	10,836	10,194	9,167	8,397	7,242	7,242
Non-Irrigated Ag. & Native Veg	56,349	52,877	44,864	44,795	34,002	30,507	33,329	33,048
Total Land Area	**92,308**	**92,308**	**92,308**	**92,308**	**92,308**	**92,308**	**92,308**	**92,308**

Footnotes:
1) Monterey County Flood Control and Water Conservation District Land Use Surveys
2) MCWRA GIS Land Use Coverage (6/97)
3) DWR Land Use Surveys
4) MCWRA 1991 "Verified Land Use" (3/97)
5) MCWRA Projected Land Use (3/97)

General Notes:
1) All grain acreage assumed to be non-irrigated for the SVIGSM simulation
2) Acreage values are gross acreages, which include irrigated fallow and/or idle crop acreages.
3) Riparian veg values are interpolated between the 1953 and 1991 values.
4) Total land area is based on the total land area estimated in the MCWRA 1991 data set.
5) Urban acreages include urban, suburban, lawn, road, railroad, farmstead, feedlot, and dairy acreages.
6) For the Pressure Subarea, urban acreages include Marina.
7) For the East Side Subarea, urban acreages include the portions of urban area in DWR Detailed Analysis Unit (DAU) that are in the SVIGSM East Side Subarea.
8) Crop acreages reflect current subarea boundaries.
9) Non-irrigated Ag. includes non-irrigated grain and dry farm acreages.
10) 1944 Forebay urban acr. is lin. extrapolated based on 1953 and 1968 data. Survey reported value is 3,414 acres.
11) 1963 Forebay urban acr. is lin. interpolated based on 1953 and 1968 data. Survey reported value is 4,804 acres.
12) 1944 Upper Valley urban acr. is lin. extrapolated based on 1953 and 1968 data. Survey reported value is 2,407 acres.
13) 1963 Upper Valley urban acr. is lin. interpolated based on 1953 and 1968 data. Survey reported value is 4,011 acres.

Table A-1 (continued)

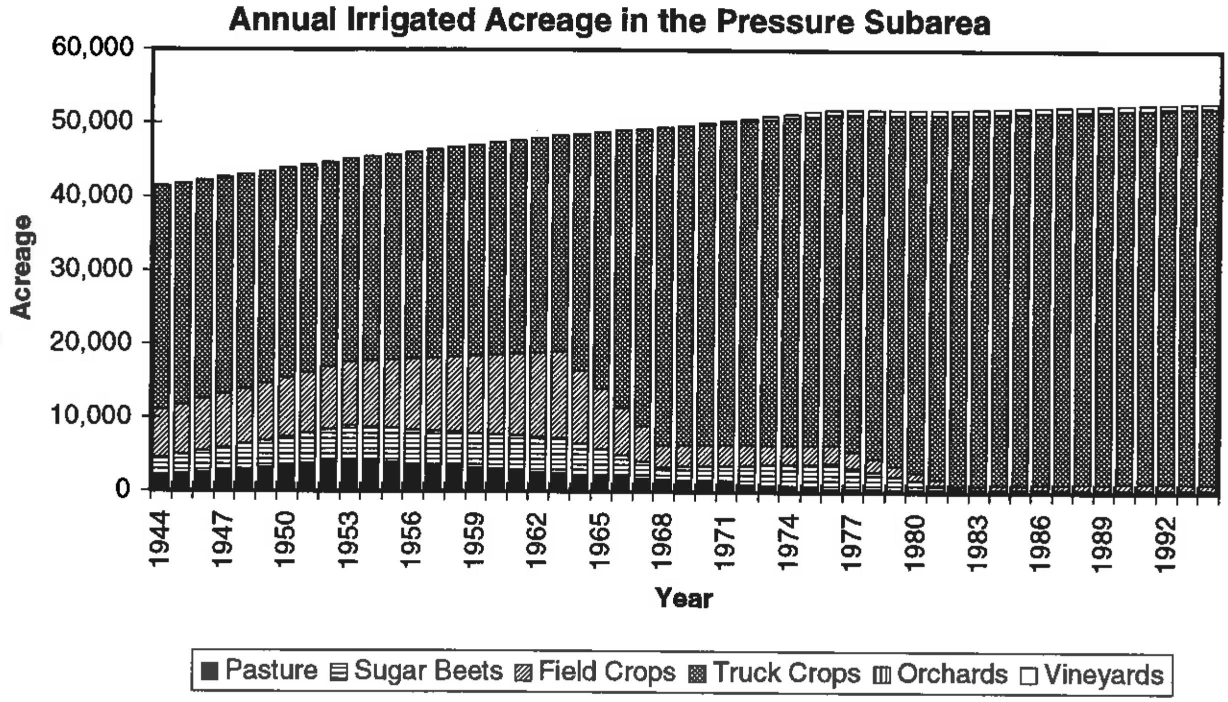
Salinas Valley Historical Benefits Analysis
Summary of Land Use Data

	TOTAL SALINAS VALLEY							
CROP TYPE	1944 (1)	1953 (2)	1963 (1)	1968 (3)	1976 (3)	1982 (3)	1991 (4)	1995 (5)
Pasture	14,402	25,869	16,726	11,972	8,292	6,332	4,744	4,377
Sugar Beets	15,761	17,003	23,266	15,360	20,300	2,475	0	0
Field Crops	36,835	35,097	50,298	32,705	22,390	10,253	7,490	7,163
Truck Crops	54,388	53,568	67,252	103,684	101,044	134,963	144,074	143,823
Orchard	2,954	2,667	2,564	2,381	671	591	834	1,147
Grain	1,050	10,715	2,085	506	5,710	4,269	5,672	4,987
Vineyard	0	0	0	1,584	35,960	37,745	32,664	35,395
Total Irrigated Ag. Acreage	**125,390**	**144,919**	**162,191**	**168,192**	**194,367**	**196,628**	**195,478**	**196,891**
Urban	11,435	13,944	16,507	17,789	21,719	23,748	32,819	32,819
Riparian Veg	28,759	28,759	25,517	23,896	21,303	19,358	16,445	16,445
Non-Irrigated Ag. & Native Veg	178,754	156,716	140,123	134,461	106,949	104,604	99,596	98,183
Total Land Area	**344,338**	**344,338**	**344,338**	**344,338**	**344,338**	**344,338**	**344,338**	**344,338**

Footnotes:
1) Monterey County Flood Control and Water Conservation District Land Use Surveys
2) MCWRA GIS Land Use Coverage (6/97)
3) DWR Land Use Surveys
4) MCWRA 1991 "Verified Land Use" (3/97)
5) MCWRA Projected Land Use (3/97)

General Notes:
1) All grain acreage assumed to be non-irrigated for the SVIGSM simulation
2) Acreage values are gross acreages, which include irrigated fallow and/or idle crop acreages.
3) Riparian veg values are interpolated between the 1953 and 1991 values.
4) Total land area is based on the total land area estimated in the MCWRA 1991 data set.
5) Urban acreages include urban, suburban, lawn, road, railroad, farmstead, feedlot, and dairy acreages.
6) For the Pressure Subarea, urban acreages include Marina.
7) For the East Side Subarea, urban acreages include the portions of urban area in DWR Detailed Analysis Unit (DAU) that are in the SVIGSM East Side Subarea.
8) Crop acreages reflect current subarea boundaries.
9) Non-irrigated Ag. includes non-irrigated grain and dry farm acreages.

Figure A-1a



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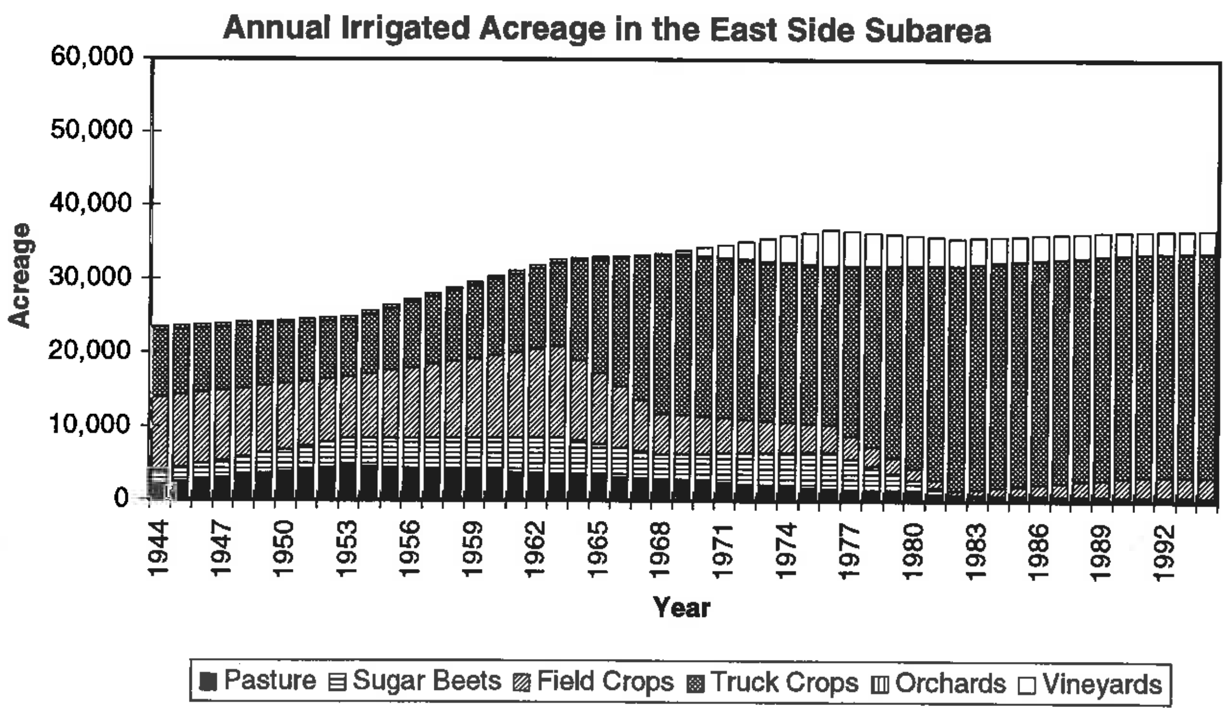

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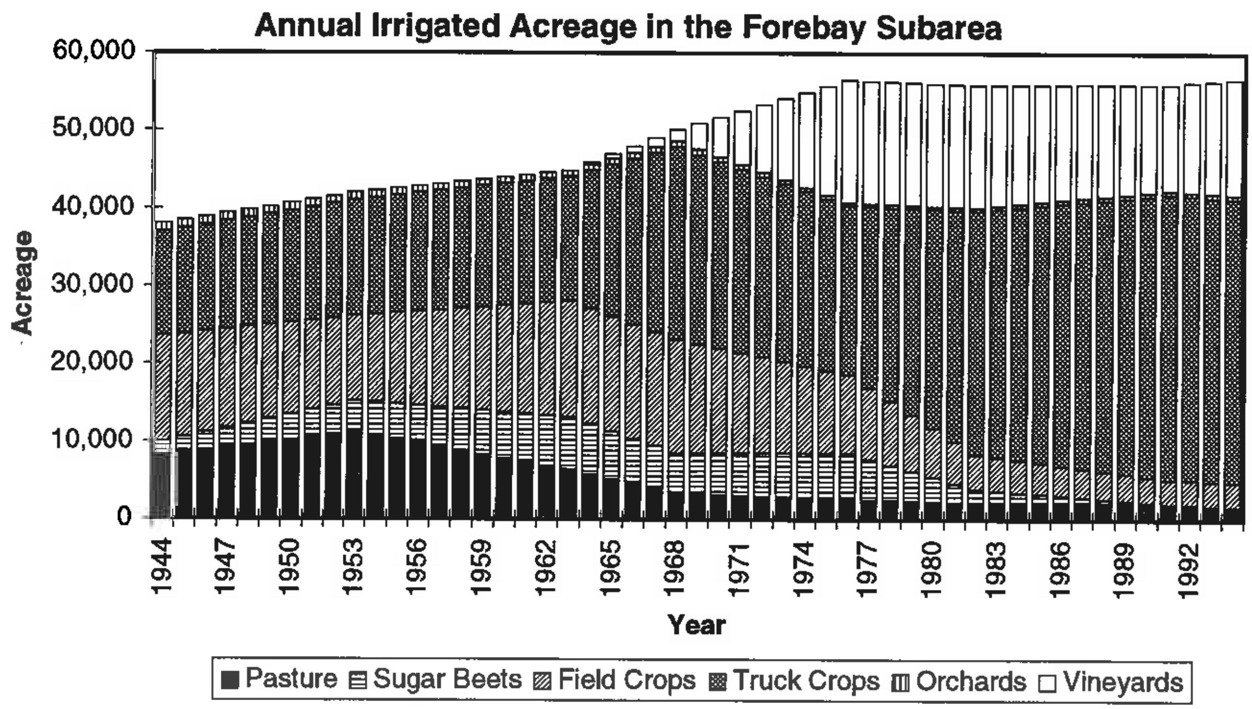


Figure A-1d

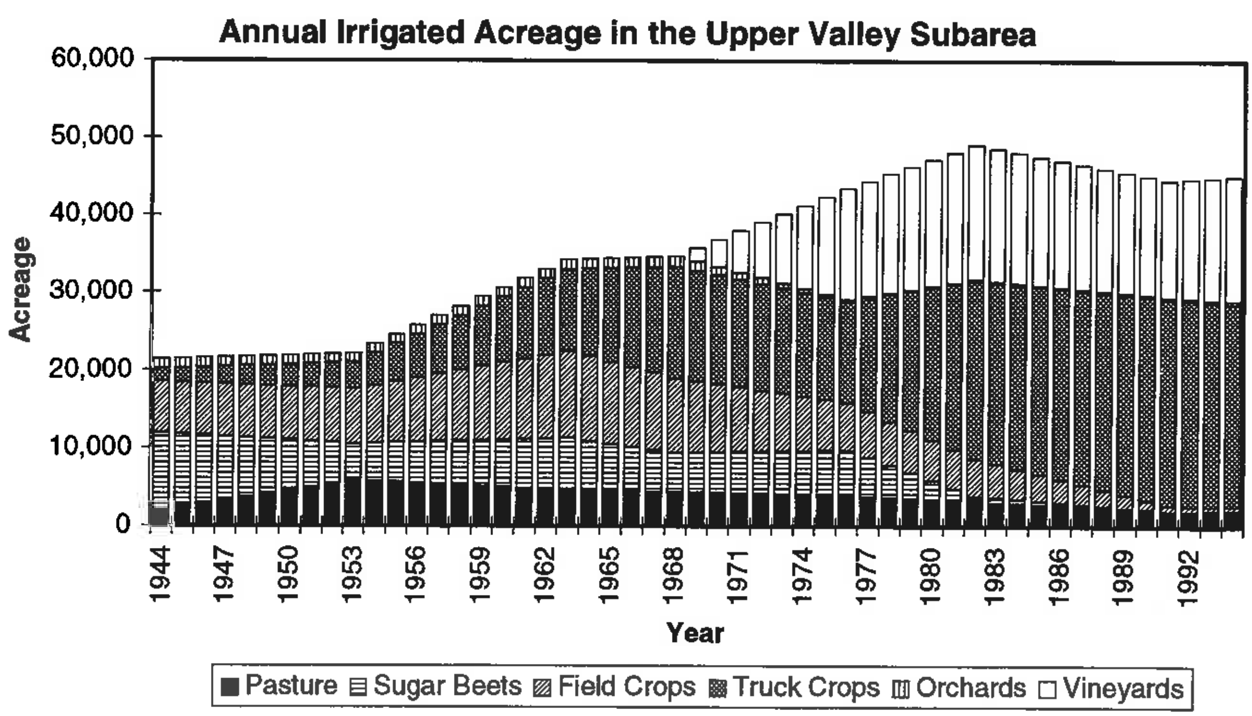


Figure A-1e

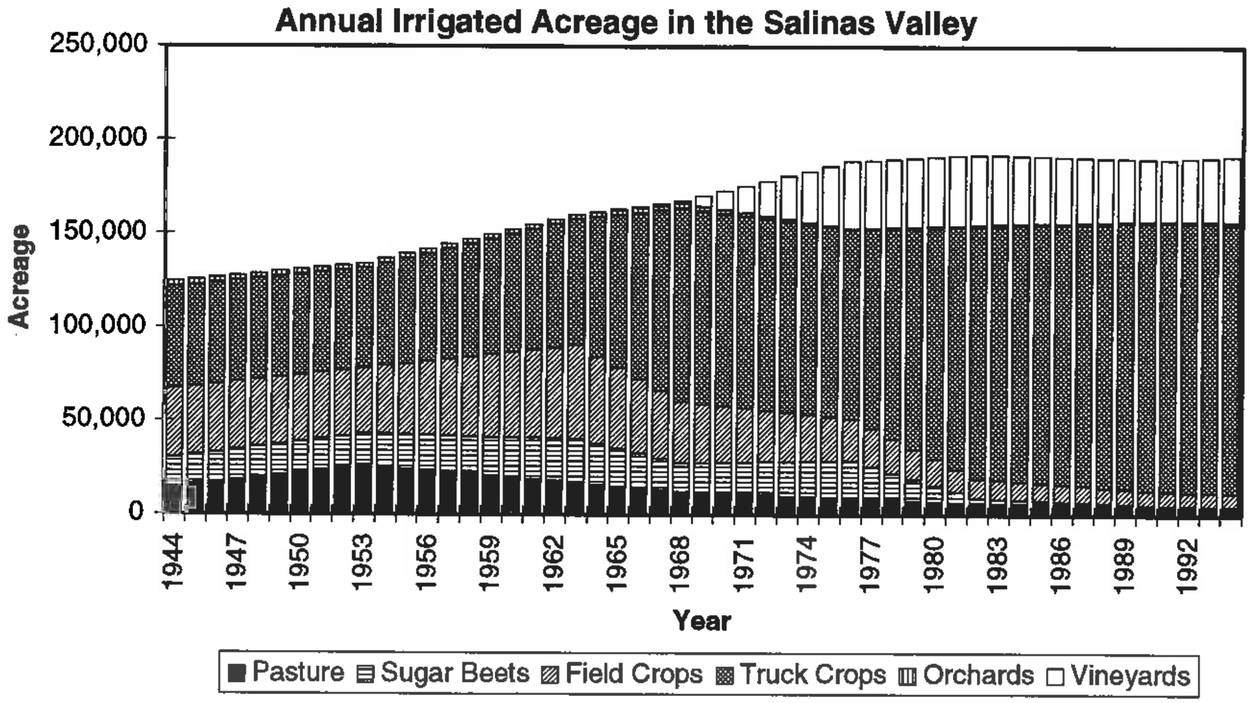

Annual Irrigated Acreage in the Salinas Valley
250,000
200,000
150,000
100,000
50,000
0
Acreage
1944
1947
1950
1953
1956
1959
1962
1965
1968
1971
1974
1977
1980
1983
1986
1989
1992
Year
Pasture
Sugar Beets
Field Crops
Truck Crops
Orchards
Vineyards

Table A-2
Crop Categories for Historical Land Use

Truck Crops	Field Crops	Non-Irrigated Ag
Artichokes	Beans	Dry Farm Lands
Asparagus	Corn	Non-Irrigated Grain
Broccoli	Safflower	Non-Irrigated Pasture
Brussels Sprouts	Sunflower	
Cabbage		
Cauliflower		
Carrots		
Celery		
Guayule		
Lettuce		
Onions & Garlic		
Potatoes		
Peppers		
Spinach		
Strawberries		
Tomatoes		

Table A-3
Range in Truck Crop Intensities
(Crops/Year)

Cropping Intensities*		
1950s	1960s	1970-1990
1.3 - 1.5	1.7 - 1.9	1.9 - 2.1

*Ranges of values show variations between subareas

the valley-wide average cropping intensity to account for regional variations. Table A-3 shows the range in cropping intensities for the simulation period. These cropping intensities are used to account for multiple cropping of truck crops during the growing season. To adjust for the shorter growing season that would have accompanied the lower cropping intensities in the 1950s and 1960s, the irrigation season for truck crops was shortened from February-September to March-August for those earlier decades.

Along with land use acreages by subarea, the SVIGSM also requires a spatial distribution of the four land use types, agricultural, urban, native vegetation, and riparian vegetation. Spatial land use distributions for the 1970-1994 calibration period were based on GIS coverages developed for 1991 and 1995, and a land use map with model grid overlay for 1976. In addition, the GIS-based land use coverage developed for 1953 was utilized in the model. Land use distributions for all other years are linearly interpolated using the survey years.

Agricultural Water Use

Agricultural water pumping requirement is estimated using the consumptive use methodology. Based on this methodology, crop evapotranspiration, basin irrigation efficiency, irrigated acreage, minimum soil moisture, and other soil parameters are used to estimate the agricultural water use requirement.

Evapotranspiration

All crop potential evapotranspiration (ET) rates from the 1970s were extended back into the 1950s and 1960s, with the exception of truck crops. As mentioned above, to account for the shorter growing season which would accompany a lower cropping intensity in the 1950s and 1960s, the truck crop growing season was shortened from February-September to March-August. Table A-4 shows the crop ET rates for the simulation period by subarea.

Table A-4
Crop Evapotranspiration Rates
(inches/year)

	Pressure		East Side		Forebay		Upper Valley	
Crop	1949 - 1969	1970 - 1994	1949 - 1969	1970 - 1994	1949 - 1969	1970 - 1994	1949 - 1969	1970 - 1994
Pasture	35.10	35.10	35.70	35.70	46.24	46.24	47.46	47.46
Sugar Beets	27.37	27.37	27.85	27.85	36.07	36.07	37.02	37.02
Field Crops	28.08	28.08	28.56	28.56	36.99	36.99	37.97	37.97
Truck Crops	18.15	23.48	18.47	23.86	23.97	30.78	24.41	31.53
Orchard	27.37	27.37	27.85	27.85	36.07	36.07	37.02	37.02
Vineyard	16.60	16.60	16.91	16.91	22.11	22.11	22.77	22.77

Growing practices associated with grape production (i.e., deficit irrigation practices) in the 1970s are extended back, without modifications, to the late 1960s, the beginning of grape production in the Salinas Valley. This results in similar consumptive water use per acre of vineyard as in the 1970s.

Irrigation Efficiency

The other main component in computing agricultural water pumping requirement is the irrigation efficiency (IE). IE may be defined at two levels, the field level (field IE) and the basin-wide level (basin IE). The crop IE represents the efficiency at the field level as defined by the equation:

$$Crop\ IE = \frac{Consumptive\ Use\ of\ Applied\ Water\ (CUAW) + Leaching\ Requirement}{Applied\ Water}$$

Crop IE accounts for losses only in the field. If irrigation practices are similar throughout the valley, the crop IEs may be the same or similar for all subareas.

The basin IE represents the efficiency at the basin level as defined by the equation:

$$Basin\ I.E. = \frac{CUAW + Leaching\ Requirement + Frost\ Protection + Pre\text{-}\ and\ Post\text{-}Harvest\ Irrigation}{Total\ Quantity\ of\ Water\ Pumped}$$

Therefore, the basin IE accounts for losses in the field as well as losses between the well and the field. Because the SVIGSM uses the IE to calculate the total quantity of water pumped (which includes conveyance losses), the basin IE is used. For subareas such as the Upper Valley, where water is transported a greater distance between the well and the field, greater conveyance losses result, and the basin efficiency is lower. Lower irrigation efficiencies for the Upper Valley Subarea are based on data gathered through the MCWRA Ground Water Extraction Management System (GEMS) program.

The basin IEs used in the model are shown in Table A-5. Adjustments are made for vineyard IEs in the 1960s to reflect the trend towards more efficient irrigation methods, although only minor vineyard acreages are in production in the late 1960s. For all other crops, the IEs in the 1970s are extended back to the 1950s and 1960s.

As reported in the SVIGSM Update Report, and based on initial information, the IEs for field crops used in the model were slightly higher than for other crops (with the exception of vineyards). Based on recent discussions with HBA workshop participants, field crop irrigation practices were not found to be significantly different from other crops. Therefore, the IEs for field crops were reduced to the same level as those for other crops.

Table A-5
Basin Irrigation Efficiencies

Period	Vineyards	Other Crops
1950s	n/a	55percent (50percent)
1960s	65percent (47percent)	55percent (50percent)
1970s	70percent (52percent)	55percent (50percent)
1980s	75percent (57percent)	60percent (50percent)
1990s	80percent (62percent)	64percent (50percent)

Notes:
1) Values represent basin IEs for all subareas. Those in () are for the Upper Valley, which account for relatively higher conveyance losses, based on MCWRA GEMS data for the 1990s.
2) Basin IE = $\frac{\text{CUAW+Leaching \& Other Irrigation Requirements}}{\text{Total Water Pumped}}$
3) Other crops include: irrigated pasture, sugar beets, field crops, truck crops, orchards, and irrigated grains.
4) Although IEs are listed for vineyards in the 1960s, only very small acreages were in production in the late 1960s. No vineyard acreages existed in the 1950s.

Urban Water Use

Urban water use information is calculated and incorporated in the SVIGSM based on population, per capita water use, and ground water extraction data, independent of the urban acreage in the model. Table A-6a and A-6b show the population and resulting annual water use by city used to simulate the historical urban water use in the SVIGSM.

Historical population data were available for most of the major cities in the Salinas Valley from the U.S. Census Bureau, the Monterey County Planning Department, and the U.S. Department of Defense. Population was interpolated between years with known values. Values for key years without historical data were estimated using methods which include proportioning populations or using growth rates of nearby cities.

Table A-6a
Estimated Population for Major Cities in the Salinas Valley

	Population					
City	1950	1960	1970	1980	1990	1995
Castroville	1,865	2,838	3,235	4,396	5,272	5,710
Chualar	344	451	538	692	700	760
Fort Ord	30,050	31,581	15,770	22,420	9,452	9,452
Gonzales	1,818	2,138	2,575	2,891	4,660	5,947
Greenfield	1,308	1,680	2,608	4,181	7,464	8,914
King City	2,347	2,937	3,717	5,495	7,634	9,440
Marina	2,232	3,310	8,343	13,887	16,984	17,863
Salinas	30,631	45,430	58,896	80,479	108,777	119,145
San Ardo	203	352	445	475	533	570
San Lucas	101	126	160	221	439	558
Soledad	2,441	2,837	9,643	8,860	13,369	15,387
Spreckels	528	497	563	692	1,110	1,330

Sources: U.S. Census Bureau, 1950, 1960, 1970, 1980, and 1990
Monterey County Planning Department
U.S. Department of Defense

Table 1-6b
Estimated Annual Water Use by City

City	Annual Water Use (Acre-Feet) 1950	1960	1970	1980	1990	1995
Castroville	378	598	703	921	650	824
Chualar	70	91	117	145	118	118
Fort Ord	4,679	4,776	2,456	3,491	1,419	2,605
Gonzales	365	426	560	606	940	1,177
Greenfield	330	429	897	1,564	1,672	1,504
King City	723	921	1,278	2,056	3,087	3,982
Marina	453	723	1,813	2,909	2,454	2,030
Salinas	6,211	9,211	12,799	16,859	20,106	20,774
San Ardo	32	57	79	92	111	123
San Lucas	16	20	28	43	91	121
Soledad	481	556	2,711	2,581	2,771	2,579
Spreckles	93	87	105	125	178	200
Unincorp	2,269	2,893	3,271	4,444	5,418	6,014

Sources: U.S. Census Bureau, 1950, 1960, 1970, 1980, and 1990
Monterey County Planning Department
U.S. Department of Defense
Boyle, 1986
Durbin, et. al., 1978
Electric Billing Data for Fort Ord (MCWRA)
DWR October 1965
DWR 1975, 1983
Other urban water use data from MCWRA

Sources for the per capita water use for each city include: The Salinas Valley Ground water Model for Monterey County Flood Control and Water Conservation District (Boyle, July 1986), Two-Dimensional and Three-Dimensional Digital Flow Models for the Salinas Valley Ground Water Basin (U.S. Geological Survey [USGS], November 1978), Electric Power Billing Data for Fort Ord (MCWRA), Municipal and Industrial Water Use - San Francisco Bay District (DWR, October 1965), Urban Water Use in California (DWR October 1975 and October 1983), and MCWRA urban water use data.

As in the case with the population data, values between years with known data were interpolated, and values for key years without known data were estimated primarily using per capita rates of nearby cities. For all cities, the per capita water use from 1949 to 1957 is assumed equal to that of 1958.

Ground Water Pumping

The total ground water pumping in the model is composed of the agricultural as well as urban pumped water. Figures A-2a through A-2e show the combined agricultural and urban ground water pumping in the Salinas Valley by subarea. The average total ground water pumping over the period from 1949 to 1994 is 518,000 acre-feet.

In the SVIGSM, the ground water pumping is distributed geographically to each model element within each subarea based on its percentage of developed area (agricultural and urban) as well as a weighting factor specified in the model input to account for localized pumping concentration.

In addition, ground water pumping is distributed vertically over the multiple aquifer layers. As discussed in the SVIGSM Update Report, field studies were used to estimate the vertical distribution of pumping in the Pressure and East Side Subareas. For the extension of the model simulation period, this field information was combined with historical seawater intrusion monitoring data in the 180- and 400-foot aquifers. It was assumed that the seawater intrusion front was defined by the 500 parts per million (ppm) chloride concentration contour. Based on the movement of the seawater intrusion front over time, the pumping from the 180-foot aquifer was shifted to the 400-foot aquifer and from the 400-foot aquifer to the deep aquifer.

Surface Water Diversions

Along with ground water pumping, it is important to quantify any surface water diversions made to satisfy water demands. Historically, the Clark Colony Water Company has made surface water diversions from the Arroyo Seco for use in the Forebay Subarea. Historical diversion data were available from 1970 to 1994, with gaps in 1977, 1982, and 1985. The SVIGSM was used to estimate surface water diversions from 1949 to 1969 and 1977, 1982, and 1985.

The historical records of Arroyo Seco stream flows were used to estimate surface water diversions based on an estimated monthly agricultural demand pattern. The estimated surface water diversions were combined with the historical data set to form a monthly surface water diversion data set from 1949 to 1994. Figure A-3 shows the annual surface water diversions on the Arroyo Seco used in the SVIGSM for the 1949-1994 period.

Figure A-2a

Annual Ground Water Pumping in the Pressure Subarea (1949-1994 Simulation Period)

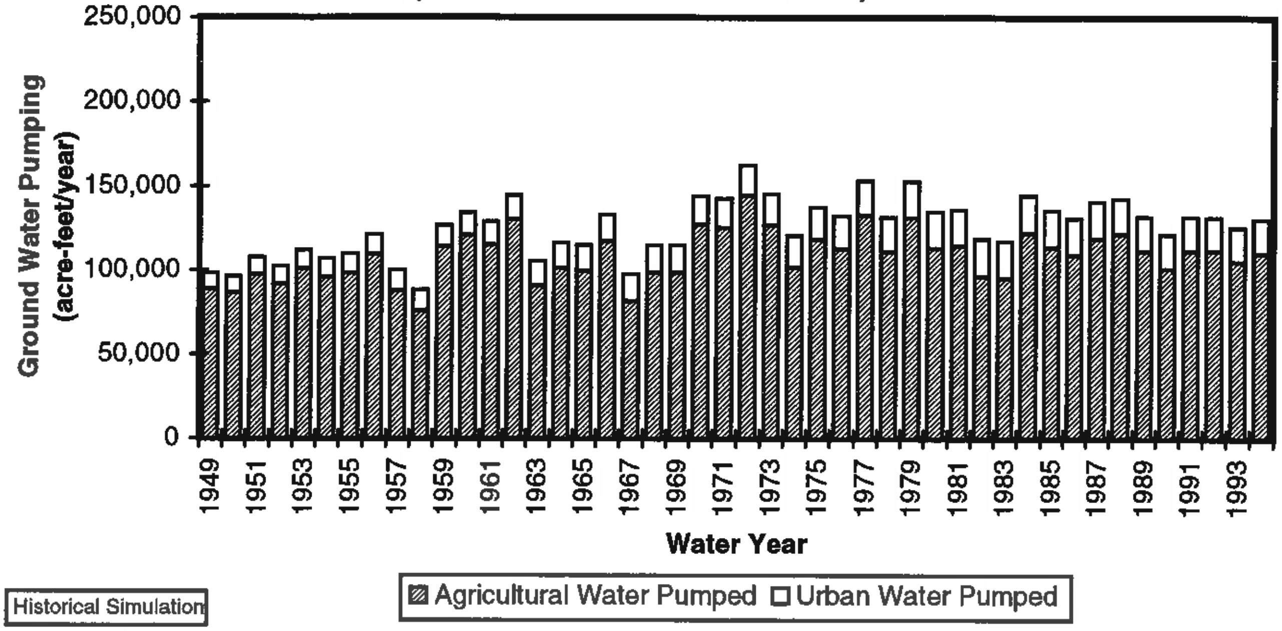


Figure A-2b

Annual Ground Water Pumping in the East Side Subarea (1949-1994 Simulation Period)

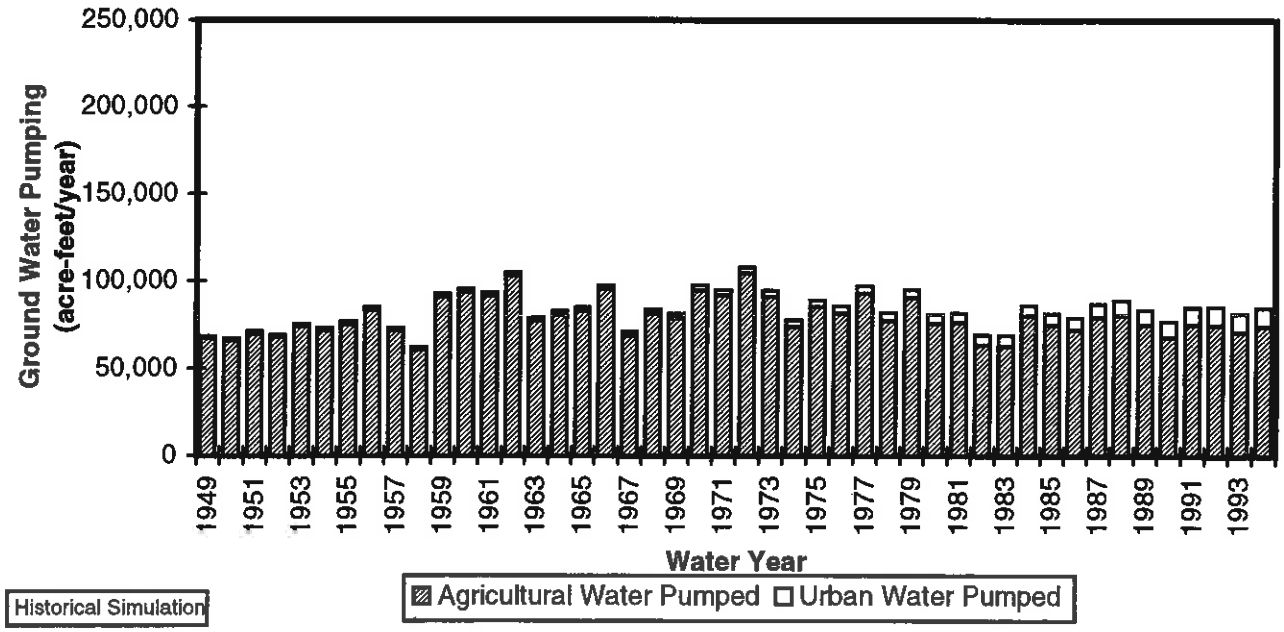


Figure A-2c

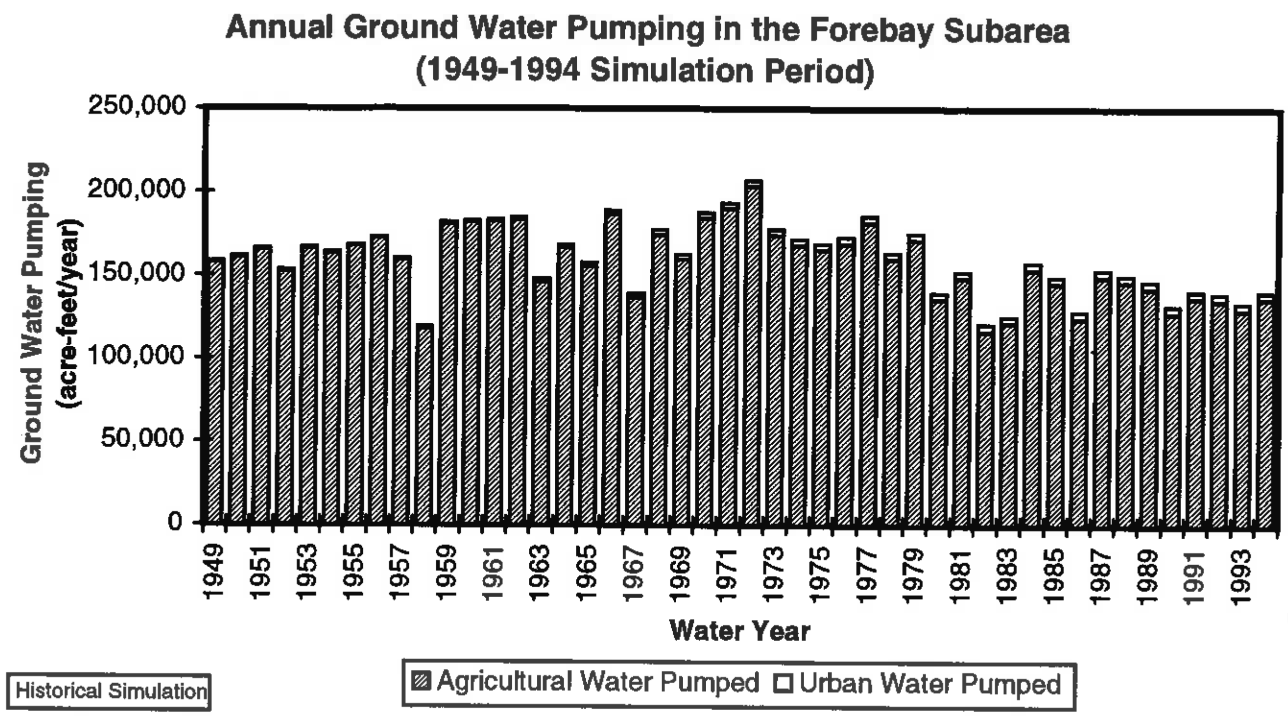


Figure A-2d

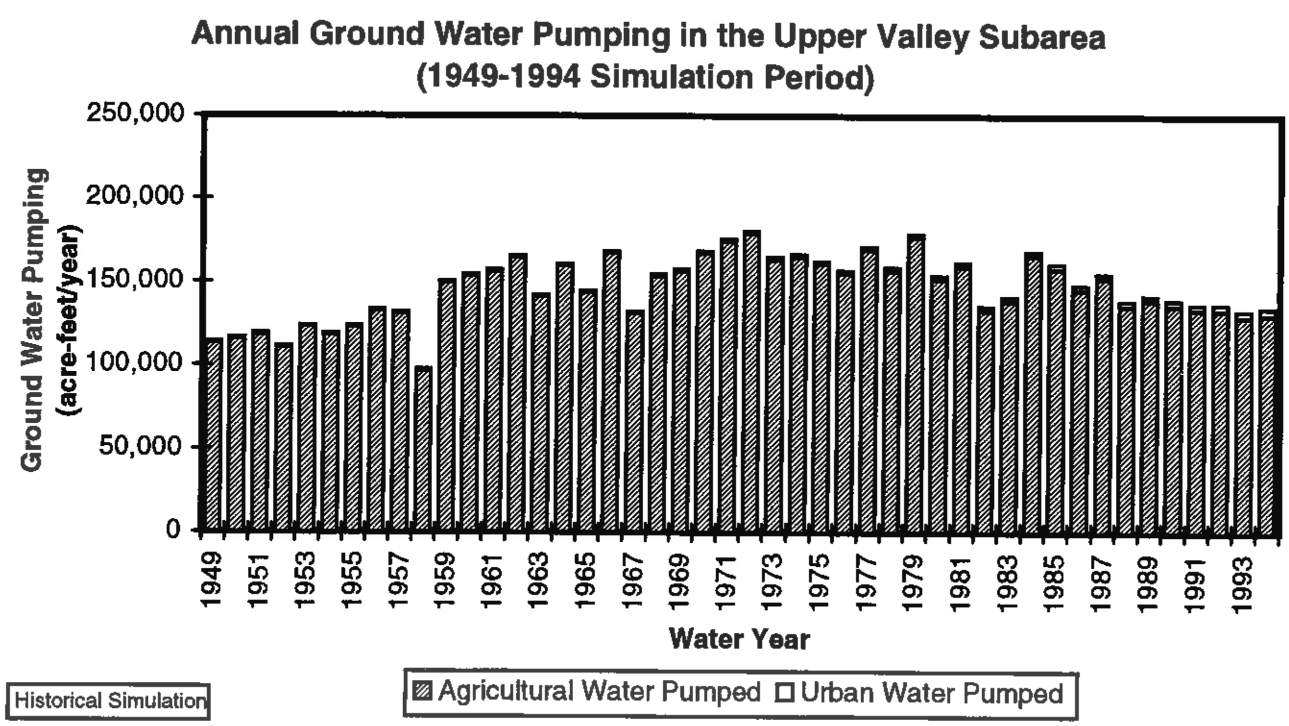
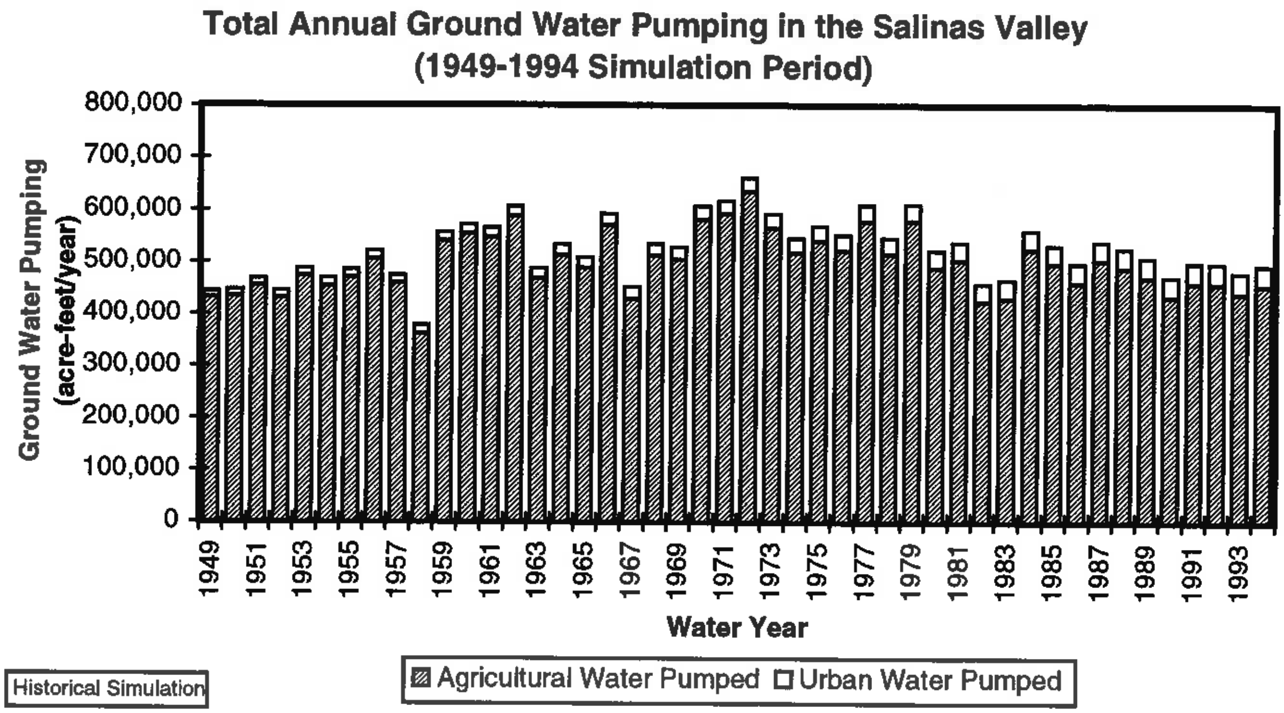


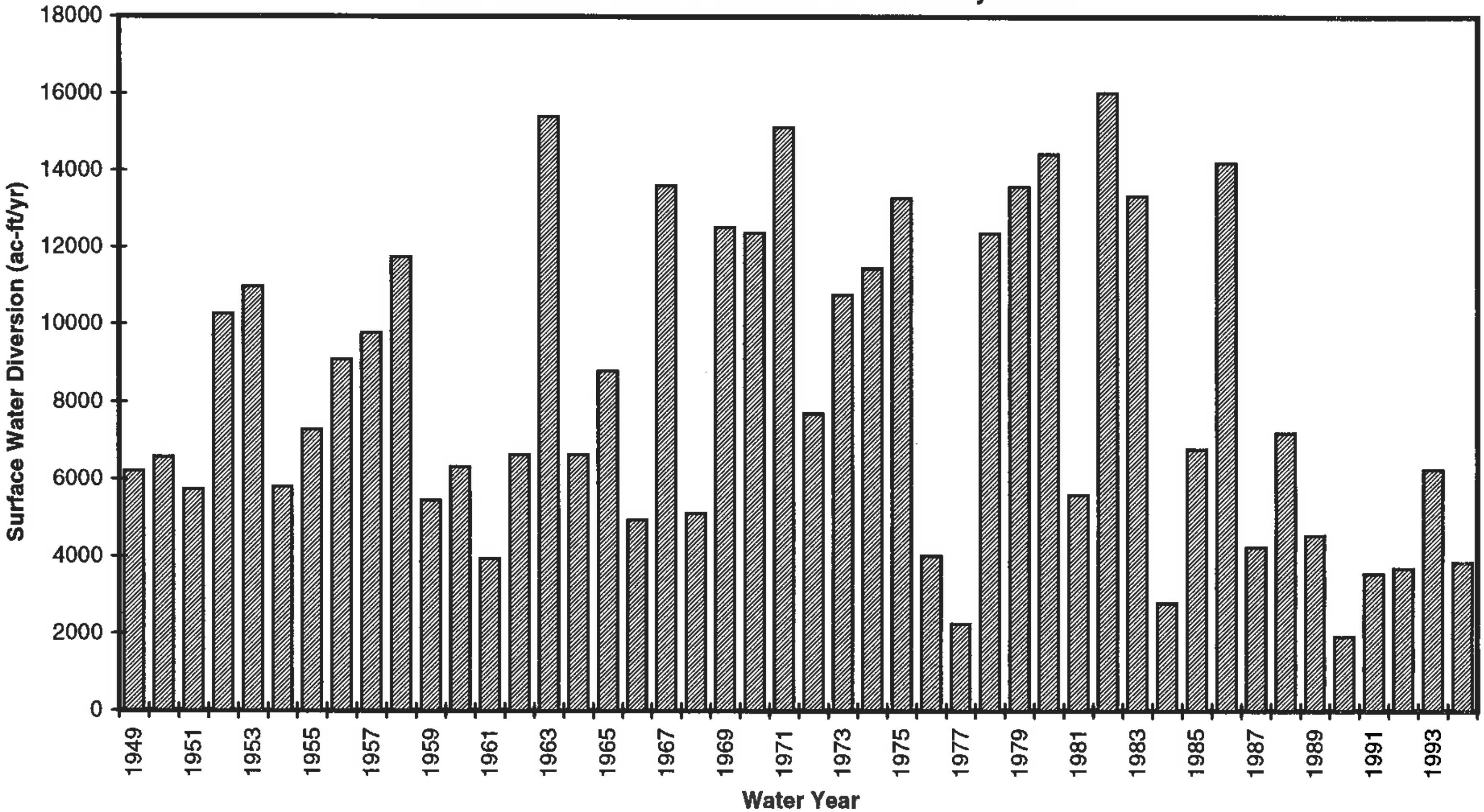
Figure A-2e



Total Annual Ground Water Pumping in the Salinas Valley
(1949-1994 Simulation Period)
Ground Water Pumping (acre-feet/year)
800,000
700,000
600,000
500,000
400,000
300,000
200,000
100,000
0
1949
1951
1953
1955
1957
1959
1961
1963
1965
1967
1969
1971
1973
1975
1977
1979
1981
1983
1985
1987
1989
1991
1993
Water Year
Historical Simulation
Agricultural Water Pumped
Urban Water Pumped

Figure A-3

Annual Surface Water Diversions on the Arroyo Seco



Aquifer Parameters in Arroyo Seco Area

At the time of the preparation of the Model Update Report in May 1997, there was a scarcity of aquifer parameter data for the Arroyo Seco Cone area in the Forebay Subarea. Due to the limited data, only a coarse estimation of the distribution of hydraulic conductivities was possible in the area. Subsequently, additional specific capacity data for 8 wells in the Arroyo Seco Cone area was provided by Hydrologic Consultants, Inc. This data was matched with well construction information from the MCWRA database. In addition, new specific capacity data was received by MCWRA as a part of the annual extraction reports from water users. Together, the data was used to determine the point locations of hydraulic conductivity in the area. Model aquifer layers were assigned to each well. Aquifer parameters for model layer 1 were used to develop regional hydraulic conductivity estimates. Aquifer parameters for model layer 2 were in the reasonable range, and not adjusted. Table A-7 presents the data for these wells.

To map the point locations of aquifer hydraulic conductivities to the Arroyo Seco Cone area, geologic maps reported in the Staal Gardner and Dunne (April 1994) were used to estimate the distribution of the alluvial deposits in the Arroyo Seco Cone area (Figure A-4).

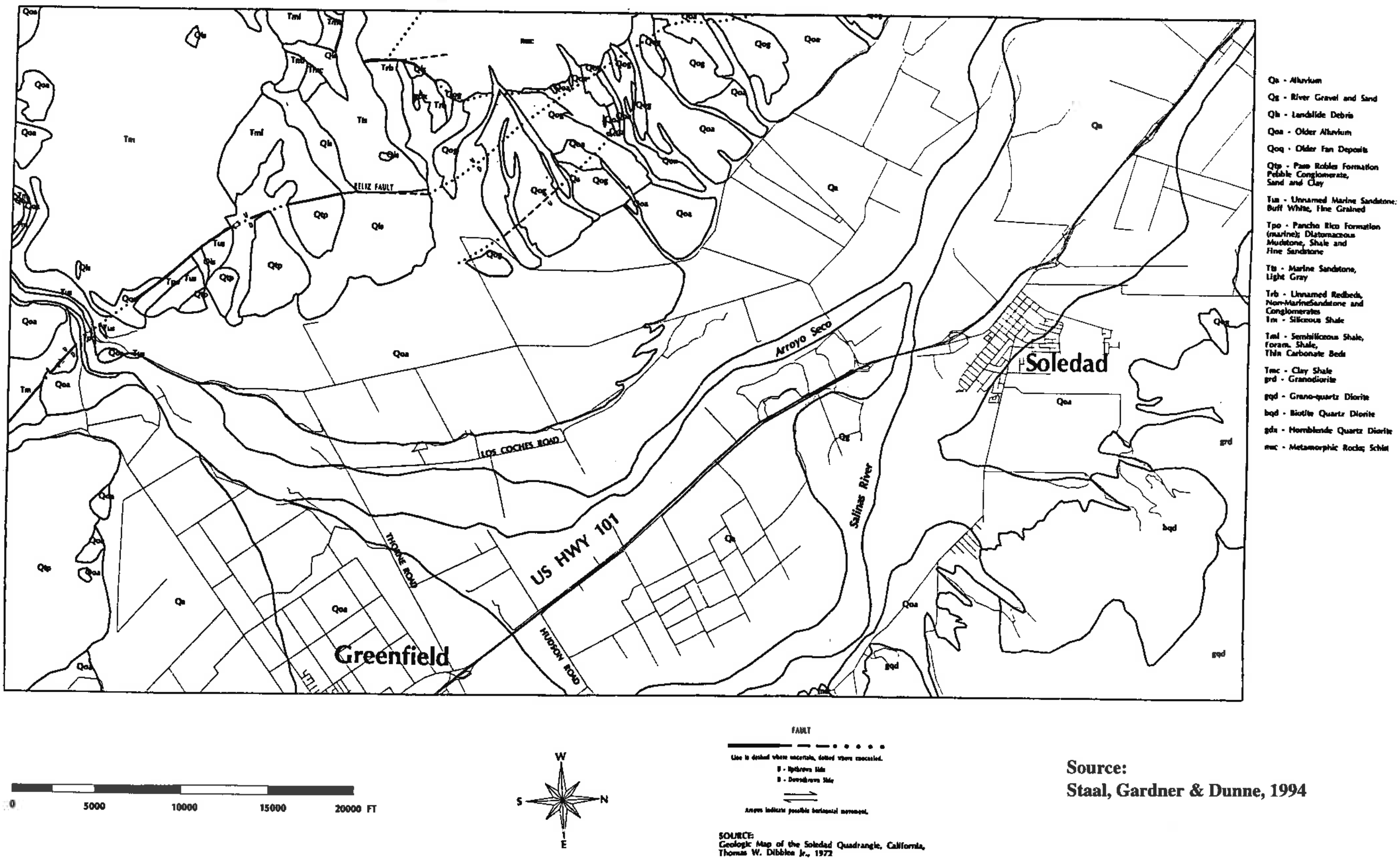
Figure A-5 shows the resulting hydraulic conductivities for model layer 1. Overall, in the Arroyo Seco Cone area, the hydraulic conductivities are lower than those presented in the Model Update Report.

MODEL VERIFICATION

As part of the SVIGSM update the model was calibrated for the period 1970 to 1994. The procedures and results of the calibration are described in the SVIGSM Update Report. After the model data sets were extended back to 1949 as part of the HBA effort, the model was verified to ensure that it was performing as expected over the extended simulation period. As part of the data collection effort to refine the model simulation in the Arroyo Seco area, additional calibration wells were added in this area. The performance of the model at these additional calibration points are discussed below under Ground Water Levels. With the additional information provided by the extended data sets, and the more extensive historical comparison provided by the extended simulation period, minor refinements were made to several model parameters to improve the historical simulation.

Figure A-4

Distribution of Alluvial Deposits in the Arroyo Seco Cone Area



Source:
Staal, Gardner & Dunne, 1994

Figure A-5

Revised Hydraulic Conductivities for Model Layer 1 (Ft/Day)

Table A-7
Specific Capacity Data for Wells used in Arroyo Seco Cone Area Aquifer Parameter Estimation

State Well ID	Approx. Length of Well Screen (Ft)	Specific Capacity (GPM/Ft DD)	T (GPD/Ft)	K (Ft/Day)
18S/06E-15M01	145	64	9,600	66
18S/06E-16L01	220	71	10,650	48
18S/06E-21Q01	270	65	9,675	36
18S/06E-22B01	176	97	14,570	82
18S/06E-28A50	401	50	7,515	19
18S/06E-34R01	237	67	10,100	43
18S/06E-35K51	272	135	20,250	75
19S/06E-01H01	82	85	12,750	156
19S/06E-02A01	214	246	36,900	172
19S/06E-03K01	165	83	12,450	75
19S/06E-11E01	197	61	9,150	46

Several soil parameters were adjusted to provide better consistency and to improve the overall water balance of the valley. The field capacities were adjusted so that they would be uniform across all subareas for each soil type. Similarly, the soil permeabilities were adjusted and made uniform across all subareas for each soil type. Because the hydrology of the original calibration period, (1970 to 1994) was fairly wet, stream recharge made up a larger proportion of the total ground water recharge. However, in the drier 1949-1969 period, when stream recharge provided a relatively smaller fraction of the total recharge, it became apparent that the recharge from applied water and runoff was underestimated. Therefore, the soil permeabilities were increased slightly, resulting in increased recharge from applied water and runoff and improving the overall water balance for the entire simulation period. Additional review of model parameters revealed the need to refine streambed parameters in the Forebay Subarea near the Arroyo Seco to improve consistency in this area.

Water Balance

The reasonableness of the water balance of the valley is an important component in verifying the model's performance for the extended simulation period. As mentioned in the SVIGSM Update Report, the main components of the water balance are the land and water use, ground water, stream, and soil systems. Detailed budget sheets for these systems for the 1949-1994 period are provided in Attachment 1 to this appendix.

Figures A-6 and A-7 show the average annual ground water balance components for the 1949-1994 period. Figure A-6 shows the balance for the entire Salinas Valley, and Figure A-7 shows the balance for each subarea. The components shown in the ground water balance are the boundary flows, deep percolation, stream recharge, ground water pumping, subsurface flows, and seawater intrusion. The water balance diagrams also show the average change in fresh ground water storage.

Ground Water Levels

For the purposes of the original model calibration as presented in the SVIGSM Update Report, historical ground water levels for 64 calibration wells were compared to simulated values. To verify the model under the extended simulation period, ground water levels for these 64 wells were extended back to 1949 by MCWRA and compared to simulated values for the 1949-1994 period. As part of the data collection effort in refining the model simulation in the Arroyo Seco area, 9 additional calibration wells were added to the data set. Although only annual ground water levels were available at these wells (primarily November and December measurements), comparison of this data with simulated values provides information on how well the model simulates the general trends in ground water levels. The additional calibration wells are numbered 65 through 73.

An examination of the measured ground water levels at calibration well #53 showed measurements that appear somewhat inconsistent with neighboring wells. These suspect ground water levels may be the result of measuring procedures/conditions or highly irregular local effects. For this reason, calibration well #53 has been excluded from the set of calibration wells used for the SVIGSM.

Locations of the remaining 63 calibration wells as well as the 9 additional wells are shown in Attachment 2 to this appendix along with the individual hydrographs of simulated and observed ground water levels for each calibration well.
To show the relative fit of the simulated to observed ground water levels at the calibration wells, Figures A-8a through A-8d show the residual ground water levels over time for the wells within each subarea. The residual ground water levels are the difference in feet between the simulated and observed ground water levels. The closer the residuals are to zero, and the more centered their distribution around zero, the better the model replicates the observed ground water levels. In general, the plots show a high density of points around the x-axis, and the distribution is closely centered around zero.

Figure A-6

Average Annual Ground Water Balance for the Salinas Valley
Water Years 1958-1994
Historical Simulation
(Values Rounded to Nearest Thousands of Acre-Feet)

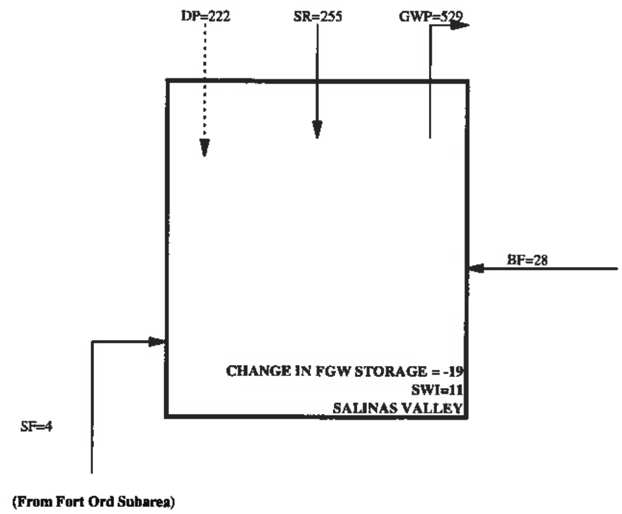
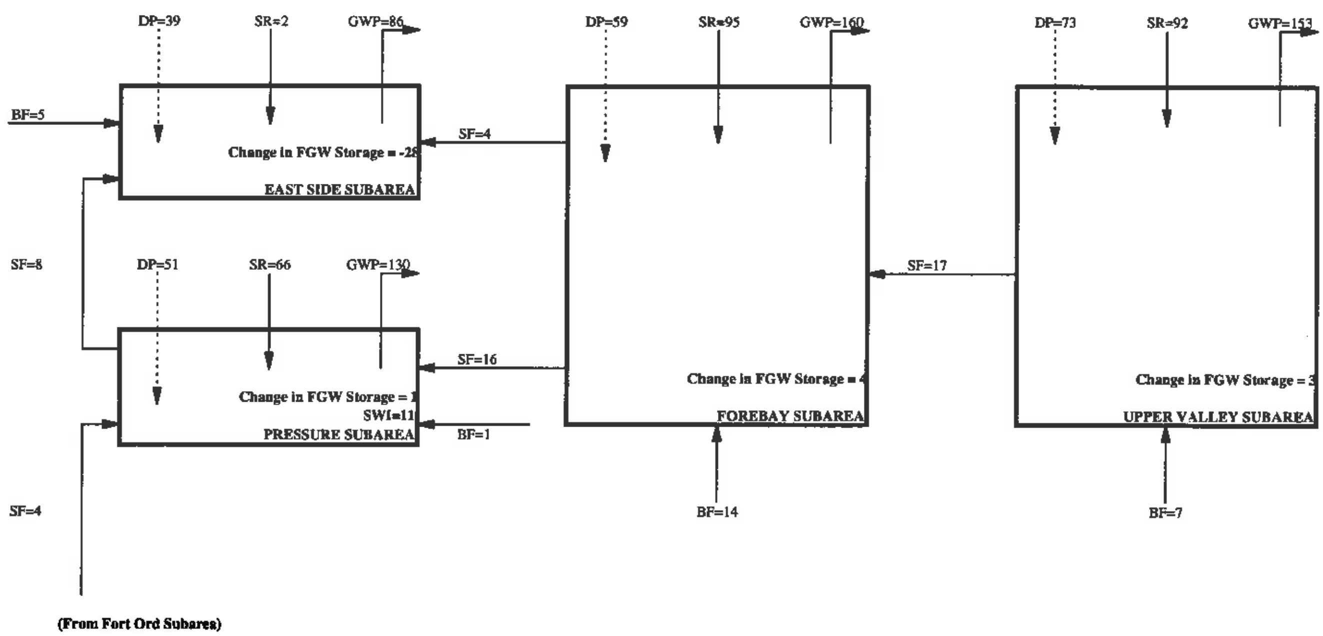


Figure A-7

Average Annual Ground Water Balance by Subarea
Water Years 1958-1994
Historical Simulation
(Values Rounded to Nearest Thousands of Acre-Feet)



Legend:

FGW	Fresh Ground Water
BF	Boundary Flow
DP	Deep Percolation from Rain and Applied Water
SR	Stream Recharge
GWP	Ground Water Pumping
SF	Subsurface Flow
SWI	Seawater Intrusion

Figure A-8a

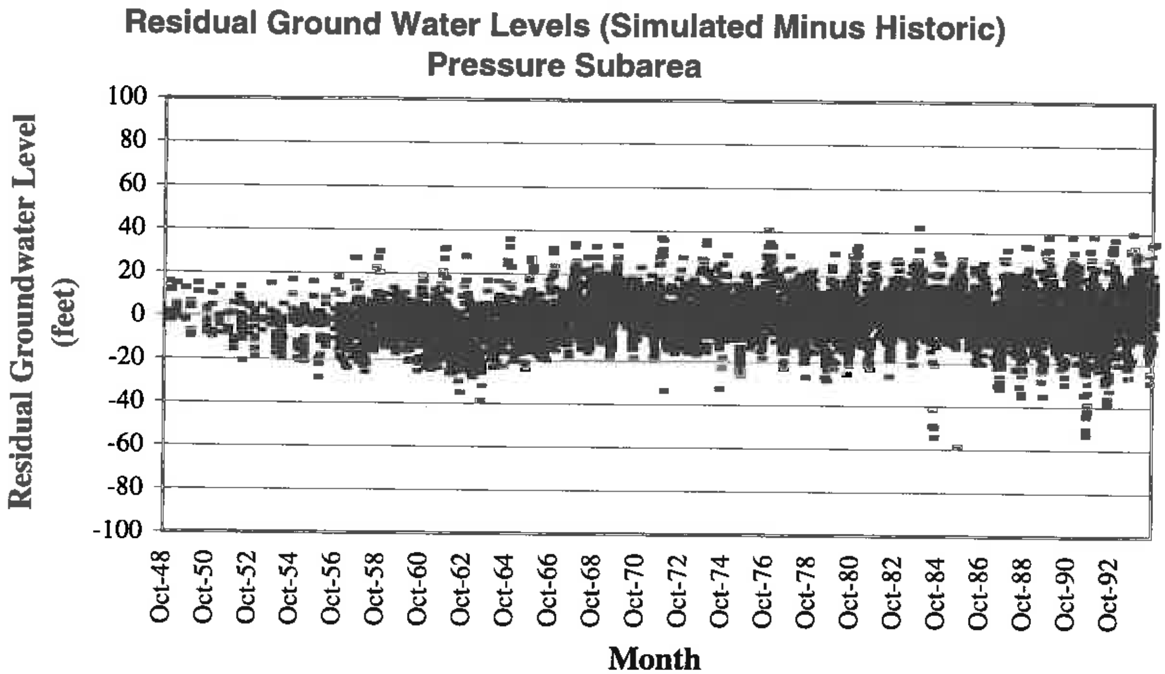


Figure A-8b

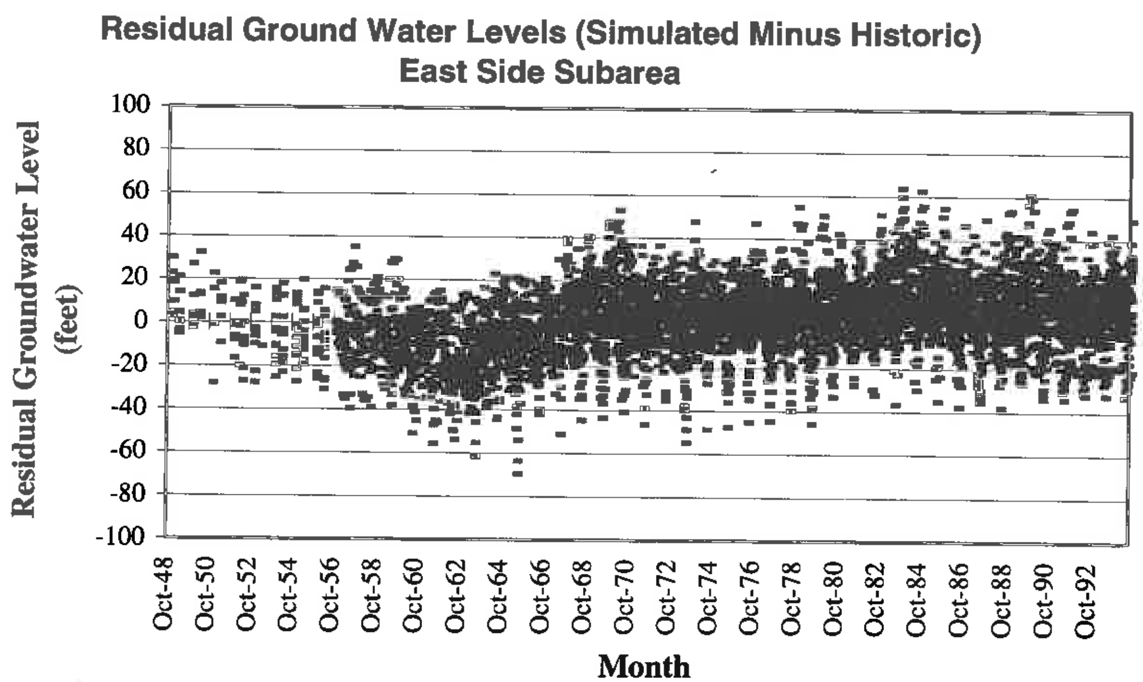


Figure A-8c

Residual Ground Water Levels (Simulated Minus Historic)
Forebay Subarea

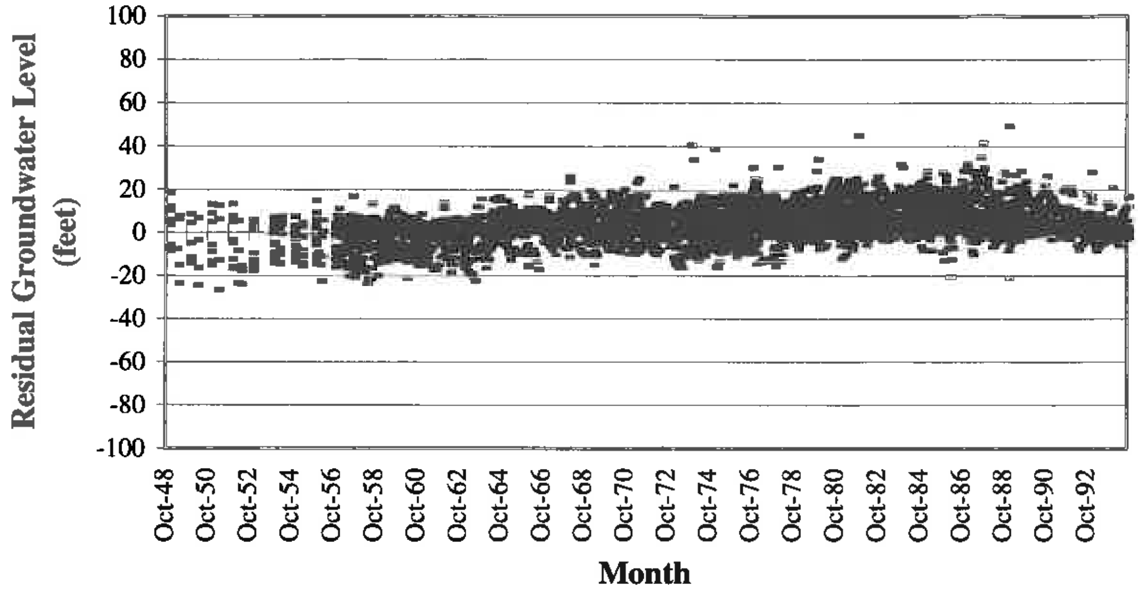
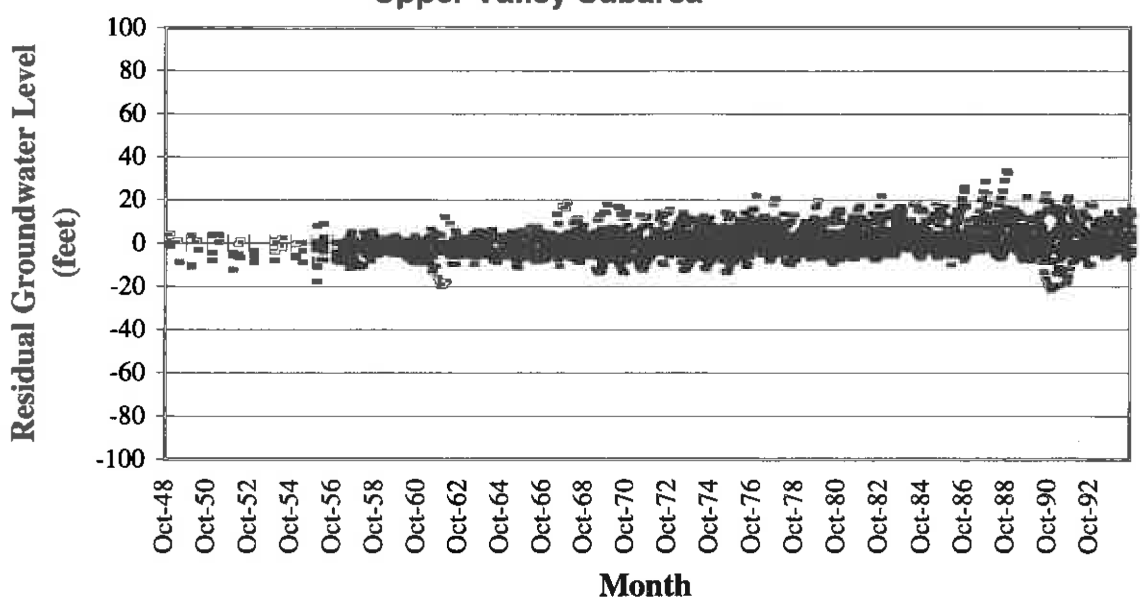


Figure A-8d

Residual Ground Water Levels (Simulated Minus Historic)
Upper Valley Subarea



Figures A-9a through A-9d show a statistical breakdown of the residual ground water levels by subarea and by aquifer layer. The distributions of residual ground water levels show the percentage of residuals within the specified ranges. Again, a higher percentage of residuals near zero, and a more centered the distribution around zero, indicates a better simulation of historical conditions. Based on these statistical breakdowns, model performance in each subarea can be summarized as follows.

Pressure Subarea. The majority of the simulated ground water levels lie within ±10 feet of observed values. Approximately 56 percent of the residuals lie within ±5 feet, and 78 percent of the residuals lie within ±10 feet. In general, the distributions for the 180-foot Aquifer, the 400-foot Aquifer, and the total Pressure Subarea appear bell-shaped and centered around the zero point. The distribution for the Deep Aquifer shows somewhat more spread. This distribution may be skewed by the limited number of wells and the limited number of data points for each well in the Deep Aquifer. Pumping and data collection from the Deep Aquifer began in the mid 1980s.

East Side Subarea. Distributions of the residuals in the East Side Subarea show that 33 percent of the simulated ground water levels lie within ±5 feet of observed levels, and 54 percent lie within ±10 feet. For similar reasons described in the SVIGSM Update Report, these distributions show more spread than in other subareas. In general, the model was calibrated to reasonable agreement with regional trends in ground water levels and as many of the calibration wells as possible. The distributions tend to be centered around the zero point, with the exception of the East Side Shallow Aquifer, which may be skewed by the relatively small number of calibration wells.

Forebay Subarea. The distribution of residuals, as well as the calibration hydrographs, show good calibration between simulated and observed ground water levels. Overall, 60 percent of the residuals are in the ±5 feet range, and 84 percent are in the ±10 feet range. The distributions appear to be normal-shaped and are centered slightly (less than 5 feet) higher than the zero point.

Upper Valley Subarea. Simulated ground water levels tend to match observed values fairly well in the Upper Valley. As the residual distribution shows, the majority of the residuals are in the ±5 feet range. Specifically, 80 percent of the residuals are within the ±5 feet range, and 91 percent are within the ±10 feet range. The distribution is normal-shaped and is centered around the zero point.

Salinas River Flows

A Salinas River gain index is used as an indicator of how well the model simulates the stream-aquifer interaction along the Salinas River. The gain index

Figure A-9a

Distribution of Residual Ground Water Levels

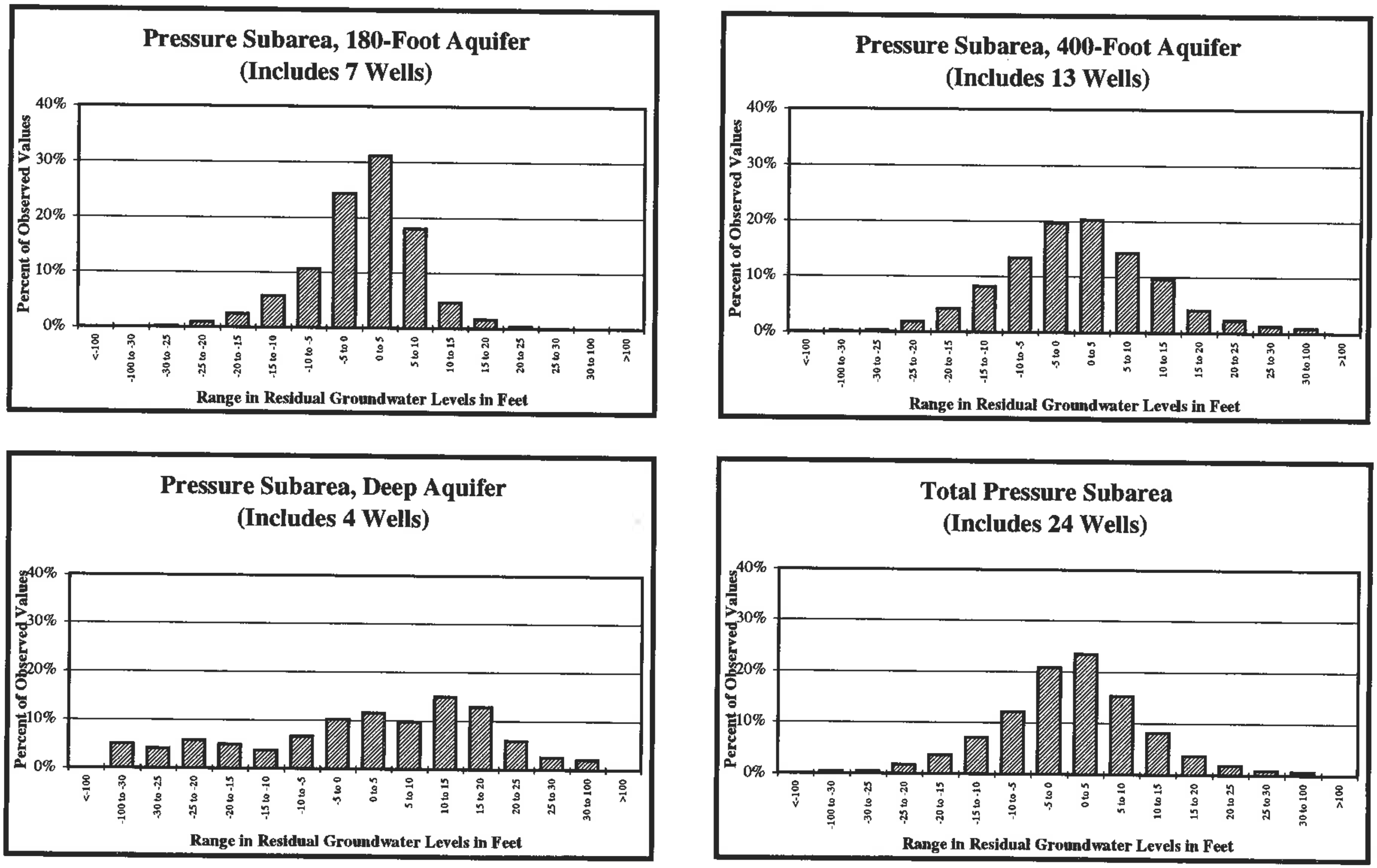
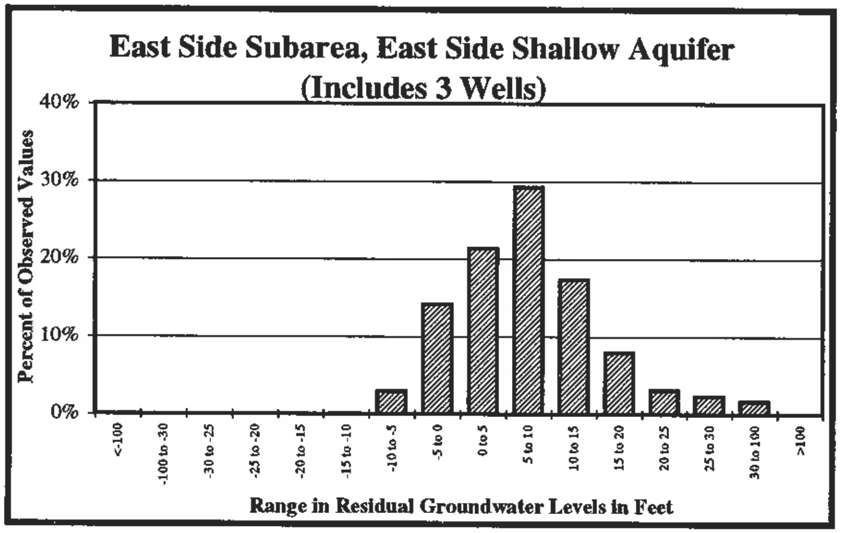
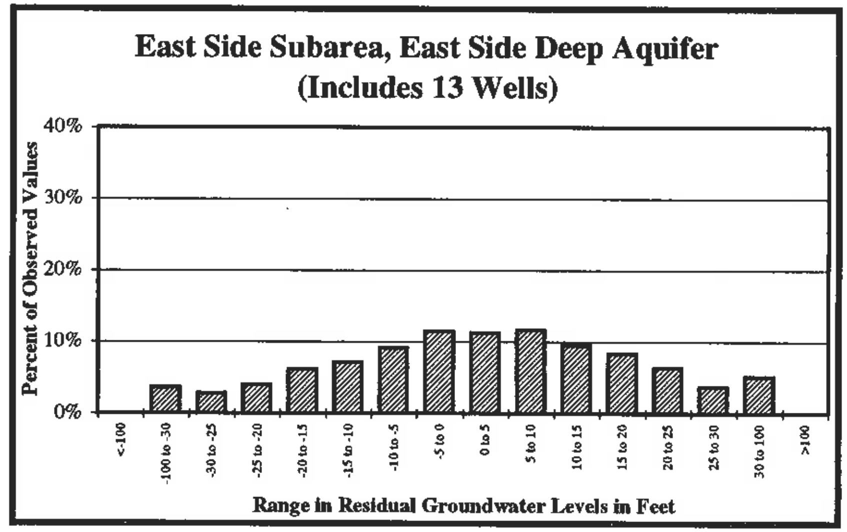


Figure A-9b

Distribution of Residual Ground Water Levels





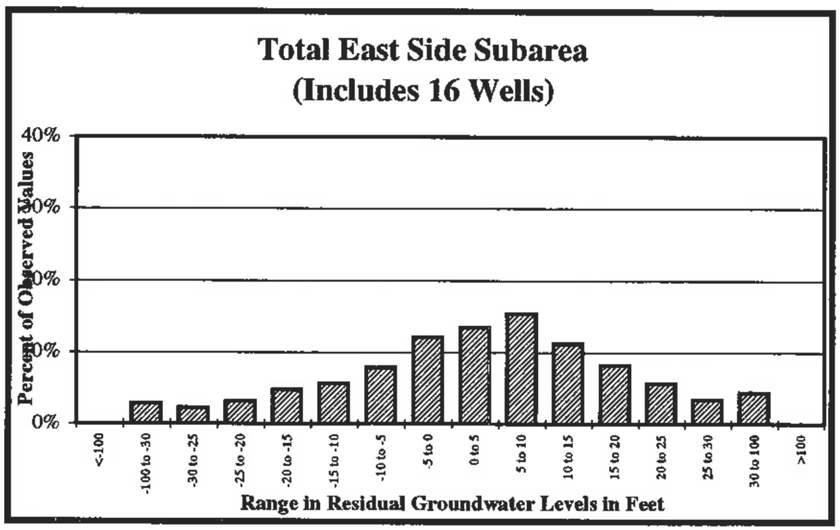
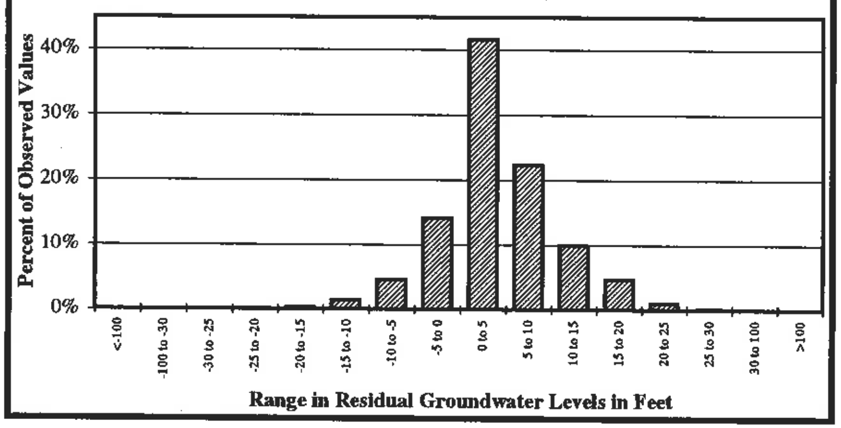


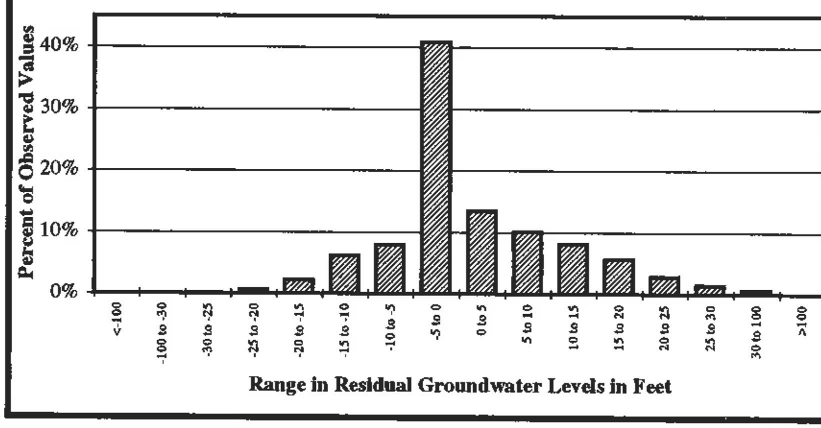
Figure A-9c

Distribution of Residual Ground Water Levels

Forebay Subarea, Forebay Shallow Aquifer
(Includes 14 Wells)



Forebay Subarea, Forebay Deep Aquifer
(Includes 8 Wells)



Total Forebay Subarea
(Includes 14 Wells)

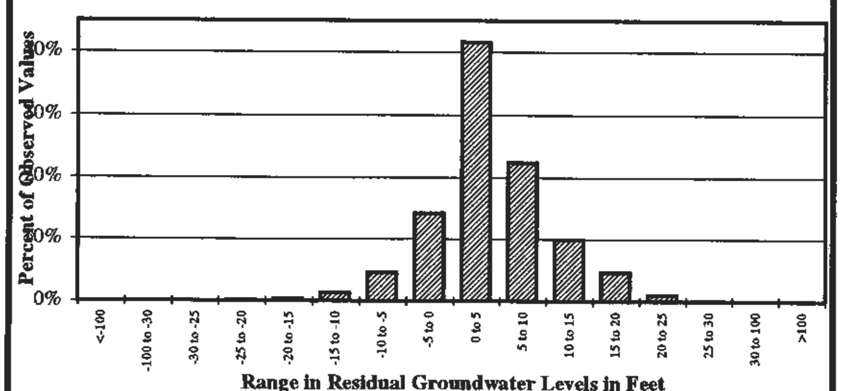
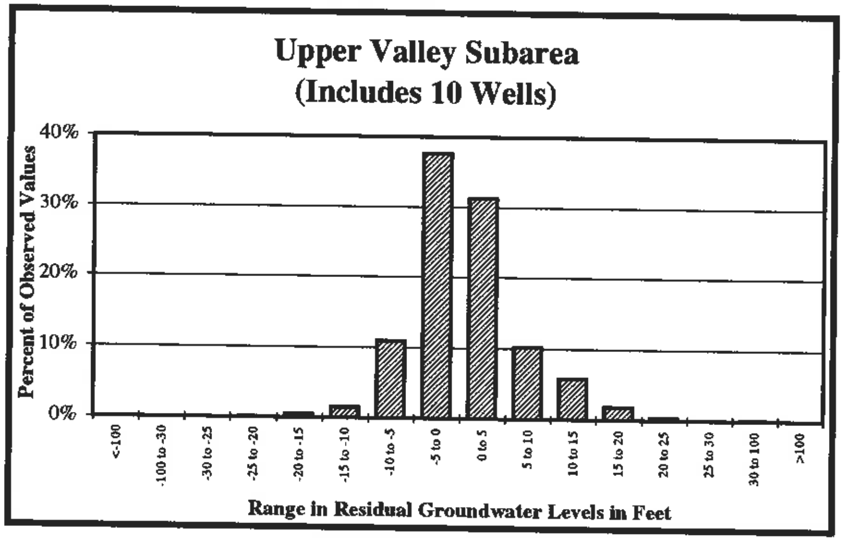
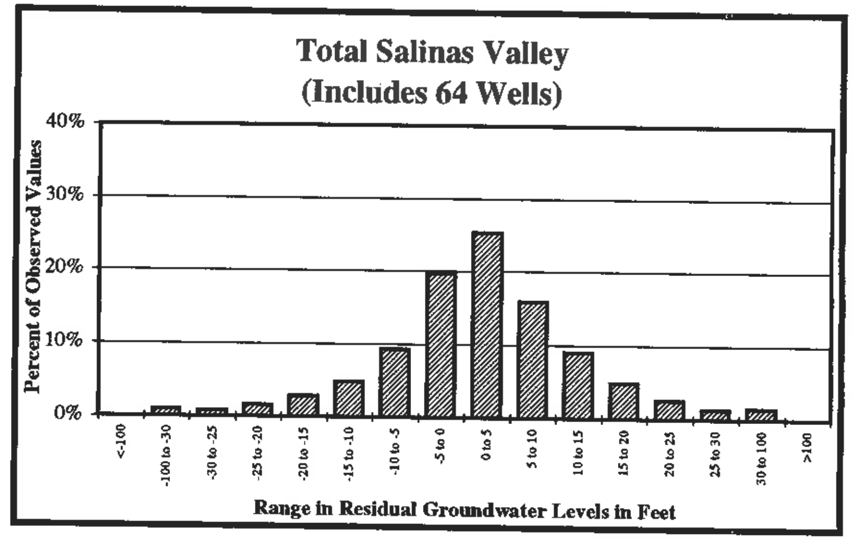


Figure A-9d

Distribution of Residual Ground Water Levels





is calculated as the difference in stream flow between the upstream and downstream point of a reach of the river, and is an indicator of the recharge along that reach. The gain indices are plotted on a scattergram, with the measured values on the x-axis and the simulated values on the y-axis. A 45° line indicates points where measured values equal simulated values; the closer the points are to this line, the better the simulation.

Figures A-10 and A-11 show the scattergrams for the reaches from Bradley to Soledad and from Soledad to Spreckels. Scattergrams are shown for months in which flows at Bradley are less than 1000 cfs. This captures over 90 percent of the flow data points and focuses on the critical lower flow conditions. Because stream gage records at Soledad begin just before 1970, these scattergrams compare the indices only from 1970 to 1994. To show the performance of the simulation of stream-aquifer interaction for the entire simulation period, the gain indices for the reach from Bradley to Spreckels is shown in Figure A-12 for 1949 to 1994.

Figures A-13, A-14a, and A-14b also show time series plots of measured and simulated Salinas River flows at Soledad and Spreckels. The plots show that the simulated stream flows are relatively close in trend and magnitude to the historical flows.

Seawater Intrusion

SVIGSM was used to simulate the movement of chloride in the aquifers of the Salinas Valley. The model was calibrated as part of the model update for the 1970-1994 period. Extending the data back to 1949 involved estimating initial chloride concentrations in the 180-foot, 400-foot, and Deep Aquifers for October 1948. The initial conditions were estimated based on the estimates available from the MCWRA annual reports, refined in an iterative process to properly define the spatial distribution and movement of salinity. No significant changes to other parameters were made. Figures A-15 and A-16 show the simulated 500 ppm chloride contours for the 180-foot and 400-foot Aquifers.

SUMMARY AND CONCLUSIONS

Through this most recent update of the SVIGSM for the HBA, the model data sets were extended back to water year 1949 using the best available data. Land use, and agricultural and urban water use input data were collected and incorporated into the model. In addition, several soil, aquifer, and streambed parameters were revised to improve data consistency and the overall water balance of the valley.

Figure A-10

SCATTER PLOT OF MEASURED VS. SIMULATED SALINAS RIVER GAINS BETWEEN BRADLEY AND SOLEDAD (FLOWS <1000 CFS) 1970-1994

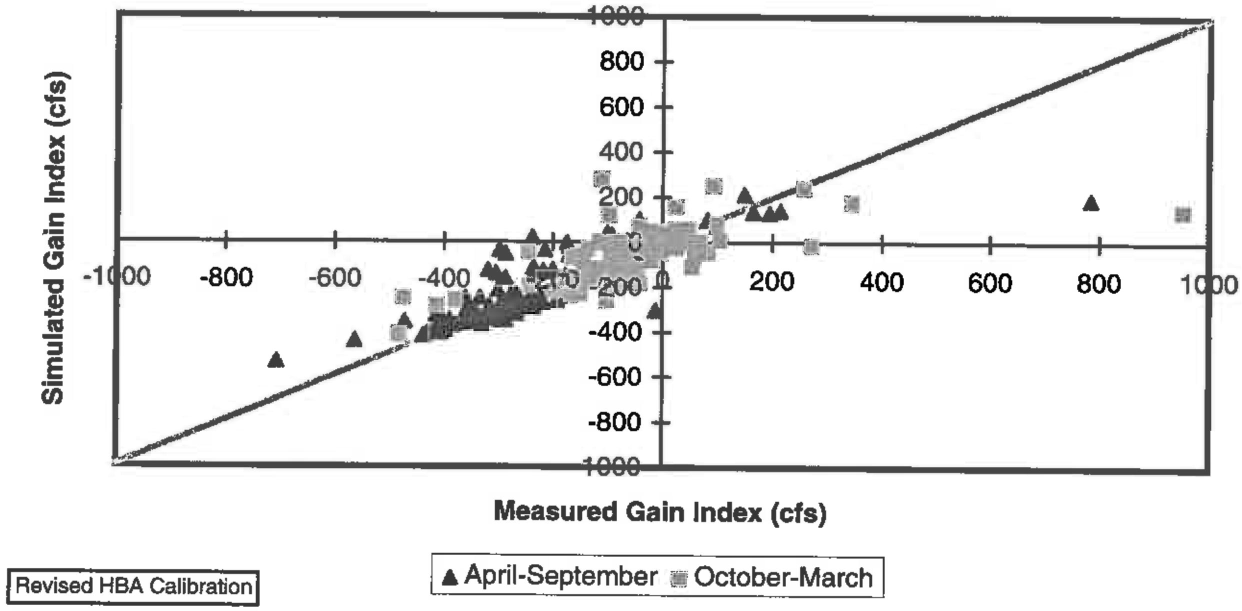


Figure A-11

SCATTER PLOT OF MEASURED VS. SIMULATED SALINAS RIVER GAINS BETWEEN SOLEDAD AND SPRECKELS (FLOWS <1000 CFS) 1970-1994

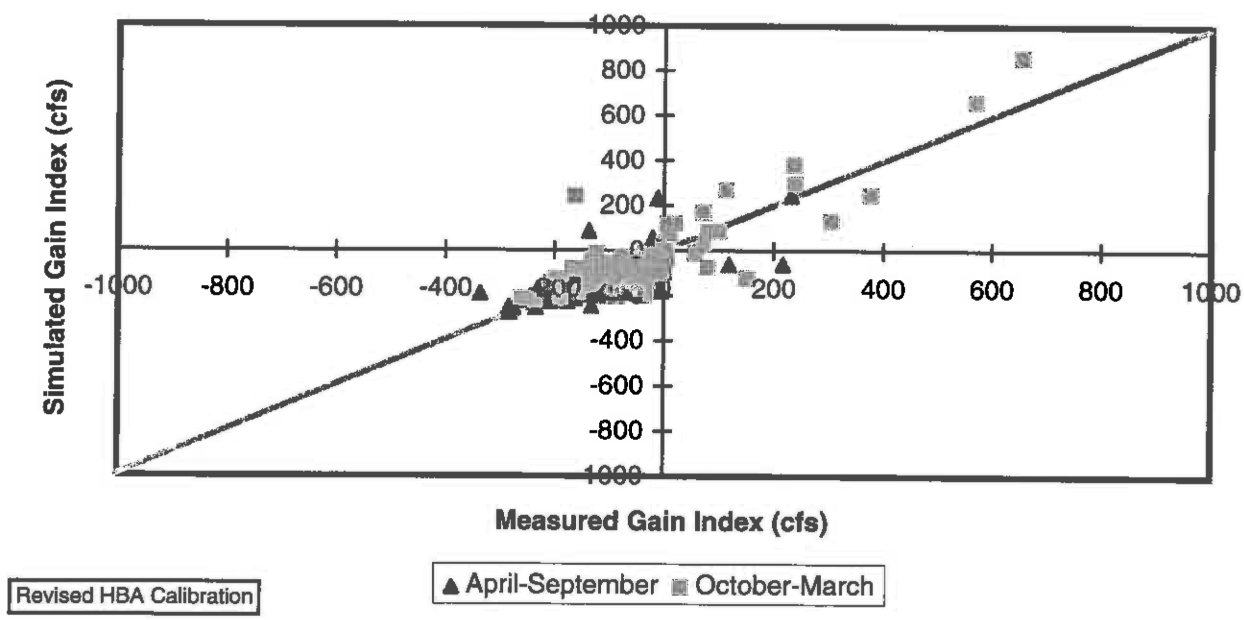


Figure A-12

SCATTER PLOT OF MEASURED VS. SIMULATED SALINAS RIVER GAINS BETWEEN BRADLEY AND SPRECKELS (FLOWS <1000 CFS)
1970-1994

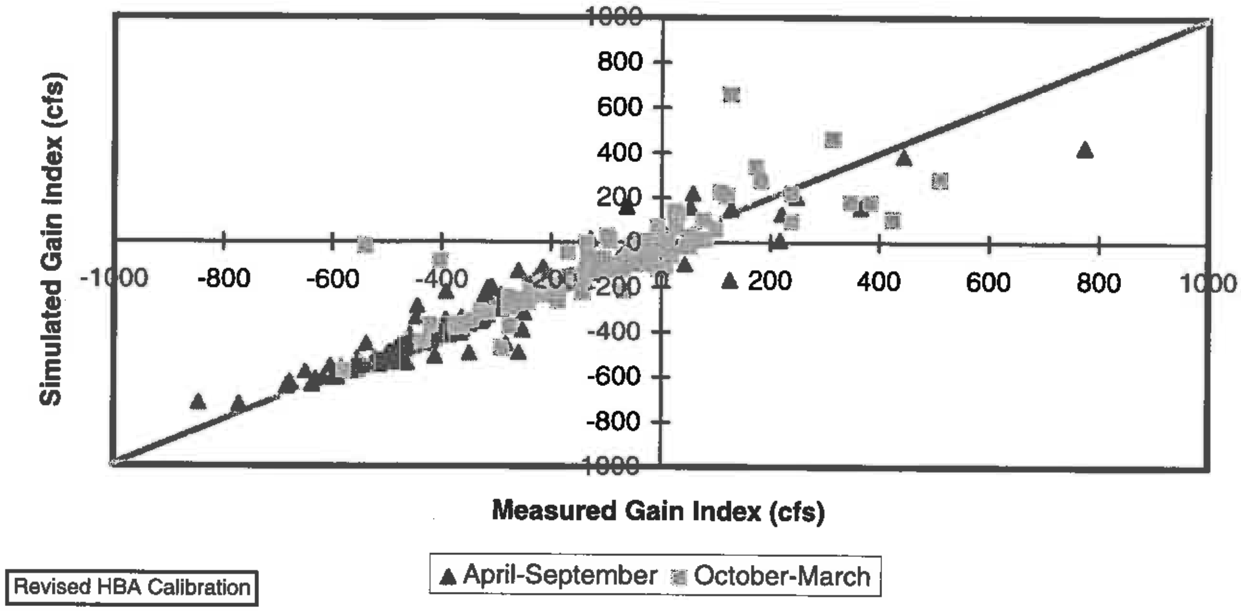
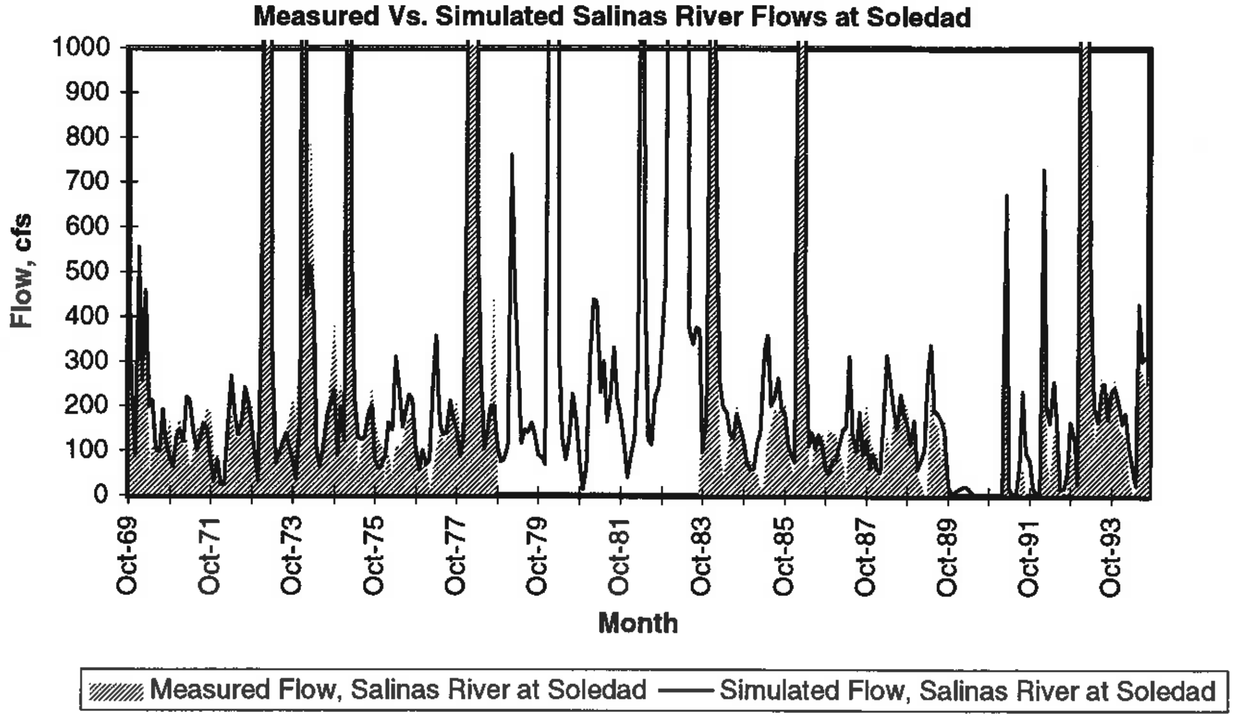


Figure A-13



Measured Vs. Simulated Salinas River Flows at Soledad
Flow, cfs
1000
900
800
700
600
500
400
300
200
100
0
Oct-69
Oct-71
Oct-73
Oct-75
Oct-77
Oct-79
Oct-81
Oct-83
Oct-85
Oct-87
Oct-89
Oct-91
Oct-93
Month
Measured Flow, Salinas River at Soledad
Simulated Flow, Salinas River at Soledad

Figure A-14a

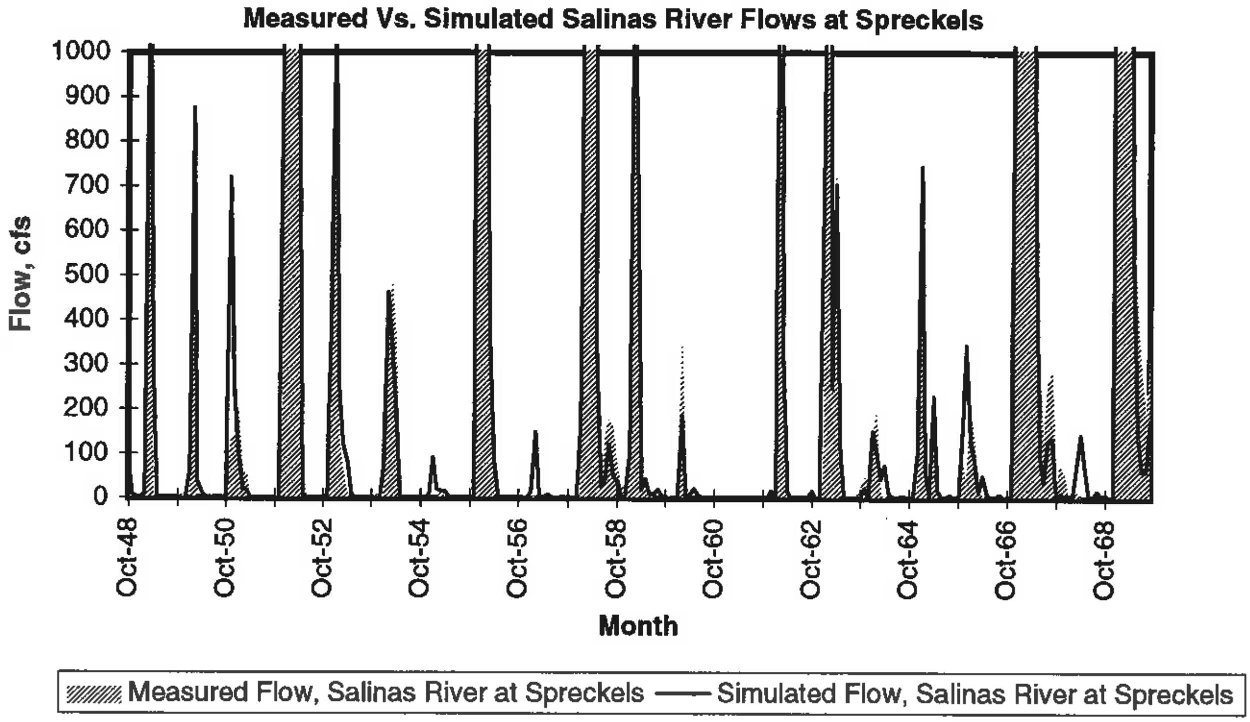


Figure A-14b

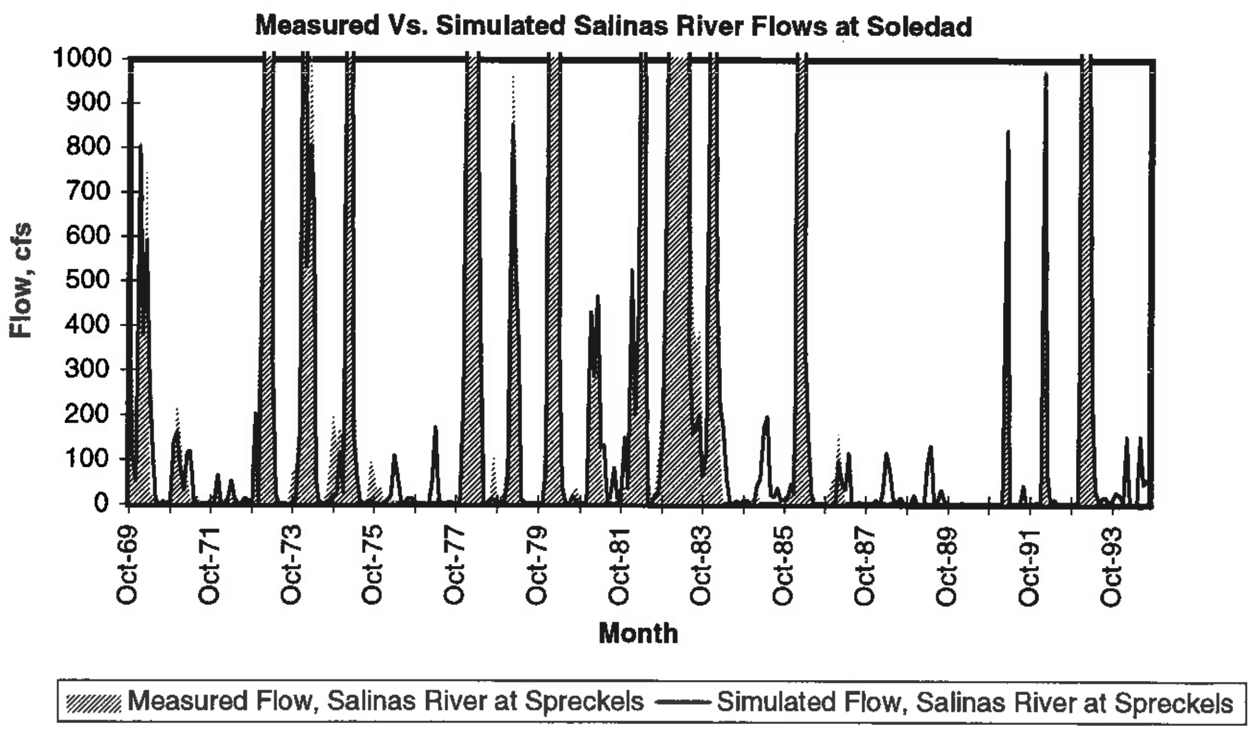


Figure A-15

Simulated 500 ppm Chloride Contours
180-Foot Aquifer

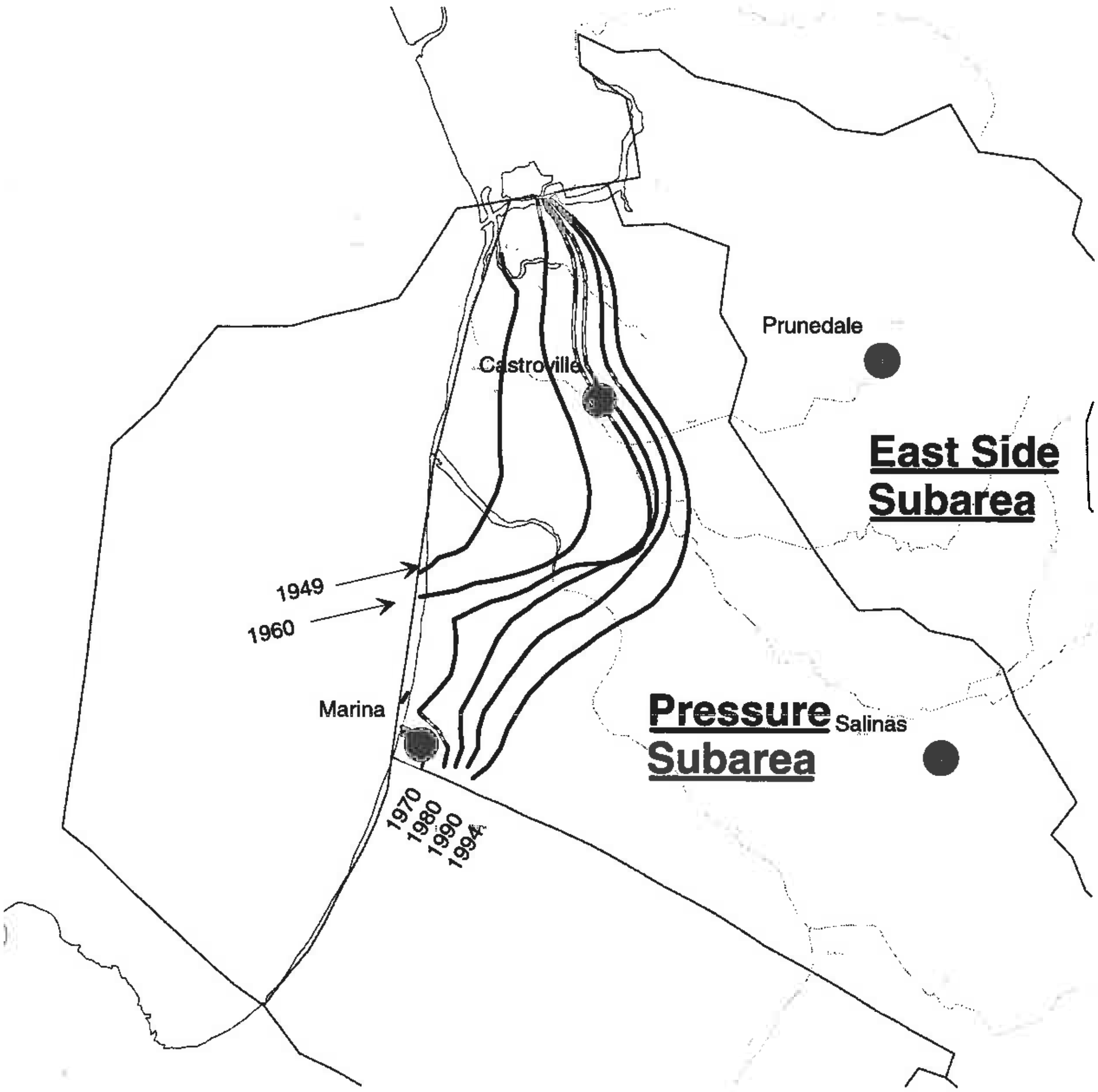
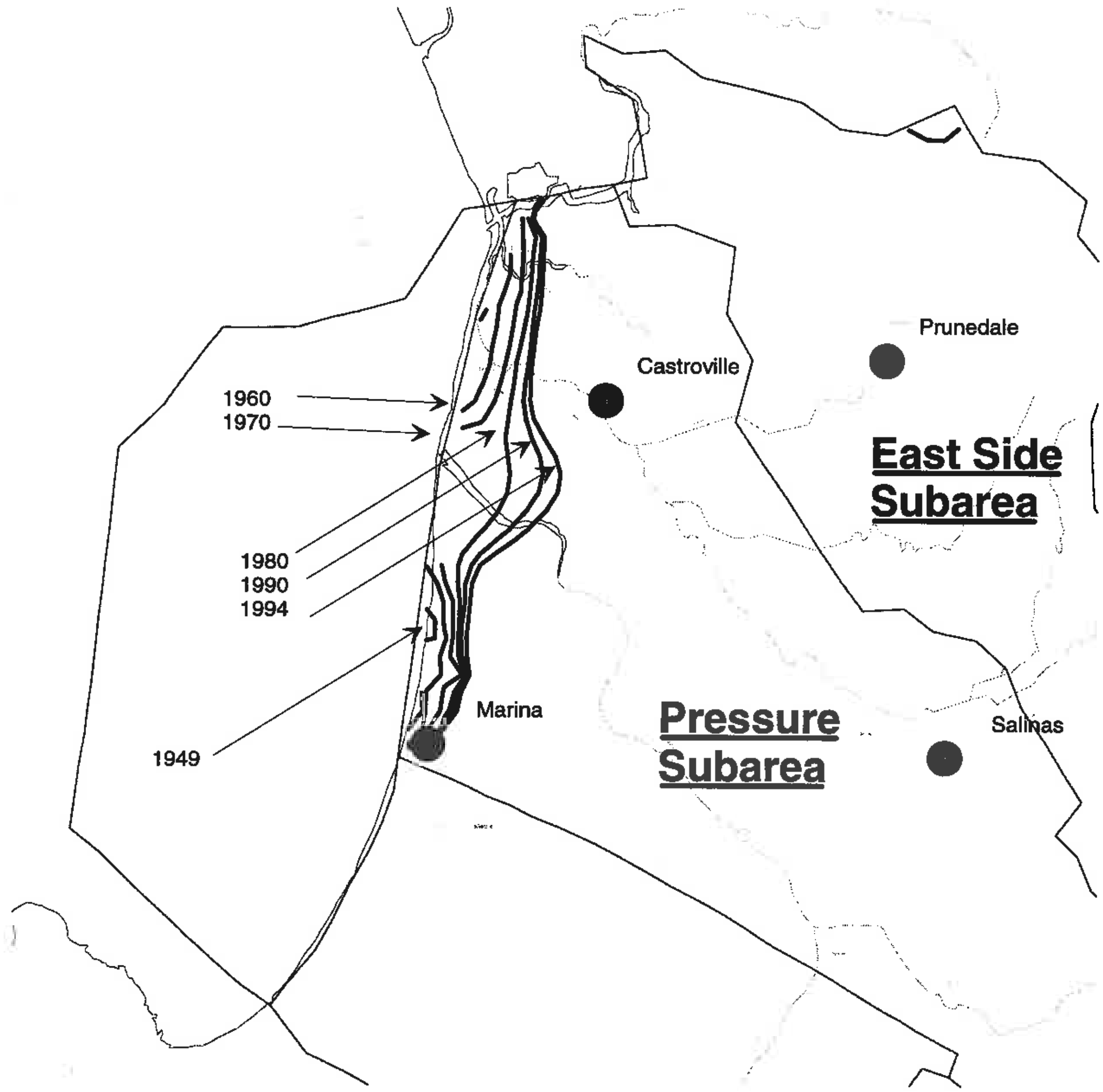


Figure A-16

Simulated 500 ppm Chloride Contours
400-Foot Aquifer



Once the model data sets were updated and refined, a verification process was performed to ensure that the model was properly simulating the hydrology of the Salinas Valley. Comparison of simulated ground water levels, Salinas River streamflows, and seawater intrusion parameters with historical conditions indicates that the model correctly simulates all of the components of the hydrologic cycle as well as their interaction. The results of the verification process provides confidence in the SVIGSM as an appropriate modeling tool for use in the HBA and other projects, such as the BMP, where a hydrologic model is needed.

Attachment 1

LAND AND WATER USE IN AC.-FT. FOR MONTEREY BAY
AREA: 37143. ACRES

TIME	AG ACRES	URBAN ACRES	CUAW DEMAND	AG SUP. REQ. (+)	URBAN SUP. REQ. (+)	GW PUMPING (-)	SW DIVERSION (-)	RECOV. LOSS (+)	NON-REC. LOSS (+)	IMPORT (-)	EXPORT (+)	SHORTAGE (=)
1949	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1950	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1951	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1952	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1953	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1954	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1955	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1956	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1957	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1958	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1959	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1960	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1961	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1962	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1963	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1964	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1965	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1966	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1967	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1968	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1969	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1970	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1971	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1972	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1973	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1974	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1975	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1976	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1977	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1978	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1979	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1980	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1981	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1982	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1983	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1984	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1985	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1986	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1987	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1988	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1989	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1990	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1991	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1992	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1993	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1994	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
AVERAGE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

LAND AND WATER USE IN AC.-FT. FOR FORT ORD/TORO
AREA: 35187. ACRES

TIME	AG ACRES	URBAN ACRES	CUAW DEMAND	AG SUP. REQ. (+)	URBAN SUP. REQ. (+)	GW PUMPING (-)	SW DIVERSION (-)	RECOV. LOSS (+)	NON-REC. LOSS (+)	IMPORT (-)	EXPORT (+)	SHORTAGE (=)
1949	48.	1358.	0.	168.	2901.	3069.	0.	0.	0.	0.	0.	0.
1950	48.	1358.	0.	163.	2901.	3064.	0.	0.	0.	0.	0.	0.
1951	48.	1358.	0.	167.	2896.	3063.	0.	0.	0.	0.	0.	0.
1952	48.	1358.	0.	164.	2884.	3048.	0.	0.	0.	0.	0.	0.
1953	48.	1358.	0.	175.	2876.	3051.	0.	0.	0.	0.	0.	0.
1954	47.	1490.	0.	161.	2867.	3028.	0.	0.	0.	0.	0.	0.
1955	45.	1623.	0.	157.	2859.	3016.	0.	0.	0.	0.	0.	0.
1956	45.	1755.	0.	171.	2852.	3023.	0.	0.	0.	0.	0.	0.
1957	44.	1887.	0.	140.	2841.	2981.	0.	0.	0.	0.	0.	0.
1958	44.	2020.	0.	119.	2835.	2954.	0.	0.	0.	0.	0.	0.
1959	42.	2152.	0.	162.	2826.	2988.	0.	0.	0.	0.	0.	0.
1960	41.	2284.	0.	150.	2962.	3112.	0.	0.	0.	0.	0.	0.
1961	41.	2416.	0.	144.	2822.	2966.	0.	0.	0.	0.	0.	0.
1962	39.	2549.	0.	151.	2680.	2831.	0.	0.	0.	0.	0.	0.
1963	38.	2681.	0.	109.	2538.	2647.	0.	0.	0.	0.	0.	0.
1964	37.	2813.	0.	112.	2397.	2509.	0.	0.	0.	0.	0.	0.
1965	36.	2945.	0.	116.	2256.	2372.	0.	0.	0.	0.	0.	0.
1966	34.	3078.	0.	128.	2107.	2235.	0.	0.	0.	0.	0.	0.
1967	33.	3210.	0.	95.	1963.	2058.	0.	0.	0.	0.	0.	0.
1968	32.	3342.	0.	111.	1818.	1929.	0.	0.	0.	0.	0.	0.
1969	31.	3474.	0.	106.	1673.	1779.	0.	0.	0.	0.	0.	0.
1970	31.	3607.	0.	107.	1521.	1628.	0.	0.	0.	0.	0.	0.
1971	29.	3739.	0.	99.	1585.	1684.	0.	0.	0.	0.	0.	0.
1972	29.	3871.	0.	112.	1653.	1765.	0.	0.	0.	0.	0.	0.
1973	28.	4003.	0.	92.	1716.	1808.	0.	0.	0.	0.	0.	0.
1974	28.	4136.	0.	77.	1780.	1857.	0.	0.	0.	0.	0.	0.
1975	26.	4268.	0.	82.	1843.	1925.	0.	0.	0.	0.	0.	0.
1976	25.	4400.	0.	76.	1906.	1982.	0.	0.	0.	0.	0.	0.
1977	24.	4532.	0.	87.	1974.	2061.	0.	0.	0.	0.	0.	0.
1978	22.	4665.	0.	67.	2037.	2104.	0.	0.	0.	0.	0.	0.
1979	22.	4797.	0.	84.	2101.	2185.	0.	0.	0.	0.	0.	0.
1980	21.	4929.	0.	69.	2162.	2231.	0.	0.	0.	0.	0.	0.
1981	19.	5062.	0.	63.	2034.	2097.	0.	0.	0.	0.	0.	0.
1982	18.	5194.	0.	52.	1899.	1951.	0.	0.	0.	0.	0.	0.
1983	17.	5326.	0.	46.	1770.	1816.	0.	0.	0.	0.	0.	0.
1984	16.	5458.	0.	59.	1640.	1699.	0.	0.	0.	0.	0.	0.
1985	14.	5591.	0.	45.	1512.	1557.	0.	0.	0.	0.	0.	0.
1986	13.	5723.	0.	41.	1384.	1425.	0.	0.	0.	0.	0.	0.
1987	14.	5855.	0.	51.	1256.	1304.	0.	0.	0.	0.	0.	3.
1988	13.	5987.	0.	46.	1128.	1167.	0.	0.	0.	0.	0.	7.
1989	11.	6120.	0.	37.	1000.	1030.	0.	0.	0.	0.	0.	7.
1990	10.	6252.	0.	29.	880.	888.	0.	0.	0.	0.	0.	21.
1991	9.	6384.	0.	29.	1026.	1029.	0.	0.	0.	0.	0.	26.
1992	9.	6384.	0.	29.	1174.	1174.	0.	0.	0.	0.	0.	29.
1993	9.	6384.	0.	29.	1321.	1317.	0.	0.	0.	0.	0.	33.
1994	9.	6384.	0.	31.	1466.	1445.	0.	0.	0.	0.	0.	52.
AVERAGE	29.	3817.	0.	98.	2055.	2149.	0.	0.	0.	0.	0.	4.

LAND AND WATER USE IN AC.-FT. FOR PRESSURE AREA

AREA: 90781. ACRES

TIME	AG ACRES	URBAN ACRES	CUAW DEMAND	AG SUP. REQ. (+)	URBAN SUP. REQ. (+)	GW PUMPING (-)	SW DIVERSION (-)	RECOV. LOSS (+)	NON-REC. LOSS (+)	IMPORT (-)	EXPORT (+)	SHORTAGE (=)
1949	43493.	5577.	0.	88474.	9884.	98358.	0.	0.	0.	0.	0.	0.
1950	43903.	5691.	0.	86411.	10000.	96411.	0.	0.	0.	0.	0.	0.
1951	44313.	5804.	0.	97430.	10347.	107777.	0.	0.	0.	0.	0.	0.
1952	44724.	5918.	0.	91741.	10724.	102465.	0.	0.	0.	0.	0.	0.
1953	45135.	6032.	0.	100768.	11076.	111844.	0.	0.	0.	0.	0.	0.
1954	45455.	6146.	0.	95659.	11422.	107081.	0.	0.	0.	0.	0.	0.
1955	45775.	6260.	0.	98333.	11781.	110114.	0.	0.	0.	0.	0.	0.
1956	46095.	6373.	0.	109060.	12156.	121216.	0.	0.	0.	0.	0.	0.
1957	46416.	6487.	0.	87524.	12488.	100012.	0.	0.	0.	0.	0.	0.
1958	46737.	6601.	0.	75539.	12859.	88398.	0.	0.	0.	0.	0.	0.
1959	47055.	6715.	0.	113594.	13215.	126809.	0.	0.	0.	0.	0.	0.
1960	47376.	6829.	0.	120672.	13688.	134360.	0.	0.	0.	0.	0.	0.
1961	47696.	6942.	0.	114788.	14075.	128863.	0.	0.	0.	0.	0.	0.
1962	48016.	7056.	0.	130171.	14446.	144617.	0.	0.	0.	0.	0.	0.
1963	48336.	7170.	0.	90589.	14837.	105426.	0.	0.	0.	0.	0.	0.
1964	48561.	7284.	0.	101354.	15203.	116557.	0.	0.	0.	0.	0.	0.
1965	48785.	7398.	0.	99235.	15584.	114819.	0.	0.	0.	0.	0.	0.
1966	49010.	7511.	0.	117235.	15893.	133128.	0.	0.	0.	0.	0.	0.
1967	49234.	7625.	0.	81525.	16187.	97712.	0.	0.	0.	0.	0.	0.
1968	49459.	7739.	0.	98508.	16492.	115000.	0.	0.	0.	0.	0.	0.
1969	49768.	7894.	0.	98047.	16785.	114832.	0.	0.	0.	0.	0.	0.
1970	50076.	8050.	0.	127098.	17078.	144176.	0.	0.	0.	0.	0.	0.
1971	50384.	8206.	0.	125222.	17596.	142819.	0.	0.	0.	0.	0.	-1.
1972	50694.	8361.	0.	144372.	18102.	162475.	0.	0.	0.	0.	0.	-1.
1973	51002.	8516.	0.	126697.	18600.	145298.	0.	0.	0.	0.	0.	-1.
1974	51310.	8670.	0.	101452.	19084.	120537.	0.	0.	0.	0.	0.	-1.
1975	51618.	8824.	0.	118203.	19563.	137767.	0.	0.	0.	0.	0.	-1.
1976	51926.	8978.	0.	112505.	20026.	132532.	0.	0.	0.	0.	0.	-1.
1977	51918.	9078.	0.	132774.	20515.	153290.	0.	0.	0.	0.	0.	-1.
1978	51908.	9179.	0.	110804.	20984.	131789.	0.	0.	0.	0.	0.	-1.
1979	51901.	9279.	0.	131405.	21446.	152852.	0.	0.	0.	0.	0.	-1.
1980	51891.	9379.	0.	113130.	21900.	135031.	0.	0.	0.	0.	0.	-1.
1981	51883.	9477.	0.	114415.	21995.	136487.	0.	0.	0.	0.	0.	-77.
1982	51873.	9576.	0.	96451.	22100.	118636.	0.	0.	0.	0.	0.	-85.
1983	51964.	9996.	0.	95193.	22182.	117458.	0.	0.	0.	0.	0.	-83.
1984	52056.	10416.	0.	122257.	22246.	144584.	0.	0.	0.	0.	0.	-81.
1985	52147.	10835.	0.	113524.	22288.	135891.	0.	0.	0.	0.	0.	-79.
1986	52238.	11255.	0.	108721.	22044.	130838.	0.	0.	0.	0.	0.	-73.
1987	52328.	11675.	0.	118881.	21770.	140718.	0.	0.	0.	0.	0.	-67.
1988	52419.	12095.	0.	121415.	21468.	142943.	0.	0.	0.	0.	0.	-60.
1989	52510.	12514.	0.	111048.	21141.	132242.	0.	0.	0.	0.	0.	-53.
1990	52602.	12934.	0.	100741.	20787.	121601.	0.	0.	0.	0.	0.	-73.
1991	52693.	13353.	0.	111491.	20593.	132150.	0.	0.	0.	0.	0.	-66.
1992	52795.	13353.	0.	111419.	20379.	131849.	0.	0.	0.	0.	0.	-51.
1993	52897.	13353.	0.	105006.	20596.	125644.	0.	0.	0.	0.	0.	-42.
1994	52998.	13353.	0.	109863.	20803.	130699.	0.	0.	0.	0.	0.	-33.
AVERAGE	49639.	8728.	0.	108277.	17270.	125567.	0.	0.	0.	0.	0.	-20.

LAND AND WATER USE IN AC.-FT. FOR EAST SIDE AREA
AREA: 74476. ACRES

TIME	AG ACRES	URBAN ACRES	CUAW DEMAND	AG SUP. REQ. (+)	URBAN SUP. REQ. (+)	GW PUMPING (-)	SW DIVERSION (-)	RECOV. LOSS (+)	NON-REC. LOSS (+)	IMPORT (-)	EXPORT (+)	SHORTAGE (=)
1949	24224.	3451.	0.	66884.	1488.	68372.	0.	0.	0.	0.	0.	0.
1950	24385.	3583.	0.	65739.	1500.	67239.	0.	0.	0.	0.	0.	0.
1951	24548.	3715.	0.	69562.	1554.	71116.	0.	0.	0.	0.	0.	0.
1952	24707.	3847.	0.	67471.	1603.	69074.	0.	0.	0.	0.	0.	0.
1953	24868.	3979.	0.	73818.	1653.	75471.	0.	0.	0.	0.	0.	0.
1954	25646.	4089.	0.	71251.	1700.	72951.	0.	0.	0.	0.	0.	0.
1955	26423.	4198.	0.	75122.	1756.	76878.	0.	0.	0.	0.	0.	0.
1956	27201.	4308.	0.	83218.	1801.	85019.	0.	0.	0.	0.	0.	0.
1957	27977.	4417.	0.	71381.	1851.	73232.	0.	0.	0.	0.	0.	0.
1958	28757.	4527.	0.	60102.	1899.	62001.	0.	0.	0.	0.	0.	0.
1959	29533.	4637.	0.	90846.	1948.	92794.	0.	0.	0.	0.	0.	0.
1960	30310.	4746.	0.	93476.	2012.	95488.	0.	0.	0.	0.	0.	0.
1961	31087.	4856.	0.	91216.	2065.	93281.	0.	0.	0.	0.	0.	0.
1962	31865.	4965.	0.	102807.	2120.	104927.	0.	0.	0.	0.	0.	0.
1963	32642.	5075.	0.	76922.	2177.	79099.	0.	0.	0.	0.	0.	0.
1964	32810.	5185.	0.	80330.	2234.	82564.	0.	0.	0.	0.	0.	0.
1965	32977.	5294.	0.	82695.	2288.	84982.	0.	0.	0.	0.	0.	1.
1966	33143.	5404.	0.	95166.	2432.	97597.	0.	0.	0.	0.	0.	1.
1967	33310.	5512.	0.	68169.	2579.	70748.	0.	0.	0.	0.	0.	0.
1968	33478.	5622.	0.	81241.	2736.	83975.	0.	0.	0.	0.	0.	2.
1969	33889.	5731.	0.	78439.	2896.	81335.	0.	0.	0.	0.	0.	0.
1970	34302.	5839.	0.	94581.	3058.	97635.	0.	0.	0.	0.	0.	4.
1971	34711.	5947.	0.	91735.	3244.	94976.	0.	0.	0.	0.	0.	3.
1972	35124.	6055.	0.	104214.	3444.	107653.	0.	0.	0.	0.	0.	5.
1973	35534.	6161.	0.	90786.	3647.	94429.	0.	0.	0.	0.	0.	4.
1974	35946.	6267.	0.	73529.	3855.	77377.	0.	0.	0.	0.	0.	7.
1975	36356.	6371.	0.	84772.	4066.	88804.	0.	0.	0.	0.	0.	34.
1976	36767.	6474.	0.	81245.	4283.	85495.	0.	0.	0.	0.	0.	33.
1977	36568.	6666.	0.	92538.	4508.	97003.	0.	0.	0.	0.	0.	43.
1978	36367.	6849.	0.	77334.	4736.	82059.	0.	0.	0.	0.	0.	11.
1979	36172.	7030.	0.	90096.	4975.	95063.	0.	0.	0.	0.	0.	8.
1980	35973.	7210.	0.	75472.	5216.	80684.	0.	0.	0.	0.	0.	4.
1981	35772.	7388.	0.	75988.	5480.	81465.	0.	0.	0.	0.	0.	3.
1982	35573.	7566.	0.	63185.	5744.	68929.	0.	0.	0.	0.	0.	0.
1983	35688.	8028.	0.	62533.	6018.	68551.	0.	0.	0.	0.	0.	0.
1984	35802.	8490.	0.	79834.	6292.	86126.	0.	0.	0.	0.	0.	0.
1985	35919.	8952.	0.	74710.	6562.	81272.	0.	0.	0.	0.	0.	0.
1986	36033.	9414.	0.	72093.	7103.	79196.	0.	0.	0.	0.	0.	0.
1987	36148.	9875.	0.	79074.	7649.	86723.	0.	0.	0.	0.	0.	0.
1988	36262.	10337.	0.	80281.	8208.	88489.	0.	0.	0.	0.	0.	0.
1989	36379.	10799.	0.	74749.	8774.	83522.	0.	0.	0.	0.	0.	1.
1990	36493.	11261.	0.	67472.	9342.	76814.	0.	0.	0.	0.	0.	0.
1991	36608.	11723.	0.	75086.	9904.	84989.	0.	0.	0.	0.	0.	1.
1992	36660.	11723.	0.	74756.	10464.	85219.	0.	0.	0.	0.	0.	1.
1993	36713.	11723.	0.	70708.	10592.	81300.	0.	0.	0.	0.	0.	0.
1994	36765.	11723.	0.	73720.	10712.	84407.	0.	0.	0.	0.	0.	25.
AVERAGE	32922.	6674.	0.	78834.	4351.	83181.	0.	0.	0.	0.	0.	4.

LAND AND WATER USE IN AC.-FT. FOR FOREBAY AREA
AREA: 86692. ACRES

TIME	AG ACRES	URBAN ACRES	CUAW DEMAND	AG SUP. REQ. (+)	URBAN SUP. REQ. (+)	GW PUMPING (-)	SW DIVERSION (-)	RECOV. LOSS (+)	NON-REC. LOSS (+)	IMPORT (-)	EXPORT (+)	SHORTAGE (=)
1949	40244.	1829.	0.	161531.	835.	158412.	5841.	175.	175.	0.	0.	-1537.
1950	40684.	1846.	0.	165625.	835.	161680.	6128.	184.	184.	0.	0.	-981.
1951	41121.	1864.	0.	169202.	852.	166254.	5085.	153.	153.	0.	0.	-980.
1952	41561.	1881.	0.	160599.	868.	153366.	9661.	290.	290.	0.	0.	-980.
1953	42000.	1899.	0.	174797.	885.	166900.	10383.	312.	312.	0.	0.	-979.
1954	42287.	1917.	0.	168210.	905.	164294.	5128.	154.	154.	0.	0.	0.
1955	42573.	1934.	0.	172816.	923.	168426.	6691.	201.	201.	0.	0.	-977.
1956	42859.	1952.	0.	179374.	941.	173235.	8570.	257.	257.	0.	0.	-976.
1957	43145.	1969.	0.	168027.	961.	160567.	8958.	269.	269.	0.	0.	0.
1958	43433.	1987.	0.	128313.	979.	119145.	11006.	330.	330.	0.	0.	-198.
1959	43719.	2005.	0.	185410.	1000.	181955.	4739.	142.	142.	0.	0.	0.
1960	44005.	2022.	0.	186274.	1016.	182884.	5721.	172.	172.	0.	0.	-972.
1961	44291.	2040.	0.	184480.	1218.	183352.	3673.	110.	110.	0.	0.	-1107.
1962	44577.	2057.	0.	189287.	1435.	184950.	6140.	184.	184.	0.	0.	0.
1963	44864.	2075.	0.	159398.	1662.	147912.	14503.	435.	435.	0.	0.	-485.
1964	45911.	2093.	0.	170778.	1905.	168292.	6152.	185.	185.	0.	0.	-1392.
1965	46956.	2110.	0.	161771.	2162.	157539.	8245.	247.	247.	0.	0.	-1357.
1966	48002.	2128.	0.	189959.	2433.	188894.	4679.	140.	140.	0.	0.	-901.
1967	49047.	2145.	0.	147979.	2715.	139243.	13126.	394.	394.	0.	0.	-887.
1968	50094.	2163.	0.	177717.	3008.	177385.	4874.	146.	146.	0.	0.	-1241.
1969	50898.	2208.	0.	170553.	3318.	162782.	11797.	354.	354.	0.	0.	0.
1970	51701.	2252.	0.	192502.	3640.	187793.	10519.	316.	316.	0.	0.	-1539.
1971	52504.	2296.	0.	199513.	3692.	193535.	13823.	415.	415.	0.	0.	-3323.
1972	53309.	2341.	0.	206873.	3744.	206877.	6294.	189.	189.	0.	0.	-2177.
1973	54112.	2385.	0.	182941.	3798.	177832.	9476.	284.	284.	0.	0.	0.
1974	54916.	2430.	0.	177131.	3852.	171752.	10986.	330.	330.	0.	0.	-1097.
1975	55718.	2473.	0.	176107.	3905.	169370.	11321.	340.	340.	0.	0.	0.
1976	56521.	2517.	0.	171864.	3962.	172957.	3577.	107.	107.	0.	0.	-494.
1977	56412.	2569.	0.	183127.	4017.	185618.	2035.	61.	61.	0.	0.	-387.
1978	56301.	2621.	0.	169633.	4074.	164015.	10311.	309.	309.	0.	0.	0.
1979	56193.	2672.	0.	179956.	4132.	175446.	9193.	276.	276.	0.	0.	0.
1980	56082.	2724.	0.	148088.	4188.	140102.	12951.	389.	389.	0.	0.	0.
1981	55973.	2775.	0.	153495.	4300.	152590.	5535.	166.	166.	0.	0.	2.
1982	55862.	2826.	0.	130341.	4392.	121012.	15451.	464.	464.	0.	0.	-803.
1983	55876.	2941.	0.	133564.	4463.	125840.	12965.	389.	389.	0.	0.	0.
1984	55889.	3056.	0.	155939.	4521.	158109.	2501.	75.	75.	0.	0.	0.
1985	55902.	3173.	0.	150047.	4560.	149762.	6250.	187.	187.	0.	0.	-1029.
1986	55916.	3288.	0.	134865.	4583.	128957.	11161.	335.	335.	0.	0.	0.
1987	55929.	3403.	0.	152604.	4587.	153764.	3646.	109.	109.	0.	0.	0.
1988	55943.	3517.	0.	150399.	4575.	150570.	5015.	150.	150.	0.	0.	-311.
1989	55956.	3633.	0.	145973.	4544.	147031.	3853.	116.	116.	0.	0.	-136.
1990	55969.	3748.	0.	129273.	4500.	132242.	1625.	49.	49.	0.	0.	4.
1991	55983.	3863.	0.	139843.	4455.	141295.	3195.	96.	96.	0.	0.	0.
1992	56197.	3863.	0.	138469.	4397.	139565.	3510.	105.	105.	0.	0.	1.
1993	56410.	3863.	0.	135343.	4324.	134000.	6208.	186.	186.	0.	0.	-168.
1994	56623.	3863.	0.	139973.	4240.	140764.	3592.	108.	108.	0.	0.	73.
AVERAGE	50445.	2548.	0.	164130.	2963.	160614.	7524.	226.	226.	0.	0.	-594.

LAND AND WATER USE IN AC.-FT. FOR UPPER VALLEY AREA
AREA: 92300. ACRES

TIME	AG ACRES	URBAN ACRES	CUAW DEMAND	AG SUP. REQ. (+)	URBAN SUP. REQ. (+)	GW PUMPING (-)	SW DIVERSION (-)	RECOV. LOSS (+)	NON-REC. LOSS (+)	IMPORT (-)	EXPORT (+)	SHORTAGE (=)
1949	21860.	1973.	0.	113357.	860.	114217.	0.	0.	0.	0.	0.	0.
1950	21945.	1988.	0.	115671.	860.	116531.	0.	0.	0.	0.	0.	0.
1951	22030.	2004.	0.	118362.	897.	119259.	0.	0.	0.	0.	0.	0.
1952	22116.	2019.	0.	110667.	921.	111588.	0.	0.	0.	0.	0.	0.
1953	22201.	2034.	0.	123279.	944.	124223.	0.	0.	0.	0.	0.	0.
1954	23409.	2049.	0.	118392.	967.	119359.	0.	0.	0.	0.	0.	0.
1955	24613.	2065.	0.	123028.	992.	124020.	0.	0.	0.	0.	0.	0.
1956	25821.	2080.	0.	132575.	1018.	133593.	0.	0.	0.	0.	0.	0.
1957	27026.	2095.	0.	130925.	1039.	131964.	0.	0.	0.	0.	0.	0.
1958	28234.	2111.	0.	96740.	1062.	97802.	0.	0.	0.	0.	0.	0.
1959	29439.	2126.	0.	149430.	1087.	150517.	0.	0.	0.	0.	0.	0.
1960	30645.	2141.	0.	153283.	1116.	154399.	0.	0.	0.	0.	0.	0.
1961	31852.	2156.	0.	155968.	1153.	157121.	0.	0.	0.	0.	0.	0.
1962	33058.	2172.	0.	164594.	1192.	165786.	0.	0.	0.	0.	0.	0.
1963	34264.	2187.	0.	140934.	1227.	142161.	0.	0.	0.	0.	0.	0.
1964	34343.	2202.	0.	159583.	1268.	160851.	0.	0.	0.	0.	0.	0.
1965	34421.	2217.	0.	143205.	1308.	144513.	0.	0.	0.	0.	0.	0.
1966	34498.	2233.	0.	167180.	1347.	168527.	0.	0.	0.	0.	0.	0.
1967	34576.	2248.	0.	130873.	1393.	132266.	0.	0.	0.	0.	0.	0.
1968	34655.	2263.	0.	153139.	1433.	154572.	0.	0.	0.	0.	0.	0.
1969	35753.	2444.	0.	155990.	1475.	157465.	0.	0.	0.	0.	0.	0.
1970	36852.	2625.	0.	166919.	1518.	168437.	0.	0.	0.	0.	0.	0.
1971	37950.	2805.	0.	174409.	1595.	176004.	0.	0.	0.	0.	0.	0.
1972	39052.	2986.	0.	178745.	1674.	180419.	0.	0.	0.	0.	0.	0.
1973	40148.	3165.	0.	163250.	1756.	165006.	0.	0.	0.	0.	0.	0.
1974	41246.	3344.	0.	164730.	1838.	166568.	0.	0.	0.	0.	0.	0.
1975	42345.	3523.	0.	160557.	1918.	162475.	0.	0.	0.	0.	0.	0.
1976	43443.	3701.	0.	155041.	2000.	157041.	0.	0.	0.	0.	0.	0.
1977	44378.	3716.	0.	169164.	2095.	171259.	0.	0.	0.	0.	0.	0.
1978	45312.	3728.	0.	156466.	2182.	158648.	0.	0.	0.	0.	0.	0.
1979	46248.	3741.	0.	176522.	2276.	178798.	0.	0.	0.	0.	0.	0.
1980	47182.	3754.	0.	151313.	2367.	153680.	0.	0.	0.	0.	0.	0.
1981	48116.	3766.	0.	159297.	2468.	161765.	0.	0.	0.	0.	0.	0.
1982	49051.	3778.	0.	132993.	2579.	135572.	0.	0.	0.	0.	0.	0.
1983	48548.	3790.	0.	138280.	2692.	140972.	0.	0.	0.	0.	0.	0.
1984	48043.	3801.	0.	165651.	2802.	168453.	0.	0.	0.	0.	0.	0.
1985	47541.	3813.	0.	157666.	2917.	160583.	0.	0.	0.	0.	0.	0.
1986	47037.	3824.	0.	144853.	3033.	147886.	0.	0.	0.	0.	0.	0.
1987	46534.	3834.	0.	151940.	3148.	155088.	0.	0.	0.	0.	0.	0.
1988	46030.	3845.	0.	135522.	3264.	138786.	0.	0.	0.	0.	0.	0.
1989	45528.	3856.	0.	138575.	3384.	141959.	0.	0.	0.	0.	0.	0.
1990	45023.	3867.	0.	135513.	3508.	139021.	0.	0.	0.	0.	0.	0.
1991	44520.	3878.	0.	133269.	3694.	136963.	0.	0.	0.	0.	0.	0.
1992	44679.	3878.	0.	132994.	3884.	136878.	0.	0.	0.	0.	0.	0.
1993	44835.	3878.	0.	128917.	4075.	132992.	0.	0.	0.	0.	0.	0.
1994	44994.	3878.	0.	130376.	4268.	134644.	0.	0.	0.	0.	0.	0.
AVERAGE	37422.	2947.	0.	144786.	1967.	146753.	0.	0.	0.	0.	0.	0.

LAND AND WATER USE IN AC.-FT. FOR ENTIRE MODEL AREA
AREA: 416580. ACRES

TIME	AG ACRES	URBAN ACRES	CUAW DEMAND	AG SUP. REQ. (+)	URBAN SUP. REQ. (+)	GW PUMPING (-)	SW DIVERSION (-)	RECOV. LOSS (+)	NON-REC. LOSS (+)	IMPORT (-)	EXPORT (+)	SHORTAGE (+)
1949	129869.	14188.	0.	430414.	15968.	442428.	5841.	175.	175.	0.	0.	-1537.
1950	130965.	14466.	0.	433609.	16096.	444925.	6128.	184.	184.	0.	0.	-981.
1951	132060.	14745.	0.	454723.	16546.	467469.	5085.	153.	153.	0.	0.	-980.
1952	133156.	15023.	0.	430642.	17000.	439541.	9661.	290.	290.	0.	0.	-980.
1953	134252.	15302.	0.	472837.	17434.	481489.	10383.	312.	312.	0.	0.	-979.
1954	136844.	15691.	0.	453673.	17861.	466713.	5128.	154.	154.	0.	0.	0.
1955	139429.	16080.	0.	469456.	18311.	482454.	6691.	201.	201.	0.	0.	-977.
1956	142021.	16468.	0.	504398.	18768.	516086.	8570.	257.	257.	0.	0.	-976.
1957	144608.	16855.	0.	457997.	19180.	468756.	8958.	269.	269.	0.	0.	0.
1958	147205.	17246.	0.	360813.	19634.	370300.	11006.	330.	330.	0.	0.	-198.
1959	149788.	17635.	0.	539442.	20076.	555063.	4739.	142.	142.	0.	0.	0.
1960	152376.	18022.	0.	553855.	20794.	570243.	5721.	172.	172.	0.	0.	-972.
1961	154967.	18410.	0.	546596.	21333.	565584.	3673.	110.	110.	0.	0.	-1107.
1962	157555.	18799.	0.	587010.	21873.	603111.	6140.	184.	184.	0.	0.	0.
1963	160144.	19188.	0.	467952.	22441.	477245.	14503.	435.	435.	0.	0.	-485.
1964	161662.	19577.	0.	512157.	23007.	530773.	6152.	185.	185.	0.	0.	-1392.
1965	163175.	19963.	0.	487022.	23598.	504226.	8245.	247.	247.	0.	0.	-1356.
1966	164687.	20353.	0.	569668.	24212.	590381.	4679.	140.	140.	0.	0.	-899.
1967	166200.	20740.	0.	428641.	24837.	442026.	13126.	394.	394.	0.	0.	-887.
1968	167718.	21128.	0.	510716.	25487.	532861.	4874.	146.	146.	0.	0.	-1239.
1969	170339.	21751.	0.	503135.	26147.	518192.	11797.	354.	354.	0.	0.	1.
1970	172962.	22373.	0.	581207.	26815.	599669.	10519.	316.	316.	0.	0.	-1535.
1971	175578.	22993.	0.	590978.	27712.	609017.	13823.	415.	415.	0.	0.	-3321.
1972	178208.	23613.	0.	634316.	28617.	659189.	6294.	189.	189.	0.	0.	-2172.
1973	180824.	24230.	0.	563766.	29517.	584372.	9476.	284.	284.	0.	0.	3.
1974	183446.	24848.	0.	516919.	30409.	538092.	10986.	330.	330.	0.	0.	-1091.
1975	186063.	25460.	0.	539721.	31295.	560340.	11321.	340.	340.	0.	0.	34.
1976	188682.	26070.	0.	520731.	32177.	550007.	3577.	107.	107.	0.	0.	-462.
1977	189300.	26561.	0.	577690.	33109.	609231.	2035.	61.	61.	0.	0.	-344.
1978	189910.	27042.	0.	514304.	34013.	538615.	10311.	309.	309.	0.	0.	10.
1979	190536.	27520.	0.	578063.	34930.	604344.	9193.	276.	276.	0.	0.	7.
1980	191149.	27995.	0.	488072.	35833.	511728.	12951.	389.	389.	0.	0.	3.
1981	191763.	28468.	0.	503258.	36277.	534404.	5535.	166.	166.	0.	0.	-72.
1982	192377.	28940.	0.	423022.	36714.	446099.	15451.	464.	464.	0.	0.	-887.
1983	192093.	30081.	0.	429616.	37125.	454636.	12965.	389.	389.	0.	0.	-83.
1984	191806.	31222.	0.	523740.	37501.	558971.	2501.	75.	75.	0.	0.	-91.
1985	191523.	32363.	0.	495992.	37839.	529065.	6250.	187.	187.	0.	0.	-1109.
1986	191237.	33503.	0.	460573.	38147.	488302.	11161.	335.	335.	0.	0.	-73.
1987	190953.	34641.	0.	502550.	38410.	537597.	3646.	109.	109.	0.	0.	-64.
1988	190667.	35781.	0.	487663.	38643.	521955.	5015.	150.	150.	0.	0.	-364.
1989	190384.	36922.	0.	470382.	38843.	505783.	3853.	116.	116.	0.	0.	-180.
1990	190097.	38062.	0.	433028.	39017.	470566.	1625.	49.	49.	0.	0.	-48.
1991	189813.	39201.	0.	459718.	39672.	496426.	3195.	96.	96.	0.	0.	-40.
1992	190340.	39201.	0.	457667.	40298.	494685.	3510.	105.	105.	0.	0.	-20.
1993	190864.	39201.	0.	440003.	40908.	475253.	6208.	186.	186.	0.	0.	-178.
1994	191389.	39201.	0.	453963.	41489.	491959.	3592.	108.	108.	0.	0.	117.
AVERAGE	170456.	24713.	0.	496124.	28607.	518265.	7524.	226.	226.	0.	0.	-606.

AVERAGE LAND AND WATER USE IN AC.-FT. FROM 1949 THRU 1994

REGION	AG ACRES	URBAN ACRES	CUAW DEMAND	AG SUP. REQ. (+)	URBAN SUP. REQ. (+)	GW PUMPING (-)	SW DIVERSION (-)	RECOV. LOSS (+)	NON-REC. LOSS (+)	IMPORT (-)	EXPORT (+)	SHORTAGE (=)
1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2	29.	3817.	0.	98.	2055.	2149.	0.	0.	0.	0.	0.	4.
3	49639.	8728.	0.	108277.	17270.	125567.	0.	0.	0.	0.	0.	-20.
4	32922.	6674.	0.	78834.	4351.	83181.	0.	0.	0.	0.	0.	4.
5	50445.	2548.	0.	164130.	2963.	160614.	7524.	226.	226.	0.	0.	-594.
6	37422.	2947.	0.	144786.	1967.	146753.	0.	0.	0.	0.	0.	0.
TOTAL	170456.	24713.	0.	496124.	28607.	518265.	7524.	226.	226.	0.	0.	-606.

GROUND WATER BUDGET IN AC.-FT. FOR MONTEREY BAY
AREA: 37143. ACRES

TIME	DEEP PERC.	NET DEEP PERC. (+)	GAIN FROM STREAM (+)	RECHARGE (+)	OTHER INFLOW (+)	BOUNDARY INFLOW (+)	SUBSURF. INFLOW (+)	PUMPING (-)	CHANGE IN STORAGE (=)	END STORAGE 1000 AF	LAND SUBSIDENCE 1000 A
1949	0.	0.	0.	0.	1243.	3708.	-1126.	0.	3825.	1630.5	0
1950	0.	0.	0.	0.	710.	4569.	-2757.	0.	2523.	1630.4	0
1951	0.	0.	0.	0.	849.	6243.	-4769.	0.	2324.	1630.5	0
1952	0.	0.	0.	0.	555.	3336.	-828.	0.	3063.	1630.4	0
1953	0.	0.	0.	0.	903.	6809.	-5618.	0.	2095.	1630.4	0
1954	0.	0.	0.	0.	1058.	8707.	-8515.	0.	1251.	1630.4	0
1955	0.	0.	0.	0.	1072.	9434.	-9704.	0.	802.	1630.4	0
1956	0.	0.	0.	0.	880.	7525.	-6691.	0.	1713.	1630.4	0
1957	0.	0.	0.	0.	1173.	10315.	-11057.	0.	432.	1630.4	0
1958	0.	0.	0.	0.	848.	6450.	-5741.	0.	1557.	1630.3	0
1959	0.	0.	0.	0.	1050.	9168.	-8406.	0.	1812.	1630.4	0
1960	0.	0.	0.	0.	1200.	11618.	-12243.	0.	575.	1630.4	0
1961	0.	0.	0.	0.	1447.	14235.	-15783.	0.	-100.	1630.4	0
1962	0.	0.	0.	0.	1655.	16758.	-19370.	0.	-957.	1630.5	0
1963	0.	0.	0.	0.	1472.	13608.	-15625.	0.	-545.	1630.4	0
1964	0.	0.	0.	0.	1472.	14257.	-15973.	0.	-243.	1630.4	0
1965	0.	0.	0.	0.	1372.	12914.	-14106.	0.	180.	1630.4	0
1966	0.	0.	0.	0.	1372.	13327.	-14242.	0.	457.	1630.5	0
1967	0.	0.	0.	0.	1068.	8075.	-7388.	0.	1755.	1630.4	0
1968	0.	0.	0.	0.	1195.	10613.	-10142.	0.	1666.	1630.4	0
1969	0.	0.	0.	0.	846.	5308.	-2787.	0.	3367.	1630.5	0
1970	0.	0.	0.	0.	872.	6977.	-4247.	0.	3601.	1630.4	0
1971	0.	0.	0.	0.	1135.	9098.	-7386.	0.	2847.	1630.5	0
1972	0.	0.	0.	0.	1545.	14155.	-14583.	0.	1117.	1630.5	0
1973	0.	0.	0.	0.	1227.	9378.	-8358.	0.	2247.	1630.5	0
1974	0.	0.	0.	0.	936.	6302.	-4158.	0.	3079.	1630.4	0
1975	0.	0.	0.	0.	1236.	9057.	-7443.	0.	2850.	1630.5	0
1976	0.	0.	0.	0.	1440.	11772.	-11599.	0.	1613.	1630.6	0
1977	0.	0.	0.	0.	1503.	14286.	-15222.	0.	567.	1630.5	0
1978	0.	0.	0.	0.	1232.	9717.	-9160.	0.	1790.	1630.4	0
1979	0.	0.	0.	0.	1467.	12424.	-12315.	0.	1576.	1630.5	0
1980	0.	0.	0.	0.	1402.	11410.	-11309.	0.	1503.	1630.5	0
1981	0.	0.	0.	0.	1745.	12390.	-12076.	0.	2059.	1630.6	0
1982	0.	0.	0.	0.	1426.	7963.	-6038.	0.	3351.	1630.7	0
1983	0.	0.	0.	0.	1186.	2018.	3138.	0.	6342.	1630.7	0
1984	0.	0.	0.	0.	1363.	6873.	-3552.	0.	4684.	1630.7	0
1985	0.	0.	0.	0.	1524.	9536.	-8087.	0.	2973.	1630.6	0
1986	0.	0.	0.	0.	1520.	9093.	-7640.	0.	2973.	1630.7	0
1987	0.	0.	0.	0.	1650.	11561.	-11200.	0.	2011.	1630.6	0
1988	0.	0.	0.	0.	1876.	14042.	-15001.	0.	918.	1630.6	0
1989	0.	0.	0.	0.	1976.	15054.	-16898.	0.	133.	1630.7	0
1990	0.	0.	0.	0.	1929.	15944.	-18592.	0.	-719.	1630.6	0
1991	0.	0.	0.	0.	2207.	17147.	-20259.	0.	-905.	1630.6	0
1992	0.	0.	0.	0.	2222.	17608.	-21010.	0.	-1180.	1630.6	0
1993	0.	0.	0.	0.	1982.	14517.	-16601.	0.	-102.	1630.6	0
1994	0.	0.	0.	0.	2073.	15574.	-17930.	0.	-284.	1630.6	0
AVERAGE	0.	0.	0.	0.	1350.	10454.	-10226.	0.	1578.	1630.6	0

GROUND WATER BUDGET IN AC.-FT. FOR FORT ORD/TORO
AREA: 35187. ACRES

TIME	DEEP PERC.	NET DEEP PERC. (+)	GAIN FROM STREAM (+)	RECHARGE (+)	OTHER INFLOW (+)	BOUNDARY INFLOW (+)	SUBSURF. INFLOW (+)	PUMPING (-)	CHANGE IN STORAGE (=)	END STORAGE 1000 AF	LAND SUBSIDENCE 1000
1949	4429.	6033.	588.	0.	0.	-48.	2461.	3069.	5965.	457.3	0
1950	11466.	8581.	1109.	0.	0.	-112.	601.	3064.	7115.	463.6	0
1951	7405.	8438.	916.	0.	0.	-82.	-414.	3063.	5795.	469.1	0
1952	22727.	16140.	2693.	0.	0.	-199.	-586.	3048.	15001.	483.1	0
1953	5797.	10303.	865.	0.	0.	-65.	-851.	3051.	7201.	489.3	0
1954	4756.	7047.	556.	0.	0.	59.	-3078.	3028.	1557.	491.1	0
1955	11174.	9068.	696.	0.	0.	107.	-5967.	3016.	888.	493.8	0
1956	21166.	16387.	2316.	0.	0.	8.	-1238.	3023.	14449.	506.1	0
1957	4133.	9044.	524.	0.	0.	145.	-8751.	2981.	-2018.	505.6	0
1958	19032.	13227.	2759.	0.	0.	72.	4858.	2954.	17962.	519.1	0
1959	4543.	10026.	646.	0.	0.	-27.	-3086.	2988.	4570.	521.2	0
1960	4294.	6949.	444.	0.	0.	151.	-7036.	3112.	-2604.	518.4	0
1961	2946.	5172.	199.	0.	0.	351.	-10302.	2966.	-7547.	513.3	0
1962	3664.	4540.	239.	0.	0.	529.	-7415.	2831.	-4938.	510.6	0
1963	7396.	5652.	276.	0.	0.	436.	663.	2647.	4380.	513.4	0
1964	4130.	5216.	48.	0.	0.	360.	-3716.	2509.	-602.	512.7	0
1965	9293.	7256.	501.	0.	0.	300.	-1540.	2372.	4145.	515.4	0
1966	9867.	8757.	471.	0.	0.	273.	-3446.	2235.	3819.	518.3	0
1967	12443.	10127.	970.	0.	0.	94.	5683.	2058.	14815.	528.1	0
1968	3033.	6706.	50.	0.	0.	59.	-5297.	1929.	-411.	526.7	0
1969	25030.	16132.	2783.	0.	0.	-51.	2573.	1779.	19658.	541.6	0
1970	11235.	13949.	835.	0.	0.	-240.	-6470.	1628.	6446.	546.2	0
1971	9970.	11902.	484.	0.	0.	6.	-5665.	1684.	5043.	549.5	0
1972	2823.	6947.	72.	0.	0.	322.	-9699.	1765.	-4121.	546.2	0
1973	19366.	13026.	2557.	0.	0.	256.	-2348.	1808.	11682.	555.6	0
1974	19634.	17371.	2243.	0.	0.	-44.	-3076.	1857.	14637.	567.1	0
1975	5750.	10694.	669.	0.	0.	98.	-5103.	1925.	4433.	569.5	0
1976	2982.	6545.	106.	0.	0.	260.	-6041.	1982.	-1112.	567.6	0
1977	2451.	4885.	104.	0.	0.	374.	-7244.	2061.	-3941.	563.7	0
1978	18989.	11506.	2388.	0.	0.	306.	-1707.	2104.	10389.	571.6	0
1979	4920.	8648.	887.	0.	0.	271.	-5897.	2185.	1725.	572.3	0
1980	6640.	7523.	1333.	0.	0.	274.	-2546.	2231.	4353.	574.6	0
1981	2372.	5012.	407.	0.	0.	229.	-2825.	2097.	725.	573.5	0
1982	11950.	8136.	2076.	0.	0.	5.	-484.	1951.	7781.	577.8	0
1983	20366.	14776.	4367.	0.	0.	-464.	2339.	1816.	19201.	591.2	0
1984	2977.	9096.	1108.	0.	0.	-311.	-7199.	1699.	995.	590.1	0
1985	3159.	5796.	451.	0.	0.	43.	-3820.	1557.	913.	588.7	0
1986	6464.	5656.	1175.	0.	0.	93.	-4633.	1425.	865.	587.5	0
1987	4491.	5526.	712.	0.	0.	169.	-7731.	1304.	-2628.	584.8	0
1988	2139.	4113.	347.	0.	0.	330.	-7821.	1167.	-4198.	581.2	0
1989	3097.	3534.	494.	0.	0.	437.	-6545.	1030.	-3109.	578.5	0
1990	2781.	3275.	473.	0.	0.	494.	-10883.	888.	-7529.	573.7	0
1991	6332.	4357.	796.	0.	0.	624.	-10379.	1029.	-5631.	571.4	0
1992	7265.	5880.	1322.	0.	0.	649.	-9836.	1174.	-3158.	571.3	0
1993	13980.	10083.	2751.	0.	0.	542.	-1139.	1317.	10920.	581.0	0
1994	3440.	6649.	736.	0.	0.	480.	-7086.	1445.	-666.	580.7	0
AVERAGE	8572.	8602.	1055.	0.	0.	164.	-3907.	2149.	3766.	580.7	0

GROUND WATER BUDGET IN AC.-FT. FOR PRESSURE AREA
AREA: 90781. ACRES

TIME	DEEP PERC.	NET DEEP PERC. (+)	GAIN FROM STREAM (+)	RECHARGE (+)	OTHER INFLOW (+)	BOUNDARY INFLOW (+)	SUBSURF. INFLOW (+)	PUMPING (-)	CHANGE IN STORAGE (=)	END STORAGE 1000 AF	LAND SUBSIDENCE 1000 A
1949	29310.	27170.	11552.	0.	0.	-437.	41373.	98358.	-18699.	6932.9	0
1950	38320.	37554.	24362.	0.	0.	980.	40628.	96411.	7113.	6924.4	0
1951	40592.	39490.	34021.	0.	0.	2410.	37888.	107777.	6032.	6913.5	0
1952	65145.	64838.	34547.	0.	0.	56.	26771.	102465.	23747.	6920.9	0
1953	40101.	40059.	45070.	0.	0.	2985.	33998.	111844.	10268.	6913.9	0
1954	33283.	32760.	33351.	0.	0.	4718.	41431.	107081.	5179.	6899.8	0
1955	46964.	44899.	16866.	0.	0.	5201.	46894.	110114.	3745.	6882.3	0
1956	66734.	67426.	61836.	0.	0.	3552.	21345.	121216.	32943.	6900.8	0
1957	28215.	28252.	12072.	0.	0.	6110.	49723.	100012.	-3855.	6875.9	0
1958	52679.	54645.	95074.	0.	0.	2999.	5466.	88398.	69787.	6933.7	0
1959	38792.	38108.	74723.	0.	0.	5180.	14920.	126809.	6122.	6921.5	0
1960	46474.	43419.	48544.	0.	0.	7072.	34375.	134360.	-949.	6898.3	0
1961	40871.	38584.	4991.	0.	0.	8628.	54966.	128863.	-21695.	6852.1	0
1962	48721.	47251.	54045.	0.	0.	10410.	45964.	144617.	13053.	6844.6	0
1963	41579.	44705.	89947.	0.	0.	8330.	13493.	105426.	51049.	6876.9	0
1964	37700.	38347.	74511.	0.	0.	8912.	19437.	116557.	24649.	6879.0	0
1965	48775.	49021.	74857.	0.	0.	7797.	14220.	114819.	31076.	6888.9	0
1966	56788.	56331.	72479.	0.	0.	7984.	17876.	133128.	21541.	6889.5	0
1967	52798.	55923.	105915.	0.	0.	4079.	-9447.	97712.	58758.	6932.9	0
1968	33168.	32967.	58675.	0.	0.	6212.	21479.	115000.	4332.	6915.6	0
1969	79388.	80139.	83491.	0.	0.	1669.	-4129.	114832.	46338.	6948.2	0
1970	63352.	58723.	47378.	0.	0.	2910.	22256.	144176.	-12908.	6917.8	0
1971	63312.	63017.	56774.	0.	0.	4190.	27221.	142819.	8383.	6911.0	0
1972	54693.	53035.	51526.	0.	0.	8036.	45092.	162475.	-4786.	6887.8	0
1973	88904.	88865.	60705.	0.	0.	4142.	15322.	145298.	23736.	6897.6	0
1974	71150.	73401.	62935.	0.	0.	2057.	13783.	120537.	31639.	6917.1	0
1975	54903.	54883.	70985.	0.	0.	4182.	20875.	137767.	13158.	6915.5	0
1976	44870.	45446.	63943.	0.	0.	6443.	31342.	132532.	14642.	6913.2	0
1977	48479.	46040.	52366.	0.	0.	8389.	37248.	153290.	-9246.	6884.3	0
1978	76438.	76929.	78840.	0.	0.	4829.	10220.	131789.	39029.	6908.0	0
1979	57866.	57391.	66935.	0.	0.	6719.	26292.	152852.	4485.	6894.9	0
1980	51132.	53660.	83793.	0.	0.	6200.	17832.	135031.	26454.	6905.3	0
1981	37954.	38297.	86486.	0.	0.	7048.	22322.	136487.	17665.	6907.0	0
1982	59845.	60195.	86183.	0.	0.	3545.	2467.	118636.	33755.	6926.2	0
1983	78340.	80685.	91276.	0.	0.	-961.	-12155.	117458.	41387.	6957.2	0
1984	43425.	41790.	52530.	0.	0.	2802.	31912.	144584.	-15550.	6925.3	0
1985	40700.	41182.	76212.	0.	0.	4838.	28235.	135891.	14576.	6923.9	0
1986	48259.	47107.	62206.	0.	0.	4451.	24958.	130838.	7883.	6914.3	0
1987	43874.	42958.	51386.	0.	0.	6310.	40123.	140718.	59.	6895.0	0
1988	40395.	40054.	63581.	0.	0.	8262.	41435.	142943.	10389.	6884.6	0
1989	39192.	39105.	65167.	0.	0.	9149.	34794.	132242.	15973.	6878.1	0
1990	31158.	30714.	6413.	0.	0.	9995.	54348.	121601.	-20131.	6833.2	0
1991	46883.	43952.	21144.	0.	0.	10588.	55121.	132150.	-1345.	6810.7	0
1992	45950.	45743.	36045.	0.	0.	10940.	47735.	131849.	8614.	6800.2	0
1993	57357.	59950.	113699.	0.	0.	8493.	10218.	125644.	66715.	6854.6	0
1994	36289.	36664.	92487.	0.	0.	9686.	19104.	130699.	27242.	6862.7	0
AVERAGE	49807.	49602.	58955.	0.	0.	5611.	26886.	125567.	15486.	6862.7	0

GROUND WATER BUDGET IN AC.-FT. FOR EAST SIDE AREA
AREA: 74476. ACRES

TIME	DEEP PERC.	NET DEEP PERC. (+)	GAIN FROM STREAM (+)	RECHARGE (+)	OTHER INFLOW (+)	BOUNDARY INFLOW (+)	SUBSURF. INFLOW (+)	PUMPING (-)	CHANGE IN STORAGE (=)	END STORAGE 1000 AF	LAND SUBSIDENCE 1000 A
1949	26317.	30749.	1227.	0.	0.	-1658.	-23057.	68372.	-61111.	2798.0	0
1950	36790.	34296.	1406.	0.	0.	1071.	-23375.	67239.	-53841.	2768.0	0
1951	33636.	33338.	1886.	0.	0.	2005.	-18498.	71116.	-52386.	2741.1	0
1952	62417.	59160.	4430.	0.	0.	1578.	-10956.	69074.	-14862.	2752.6	0
1953	34746.	36908.	1802.	0.	0.	2178.	-12778.	75471.	-47362.	2732.5	0
1954	28966.	29119.	1131.	0.	0.	3087.	-15827.	72951.	-55441.	2705.0	0
1955	42753.	39617.	1170.	0.	0.	3442.	-17433.	76878.	-50083.	2683.5	0
1956	65365.	63009.	3654.	0.	0.	2938.	1375.	85019.	-14044.	2695.8	0
1957	26683.	30299.	1115.	0.	0.	3413.	-15314.	73232.	-53719.	2670.7	0
1958	51721.	47136.	5052.	0.	0.	3204.	10959.	62001.	4349.	2701.0	0
1959	34596.	37733.	1327.	0.	0.	3434.	14958.	92794.	-35343.	2694.3	0
1960	36995.	35852.	943.	0.	0.	4160.	3464.	95488.	-51070.	2672.7	0
1961	34212.	34408.	473.	0.	0.	4808.	-12772.	93281.	-66364.	2635.7	0
1962	39143.	36270.	2065.	0.	0.	5536.	-2914.	104927.	-63971.	2597.9	0
1963	35219.	36175.	3555.	0.	0.	5418.	23296.	79099.	-10655.	2612.9	0
1964	29981.	31905.	935.	0.	0.	5492.	21586.	82564.	-22645.	2617.0	0
1965	43067.	41362.	2219.	0.	0.	5356.	22523.	84982.	-13524.	2630.3	0
1966	50601.	49932.	1483.	0.	0.	5266.	20476.	97597.	-20440.	2636.1	0
1967	46311.	47591.	4441.	0.	0.	4605.	31646.	70748.	17535.	2678.8	0
1968	27847.	31402.	650.	0.	0.	4720.	13155.	83975.	-34048.	2672.4	0
1969	75464.	70154.	5030.	0.	0.	3508.	23707.	81335.	21065.	2718.0	0
1970	49783.	50350.	2313.	0.	0.	3344.	7558.	97635.	-34070.	2710.2	0
1971	49386.	50145.	616.	0.	0.	3841.	4678.	94976.	-35696.	2697.9	0
1972	37717.	37979.	99.	0.	0.	4806.	-1649.	107653.	-66417.	2654.6	0
1973	72778.	68038.	4599.	0.	0.	4143.	16413.	94429.	-1235.	2675.1	0
1974	58262.	61664.	6253.	0.	0.	3171.	13582.	77377.	7292.	2703.5	0
1975	37539.	39339.	1349.	0.	0.	3742.	12198.	88804.	-32175.	2693.8	0
1976	29395.	31518.	112.	0.	0.	4470.	6832.	85495.	-42563.	2673.6	0
1977	30446.	29807.	83.	0.	0.	5227.	7083.	97003.	-54803.	2642.3	0
1978	62006.	56990.	1972.	0.	0.	4547.	22824.	82059.	4273.	2668.3	0
1979	37693.	40320.	528.	0.	0.	4749.	14049.	95063.	-35417.	2655.8	0
1980	35073.	37467.	2389.	0.	0.	4905.	18404.	80684.	-17519.	2661.2	0
1981	23060.	25530.	369.	0.	0.	5740.	13944.	81465.	-35881.	2648.9	0
1982	42696.	39584.	5615.	0.	0.	5234.	25557.	68929.	7061.	2680.2	0
1983	62770.	61049.	11651.	0.	0.	3957.	27435.	68551.	35541.	2740.4	0
1984	26486.	31830.	2601.	0.	0.	4268.	-1509.	86126.	-48936.	2718.6	0
1985	25179.	25865.	415.	0.	0.	4881.	2730.	81272.	-47382.	2696.6	0
1986	32882.	30575.	2140.	0.	0.	5126.	8083.	79196.	-33273.	2689.9	0
1987	27988.	28138.	303.	0.	0.	5466.	-562.	86723.	-53379.	2662.7	0
1988	25219.	25533.	87.	0.	0.	5985.	2693.	88489.	-54191.	2634.4	0
1989	25239.	25107.	124.	0.	0.	6308.	10424.	83522.	-41559.	2618.9	0
1990	21289.	22400.	124.	0.	0.	6469.	-5773.	76814.	-53594.	2592.8	0
1991	32947.	28167.	261.	0.	0.	6920.	-9077.	84989.	-58718.	2559.1	0
1992	32655.	31961.	467.	0.	0.	6954.	617.	85219.	-45220.	2537.7	0
1993	45035.	43165.	2449.	0.	0.	6393.	29789.	81300.	496.	2558.5	0
1994	24263.	28201.	199.	0.	0.	6568.	32660.	84407.	-16779.	2563.6	0
AVERAGE	39361.	39286.	2024.	0.	0.	4365.	6374.	83181.	-31133.	2563.6	0

GROUND WATER BUDGET IN AC.-FT. FOR FOREBAY AREA
AREA: 86692. ACRES

TIME	DEEP PERC.	NET DEEP PERC. (+)	GAIN FROM STREAM (+)	RECHARGE (+)	OTHER INFLOW (+)	BOUNDARY INFLOW (+)	SUBSURF. INFLOW (+)	PUMPING (-)	CHANGE IN STORAGE (=)	END STORAGE 1000 AF	LAND SUBSIDENCE 1000
1949	59246.	55534.	52655.	175.	0.	13757.	4086.	158412.	-32205.	4446.1	0
1950	59639.	59247.	66761.	184.	0.	13670.	9642.	161680.	-12176.	4429.5	0
1951	59479.	59855.	94953.	153.	0.	13635.	12050.	166254.	14391.	4439.2	0
1952	81803.	82595.	132375.	290.	0.	14324.	9561.	153366.	85779.	4521.3	0
1953	70324.	71326.	82126.	312.	0.	13735.	8883.	166900.	9480.	4525.4	0
1954	61357.	60815.	64844.	154.	0.	13714.	9748.	164294.	-15019.	4503.4	0
1955	65139.	64185.	66188.	201.	0.	13703.	9971.	168426.	-14179.	4481.0	0
1956	79381.	79991.	115719.	257.	0.	13899.	8802.	173235.	45433.	4520.3	0
1957	58597.	57824.	52080.	269.	0.	13683.	7436.	160567.	-29276.	4482.2	0
1958	68821.	70285.	139293.	330.	0.	14222.	5481.	119145.	110467.	4587.2	0
1959	65162.	65511.	83187.	142.	0.	13783.	3303.	181955.	-16029.	4567.7	0
1960	68733.	67208.	74309.	172.	0.	13773.	4702.	182884.	-22720.	4540.2	0
1961	70175.	67989.	27417.	110.	0.	13695.	4873.	183352.	-69268.	4463.2	0
1962	81749.	81257.	130659.	184.	0.	13857.	1809.	184950.	42816.	4499.7	0
1963	66997.	70492.	133422.	435.	0.	13727.	-3396.	147912.	66768.	4563.4	0
1964	60821.	60993.	87479.	185.	0.	13718.	-5211.	168292.	-11129.	4550.2	0
1965	58676.	59642.	105314.	247.	0.	13670.	-4827.	157539.	16506.	4564.4	0
1966	79567.	79052.	93073.	140.	0.	14079.	-5152.	188894.	-7703.	4554.7	0
1967	59065.	61583.	119298.	394.	0.	14102.	-4352.	139243.	51783.	4605.1	0
1968	55675.	54181.	69650.	146.	0.	13926.	-3872.	177385.	-43353.	4559.8	0
1969	91618.	91211.	106767.	354.	0.	14595.	-3476.	162782.	46668.	4605.1	0
1970	66106.	64208.	80218.	316.	0.	13896.	-4062.	187793.	-33217.	4569.9	0
1971	78446.	77685.	83881.	415.	0.	13974.	-3252.	193535.	-20831.	4547.0	0
1972	69429.	68190.	87993.	189.	0.	13892.	-2709.	206877.	-39323.	4505.4	0
1973	86814.	87896.	125255.	284.	0.	14297.	-3907.	177832.	45993.	4549.8	0
1974	70450.	71951.	114820.	330.	0.	14138.	-4760.	171752.	24727.	4573.5	0
1975	63031.	63538.	101888.	340.	0.	14306.	-5614.	169370.	5086.	4577.4	0
1976	54597.	54866.	76707.	107.	0.	14019.	-5136.	172957.	-32395.	4543.9	0
1977	55435.	53447.	77299.	61.	0.	13945.	-5307.	185618.	-46173.	4496.3	0
1978	76730.	77874.	149308.	309.	0.	14891.	-4747.	164015.	73621.	4569.5	0
1979	59433.	60730.	115503.	276.	0.	14307.	-6948.	175446.	8421.	4576.9	0
1980	52633.	55717.	114456.	389.	0.	14972.	-7633.	140102.	37799.	4612.6	0
1981	39741.	39791.	88115.	166.	0.	14440.	-7360.	152590.	-17439.	4592.7	0
1982	40137.	41483.	110102.	464.	0.	14622.	-6906.	121012.	38754.	4629.4	0
1983	71397.	70900.	95992.	257.	0.	15604.	-5989.	125840.	50925.	4678.0	0
1984	42932.	43214.	66040.	61.	0.	15023.	-6686.	158109.	-40457.	4633.6	0
1985	42758.	42300.	72492.	173.	0.	14699.	-5151.	149762.	-25250.	4604.8	0
1986	49451.	49554.	90956.	335.	0.	15521.	-5975.	128957.	21433.	4622.6	0
1987	39073.	38223.	65643.	109.	0.	14921.	-5935.	153764.	-40803.	4577.8	0
1988	41537.	40753.	78861.	150.	0.	15015.	-5189.	150570.	-20979.	4553.0	0
1989	37903.	38065.	83909.	116.	0.	14813.	-4798.	147031.	-14927.	4535.4	0
1990	31803.	31733.	21585.	49.	0.	14768.	-1218.	132242.	-65325.	4463.7	0
1991	44690.	42359.	66391.	96.	0.	14913.	789.	141295.	-16747.	4439.4	0
1992	40431.	41789.	108157.	105.	0.	14834.	789.	139565.	26110.	4458.2	0
1993	47026.	48230.	163336.	186.	0.	15173.	-4108.	134000.	88817.	4541.5	0
1994	33507.	33761.	95694.	108.	0.	14835.	-9061.	140764.	-5427.	4533.9	0
AVERAGE	59946.	59979.	92004.	222.	0.	14284.	-1105.	160614.	4770.	4533.9	0

GROUND WATER BUDGET IN AC.-FT. FOR UPPER VALLEY AREA
AREA: 92300. ACRES

TIME	DEEP PERC.	NET DEEP PERC. (+)	GAIN FROM STREAM (+)	RECHARGE (+)	OTHER INFLOW (+)	BOUNDARY INFLOW (+)	SUBSURF. INFLOW (+)	PUMPING (-)	CHANGE IN STORAGE (=)	END STORAGE 1000 AF	LAND SUBSIDENCE 1000
1949	49572.	45552.	47697.	0.	0.	6106.	-23736.	114217.	-38598.	2380.1	0
1950	54645.	54470.	71528.	0.	0.	6122.	-24740.	116531.	-9149.	2371.3	0
1951	53178.	53924.	89208.	0.	0.	6135.	-26257.	119259.	3751.	2374.5	0
1952	64208.	63684.	92376.	0.	0.	6635.	-23962.	111588.	27145.	2400.1	0
1953	62532.	63475.	78178.	0.	0.	6202.	-23635.	124223.	-3.	2399.4	0
1954	58017.	56349.	63326.	0.	0.	6253.	-23759.	119359.	-17190.	2382.4	0
1955	58326.	57009.	73883.	0.	0.	6245.	-23762.	124020.	-10645.	2372.3	0
1956	79592.	78846.	93253.	0.	0.	6587.	-23594.	133593.	21499.	2392.6	0
1957	59731.	58713.	62222.	0.	0.	6301.	-22037.	131964.	-26765.	2366.7	0
1958	81278.	81960.	128599.	0.	0.	7134.	-21024.	97802.	98868.	2463.9	0
1959	69668.	70574.	89426.	0.	0.	6436.	-21689.	150517.	-5770.	2456.3	0
1960	68084.	67595.	92555.	0.	0.	6417.	-23261.	154399.	-11093.	2444.3	0
1961	69601.	67127.	38498.	0.	0.	6409.	-20981.	157121.	-66067.	2379.3	0
1962	92108.	91993.	148517.	0.	0.	6626.	-18074.	165786.	63276.	2440.7	0
1963	76400.	77679.	83963.	0.	0.	6737.	-18431.	142161.	7787.	2446.6	0
1964	68294.	68767.	101333.	0.	0.	6506.	-16124.	160851.	-369.	2444.6	0
1965	67425.	67517.	87588.	0.	0.	6505.	-16269.	144513.	828.	2444.3	0
1966	74215.	74759.	104296.	0.	0.	6868.	-15512.	168527.	1885.	2445.1	0
1967	70643.	71684.	84332.	0.	0.	6942.	-16142.	132266.	14549.	2458.8	0
1968	62474.	61868.	90059.	0.	0.	6781.	-15325.	154572.	-11189.	2446.9	0
1969	102305.	101479.	89367.	0.	0.	7537.	-15888.	157465.	25029.	2471.2	0
1970	72617.	70415.	77960.	0.	0.	6694.	-15035.	168437.	-28404.	2442.3	0
1971	89073.	88995.	97101.	0.	0.	6786.	-15598.	176004.	1279.	2442.6	0
1972	74165.	74887.	117556.	0.	0.	6743.	-16452.	180419.	2314.	2443.5	0
1973	105092.	103551.	72852.	0.	0.	7213.	-17122.	165006.	1488.	2444.1	0
1974	82516.	83046.	92605.	0.	0.	7140.	-15371.	166568.	851.	2444.0	0
1975	78218.	78552.	94116.	0.	0.	7246.	-14913.	162475.	2527.	2445.5	0
1976	59722.	63618.	107198.	0.	0.	6899.	-15398.	157041.	5275.	2449.5	0
1977	68339.	65557.	106271.	0.	0.	6866.	-16558.	171259.	-9124.	2439.3	0
1978	94275.	92587.	90186.	0.	0.	8009.	-17432.	158648.	14703.	2453.0	0
1979	81021.	81508.	98698.	0.	0.	7144.	-15180.	178798.	-6627.	2445.2	0
1980	82151.	83305.	85725.	0.	0.	7899.	-14749.	153680.	8500.	2453.2	0
1981	60006.	61079.	107170.	0.	0.	7172.	-14005.	161765.	-350.	2452.2	0
1982	60251.	61673.	88012.	0.	0.	7478.	-14596.	135572.	6995.	2459.0	0
1983	107295.	105757.	63322.	0.	0.	8751.	-14769.	140972.	22089.	2481.8	0
1984	70450.	70861.	74200.	0.	0.	7542.	-12966.	168453.	-28817.	2453.6	0
1985	68763.	69480.	99898.	0.	0.	7249.	-13906.	160583.	2139.	2455.7	0
1986	82939.	82624.	72602.	0.	0.	8236.	-14793.	147886.	783.	2456.7	0
1987	55192.	55828.	96139.	0.	0.	7415.	-14695.	155088.	-10401.	2446.2	0
1988	56879.	57169.	96219.	0.	0.	7511.	-16118.	138786.	5994.	2451.8	0
1989	53660.	54507.	104394.	0.	0.	7367.	-16977.	141959.	7332.	2458.5	0
1990	43639.	43039.	10997.	0.	0.	7391.	-17882.	139021.	-95476.	2363.9	0
1991	70791.	68179.	119256.	0.	0.	7597.	-16194.	136963.	41875.	2405.8	0
1992	53342.	55942.	105578.	0.	0.	7539.	-18295.	136878.	13886.	2418.5	0
1993	77877.	78286.	106745.	0.	0.	8097.	-18159.	132992.	41977.	2459.5	0
1994	48761.	49753.	94146.	0.	0.	7509.	-17687.	134644.	-923.	2458.1	0
AVERAGE	70420.	70331.	88895.	0.	0.	7021.	-18023.	146753.	1471.	2458.1	0

GROUND WATER BUDGET IN AC.-FT. FOR ENTIRE MODEL AREA
AREA: 416580. ACRES

TIME	DEEP PERC.	NET DEEP PERC. (+)	GAIN FROM STREAM (+)	RECHARGE (+)	OTHER INFLOW (+)	BOUNDARY INFLOW (+)	SUBSURF. INFLOW (+)	PUMPING (-)	CHANGE IN STORAGE (=)	END STORAGE 1000 AF	LAND SUBSIDENCE 1000 A
1949	168874.	165038.	113719.	175.	1243.	21429.	0.	442428.	-140824.	18644.8	0
1950	200861.	194148.	165167.	184.	710.	26300.	0.	444925.	-58415.	18587.2	0
1951	194290.	195044.	220984.	153.	849.	30345.	0.	467469.	-20094.	18567.9	0
1952	296299.	286416.	266422.	290.	555.	25730.	0.	439541.	139873.	18708.4	0
1953	213499.	222071.	208040.	312.	903.	31843.	0.	481489.	-18321.	18690.9	0
1954	186380.	186090.	163208.	154.	1058.	36539.	0.	466713.	-79664.	18612.0	0
1955	224354.	214776.	158803.	201.	1072.	38131.	0.	482454.	-69472.	18543.3	0
1956	312238.	305658.	276777.	257.	880.	34509.	0.	516086.	101994.	18645.9	0
1957	177358.	184132.	128013.	269.	1173.	39968.	0.	468756.	-115201.	18531.5	0
1958	273531.	267253.	370778.	330.	848.	34081.	0.	370300.	302990.	18835.2	0
1959	212761.	221951.	249309.	142.	1050.	37973.	0.	555063.	-44637.	18791.4	0
1960	224581.	221023.	216796.	172.	1200.	43191.	0.	570243.	-87863.	18704.3	0
1961	217804.	213280.	71579.	110.	1447.	48126.	0.	565584.	-231041.	18474.0	0
1962	265386.	261310.	335524.	184.	1655.	53716.	0.	603111.	49279.	18524.0	0
1963	227592.	234703.	311164.	435.	1472.	48256.	0.	477245.	118784.	18643.5	0
1964	200925.	205228.	264306.	185.	1472.	49243.	0.	530773.	-10339.	18633.9	0
1965	227237.	224798.	270479.	247.	1372.	46542.	0.	504226.	39212.	18673.8	0
1966	271038.	268830.	271802.	140.	1372.	47796.	0.	590381.	-441.	18674.1	0
1967	241259.	246908.	314956.	394.	1068.	37897.	0.	442026.	159195.	18834.0	0
1968	182196.	187124.	219083.	146.	1195.	42310.	0.	532861.	-83002.	18751.8	0
1969	373805.	359114.	287438.	354.	846.	32565.	0.	518192.	162125.	18914.6	0
1970	263093.	257646.	208704.	316.	872.	33580.	0.	599669.	-98552.	18816.8	0
1971	290187.	291744.	238856.	415.	1135.	37894.	0.	609017.	-38974.	18778.6	0
1972	238828.	241038.	257246.	189.	1545.	47954.	0.	659189.	-111217.	18668.1	0
1973	372953.	361375.	265968.	284.	1227.	39429.	0.	584372.	83911.	18752.6	0
1974	302012.	307432.	278856.	330.	936.	32763.	0.	538092.	82225.	18835.6	0
1975	239440.	247005.	269007.	340.	1236.	38631.	0.	560340.	-4121.	18832.2	0
1976	191565.	201992.	248066.	107.	1440.	43863.	0.	550007.	-54539.	18778.4	0
1977	205150.	199736.	236123.	61.	1503.	49088.	0.	609231.	-122720.	18656.4	0
1978	328439.	315886.	322694.	309.	1232.	42300.	0.	538615.	143805.	18800.8	0
1979	240933.	248598.	282552.	276.	1467.	45613.	0.	604344.	-25838.	18775.7	0
1980	227629.	237672.	287696.	389.	1402.	45659.	0.	511728.	61089.	18837.5	0
1981	163131.	169708.	282546.	166.	1745.	47018.	0.	534404.	-33221.	18804.9	0
1982	214878.	211071.	291988.	464.	1426.	38847.	0.	446099.	97697.	18903.1	0
1983	340169.	333166.	266609.	257.	1186.	28904.	0.	454636.	175485.	19079.2	0
1984	186270.	196791.	196478.	61.	1363.	36196.	0.	558971.	-128082.	18951.8	0
1985	180558.	184623.	249468.	173.	1524.	41246.	0.	529065.	-52031.	18900.4	0
1986	219995.	215515.	229079.	335.	1520.	42519.	0.	488302.	665.	18901.7	0
1987	170617.	170673.	214182.	109.	1650.	45842.	0.	537597.	-105140.	18797.2	0
1988	166169.	167622.	239094.	150.	1876.	51145.	0.	521955.	-62068.	18735.7	0
1989	159092.	160318.	254087.	116.	1976.	53128.	0.	505783.	-36158.	18700.1	0
1990	130671.	131161.	39592.	49.	1929.	55059.	0.	470566.	-242775.	18457.9	0
1991	201644.	187014.	207848.	96.	2207.	57790.	0.	496426.	-41471.	18417.0	0
1992	179644.	181316.	251570.	105.	2222.	58525.	0.	494685.	-948.	18416.5	0
1993	241274.	239713.	388980.	186.	1982.	53215.	0.	475253.	208824.	18625.8	0
1994	146261.	155028.	283263.	108.	2073.	54652.	0.	491959.	3164.	18629.5	0
AVERAGE	228106.	227799.	242933.	222.	1350.	41899.	0.	518265.	-4062.	18629.5	0

AVERAGE GROUNDWATER BUDGET IN AC.-FT. FROM 1949 THRU 1994

REGION	DEEP PERC.	NET DEEP PERC. (+)	GAIN FROM STREAM (+)	RECHARGE (+)	OTHER INFLOW (+)	BOUNDARY INFLOW (+)	SUBSURF. INFLOW (+)	PUMPING (-)	CHANGE IN STORAGE (=)	END STORAGE 1000 AF	LAND SUBSIDENCE 1000 A
1	0.	0.	0.	0.	1350.	10454.	-10226.	0.	1578.	1630.6	0
2	8572.	8602.	1055.	0.	0.	164.	-3907.	2149.	3766.	580.7	0
3	49807.	49602.	58955.	0.	0.	5611.	26886.	125567.	15486.	6862.7	0
4	39361.	39286.	2024.	0.	0.	4365.	6374.	83181.	-31133.	2563.6	0
5	59946.	59979.	92004.	222.	0.	14284.	-1105.	160614.	4770.	4533.9	0
6	70420.	70331.	88895.	0.	0.	7021.	-18023.	146753.	1471.	2458.1	0
TOTAL	228106.	227799.	242933.	222.	1350.	41899.	0.	518265.	-4062.	18629.5	0

STREAMFLOW BUDGET IN AC.-FT. FOR MONTEREY BAY
AREA: 37143. ACRES

TIME	UPSTREAM FLOW (+)	TRIB. FLOW (+)	D.R. FROM RAIN (+)	AG/URBAN SW RETURN (+)	GAIN FROM GW (+)	SW DIVERSION (-)	BY-PASS FLOW (-)	ERROR ADJUST. (+)	DOWNSTRM FLOW (=)	DIVERSION SHORT
1949	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1950	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1951	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1952	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1953	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1954	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1955	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1956	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1957	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1958	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1959	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1960	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1961	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1962	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1963	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1964	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1965	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1966	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1967	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1968	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1969	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1970	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1971	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1972	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1973	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1974	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1975	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1976	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1977	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1978	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1979	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1980	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1981	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1982	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1983	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1984	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1985	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1986	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1987	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1988	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1989	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1990	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1991	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1992	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1993	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1994	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
AVERAGE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

STREAMFLOW BUDGET IN AC.-FT. FOR FORT ORD/TORO
AREA: 35187. ACRES

TIME	UPSTREAM FLOW (+)	TRIB. FLOW (+)	D.R. FROM RAIN (+)	AG/URBAN SW RETURN (+)	GAIN FROM GW (+)	SW DIVERSION (-)	BY-PASS FLOW (-)	ERROR ADJUST. (+)	DOWNSTRM FLOW (=)	DIVERSION SHORT
1949	677.	22.	3.	0.	-588.	0.	0.	0.	114.	0.
1950	645.	16.	988.	0.	-1109.	0.	0.	0.	541.	0.
1951	1165.	0.	70.	0.	-916.	0.	0.	0.	319.	0.
1952	2722.	765.	2219.	0.	-2693.	0.	0.	0.	3013.	0.
1953	939.	0.	31.	0.	-865.	0.	0.	0.	106.	0.
1954	571.	0.	37.	0.	-556.	0.	0.	0.	53.	0.
1955	531.	0.	282.	0.	-696.	0.	0.	0.	117.	0.
1956	2311.	260.	2877.	0.	-2316.	0.	0.	0.	3132.	0.
1957	620.	0.	1.	0.	-524.	0.	0.	0.	97.	0.
1958	3787.	453.	1421.	0.	-2759.	0.	0.	0.	2902.	0.
1959	751.	0.	25.	0.	-646.	0.	0.	0.	130.	0.
1960	483.	0.	6.	0.	-444.	0.	0.	0.	45.	0.
1961	210.	0.	1.	0.	-199.	0.	0.	0.	13.	0.
1962	115.	63.	175.	0.	-239.	0.	0.	0.	115.	0.
1963	159.	272.	161.	0.	-276.	0.	0.	0.	316.	0.
1964	49.	0.	2.	0.	-48.	0.	0.	0.	4.	0.
1965	393.	0.	244.	0.	-501.	0.	0.	0.	136.	0.
1966	283.	0.	382.	0.	-471.	0.	0.	0.	194.	0.
1967	864.	0.	665.	0.	-970.	0.	0.	0.	560.	0.
1968	50.	0.	5.	0.	-50.	0.	0.	0.	5.	0.
1969	7207.	1058.	2406.	0.	-2783.	0.	0.	0.	7888.	0.
1970	626.	0.	601.	0.	-835.	0.	0.	0.	393.	0.
1971	336.	0.	274.	0.	-484.	0.	0.	0.	126.	0.
1972	68.	0.	13.	0.	-72.	0.	0.	0.	9.	0.
1973	3859.	491.	1690.	0.	-2557.	0.	0.	0.	3484.	0.
1974	1941.	0.	2574.	0.	-2243.	0.	0.	0.	2271.	0.
1975	668.	32.	155.	0.	-669.	0.	0.	0.	186.	0.
1976	88.	0.	38.	0.	-106.	0.	0.	0.	20.	0.
1977	75.	0.	51.	0.	-104.	0.	0.	0.	22.	0.
1978	2212.	581.	1757.	0.	-2388.	0.	0.	0.	2163.	0.
1979	806.	0.	246.	0.	-887.	0.	0.	0.	165.	0.
1980	1536.	376.	459.	0.	-1333.	0.	0.	0.	1038.	0.
1981	296.	0.	207.	0.	-407.	0.	0.	0.	97.	0.
1982	2030.	336.	1256.	0.	-2076.	0.	0.	0.	1547.	0.
1983	8189.	1398.	2511.	0.	-4367.	0.	0.	0.	7731.	0.
1984	888.	268.	364.	0.	-1108.	0.	0.	0.	411.	0.
1985	138.	0.	454.	0.	-451.	0.	0.	0.	141.	0.
1986	999.	1571.	926.	0.	-1175.	0.	0.	0.	2321.	0.
1987	91.	0.	972.	0.	-712.	0.	0.	0.	351.	0.
1988	43.	0.	432.	0.	-347.	0.	0.	0.	129.	0.
1989	35.	0.	651.	0.	-494.	0.	0.	0.	192.	0.
1990	28.	0.	630.	0.	-473.	0.	0.	0.	185.	0.
1991	273.	21.	968.	0.	-796.	0.	0.	0.	465.	0.
1992	1120.	13.	1375.	0.	-1322.	0.	0.	0.	1186.	0.
1993	5045.	978.	2308.	0.	-2751.	0.	0.	0.	5580.	0.
1994	201.	0.	788.	0.	-736.	0.	0.	0.	253.	0.
AVERAGE	1220.	195.	733.	0.	-1055.	0.	0.	0.	1093.	0.

STREAMFLOW BUDGET IN AC.-FT. FOR PRESSURE AREA
AREA: 90781. ACRES

TIME	UPSTREAM FLOW (+)	TRIB. FLOW (+)	D.R. FROM RAIN (+)	AG/URBAN SW RETURN (+)	GAIN FROM GW (+)	SW DIVERSION (-)	BY-PASS FLOW (-)	ERROR ADJUST. (+)	DOWNSTRM FLOW (=)	DIVERSION SHORT
1949	112814.	258.	4156.	5325.	-11552.	0.	0.	0.	111001.	0.
1950	68502.	0.	18603.	5357.	-24362.	0.	0.	0.	68100.	0.
1951	91075.	0.	10458.	5613.	-34021.	0.	0.	0.	73125.	0.
1952	735968.	1474.	38926.	5768.	-34547.	0.	0.	0.	747588.	0.
1953	149346.	0.	8509.	6004.	-45070.	0.	0.	0.	118789.	0.
1954	86424.	0.	5738.	6067.	-33351.	0.	0.	0.	64879.	0.
1955	18140.	0.	12758.	6294.	-16866.	0.	0.	0.	20327.	0.
1956	461008.	233.	46450.	6530.	-61836.	0.	0.	0.	452385.	0.
1957	17911.	0.	5209.	6449.	-12072.	0.	0.	0.	17497.	0.
1958	819608.	170.	28534.	6470.	-95074.	0.	0.	0.	759708.	0.
1959	190696.	0.	4931.	6992.	-74723.	0.	0.	0.	127896.	0.
1960	54121.	0.	4649.	7638.	-48544.	0.	0.	0.	17863.	0.
1961	1172.	0.	5268.	7412.	-4991.	0.	0.	0.	8861.	0.
1962	187607.	0.	6575.	7848.	-54045.	0.	0.	0.	147984.	0.
1963	280426.	0.	11602.	7736.	-89947.	0.	0.	0.	209817.	0.
1964	85342.	0.	7925.	7596.	-74511.	0.	0.	0.	26353.	0.
1965	127316.	0.	14126.	7899.	-74857.	0.	0.	0.	74485.	0.
1966	99875.	1.	18440.	8088.	-72479.	0.	0.	0.	53924.	0.
1967	623094.	0.	26251.	7795.	-105915.	0.	0.	0.	551224.	0.
1968	65558.	0.	4193.	8043.	-58675.	0.	0.	0.	19120.	0.
1969	1632942.	402.	42561.	8123.	-83491.	0.	0.	0.	1600537.	0.
1970	194518.	0.	16812.	8551.	-47378.	0.	0.	0.	172502.	0.
1971	78857.	0.	18292.	9158.	-56774.	0.	0.	0.	49533.	0.
1972	51267.	0.	5822.	9609.	-51526.	0.	0.	0.	15172.	0.
1973	515314.	731.	38551.	9627.	-60705.	0.	0.	0.	503518.	0.
1974	353058.	297.	47075.	8927.	-62935.	0.	0.	0.	346421.	0.
1975	337674.	201.	10768.	9778.	-70985.	0.	0.	0.	287436.	0.
1976	63866.	0.	6065.	9887.	-63943.	0.	0.	0.	15875.	0.
1977	55229.	0.	4494.	9743.	-52366.	0.	0.	0.	17100.	0.
1978	1203060.	917.	36925.	10012.	-78840.	0.	0.	0.	1172074.	0.
1979	156132.	0.	9393.	10289.	-66935.	0.	0.	0.	108879.	0.
1980	857611.	0.	14814.	10042.	-83793.	0.	0.	0.	798673.	0.
1981	158099.	0.	4192.	10077.	-86486.	0.	0.	0.	85883.	0.
1982	404035.	0.	25440.	9973.	-86183.	0.	0.	0.	353265.	0.
1983	1949363.	99.	40629.	9971.	-91276.	0.	0.	0.	1908786.	0.
1984	303953.	0.	6884.	10168.	-52530.	0.	0.	0.	268476.	0.
1985	92985.	0.	7893.	10091.	-76212.	0.	0.	0.	34758.	0.
1986	577140.	0.	15923.	9925.	-62206.	0.	0.	0.	540782.	0.
1987	54836.	0.	13188.	9863.	-51386.	0.	0.	0.	26502.	0.
1988	65951.	0.	6168.	9729.	-63581.	0.	0.	0.	18267.	0.
1989	69836.	0.	8717.	9492.	-65167.	0.	0.	0.	22878.	0.
1990	1189.	0.	8027.	9235.	-6413.	0.	0.	0.	12037.	0.
1991	64806.	0.	13735.	9207.	-21144.	0.	0.	0.	66605.	0.
1992	84853.	0.	18769.	9109.	-36045.	0.	0.	0.	76687.	0.
1993	538330.	0.	30848.	9147.	-113699.	0.	0.	0.	464627.	0.
1994	102866.	0.	8931.	9417.	-92487.	0.	0.	0.	28726.	0.
AVERAGE	309647.	104.	16179.	8393.	-58955.	0.	0.	0.	275368.	0.

STREAMFLOW BUDGET IN AC.-FT. FOR EAST SIDE AREA
AREA: 74476. ACRES

TIME	UPSTREAM FLOW (+)	TRIB. FLOW (+)	D.R. FROM RAIN (+)	AG/URBAN SW RETURN (+)	GAIN FROM GW (+)	SW DIVERSION (-)	BY-PASS FLOW (-)	ERROR ADJUST. (+)	DOWNSTRM FLOW (=)	DIVERSION SHORT
1949	1451.	0.	98.	43.	-1227.	0.	0.	0.	365.	0.
1950	1371.	0.	664.	41.	-1406.	0.	0.	0.	669.	0.
1951	2495.	0.	253.	47.	-1886.	0.	0.	0.	909.	0.
1952	5851.	0.	1408.	48.	-4430.	0.	0.	0.	2878.	0.
1953	2007.	0.	236.	52.	-1802.	0.	0.	0.	493.	0.
1954	1212.	0.	165.	44.	-1131.	0.	0.	0.	290.	0.
1955	1127.	0.	388.	53.	-1170.	0.	0.	0.	398.	0.
1956	4970.	0.	1853.	57.	-3654.	0.	0.	0.	3226.	0.
1957	1311.	0.	190.	43.	-1115.	0.	0.	0.	428.	0.
1958	8154.	0.	973.	34.	-5052.	0.	0.	0.	4110.	0.
1959	1603.	0.	195.	58.	-1327.	0.	0.	0.	529.	0.
1960	1030.	0.	198.	78.	-943.	0.	0.	0.	364.	0.
1961	442.	0.	225.	66.	-473.	0.	0.	0.	260.	0.
1962	2819.	0.	297.	79.	-2065.	0.	0.	0.	1131.	0.
1963	5513.	0.	569.	64.	-3555.	0.	0.	0.	2590.	0.
1964	993.	0.	363.	43.	-935.	0.	0.	0.	463.	0.
1965	2619.	0.	623.	63.	-2219.	0.	0.	0.	1086.	0.
1966	1476.	0.	809.	61.	-1483.	0.	0.	0.	863.	0.
1967	6111.	0.	1307.	35.	-4441.	0.	0.	0.	3012.	0.
1968	659.	0.	304.	41.	-650.	0.	0.	0.	353.	0.
1969	8436.	0.	1922.	39.	-5030.	0.	0.	0.	5367.	0.
1970	2625.	0.	904.	51.	-2313.	0.	0.	0.	1267.	0.
1971	437.	0.	902.	66.	-616.	0.	0.	0.	789.	0.
1972	0.	0.	361.	71.	-99.	0.	0.	0.	332.	0.
1973	7302.	0.	1946.	63.	-4599.	0.	0.	0.	4711.	0.
1974	9150.	0.	2474.	36.	-6253.	0.	0.	0.	5406.	0.
1975	1343.	0.	785.	55.	-1349.	0.	0.	0.	833.	0.
1976	0.	0.	474.	51.	-112.	0.	0.	0.	412.	0.
1977	0.	0.	351.	44.	-83.	0.	0.	0.	312.	0.
1978	2440.	0.	1874.	40.	-1972.	0.	0.	0.	2382.	0.
1979	550.	0.	617.	42.	-528.	0.	0.	0.	681.	0.
1980	3669.	0.	823.	35.	-2389.	0.	0.	0.	2139.	0.
1981	611.	0.	313.	36.	-369.	0.	0.	0.	590.	0.
1982	8376.	0.	1304.	29.	-5615.	0.	0.	0.	4094.	0.
1983	21510.	0.	1883.	29.	-11651.	0.	0.	0.	11771.	0.
1984	3013.	0.	413.	37.	-2601.	0.	0.	0.	862.	0.
1985	380.	0.	459.	34.	-415.	0.	0.	0.	458.	0.
1986	3551.	0.	811.	33.	-2140.	0.	0.	0.	2255.	0.
1987	132.	0.	715.	36.	-303.	0.	0.	0.	581.	0.
1988	0.	0.	353.	36.	-87.	0.	0.	0.	303.	0.
1989	5.	0.	494.	34.	-124.	0.	0.	0.	409.	0.
1990	12.	0.	456.	30.	-124.	0.	0.	0.	375.	0.
1991	100.	0.	645.	34.	-261.	0.	0.	0.	518.	0.
1992	237.	0.	898.	33.	-467.	0.	0.	0.	701.	0.
1993	3084.	0.	1354.	32.	-2449.	0.	0.	0.	2020.	0.
1994	50.	0.	559.	34.	-199.	0.	0.	0.	443.	0.
AVERAGE	2831.	0.	765.	46.	-2024.	0.	0.	0.	1618.	0.

STREAMFLOW BUDGET IN AC.-FT. FOR FOREBAY AREA
AREA: 86692. ACRES

TIME	UPSTREAM FLOW (+)	TRIB. FLOW (+)	D.R. FROM RAIN (+)	AG/URBAN SW RETURN (+)	GAIN FROM GW (+)	SW DIVERSION (-)	BY-PASS FLOW (-)	ERROR ADJUST. (+)	DOWNSTRM FLOW (=)	DIVERSION SHORT
1949	165143.	1317.	3248.	1123.	-52655.	5841.	0.	0.	112335.	359.
1950	137925.	0.	1106.	1150.	-66761.	6128.	0.	0.	67291.	447.
1951	187862.	0.	844.	1177.	-94953.	5085.	0.	0.	89846.	648.
1952	843654.	16774.	10541.	1145.	-132375.	9661.	0.	0.	730077.	607.
1953	237663.	0.	2374.	1221.	-82126.	10383.	0.	0.	148748.	589.
1954	152897.	0.	1993.	1164.	-64844.	5128.	0.	0.	86082.	671.
1955	86515.	6.	2770.	1212.	-66188.	6691.	0.	0.	17625.	578.
1956	560997.	1609.	15084.	1249.	-115719.	8570.	0.	0.	454649.	519.
1957	76197.	0.	1112.	1115.	-52080.	8958.	0.	0.	17385.	817.
1958	946920.	6110.	9105.	760.	-139293.	11006.	0.	0.	812596.	749.
1959	274619.	29.	2030.	1285.	-83187.	4739.	0.	0.	190037.	707.
1960	131517.	0.	730.	1496.	-74309.	5721.	0.	0.	53712.	598.
1961	29063.	0.	1477.	1450.	-27417.	3673.	0.	0.	900.	271.
1962	315308.	2024.	4232.	1596.	-130659.	6140.	0.	0.	186361.	486.
1963	418309.	167.	5749.	1219.	-133422.	14503.	0.	0.	277520.	907.
1964	176294.	0.	976.	1236.	-87479.	6152.	0.	0.	84876.	480.
1965	236825.	0.	1559.	1269.	-105314.	8245.	0.	0.	126095.	549.
1966	179360.	9346.	6496.	1367.	-93073.	4679.	0.	0.	98817.	257.
1967	742227.	2527.	6265.	927.	-119298.	13126.	0.	0.	619522.	478.
1968	137220.	866.	451.	1186.	-69650.	4874.	0.	0.	65200.	235.
1969	1698789.	24269.	14051.	1140.	-106767.	11797.	0.	0.	1619686.	722.
1970	280843.	0.	1319.	1434.	-80218.	10519.	0.	0.	192858.	1871.
1971	167453.	696.	6042.	1454.	-83881.	13823.	0.	0.	77942.	1305.
1972	140590.	0.	3172.	1451.	-87993.	6294.	0.	0.	50926.	1402.
1973	621467.	6330.	12692.	1361.	-125255.	9476.	0.	0.	507119.	1288.
1974	456738.	5105.	8098.	1245.	-114820.	10986.	0.	0.	345380.	472.
1975	430944.	12679.	4985.	1255.	-101888.	11321.	0.	0.	336655.	1960.
1976	141126.	5.	1400.	1186.	-76707.	3577.	0.	0.	63434.	438.
1977	132283.	0.	791.	1154.	-77299.	2035.	0.	0.	54894.	210.
1978	1327094.	16088.	13867.	1084.	-149308.	10311.	0.	0.	1198514.	2061.
1979	274752.	1173.	2968.	1089.	-115503.	9193.	0.	0.	155285.	4389.
1980	963079.	13506.	4483.	773.	-114456.	12951.	0.	0.	854434.	1482.
1981	248679.	696.	886.	802.	-88115.	5535.	0.	0.	157412.	58.
1982	512280.	7909.	3078.	680.	-110102.	15451.	0.	0.	398394.	575.
1983	2005177.	19898.	13046.	697.	-95992.	12965.	0.	0.	1929861.	372.
1984	360275.	7534.	2596.	816.	-66040.	2501.	0.	0.	302680.	291.
1985	168621.	0.	1721.	785.	-72492.	6250.	0.	0.	92386.	525.
1986	647398.	19652.	6924.	707.	-90956.	11161.	0.	0.	572564.	3044.
1987	121060.	182.	1153.	797.	-65643.	3646.	0.	0.	53904.	592.
1988	145398.	1228.	1987.	783.	-78861.	5015.	0.	0.	65520.	2181.
1989	154932.	0.	1304.	761.	-83909.	3853.	0.	0.	69235.	691.
1990	22024.	0.	1137.	678.	-21585.	1625.	0.	0.	629.	288.
1991	126335.	2906.	3437.	731.	-66391.	3195.	0.	0.	63823.	356.
1992	189329.	498.	4083.	724.	-108157.	3510.	0.	0.	82967.	173.
1993	690377.	3365.	5826.	707.	-163336.	6208.	0.	0.	530730.	43.
1994	199568.	17.	1142.	729.	-95694.	3592.	0.	0.	102170.	245.
AVERAGE	397024.	4011.	4355.	1073.	-92004.	7524.	0.	0.	306936.	826.

STREAMFLOW BUDGET IN AC.-FT. FOR UPPER VALLEY AREA
AREA: 92300. ACRES

TIME	UPSTREAM FLOW (+)	TRIB. FLOW (+)	D.R. FROM RAIN (+)	AG/URBAN SW RETURN (+)	GAIN FROM GW (+)	SW DIVERSION (-)	BY-PASS FLOW (-)	ERROR ADJUST. (+)	DOWNSTRM FLOW (=)	DIVERSION SHORT
1949	155625.	0.	1007.	4108.	-47697.	0.	0.	0.	113043.	0.
1950	154645.	0.	1019.	4152.	-71528.	0.	0.	0.	88289.	0.
1951	182627.	0.	712.	4211.	-89208.	0.	0.	0.	98341.	0.
1952	704515.	14019.	3916.	4196.	-92376.	0.	0.	0.	634269.	0.
1953	237794.	0.	1559.	4337.	-78178.	0.	0.	0.	165512.	0.
1954	166258.	40.	1759.	4310.	-63326.	0.	0.	0.	109042.	0.
1955	113537.	0.	1675.	4295.	-73883.	0.	0.	0.	45625.	0.
1956	453724.	4496.	13719.	4377.	-93253.	0.	0.	0.	383062.	0.
1957	85613.	0.	1018.	4416.	-62222.	0.	0.	0.	28825.	0.
1958	756491.	10995.	12487.	4210.	-128599.	0.	0.	0.	655584.	0.
1959	298218.	111.	3542.	4604.	-89426.	0.	0.	0.	217050.	0.
1960	181438.	0.	748.	4823.	-92555.	0.	0.	0.	94454.	0.
1961	45443.	0.	1123.	4853.	-38498.	0.	0.	0.	12921.	0.
1962	349634.	1988.	6404.	5043.	-148517.	0.	0.	0.	214552.	0.
1963	278526.	4651.	17109.	4902.	-83963.	0.	0.	0.	221225.	0.
1964	235588.	0.	985.	5150.	-101333.	0.	0.	0.	140390.	0.
1965	223605.	0.	1633.	5163.	-87588.	0.	0.	0.	142812.	0.
1966	210927.	11843.	2188.	5456.	-104296.	0.	0.	0.	126119.	0.
1967	590420.	6611.	5516.	5379.	-84332.	0.	0.	0.	523594.	0.
1968	195214.	1710.	618.	5701.	-90059.	0.	0.	0.	113185.	0.
1969	1419318.	49079.	12269.	5936.	-89367.	0.	0.	0.	1397236.	0.
1970	257048.	0.	1304.	6187.	-77960.	0.	0.	0.	186579.	0.
1971	188227.	1209.	6731.	6417.	-97101.	0.	0.	0.	105484.	0.
1972	222842.	0.	2413.	6607.	-117556.	0.	0.	0.	114306.	0.
1973	439424.	4869.	12968.	6801.	-72852.	0.	0.	0.	391211.	0.
1974	379896.	8933.	11854.	6993.	-92605.	0.	0.	0.	315072.	0.
1975	320418.	17977.	13053.	7190.	-94116.	0.	0.	0.	264521.	0.
1976	227850.	15.	1990.	7377.	-107198.	0.	0.	0.	130034.	0.
1977	224680.	0.	1171.	7659.	-106271.	0.	0.	0.	127240.	0.
1978	1064821.	16340.	14853.	7827.	-90186.	0.	0.	0.	1013655.	0.
1979	239992.	1642.	4201.	8201.	-98698.	0.	0.	0.	155337.	0.
1980	715459.	20439.	9908.	8261.	-85725.	0.	0.	0.	668343.	0.
1981	262004.	1152.	1708.	8479.	-107170.	0.	0.	0.	166173.	0.
1982	320288.	10973.	6452.	8492.	-88012.	0.	0.	0.	258194.	0.
1983	1493997.	33132.	19209.	8721.	-63322.	0.	0.	0.	1491736.	0.
1984	319318.	11608.	4388.	9024.	-74200.	0.	0.	0.	270138.	0.
1985	211681.	0.	2859.	9137.	-99898.	0.	0.	0.	123778.	0.
1986	421492.	34624.	19789.	9366.	-72602.	0.	0.	0.	412669.	0.
1987	174403.	248.	1449.	9684.	-96139.	0.	0.	0.	89645.	0.
1988	203305.	1443.	3867.	9865.	-96219.	0.	0.	0.	122261.	0.
1989	224847.	0.	3267.	10187.	-104394.	0.	0.	0.	133906.	0.
1990	7166.	1.	985.	10432.	-10997.	0.	0.	0.	7588.	0.
1991	173724.	4264.	8887.	10875.	-119256.	0.	0.	0.	78493.	0.
1992	205869.	255.	3742.	11323.	-105578.	0.	0.	0.	115612.	0.
1993	552600.	7424.	11111.	11501.	-106745.	0.	0.	0.	475890.	0.
1994	248765.	0.	2265.	11724.	-94146.	0.	0.	0.	168607.	0.
AVERAGE	350854.	6132.	5683.	6912.	-88895.	0.	0.	0.	280687.	0.

STREAMFLOW BUDGET IN AC.-FT. FOR ENTIRE MODEL AREA

AREA: 416580. ACRES

TIME	UPSTREAM FLOW (+)	TRIB. FLOW (+)	D.R. FROM RAIN (+)	AG/URBAN SW RETURN (+)	GAIN FROM GW (+)	SW DIVERSION (-)	BY-PASS FLOW (-)	ERROR ADJUST. (+)	DOWNSTRM FLOW (=)	DIVERSION SHORT
1949	209852.	1597.	8513.	10599.	-113719.	5841.	0.	0.	111001.	359.
1950	206297.	16.	22381.	10701.	-165167.	6128.	0.	0.	68100.	447.
1951	275808.	0.	12337.	11048.	-220984.	5085.	0.	0.	73125.	648.
1952	922473.	33032.	57009.	11158.	-266422.	9661.	0.	0.	747588.	607.
1953	312891.	0.	12707.	11613.	-208040.	10383.	0.	0.	118789.	589.
1954	211897.	40.	9692.	11586.	-163208.	5128.	0.	0.	64879.	671.
1955	156085.	6.	17873.	11855.	-158803.	6691.	0.	0.	20327.	578.
1956	638939.	6597.	79983.	12212.	-276777.	8570.	0.	0.	452385.	519.
1957	134916.	0.	7529.	12023.	-128013.	8958.	0.	0.	17497.	817.
1958	1059768.	17728.	52521.	11474.	-370778.	11006.	0.	0.	759708.	749.
1959	358141.	140.	10724.	12939.	-249309.	4739.	0.	0.	127896.	707.
1960	220014.	0.	6331.	14035.	-216796.	5721.	0.	0.	17863.	598.
1961	62237.	0.	8094.	13782.	-71579.	3673.	0.	0.	8861.	271.
1962	453325.	4076.	17683.	14566.	-335524.	6140.	0.	0.	147984.	486.
1963	481282.	5091.	35189.	13922.	-311164.	14503.	0.	0.	209817.	907.
1964	272534.	0.	10251.	14025.	-264306.	6152.	0.	0.	26353.	480.
1965	320630.	0.	18184.	14394.	-270479.	8245.	0.	0.	74485.	549.
1966	265928.	21190.	28315.	14971.	-271802.	4679.	0.	0.	53924.	257.
1967	816028.	9138.	40004.	14135.	-314956.	13126.	0.	0.	551224.	478.
1968	219958.	2576.	5571.	14971.	-219083.	4874.	0.	0.	19120.	235.
1969	1736515.	74808.	73209.	15239.	-287438.	11797.	0.	0.	1600537.	722.
1970	354563.	0.	20939.	16223.	-208704.	10519.	0.	0.	172502.	1871.
1971	250971.	1906.	32241.	17095.	-238856.	13823.	0.	0.	49533.	1305.
1972	249194.	0.	11780.	17738.	-257246.	6294.	0.	0.	15172.	1402.
1973	680841.	12422.	67847.	17853.	-265968.	9476.	0.	0.	503518.	1288.
1974	532652.	14336.	72075.	17201.	-278856.	10986.	0.	0.	346421.	472.
1975	488852.	30889.	29746.	18277.	-269007.	11321.	0.	0.	287436.	1960.
1976	239030.	20.	9967.	18501.	-248066.	3577.	0.	0.	15875.	438.
1977	229798.	0.	6859.	18601.	-236123.	2035.	0.	0.	17100.	210.
1978	1382914.	33926.	69276.	18963.	-322694.	10311.	0.	0.	1172074.	2061.
1979	360763.	2814.	17425.	19622.	-282552.	9193.	0.	0.	108879.	4389.
1980	1015400.	34322.	30487.	19111.	-287696.	12951.	0.	0.	798673.	1482.
1981	345416.	1848.	7306.	19394.	-282546.	5535.	0.	0.	85883.	58.
1982	584781.	19219.	37530.	19174.	-291988.	15451.	0.	0.	353265.	575.
1983	2037137.	54526.	77279.	19418.	-266609.	12965.	0.	0.	1908786.	372.
1984	413355.	19410.	14645.	20046.	-196478.	2501.	0.	0.	268476.	291.
1985	257041.	0.	13387.	20047.	-249468.	6250.	0.	0.	34758.	525.
1986	660771.	55847.	44372.	20032.	-229079.	11161.	0.	0.	540782.	3044.
1987	206041.	431.	17477.	20381.	-214182.	3646.	0.	0.	26502.	592.
1988	226485.	2671.	12807.	20413.	-239094.	5015.	0.	0.	18267.	2181.
1989	245913.	0.	14432.	20474.	-254087.	3853.	0.	0.	22878.	691.
1990	21642.	1.	11234.	20375.	-39592.	1625.	0.	0.	12037.	288.
1991	221938.	7191.	27672.	20846.	-207848.	3195.	0.	0.	66605.	356.
1992	280942.	767.	28868.	21190.	-251570.	3510.	0.	0.	76687.	173.
1993	775216.	11766.	51446.	21386.	-388980.	6208.	0.	0.	464627.	43.
1994	279977.	17.	13684.	21903.	-283263.	3592.	0.	0.	28726.	245.
AVERAGE	471242.	10443.	27715.	16424.	-242933.	7524.	0.	0.	275368.	826.

AVERAGE STREAMFLOW BUDGET IN AC.-FT. FROM 1949 THRU 1994

REGION	UPSTREAM FLOW (+)	TRIB. FLOW (+)	D.R. FROM RAIN (+)	AG/URBAN SW RETURN (+)	GAIN FROM GW (+)	SW DIVERSION (-)	BY-PASS FLOW (-)	ERROR ADJUST. (+)	DOWNSTRM FLOW (=)	DIVERSION SHORT
1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2	1220.	195.	733.	0.	-1055.	0.	0.	0.	1093.	0.
3	309647.	104.	16179.	8393.	-58955.	0.	0.	0.	275368.	0.
4	2831.	0.	765.	46.	-2024.	0.	0.	0.	1618.	0.
5	397024.	4011.	4355.	1073.	-92004.	7524.	0.	0.	306936.	826.
6	350854.	6132.	5683.	6912.	-88895.	0.	0.	0.	280687.	0.
TOTAL	471242.	10443.	27715.	16424.	-242933.	7524.	0.	0.	275368.	826.

SOIL MOISTURE BUDGET IN INCHES FOR MONTEREY BAY
AREA: 37143. ACRES

TIME	AGRICULTURAL AREA							MUNICIPAL AREA						UNDEVELOPED AREA			
	RAIN	IRIG.	C.U.	ET	D.R.	RETURN	PERC.	RAIN	W.U.	ET	D.R.	RETURN	PERC.	RAIN	ET	D.R.	PERC.
1949	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1950	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1951	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1952	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1953	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1954	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1955	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1956	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1957	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1958	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1959	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1960	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1961	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1962	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1963	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1964	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1965	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1966	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1967	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1968	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1969	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1970	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1971	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1972	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1973	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1974	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1975	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1976	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1977	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1978	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1979	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1980	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1981	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1982	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1983	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1984	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1985	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1986	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1987	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1988	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1989	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1990	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1991	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1992	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1993	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1994	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AVERAGE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

SOIL MOISTURE BUDGET IN INCHES FOR FORT ORD/TORO
AREA: 35187. ACRES

TIME	AGRICULTURAL AREA RAIN	IRIG.	C.U.	ET	D.R.	RETURN	PERC.	MUNICIPAL AREA RAIN	W.U.	ET	D.R.	RETURN	PERC.	UNDEVELOPED AREA RAIN	ET	D.R.	PERC.
1949	10.8	42.0	26.1	32.8	0.0	0.2	17.7	11.5	25.6	11.3	6.4	13.7	5.0	11.4	10.1	0.0	1.3
1950	14.6	40.8	25.0	33.6	0.5	0.2	21.0	15.5	25.6	12.2	9.1	13.7	6.2	15.4	10.8	0.8	3.8
1951	12.9	41.8	25.2	33.9	0.1	0.2	20.4	13.7	25.6	10.7	7.9	13.7	7.0	13.6	11.3	0.0	2.3
1952	21.3	41.0	25.4	35.3	0.6	0.2	26.2	22.7	25.5	12.1	13.6	13.7	8.8	22.6	13.2	1.7	7.7
1953	10.2	43.8	26.5	32.6	0.0	0.2	21.1	10.8	25.4	10.3	6.2	13.6	6.2	10.8	9.0	0.0	1.8
1954	10.9	41.1	25.1	33.3	0.0	0.2	18.4	11.4	23.1	10.8	6.3	12.4	4.9	11.5	10.1	0.0	1.5
1955	14.2	41.9	26.0	34.6	0.1	0.2	21.2	14.7	21.1	10.6	8.5	11.3	5.4	14.9	11.0	0.2	3.7
1956	19.2	45.6	28.3	35.8	1.7	0.2	26.7	19.4	19.5	10.0	12.0	10.5	6.4	20.3	10.6	2.4	7.2
1957	11.6	38.2	24.6	33.8	0.0	0.2	15.7	12.1	18.1	10.3	6.7	9.7	3.4	12.2	10.8	0.0	1.3
1958	21.7	32.5	21.3	34.2	0.4	0.2	19.5	22.5	16.8	11.2	13.1	9.0	6.0	22.8	15.3	0.9	6.5
1959	8.3	46.3	28.5	34.5	0.0	0.2	19.7	8.7	15.8	8.6	4.7	8.4	2.6	8.7	7.3	0.0	1.5
1960	8.7	43.9	27.7	34.4	0.0	0.2	17.9	9.1	15.6	8.7	5.1	8.3	2.5	9.1	7.8	0.0	1.4
1961	8.5	42.1	26.5	32.7	0.0	0.2	17.7	8.8	14.0	7.8	4.8	7.5	2.7	9.0	8.1	0.0	0.9
1962	6.9	46.5	29.5	34.3	0.2	0.2	18.7	7.0	12.6	6.6	3.9	6.8	2.4	7.1	5.8	0.2	1.1
1963	15.2	34.4	22.6	34.3	0.2	0.2	15.1	15.7	11.4	9.1	8.9	6.1	2.9	15.9	13.2	0.1	2.5
1964	11.2	36.3	24.1	32.7	0.0	0.2	14.6	11.3	10.2	7.1	6.2	5.5	2.8	11.6	10.4	0.0	1.3
1965	13.8	38.7	25.4	33.4	0.2	0.2	18.7	13.8	9.2	6.7	7.9	4.9	3.6	14.3	11.0	0.2	3.1
1966	12.6	45.2	29.5	35.2	0.6	0.2	21.8	12.2	8.2	5.7	6.9	4.4	3.3	12.7	9.0	0.2	3.4
1967	20.5	34.5	22.4	34.8	0.9	0.2	19.2	20.9	7.3	8.6	12.3	3.9	3.5	21.3	16.4	0.6	4.3
1968	8.7	41.6	27.4	34.6	0.0	0.2	15.6	8.8	6.5	5.8	4.8	3.5	1.3	9.0	8.1	0.0	1.0
1969	23.1	41.0	25.9	37.0	1.1	0.2	25.9	23.6	5.8	8.2	13.9	3.1	4.2	24.0	13.4	1.6	9.0
1970	14.4	41.4	26.8	35.6	0.5	0.2	19.5	14.8	5.1	6.3	8.5	2.7	2.4	15.1	10.7	0.4	4.0
1971	14.8	41.0	26.1	34.6	0.5	0.2	20.6	14.4	5.1	5.6	8.3	2.7	2.8	14.9	11.2	0.2	3.5
1972	7.1	46.3	29.3	34.4	0.0	0.2	18.7	7.2	5.1	4.2	4.0	2.7	1.3	7.4	6.6	0.0	0.9
1973	22.9	39.4	24.4	37.0	1.2	0.2	24.0	23.2	5.1	8.2	13.6	2.8	3.8	23.7	15.5	1.2	7.0
1974	24.5	33.0	22.0	34.8	2.1	0.2	20.4	25.0	5.2	7.2	15.2	2.8	5.0	25.7	16.5	2.3	6.9
1975	14.3	37.8	24.2	35.6	0.1	0.2	16.6	14.4	5.2	7.2	8.1	2.8	1.5	14.7	12.6	0.1	2.0
1976	9.3	36.5	23.4	31.7	0.0	0.2	14.7	9.5	5.2	5.0	5.2	2.8	1.3	9.7	7.6	0.0	1.0
1977	7.0	43.5	27.6	32.7	0.0	0.2	17.1	7.1	5.2	4.9	3.7	2.8	1.3	7.2	7.5	0.0	0.8
1978	22.7	36.5	23.8	37.1	1.3	0.2	20.9	23.0	5.2	8.4	13.6	2.8	3.5	23.3	15.4	1.0	6.9
1979	11.8	45.8	27.9	36.6	0.2	0.2	20.6	12.2	5.3	6.3	6.9	2.8	1.4	12.3	10.7	0.0	1.7
1980	13.9	39.4	26.6	36.4	0.2	0.2	16.7	14.1	5.3	6.8	8.0	2.8	1.8	14.3	11.9	0.1	2.3
1981	7.2	39.8	27.0	33.6	0.0	0.2	13.6	7.4	4.8	4.6	4.1	2.6	0.9	7.4	6.6	0.0	0.8
1982	21.3	34.7	23.1	37.4	0.6	0.2	18.6	21.7	4.4	7.9	12.7	2.4	2.8	21.9	16.5	0.4	4.3
1983	25.9	32.5	21.8	37.4	1.2	0.2	19.7	26.3	4.0	8.9	15.6	2.1	3.6	26.5	17.6	1.1	7.5
1984	9.2	44.3	29.2	35.4	0.0	0.2	17.4	9.2	3.6	4.9	5.0	1.9	1.3	9.3	9.3	0.0	1.0
1985	10.7	38.6	26.2	35.3	0.0	0.2	14.4	10.3	3.2	5.1	5.6	1.7	1.1	10.4	9.4	0.0	1.1
1986	12.7	37.8	26.1	36.5	0.3	0.2	14.6	13.0	2.9	5.4	7.4	1.6	1.3	13.0	9.8	0.2	2.4
1987	9.8	43.7	28.6	34.8	0.6	0.2	16.9	10.3	2.6	4.9	5.9	1.4	1.0	10.2	8.8	0.4	1.6
1988	7.9	42.5	28.2	34.9	0.0	0.2	15.5	7.7	2.3	4.0	4.2	1.2	0.6	7.8	7.1	0.0	0.7
1989	10.8	40.4	27.6	36.6	0.0	0.2	14.5	10.4	2.0	4.4	5.8	1.1	0.9	10.4	8.8	0.0	1.1
1990	9.5	34.8	24.3	33.7	0.0	0.2	11.9	9.5	1.7	4.6	5.2	0.9	0.7	9.5	8.9	0.0	1.0
1991	11.7	38.7	27.0	34.3	0.2	0.2	14.8	11.5	1.9	4.9	6.4	1.0	1.1	11.4	9.0	0.1	2.4
1992	13.6	38.7	27.3	36.4	0.6	0.2	14.7	13.5	2.2	5.4	7.7	1.2	1.3	13.4	10.3	0.3	2.7
1993	18.9	38.7	27.1	38.2	0.9	0.2	18.3	18.8	2.5	6.4	11.0	1.3	2.5	18.6	12.7	0.7	5.3
1994	10.6	41.3	28.2	36.4	0.1	0.2	15.1	10.4	2.8	5.0	5.7	1.5	0.9	10.3	9.0	0.0	1.2
AVERAGE	13.6	40.1	26.0	34.9	0.4	0.2	18.3	13.9	9.6	7.4	8.0	5.1	3.0	14.1	10.7	0.4	3.0

SOIL MOISTURE BUDGET IN INCHES FOR PRESSURE AREA
AREA: 90781. ACRES

	AGRICULTURAL AREA							MUNICIPAL AREA						UNDEVELOPED AREA			
TIME	RAIN	IRIG.	C.U.	ET	D.R.	RETURN	PERC.	RAIN	W.U.	ET	D.R.	RETURN	PERC.	RAIN	ET	D.R.	PERC.
1949	10.9	24.4	18.4	26.8	0.1	0.1	7.0	11.1	21.3	12.4	5.2	11.4	1.6	11.3	10.5	0.0	0.9
1950	13.9	23.6	18.5	27.7	1.8	0.1	7.8	14.4	21.1	13.7	7.9	11.3	2.5	14.8	11.4	0.9	2.5
1951	12.3	26.4	19.6	28.0	1.2	0.1	9.2	12.7	21.4	12.0	7.4	11.5	3.1	13.2	11.6	0.0	1.5
1952	21.0	24.6	18.5	29.4	3.7	0.1	12.2	21.3	21.7	14.1	13.2	11.7	4.1	22.2	14.7	2.2	5.3
1953	10.1	26.8	19.8	26.6	0.9	0.1	9.1	10.2	22.0	11.6	5.8	11.8	3.0	10.7	9.3	0.0	1.4
1954	10.7	25.3	18.8	27.9	0.3	0.1	7.6	10.9	22.3	13.3	5.4	12.0	2.5	11.3	10.3	0.0	1.0
1955	13.6	25.8	19.1	28.3	1.2	0.1	9.7	14.0	22.6	13.6	7.6	12.1	3.2	14.4	11.6	0.3	2.5
1956	18.5	28.4	21.3	29.4	4.6	0.1	12.6	18.9	22.9	13.3	12.0	12.3	4.1	19.7	11.9	2.7	5.0
1957	11.2	22.6	17.3	27.3	0.1	0.1	6.3	11.4	23.1	14.0	5.4	12.4	2.6	11.7	10.8	0.0	0.8
1958	21.6	19.4	15.7	29.4	2.6	0.1	9.2	21.7	23.4	16.1	11.9	12.5	4.4	22.4	16.3	1.3	4.6
1959	8.2	29.0	21.3	27.6	0.3	0.1	8.7	8.2	23.6	12.9	3.9	12.7	2.5	8.5	7.5	0.0	1.1
1960	8.6	30.6	20.9	27.7	0.2	0.2	10.6	8.6	24.1	13.1	4.1	12.9	2.5	8.9	7.9	0.0	1.0
1961	8.4	28.9	20.5	27.3	0.3	0.1	9.4	8.4	24.3	12.4	4.2	13.0	3.1	8.7	8.1	0.0	0.6
1962	7.4	32.5	22.4	28.1	0.5	0.2	11.1	7.0	24.6	11.8	3.5	13.2	3.0	7.3	6.3	0.2	0.9
1963	15.0	22.5	15.9	28.3	0.8	0.2	8.5	15.0	24.8	15.3	7.7	13.3	3.5	15.5	13.3	0.1	1.8
1964	10.7	25.0	18.4	26.8	0.7	0.1	8.1	10.8	25.0	12.9	5.6	13.4	3.8	11.1	10.4	0.0	0.9
1965	13.3	24.4	17.6	26.6	1.4	0.1	9.8	13.3	25.3	12.8	7.5	13.5	4.6	13.8	11.4	0.2	2.2
1966	12.0	28.7	20.5	27.0	2.0	0.1	11.5	11.8	25.4	11.9	7.1	13.6	4.5	12.4	9.4	0.3	2.5
1967	19.8	19.9	14.2	27.2	2.6	0.1	9.9	19.8	25.5	15.8	10.9	13.7	4.8	20.5	16.7	0.6	3.2
1968	8.2	23.9	17.5	25.1	0.0	0.1	7.1	8.3	25.6	12.8	4.0	13.7	3.3	8.6	8.0	0.0	0.7
1969	22.7	23.6	16.5	28.1	4.1	0.1	13.8	22.4	25.5	16.0	12.7	13.7	5.5	23.2	14.5	2.0	6.7
1970	13.8	30.5	20.7	29.1	1.4	0.2	12.6	13.9	25.5	13.9	7.6	13.6	4.1	14.3	11.0	0.4	2.9
1971	13.7	29.8	20.3	28.7	1.9	0.3	12.6	13.6	25.7	12.9	7.7	13.8	4.9	14.3	11.4	0.2	2.6
1972	7.0	34.2	23.1	28.5	0.4	0.3	11.9	6.9	26.0	11.5	3.6	13.9	3.7	7.2	6.6	0.0	0.7
1973	22.4	29.8	19.3	31.3	3.8	0.3	16.6	22.0	26.2	15.9	12.5	14.0	5.7	22.8	16.1	1.2	5.4
1974	23.2	23.7	17.6	29.8	4.4	0.1	12.4	23.5	26.4	14.9	14.0	14.2	6.8	24.3	17.3	1.9	5.1
1975	14.1	27.5	18.2	29.7	0.6	0.3	11.1	13.7	26.6	14.8	6.8	14.3	4.4	14.2	12.6	0.1	1.5
1976	9.2	26.0	17.4	26.1	0.2	0.2	9.2	9.0	26.8	12.3	4.7	14.3	4.4	9.3	7.4	0.0	0.7
1977	7.0	30.7	21.0	26.5	0.2	0.2	10.2	6.8	27.1	12.3	3.2	14.5	3.9	7.0	7.6	0.0	0.5
1978	22.1	25.6	17.3	30.4	3.5	0.2	13.7	21.7	27.4	17.0	12.1	14.7	5.4	22.3	15.9	1.1	5.3
1979	11.9	30.4	20.1	29.6	0.4	0.2	11.9	11.6	27.7	14.4	5.9	14.9	4.1	12.0	10.6	0.0	1.4
1980	13.9	26.2	18.8	29.4	1.2	0.1	9.9	13.5	28.0	14.6	7.0	15.0	4.8	13.9	12.0	0.1	1.9
1981	7.2	26.5	19.1	25.6	0.0	0.1	7.8	7.0	27.8	13.2	3.3	14.9	3.5	7.3	6.7	0.0	0.6
1982	20.2	22.3	16.0	29.9	1.9	0.1	10.9	20.4	27.7	16.0	11.3	14.8	5.9	20.9	16.4	0.4	3.3
1983	25.1	22.0	15.0	30.0	3.3	0.1	13.5	24.7	26.6	16.9	13.9	14.3	6.1	25.9	18.3	1.3	6.1
1984	8.9	28.2	20.3	27.6	0.2	0.1	8.8	8.6	25.6	12.1	4.4	13.7	3.9	9.2	9.5	0.0	0.7
1985	10.0	26.1	19.0	27.6	0.2	0.1	8.2	9.7	24.7	12.3	4.9	13.2	3.8	10.3	9.5	0.0	0.8
1986	13.0	25.0	17.7	27.7	0.9	0.1	9.3	12.5	23.5	13.5	6.3	12.6	3.5	13.0	10.2	0.2	1.9
1987	9.4	27.3	19.4	26.8	0.7	0.1	8.8	9.7	22.4	12.7	4.8	12.0	2.5	9.9	8.9	0.4	1.3
1988	7.7	27.8	20.1	27.0	0.1	0.1	8.3	7.4	21.3	10.9	3.6	11.4	2.7	7.9	7.3	0.0	0.6
1989	9.7	25.4	18.3	27.2	0.1	0.1	7.9	9.7	20.3	11.4	4.8	10.9	2.8	10.2	8.8	0.0	0.8
1990	8.8	23.0	17.5	25.5	0.0	0.1	6.2	9.0	19.3	11.4	4.4	10.3	2.2	9.3	9.0	0.0	0.8
1991	10.8	25.4	18.4	26.2	0.7	0.1	9.2	10.9	18.5	12.1	5.2	9.9	2.2	11.3	9.3	0.2	2.0
1992	12.6	25.3	18.8	28.0	0.9	0.1	8.8	12.8	18.3	12.5	6.6	9.8	2.3	13.3	10.6	0.4	2.3
1993	17.4	23.8	17.9	28.9	1.9	0.1	10.1	17.8	18.5	13.4	9.5	9.9	3.5	18.4	13.1	0.9	4.4
1994	9.3	24.9	18.6	26.8	0.1	0.1	7.3	9.8	19.1	12.1	4.6	10.2	2.0	10.1	9.2	0.0	1.0
AVERAGE	13.2	26.2	18.8	27.9	1.3	0.2	9.9	13.2	24.0	13.4	7.1	12.8	3.7	13.7	11.0	0.4	2.2

SOIL MOISTURE BUDGET IN INCHES FOR EAST SIDE AREA
AREA: 74476. ACRES

	AGRICULTURAL AREA							MUNICIPAL AREA						UNDEVELOPED AREA			
TIME	RAIN	IRIG.	C.U.	ET	D.R.	RETURN	PERC.	RAIN	W.U.	ET	D.R.	RETURN	PERC.	RAIN	ET	D.R.	PERC.
1949	10.5	33.1	23.9	31.0	0.0	0.2	10.4	12.1	5.2	6.5	6.8	2.8	1.0	11.9	10.6	0.0	1.3
1950	13.5	32.4	23.6	32.3	1.1	0.2	12.2	16.2	5.0	7.4	9.8	2.7	1.5	15.0	11.2	0.8	3.0
1951	12.0	34.0	23.8	32.1	0.5	0.2	13.1	14.1	5.0	6.1	8.4	2.7	1.9	13.4	11.8	0.0	1.6
1952	20.3	32.8	23.5	33.6	2.2	0.2	17.0	23.4	5.0	7.6	15.0	2.7	3.2	22.9	13.9	2.1	6.9
1953	9.8	35.6	24.8	30.9	0.5	0.2	13.7	11.1	5.0	5.5	6.5	2.7	1.4	11.1	9.5	0.0	1.5
1954	10.3	33.3	23.7	32.1	0.2	0.2	11.1	12.1	5.0	6.6	6.8	2.7	1.0	11.7	10.4	0.0	1.3
1955	13.1	34.1	23.9	32.4	0.6	0.2	13.9	15.5	5.0	6.9	9.2	2.7	1.7	14.9	11.4	0.3	3.2
1956	17.6	36.7	25.9	33.4	2.9	0.2	17.7	20.9	5.0	6.7	13.8	2.7	2.7	20.4	10.8	2.8	6.8
1957	10.7	30.6	22.1	31.4	0.1	0.2	9.6	12.6	5.0	7.0	7.1	2.7	0.9	12.2	11.0	0.0	1.1
1958	20.6	25.1	19.2	32.6	1.2	0.1	12.0	23.6	5.0	9.6	14.0	2.7	2.2	23.7	15.9	1.3	6.5
1959	7.8	36.9	25.8	31.9	0.1	0.2	12.1	9.0	5.0	5.7	5.0	2.7	0.8	9.0	7.7	0.1	1.3
1960	8.2	37.0	25.0	31.7	0.1	0.3	13.0	9.4	5.1	5.7	5.3	2.7	0.8	9.4	8.3	0.0	1.2
1961	8.0	35.2	24.4	30.5	0.2	0.2	12.1	9.1	5.1	5.7	5.0	2.7	0.7	9.3	8.5	0.0	0.8
1962	7.0	38.7	26.3	31.6	0.3	0.3	13.5	7.3	5.1	4.8	4.1	2.7	0.7	8.2	7.1	0.2	1.0
1963	14.3	28.3	20.1	31.8	0.4	0.2	10.1	16.2	5.1	7.9	9.3	2.8	1.2	16.6	14.0	0.2	2.3
1964	10.2	29.4	21.3	29.7	0.2	0.1	9.5	11.7	5.2	6.4	6.5	2.8	1.2	11.8	10.8	0.0	1.2
1965	12.7	30.1	21.3	29.8	0.6	0.2	12.3	14.3	5.2	6.2	8.6	2.8	1.9	14.7	11.7	0.2	2.8
1966	11.4	34.5	24.0	30.0	1.2	0.2	14.5	12.7	5.4	5.5	7.7	2.9	1.9	13.3	9.6	0.4	3.2
1967	18.8	24.6	17.3	29.8	1.4	0.1	12.1	21.3	5.6	9.1	12.9	3.0	2.0	21.9	17.2	0.7	4.0
1968	7.8	29.1	21.0	27.9	0.0	0.1	8.9	8.9	5.8	5.9	4.9	3.1	0.8	9.1	8.3	0.0	0.9
1969	21.5	27.8	19.2	30.3	2.2	0.1	16.5	24.0	6.1	9.2	14.8	3.3	2.8	25.2	13.5	2.1	9.5
1970	13.0	33.1	22.9	31.3	0.8	0.2	13.3	14.9	6.3	7.3	8.9	3.4	1.6	15.4	11.0	0.5	3.9
1971	12.9	31.7	22.1	30.0	1.0	0.2	13.2	14.6	6.5	6.6	8.8	3.5	2.1	15.4	11.6	0.2	3.6
1972	6.6	35.6	24.6	29.7	0.2	0.3	11.9	7.3	6.8	5.3	4.2	3.7	1.0	7.9	7.1	0.0	0.9
1973	21.2	30.7	20.5	32.5	2.0	0.2	16.9	23.3	7.1	9.5	14.3	3.8	2.7	25.1	15.7	1.5	7.8
1974	21.7	24.5	18.5	30.9	2.5	0.1	12.7	24.9	7.4	8.9	15.9	4.0	3.4	26.3	17.1	2.3	6.9
1975	13.4	28.0	19.3	30.5	0.3	0.2	10.3	14.5	7.7	8.5	8.2	4.1	1.3	15.8	13.5	0.1	2.2
1976	8.6	26.5	18.7	26.9	0.1	0.2	8.6	9.5	7.9	6.4	5.2	4.3	1.0	10.3	8.0	0.0	1.0
1977	6.6	30.4	21.7	27.0	0.1	0.2	9.2	7.1	8.1	6.5	3.8	4.3	1.1	7.8	8.2	0.0	0.7
1978	20.9	25.5	18.1	31.1	2.0	0.1	13.4	23.3	8.3	10.2	14.3	4.4	2.5	24.6	15.8	1.2	7.7
1979	11.3	29.9	20.7	30.3	0.2	0.1	10.7	12.5	8.5	7.9	7.2	4.6	1.4	13.2	11.4	0.0	1.8
1980	13.3	25.2	18.7	29.5	0.6	0.1	9.1	14.6	8.7	8.4	8.4	4.7	1.7	15.4	12.6	0.2	2.6
1981	6.9	25.5	19.1	25.2	0.0	0.1	6.9	7.6	8.9	6.4	4.3	4.8	1.0	8.0	7.2	0.0	0.8
1982	19.1	21.3	15.8	29.9	0.9	0.1	9.9	22.4	9.1	9.9	13.5	4.9	2.8	22.4	16.6	0.5	4.4
1983	24.0	21.0	15.0	30.0	1.7	0.1	13.1	27.0	9.0	11.1	16.6	4.8	3.5	28.0	18.0	1.3	8.4
1984	8.5	26.8	19.9	27.2	0.1	0.1	7.6	9.4	8.9	6.8	5.3	4.8	1.8	9.9	10.0	0.0	1.0
1985	9.6	25.0	18.7	27.2	0.1	0.1	7.1	10.7	8.8	7.1	5.9	4.7	1.7	11.1	10.1	0.0	1.0
1986	12.6	24.0	17.7	27.5	0.5	0.1	8.5	13.7	9.1	8.1	7.8	4.9	1.5	14.4	10.8	0.4	2.5
1987	9.1	26.3	19.4	26.7	0.5	0.1	7.8	10.8	9.3	7.7	6.2	5.0	1.4	10.5	9.4	0.4	1.4
1988	7.5	26.6	19.8	26.5	0.0	0.1	7.4	8.1	9.5	6.6	4.4	5.1	1.4	8.6	7.9	0.0	0.7
1989	9.3	24.7	18.4	26.9	0.0	0.1	7.1	10.8	9.7	7.3	6.1	5.2	1.6	10.8	9.1	0.0	1.0
1990	8.5	22.2	17.2	25.0	0.0	0.1	5.8	10.0	10.0	7.7	5.6	5.3	1.5	9.8	9.3	0.0	1.0
1991	10.5	24.6	18.4	26.0	0.3	0.1	8.6	12.1	10.1	8.3	6.8	5.4	1.6	12.0	9.6	0.2	2.4
1992	12.3	24.5	18.7	28.0	0.5	0.1	8.1	14.3	10.7	9.0	8.4	5.7	1.9	14.0	10.7	0.5	2.8
1993	16.8	23.1	17.7	28.9	1.0	0.1	9.9	19.8	10.8	9.6	11.9	5.8	3.3	19.2	13.1	0.9	5.2
1994	9.1	24.1	18.5	26.3	0.0	0.1	6.6	10.8	11.0	8.3	6.1	5.9	1.6	10.4	9.2	0.0	1.1
AVERAGE	12.6	29.1	20.9	29.7	0.7	0.2	11.1	14.3	7.1	7.4	8.5	3.8	1.7	14.6	11.2	0.5	2.9

SOIL MOISTURE BUDGET IN INCHES FOR FOREBAY AREA
AREA: 86692. ACRES

	AGRICULTURAL AREA							MUNICIPAL AREA						UNDEVELOPED AREA			
TIME	RAIN	IRIG.	C.U.	ET	D.R.	RETURN	PERC.	RAIN	W.U.	ET	D.R.	RETURN	PERC.	RAIN	ET	D.R.	PERC.
1949	10.9	48.2	33.3	40.3	0.4	0.3	16.2	10.7	5.5	5.8	6.1	2.9	1.0	11.9	10.4	0.3	1.2
1950	8.5	48.9	33.1	40.3	0.0	0.3	16.7	8.0	5.4	5.4	4.3	2.9	0.8	9.1	8.4	0.0	0.8
1951	8.1	49.4	33.5	40.4	0.0	0.3	16.6	7.7	5.5	5.3	4.2	2.9	0.8	8.8	8.1	0.0	0.7
1952	17.7	46.4	31.8	42.6	1.3	0.3	19.9	17.2	5.5	7.7	10.2	3.0	1.8	19.4	14.9	1.0	3.5
1953	9.2	49.9	33.8	39.5	0.4	0.3	18.9	8.9	5.6	5.3	5.0	3.0	1.1	10.2	9.0	0.0	1.1
1954	9.4	47.7	32.7	40.0	0.3	0.3	16.5	8.6	5.7	5.6	4.8	3.0	0.9	10.0	9.1	0.0	0.9
1955	10.3	48.7	32.9	40.9	0.3	0.3	17.4	9.5	5.7	6.0	5.4	3.1	0.9	11.0	9.9	0.1	1.0
1956	13.8	50.2	34.5	41.8	2.3	0.3	19.6	12.8	5.8	5.9	7.9	3.1	1.6	14.9	10.9	1.2	2.6
1957	8.3	46.7	32.2	39.0	0.1	0.3	15.6	7.7	5.9	5.5	4.2	3.1	0.8	8.9	8.2	0.0	0.7
1958	21.3	35.5	25.5	40.4	1.1	0.2	15.3	19.2	5.9	9.2	10.9	3.2	1.6	22.5	17.9	0.6	3.8
1959	7.5	50.9	34.6	40.3	0.2	0.3	17.1	6.8	6.0	5.3	3.7	3.2	0.8	7.9	7.2	0.1	0.8
1960	7.8	50.8	33.4	40.0	0.0	0.4	18.1	7.3	6.0	5.4	3.9	3.2	0.8	8.3	7.6	0.0	0.7
1961	7.0	50.0	33.0	37.9	0.2	0.4	18.4	6.6	7.2	5.5	3.5	3.8	0.9	7.5	7.0	0.0	0.6
1962	11.4	51.0	33.1	40.7	0.6	0.4	20.5	10.4	8.4	6.9	6.0	4.5	1.3	12.1	10.3	0.2	1.6
1963	14.1	42.6	28.9	39.4	0.8	0.3	16.3	12.6	9.6	8.3	7.1	5.1	1.5	14.9	12.7	0.3	1.8
1964	7.3	44.6	30.1	36.2	0.1	0.3	15.4	7.0	10.9	7.0	3.7	5.9	1.3	7.9	7.4	0.0	0.6
1965	10.6	41.3	28.4	37.1	0.1	0.3	14.2	9.8	12.3	8.1	5.5	6.6	1.8	11.5	10.5	0.0	0.9
1966	10.2	47.5	32.6	37.6	1.1	0.3	18.6	9.9	13.7	7.5	6.1	7.4	2.7	11.2	9.4	0.2	1.5
1967	15.4	36.2	26.1	37.3	0.9	0.2	13.2	14.2	15.2	10.2	8.4	8.1	2.6	16.6	14.7	0.2	1.6
1968	5.4	42.6	29.8	34.6	0.0	0.3	13.0	5.0	16.7	8.3	2.6	8.9	1.8	5.8	5.5	0.0	0.4
1969	19.6	40.2	27.7	39.6	1.7	0.3	18.4	18.2	18.0	12.2	10.7	9.7	3.5	20.9	14.9	1.3	4.6
1970	8.7	44.7	30.7	37.9	0.0	0.3	14.7	8.0	19.4	9.9	4.4	10.4	2.7	9.2	8.4	0.0	0.8
1971	9.9	45.6	31.4	37.2	0.9	0.3	16.9	9.1	19.3	9.1	5.4	10.3	3.5	10.8	9.2	0.2	1.4
1972	6.0	46.6	32.3	36.5	0.5	0.3	15.2	5.5	19.2	8.5	3.1	10.3	2.8	6.6	5.9	0.1	0.6
1973	19.8	40.6	27.9	41.0	1.5	0.3	17.3	18.2	19.1	11.5	11.0	10.2	4.5	21.3	17.2	1.0	3.2
1974	13.1	38.7	27.7	36.3	1.0	0.3	14.1	12.2	19.0	10.0	7.2	10.2	3.8	14.1	11.6	0.4	2.1
1975	13.9	37.9	27.0	38.2	0.5	0.3	12.7	12.8	18.9	10.9	7.4	10.2	3.4	15.0	13.4	0.2	1.4
1976	7.7	36.5	26.2	33.7	0.1	0.2	11.2	7.2	18.9	8.5	4.0	10.1	3.4	8.2	6.0	0.0	0.6
1977	6.5	39.0	28.2	32.9	0.0	0.2	11.4	6.0	18.8	8.8	3.1	10.1	2.7	6.8	7.7	0.0	0.6
1978	19.2	36.2	25.7	39.1	1.6	0.2	14.6	17.7	18.7	12.7	10.4	10.0	3.2	20.5	16.1	1.4	3.3
1979	11.7	38.4	27.8	37.7	0.3	0.2	12.0	10.8	18.6	10.4	6.2	9.9	2.8	12.5	11.4	0.0	1.1
1980	14.6	31.7	24.5	36.7	0.4	0.2	10.1	13.3	18.5	11.2	7.5	9.9	3.2	15.7	13.5	0.2	2.0
1981	7.7	32.9	25.4	32.1	0.0	0.2	8.1	7.1	18.6	9.5	3.9	10.0	2.3	8.3	7.6	0.0	0.7
1982	14.3	28.0	21.8	34.5	0.2	0.1	7.8	12.9	18.6	10.5	7.4	10.0	3.7	15.3	13.2	0.0	1.3
1983	23.2	28.7	21.5	37.6	1.3	0.1	12.7	20.9	18.2	12.8	12.4	9.8	4.2	24.9	19.1	1.2	4.8
1984	8.5	33.5	25.8	32.8	0.3	0.2	8.6	7.6	17.7	8.4	4.4	9.5	3.0	9.1	8.9	0.0	0.8
1985	9.8	32.2	25.0	33.2	0.1	0.2	8.6	8.8	17.2	8.7	4.9	9.2	3.1	10.5	9.6	0.0	0.9
1986	16.5	28.9	22.4	35.6	0.6	0.1	9.3	14.9	16.7	10.8	8.6	9.0	3.2	17.8	14.6	0.6	2.3
1987	7.2	32.7	25.3	31.7	0.0	0.2	8.0	6.6	16.2	8.7	3.6	8.7	1.8	7.7	7.5	0.0	0.6
1988	9.7	32.3	24.9	33.4	0.1	0.2	8.4	8.7	15.6	9.0	4.8	8.4	2.2	10.6	9.7	0.0	0.9
1989	7.9	31.3	24.2	31.6	0.0	0.2	7.7	7.2	15.0	8.2	3.9	8.0	1.9	8.6	7.0	0.0	0.6
1990	6.9	27.7	22.0	28.5	0.0	0.1	6.4	6.4	14.4	7.9	3.5	7.7	1.7	7.2	7.2	0.0	0.6
1991	10.4	30.0	23.3	31.4	0.2	0.1	8.6	9.5	13.8	9.0	5.3	7.4	1.8	11.3	9.7	0.2	1.8
1992	11.7	29.6	23.5	33.1	0.3	0.1	7.8	10.8	13.7	9.0	6.2	7.3	1.9	12.5	10.6	0.2	1.5
1993	15.2	28.8	22.8	34.9	0.4	0.1	8.7	13.9	13.4	10.3	7.9	7.2	2.1	16.6	14.0	0.4	2.5
1994	7.1	29.7	23.5	29.7	0.0	0.1	6.7	6.4	13.2	7.8	3.4	7.1	1.4	7.6	7.0	0.0	0.6
AVERAGE	11.3	39.8	28.3	36.8	0.5	0.3	13.5	10.5	13.3	8.4	6.0	7.1	2.2	12.2	10.4	0.3	1.5

SOIL MOISTURE BUDGET IN INCHES FOR UPPER VALLEY AREA

AREA: 92300. ACRES

	AGRICULTURAL AREA							MUNICIPAL AREA						UNDEVELOPED AREA			
TIME	RAIN	IRIG.	C.U.	ET	D.R.	RETURN	PERC.	RAIN	W.U.	ET	D.R.	RETURN	PERC.	RAIN	ET	D.R.	PERC.
1949	8.4	62.2	38.3	43.5	0.1	0.5	24.3	8.4	5.2	5.0	4.6	2.8	0.8	8.7	7.8	0.0	0.9
1950	8.4	63.3	36.8	44.1	0.2	0.5	27.0	8.4	5.2	5.3	4.6	2.8	0.9	8.6	7.7	0.0	0.9
1951	7.3	64.5	38.5	44.4	0.0	0.5	26.9	7.2	5.4	5.1	3.9	2.9	0.8	7.5	6.8	0.0	0.7
1952	14.5	60.0	36.2	46.0	0.8	0.5	27.3	14.4	5.5	7.2	8.4	2.9	1.3	14.9	12.3	0.2	2.4
1953	8.1	66.6	39.1	43.8	0.5	0.5	30.0	8.0	5.6	4.8	4.6	3.0	1.3	8.3	7.1	0.0	1.2
1954	10.4	60.7	35.9	43.9	0.4	0.5	26.1	10.4	5.7	6.2	5.8	3.0	1.1	10.8	9.5	0.0	1.3
1955	10.5	60.0	36.2	44.5	0.3	0.4	25.2	10.5	5.8	6.3	5.9	3.1	1.0	10.9	9.6	0.0	1.2
1956	14.1	61.6	37.5	44.1	2.8	0.4	28.3	14.4	5.9	5.9	9.3	3.1	2.0	15.1	10.4	1.3	3.4
1957	9.1	58.1	35.6	42.5	0.1	0.4	24.1	9.1	6.0	5.9	5.0	3.2	1.0	9.4	8.4	0.0	1.0
1958	25.3	41.1	26.7	42.6	2.3	0.3	21.3	25.3	6.0	10.4	15.1	3.2	2.3	26.2	18.9	1.0	6.0
1959	8.4	60.9	36.5	42.5	0.6	0.4	25.5	8.4	6.1	5.8	4.7	3.3	1.0	8.6	7.2	0.3	1.4
1960	7.5	60.0	35.6	41.8	0.0	0.4	25.1	7.4	6.3	5.4	4.0	3.4	0.9	7.6	6.9	0.0	0.8
1961	6.1	58.8	35.4	39.1	0.2	0.4	25.0	6.1	6.4	5.0	3.2	3.4	0.9	6.4	5.8	0.0	0.6
1962	12.6	59.7	35.0	41.8	1.3	0.4	28.8	12.6	6.6	6.2	7.6	3.5	1.8	13.1	10.1	0.4	2.6
1963	17.4	49.4	30.9	41.4	2.8	0.3	22.1	17.3	6.7	7.9	10.8	3.6	1.7	17.9	13.3	1.7	2.9
1964	6.0	55.8	33.9	38.3	0.2	0.4	23.0	5.9	6.9	5.2	3.1	3.7	0.9	6.1	5.7	0.0	0.5
1965	11.6	49.9	30.3	39.7	0.2	0.3	21.4	11.5	7.1	6.8	6.6	3.8	1.5	11.8	10.6	0.0	1.2
1966	6.8	58.2	35.4	39.4	0.6	0.4	24.6	6.7	7.2	5.1	3.7	3.9	1.1	6.9	6.1	0.0	0.7
1967	16.6	45.4	28.9	39.9	1.0	0.3	20.9	16.4	7.4	8.0	9.7	4.0	2.0	16.8	14.2	0.2	2.2
1968	6.1	53.0	32.8	38.1	0.0	0.3	20.7	6.1	7.6	5.6	3.2	4.1	0.9	6.2	5.9	0.0	0.5
1969	19.0	52.4	31.8	42.0	1.9	0.3	27.0	18.7	7.2	8.7	11.1	3.9	2.1	19.4	13.5	1.1	4.8
1970	8.5	54.4	33.6	40.3	0.1	0.3	21.9	8.4	6.9	5.9	4.6	3.7	1.1	8.6	7.5	0.0	1.2
1971	10.4	55.1	33.9	38.6	1.3	0.3	25.0	10.0	6.8	5.3	6.0	3.7	1.8	10.9	8.4	0.3	2.2
1972	6.0	54.9	34.5	38.1	0.5	0.3	21.8	5.8	6.7	4.7	3.3	3.6	0.9	6.3	5.5	0.0	0.7
1973	21.4	48.8	29.6	42.1	2.0	0.3	25.6	21.1	6.7	8.8	12.8	3.6	2.6	22.0	16.6	0.8	4.6
1974	13.6	47.9	29.9	38.0	1.8	0.3	21.2	13.4	6.6	6.4	8.4	3.5	1.7	13.9	10.7	0.9	2.3
1975	16.1	45.5	28.4	39.4	2.2	0.3	19.5	16.0	6.5	7.7	9.6	3.5	1.6	16.5	13.4	0.8	2.3
1976	7.8	42.8	28.4	34.4	0.2	0.2	15.7	7.8	6.5	5.1	4.2	3.5	0.9	7.9	6.4	0.0	0.7
1977	6.1	45.7	29.2	33.6	0.0	0.3	17.8	6.1	6.8	5.5	3.2	3.6	1.0	6.2	6.4	0.0	0.6
1978	21.6	41.4	26.2	40.2	2.1	0.2	20.5	21.7	7.0	9.8	13.1	3.8	2.0	21.9	16.4	1.0	4.5
1979	13.0	45.8	28.7	38.5	0.5	0.3	19.4	13.0	7.3	7.6	7.5	3.9	1.3	13.1	11.5	0.0	1.6
1980	17.5	38.5	25.4	36.8	1.2	0.2	17.7	17.6	7.6	8.7	10.3	4.1	2.0	17.8	13.7	0.6	3.5
1981	8.5	39.7	26.2	33.7	0.1	0.2	14.2	8.5	7.9	6.3	4.8	4.2	1.1	8.6	7.8	0.0	0.8
1982	17.3	32.5	22.8	36.1	0.8	0.2	13.0	17.3	8.2	8.9	10.0	4.4	1.8	17.5	14.8	0.1	2.0
1983	27.6	34.2	22.6	38.4	2.5	0.2	20.4	27.5	8.5	11.3	16.8	4.6	3.6	27.6	19.4	1.4	7.1
1984	9.1	41.4	27.5	33.1	0.6	0.2	16.5	9.0	8.8	5.9	5.4	4.7	2.0	9.0	8.1	0.1	1.1
1985	10.3	39.8	26.9	33.4	0.3	0.2	16.2	10.2	9.2	6.4	5.8	4.9	2.1	10.2	9.0	0.0	1.1
1986	20.0	37.0	24.7	36.4	2.8	0.2	17.6	19.9	9.5	9.3	12.2	5.1	2.6	20.0	14.2	1.6	3.8
1987	7.9	39.2	26.4	33.4	0.0	0.2	13.4	7.9	9.9	7.0	4.3	5.3	1.2	7.9	7.5	0.0	0.8
1988	13.2	35.3	23.9	34.6	0.4	0.2	13.4	13.1	10.2	8.2	7.5	5.5	2.2	13.1	11.7	0.1	1.4
1989	9.2	36.5	24.4	32.9	0.4	0.2	13.1	9.2	10.5	6.6	5.4	5.6	1.6	9.2	6.9	0.0	0.9
1990	5.3	36.1	25.5	29.3	0.0	0.2	11.1	5.3	10.9	6.7	2.7	5.8	1.2	5.3	6.1	0.0	0.4
1991	13.1	35.9	24.2	32.5	1.1	0.2	15.5	13.1	11.4	8.5	7.9	6.1	2.1	13.2	9.1	0.7	3.5
1992	11.7	35.7	24.5	34.0	0.4	0.2	12.7	11.7	12.0	8.8	6.7	6.4	1.7	11.8	10.2	0.1	1.5
1993	19.3	34.5	23.9	35.9	1.4	0.2	16.3	19.3	12.6	10.4	11.7	6.8	3.0	19.4	14.3	0.7	4.4
1994	9.8	34.8	24.3	32.6	0.1	0.2	11.7	9.8	13.2	8.7	5.5	7.1	1.7	9.9	8.7	0.0	1.2
AVERAGE	12.1	48.6	30.5	38.7	0.8	0.3	20.8	12.1	7.6	7.0	7.1	4.1	1.6	12.4	10.1	0.3	2.0

SOIL MOISTURE BUDGET IN INCHES FOR ENTIRE MODEL AREA
AREA: 416580. ACRES

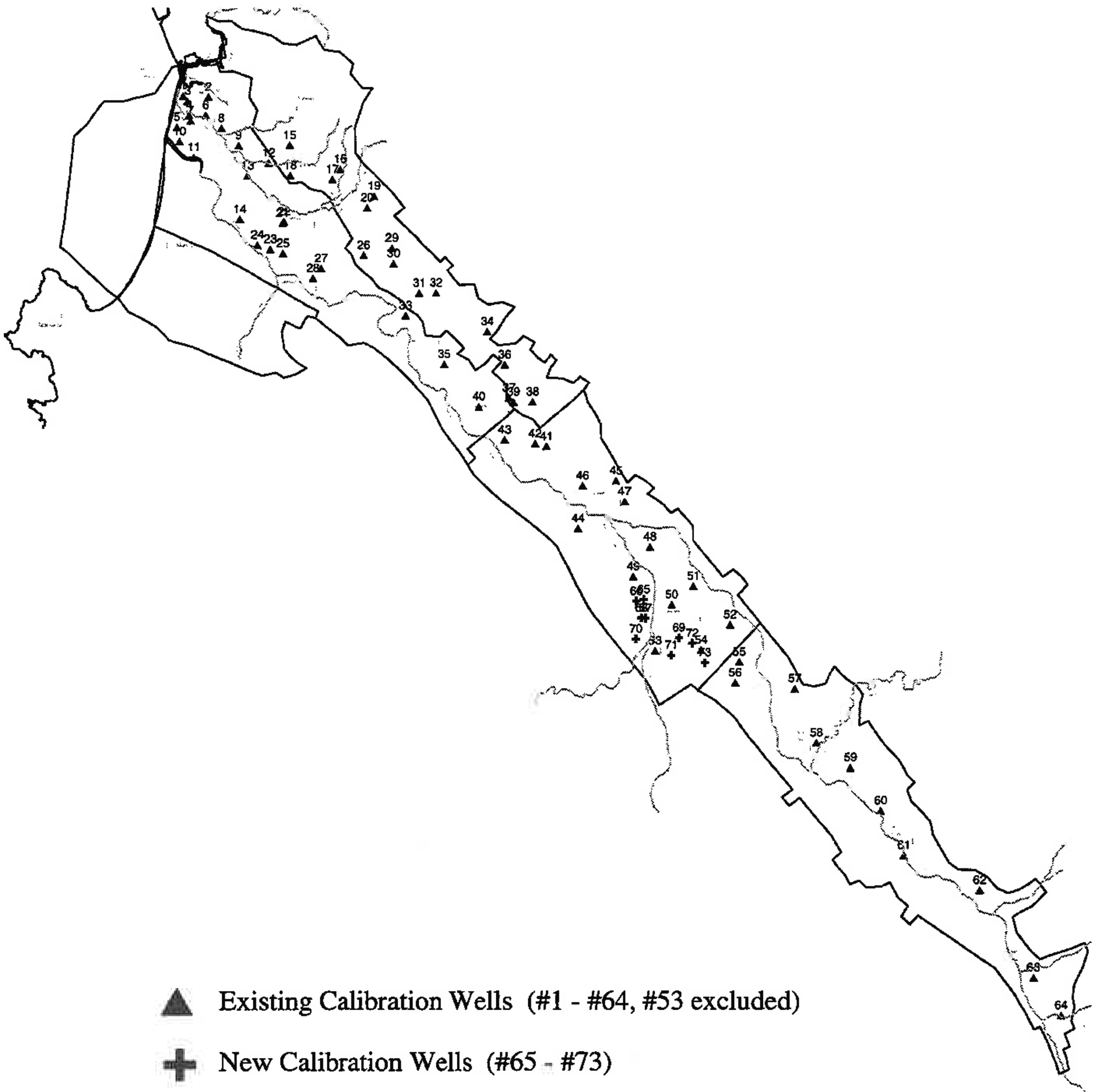
	AGRICULTURAL AREA							MUNICIPAL AREA						UNDEVELOPED AREA			
TIME	RAIN	IRIG.	C.U.	ET	D.R.	RETURN	PERC.	RAIN	W.U.	ET	D.R.	RETURN	PERC.	RAIN	ET	D.R.	PERC.
1949	10.4	39.8	27.4	34.6	0.2	0.3	13.4	10.9	13.5	9.0	5.7	7.2	1.6	10.8	9.6	0.1	1.1
1950	11.2	39.7	27.0	35.2	0.8	0.3	14.6	13.3	13.4	9.8	7.6	7.2	2.1	12.1	9.6	0.4	2.0
1951	10.1	41.3	27.9	35.4	0.5	0.3	15.2	11.8	13.5	8.6	6.8	7.2	2.5	10.8	9.5	0.0	1.2
1952	18.8	38.8	26.5	37.1	2.2	0.3	18.0	20.6	13.6	10.5	12.7	7.3	3.6	19.7	13.7	1.3	4.8
1953	9.4	42.3	28.3	34.3	0.6	0.3	16.5	10.1	13.7	8.2	5.7	7.3	2.4	10.0	8.6	0.0	1.4
1954	10.2	39.8	26.9	35.2	0.3	0.3	14.2	10.9	13.7	9.5	5.8	7.3	1.9	11.0	9.8	0.0	1.2
1955	12.0	40.4	27.3	35.8	0.6	0.3	15.6	13.5	13.7	9.7	7.6	7.3	2.5	12.9	10.6	0.2	2.2
1956	16.1	42.6	29.1	36.6	3.2	0.3	18.6	18.2	13.7	9.4	11.6	7.3	3.4	17.7	10.9	2.0	4.8
1957	9.9	38.0	26.1	34.4	0.1	0.2	13.0	11.1	13.7	9.7	5.8	7.3	1.8	10.7	9.7	0.0	1.0
1958	22.0	29.4	21.4	35.8	1.8	0.2	13.9	22.4	13.7	12.3	12.9	7.3	3.4	23.8	17.1	1.0	5.5
1959	8.0	43.2	29.1	35.1	0.3	0.3	15.1	8.4	13.7	8.8	4.3	7.3	1.7	8.5	7.4	0.1	1.2
1960	8.1	43.6	28.3	34.9	0.1	0.3	16.1	8.6	13.8	8.8	4.5	7.4	1.7	8.5	7.6	0.0	1.0
1961	7.4	42.3	27.9	33.4	0.2	0.3	15.7	8.2	13.9	8.4	4.3	7.5	1.9	8.0	7.3	0.0	0.7
1962	9.5	44.7	28.9	35.2	0.7	0.3	17.9	8.1	14.0	8.1	4.5	7.5	2.0	10.0	8.2	0.2	1.6
1963	15.1	35.1	23.6	34.9	1.1	0.2	13.9	15.4	14.0	10.9	8.6	7.5	2.4	16.3	13.3	0.6	2.3
1964	8.6	38.0	25.6	32.5	0.3	0.2	13.6	10.1	14.1	8.9	5.4	7.6	2.4	9.3	8.6	0.0	0.8
1965	12.0	35.8	24.1	33.0	0.6	0.2	14.0	13.1	14.2	9.0	7.5	7.6	3.1	13.1	11.0	0.1	1.9
1966	10.3	41.5	27.9	33.3	1.3	0.3	16.9	11.3	14.3	8.0	6.8	7.7	3.1	10.8	8.4	0.2	2.1
1967	17.6	30.9	21.4	33.3	1.5	0.2	13.6	19.4	14.4	11.5	11.3	7.7	3.3	19.1	15.7	0.4	2.9
1968	6.8	36.5	25.0	31.2	0.0	0.2	12.0	8.0	14.5	8.6	4.2	7.8	1.9	7.6	7.0	0.0	0.7
1969	20.8	35.4	23.6	34.9	2.5	0.2	18.5	22.2	14.4	11.7	13.1	7.7	4.0	22.2	13.9	1.6	6.7
1970	11.0	40.3	26.9	34.5	0.6	0.3	15.3	13.1	14.4	9.6	7.4	7.7	2.7	12.1	9.5	0.2	2.4
1971	11.7	40.4	26.9	33.6	1.3	0.3	16.7	13.1	14.5	8.8	7.6	7.8	3.3	13.0	10.1	0.2	2.6
1972	6.4	42.7	28.7	33.3	0.4	0.3	15.0	6.8	14.5	7.6	3.7	7.8	2.2	7.0	6.2	0.0	0.8
1973	21.1	37.4	24.4	36.8	2.4	0.3	18.9	22.0	14.6	11.6	13.0	7.8	4.1	22.9	16.2	1.1	5.5
1974	17.7	33.8	23.6	33.8	2.4	0.2	14.9	21.6	14.7	10.5	13.3	7.9	4.7	20.3	14.3	1.5	4.5
1975	14.4	34.8	23.4	34.6	0.9	0.2	13.3	14.3	14.8	10.6	7.8	7.9	2.7	15.4	13.1	0.3	1.9
1976	8.3	33.1	22.8	30.4	0.2	0.2	11.2	8.9	14.8	8.2	4.8	7.9	2.5	9.0	7.0	0.0	0.8
1977	6.5	36.6	25.2	30.1	0.1	0.2	12.1	6.7	15.0	8.3	3.4	8.0	2.2	6.9	7.4	0.0	0.6
1978	20.9	32.5	22.1	35.5	2.3	0.2	15.5	21.9	15.1	12.4	12.9	8.1	3.6	22.5	16.0	1.1	5.5
1979	12.0	36.4	24.6	34.3	0.4	0.2	13.5	12.0	15.2	10.0	6.6	8.2	2.4	12.7	11.1	0.0	1.5
1980	14.9	30.6	22.1	33.4	0.8	0.2	11.7	14.4	15.4	10.5	8.0	8.2	2.9	15.6	12.8	0.3	2.5
1981	7.6	31.5	22.7	29.5	0.0	0.2	9.3	7.5	15.3	8.6	4.0	8.2	2.0	7.9	7.2	0.0	0.7
1982	17.5	26.4	19.4	32.8	0.9	0.1	10.4	20.1	15.2	11.5	11.6	8.2	3.8	19.6	15.5	0.3	3.0
1983	25.0	26.8	18.8	34.4	2.2	0.1	15.0	25.6	14.8	12.8	15.1	7.9	4.5	26.7	18.5	1.3	6.8
1984	8.8	32.8	23.6	30.4	0.3	0.2	10.5	8.9	14.4	8.3	4.9	7.7	2.5	9.3	9.1	0.0	0.9
1985	9.9	31.1	22.6	30.6	0.2	0.2	10.1	10.0	14.0	8.6	5.4	7.5	2.5	10.5	9.5	0.0	1.0
1986	15.7	28.9	20.8	32.1	1.2	0.1	11.2	14.0	13.7	9.9	7.8	7.3	2.5	16.0	12.1	0.7	2.7
1987	8.3	31.6	22.9	29.8	0.3	0.2	9.5	9.6	13.3	8.9	5.2	7.1	1.7	9.1	8.3	0.2	1.1
1988	9.6	30.7	22.4	30.6	0.1	0.2	9.4	8.4	13.0	8.0	4.5	6.9	1.9	9.9	9.0	0.0	0.9
1989	9.0	29.6	21.5	29.8	0.1	0.2	8.9	9.8	12.6	8.2	5.3	6.8	1.9	9.8	8.0	0.0	0.9
1990	7.3	27.3	20.7	27.2	0.0	0.1	7.4	8.7	12.3	8.4	4.6	6.6	1.6	7.9	7.9	0.0	0.7
1991	11.2	29.1	21.2	29.1	0.6	0.1	10.4	11.4	12.1	9.1	6.2	6.5	1.8	12.0	9.3	0.3	2.5
1992	12.1	28.9	21.5	30.9	0.5	0.1	9.3	13.1	12.3	9.6	7.3	6.6	1.9	12.8	10.5	0.3	2.1
1993	17.1	27.7	20.7	32.3	1.2	0.1	11.1	18.3	12.5	10.5	10.5	6.7	3.1	18.6	13.5	0.7	4.4
1994	8.7	28.5	21.3	28.9	0.1	0.1	8.0	9.9	12.8	9.0	5.2	6.9	1.6	9.7	8.6	0.0	1.0
AVERAGE	12.3	35.4	24.4	33.2	0.8	0.2	13.5	13.2	14.0	9.5	7.5	7.5	2.6	13.3	10.6	0.4	2.3

AVERAGE SOIL MOISTURE BUDGET IN INCHES FROM 1949 THRU 1994

	AGRICULTURAL AREA							MUNICIPAL AREA						UNDEVELOPED AREA			
REGION	RAIN	IRIG.	C.U.	ET	D.R.	RETURN	PERC.	RAIN	W.U.	ET	D.R.	RETURN	PERC.	RAIN	ET	D.R.	PERC.
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	13.6	40.1	26.0	34.9	0.4	0.2	18.3	13.9	9.6	7.4	8.0	5.1	3.0	14.1	10.7	0.4	3.0
3	13.2	26.2	18.8	27.9	1.3	0.2	9.9	13.2	24.0	13.4	7.1	12.8	3.7	13.7	11.0	0.4	2.2
4	12.6	29.1	20.9	29.7	0.7	0.2	11.1	14.3	7.1	7.4	8.5	3.8	1.7	14.6	11.2	0.5	2.9
5	11.3	39.8	28.3	36.8	0.5	0.3	13.5	10.5	13.3	8.4	6.0	7.1	2.2	12.2	10.4	0.3	1.5
6	12.1	48.6	30.5	38.7	0.8	0.3	20.8	12.1	7.6	7.0	7.1	4.1	1.6	12.4	10.1	0.3	2.0
TOTAL	12.3	35.4	24.4	33.2	0.8	0.2	13.5	13.2	14.0	9.5	7.5	7.5	2.6	13.3	10.6	0.4	2.3

Attachment 2

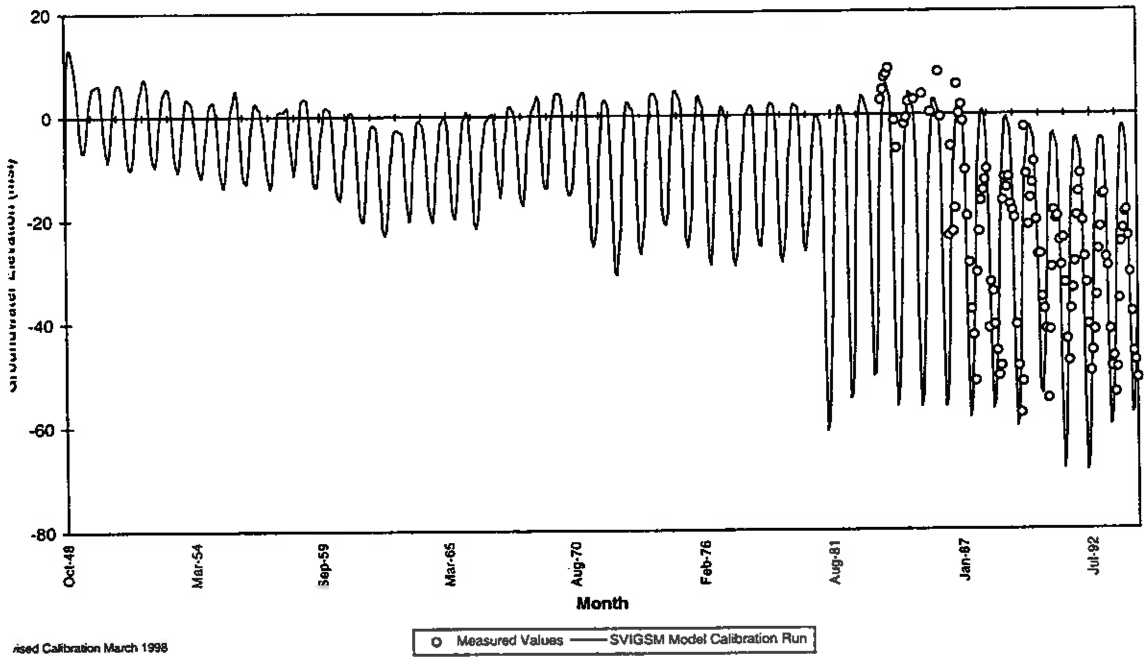
Locations of Existing and New Calibration Wells



▲ Existing Calibration Wells (#1 - #64, #53 excluded)

✚ New Calibration Wells (#65 - #73)

HYDROGRAPH OF MEASURED AND SIMULATED GW LEVELS
Calibration Well No. 1: Pressure Subarea, Deep Aquifer



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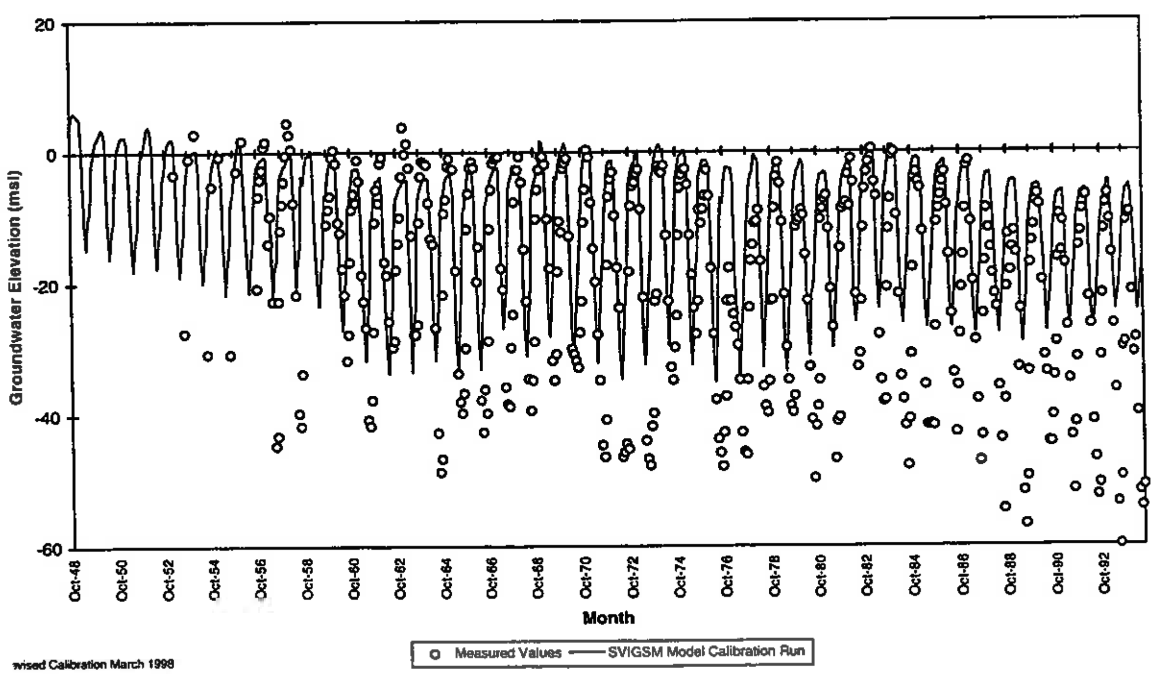
HYDROGRAPH OF MEASURED AND SIMULATED GW LEVELS
Calibration Well No. 2: Pressure Subarea, 400 Foot Aquifer



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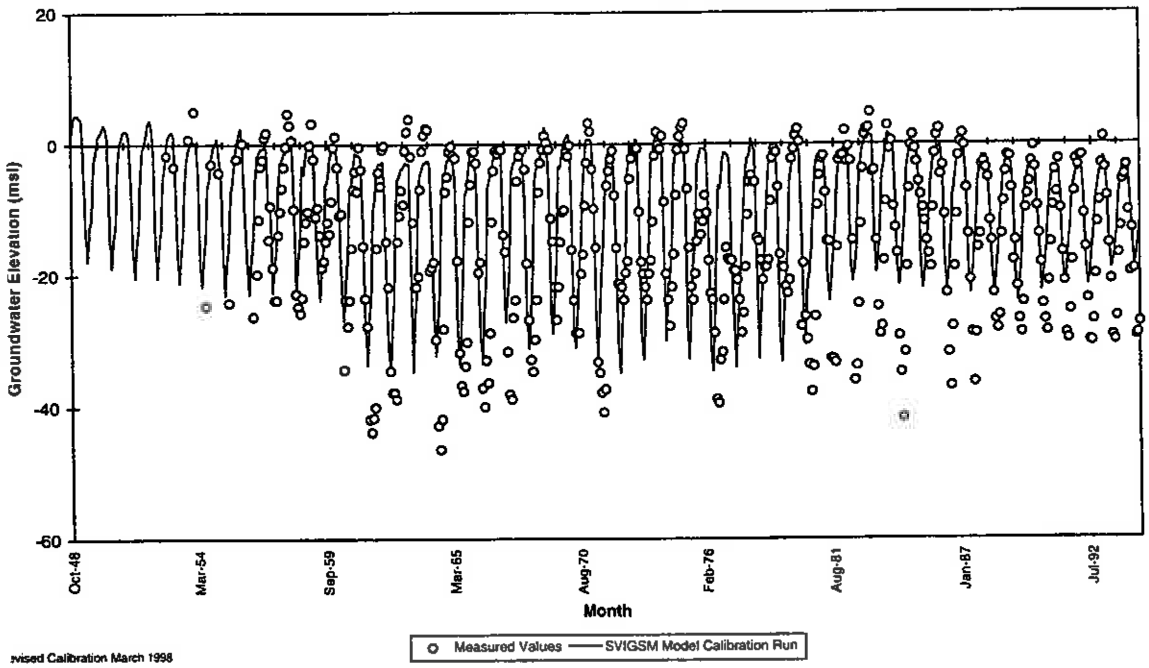
3/27/98

HYDROGRAPH OF MEASURED AND SIMULATED GW LEVELS
Calibration Well No. 3: Pressure Subarea, 400 Foot Aquifer



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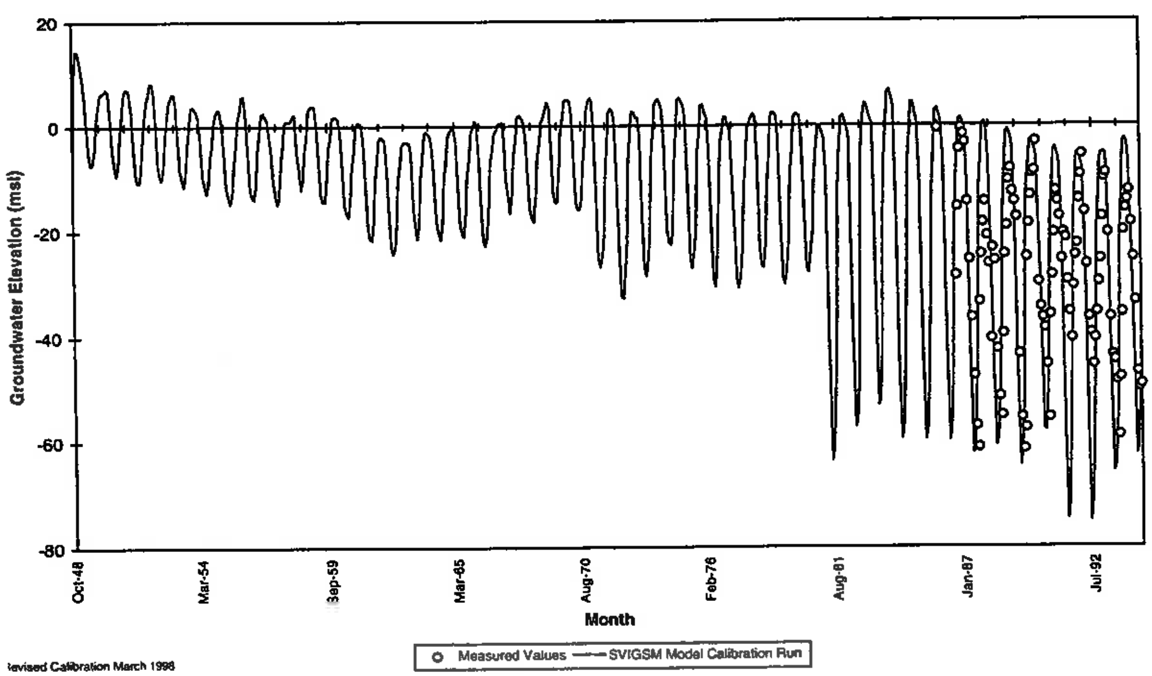
HYDROGRAPH OF MEASURED AND SIMULATED GW LEVELS
Calibration Well No. 4: Pressure Subarea, Deep Aquifer



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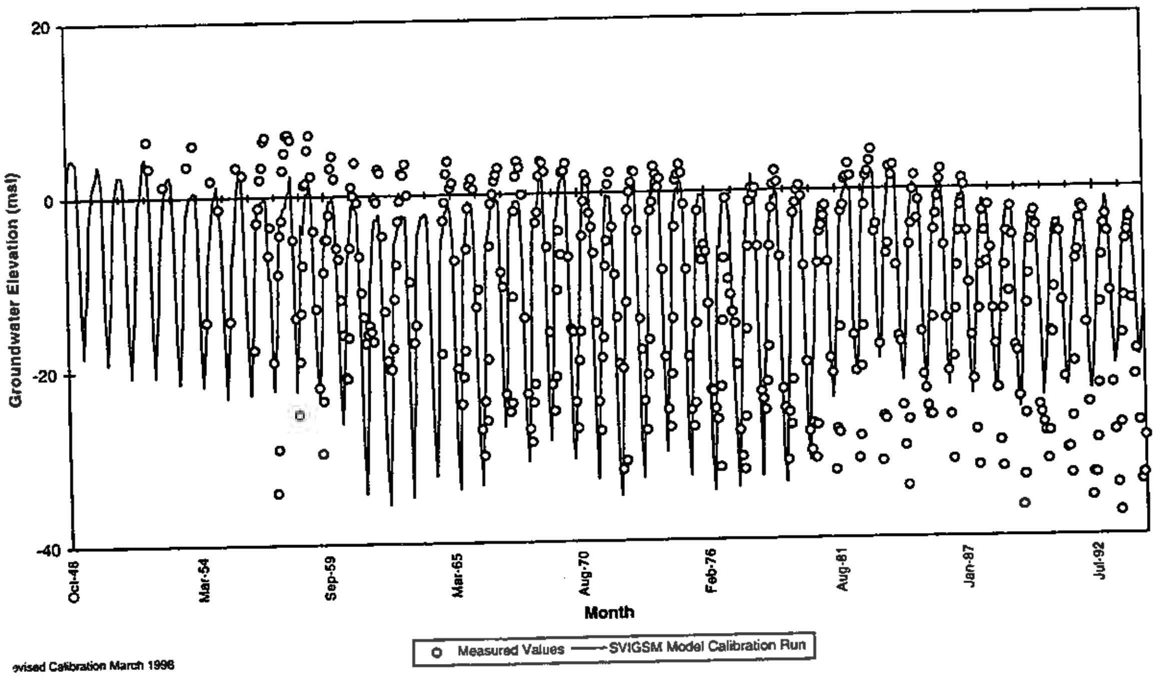
HYDROGRAPH OF MEASURED AND SIMULATED GW LEVELS
Calibration Well No. 5: Pressure Subarea, 400 Foot Aquifer



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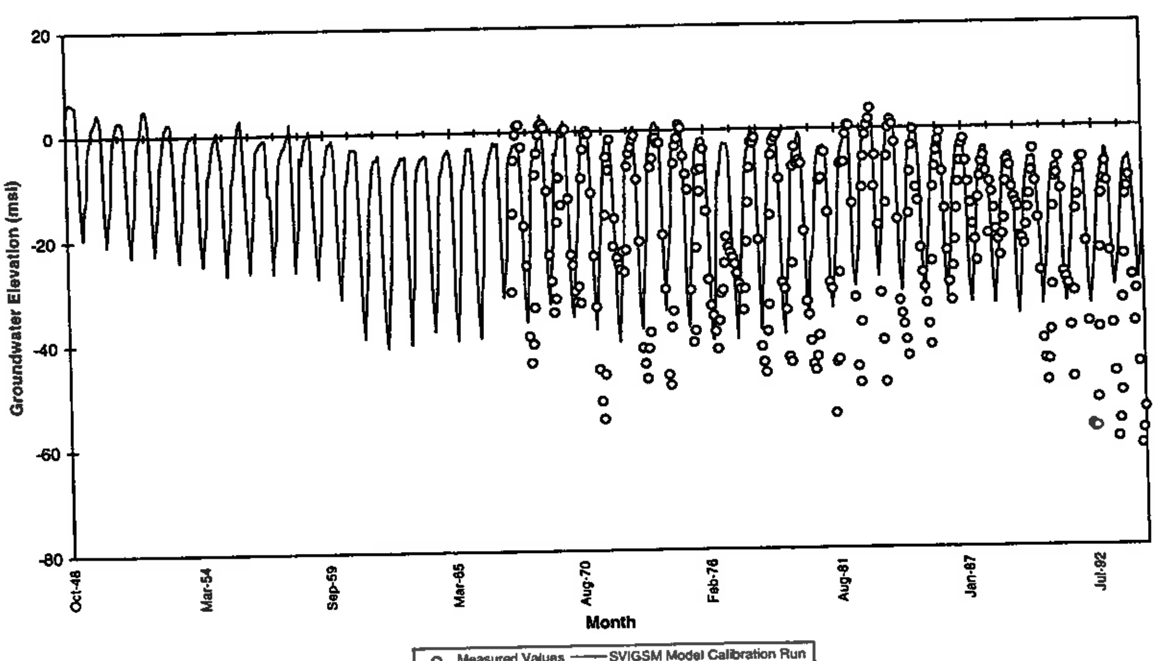
HYDROGRAPH OF MEASURED AND SIMULATED GW LEVELS
Calibration Well No. 6: Pressure Subarea, 400 Foot Aquifer



levised Calibration March 1998

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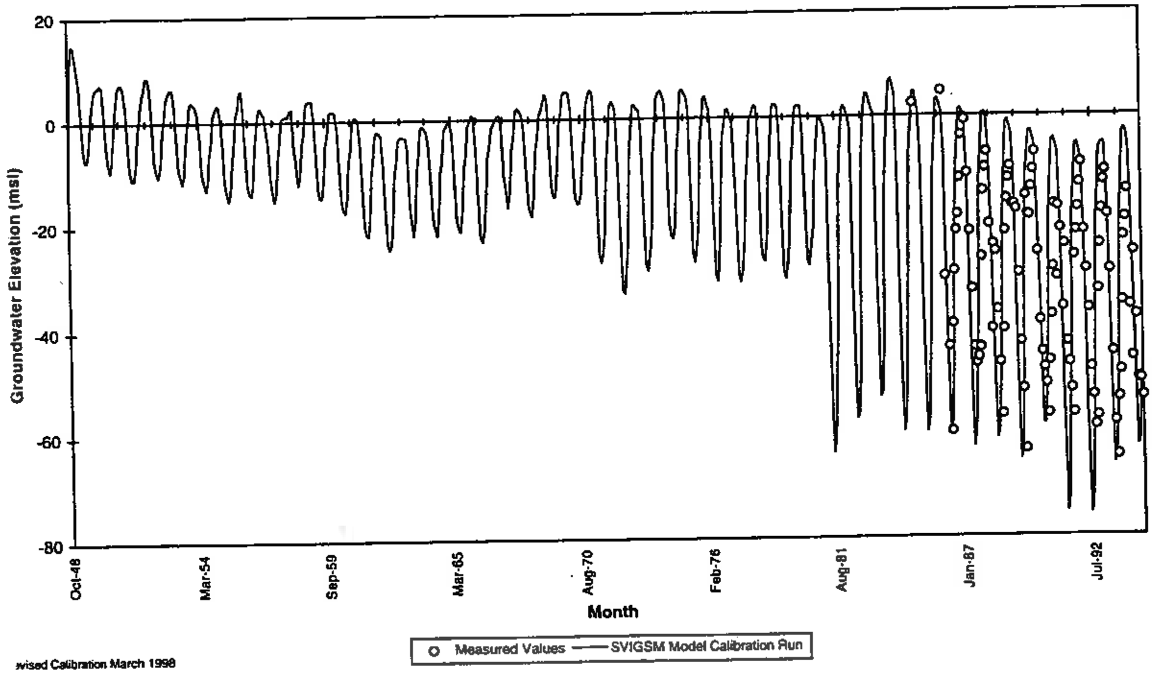
HYDROGRAPH OF MEASURED AND SIMULATED GW LEVELS
Calibration Well No. 7: Pressure Subarea, Deep Aquifer



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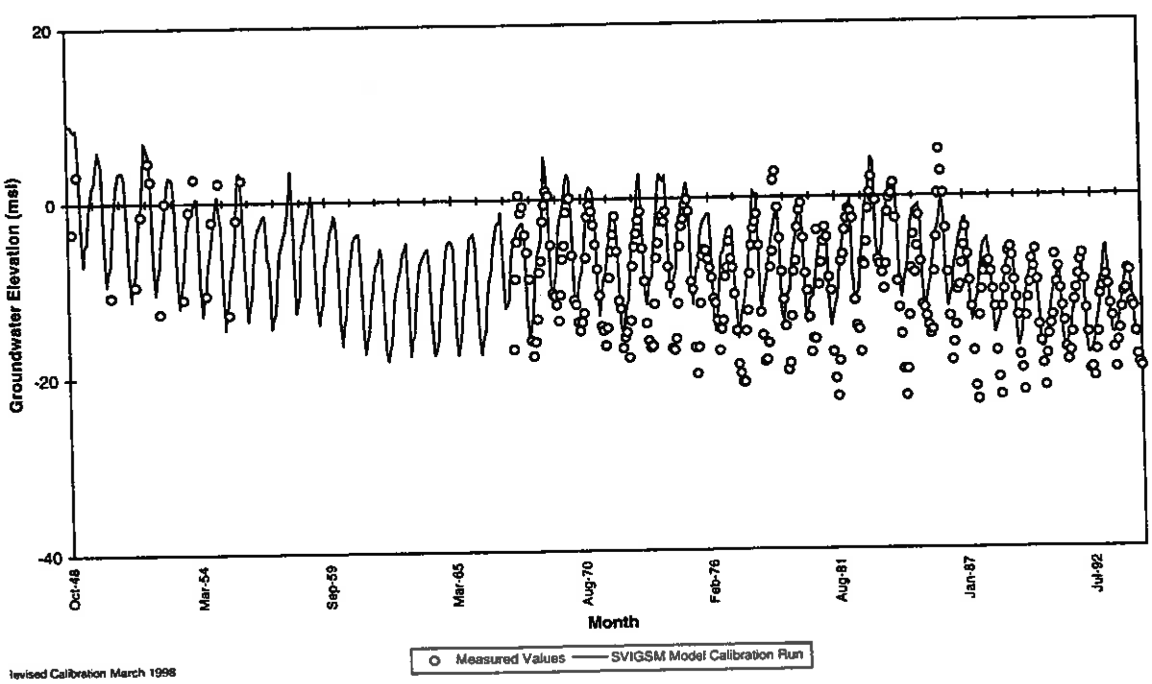
HYDROGRAPH OF MEASURED AND SIMULATED GW LEVELS
Calibration Well No. 8: Pressure Subarea, 180 Foot Aquifer



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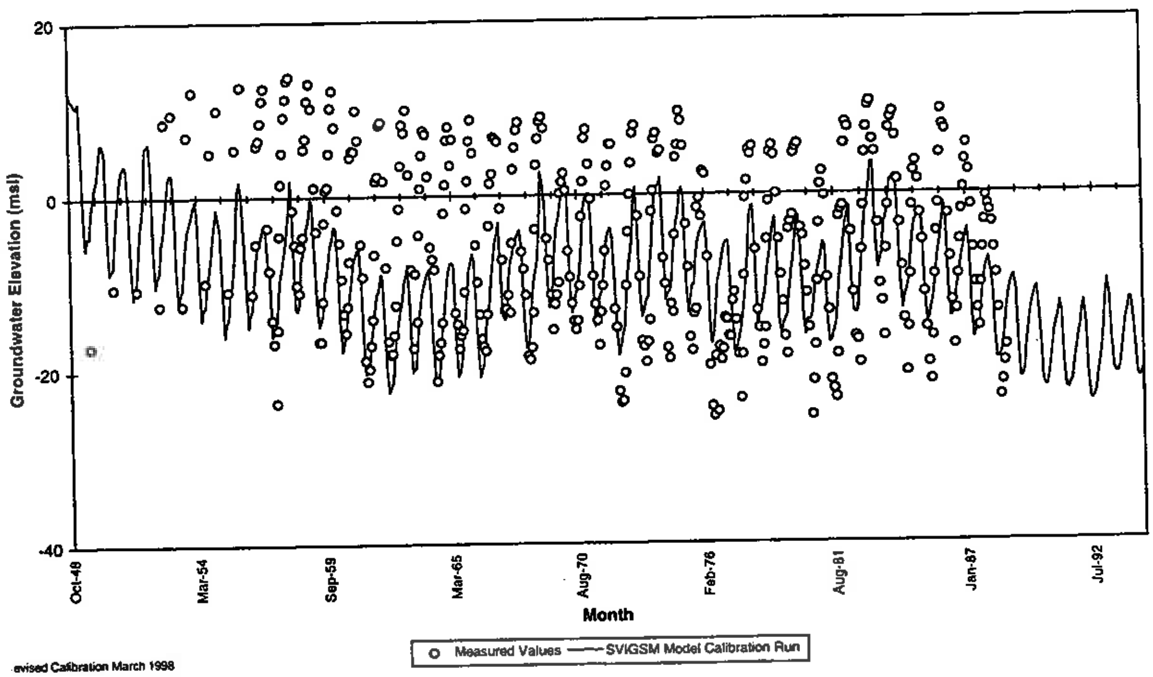
HYDROGRAPH OF MEASURED AND SIMULATED GW LEVELS
Calibration Well No. 9: Pressure Subarea, 180 Foot Aquifer



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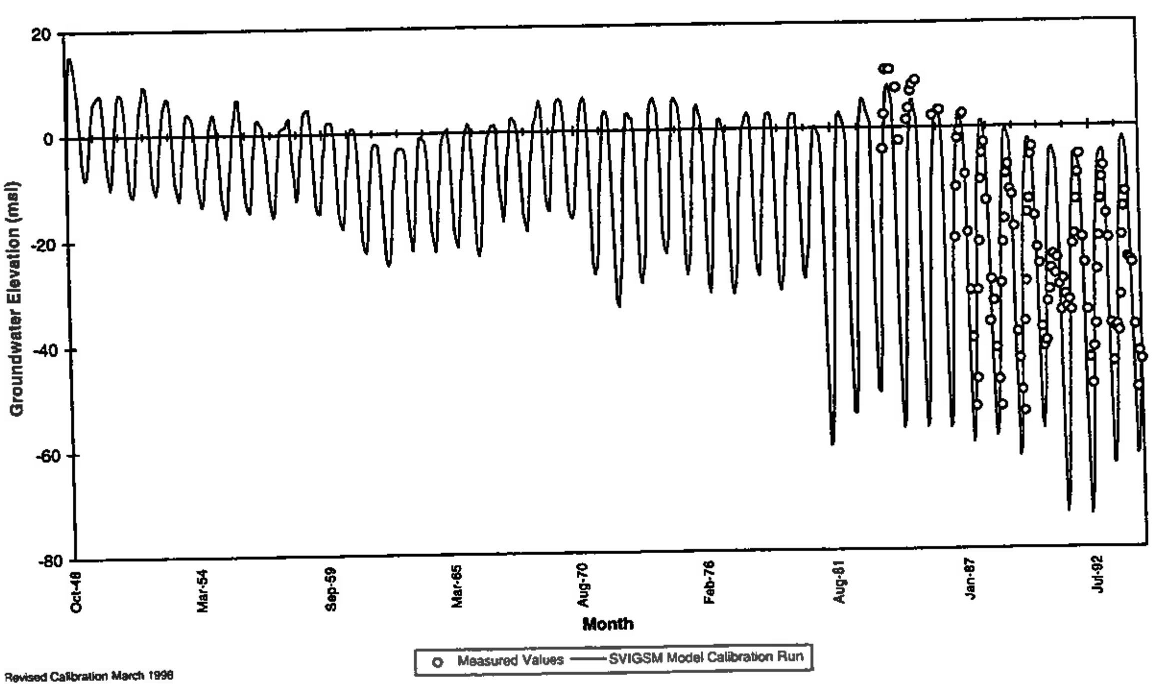
HYDROGRAPH OF MEASURED AND SIMULATED GW LEVELS
Calibration Well No. 10: Pressure Subarea, Deep Aquifer



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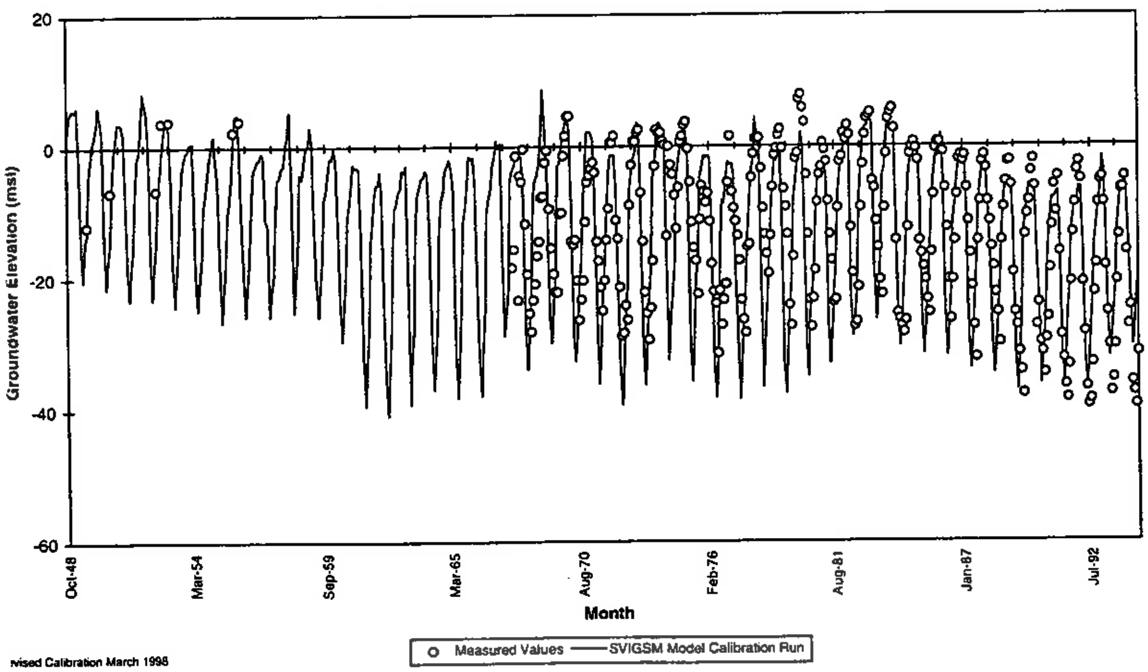
HYDROGRAPH OF MEASURED AND SIMULATED GW LEVELS
Calibration Well No. 11: Pressure Subarea, 180 Foot Aquifer



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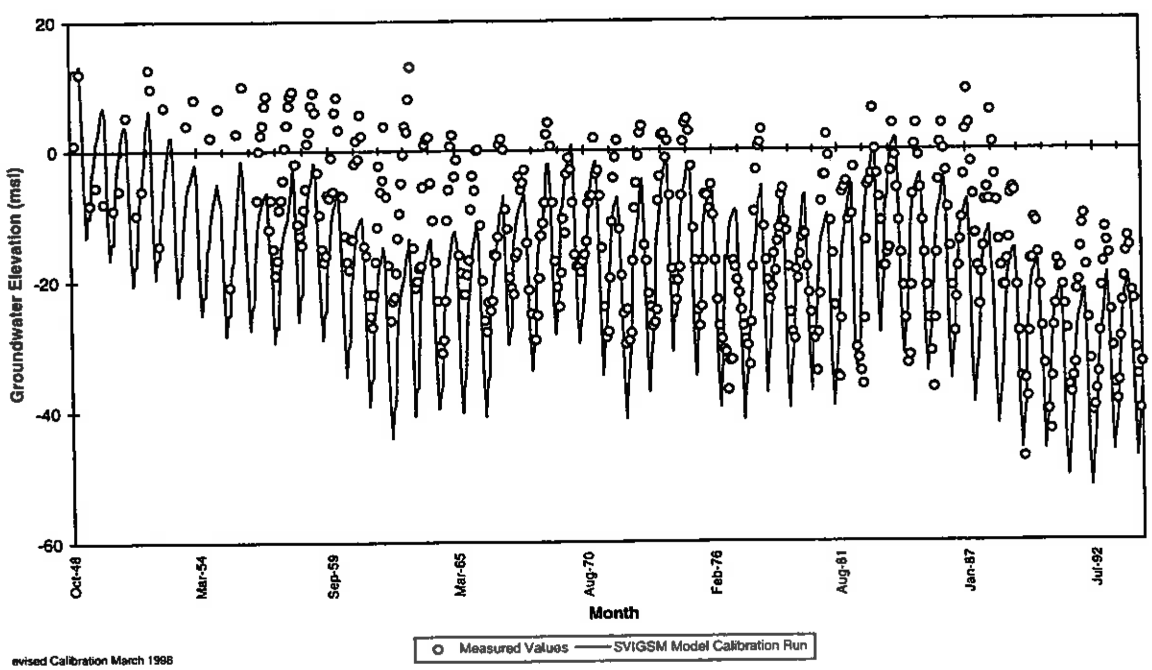
HYDROGRAPH OF MEASURED AND SIMULATED GW LEVELS
Calibration Well No. 12: Pressure Subarea, 400 Foot Aquifer



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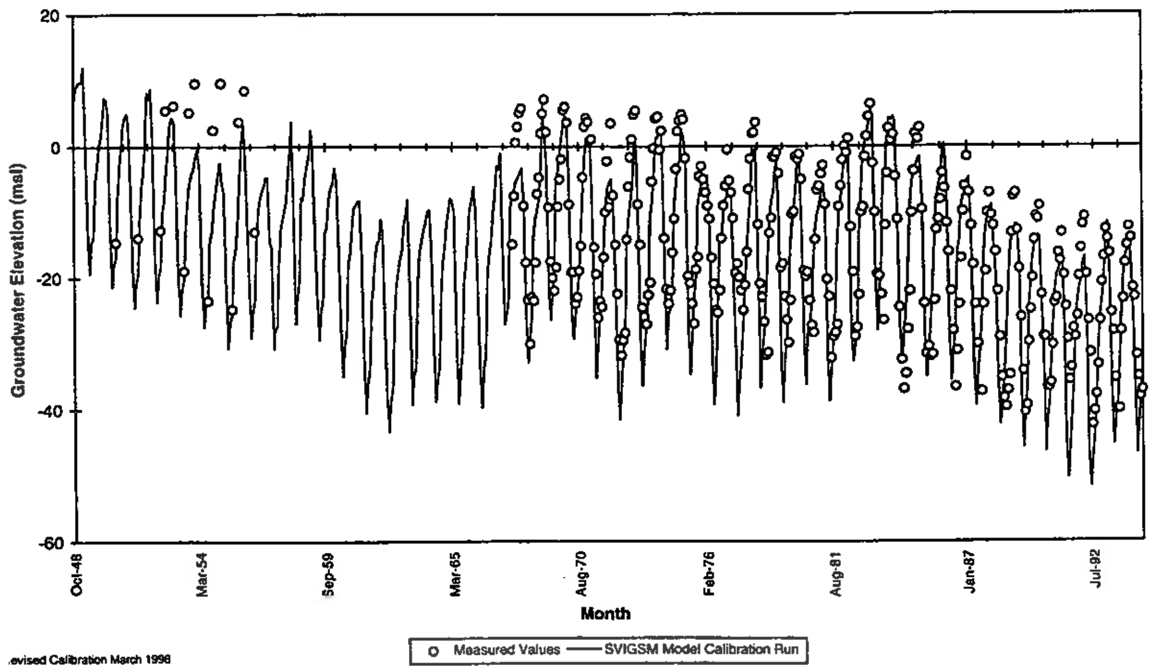
HYDROGRAPH OF MEASURED AND SIMULATED GW LEVELS
Calibration Well No. 13: Pressure Subarea, 180 Foot Aquifer



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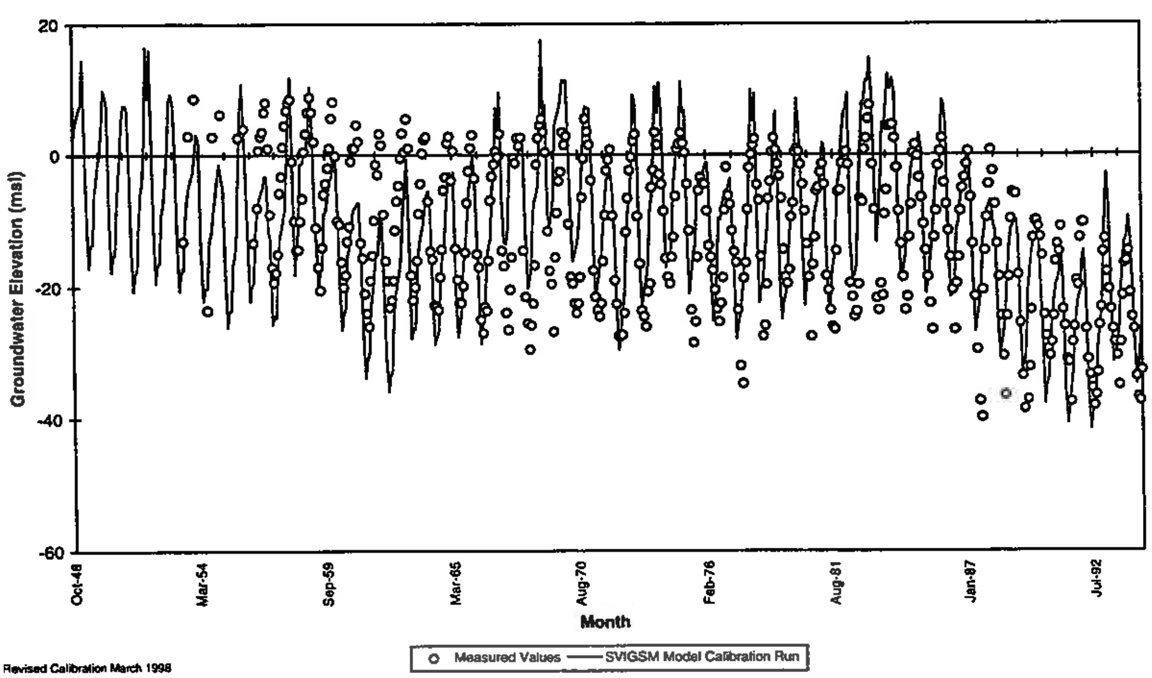
HYDROGRAPH OF MEASURED AND SIMULATED GW LEVELS
Calibration Well No. 14: Pressure Subarea, 400 Foot Aquifer



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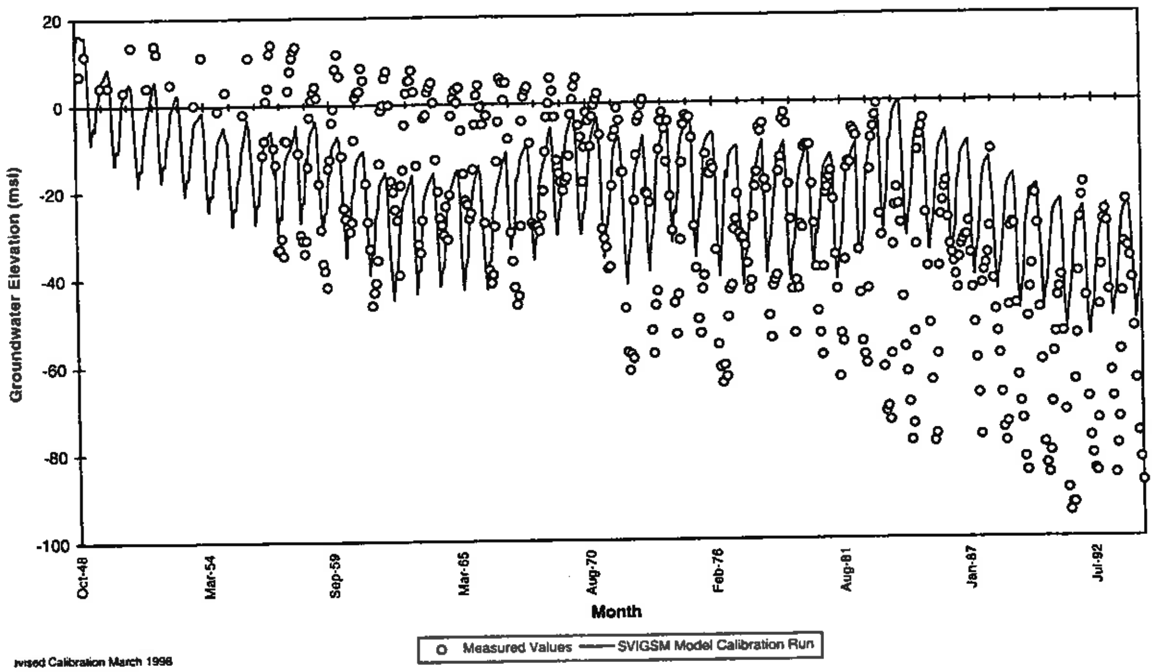
HYDROGRAPH OF MEASURED AND SIMULATED GW LEVELS
Calibration Well No. 15: East Side Subarea, East Side Deep Aquifer



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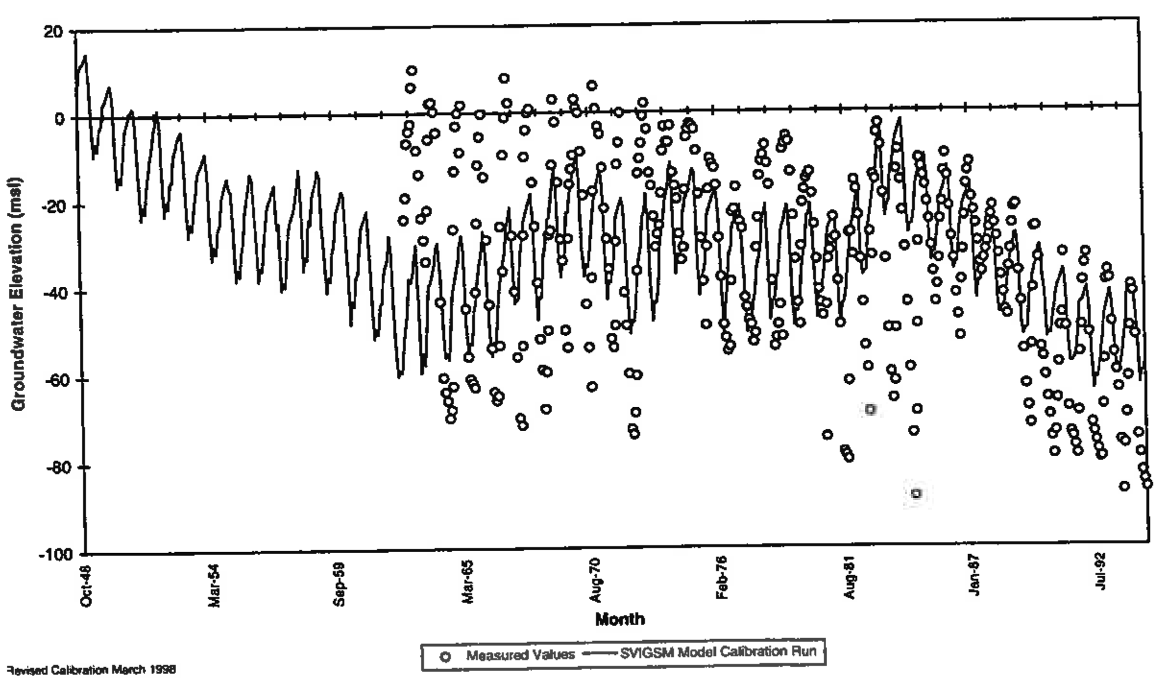
HYDROGRAPH OF MEASURED AND SIMULATED GW LEVELS
Calibration Well No. 16: East Side Subarea, East Side Deep Aquifer



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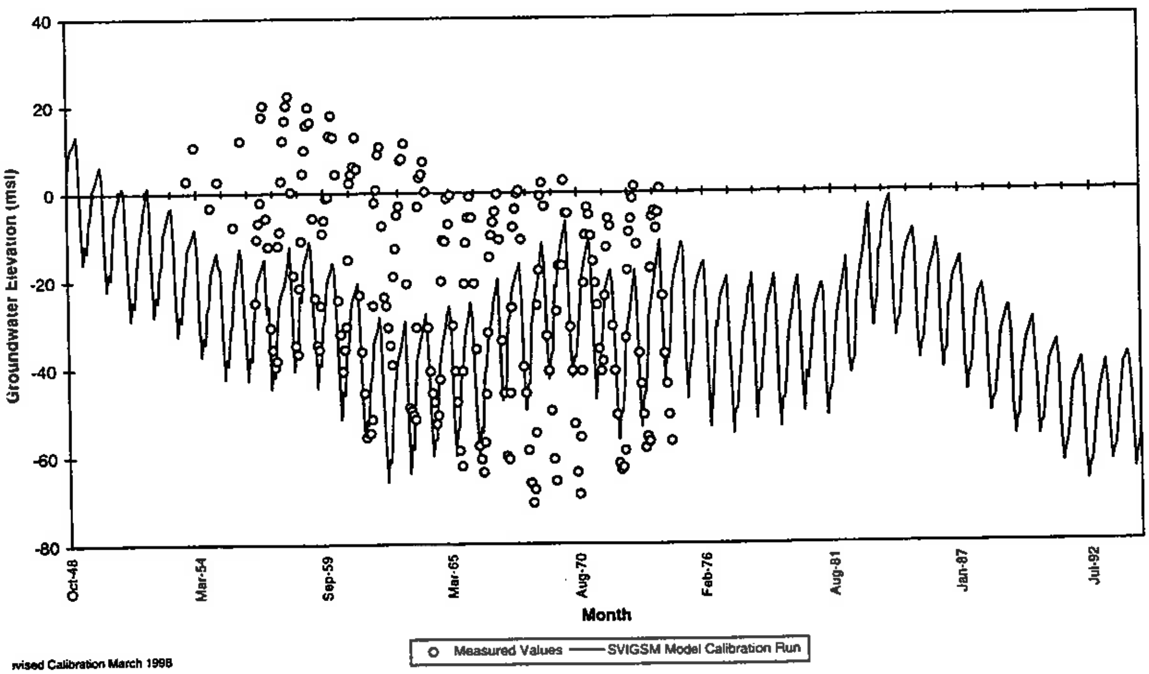
HYDROGRAPH OF MEASURED AND SIMULATED GW LEVELS
Calibration Well No. 17: East Side Subarea, East Side Deep Aquifer



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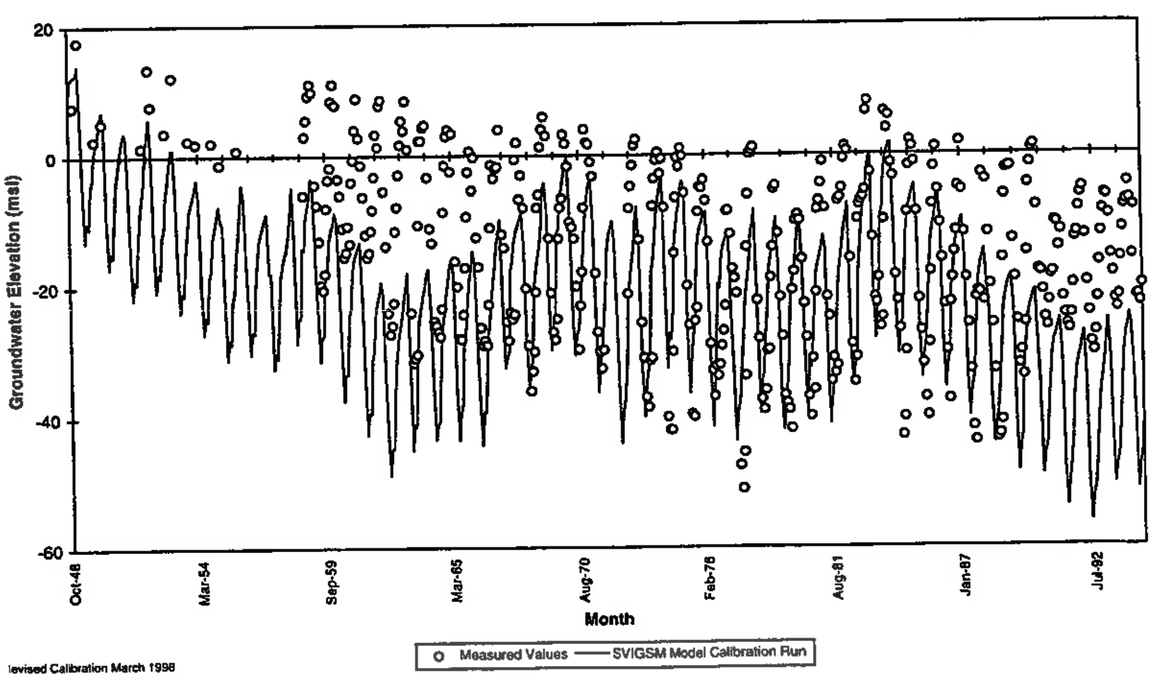
HYDROGRAPH OF MEASURED AND SIMULATED GW LEVELS
Calibration Well No. 18: East Side Subarea, East Side Deep Aquifer



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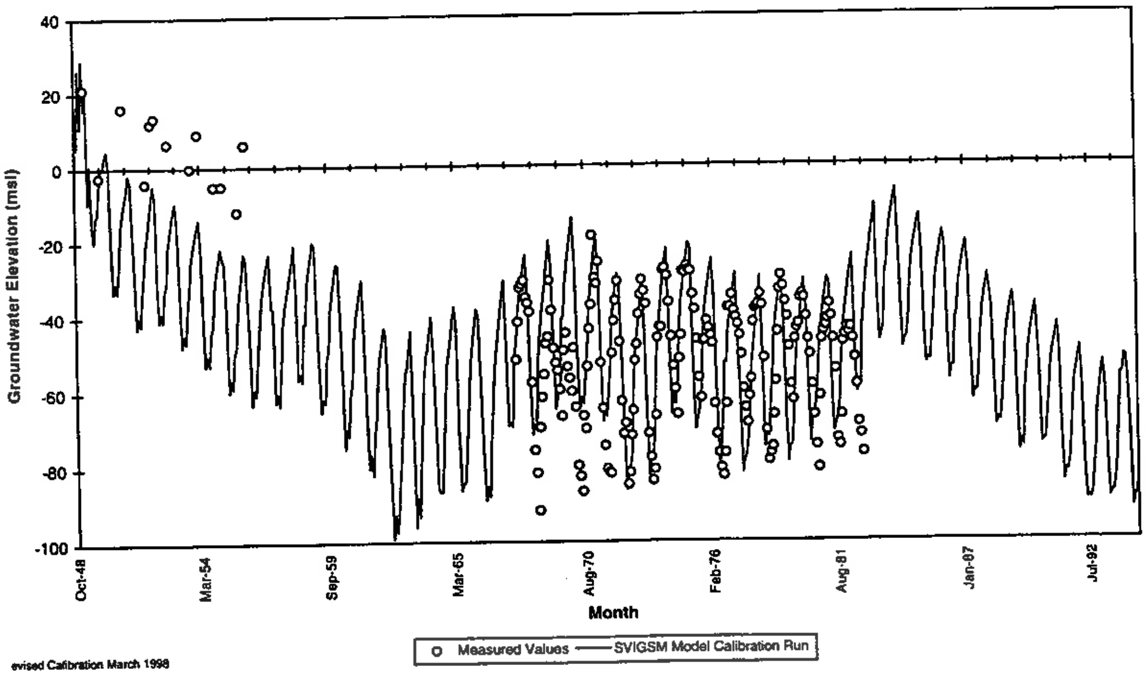
3/27/98

HYDROGRAPH OF MEASURED AND SIMULATED GW LEVELS
Calibration Well No. 19: East Side Subarea, East Side Deep Aquifer



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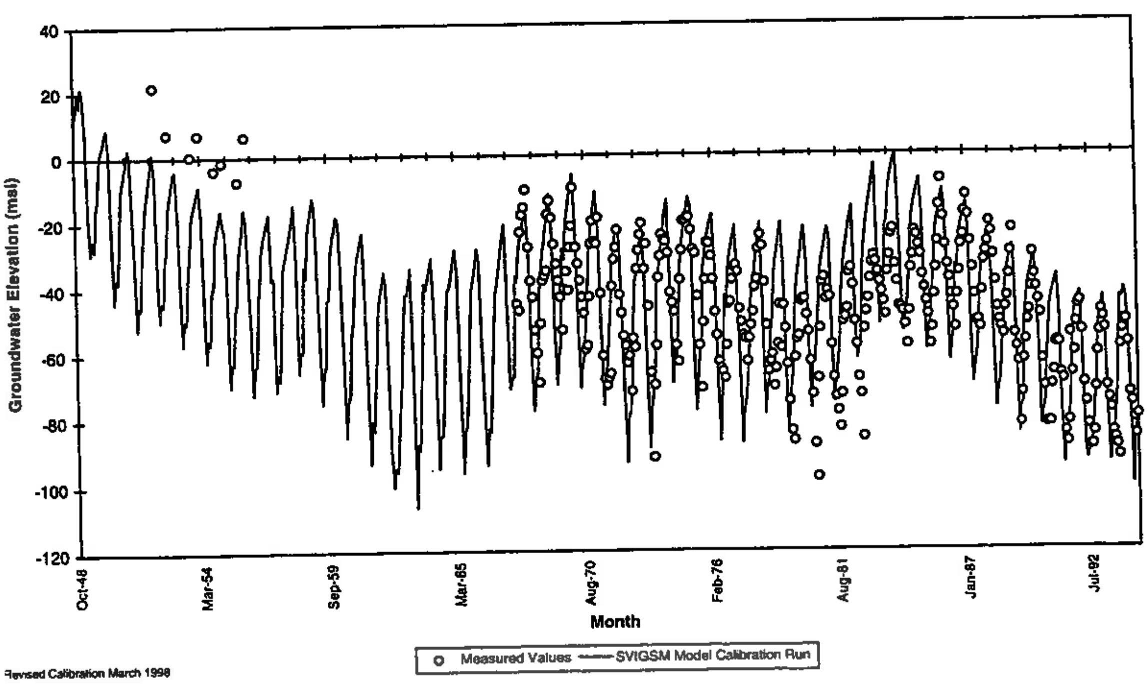
HYDROGRAPH OF MEASURED AND SIMULATED GW LEVELS
Calibration Well No. 20: East Side Subarea, East Side Deep Aquifer



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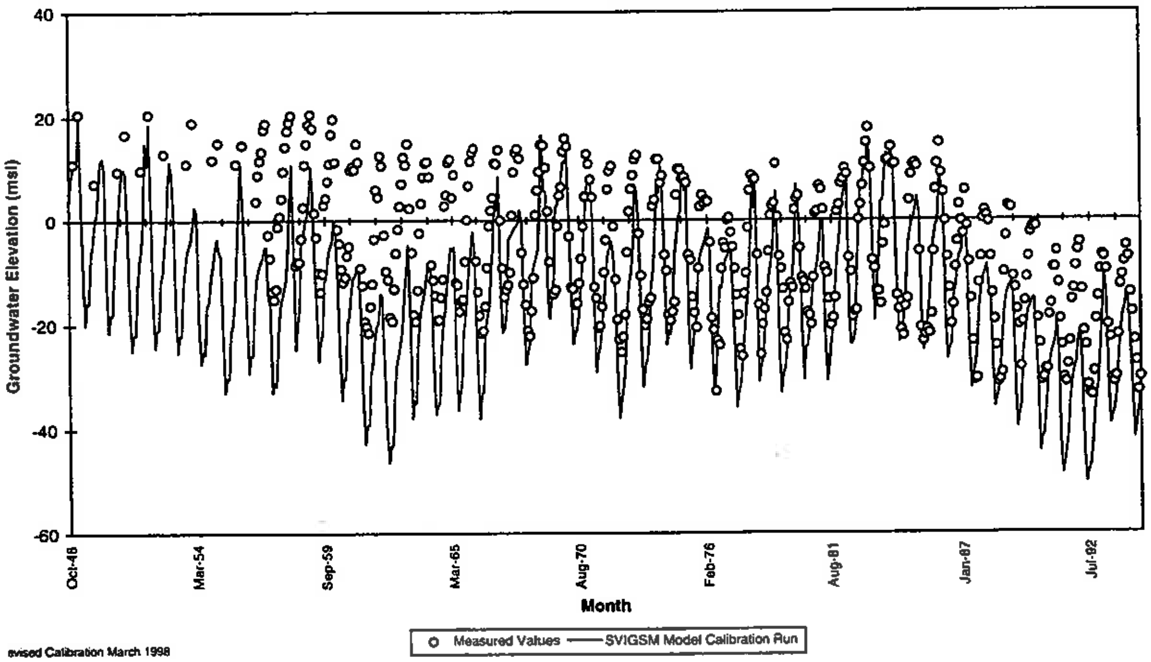
HYDROGRAPH OF MEASURED AND SIMULATED GW LEVELS
Calibration Well No. 21: Pressure Subarea, 400 Foot Aquifer



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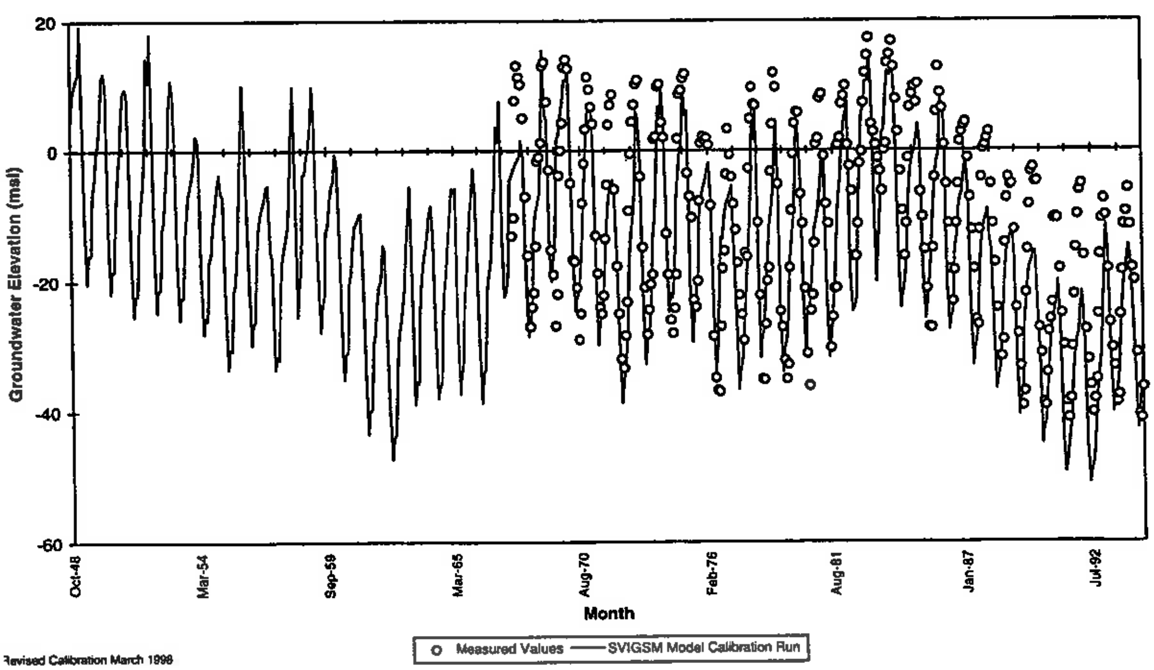
HYDROGRAPH OF MEASURED AND SIMULATED GW LEVELS
Calibration Well No. 22: Pressure Subarea, 400 Foot Aquifer



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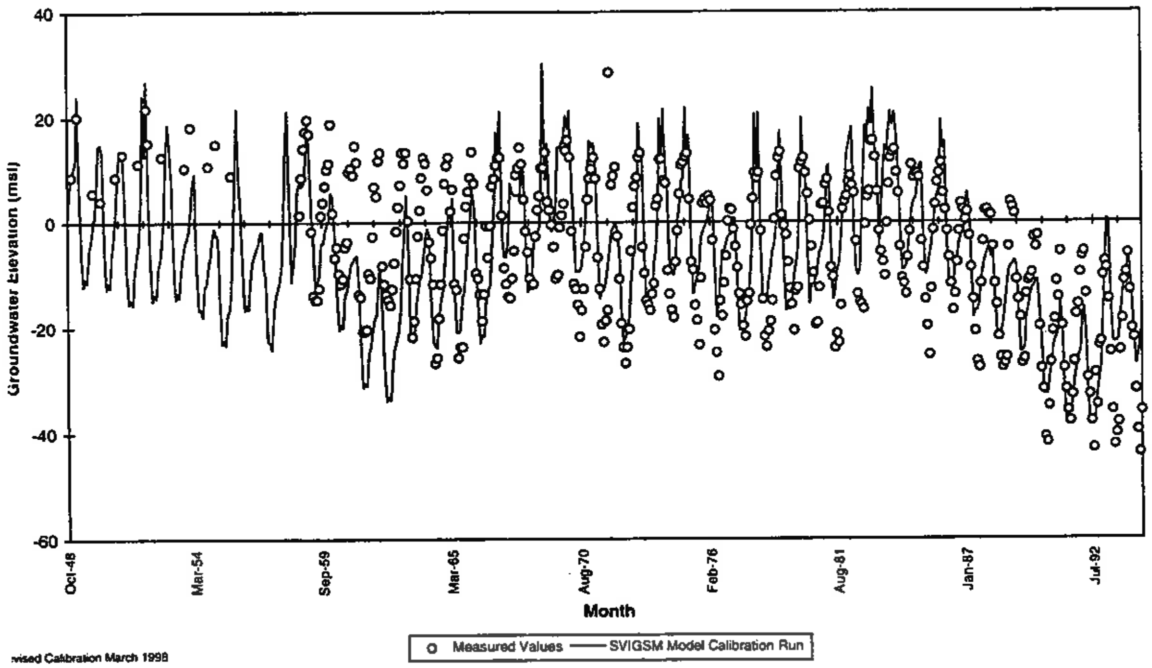
HYDROGRAPH OF MEASURED AND SIMULATED GW LEVELS
Calibration Well No. 23: Pressure Subarea, 400 Foot Aquifer



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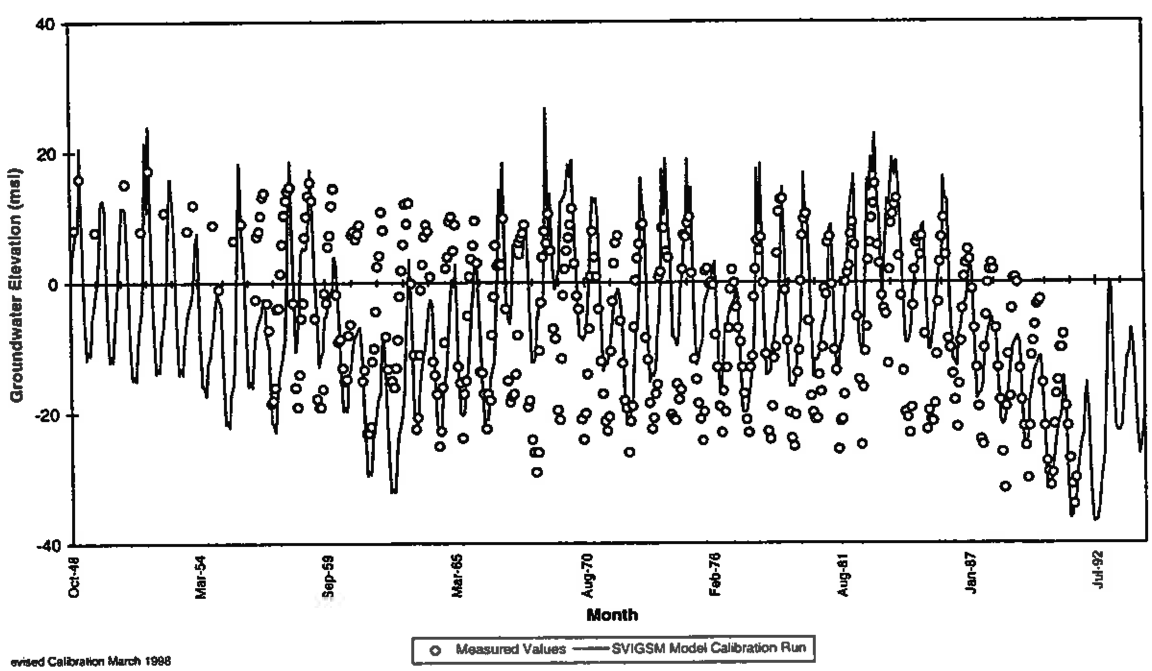
HYDROGRAPH OF MEASURED AND SIMULATED GW LEVELS
Calibration Well No. 24: Pressure Subarea, 400 Foot Aquifer



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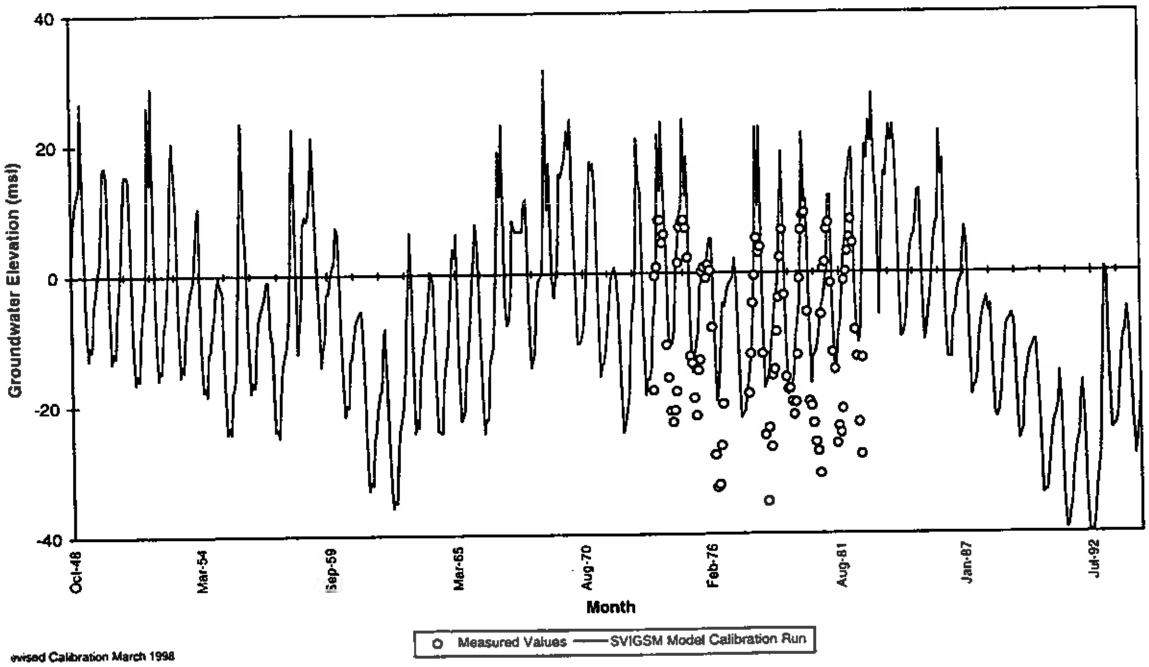
HYDROGRAPH OF MEASURED AND SIMULATED GW LEVELS
Calibration Well No. 25: Pressure Subarea, 400 Foot Aquifer



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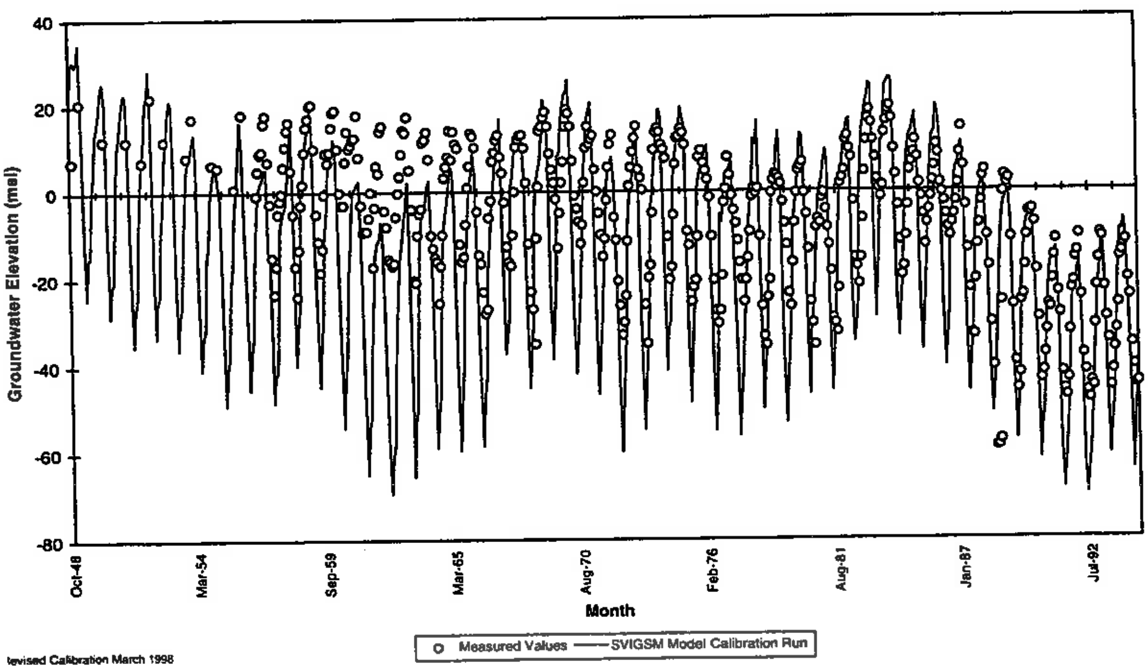
HYDROGRAPH OF MEASURED AND SIMULATED GW LEVELS
Calibration Well No. 26: East Side Subarea, East Side Deep Aquifer



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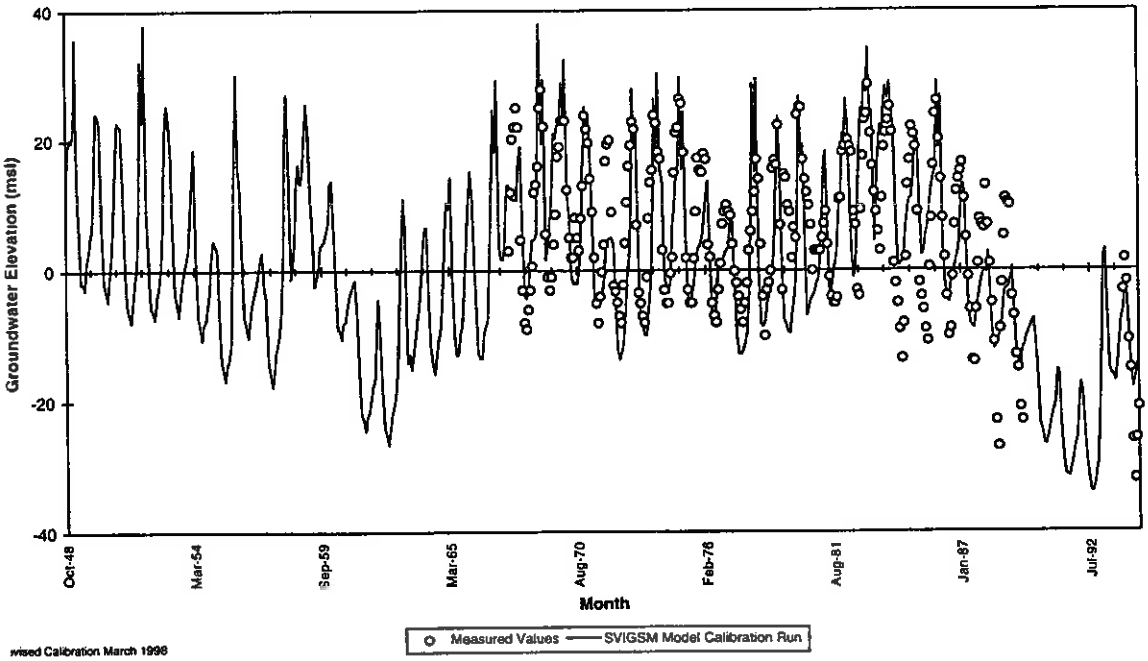
HYDROGRAPH OF MEASURED AND SIMULATED GW LEVELS
Calibration Well No. 27: Pressure Subarea, 400 Foot Aquifer



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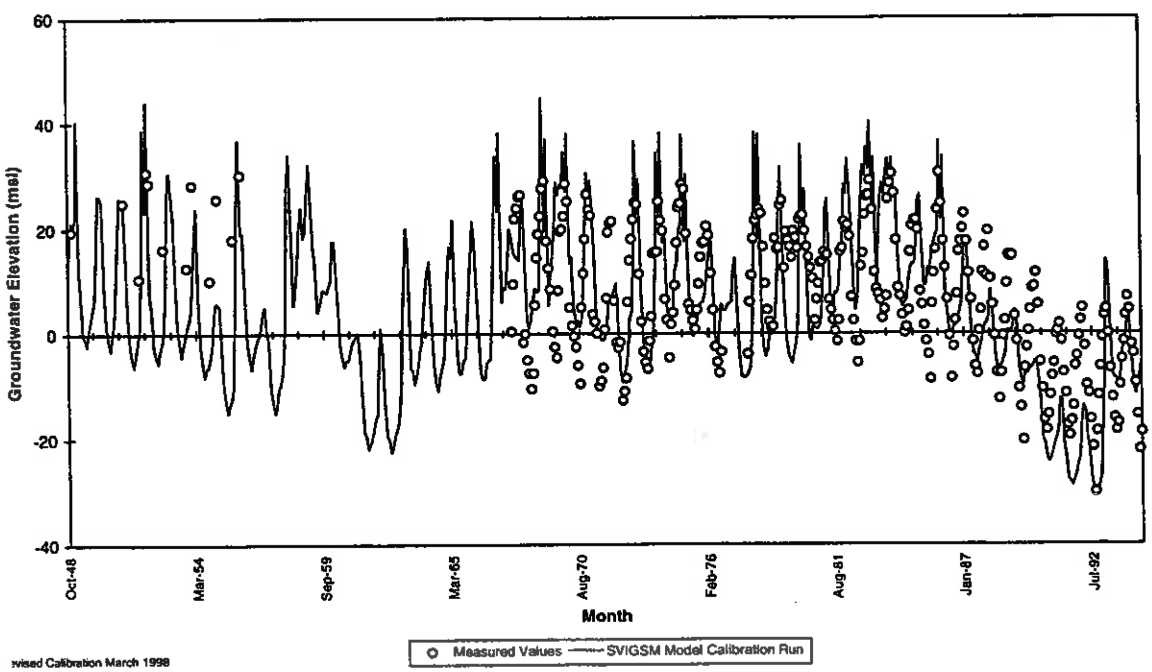
HYDROGRAPH OF MEASURED AND SIMULATED GW LEVELS
Calibration Well No. 28: Pressure Subarea, 180 Foot Aquifer



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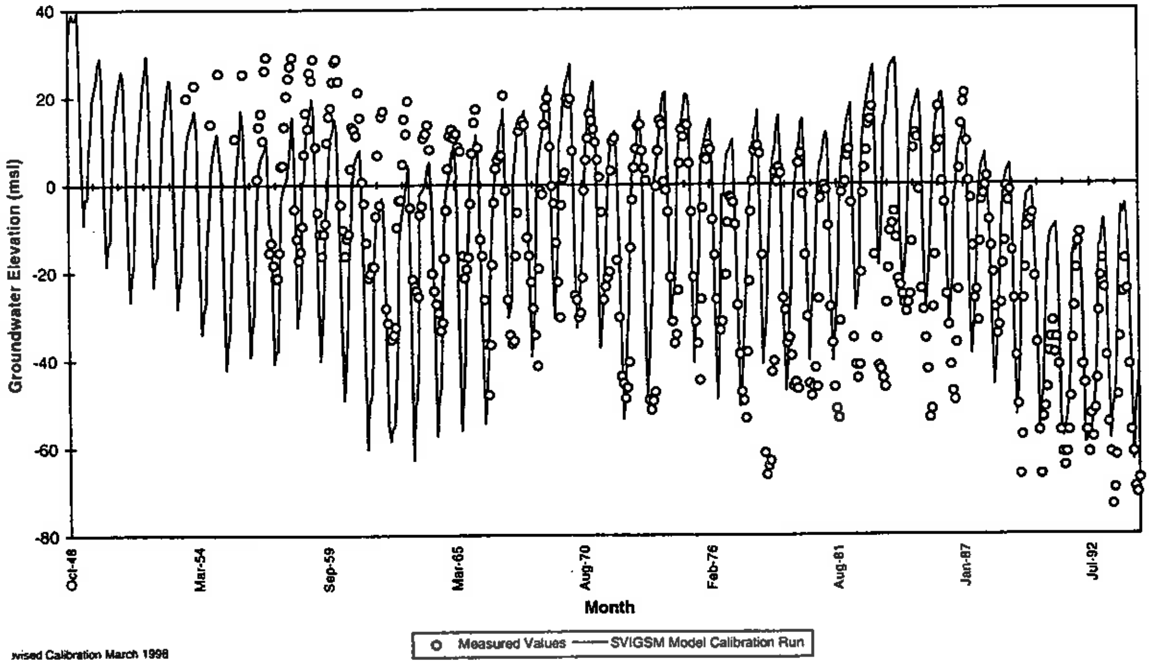
HYDROGRAPH OF MEASURED AND SIMULATED GW LEVELS
Calibration Well No. 29: East Side Subarea, East Side Deep Aquifer



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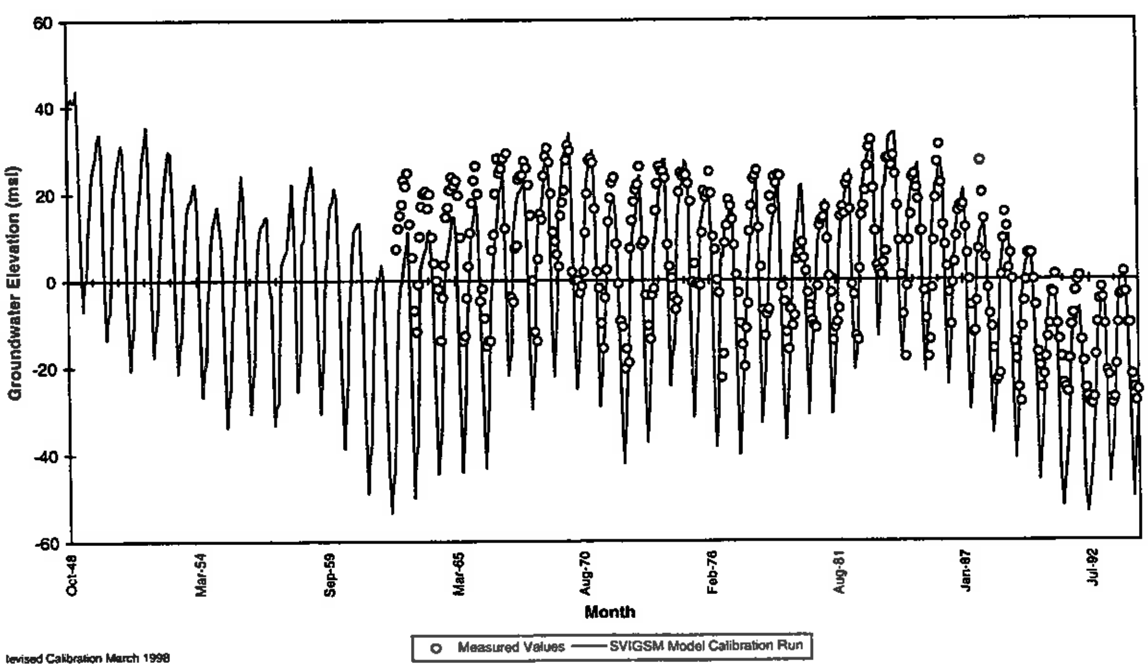
HYDROGRAPH OF MEASURED AND SIMULATED GW LEVELS
Calibration Well No. 30: East Side Subarea, East Side Deep Aquifer



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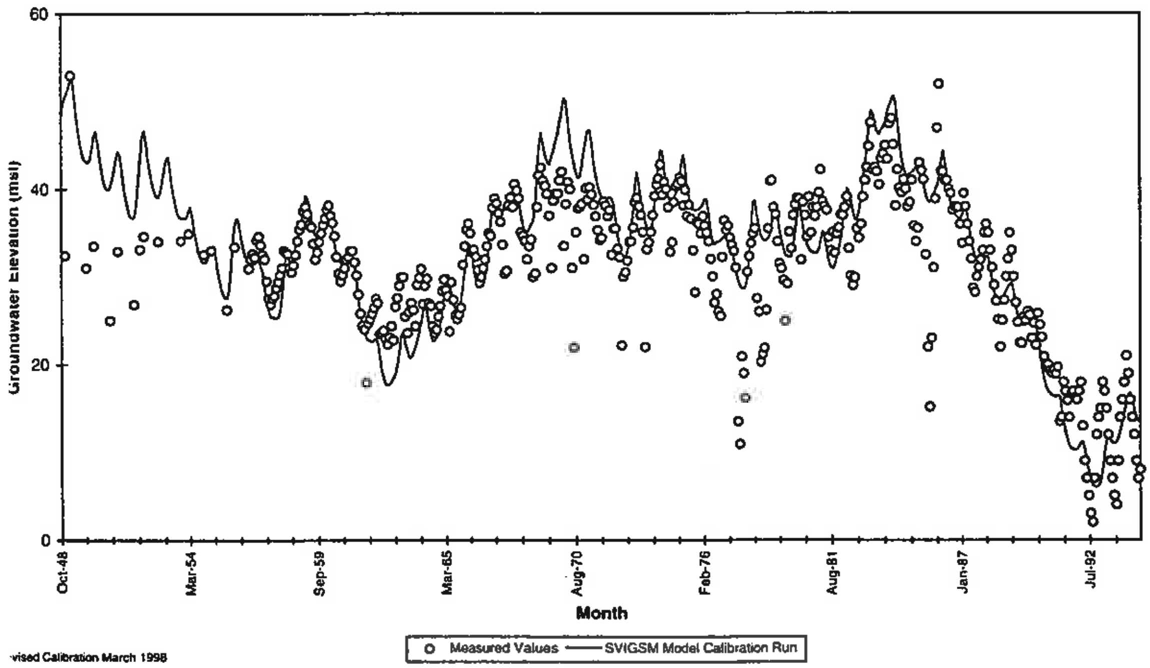
HYDROGRAPH OF MEASURED AND SIMULATED GW LEVELS
Calibration Well No. 31: East Side Subarea, East Side Shallow Aquifer



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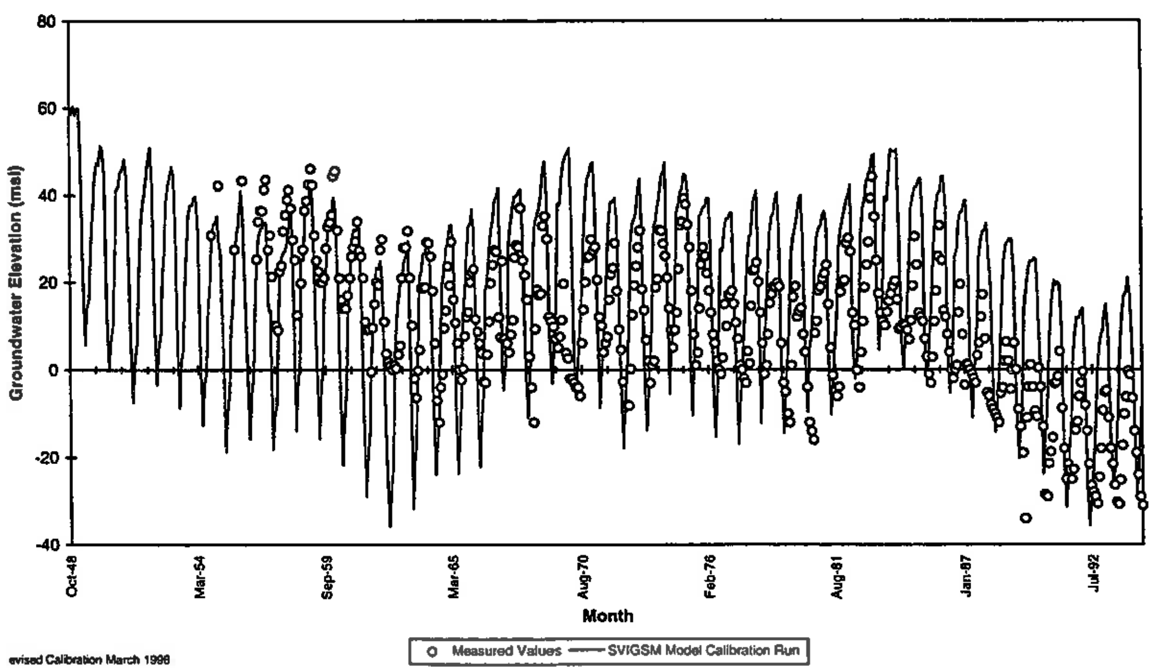
HYDROGRAPH OF MEASURED AND SIMULATED GW LEVELS
Calibration Well No. 32: East Side Subarea, East Side Deep Aquifer



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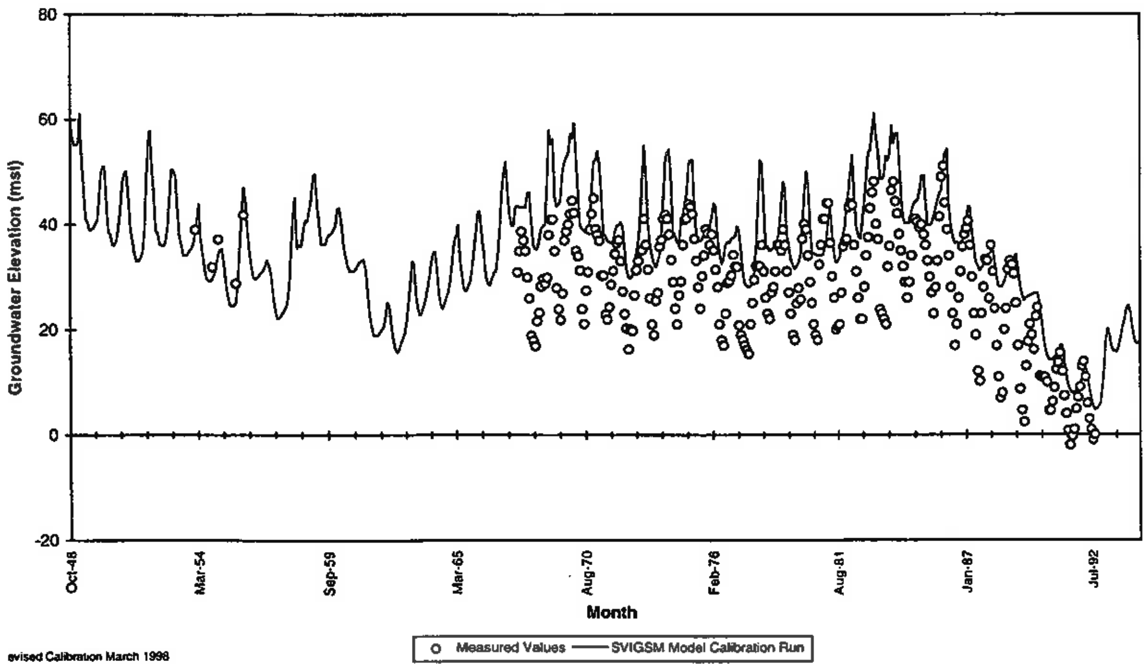
HYDROGRAPH OF MEASURED AND SIMULATED GW LEVELS
Calibration Well No. 33: Pressure Subarea, 400 Foot Aquifer



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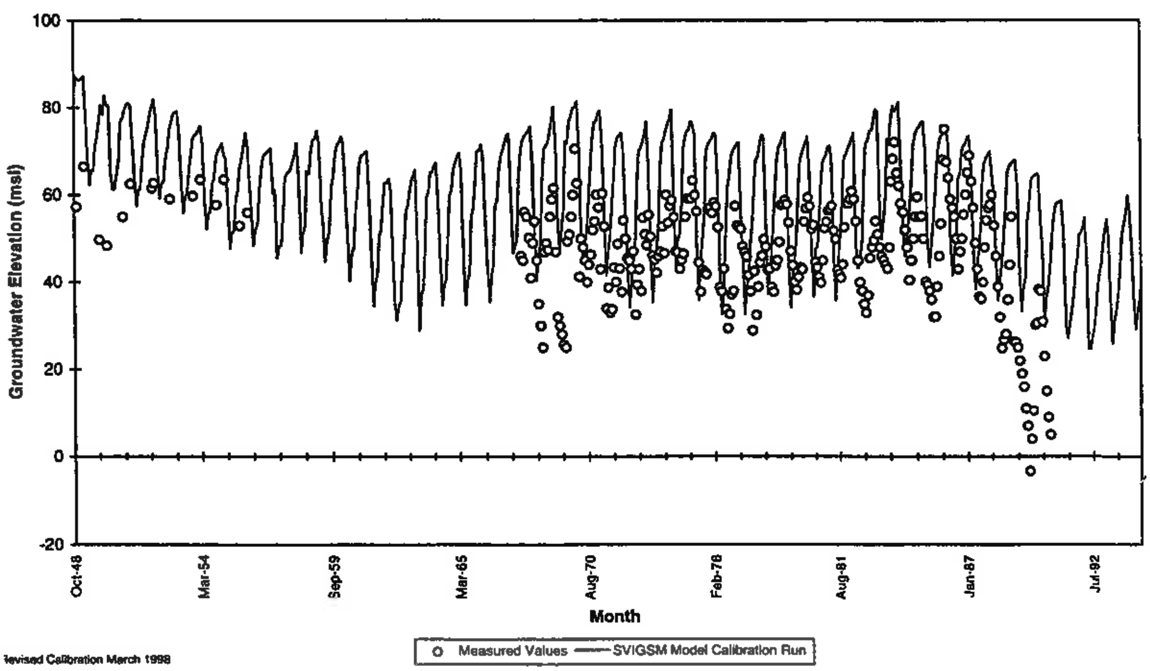
3/27/98

HYDROGRAPH OF MEASURED AND SIMULATED GW LEVELS
Calibration Well No. 34: East Side Subarea, East Side Deep Aquifer



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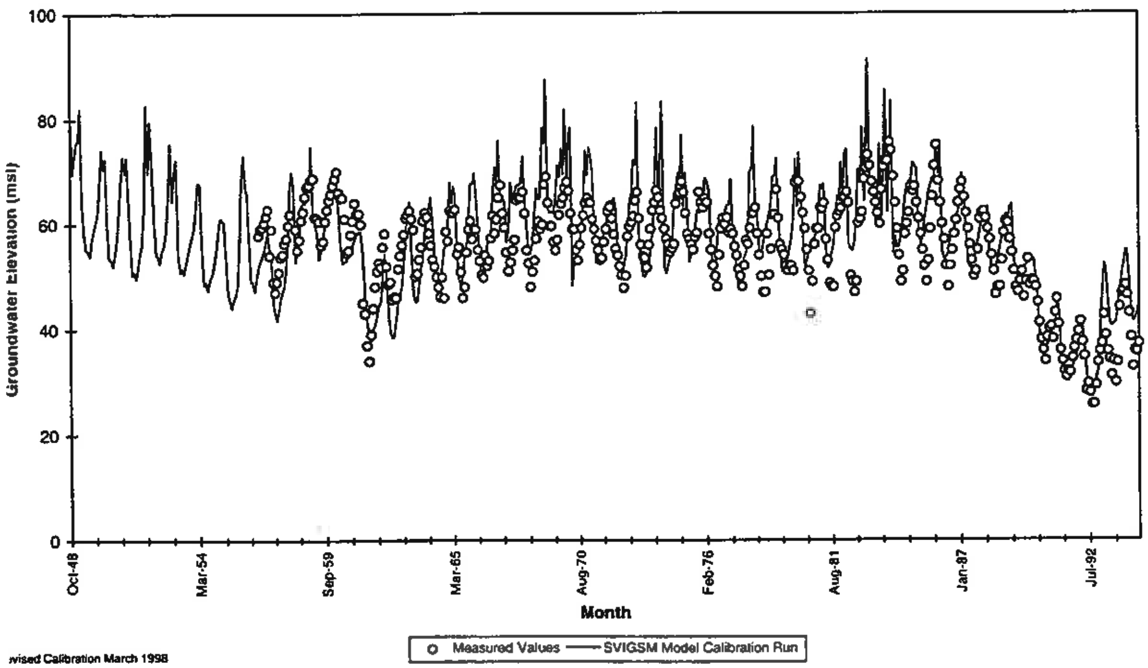
HYDROGRAPH OF MEASURED AND SIMULATED GW LEVELS
Calibration Well No. 35: Pressure Subarea, 180 Foot Aquifer



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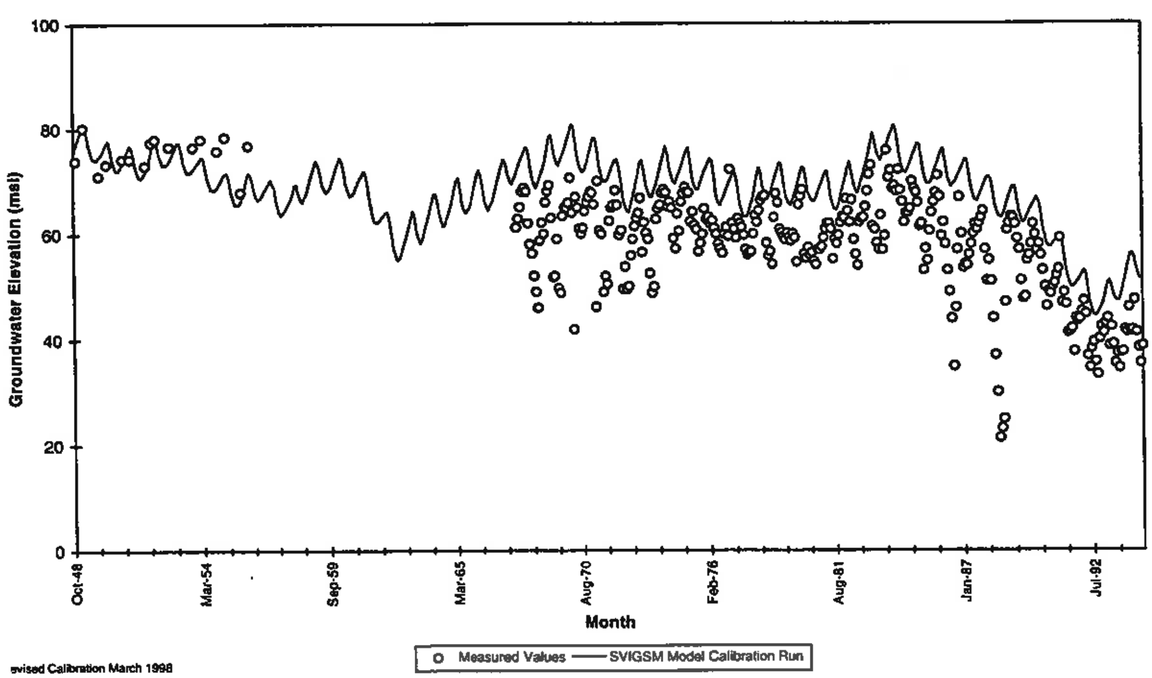
HYDROGRAPH OF MEASURED AND SIMULATED GW LEVELS
Calibration Well No. 36: East Side Subarea, East Side Shallow Aquifer



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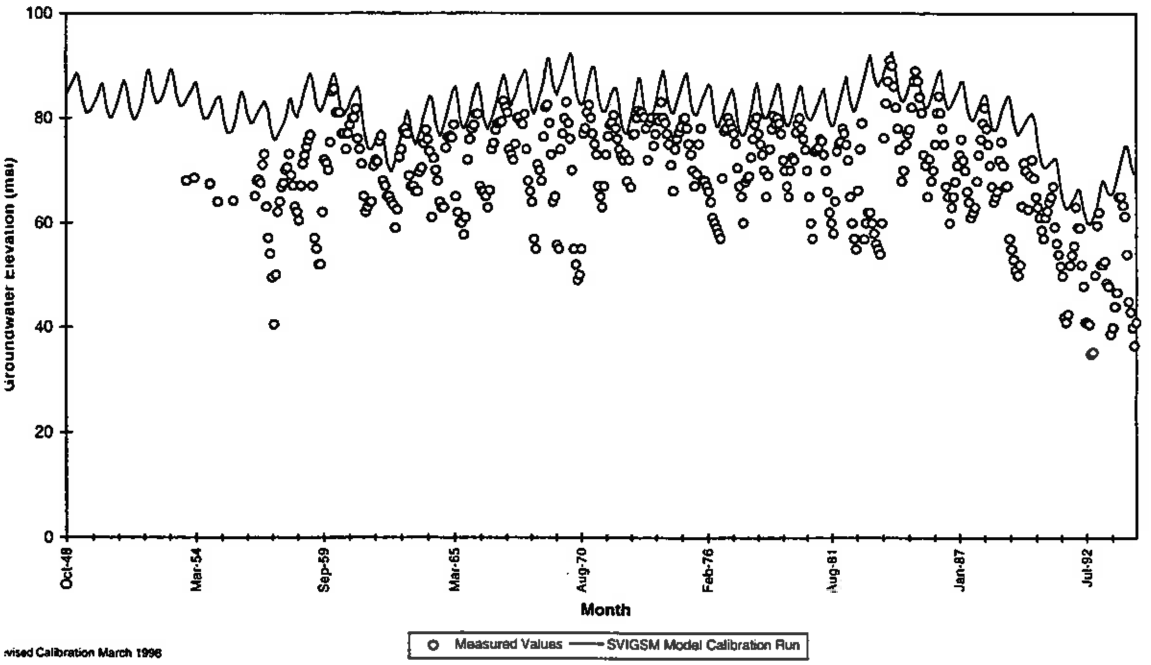
3/27/98

HYDROGRAPH OF MEASURED AND SIMULATED GW LEVELS
Calibration Well No. 37: East Side Subarea, East Side Shallow Aquifer



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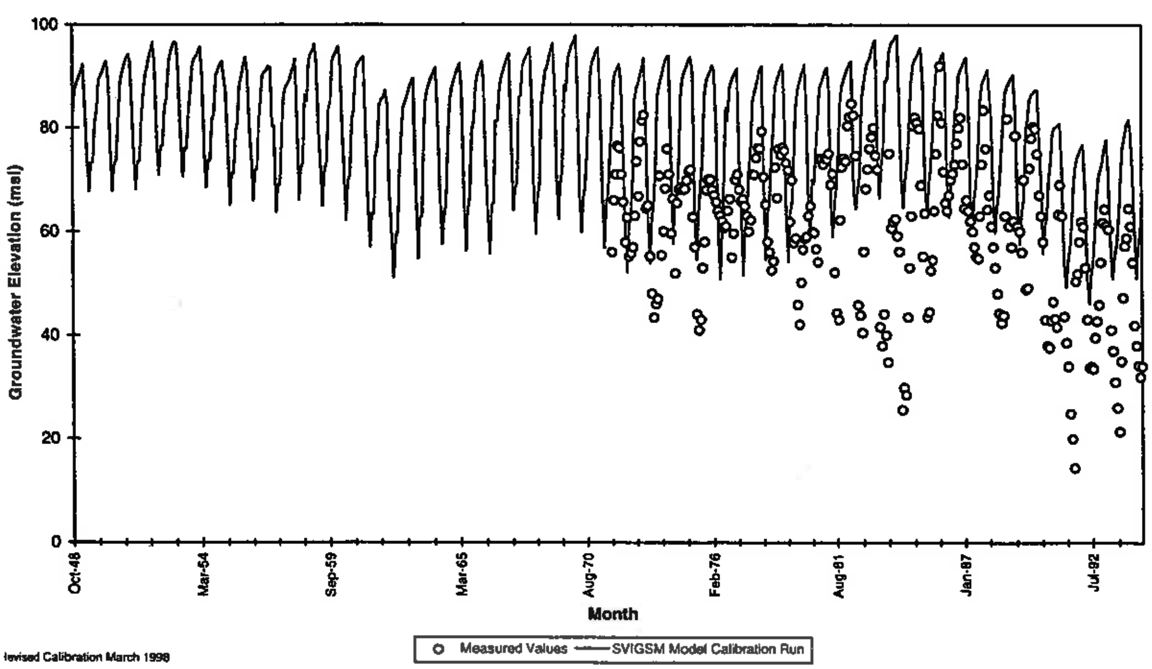
3/27/98

HYDROGRAPH OF MEASURED AND SIMULATED GW LEVELS
Calibration Well No. 38: East Side Subarea, East Side Deep Aquifer



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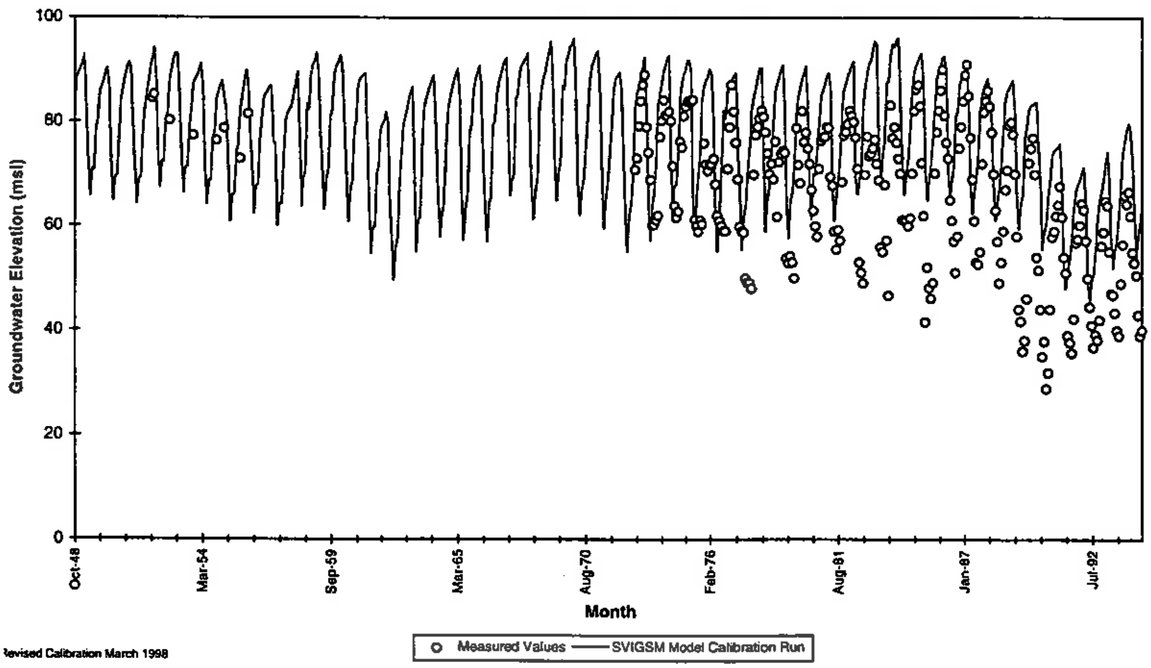
3/27/98

HYDROGRAPH OF MEASURED AND SIMULATED GW LEVELS
Calibration Well No. 39: East Side Subarea, East Side Deep Aquifer



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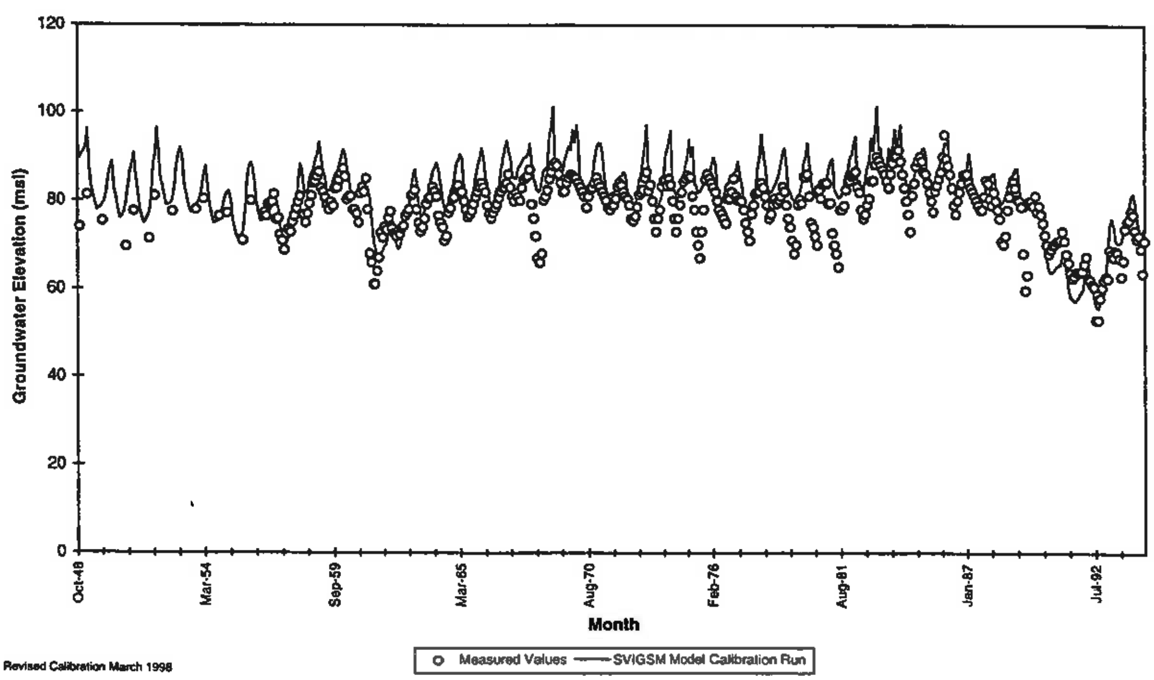
HYDROGRAPH OF MEASURED AND SIMULATED GW LEVELS
Calibration Well No. 40: Pressure Subarea, 180 Foot Aquifer



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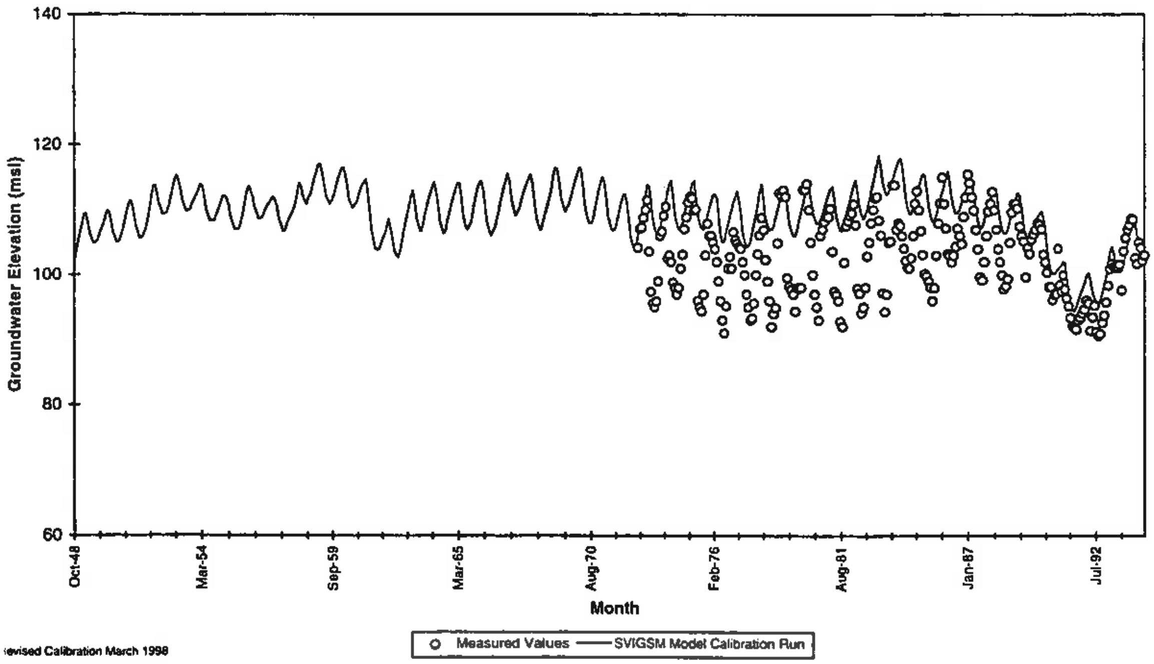
HYDROGRAPH OF MEASURED AND SIMULATED GW LEVELS
Calibration Well No. 41: Forebay Subarea, Forebay Shallow Aquifer



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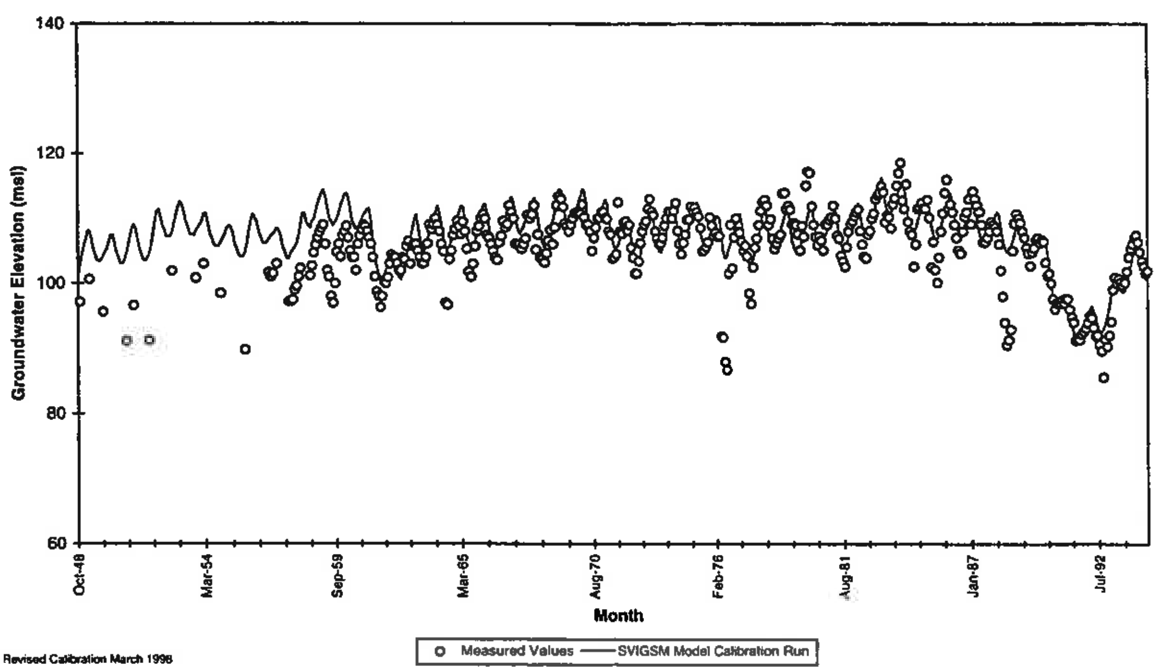
HYDROGRAPH OF MEASURED AND SIMULATED GW LEVELS
Calibration Well No. 42: Forebay Subarea, Forebay Shallow Aquifer



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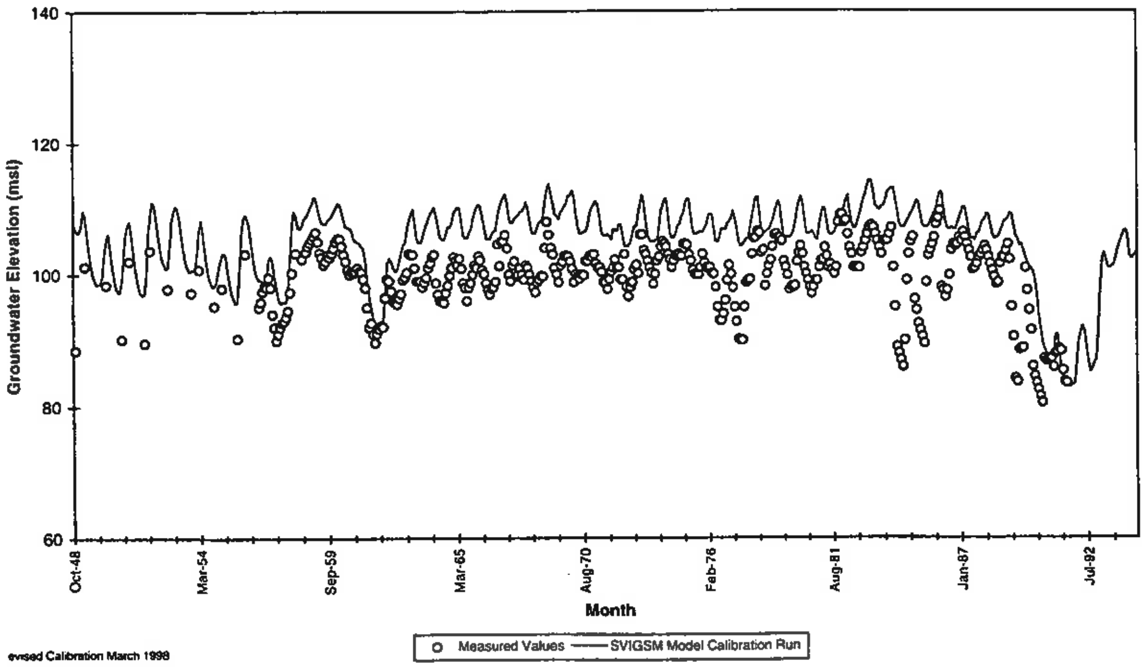
HYDROGRAPH OF MEASURED AND SIMULATED GW LEVELS
Calibration Well No. 43: Forebay Subarea, Forebay Shallow Aquifer



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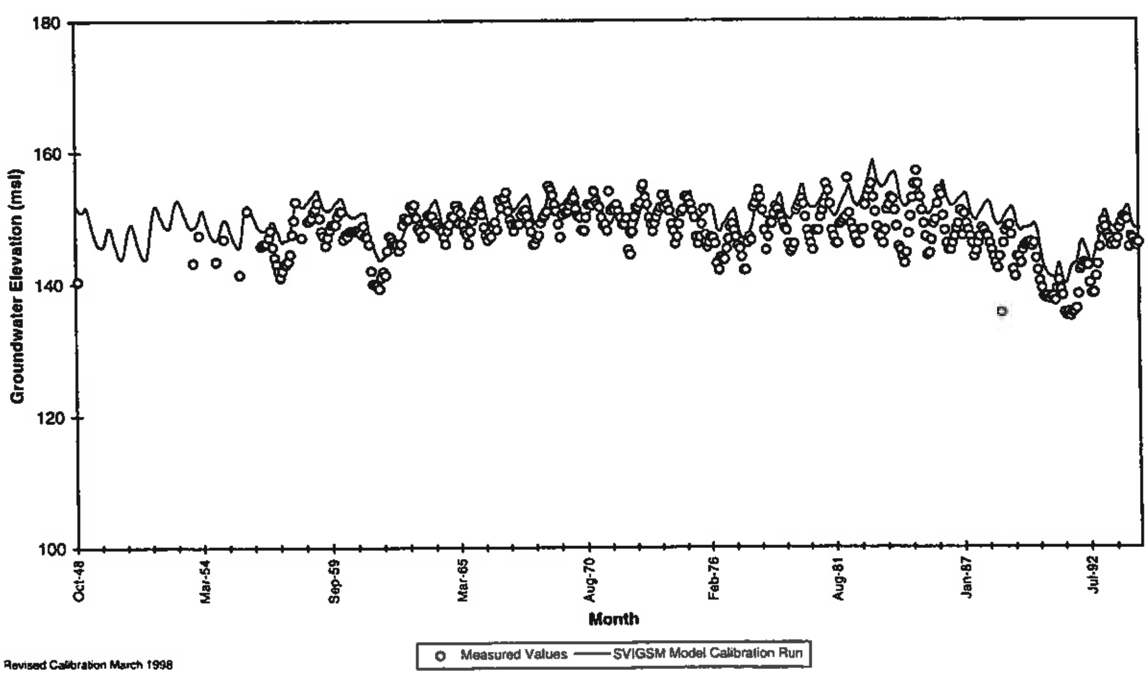
3/27/98

HYDROGRAPH OF MEASURED AND SIMULATED GW LEVELS
Calibration Well No. 44: Forebay Subarea, Forebay Shallow Aquifer



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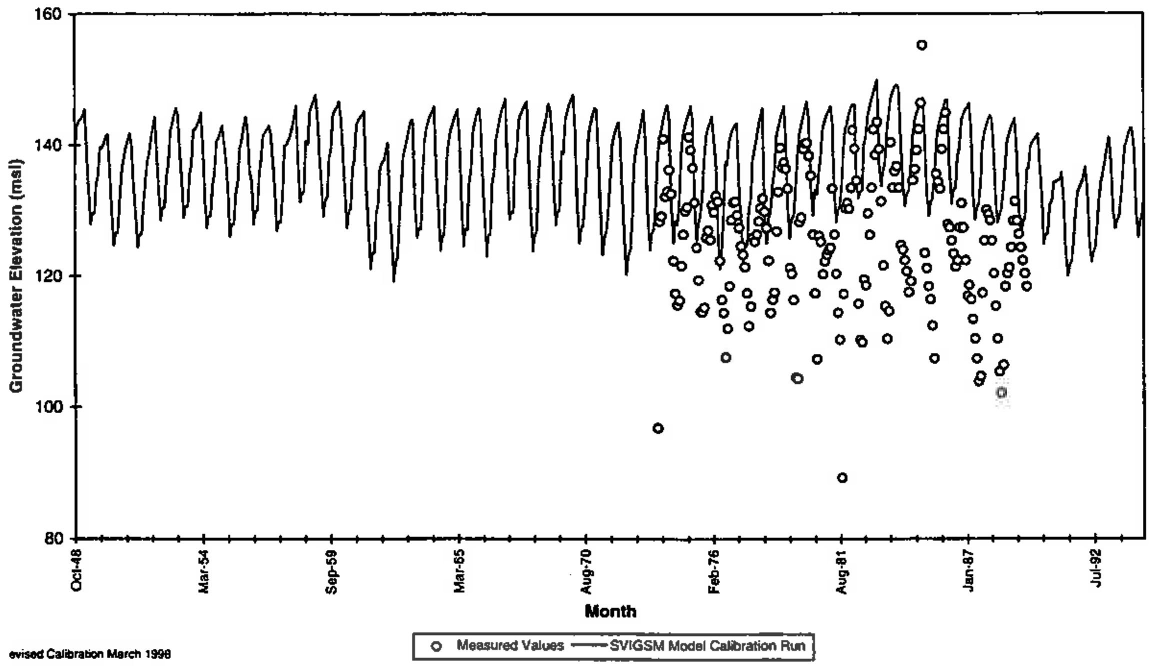
HYDROGRAPH OF MEASURED AND SIMULATED GW LEVELS
Calibration Well No. 45: Forebay Subarea, Forebay Deep Aquifer



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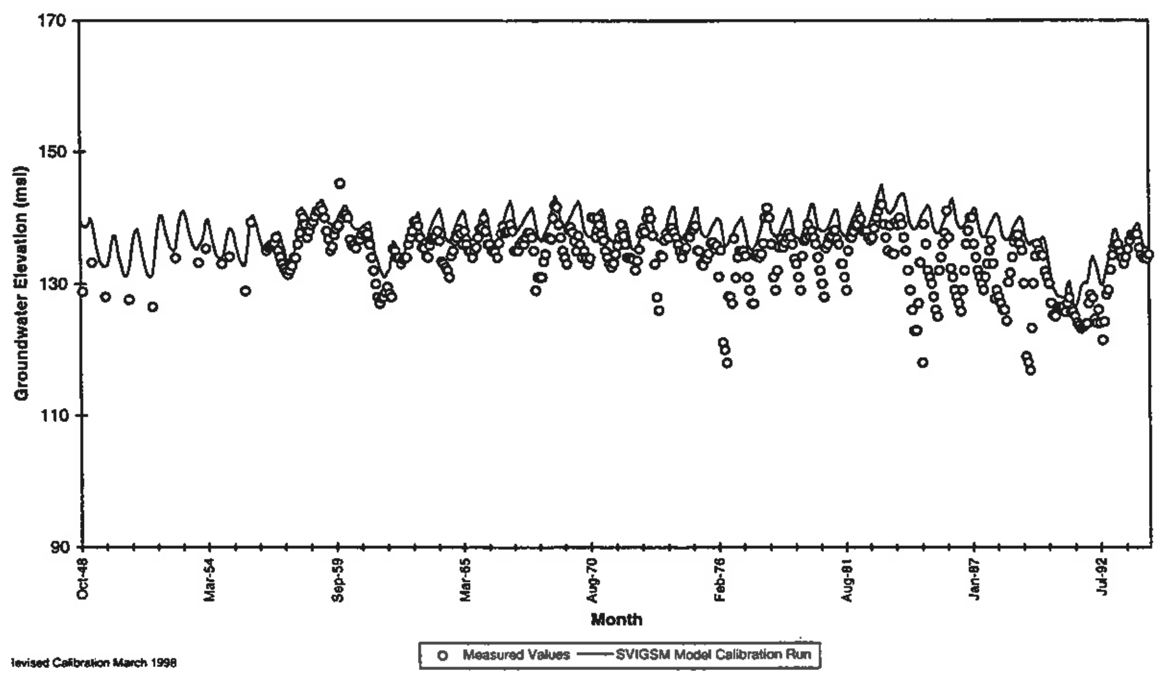
3/27/98

HYDROGRAPH OF MEASURED AND SIMULATED GW LEVELS
Calibration Well No. 46: Forebay Subarea, Forebay Shallow Aquifer



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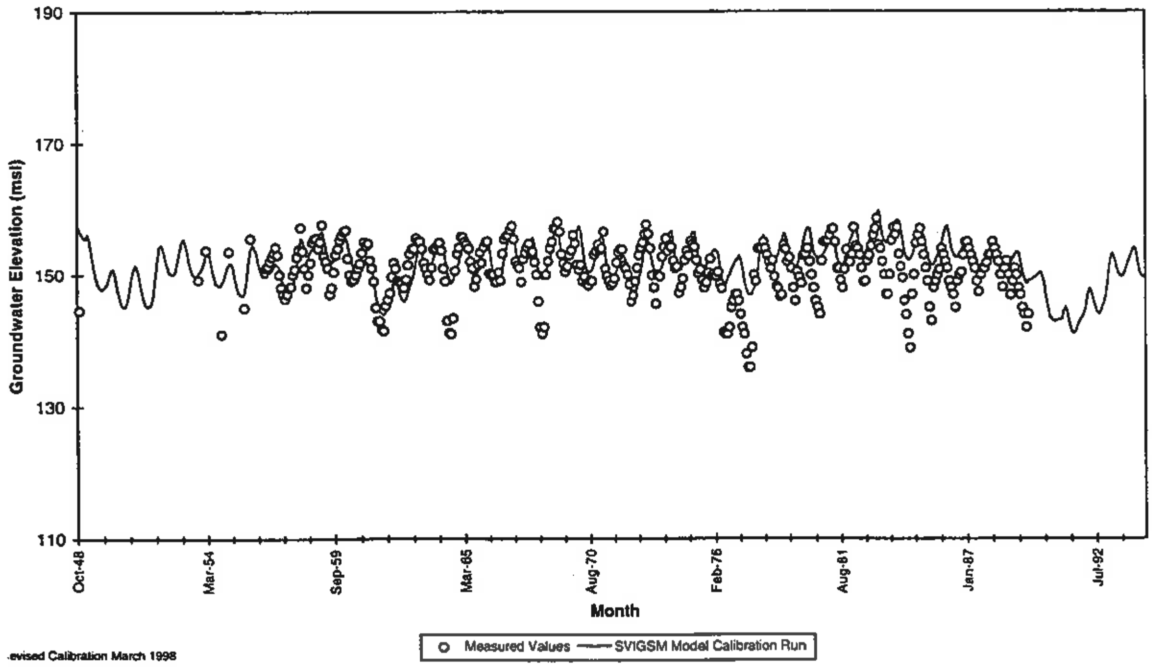
HYDROGRAPH OF MEASURED AND SIMULATED GW LEVELS
Calibration Well No. 47: Forebay Subarea, Forebay Shallow Aquifer



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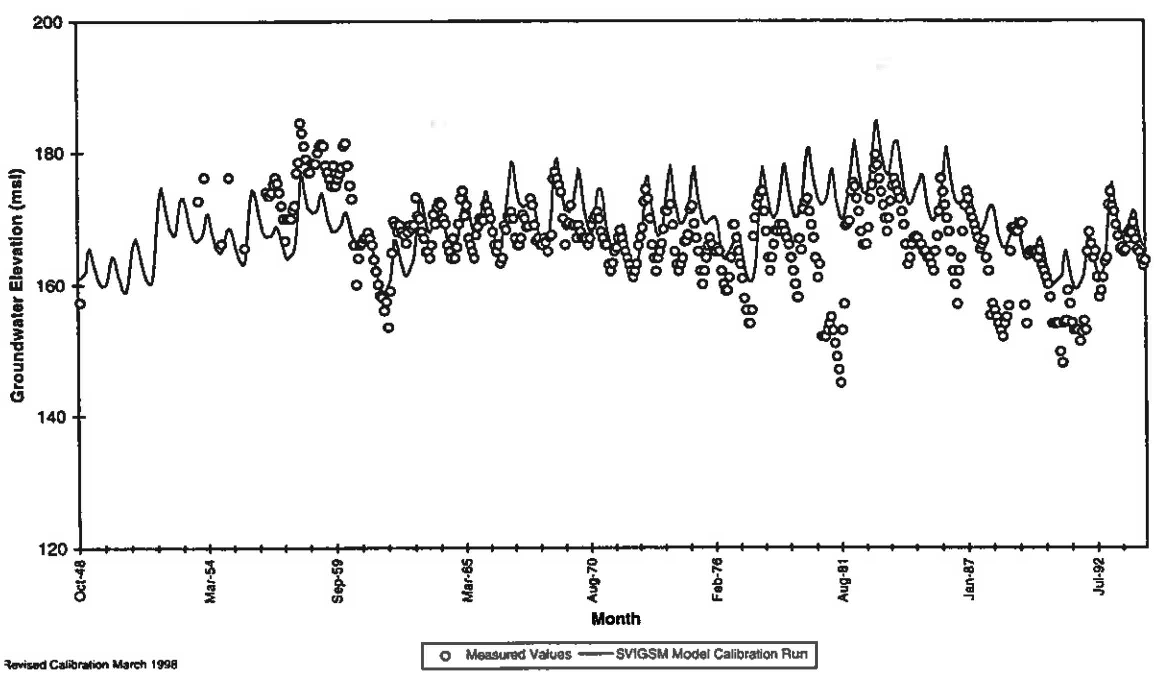
HYDROGRAPH OF MEASURED AND SIMULATED GW LEVELS
Calibration Well No. 48: Forebay Subarea, Forebay Shallow Aquifer



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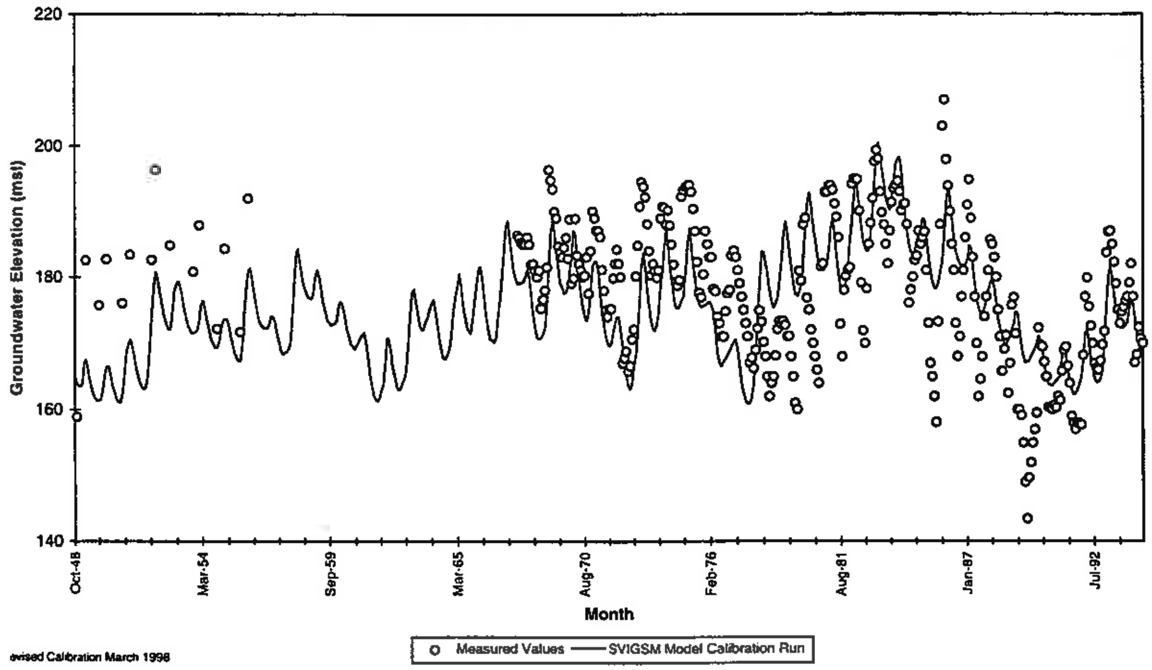
HYDROGRAPH OF MEASURED AND SIMULATED GW LEVELS
Calibration Well No. 49: Forebay Subarea, Forebay Shallow Aquifer



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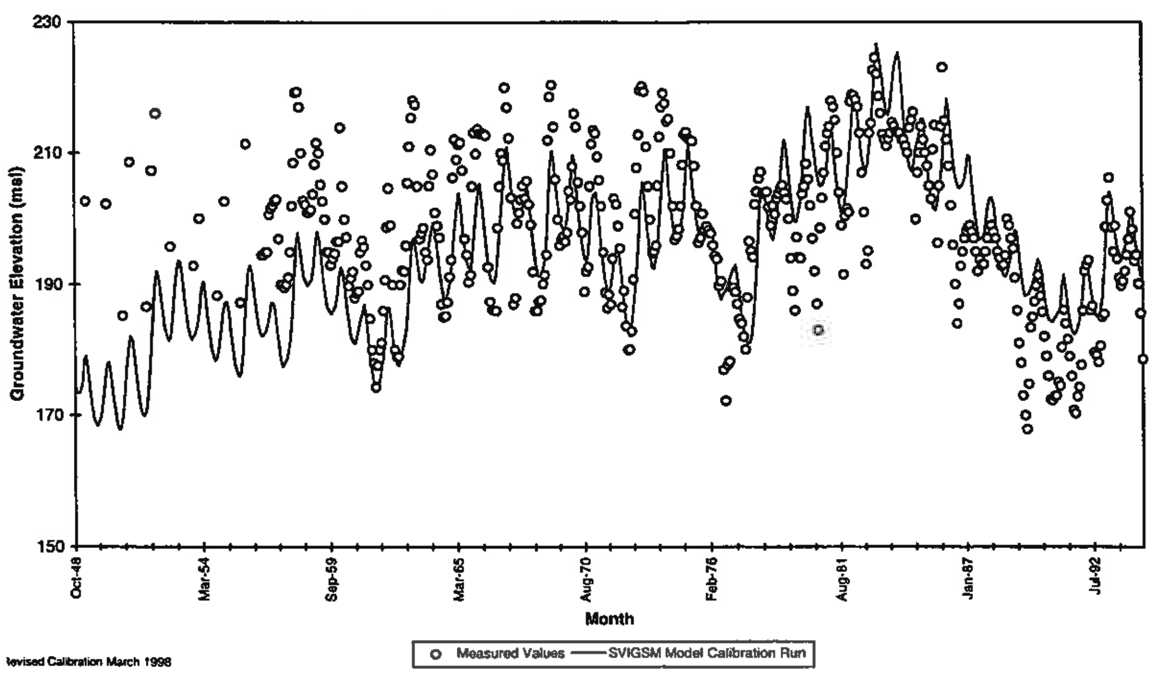
HYDROGRAPH OF MEASURED AND SIMULATED GW LEVELS
Calibration Well No. 50: Forebay Subarea, Forebay Deep Aquifer



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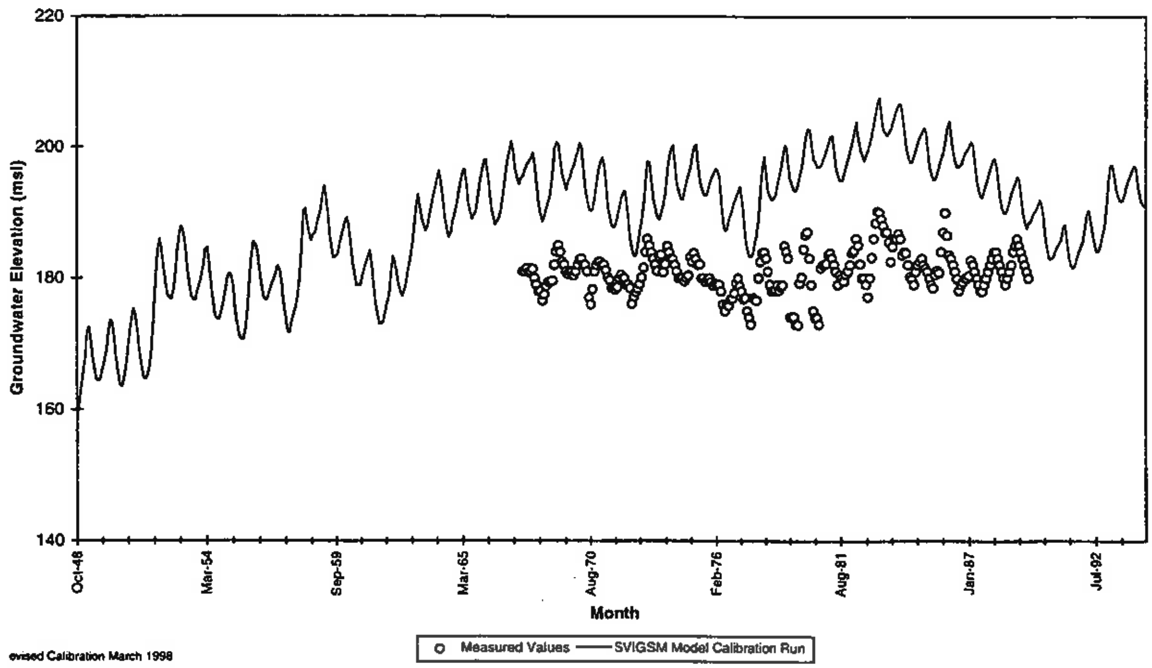
HYDROGRAPH OF MEASURED AND SIMULATED GW LEVELS
Calibration Well No. 51: Forebay Subarea, Forebay Shallow Aquifer



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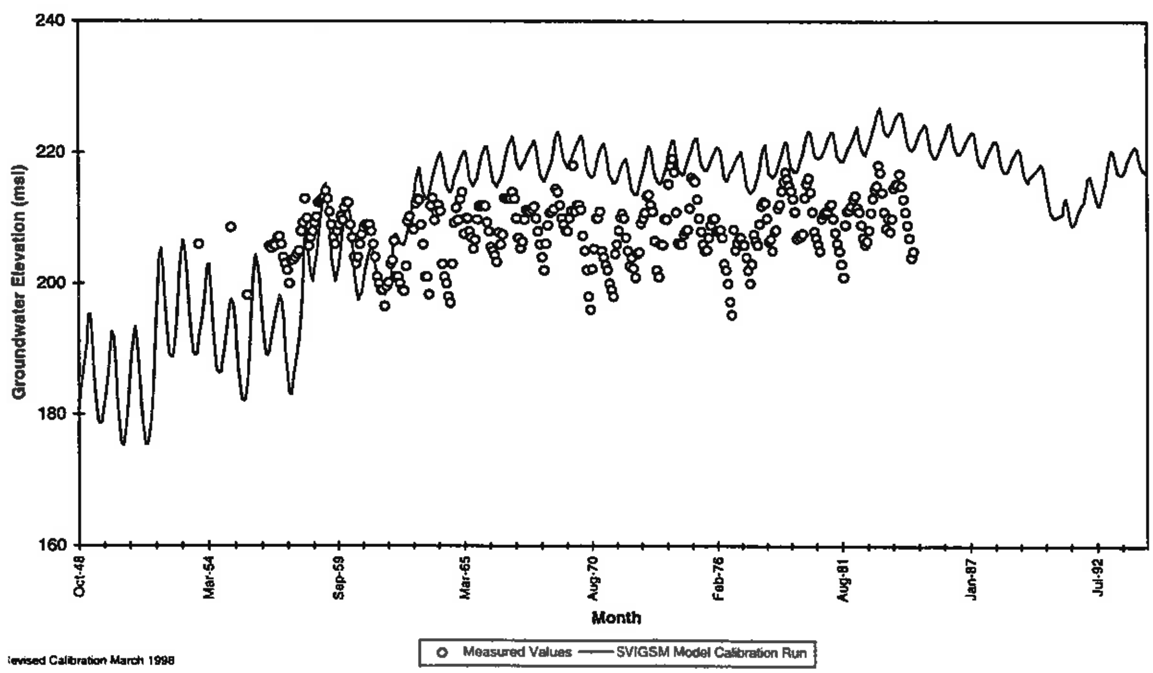
HYDROGRAPH OF MEASURED AND SIMULATED GW LEVELS
Calibration Well No. 52: Forebay Subarea, Forebay Shallow Aquifer



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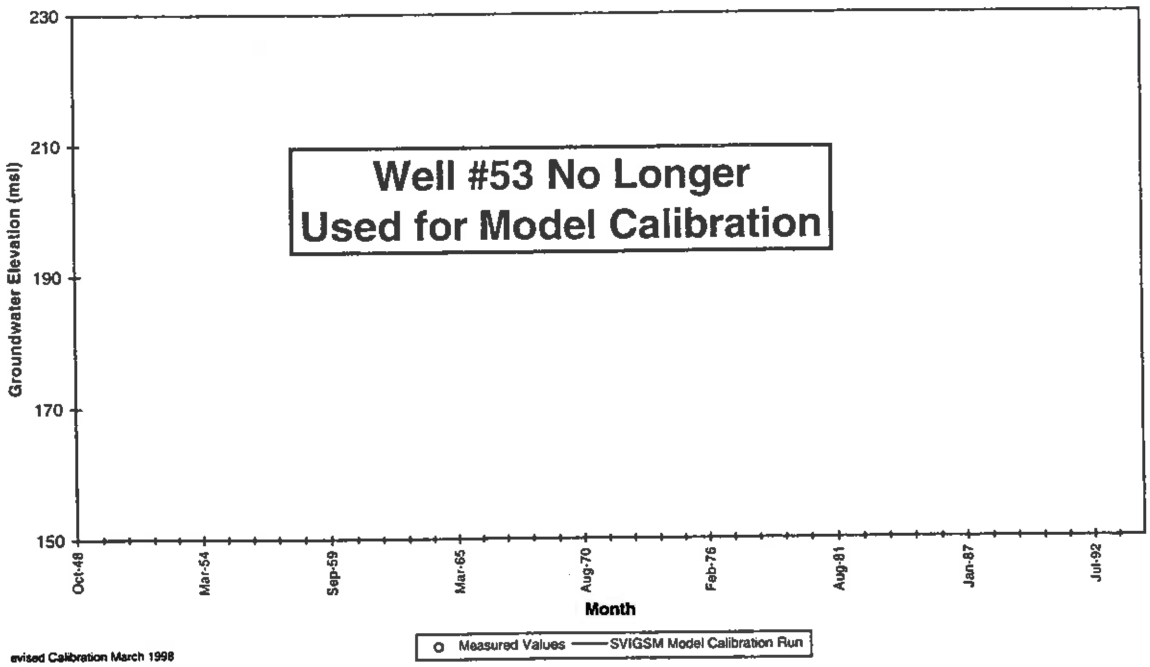
HYDROGRAPH OF MEASURED AND SIMULATED GW LEVELS
Calibration Well No. 53: Forebay Subarea, Forebay Deep Aquifer



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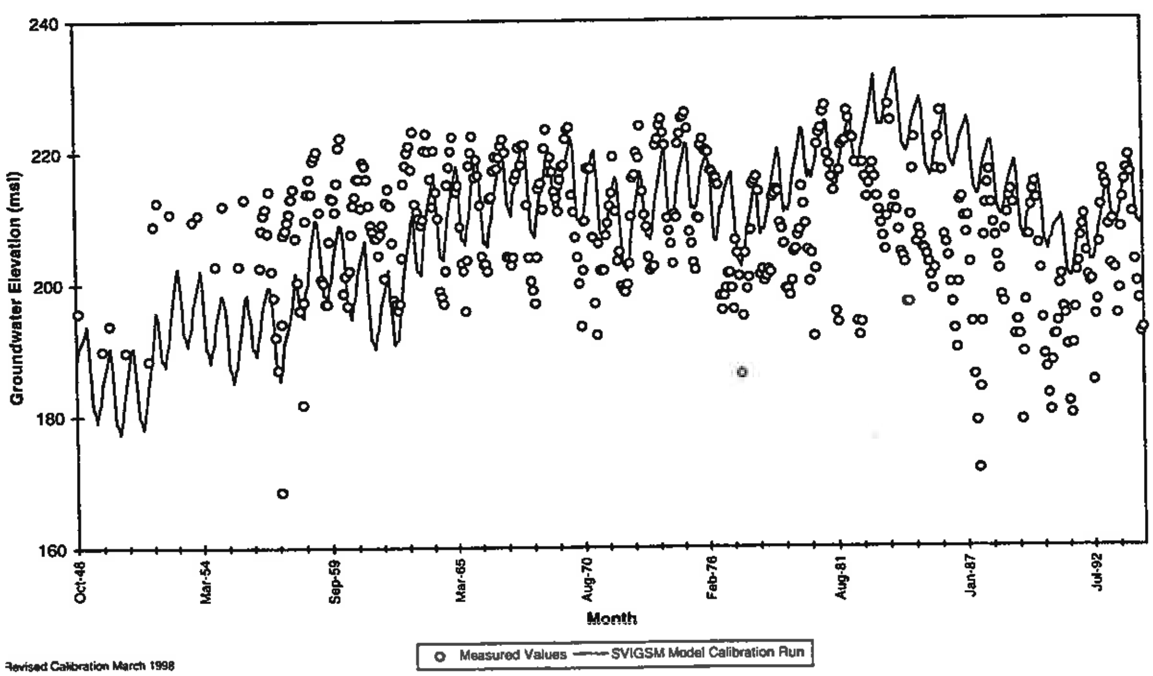
HYDROGRAPH OF MEASURED AND SIMULATED GW LEVELS
Calibration Well No. 54: Forebay Subarea, Forebay Deep Aquifer



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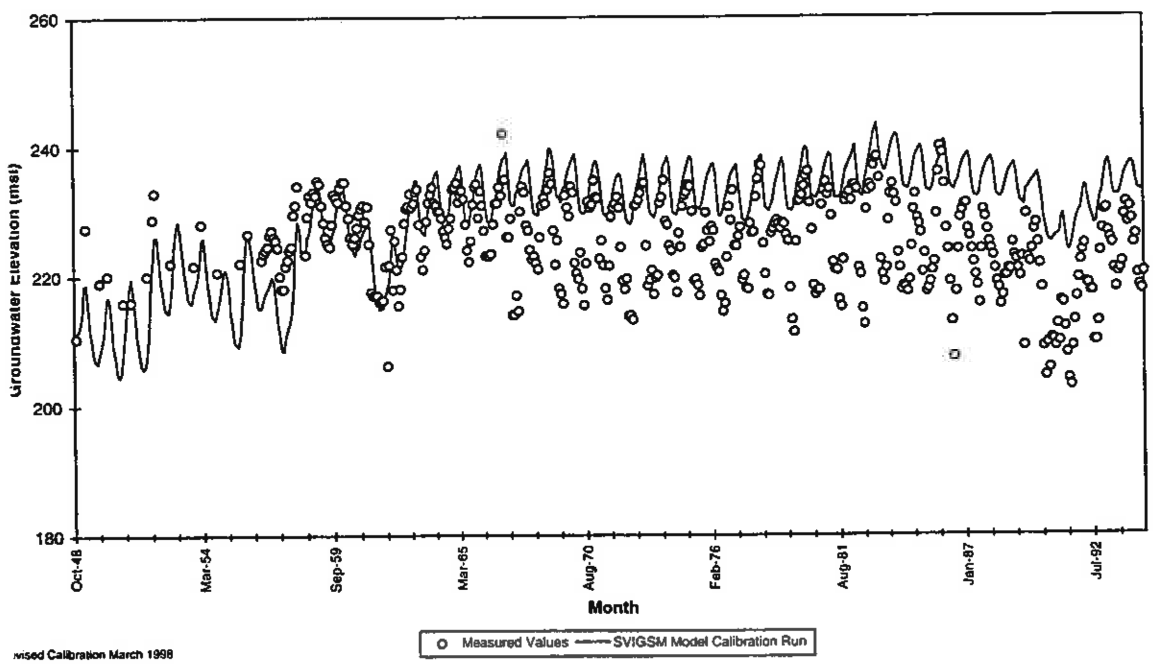
HYDROGRAPH OF MEASURED AND SIMULATED GW LEVELS
Calibration Well No. 55: Upper Valley Subarea



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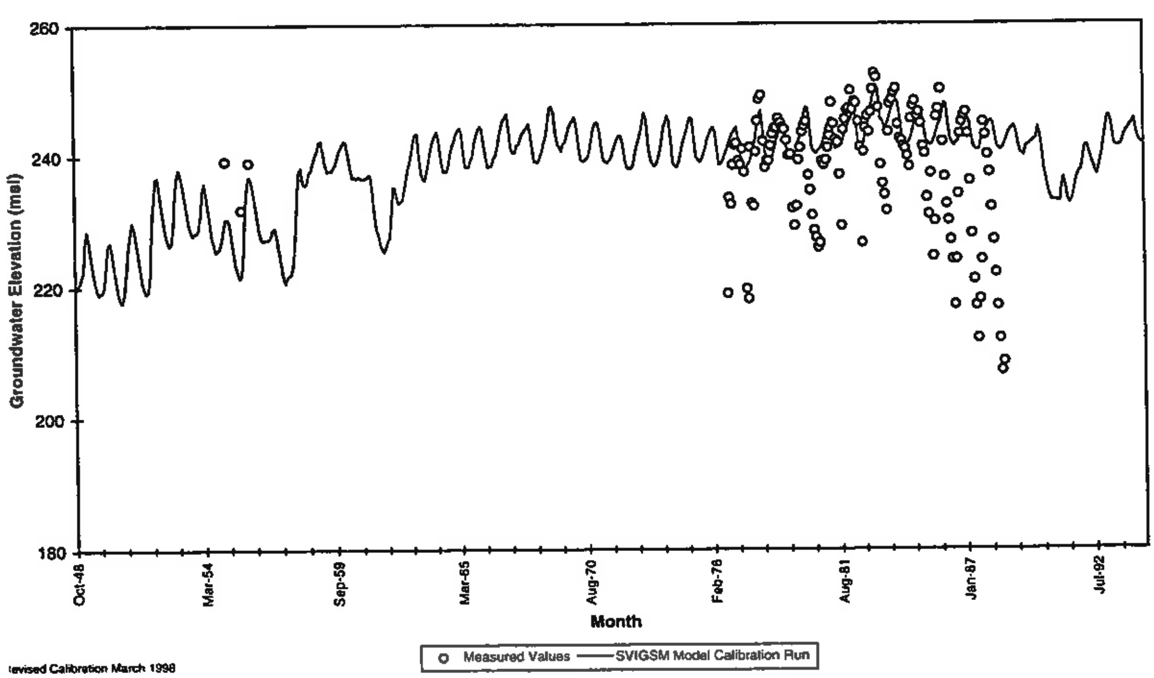
HYDROGRAPH OF MEASURED AND SIMULATED GW LEVELS
Calibration Well No. 56: Upper Valley Subarea



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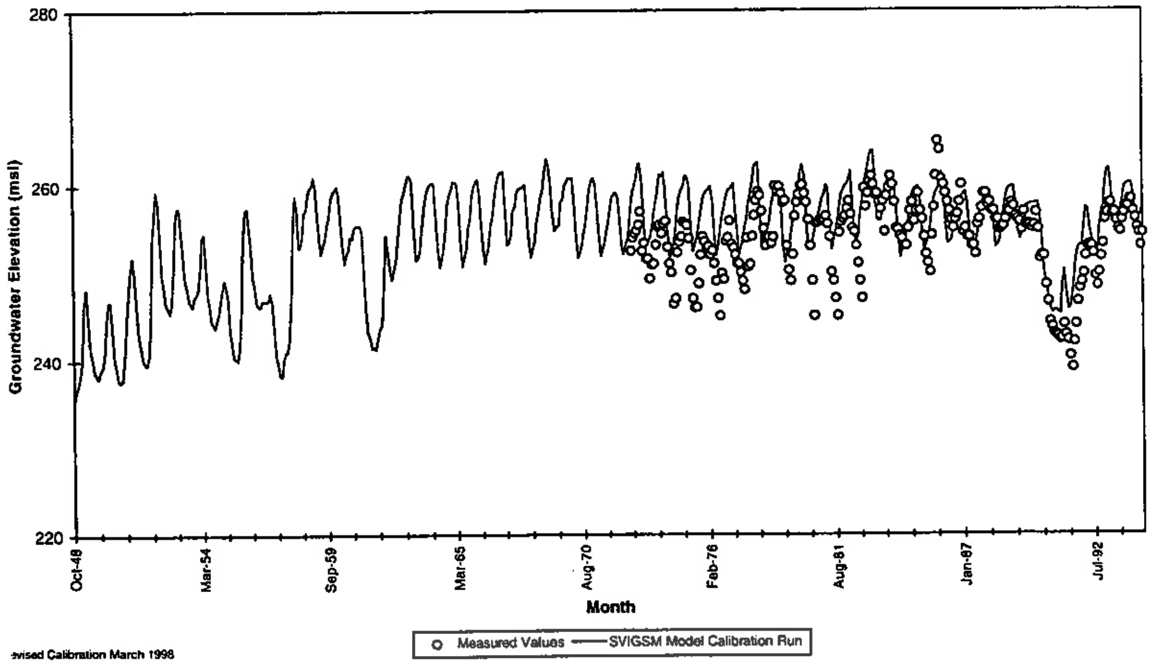
HYDROGRAPH OF MEASURED AND SIMULATED GW LEVELS
Calibration Well No. 57: Upper Valley Subarea



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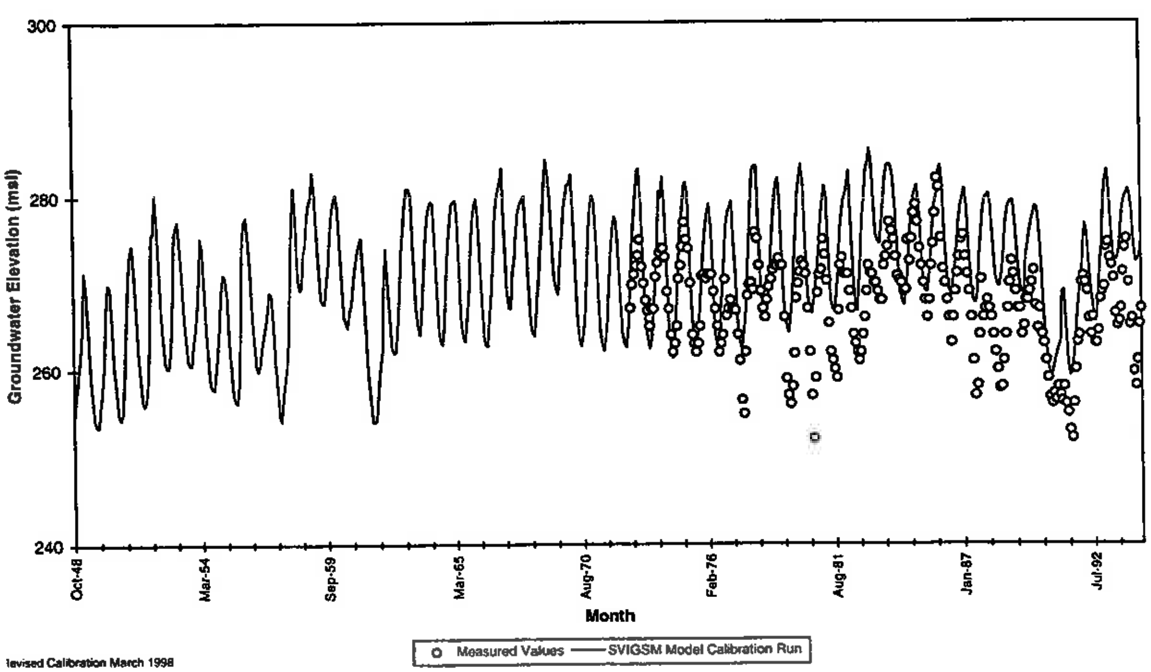
HYDROGRAPH OF MEASURED AND SIMULATED GW LEVELS
Calibration Well No. 58: Upper Valley Subarea



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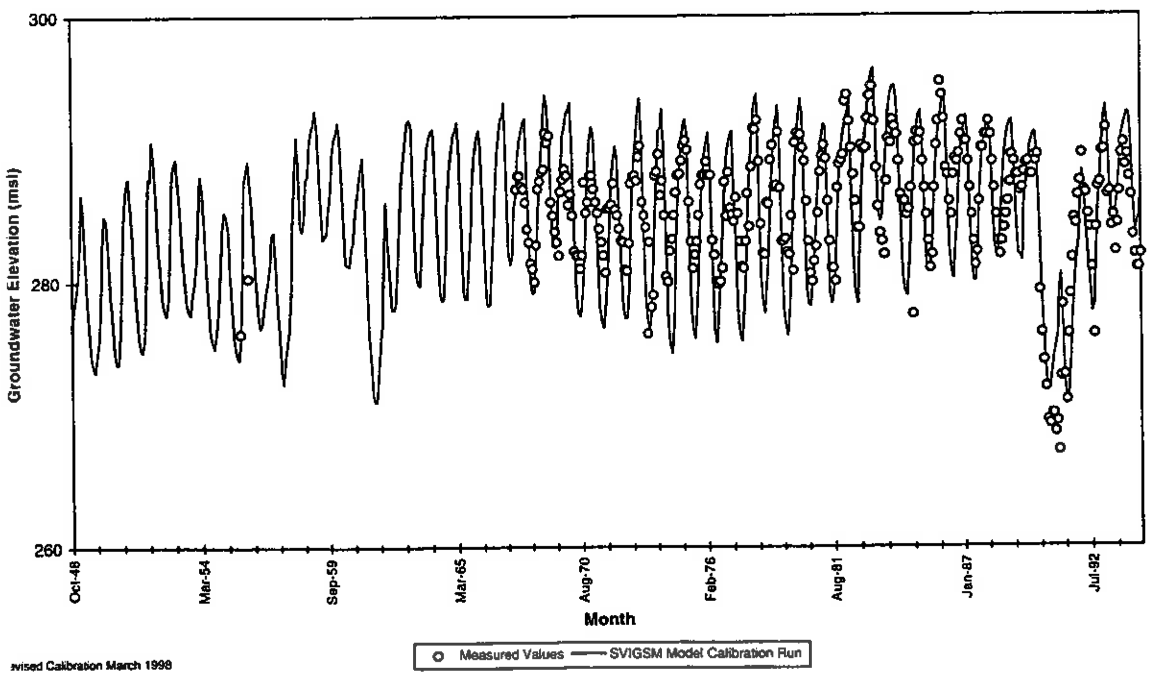
HYDROGRAPH OF MEASURED AND SIMULATED GW LEVELS
Calibration Well No. 59: Upper Valley Subarea



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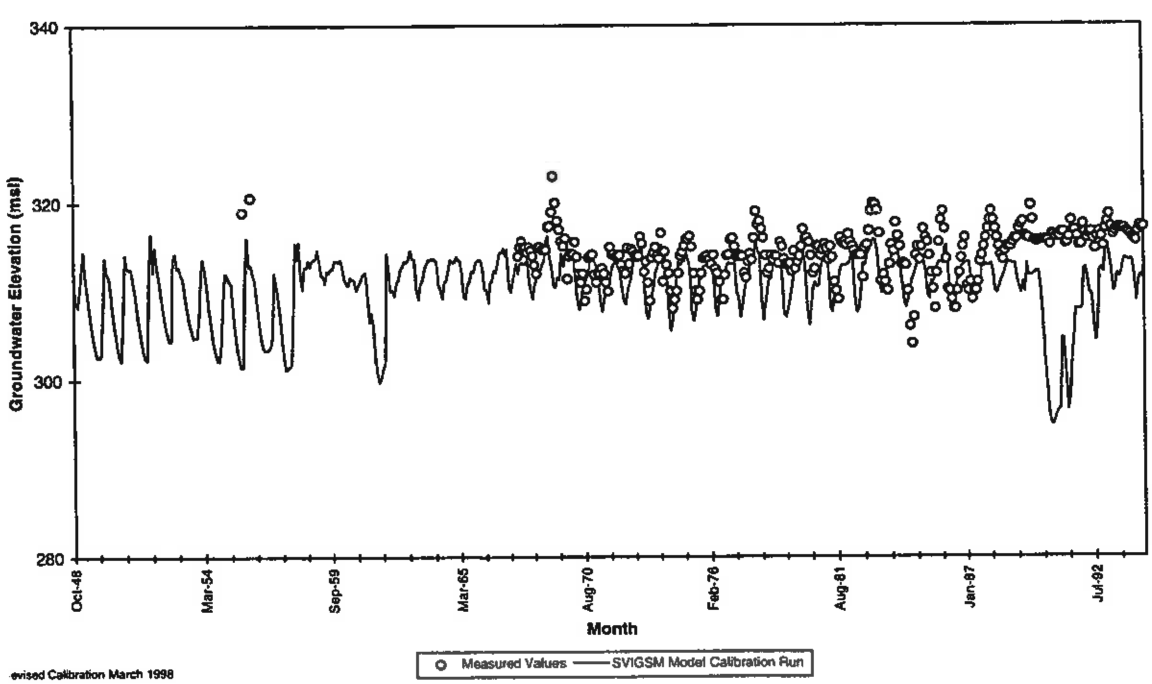
HYDROGRAPH OF MEASURED AND SIMULATED GW LEVELS
Calibration Well No. 60: Upper Valley Subarea



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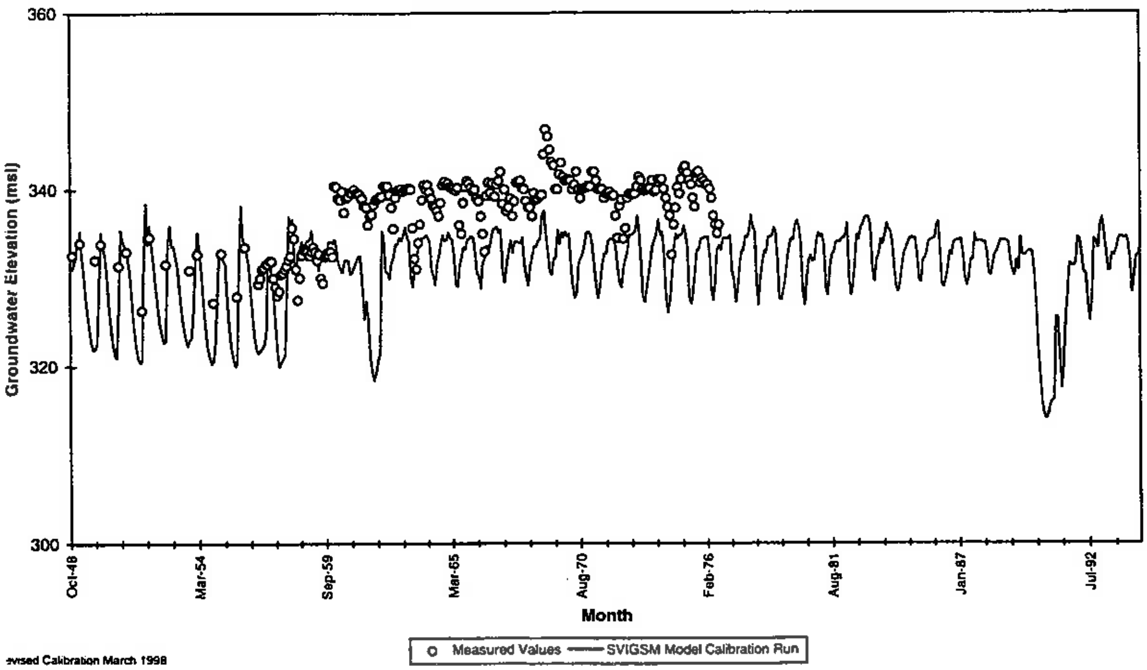
HYDROGRAPH OF MEASURED AND SIMULATED GW LEVELS
Calibration Well No. 61: Upper Valley Subarea



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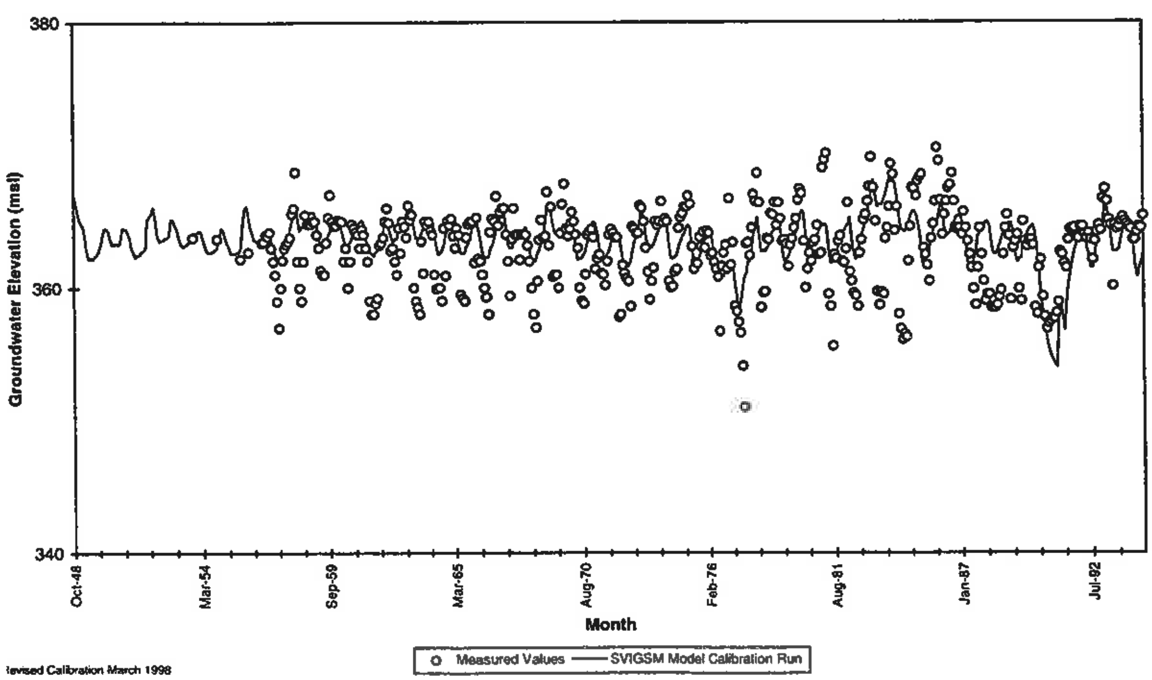

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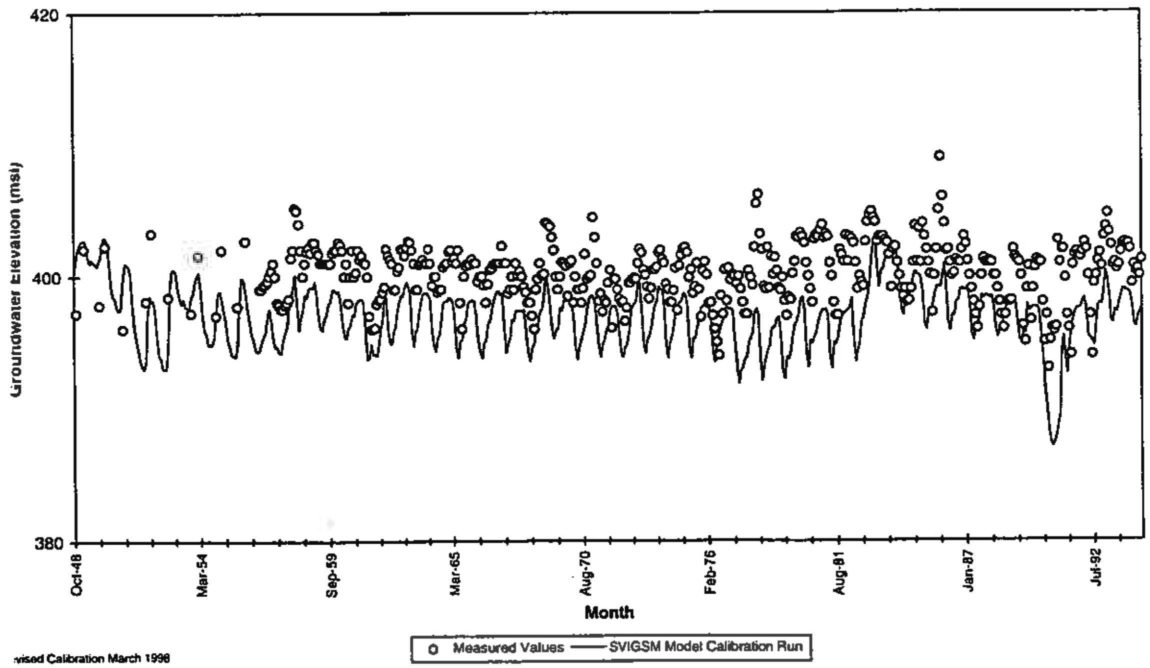

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HYDROGRAPH OF MEASURED AND SIMULATED GW LEVELS
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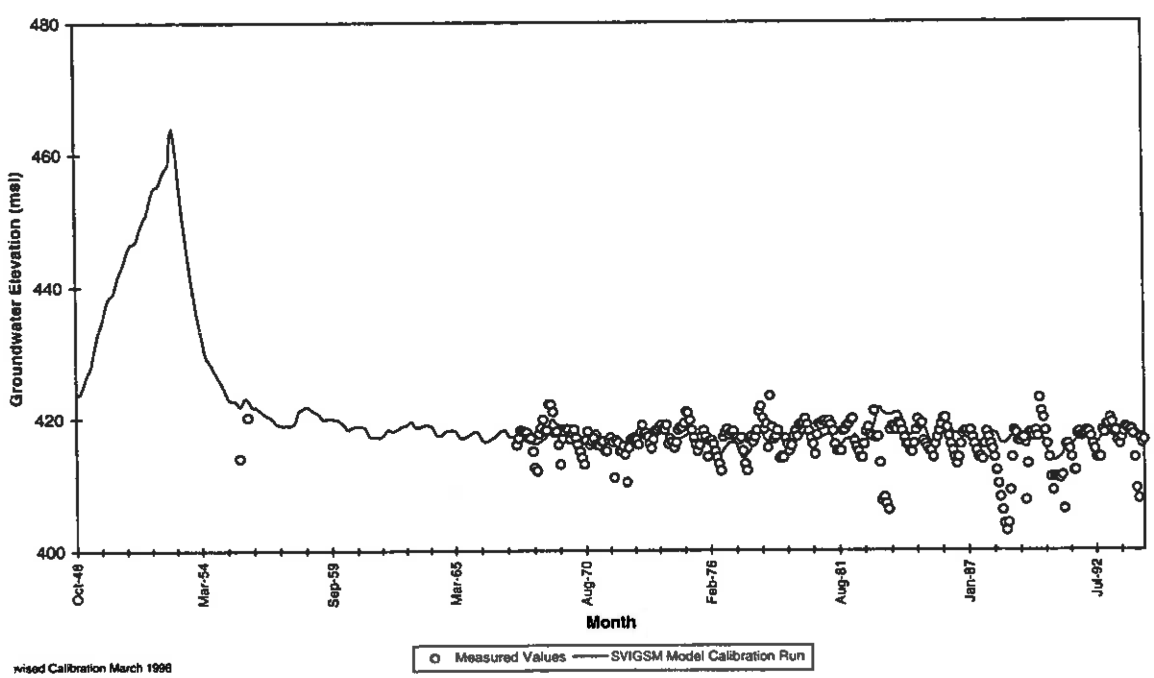

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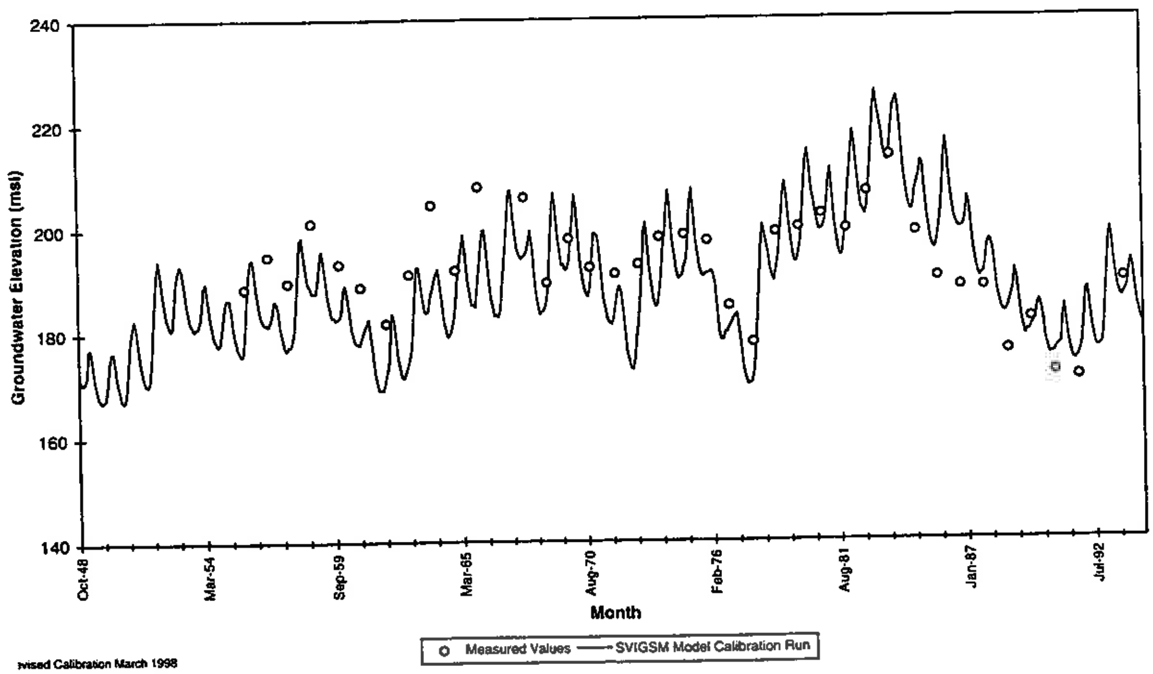
HYDROGRAPH OF MEASURED AND SIMULATED GW LEVELS
Calibration Well No. 65: Forebay Subarea, Forebay Deep Aquifer



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HYDROGRAPH OF MEASURED AND SIMULATED GW LEVELS
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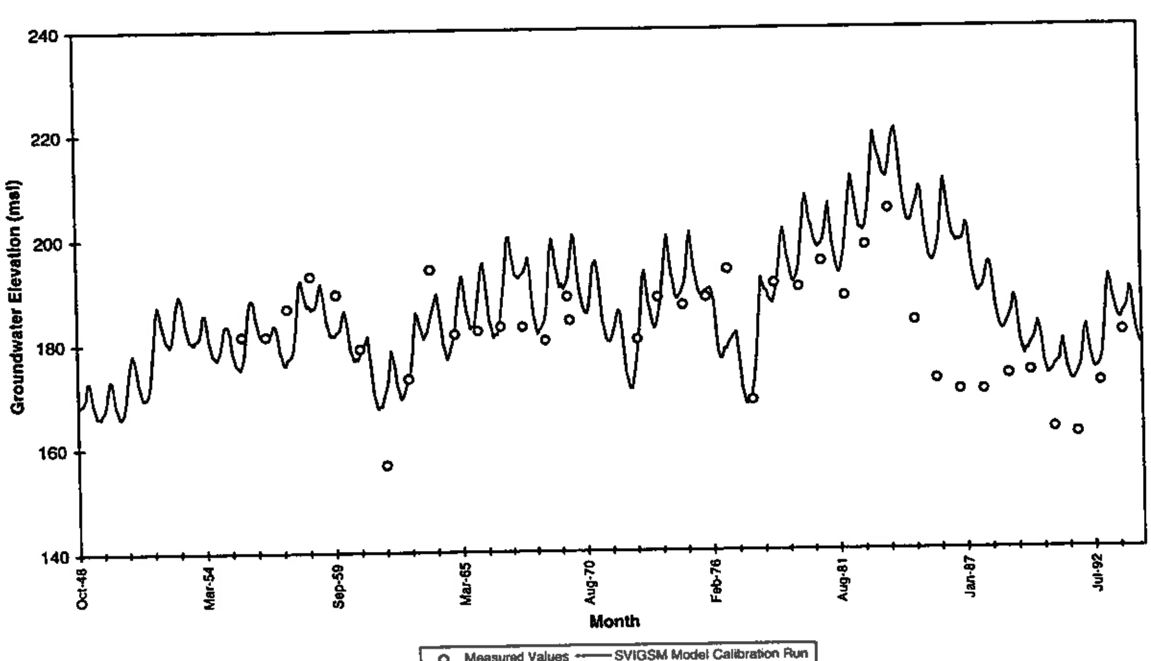

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HYDROGRAPH OF MEASURED AND SIMULATED GW LEVELS
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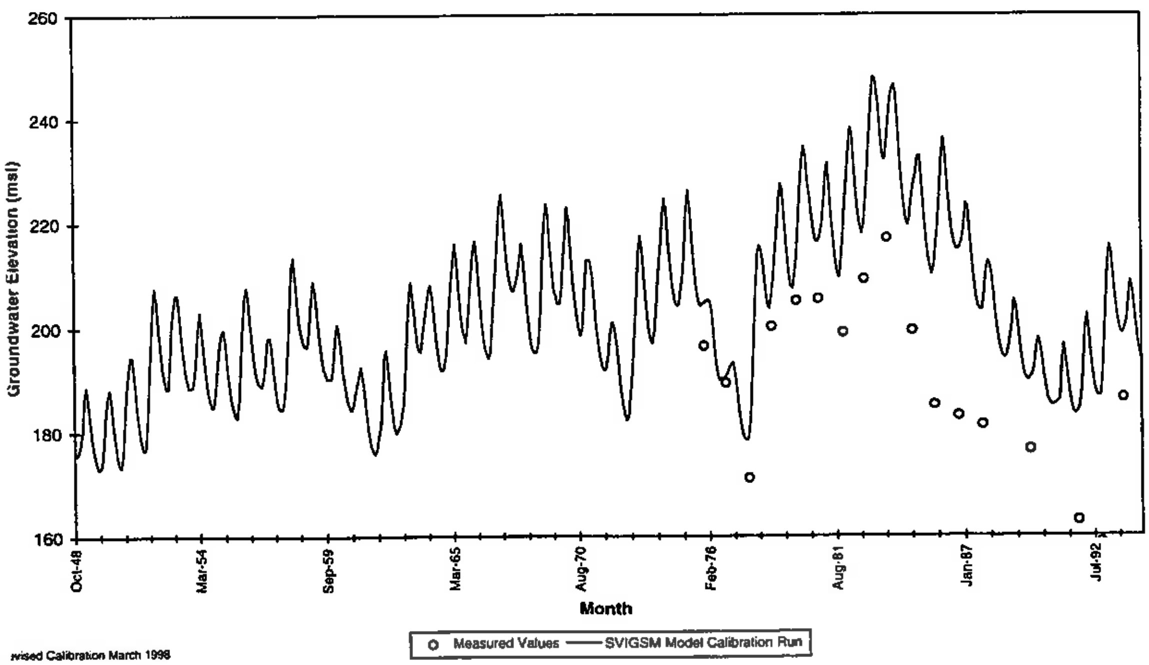

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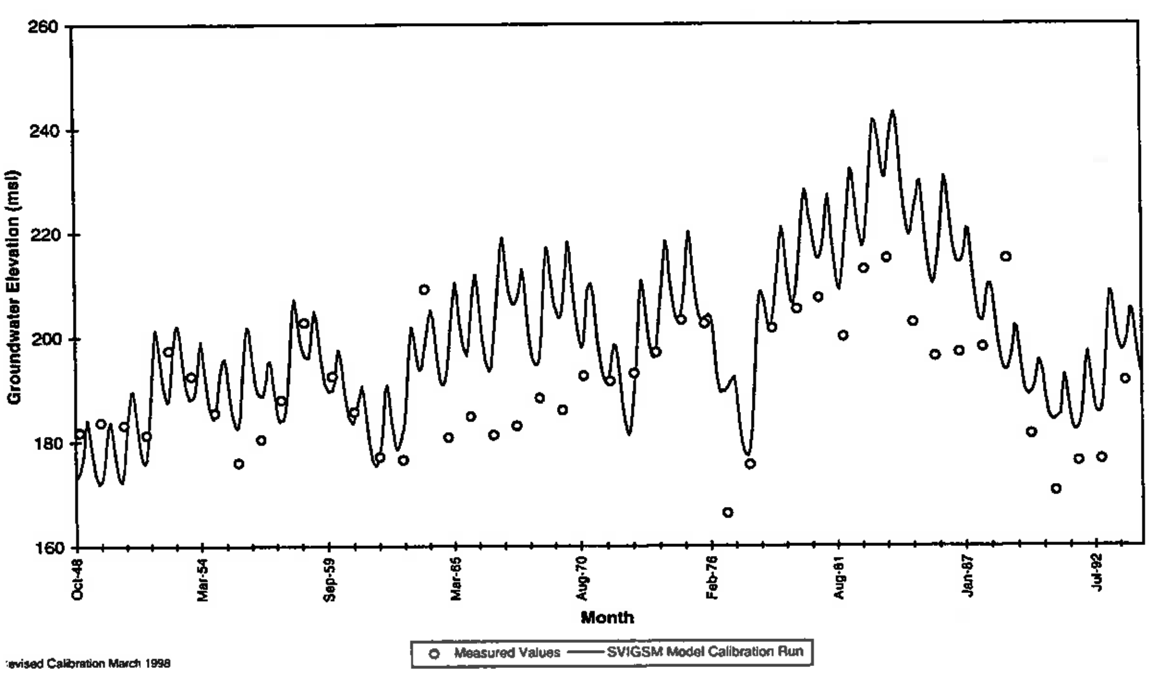

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HYDROGRAPH OF MEASURED AND SIMULATED GW LEVELS
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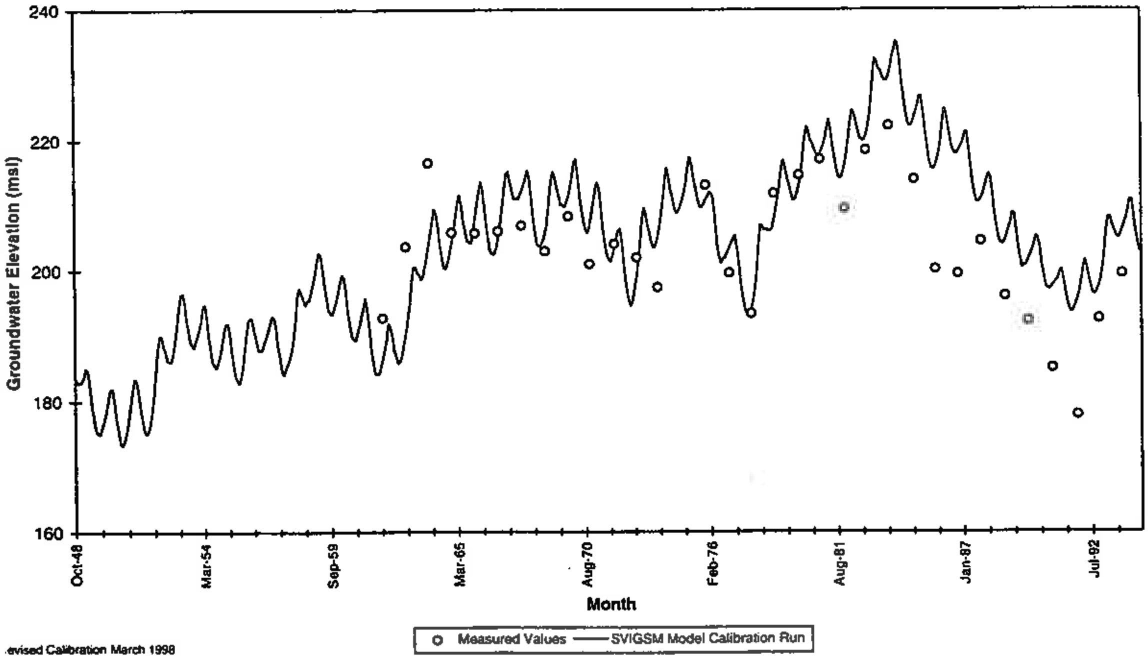

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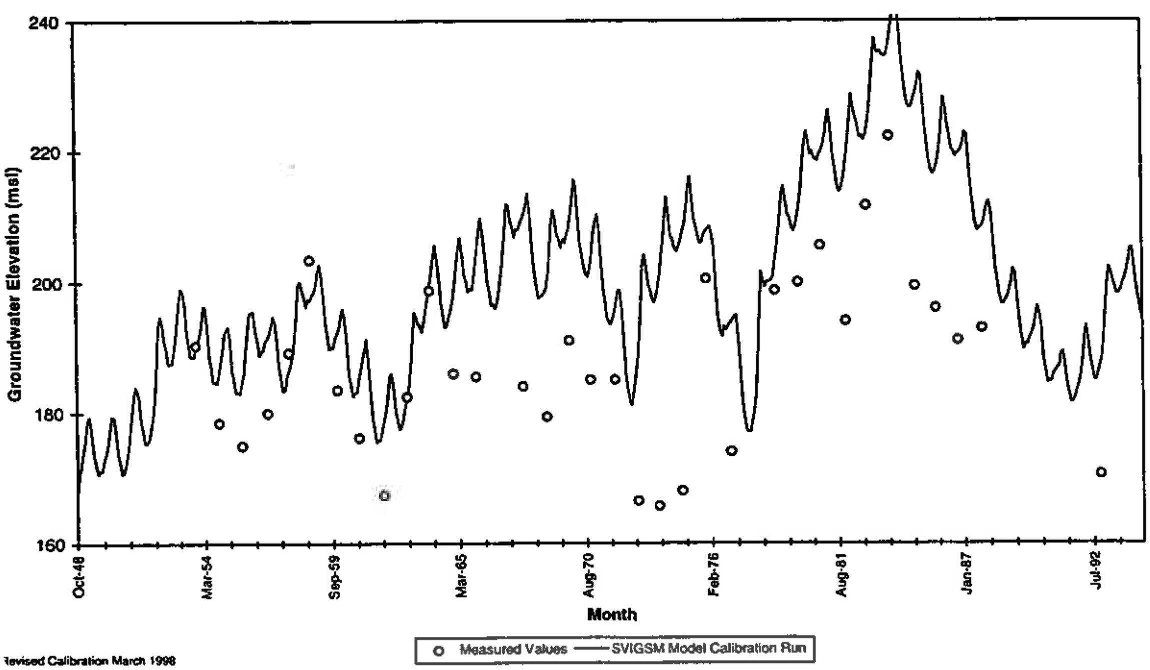

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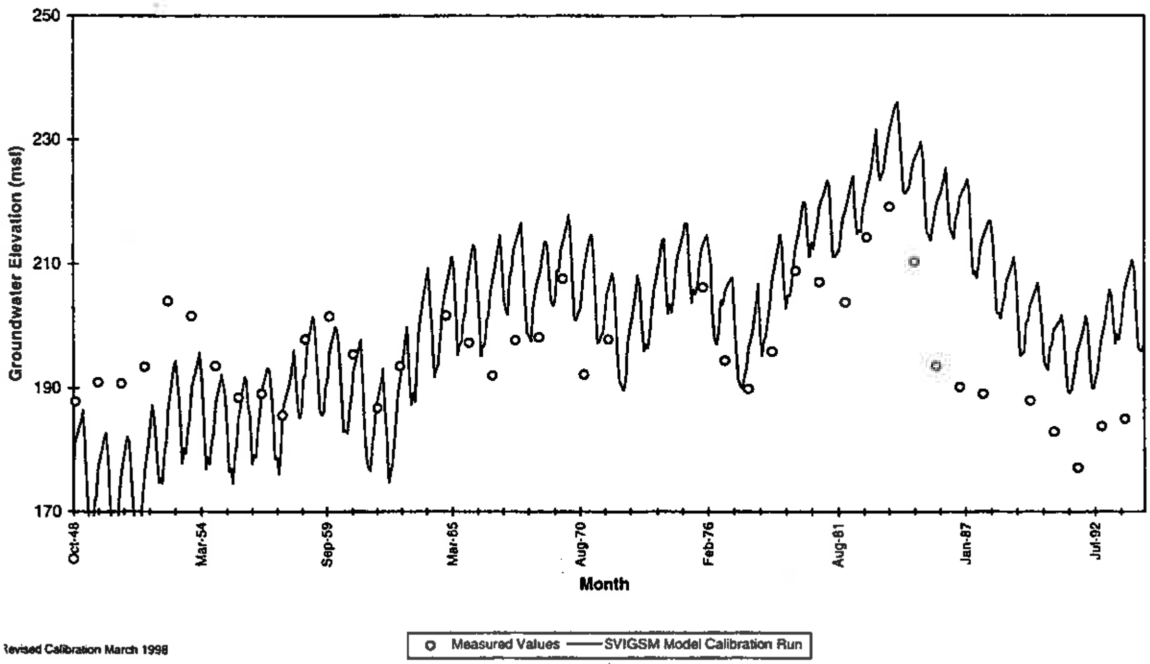

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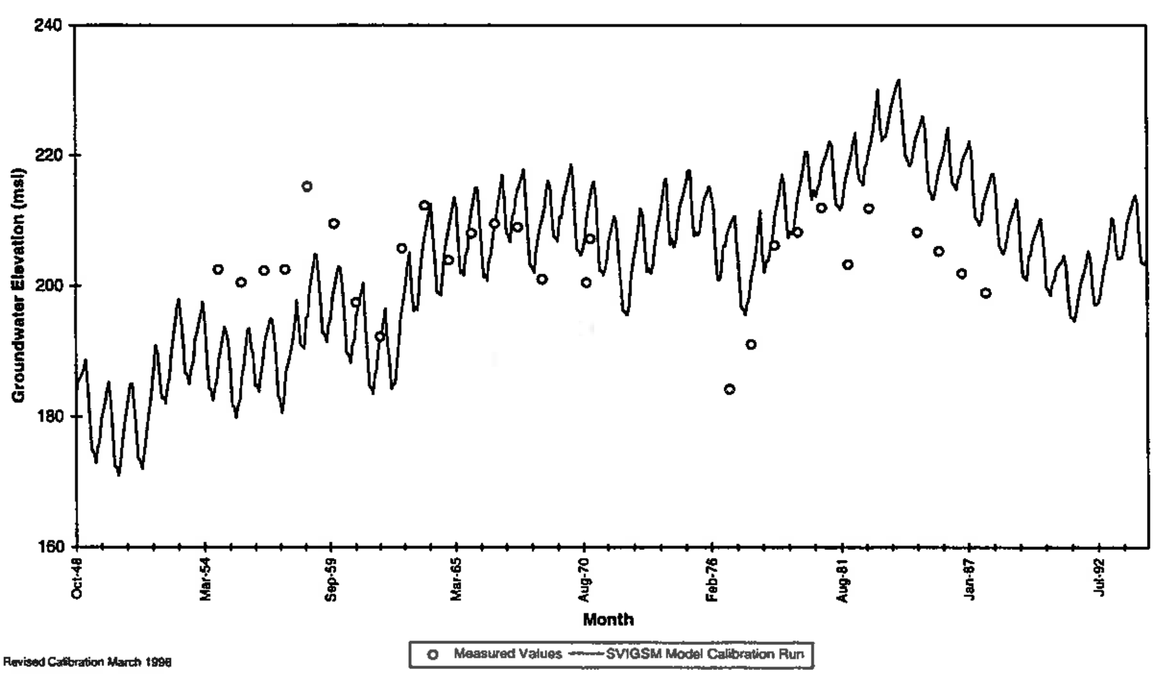

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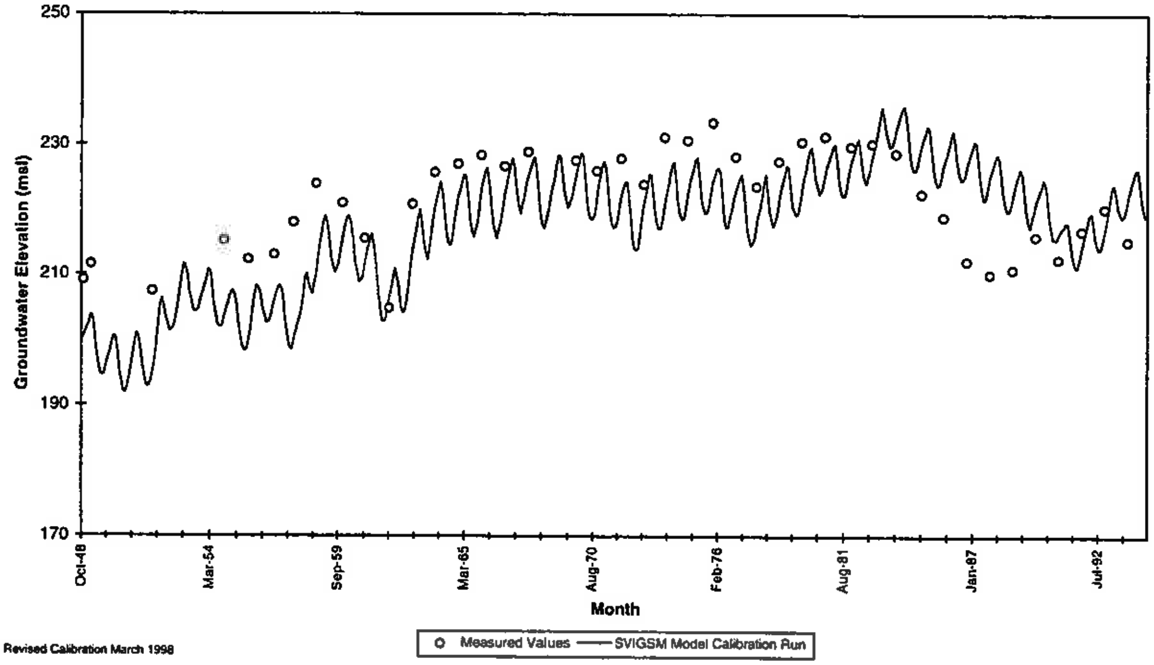
HYDROGRAPH OF MEASURED AND SIMULATED GW LEVELS
Calibration Well No. 73: Forebay Subarea, Forebay Shallow Aquifer



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Appendix B

MONTGOMERY WATSON

HYDROLOGIC EFFECTS
of
FLOOD CONTROL OPERATIONS
for
NACIMIENTO AND SAN ANTONIO RESERVOIRS

Background, Terminology

The results of this investigation have been succinctly presented on the eighteen log-normal graphs enclosed.

A log-normal graph shows the relationship between (in this case) river discharge in cfs which is plotted on the ordinate or y-axis at a logarithmic (to the base 10) scale and the exceedance probability in percent which is plotted on the abscissa or x-axis at a normal variate scale. The normal variate scale simply means that location of the various exceedance probability values is dictated by the equation for the bell-shaped normal distribution with which we are all familiar.

The "exceedance probability in percent" is directly related to the "frequency of occurrence" of an event. Also commonly used is the term "return period" which is simply the inverse of the "frequency". For example, a 100-year flood has a frequency of 0.01 (1/100) and an exceedance probability of 1%. These terms mean that there is a 1 percent chance *each year* that this discharge will be *equaled or exceeded*. Or, similarly, the 100-year flood will occur *on the average* of once every 100 years. It, however, may occur two years in a row or only once in 200 years, but *on the average* it will occur once every 100 years. These probability terms all denote the same concept of risk but in slightly different ways.

All the work contained in this report is based on the concept of annual series. This means that the probabilities are established by selecting the largest event to have occurred during each water year. (A water year begins on October 1 and concludes on September 30. The calendar year on September 30 determines the year of the water year.) While it may be that some years have more than one large flood event (like, for instance, 1969) only the largest of the year is selected.

Data used in the analyses used to develop the frequency curves for various hydrologic variables came from a number of sources. The records from United States Geological Survey (USGS) stream gage stations on the Salinas River at Spreckels and at Bradley were used. The daily stream flow data from the Integrated Ground and Surface Water Model (IGSM) as prepared by Montgomery-Watson was used to supplement the USGS stream gage data. The HEC-1 hydrologic model developed and used by the Corps of Engineers after the 1969 floods and by FEMA for the Flood Insurance Study on the Salinas River was used to predict the 10-, 50-, and 100-year floods along the river. This model was modified for this current project in two respects: 1) the Unit Hydrographs for inflows to Nacimiento and San Antonio Reservoirs were modified to reflect the recent work done by GEI Consultants to reconstitute the 1995 flood hydrographs into the two reservoirs; and, 2) the flood control operations rules curves were altered to reflect the current operational regimen.

Also included were descriptions of historic floods on the Salinas River as presented in the Flood Insurance Study Report for Monterey County.

Four river discharge parameters were used as indicators. The first was the instantaneous peak river discharge in cfs. This is the maximum river discharge rate no matter how long that particular discharge lasts. The second parameter is average river flow in cfs for one day. There is always some confusion using this variable when interpreting HEC-1 output because HEC-1 provides the maximum 24-hour average discharge. To make proper comparisons, a standard, Corps of Engineers' correction factor was used to convert the 24-hour discharges to daily discharges.

The third and fourth river discharge parameters used as indicators were the average three-day and five-day river discharges.

Results

The difference between the "with dams" (WD) and the "without dams" (WOD) conditions for Spreckels and for Bradley are shown in Figures 1 and 10 respectively.

The difference between the WOD and WD peak discharge at Spreckels is 62,000 cfs for the 100-year flood (1% exceedance probability) and is 24,500 cfs for the 10-year flood (10 % exceedance probability). For the 5-day average river discharge the difference between WOD and WD is 7,000 cfs for the 100-year flood and 4,700 for the 10-year flood.

Figure 10 shows the differences in the WOD and WD cases for the Bradley gaging station location.

The dams appear to have slightly less impact at Spreckels than at Bradley. This might be expected. The drainage area controlled by the two dams is approximately 650 square miles. The total drainage area at Bradley is 2,535 square miles and that at Spreckels is 4,156 - a 64 percent increase.

Figures 2 through 5 show the results at Spreckels WOD. On Figure 2 are shown the four frequency curves for Peak, 1-, 3-, and 5-day discharges. The little squares are the actual annual maximum instantaneous peak discharge data recorded at Spreckels by the USGS during the period from 1930 to 1956. The three "X's" are the results of the HEC-1 model modified as described above. An "X" is shown for the 100-year, 50-year and 10-year floods.

Figure 3 shows the results for the 1-day average discharge. Again the USGS 1-day data is shown as are the results from the HEC-1 model. For the 3-day and 5-day average discharges as shown in Figures 4 and 5 there was no HEC-1 information because the model did not use a storm pattern that could produce a reliable 72-hour average discharge and did not produce any 120-hour discharge information.

Figures 6 through 9 show the results at Spreckels WD. As there was only 30 years of USGS data in the WD condition, and as Montgomery-Watson had produced a 47-year record of WD conditions at Spreckels using the IGSM, these longer period data were used for all the curves with the exception of the peak discharge curve. Curves were fit to the data by eye using the USGS data, the IGSM results, the HEC-1 model output and a desire to construct a family of curves which looked like a family of curves.

The Water Resources Council Bulletin 17B Guidelines for frequency analysis was used to perform a historic adjustment to the data to assist in plotting the return period of the peak discharges for the two large floods at Spreckels (1969 and 1995). Even though the stream gage data only covered 30 years of recorded flows, the two flood peaks were so large that they were bigger than any peak recorded before or during the two construction of the two dams, thus making these two peak discharges the largest recorded since 1930 when gaging began.

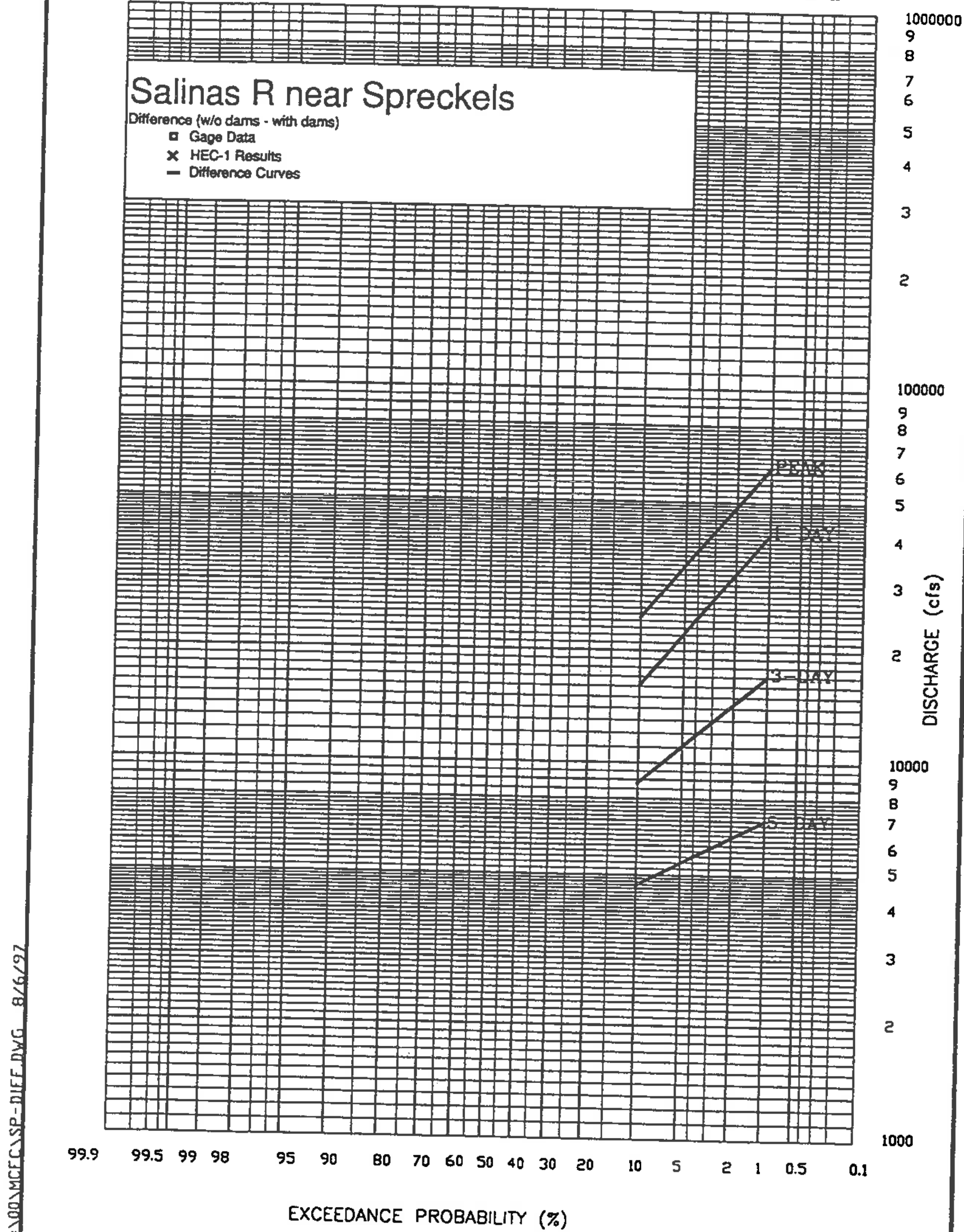
A search of the Flood Insurance Study report for Monterey County uncovered the fact that the floods of 1911 and 1914 were quite large events which created great flooding and generated significant flood damage. Between 1914 and 1930 there were no significant flood events reported. The 1911 event was described as the "largest known to have occurred since 1862". There was no comparison between the 1914 event and the 1911 event leading one to believe that although it created huge flood losses, it was not as large as the 1911 event.

There was no way to compare the 1911 event and the 1995 or 1969 events. If, for example, it could have been shown that the 1995 event was larger than the 1911 event, it would have been the largest event known to have occurred on the Salinas River at Spreckels since at least 1862 - a 136-year period. As it stands now we can only state that the 1995 event was the largest known to have occurred since at least 1911 - a period of 87 years. Using the historic adjustment procedures in Water Resources Council Bulletin 17B helped place these two large floods in a more proper perspective from a return period viewpoint. The two highest discharge points plotted on Figure 6 were plotted after using this historic adjustment procedure.

The information contained in Figures 11 through 18 shows the results for the Bradley gaging station. This information parallels the information shown in Figure 2 through 9 for Spreckels. No historic adjustment was done at Bradley because there was no specific information about the effects of historic floods at that location.

The results of this investigation show that the flood control operations using the storage and outlet works in the dam/reservoir facilities on the Nacimiento and the San Antonio Rivers provide a significant level of reduction in flood frequency at downstream locations along the Salinas River.

FIGURE 1



Schaaf & Wheeler

FIGURE 2

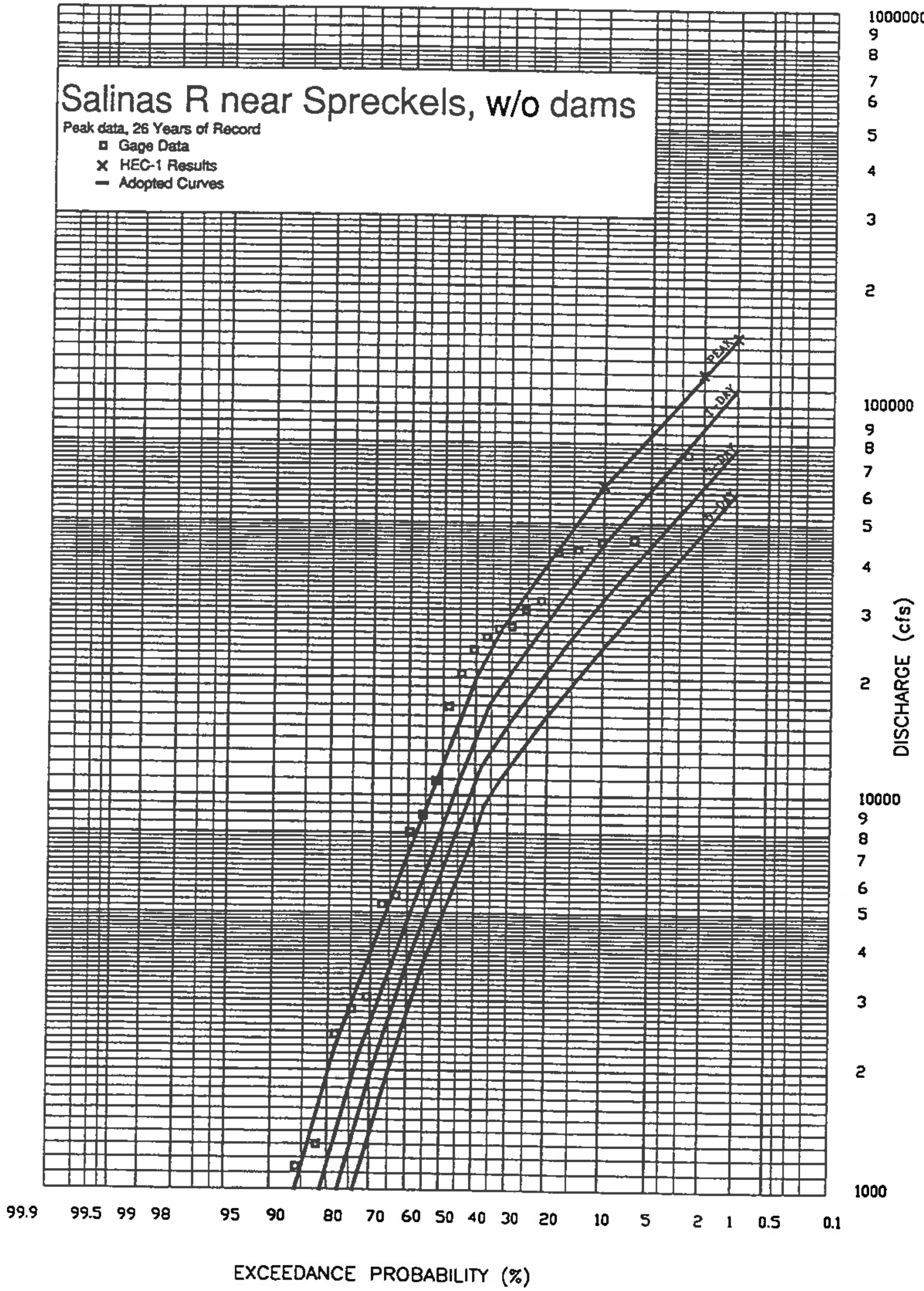


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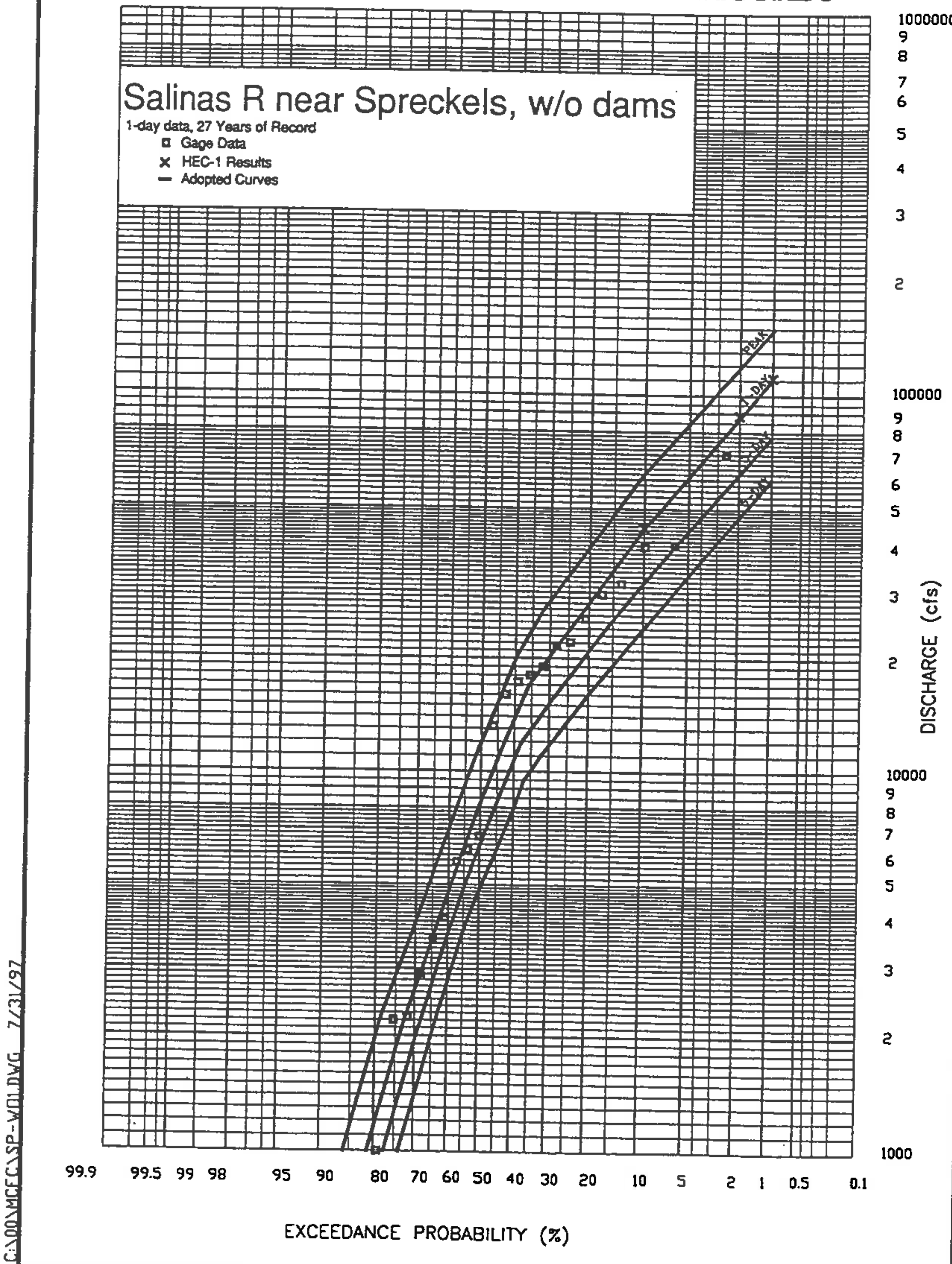
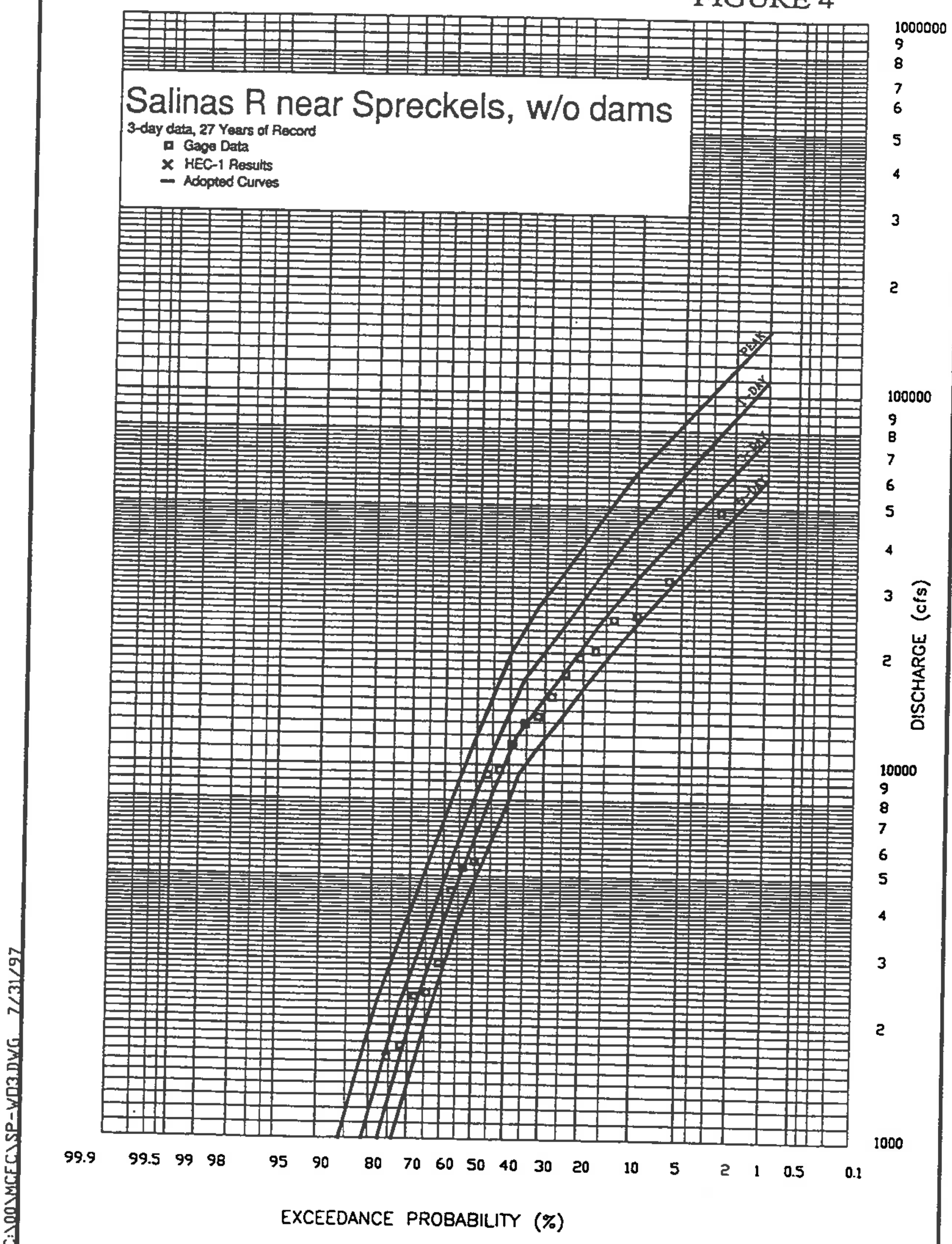
FIGURE 3



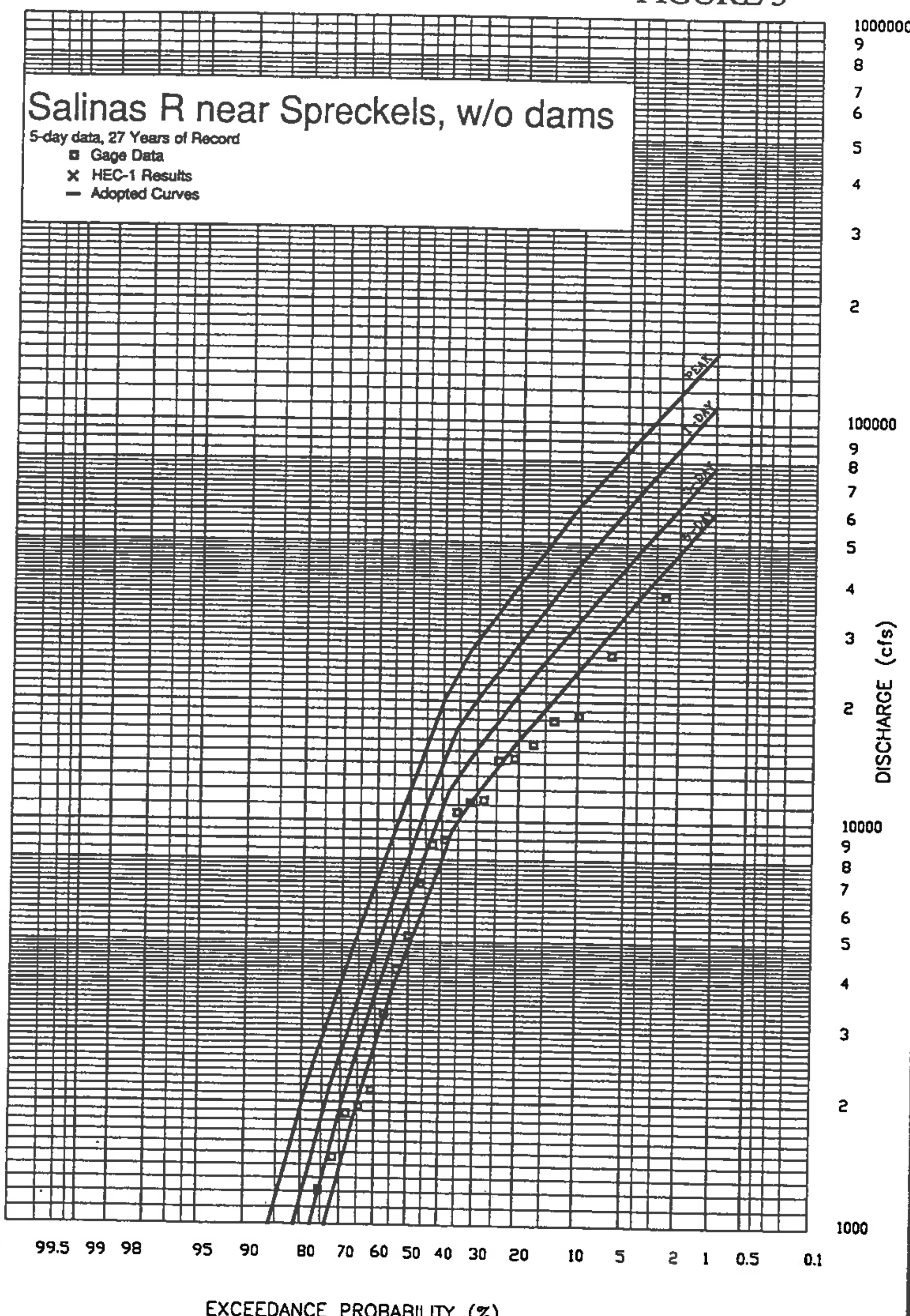
Schaaf & Wheeler

FIGURE 4



Schaaf & Wheeler

FIGURE 5



Schaaf & Wheeler

FIGURE 6

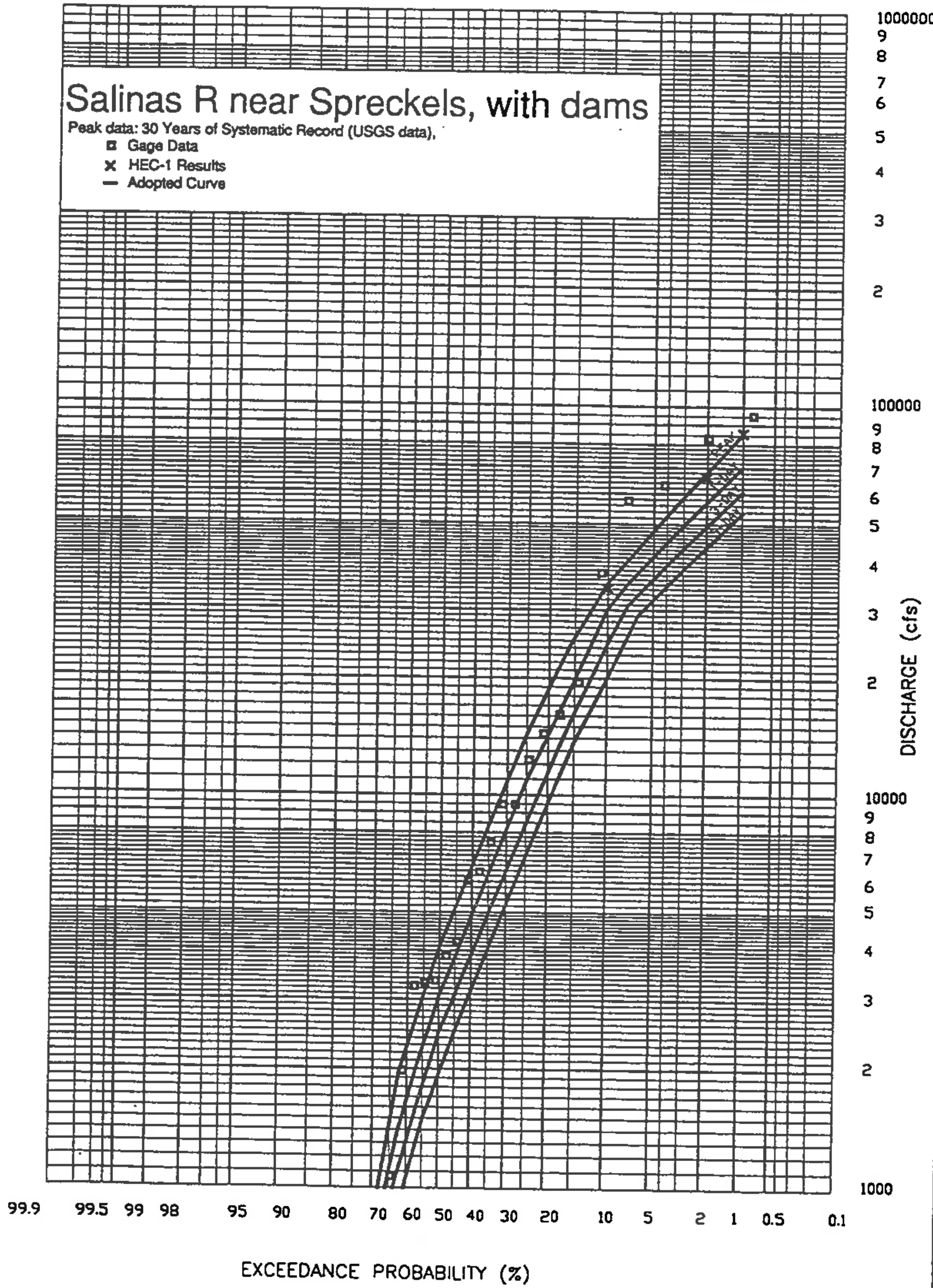


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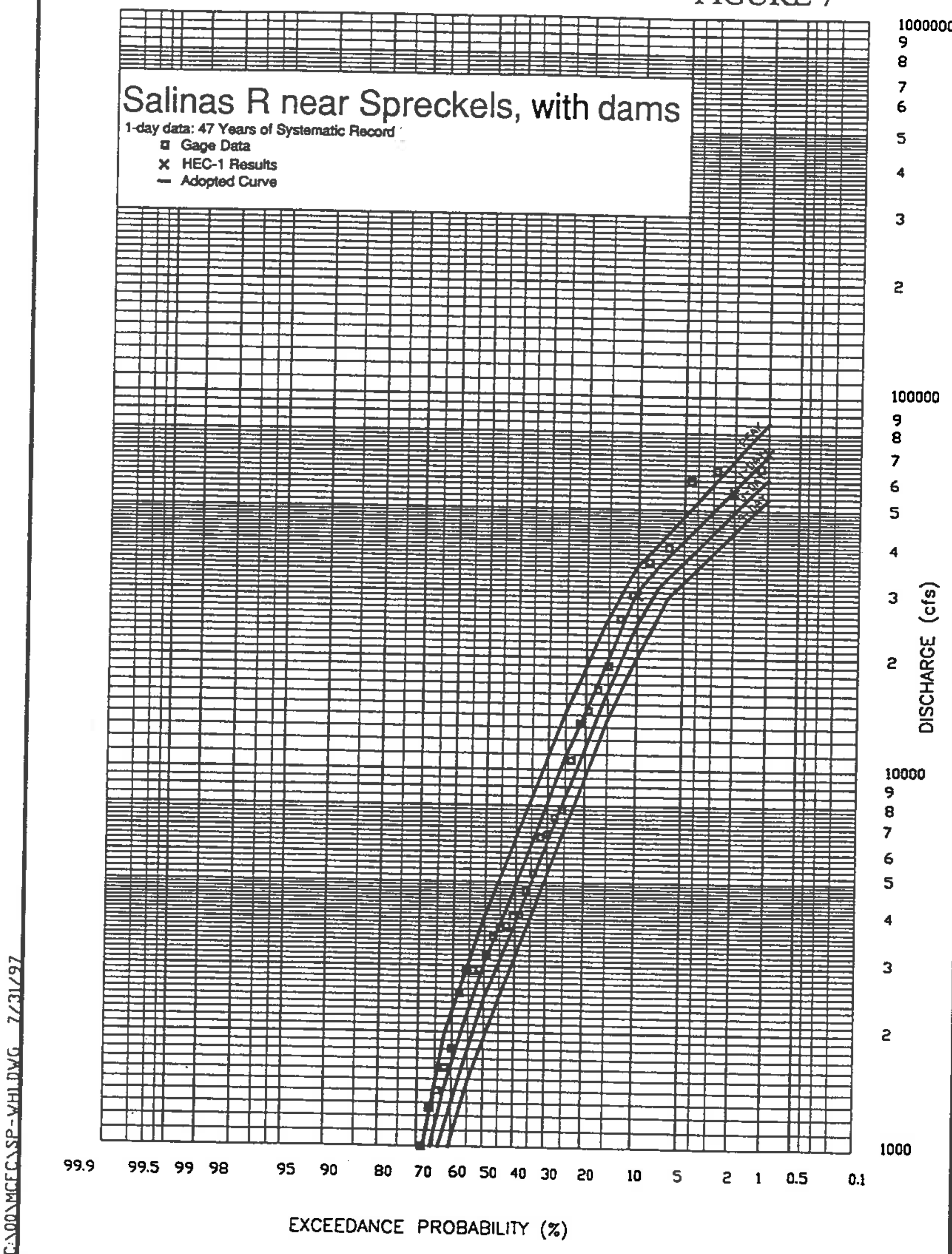
FIGURE 7



Schaaf & Wheeler

FIGURE 8

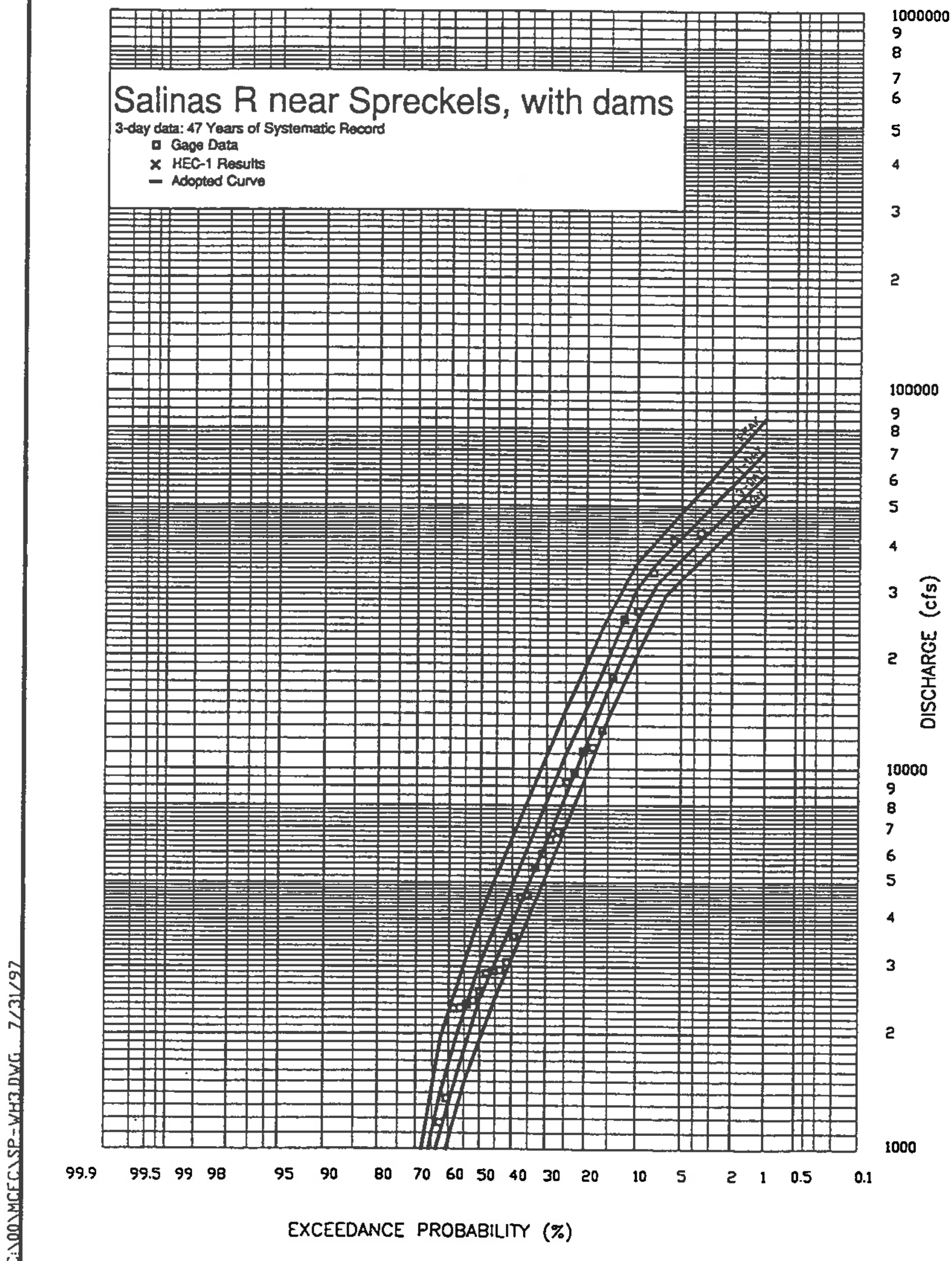


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FIGURE 9

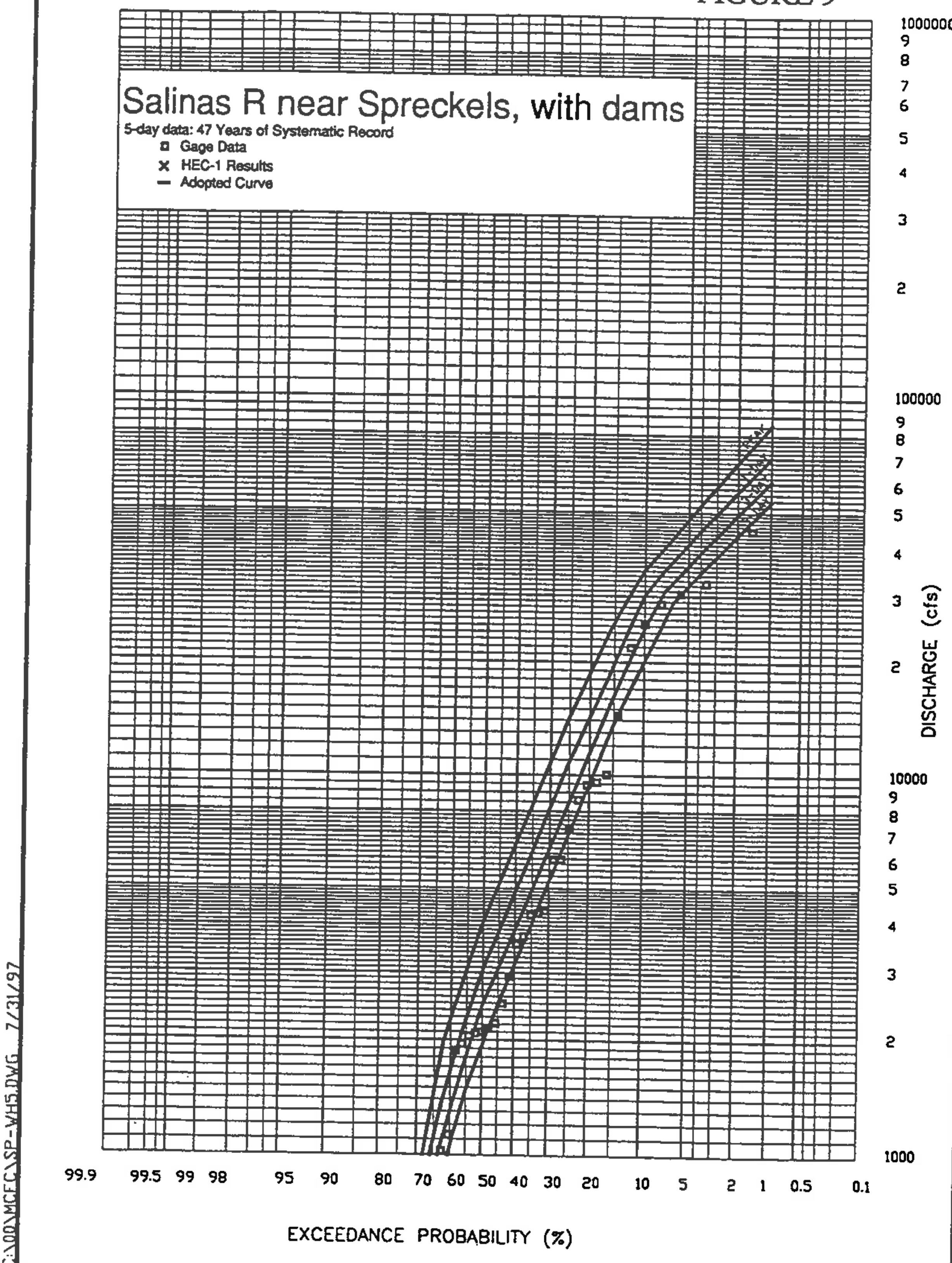

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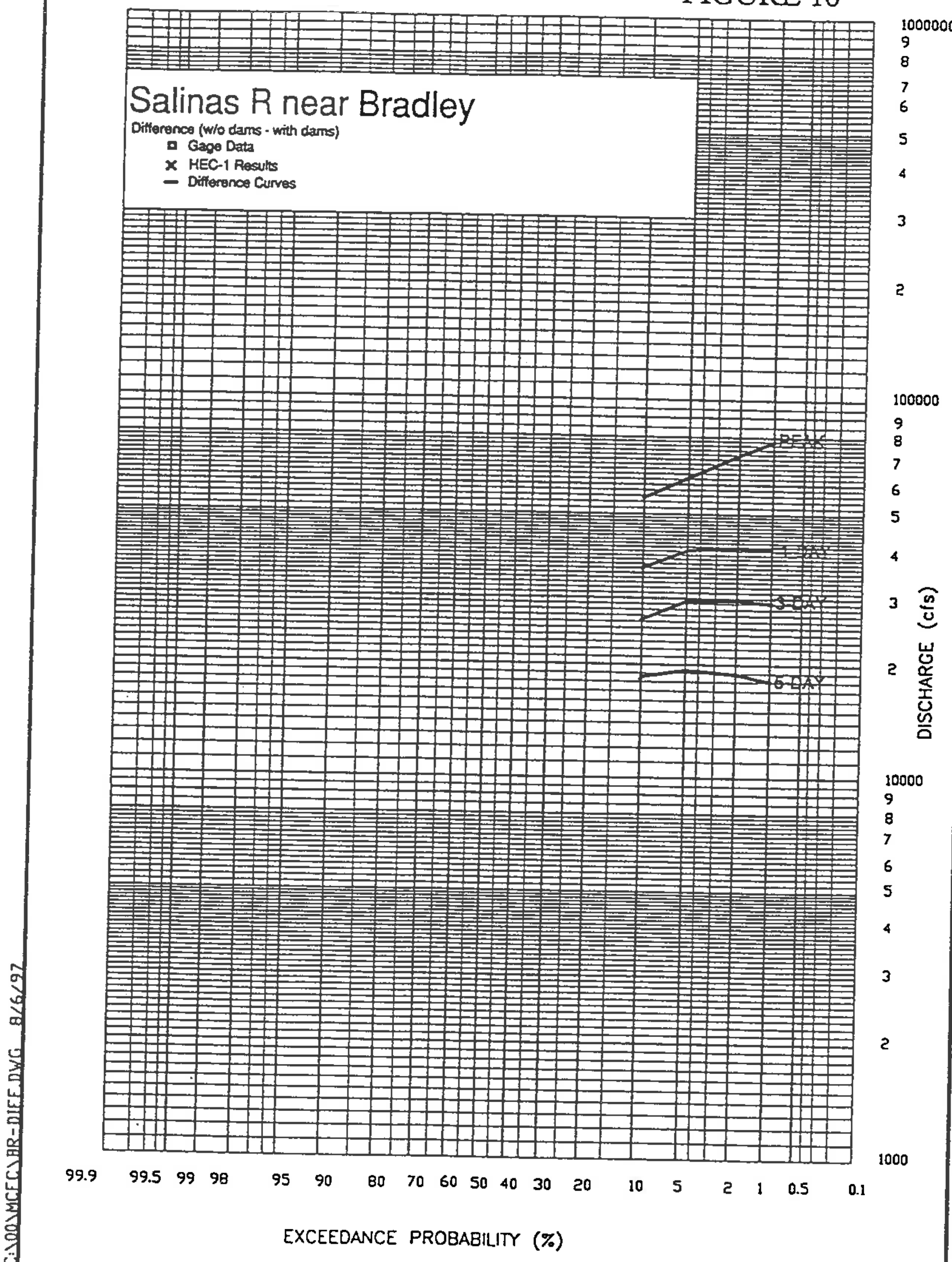
FIGURE 10



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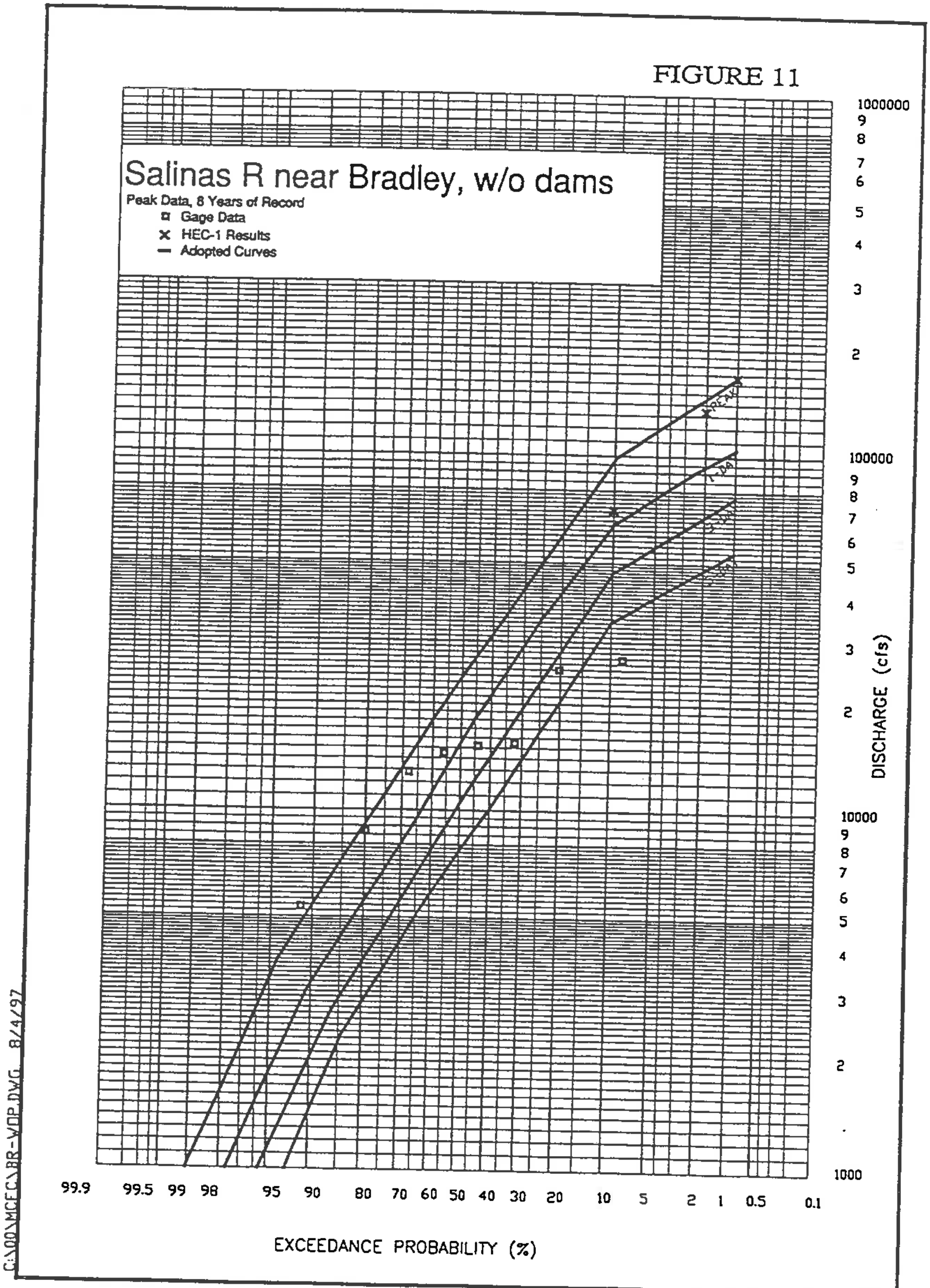

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FIGURE 12

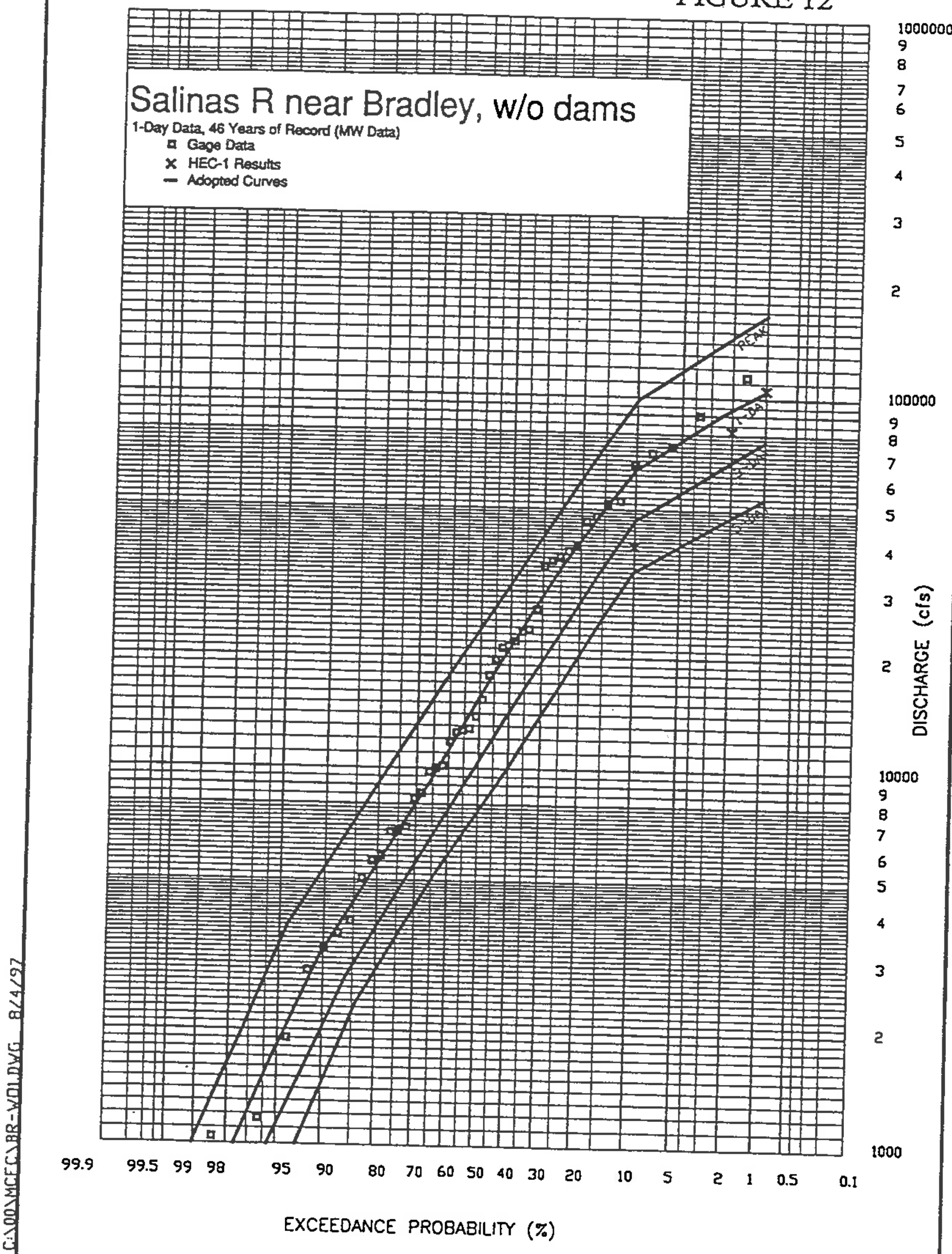

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FIGURE 13

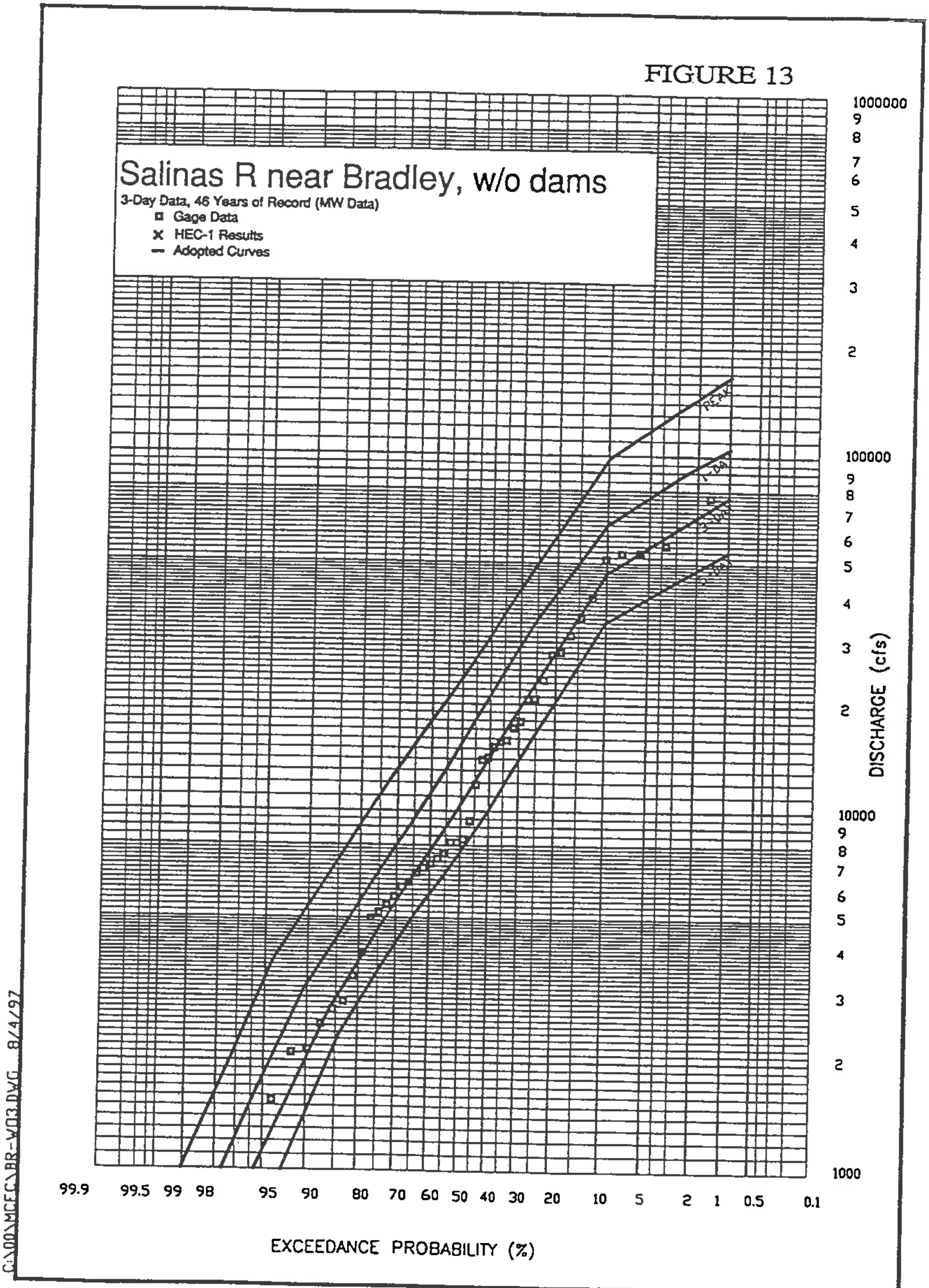

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FIGURE 14

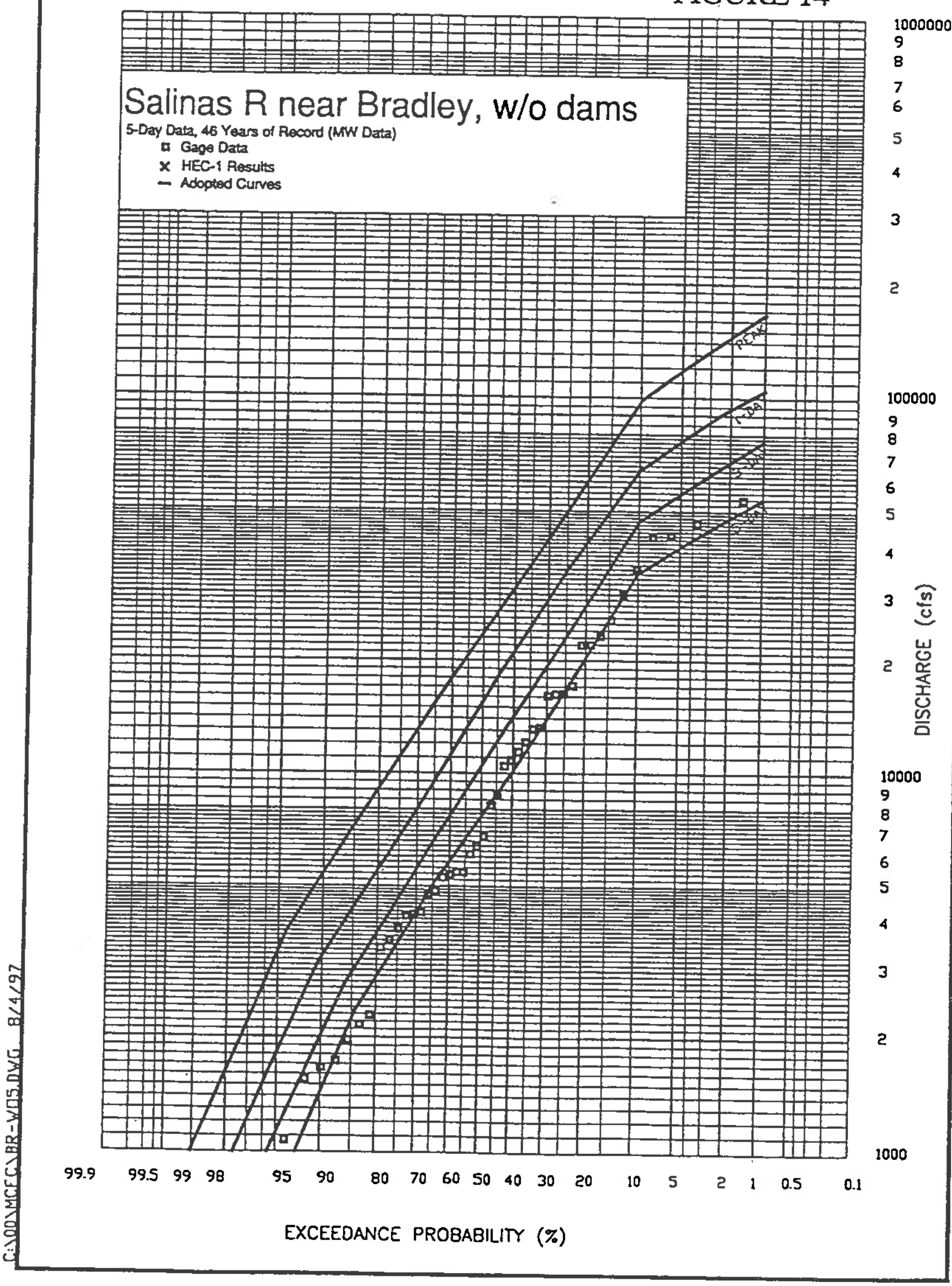

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FIGURE 15

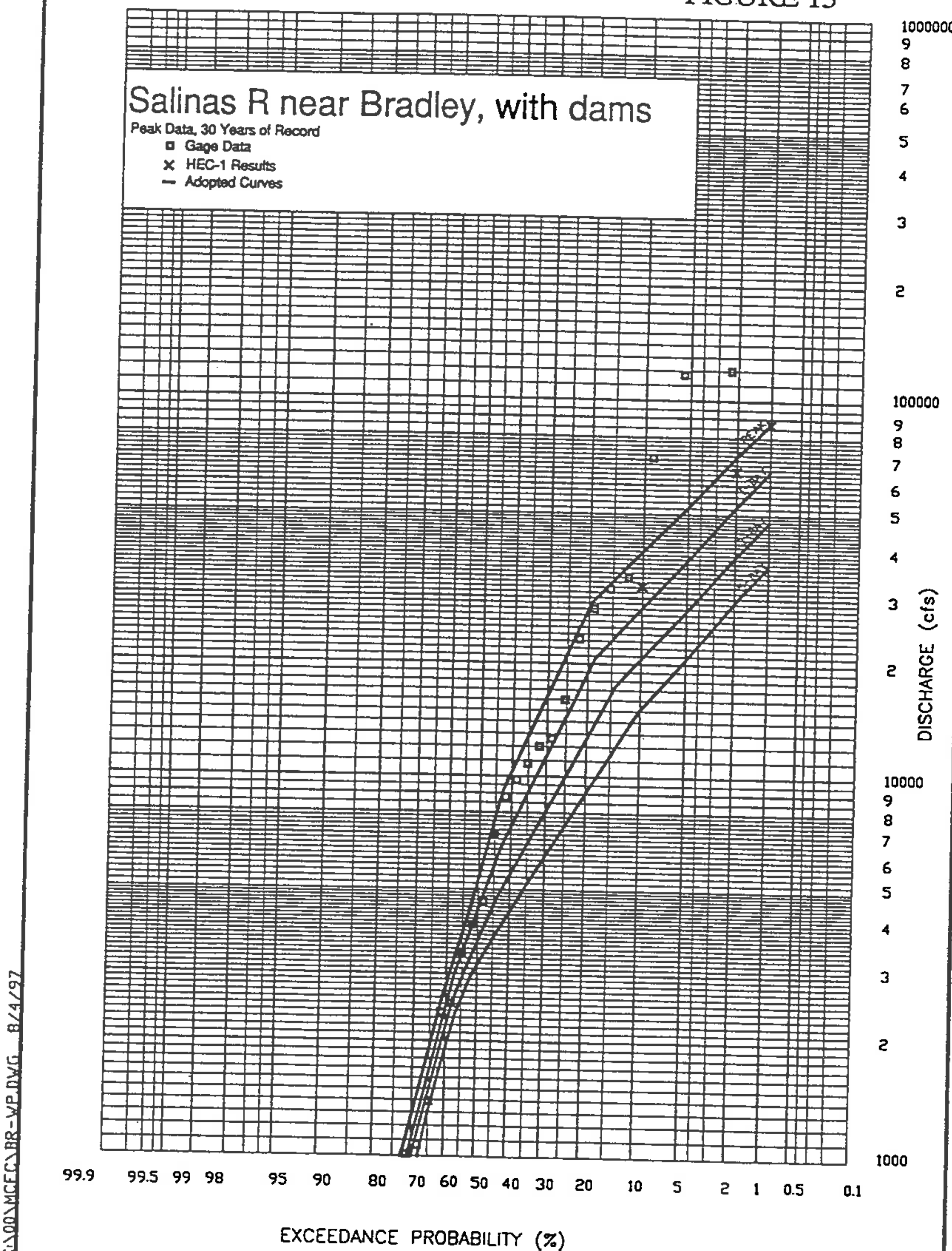

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FIGURE 16

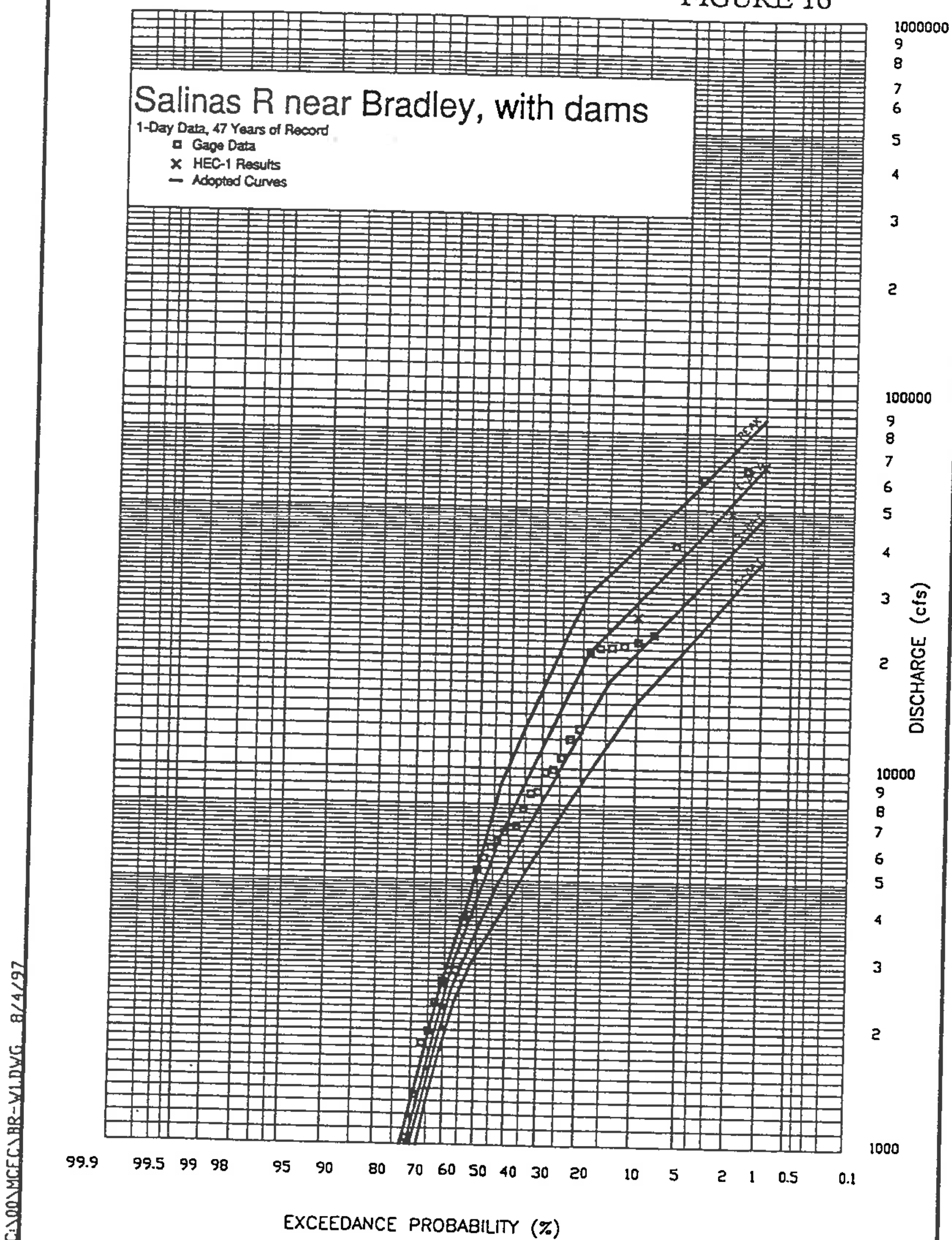

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FIGURE 17

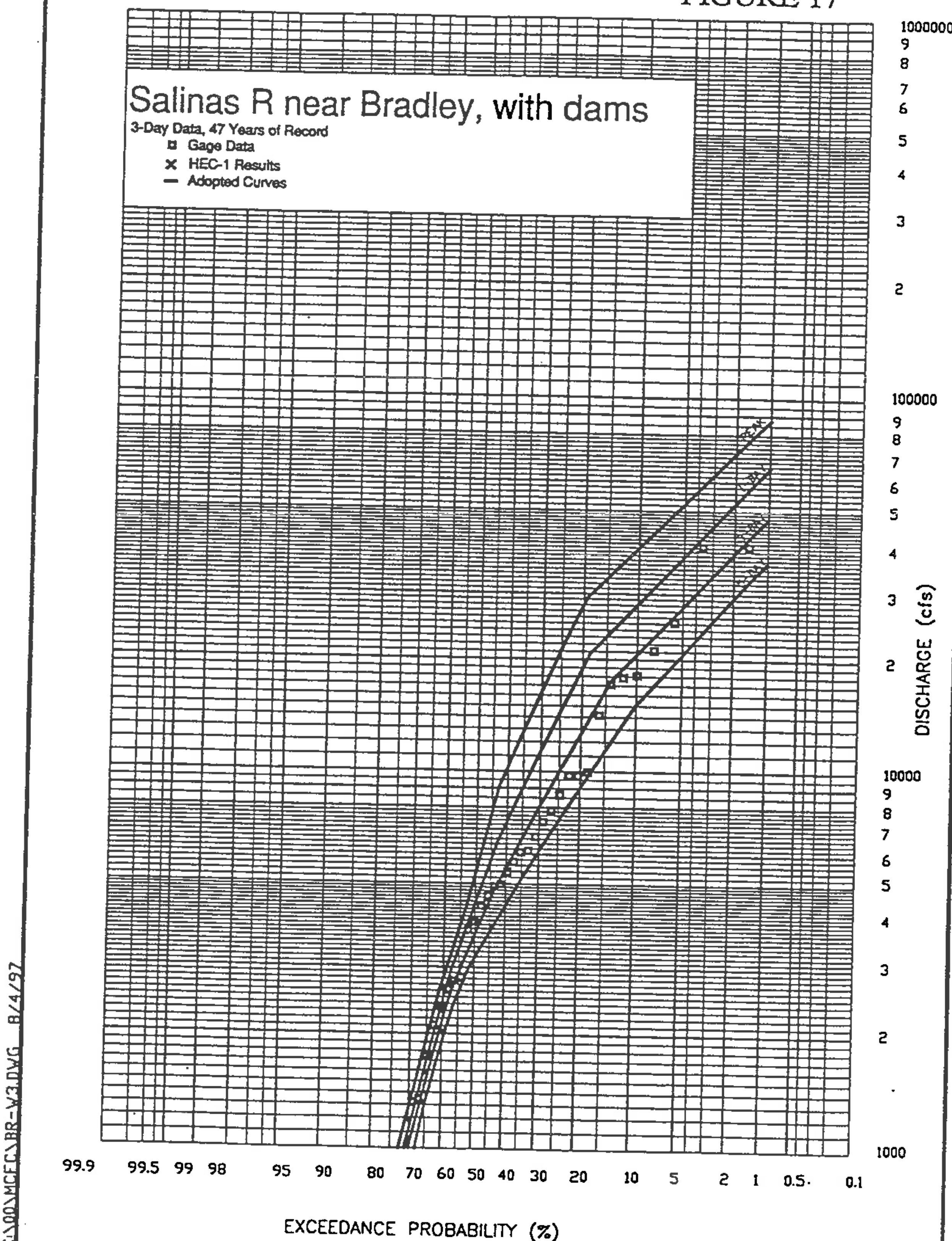

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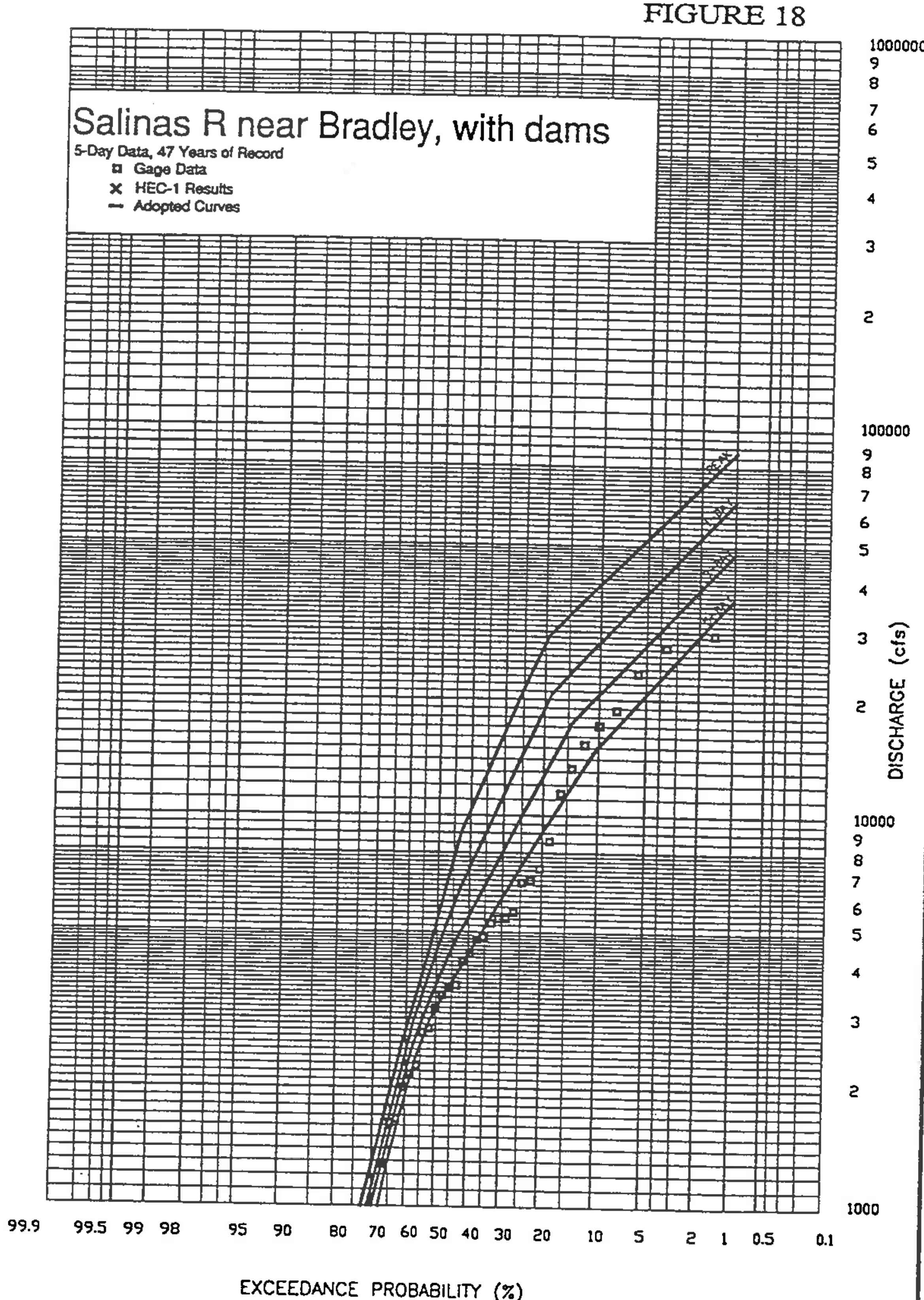
FIGURE 18



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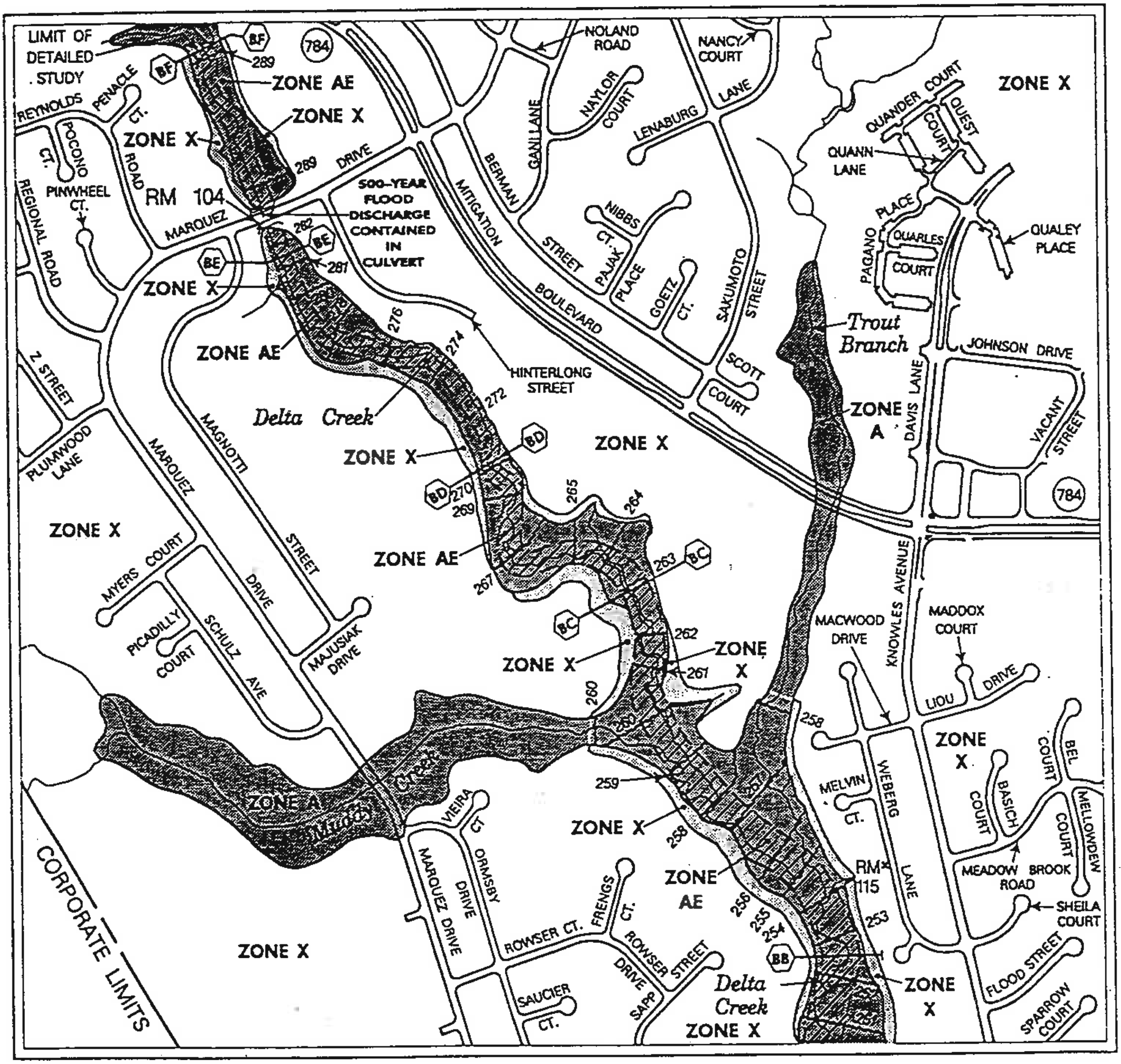
FEMA Levee Policy

FLOOD INSURANCE STUDY

FEMA 37

Guidelines and Specifications for Study Contractors



FEDERAL EMERGENCY MANAGEMENT AGENCY

January 1995

CHAPTER 7. EVALUATION OF LEVEE FLOOD CONTROL SYSTEMS

The following paragraphs describe procedures for evaluating earthen riverine levees. Procedures for evaluating concrete dikes, floodwalls, seawalls, and other structures shall be coordinated with and approved by the Regional PO. The Regional PO should also be contacted to obtain the appropriate criteria in analyzing agricultural levees. Specific guidance addressing coastal structures are contained in Appendix 1A.

In evaluating the ability of levee systems to provide protection against the 100-year flood, the criteria outlined in Section 65.10 of 44 CFR and the step-by-step procedures as summarized on the proceeding pages should be used. The SC should always initiate its analyses by evaluating the levee's freeboard and maintenance plan and should only proceed with further analyses if these requirements are met.

1. Freeboard. A minimum levee freeboard of 3 feet shall be necessary, with an additional 1 foot of freeboard within 100 feet of either side of structures within the levee or wherever the flow is constricted, such as at bridges. An additional 0.5 foot above this minimum is also required at the upstream end, tapering to the minimum at the downstream end of the levee. The criteria concerning freeboard is detailed in 44 CFR 65.10(b)(1).

2. Structural Design Analyses. The SC must review the structural analyses which address closures, embankment protection, embankment and foundation stability, and settlement. The structural analyses must meet the criteria detailed in 44 CFR 65.10(b)(2),(3),(4) and (5).

3. Interior Drainage. Where credit will be given to levees providing 100-year flood protection, the adequacy of interior drainage systems will be evaluated. Interior drainage systems associated with levee systems usually include storage areas, gravity outlets, pumping stations, or a combination thereof. These drainage systems will be recognized by FEMA only if the criteria outlined in 44 CFR 65.10 (b)(6) and (c)(2) are met.

4. Operations. In general, levee evaluation shall not consider human intervention (e.g., capping of levees by sandbagging, earthfill, or flashboards) for the purpose of increasing a levee's design level of protection during an imminent flood. Only in exceptional cases where no practicable alternative exists and technical justification is provided, will FEMA permit sandbagging to satisfy freeboard requirements. The Regional PO must coordinate all such cases with FEMA. Human intervention will normally only be accepted for the operation of closure structures (e.g., gates or stoplogs) and manual back-up for pumping stations in a levee system designed to provide at least 100-year flood protection, including adequate freeboard as described earlier. Where levee closures and/or pumping stations are

involved, an officially adopted operations plan must be submitted that meets all the criteria set forth in 44 CFR 65.10(c)(1) and (2).

5. <u>Maintenance</u>. For a levee system to be recognized as providing protection from the base (100-year) flood, the system must be maintained in accordance with an officially adopted maintenance plan, and a copy of this plan must be provided to FEMA by the owner of the levee system. The specific requirements of the maintenance plan are detailed in 44 CFR 65.10(d). Note that a governmental agency must assume ultimate responsibility for maintenance plans.

6. <u>Certification Requirements</u>. All levee systems must be certified in accordance with 44 CFR 65.10(e).

7. <u>Exception Procedures</u>. FEMA will accept certification from another Federal agency that an existing levee system is designed and constructed to provide protection against the 100-year flood in lieu of the requirements outlined in 44 CFR 65.10(b)(1) through (7). Under certain circumstances, FEMA may also grant exceptions to the above requirements or approve alternate analysis techniques.

The SC shall follow the steps listed below in determining a levee system's ability to provide protection against the 100-year flood. The final decision concerning the creditability of the levee system must be coordinated with the Regional PO before the SC proceeds with further hydraulic analyses.

1. Identify the levee system to be studied, including all "levee elements" (e.g., main levee, tieback levee, railroad or highway embankment), interior drainage elements and any other elements required to form a stand-alone flood-control structure.

2. Determine the ownership of each system element via telephone contact with community officials and/or appropriate State and Federal agencies.

3. Determine the status of all system elements, as presently reflected on the effective FIRM (i.e., credited or uncredited, detailed or approximate study).

4. Obtain from the system element owner, operator (i.e., local, State, or Federal agency; or private individual or corporation), and/or the appropriate FEMA data repository, all available supporting documentation, including but not limited to "as-built" plans; survey data; geotechnical reports; structural analyses; interior drainage analyses; inspection reports; and operation and maintenance plans.

5. Obtain written confirmation of any previous certification by the agency responsible for design and construction that the levee system or elements thereof are Federal projects that provide protection from the 100-year flood, when appropriate.

6. Make an individual inventory of data received for the levee system.

7. Perform hydraulic analyses of the 10-, 50-, 100-, and 500-year floods, assuming the levee system to be in place if these water-surface profiles are not available. Otherwise, assess the available computations for present-day application and modify, if necessary.

8. Use available "as-built" levee profiles or topographic data and the 100-year water-surface profile obtained from the hydraulic analysis conducted with the levee in place to make a determination of the available freeboard of each system element.

9. Contact the Regional PO immediately if any element of a levee system is found to provide less than the required freeboard and notify him or her of the level of freeboard deficiency identified. Based on this discussion and the availability of other design data, the Regional PO may request more detailed surveys of the levee profile or that a risk analysis be performed on uncertainties related to elements of levee design.

10. Review the available operation and maintenance plans to determine whether the plans conform with the requirements of Section 65.10 (c) and (d) and document in writing to the Regional PO any noted deficiencies. The Regional PO will provide guidance on any supplemental investigations necessary to ascertain the adequacy of operation and maintenance plans.

11. Summarize the results and conclusions of the above-mentioned levee investigation in a final letter report to the Regional PO and include as attachments and/or references all correspondence and reports of telephone conversations among the SC, the Regional PO, local, State, and Federal entities, and levee owners; inventories of available data; and field inspection reports and photographs.

12. Summarize the actions taken in the investigation, the ownership of each system element, and the outcome of the investigation in the draft FIS report, under the section headed "Local Flood Protection Measures."

    If the levee satisfies the appropriate aforementioned requirements, as verified by the Regional PO, the protected area (landward side of the levee) will be designated as Zone X or the appropriate zone determined by the interior drainage analysis such as Zone AH. If an interior drainage analysis does not exist or has been determined to be insufficient in the levee investigation, the SC shall coordinate internal zone designations with the Regional PO.

    If the subject levee does not meet the requirements stated in 44 CFR 65.10, as verified by the Regional PO, the 100-year flood elevations will be recomputed as if the levee did not exist. None of the subject levee should be recognized as providing 100-year flood protection unless there are portions of the levee system that can meet requirements of 44 CFR 65.10 independent of the remaining levee system. The 100-year flood levels on the unprotected side of the levee will be equal to the 100-year water-surface elevations computed with the levees in place.

If the 100-year flood level, with the levee in place, is higher than the top of the levee, the computed 100-year flood levels should be used on the river side of the levee. The 100-year flood levels will then be recomputed for the landward side of the unrecognized levee as if the levee did not exist.

If water-surface elevations of the other floods (10-, 50-, and 500-year) are higher than the top of the levee elevations, they will also be considered equal to the top of the levee on the unprotected side. If these elevations are lower than the top of the levee, they will be shown as computed on the profile. Further analyses for the conditions without the levees should not be made for frequency floods less than the 100-year.

For the levees that do not satisfy the minimum requirements, a maximum of five flood profiles might be drawn on the profile sheet representing the 10-year, 50-year, 100-year flood with levee, and the 100-year and 500-year flood without levee elevations.

If the "with levee" BFEs are higher than the "without levee" BFEs, the FIRM should show a line, running along the levee centerline, separating the areas of different BFEs. Otherwise, only "without levee" BFEs will be shown.

The floodway widths will be computed for the "without levee" condition if the levees do not meet the requirements of 44 CFR 65.10. The equal conveyance reduction method should be considered, if it is technically appropriate. The "Regulatory" column in the Floodway Data table will show two BFEs, representing "river side" and "land side" conditions, if the former elevation is higher than the latter elevation. Otherwise, "without levee" BFEs will be shown. At a tributary's confluence with the main stream, BFEs from the main stream will be shown as the regulatory elevations if they are higher than the "river side" or "land side" BFEs of the tributary.

The above procedures for the determination of profiles and floodways can also be applied to the conditions where levees exist on both sides of the stream. If levees exist on both sides of a stream, the evaluation of levee systems must consider the possibility of simultaneous levee failure, failure of only the left side, and failure of only the right side. Simultaneous levee failure should be considered for profile and floodway computations.

Floodways will be delineated at the landside toe of mainline and tributary levees that are recognized as providing 100-year flood protection on a FIRM. Thus, the community's floodplain management ordinance will prohibit encroachment upon the levee, which could jeopardize the levee's integrity or effectiveness. It may also be appropriate to place floodways at levees providing a lower level of protection if encroachment on the river side of the levee is of concern to the community. The SC should consult with community officials and the Regional PO in resolving this situation.

For levee systems where an area of land may be totally or partially surrounded by levees or where two or more flooding sources join that have levees on both sides of the stream, the SC should contact the Regional PO before proceeding with any analyses for levee failures. For these complex situations, the flood hazard in the area that would have been protected by the non-failed levee(s) should be based on selection of failure scenarios that yield the highest BFE or flood hazard.

Appendix C

MONTGOMERY WATSON

Appendix C
Supporting Information for Economic Benefits Analysis

METHODOLOGY FOR ESTIMATING FLOOD CONTROL BENEFITS FOR PREVENTION OF DAMAGES TO BUILDINGS AND STRUCTURES

The benefits of flood control are the avoided future damages and losses (i.e., the extent to which expected future damages and losses are reduced). The net present value of benefits accounts for the time value of money, because benefits are expected to accrue in the future and dollars received in the future have a present value that is less than dollars received immediately.

Each year's expected net benefit is discounted to its present value, then all years' expected net benefits are summed together to yield the total expected net present value. The planning horizon, or useful lifetime, of a flood control project varies depending on the type of project, with 50 to 100 years being common for flood control projects. The discount rate correctly values benefits expected in the future.

Two other factors can be included in the expected net present value calculation: the salvage ,value of the mitigation investment at the end of the planning horizon; and the annual costs to maintain the effectiveness of the flood control project. However, the present value of the salvage value of flood control projects is generally quite small, because of the long planning horizons appropriate for flood control projects, thus salvage value is not considered in this analysis. The annual maintenance costs of typical flood control projects are generally small, but may be significant, especially for levee projects. Therefore, for completeness, the annual maintenance costs are included in the FEMA benefit-cost program.

The benefits of a riverine flood control project are the reduction in damages that would otherwise be expected. Expected annual benefits are defined as the sum of expected avoided damages and losses. There are three different types of damages which are considered in this analysis: scenario damages, expected annual damages, and expected annual avoided damages.

- Scenario damages are the expected damages per flood of a given flood depth at a building or structure.
- Expected annual damages are the product of scenario damages and the expected annual number of floods of a given flood depth at a building or structure.
- Expected annual avoided damages are the product of expected annual damages and the effectiveness of the mitigation measure in reducing damages at the building.

The table below gives a schematic example of these damage terms.

EXAMPLE OF CALCULATING EXPECTED ANNUAL AVOIDED DAMAGES

Flood Depth (ft)	Scenario Damages	Expected Annual Number of Floods	Expected Annual Damages	Effectiveness of Mitigation Measure	Expected Annual Avoided Damages
-2	$20,000	.10	$2000	100%	$2,000
-1	$25,000	.05	$1250	80%	$1,000
0	$35,000	.02	$700	50%	$350
1	$50,000	.01	$500	25%	$125
2	$85,000	.005	$425	15%	$64

In this example, the scenario damages indicate the expected damages each time a flood of the given depth occurs at a building site. Scenario damages do not depend on how frequently such floods are expected to occur. The annual flood probabilities indicate the degree of flood-related risk at a specific site under consideration. The expected annual damages are the product of scenario damages and annual flood probability. Expected annual damages are the best estimate of the average damages per year expected at this site; such estimates do not indicate that these damages will occur every year. Expected annual damages are those damages which are expected to occur without undertaking the mitigation measure. The effectiveness of the mitigation measure is an estimate of how much expected damages will be reduced by the mitigation measure under consideration. The expected annual avoided damages (i.e., the annual benefits) are the product of expected annual damages and the effectiveness of the mitigation measure. The expected annual avoided damages are thus the expected annual benefits of a flood control project.

Scenario damages are the total damages per flood event. Thus, scenario damages are the sum of building damages, contents damages, displacement costs, lost business income, rental income losses, and the value of lost government services for floods of each depth per scenario (flood event).

Building damages are estimated as the product of the modified structural depth damage function (Tables C-4 and C-5), the floor area of the building, and the replacement value of the building per square foot.

Contents damages (Table C-6) are estimated as the product of the contents depth-damage function and the total replacement value of the building contents for each flood depth.

Displacement costs are the product of displacement days necessary, the total displacement costs per day, and the total area occupied by the owner agency or public or nonprofit agencies.

Lost business income is included if all or a portion of the building is rented to commercial businesses (Table C-4, Value Loss of Services). Lost business income is the product of the net income of commercial businesses per day and the number of days of functional downtime.

Lost public services must be included when public/nonprofit sector buildings become unusable during a flood must be included (Table C-4, Value Loss of Services). Public/nonprofit services are valued using the Quasi-Willingness to Pay (QWTP) model. QWTP is a simple methodology that assumes that public/nonprofit services are worth what we pay to provide the services.

Value of Lost Services is the product of the total value of lost services per day and the number of days of functional downtime. The period of lost services depends on the agency's ability to find alternative quarters and to establish normal functions. This period may vary depending on the structure, size, and function of the agency and the availability of suitable quarters after the flood. Note that the period of loss of agency function may be much shorter than the period of displacement necessary due to flood damage, because agencies will resume their functions in temporary quarters.

Expected annual damages are the product of scenario damages and the expected annual number of floods of a given depth.

Expected annual avoided damages are the product of expected annual damages and the effectiveness of the mitigation measure. The expected annual benefits of a flood hazard mitigation project are the expected annual avoided damages summed over the full range of damaging floods considered (e.g., -2 feet to 18 feet).

TABLE C-1
Sample Information for Affected Wells By Hydrologic Areas

	Row	Pressure Area		East Side		Forebay		Upper Valley	
		Redrilling	Lowering Bowls	Redrilling	Lowering Bowls	Redrilling	Lowering Bowls	Redrilling	Lowering Bowls
Total Number of Wells With Records	a	601		386		348		262	
Number of Wells With Detailed Construction Data and Used as Sample	b	186		84		65		50	
Row B/Row A (b)/(a)		31%		22%		19%		19%	
Number of Affected Wells	c	0	3	0	1	0	0	4	0
Row C/Row B (c)/(b)		0.0%	1.6%	0.0%	1.2%	0.0%	0.0%	8.0%	0.0%

Source: Section 1, Hydrologic Benefits Analysis, Table 1-5

Table C-2
Information on Irrigation Well Cost By Economic Study Area (ESU)

		Low	Medium	Medium High	High
Depth of well From Ground Surface	ft	**250**	**400**	**600**	**1000 or above**
Well cost	$	$25,000	$48,000	$120,000	$250,000
Pump cost	$	$15,000	$20,000	$30,000	$40,000
Total cost per well	$	$40,000	$68,000	$150,000	$290,000
Annualized cost per well	$	$3,571	$5,961	$12,865	$24,510
Water produced per well (af/year)					
ESU1	acre-foot			306	306
ESU2	acre-foot			214	214
ESU3	acre-foot			266	266
ESU5	acre-foot			372	372
ESU6	acre-foot			256	256
ESU7	acre-foot	410	410		
ESU8A	acre-foot	385	385		
ESU8B	acre-foot	385	385		
ESU9	acre-foot	446	446		
ESU10	acre-foot	529	529		
Annualized cost Per acre-foot					
ESU1	$/af			$42.04	$80.10
ESU2	$/af			$60.12	$114.53
ESU3	$/af			$48.36	$92.14
ESU5	$/af			$34.58	$65.89
ESU6	$/af			$50.25	$95.74
ESU7	$/af	$8.71	$14.54		
ESU8A	$/af	$9.28	$15.48		
ESU8B	$/af	$9.28	$15.48		
ESU9	$/af	$8.01	$13.36		
ESU10	$/af	$6.75	$11.27		

SOURCE:

a. Information on well and pump costs is based on a phone survey of well drilling companies that operate in the Salinas Valley. The detailed survey results are shown in Appendix Table 3.

b. Average well production data are from MCWRA's GIS Data Base (WRAGIS).

NOTE:

1. Measured in 1997 dollars.
2. Well cost per foot includes the cost of test hole, electric log, gravel pack, cement filling when needed, development, etc.
3. Pump cost depends on well capacity and the depth of well. At low end, average pump horsepower is between 60-75, with an average cost of $15,000. At medium level, the horsepower is between 75-100, with an average cost of $20,000. At medium high level, the horsepower is between 100-125, with an average cost of $30,000. At high level, the horsepower is up to 150, with an average cost of $40,000. Pump costs listed above exclude horsepower needed to pressurize water for irrigation purposes. On average, about 15-20 horsepower is assumed to be used for sprinkler pressurization.
4. Based on GEMS Data, average well capacity is 1,108 gpm in ESU1, 775 gpm in ESU2, 963 gpm in ESU3, 1,346 gpm in ESU5, 927 gpm in ESU6, 1,484 gpm in ESU7, 1,395 gpm in ESU8, 1,615 gpm in ESU9, and 1,915 gpm in ESU10. The above well production numbers are calculated assuming all wells run about 1,500 hours during the season. On average, about 15-20 hp are needed to pressurize water for sprinkler irrigation system.
5. Costs are amortized assuming an 8 percent interest rate, and wells and pumps have an assumed life of 50 and 20 years, respectively.

Table C-3
Phone Survey of Irrigation Well and Pump Costs in the Salinas Valley

PHONE SURVEY COST OF A TYPICAL IRRIGATION WELL IN MONTEREY COUNTY	
Surveyed Company	Mr. Dougherty Dougherty Pump & Drilling 2108 San Miguel Canyon Rd Salinas, CA 93907 408-663-3562
What is your cost estimate to drill a new well around the Castroville area?	• About \$200,000-\$250,000. • Costs include testing hole, electric log, gravel pack, development, and cement filling to Zone 6 standard. • Well depth: 1,000-1,500 ft.
What is the cost to drill in other areas?	• \$50,000-\$120,000. • Depth between 400ft-600 ft.
What is the cost of a typical irrigation pump?	• Between \$30,000 and \$40,000.
What is the cost to deep an existing well or lower the bowls?	• Deepening: \$20,000-\$40,000 per job. • Don't do lowering bowls.
Surveyed Company	Mr. Alsop Alsop Pump & Drilling 1508 Abbott St. Salinas, CA 93901 408-424-3946
What is your cost estimate to drill a new well around the Castroville area?	• Between \$200,000 and 250,000 per well. • Well Depth between 900 ft and 1,000 ft. • High costs are due to special requirements in casing.
What is the cost to drill in other areas?	• \$25,000-35,000 per well in the areas along the Salinas River, \$100,000-\$120,000 in other areas. • Depth between 400-500 ft.
What is the cost of a typical irrigation pump?	• Between \$15,000 and \$20,000.
What is the cost to deep an existing well or lower the bowls?	• No. Not cost effective.
Surveyed Company	Mr. Tom Eaton Eaton Drilling Co. 20 W Kentucky Ave, Woodland, CA 95695 916-662-6795
What is your cost estimate to drill a new well around the Castroville area?	• Between \$125,000 and \$250,000 per well. • Well Depth between 900 ft and 1,000 ft or above 1,000 ft. • Costs include testing hole, electric log, gravel pack, development, and cement filling to Zone 6 standard. • Cost will be higher for special well casing and cement seal.
What is the cost to drill in other areas?	• \$50,000 per well in the areas along the Salinas River, \$100,000 in other areas. • Well depth between 400-500 ft. For shallow wells in the Upper Valley area, cost would be much lower, between \$20,000-\$30,000.
What is the cost of a typical irrigation pump?	• Between \$20,000 and \$30,000.

Appendix Table C-3. Continued

What is the cost to deep an existing well or lower the bowls?	• Rarely on deepening since it can be more expensive than a new well. • Rarely on lowering bowls, but the cost should be around $3,000-$5,000 per job.
Surveyed Company	Mr. Arron Thorton Salinas Pump Company 772 Vertin Avenue, Salinas, CA 93901 408-422-4522
What is your cost estimate to drill a new well around the Castroville area?	• About $150,000-$200,000. • Well Depth: above 1,000 ft. • Costs include testing hole, electric log, gravel pack, development, and cement filling to Zone 6 standard. • Cost will be higher for special well casing and sealing.
What is the cost to drill in other areas?	• $100,000 - $120,000 in the areas along the Salinas River. • Well depth between 400-600 ft. An old, shallow well may only cost you $20,000-$30,000.
What is the cost of a typical irrigation pump?	• Between $20,000 and $40,000.
What is the cost to deep an existing well or lower the bowls?	• Rarely deepen wells, since it can be more expensive than a new well. • Rarely lower bowls, but the cost should be around $3,000-$5,000 per job..
Surveyed Company	Myers Bros 8650 E Lacey Blvd Hanford, CA 93230
What is your cost estimate to drill a new well around the Castroville area?	• About $150,000-$200,000. • Well Depth between 900 ft and above. • Costs include testing hole, electric log, gravel pack, development, and cement filling to Zone 6 standard. • Cost will be higher for special well casing.
What is the cost to drill in other areas?	• $120,000 in the areas along the Salinas River, and $150,000 in other areas. • Well depth between 400-600 ft.
What is the cost of a typical irrigation pump?	• Between $30,000 and $35,000.
What is the cost to deep an existing well or lower the bowls?	• Rarely deepen wells, since it can be more expensive than a new well. • Rarely lower bowls, but the cost should be around $4,000-$5,000 per job.
Surveyed Company	Ash & Sons 16339 Castroville Blvd Salinas, CA 93907
What is your cost estimate to drill a new well around the Castroville area?	• Between $200,000 and $250,000 per well. • Well Depth 1,000 ft or above. • Costs include testing hole, electric log, gravel pack, development, and cement filling to Zone 6 standard. • Cost will be higher for special well casing.
What is the cost to drill in other areas?	• $50,000 per well in the areas along the Salinas River, $100,000 in other areas. • Well depth between 400-500 ft.
What is the cost of a typical irrigation pump?	• Between $20,000 and $30,000.
What is the cost to deep an existing well or lower the bowls?	• Rarely deepen wells, since it can be more expensive than a new well. • Rarely lower bowls, but the cost should be around $3,000-$5,000 per job.

Table C-4

Building/Structure Categories, Replacement Costs, Contents Values, Value of Lost Services, and Net Income

Category	Description	Replacement Cost(1)	Contents Value(2)	Relocation Cost(3)	Value of Lost Services(4)	Net Income(5)
1	Residence, 1 story w/o basement	$45.00	30.00%	$1.00		
2	Residence, 1 story w basement	$45.00	30.00%	$1.00		
3	Residence, 2 story w/o basement	$45.00	30.00%	$1.00		
4	Residence, 2 story w basement	$45.00	30.00%	$1.00		
5	Residence, Split level	$45.00	30.00%	$1.00		
6	Residence, Split foyer	$45.00	30.00%	$1.00		
7	Residence, Mobile Home	$15.00	30.00%	$1.00		
8	Residence, Apartment w/garden level units	$20.00	30.00%	$1.00		
9	Residence, Apartment w/o basement	$45.00	30.00%	$1.00		
10	Residence, Apartment w basement	$45.00	30.00%	$1.00		
11	Public Research Facility	$45.00	100.00%	$1.50	$10.00	
12	Livestock Barn	$6.00	200.00%	$1.00		$0.00
13	Industrial, Light	$25.00	200.00%	$1.50		$0.25
14	Industrial, Heavy	$30.00	200.00%	$1.50		$0.83
15	Primary Sewage Treatment Plant	$46.00	0.00%	$0.00		$0.01
16	Secondary Sewage Treatment Plant	$46.00	0.00%	$0.00		$0.01
17	Well	$75,000.00	0.00%	$0.00		$276.07
18	Pump House	$85,000.00	0.00%	$0.00		$276.07
19	RV Campground	$50.00	200.00%	$1.00		$0.15
20	Storage	$15.00	200.00%	$1.00		$0.15
21	Roads (miles)	$100,000.00	0.00%	$0.00	$5,000.00	$0.00
22	Streets (miles)	$200,000.00	0.00%	$0.00	$15,000.00	$0.00
23	Power Station	$320,000.00	10.00%	$5,000.00	$8,533.33	$2,133.33
26	Farm Shop/Storage	$25.00	200%	$1.00		$0.12
27	Antique shop	$45.00	100.00%	$1.00		$0.12
28	Applicance shop	$25.00	100.00%	$1.00		$0.12
29	Auto dealer	$15.00	100.00%	$1.00		$0.12
30	Auto junkyard	$15.00	100.00%	$1.00		$0.12
31	Auto parks	$25.00	100.00%	$1.00		$0.83
32	Auto repair	$15.00	100.00%	$1.00		$0.60
33	Auto transmission service	$25.00	100.00%	$1.00		$0.60
34	Auto muffler service	$25.00	100.00%	$1.00		$0.60
35	Bakery	$35.00	100.00%	$1.00		$0.17
36	Bank	$45.00	100.00%	$1.00		$2.50
37	Barber shop	$35.00	100.00%	$1.00		$1.50
38	Beauty shop	$35.00	100.00%	$1.00		$1.50
39	Boat sales	$25.00	100.00%	$1.00		$0.12
40	Bowling Alley	$45.00	100.00%	$1.00		$3.13
41	Book store	$35.00	100.00%	$1.00		$0.12
42	Business (general)	$20.00	50.00%	$1.00		$0.12
43	Church	$25.00	50.00%	$1.00	$7.00	
44	City hall	$25.00	50.00%	$1.00	$10.00	
45	Cleaners	$35.00	100.00%	$1.00		$1.50
46	Clinic (medical)	$45.00	100.00%	$1.00		$20.83
47	Construction company	$25.00	50.00%	$1.00		$6.25
48	Country club	$45.00	50.00%	$1.00		$3.13
49	Clothing	$35.00	100.00%	$1.00		$0.12
50	Dentist Office	$45.00	100.00%	$1.00		$20.83
51	Department store	$35.00	100.00%	$1.00		$0.12
52	Doctors office	$45.00	100.00%	$1.00		$20.83
53	Drug store	$45.00	100.00%	$1.00		$0.12
54	Fire station	$25.00	30.00%	$1.00	$10.00	
55	Flooring & carpeting	$35.00	100.00%	$1.00		$0.12
56	Florist	$35.00	100.00%	$1.00		$0.12
57	Food processor	$35.00	100.00%	$1.00		
58	Funeral home	$45.00	100.00%	$1.00		$0.12
59	Furniture	$35.00	100.00%	$1.00		$0.12
60	Gas Company	$25.00	50.00%	$1.00		$0.12
61	Garage	$25.00	50.00%	$1.00		
62	Greenhouse	$35.00	100.00%	$1.00		$0.12
63	Grocery store	$35.00	100.00%	$1.00		$0.12
64	Grocery store (quick)	$35.00	100.00%	$1.00		$0.12
65	Gift shop	$35.00	100.00%	$1.00		$0.12
66	Golf course	$0.46	0.00%	$0.00		$0.01
67	Gun shop	$35.00	100.00%	$1.00		$0.12
68	Hall	$25.00	50.00%	$1.00		$0.12
69	Hardware	$35.00	100.00%	$1.00		$0.12
70	Hobby shop	$35.00	100.00%	$1.00		$0.12
71	Hotel	$40.00	50.00%	$1.00		$0.12
72	Jewelry	$35.00	100.00%	$1.00		$0.12
73	Laundry	$25.00	100.00%	$1.00		$0.12
74	Library	$35.00	100.00%	$1.00		$0.12
75	Liquor store	$35.00	100.00%	$1.00		$0.12
76	Lumber yard	$25.00	100.00%	$1.00		$0.12
77	Meat market	$35.00	100.00%	$1.00		$0.12
78	Motel	$40.00	50.00%	$1.00		$0.30
79	Music store	$35.00	100.00%	$1.00		$0.12
80	Newspapaer printing	$25.00	100.00%	$1.00		$0.12

Table C-4 (cont'd)

Building/Structure Categories, Replacement Costs, Contents Values, Value of Lost Services, and Net Income

Category	Description	Replacement Cost(1)	Contents Value(2)	Relocation Cost(3)	Value of Lost Services(4)	Net Income(5)
81	Nursing home	$45.00	100.00%	$1.00		$0.83
82	Nursery (plant)	$25.00	100.00%	$1.00		$0.12
83	Office building	$35.00	50.00%	$1.00		$0.12
84	Plumbing supply	$25.00	100.00%	$1.00		$0.12
85	Police station	$25.00	50.00%	$1.00	$10.00	
86	Post office	$25.00	50.00%	$1.00		$0.12
87	Private club	$45.00	50.00%	$1.00		$0.12
88	Real estate office	$35.00	50.00%	$1.00		$0.12
89	Radio station	$35.00	50.00%	$1.00		$0.12
90	Restaurant	$35.00	100.00%	$1.00		$0.12
91	Restaurant drive-in	$35.00	100.00%	$1.00		$0.12
92	School	$25.00	50.00%	$1.00	$10.00	
93	Tavern	$35.00	100.00%	$1.00		$0.12
94	Theater	$35.00	50.00%	$1.00		$0.12
95	Transport company	$25.00	50.00%	$1.00		$0.12
96	trailer sales	$35.00	100.00%	$1.00		$0.12
97	TV repair	$35.00	100.00%	$1.00		$0.12
98	Variety store	$35.00	100.00%	$1.00		$0.12
99	Warehouse	$25.00	100.00%	$1.00		$0.12
100	Welding supply	$35.00	100.00%	$1.00		$0.12
101	Telephone Repair Shop	$15.00	100.00%	$1.00		$0.60
102	Vegetable Packing Shed	$15.00	200.00%	$1.00		$0.60
201	Public Res, 1S w/o Bsmnt	$40.00	30.00%	$1.00	$0.50	
202	Public Res, 1S w Bsmnt	$40.00	30.00%	$1.00	$0.50	
203	Public Res, 2S w/o Bsmnt	$40.00	30.00%	$1.00	$0.50	
204	Public Res, 2S w Bsmnt	$40.00	30.00%	$1.00	$0.50	
205	Public Res, Split level	$40.00	30.00%	$1.00	$0.50	
206	Public Res, Split foyer	$40.00	30.00%	$1.00	$0.50	
207	Public Res, Mobile Home	$40.00	30.00%	$1.00	$0.50	
208	Public Res, Apt ground level	$40.00	30.00%	$1.00	$0.50	
209	Public Res, Apt w/o Bsmnt	$40.00	30.00%	$1.00	$0.50	
210	Public Res, Apt w Bsmnt	$40.00	30.00%	$1.00	$0.50	
211	Public Administration	$35.00	50.00%	$1.00	$0.50	
212	Public Assembly Hall	$30.00	25.00%	$1.00	$0.10	
213	Public Clinic	$55.00	100.00%	$1.00	$1.00	
214	Public Dining Hall	$65.00	50.00%	$1.00	$1.00	
215	Public Dorm	$40.00	30.00%	$1.00	$0.50	
216	Public Heli Pad	$5.00	10.00%	$1.00	$1.00	
217	Public Laundry	$25.00	50.00%	$1.00	$0.50	
218	Public Office Bldg	$35.00	50.00%	$1.00	$0.50	
219	Public Repair Facility	$25.00	50.00%	$1.00	$0.50	
220	Public Retail Store	$55.00	100.00%	$1.00	$1.00	
221	Public Sewage Lagoon	$250,000.00	0.00%	$0.00	$10,000.00	
222	Public Sewage Pumping Plant	$350,000.00	0.00%	$0.00	$10,000.00	
223	Public Shooting Range	$5.00	30.00%	$1.00	$1.00	
224	Public Storage	$25.00	100.00%	$1.00	$1.00	
225	Public Warehouse	$25.00	100.00%	$1.00	$1.00	
226	Public Well House	$75,000.00	0.00%	$0.00	$276.07	
227	Public Recycle Bldg	$15.00	100.00%	$1.00	$0.50	
228	Public Recycle Lot	$1.00	1000.00%	$1.00	$0.50	
901	Non-ag Infrastructure	$4,003,000.00		$10,961,670.00		
902	Ag Infrastructure	$100,000.00				
903	Agriculture	$383,738.00				
904	Gravel Pit	$500,000.00		$50,000.00		$50,000.00

Table C-5

Building/Structure Structural Damage Function (percent of structural replacement cost)

Category	Flood Depth (ft)																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1	0%	5%	10%	21%	28%	33%	38%	43%	50%	56%	63%	66%	69%	73%	77%	81%	85%	88%	92%	96%	100%
2	5%	11%	16%	26%	32%	36%	40%	45%	51%	56%	62%	65%	68%	72%	76%	80%	84%	88%	92%	96%	100%
3	0%	4%	7%	14%	21%	27%	31%	36%	40%	44%	48%	53%	57%	62%	68%	73%	79%	84%	89%	95%	100%
4	3%	9%	14%	20%	25%	29%	31%	34%	38%	41%	45%	50%	55%	61%	66%	72%	78%	83%	89%	94%	100%
5	3%	9%	15%	19%	22%	27%	32%	38%	43%	48%	53%	55%	57%	62%	68%	73%	79%	84%	89%	95%	100%
6	16%	26%	36%	40%	45%	49%	53%	58%	63%	67%	72%	74%	76%	79%	82%	85%	88%	91%	94%	97%	100%
7	5%	8%	10%	20%	31%	44%	60%	74%	81%	87%	94%	95%	96%	97%	97%	98%	98%	99%	99%	100%	100%
8	0%	10%	20%	31%	34%	36%	39%	41%	45%	49%	53%	56%	58%	63%	69%	74%	79%	84%	90%	95%	100%
9	0%	6%	12%	19%	25%	28%	30%	32%	34%	37%	39%	43%	46%	53%	60%	66%	73%	80%	87%	93%	100%
10	0%	5%	10%	14%	17%	19%	21%	22%	24%	27%	29%	32%	35%	43%	51%	59%	68%	76%	84%	92%	100%
11	0%	0%	0%	1%	2%	3%	5%	8%	11%	13%	16%	19%	21%	31%	41%	51%	61%	70%	80%	90%	100%
12	0%	0%	0%	1%	1%	1%	1%	1%	2%	4%	5%	6%	7%	19%	30%	42%	54%	65%	77%	88%	100%
13	0%	0%	0%	1%	1%	1%	1%	1%	2%	4%	5%	6%	7%	19%	30%	42%	54%	65%	77%	88%	100%
14	0%	0%	0%	1%	1%	1%	1%	1%	2%	4%	5%	6%	7%	19%	30%	42%	54%	65%	77%	88%	100%
15	0%	0%	0%	1%	4%	6%	8%	9%	12%	14%	17%	22%	26%	35%	45%	54%	63%	72%	82%	91%	100%
16	0%	0%	0%	1%	4%	6%	8%	9%	12%	14%	17%	22%	26%	35%	45%	54%	63%	72%	82%	91%	100%
17	0%	0%	0%	10%	20%	30%	40%	50%	50%	50%	50%	50%	50%	56%	63%	69%	75%	81%	88%	94%	100%
18	0%	0%	0%	10%	20%	30%	40%	50%	50%	50%	50%	50%	50%	56%	63%	69%	75%	81%	88%	94%	100%
19	0%	0%	0%	1%	2%	2%	2%	3%	5%	7%	9%	12%	15%	26%	36%	47%	58%	68%	79%	89%	100%
20	0%	0%	0%	1%	2%	2%	2%	3%	5%	7%	9%	12%	15%	26%	36%	47%	58%	68%	79%	89%	100%
21	0%	0%	0%	1%	1%	1%	1%	1%	2%	4%	5%	6%	7%	12%	18%	23%	29%	34%	39%	45%	50%
22	0%	0%	0%	1%	1%	1%	1%	1%	2%	4%	5%	6%	7%	12%	18%	23%	29%	34%	39%	45%	50%
23	0%	0%	0%	17%	17%	18%	19%	21%	23%	26%	28%	32%	35%	43%	51%	59%	68%	76%	84%	92%	100%
26	0%	0%	0%	17%	17%	18%	19%	21%	23%	26%	28%	32%	35%	43%	51%	59%	68%	76%	84%	92%	100%
27	0%	0%	0%	17%	17%	18%	19%	21%	23%	26%	28%	32%	35%	43%	51%	59%	68%	76%	84%	92%	100%
28	0%	0%	0%	17%	17%	18%	19%	21%	23%	26%	28%	32%	35%	43%	51%	59%	68%	76%	84%	92%	100%
29	0%	0%	0%	17%	17%	18%	19%	21%	23%	26%	28%	32%	35%	43%	51%	59%	68%	76%	84%	92%	100%
30	0%	0%	0%	2%	4%	5%	7%	8%	10%	11%	13%	14%	15%	26%	36%	47%	58%	68%	79%	89%	100%
31	0%	0%	0%	5%	5%	5%	5%	7%	11%	15%	19%	26%	32%	41%	49%	58%	66%	75%	83%	92%	100%
32	0%	0%	0%	3%	3%	3%	4%	5%	9%	13%	17%	24%	31%	40%	48%	57%	66%	74%	83%	91%	100%
33	0%	0%	0%	3%	3%	3%	4%	5%	9%	13%	17%	24%	31%	40%	48%	57%	66%	74%	83%	91%	100%
34	0%	0%	0%	3%	3%	3%	4%	5%	9%	13%	17%	24%	31%	40%	48%	57%	66%	74%	83%	91%	100%
35	0%	6%	12%	17%	21%	25%	28%	31%	33%	36%	38%	41%	43%	50%	57%	64%	72%	79%	86%	93%	100%
36	0%	0%	0%	11%	11%	12%	13%	15%	17%	20%	22%	25%	28%	37%	46%	55%	64%	73%	82%	91%	100%
37	0%	0%	0%	13%	17%	18%	24%	31%	36%	40%	45%	47%	49%	55%	62%	68%	75%	81%	87%	94%	100%
38	0%	0%	0%	10%	14%	17%	23%	28%	33%	38%	43%	47%	50%	56%	63%	69%	75%	81%	88%	94%	100%
39	0%	7%	14%	20%	32%	33%	34%	36%	41%	45%	50%	55%	60%	65%	70%	75%	80%	85%	90%	95%	100%
40	0%	0%	0%	4%	7%	11%	15%	19%	23%	27%	31%	35%	39%	47%	54%	62%	70%	77%	85%	92%	100%
41	0%	0%	0%	2%	3%	5%	8%	10%	12%	15%	17%	20%	23%	33%	42%	52%	62%	71%	81%	90%	100%
42	0%	0%	0%	1%	2%	3%	5%	8%	11%	13%	16%	19%	21%	31%	41%	51%	61%	70%	80%	90%	100%
43	0%	0%	0%	10%	11%	11%	12%	12%	13%	13%	14%	16%	17%	27%	38%	48%	59%	69%	79%	90%	100%
44	0%	0%	0%	1%	1%	1%	2%	2%	3%	5%	6%	9%	12%	23%	34%	45%	56%	67%	78%	89%	100%
45	0%	0%	0%	4%	6%	6%	8%	10%	14%	18%	22%	28%	34%	42%	51%	59%	67%	75%	84%	92%	100%
46	0%	0%	0%	1%	2%	2%	2%	4%	6%	9%	11%	14%	17%	27%	38%	48%	59%	69%	79%	90%	100%
47	0%	0%	0%	13%	14%	15%	17%	19%	21%	23%	25%	25%	25%	34%	44%	53%	63%	72%	81%	91%	100%
48	0%	0%	0%	7%	8%	8%	9%	10%	11%	12%	13%	14%	15%	26%	36%	47%	58%	68%	79%	89%	100%
49	0%	0%	0%	8%	10%	11%	13%	15%	18%	21%	24%	28%	32%	41%	49%	58%	66%	75%	83%	92%	100%
50	0%	4%	7%	35%	35%	35%	35%	35%	36%	36%	37%	38%	39%	47%	54%	62%	70%	77%	85%	92%	100%
51	0%	0%	0%	3%	7%	7%	7%	9%	12%	14%	17%	20%	23%	33%	42%	52%	62%	71%	81%	90%	100%
52	0%	0%	0%	1%	3%	4%	6%	9%	12%	14%	17%	21%	24%	34%	43%	53%	62%	72%	81%	91%	100%
53	0%	0%	0%	1%	5%	5%	5%	7%	9%	12%	14%	18%	22%	32%	42%	51%	61%	71%	81%	90%	100%
54	0%	0%	0%	1%	5%	5%	5%	6%	8%	9%	11%	14%	17%	27%	38%	48%	59%	69%	79%	90%	100%
55	0%	0%	0%	70%	90%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
56	0%	0%	0%	7%	7%	8%	9%	11%	14%	16%	19%	23%	26%	35%	45%	54%	63%	72%	82%	91%	100%
57	0%	0%	0%	6%	6%	6%	6%	10%	13%	17%	20%	20%	20%	30%	40%	50%	60%	70%	80%	90%	100%
58	0%	0%	0%	1%	5%	5%	5%	6%	8%	9%	11%	14%	17%	27%	38%	48%	59%	69%	79%	90%	100%
59	0%	0%	0%	2%	4%	4%	5%	6%	8%	9%	11%	14%	17%	27%	38%	48%	59%	69%	79%	90%	100%
60	0%	9%	17%	17%	17%	17%	23%	32%	42%	51%	61%	65%	69%	73%	77%	81%	85%	88%	92%	96%	100%
61	0%	0%	0%	3%	5%	6%	7%	8%	11%	14%	17%	21%	25%	34%	44%	53%	63%	72%	81%	91%	100%
62	0%	0%	0%	5%	11%	16%	21%	26%	31%	37%	42%	47%	52%	58%	64%	70%	76%	82%	88%	94%	100%
63	0%	0%	0%	3%	4%	5%	6%	7%	11%	16%	20%	29%	37%	45%	53%	61%	69%	76%	84%	92%	100%
64	0%	0%	0%	3%	4%	5%	6%	7%	11%	16%	20%	29%	37%	45%	53%	61%	69%	76%	84%	92%	100%
65	0%	0%	0%	5%	8%	9%	9%	9%	12%	15%	18%	25%	31%	40%	48%	57%	66%	74%	83%	91%	100%
66	0%	0%	0%	1%	4%	6%	8%	9%	12%	14%	17%	22%	26%	35%	45%	54%	63%	72%	82%	91%	100%
67	0%	0%	0%	10%	10%	10%	11%	12%	13%	15%	16%	18%	20%	30%	40%	50%	60%	70%	80%	90%	100%
68	0%	0%	0%	1%	5%	5%	5%	5%	6%	8%	9%	12%	14%	25%	36%	46%	57%	68%	79%	89%	100%
69	0%	0%	0%	12%	12%	12%	12%	12%	13%	14%	15%	18%	21%	31%	41%	51%	61%	70%	80%	90%	100%
70	0%	0%	0%	18%	20%	20%	20%	20%	22%	25%	27%	33%	39%	47%	54%	62%	70%	77%	85%	92%	100%
71	0%	0%	0%	1%	2%	2%	2%	3%	5%	7%	9%	12%	15%	26%	36%	47%	58%	68%	79%	89%	100%
72	0%	0%	0%	1%	2%	2%	2%	3%	5%	6%	8%	10%	12%	23%	34%	45%	56%	67%	78%	89%	100%
73	0%	0%	0%	2%	5%	8%	12%	15%	18%	20%	23%	26%	28%	37%	46%	55%	64%	73%	82%	91%	100%
74	0%	0%	0%	1%	2%	2%	2%	3%	5%	6%	8%	10%	12%	23%	34%	45%	56%	67%	78%	89%	100%
75	0%	0%	0%	1%	1%	2%	2%	3%	5%	6%	8%	12%	16%	27%	37%	48%	58%	69%	79%	90%	100%
76	0%	0%	0%	1%	1%	1%	1%	1%	2%	4%	5%	6%	7%	19%	30%	42%	54%	65%	77%	88%	100%
77	0%	0%	0%	10%	10%	10%	11%	12%	16%	19%	23%	26%	28%	37%	46%	55%	64%	73%	82%	91%	100%
78	0%	0%	0%	4%	7%	10%	12%	15%	19%	22%	26%	32%	37%	45%	53%	61%	69%	76%	84%	92%	100%
79	0%	3%	5%	10%	13%	14%	15%	15%	16%	17%	18%	23%	27%	36%	45%	54%	64%	73%	82%	91%	100%
80	0%	0%	0%	2%	3%	4%	5%	6%	7%	7%	8%	10%	11%	22%	33%	44%	56%	67%	78%	89%	100%

Table C-5 (cont'd)

Building/Structure Structural Damage Function (percent of structural replacement cost)

Category	Flood Depth (ft)																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
81	0%	0%	0%	7%	10%	14%	15%	15%	17%	18%	20%	23%	26%	35%	45%	54%	63%	72%	82%	91%	100%
82	0%	1%	2%	2%	3%	6%	10%	15%	21%	26%	32%	37%	41%	48%	56%	63%	71%	78%	85%	93%	100%
83	0%	0%	0%	12%	14%	17%	19%	23%	27%	31%	35%	40%	45%	52%	59%	66%	73%	79%	86%	93%	100%
84	0%	0%	0%	20%	32%	40%	47%	53%	57%	60%	64%	67%	70%	74%	78%	81%	85%	89%	93%	96%	100%
85	0%	0%	0%	12%	14%	17%	19%	23%	27%	31%	35%	40%	45%	52%	59%	66%	73%	79%	86%	93%	100%
86	0%	0%	0%	8%	15%	24%	25%	26%	28%	30%	32%	36%	40%	48%	55%	63%	70%	78%	85%	93%	100%
87	0%	0%	0%	5%	8%	8%	9%	9%	10%	11%	12%	15%	17%	27%	38%	48%	59%	69%	79%	90%	100%
88	0%	0%	0%	8%	15%	24%	25%	26%	28%	30%	32%	36%	40%	48%	55%	63%	70%	78%	85%	93%	100%
89	0%	0%	0%	8%	15%	24%	25%	26%	28%	30%	32%	36%	40%	48%	55%	63%	70%	78%	85%	93%	100%
90	4%	5%	6%	9%	12%	13%	15%	18%	20%	22%	24%	27%	30%	39%	48%	56%	65%	74%	83%	91%	100%
91	0%	0%	0%	2%	4%	7%	10%	14%	19%	23%	28%	34%	39%	47%	54%	62%	70%	77%	85%	92%	100%
92	0%	0%	0%	8%	12%	15%	15%	16%	18%	20%	22%	25%	28%	37%	46%	55%	64%	73%	82%	91%	100%
93	0%	0%	0%	15%	18%	20%	22%	24%	27%	31%	34%	38%	42%	49%	57%	64%	71%	78%	86%	93%	100%
94	0%	0%	0%	2%	3%	4%	4%	4%	6%	8%	10%	13%	16%	27%	37%	48%	58%	69%	79%	90%	100%
95	0%	0%	0%	0%	0%	9%	11%	12%	18%	24%	30%	30%	30%	39%	48%	56%	65%	74%	83%	91%	100%
96	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
97	0%	0%	0%	2%	6%	12%	15%	20%	27%	34%	41%	49%	57%	62%	68%	73%	79%	84%	89%	95%	100%
98	0%	0%	0%	8%	9%	10%	12%	15%	16%	17%	18%	19%	20%	30%	40%	50%	60%	70%	80%	90%	100%
99	0%	0%	0%	1%	1%	1%	1%	3%	6%	9%	12%	17%	21%	31%	41%	51%	61%	70%	80%	90%	100%
100	0%	0%	0%	7%	13%	18%	22%	25%	27%	30%	32%	35%	37%	45%	53%	61%	69%	76%	84%	92%	100%
101	0%	0%	0%	3%	3%	3%	4%	5%	9%	13%	17%	24%	31%	40%	48%	57%	66%	74%	83%	91%	100%
102	0%	0%	0%	3%	3%	3%	4%	5%	9%	13%	17%	24%	31%	40%	48%	57%	66%	74%	83%	91%	100%
201	0%	5%	10%	21%	28%	33%	38%	43%	50%	56%	63%	66%	69%	73%	77%	81%	85%	88%	92%	96%	100%
202	5%	11%	16%	26%	32%	36%	40%	45%	51%	56%	62%	65%	68%	72%	76%	80%	84%	88%	92%	96%	100%
203	0%	4%	7%	14%	21%	27%	31%	36%	40%	44%	48%	53%	57%	62%	68%	73%	79%	84%	89%	95%	100%
204	3%	9%	14%	20%	25%	29%	31%	34%	38%	41%	45%	50%	55%	61%	66%	72%	78%	83%	89%	94%	100%
205	3%	9%	15%	19%	22%	27%	32%	38%	43%	48%	53%	55%	57%	62%	68%	73%	79%	84%	89%	95%	100%
206	16%	26%	36%	40%	45%	49%	53%	58%	63%	67%	72%	74%	76%	79%	82%	85%	88%	91%	94%	97%	100%
207	5%	8%	10%	20%	31%	44%	60%	74%	81%	87%	94%	95%	96%	97%	97%	98%	98%	99%	99%	100%	100%
208	0%	10%	20%	31%	34%	36%	39%	41%	45%	49%	53%	56%	58%	63%	69%	74%	79%	84%	90%	95%	100%
209	0%	6%	12%	19%	25%	28%	30%	32%	34%	37%	39%	43%	46%	53%	60%	66%	73%	80%	87%	93%	100%
210	0%	5%	10%	14%	17%	19%	21%	22%	24%	27%	29%	32%	35%	43%	51%	59%	68%	76%	84%	92%	100%
211	0%	0%	0%	12%	14%	17%	19%	23%	27%	31%	35%	40%	45%	52%	59%	66%	73%	79%	86%	93%	100%
212	0%	0%	0%	10%	11%	11%	12%	12%	13%	13%	14%	16%	17%	27%	38%	48%	59%	69%	79%	90%	100%
213	0%	0%	0%	1%	2%	2%	2%	4%	6%	9%	11%	14%	17%	27%	38%	48%	59%	69%	79%	90%	100%
214	4%	5%	6%	9%	12%	13%	15%	18%	20%	22%	24%	27%	30%	39%	48%	56%	65%	74%	83%	91%	100%
215	0%	0%	0%	4%	7%	10%	12%	15%	19%	22%	26%	32%	37%	45%	53%	61%	69%	76%	84%	92%	100%
216	0%	0%	0%	4%	7%	10%	12%	15%	19%	22%	26%	26%	26%	26%	26%	26%	26%	26%	26%	26%	26%
217	0%	0%	0%	2%	5%	8%	12%	15%	18%	20%	23%	26%	28%	37%	46%	55%	64%	73%	82%	91%	100%
218	0%	0%	0%	12%	14%	17%	19%	23%	27%	31%	35%	40%	45%	52%	59%	66%	73%	79%	86%	93%	100%
219	0%	0%	0%	3%	3%	3%	4%	5%	9%	13%	17%	24%	31%	40%	48%	57%	66%	74%	83%	91%	100%
220	0%	0%	0%	1%	4%	6%	8%	9%	12%	14%	17%	22%	26%	35%	45%	54%	63%	72%	82%	91%	100%
221	0%	0%	0%	1%	4%	6%	8%	9%	12%	14%	17%	22%	26%	35%	45%	54%	63%	72%	82%	91%	100%
222	0%	0%	0%	1%	4%	6%	8%	9%	12%	14%	17%	22%	26%	35%	45%	54%	63%	72%	82%	91%	100%
223	0%	0%	0%	4%	7%	10%	12%	15%	19%	22%	26%	26%	26%	26%	26%	26%	26%	26%	26%	26%	26%
224	0%	0%	0%	1%	2%	2%	2%	3%	5%	7%	9%	12%	15%	26%	36%	47%	58%	68%	79%	89%	100%
225	0%	0%	0%	1%	1%	1%	1%	3%	6%	9%	12%	17%	21%	31%	41%	51%	61%	70%	80%	90%	100%
226	0%	0%	0%	10%	20%	30%	40%	50%	50%	50%	50%	50%	50%	56%	63%	69%	75%	81%	88%	94%	100%
227	0%	0%	0%	3%	3%	3%	4%	5%	9%	13%	17%	24%	31%	40%	48%	57%	66%	74%	83%	91%	100%
228	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
901	0%	0%	0%	0%	0%	25%	50%	75%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
902	0%	0%	0%	0%	0%	53%	73%	94%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
903	0%	0%	0%	0%	0%	53%	73%	94%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
904	0%	0%	0%	0%	0%	53%	73%	94%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Table C-6

Building/Structure Contents Damage Function (percent of structural replacement cost)

	Flood Depth (ft)										
Category	1	2	3	4	5	6	7	8	9	10	11
1	0%	0%	0%	44%	75%	85%	86%	89%	90%	91%	92%
2	9%	10%	10%	46%	74%	82%	86%	88%	89%	90%	91%
3	0%	0%	0%	36%	47%	53%	57%	60%	62%	64%	68%
4	7%	8%	9%	36%	49%	53%	56%	58%	61%	63%	66%
5	13%	19%	24%	35%	44%	50%	56%	71%	76%	81%	86%
6	25%	32%	38%	64%	82%	87%	92%	94%	94%	95%	95%
7	0%	0%	0%	51%	76%	85%	89%	92%	93%	94%	95%
8	25%	32%	38%	64%	82%	89%	92%	94%	96%	98%	100%
9	0%	0%	0%	44%	75%	85%	88%	89%	93%	96%	100%
10	9%	10%	10%	46%	74%	82%	86%	88%	80%	73%	65%
11	0%	0%	0%	35%	75%	85%	95%	100%	100%	100%	100%
12	0%	25%	50%	100%	100%	100%	100%	100%	100%	100%	100%
13	0%	25%	50%	80%	95%	100%	100%	100%	100%	100%	100%
14	0%	25%	50%	80%	95%	100%	100%	100%	100%	100%	100%
15	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
16	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
17	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
18	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
19	0%	4%	8%	11%	22%	28%	33%	37%	40%	43%	46%
20	0%	4%	8%	11%	22%	28%	33%	37%	40%	43%	46%
21	0%	4%	8%	11%	22%	28%	33%	37%	40%	43%	46%
22	0%	4%	8%	11%	22%	28%	33%	37%	40%	43%	46%
23	0%	10%	20%	75%	78%	85%	90%	95%	97%	98%	100%
26	0%	10%	20%	75%	78%	85%	90%	95%	97%	98%	100%
27	0%	10%	20%	75%	78%	85%	90%	95%	97%	98%	100%
28	0%	0%	0%	83%	91%	94%	95%	97%	98%	99%	100%
29	0%	10%	20%	50%	90%	95%	98%	100%	100%	100%	100%
30	0%	0%	0%	9%	13%	16%	17%	18%	18%	19%	19%
31	0%	0%	0%	18%	30%	59%	70%	90%	93%	97%	100%
32	0%	25%	50%	80%	95%	100%	100%	100%	100%	100%	100%
33	0%	20%	40%	60%	85%	100%	100%	100%	100%	100%	100%
34	0%	0%	0%	10%	20%	40%	60%	100%	100%	100%	100%
35	0%	28%	55%	65%	90%	100%	100%	100%	100%	100%	100%
36	0%	0%	0%	50%	87%	95%	100%	100%	100%	100%	100%
37	0%	0%	0%	15%	50%	75%	88%	100%	100%	100%	100%
38	0%	0%	0%	18%	31%	50%	100%	100%	100%	100%	100%
39	0%	7%	13%	24%	43%	82%	95%	100%	100%	100%	100%
40	0%	0%	0%	17%	22%	25%	27%	27%	29%	30%	32%
41	0%	0%	0%	7%	14%	21%	27%	35%	42%	50%	57%
42	0%	0%	0%	2%	6%	10%	15%	19%	24%	28%	33%
43	0%	0%	0%	35%	75%	85%	95%	100%	100%	100%	100%
44	0%	0%	0%	35%	75%	85%	95%	100%	100%	100%	100%
45	0%	0%	0%	10%	30%	50%	75%	95%	97%	98%	100%
46	0%	0%	0%	6%	30%	30%	30%	31%	33%	36%	38%
47	0%	0%	0%	50%	75%	100%	100%	100%	100%	100%	100%
48	0%	0%	0%	12%	19%	27%	34%	42%	49%	55%	62%
49	0%	3%	6%	37%	50%	75%	88%	100%	100%	100%	100%
50	0%	0%	0%	21%	40%	55%	70%	85%	90%	95%	100%
51	0%	0%	0%	18%	33%	65%	88%	95%	97%	98%	100%
52	0%	0%	0%	7%	12%	15%	16%	18%	23%	29%	34%
53	0%	25%	50%	100%	100%	100%	100%	100%	100%	100%	100%
54	0%	0%	0%	10%	25%	50%	75%	91%	94%	97%	100%
55	0%	0%	0%	25%	42%	54%	65%	78%	85%	93%	100%
56	0%	0%	0%	50%	85%	100%	100%	100%	100%	100%	100%
57	0%	25%	50%	100%	100%	100%	100%	100%	100%	100%	100%
58	0%	0%	0%	10%	30%	60%	90%	100%	100%	100%	100%
59	0%	10%	20%	78%	100%	100%	100%	100%	100%	100%	100%
60	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
61	0%	0%	0%	11%	17%	20%	23%	25%	31%	36%	42%
62	0%	0%	0%	66%	88%	100%	100%	100%	100%	100%	100%
63	0%	25%	50%	100%	100%	100%	100%	100%	100%	100%	100%
64	0%	25%	50%	100%	100%	100%	100%	100%	100%	100%	100%
65	0%	0%	0%	54%	63%	75%	88%	100%	100%	100%	100%
66	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
67	0%	0%	0%	22%	39%	58%	88%	100%	100%	100%	100%
68	0%	0%	0%	5%	8%	10%	12%	14%	20%	26%	32%
69	0%	4%	8%	33%	52%	70%	75%	88%	92%	96%	100%
70	0%	4%	8%	25%	49%	64%	77%	88%	92%	96%	100%
71	0%	4%	8%	11%	22%	28%	33%	37%	40%	43%	46%
72	0%	0%	0%	7%	15%	24%	33%	39%	45%	50%	56%
73	0%	0%	0%	5%	10%	13%	16%	19%	24%	28%	33%
74	0%	0%	0%	35%	50%	75%	95%	100%	100%	100%	100%
75	0%	25%	50%	100%	100%	100%	100%	100%	100%	100%	100%
76	0%	0%	0%	20%	30%	45%	60%	75%	83%	92%	100%
77	0%	25%	50%	100%	100%	100%	100%	100%	100%	100%	100%
78		0%	0%	10%	16%	21%	25%	30%	37%	45%	52%
79	0%	0%	0%	66%	72%	75%	80%	88%	92%	96%	100%
80	0%	0%	0%	5%	8%	11%	13%	16%	21%	26%	31%

	Flood Depth (ft)									
Category	12	13	14	15	16	17	18	19	20	21
1	92%	92%	93%	94%	95%	96%	97%	98%	99%	100%
2	92%	92%	93%	94%	95%	96%	97%	98%	99%	100%
3	72%	78%	81%	84%	86%	89%	92%	95%	97%	100%
4	72%	78%	81%	84%	86%	89%	92%	95%	97%	100%
5	87%	88%	90%	91%	93%	94%	96%	97%	99%	100%
6	95%	95%	96%	96%	97%	98%	98%	99%	99%	100%
7	96%	96%	97%	97%	98%	98%	99%	99%	100%	100%
8	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
9	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
10	71%	77%	80%	83%	86%	89%	91%	94%	97%	100%
11	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
12	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
13	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
14	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
15	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
16	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
17	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
18	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
19	50%	54%	60%	66%	71%	77%	83%	89%	94%	100%
20	50%	54%	60%	66%	71%	77%	83%	89%	94%	100%
21	50%	54%	60%	66%	71%	77%	83%	89%	94%	100%
22	50%	54%	60%	66%	71%	77%	83%	89%	94%	100%
23	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
26	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
27	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
28	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
29	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
30	19%	19%	29%	39%	49%	60%	70%	80%	90%	100%
31	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
32	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
33	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
34	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
35	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
36	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
37	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
38	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
39	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
40	36%	39%	47%	54%	62%	70%	77%	85%	92%	100%
41	65%	73%	76%	80%	83%	87%	90%	93%	97%	100%
42	39%	44%	51%	58%	65%	72%	79%	86%	93%	100%
43	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
44	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
45	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
46	43%	47%	54%	60%	67%	74%	80%	87%	93%	100%
47	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
48	68%	73%	76%	80%	83%	87%	90%	93%	97%	100%
49	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
50	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
51	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
52	46%	57%	62%	68%	73%	79%	84%	89%	95%	100%
53	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
54	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
55	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
56	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
57	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
58	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
59	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
60	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
61	53%	63%	68%	72%	77%	82%	86%	91%	95%	100%
62	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
63	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
64	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
65	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
66	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
67	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
68	46%	60%	65%	70%	75%	80%	85%	90%	95%	100%
69	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
70	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
71	50%	54%	60%	66%	71%	77%	83%	89%	94%	100%
72	56%	56%	62%	67%	73%	78%	84%	89%	95%	100%
73	40%	47%	54%	60%	67%	74%	80%	87%	93%	100%
74	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
75	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
76	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
77	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
78	64%	76%	79%	82%	85%	88%	91%	94%	97%	100%
79	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
80	40%	48%	55%	61%	68%	74%	81%	87%	94%	100%

Table C-6 (cont'd)

Building/Structure Contents Damage Function (percent of structural replacement cost)

81	0%	4%	8%	35%	49%	53%	56%	56%	59%	62%	65%	71%	77%	80%	83%	86%	89%	91%	94%	97%	100%
82	0%	0%	0%	5%	20%	79%	88%	95%	97%	98%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
83	0%	0%	0%	16%	21%	24%	25%	26%	29%	33%	36%	43%	50%	56%	63%	69%	75%	81%	88%	94%	100%
84	0%	0%	0%	14%	25%	35%	44%	53%	61%	69%	77%	85%	93%	94%	95%	96%	97%	97%	98%	99%	100%
85	0%	0%	0%	5%	15%	25%	35%	48%	64%	79%	95%	98%	100%	100%	100%	100%	100%	100%	100%	100%	100%
86	0%	0%	0%	25%	43%	63%	70%	80%	87%	93%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
87	0%	0%	0%	10%	21%	28%	35%	41%	61%	80%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
88	0%	13%	25%	43%	63%	70%	80%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
89	0%	0%	0%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
90	8%	13%	17%	24%	33%	52%	70%	75%	80%	85%	90%	95%	100%	100%	100%	100%	100%	100%	100%	100%	100%
91	0%	25%	50%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
92	0%	0%	0%	18%	26%	30%	33%	35%	40%	45%	50%	58%	66%	70%	75%	79%	83%	87%	92%	96%	100%
93	0%	25%	50%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
94	0%	0%	0%	3%	4%	5%	6%	6%	8%	10%	12%	17%	22%	32%	42%	51%	61%	71%	81%	90%	100%
95	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
96	0%	0%	0%	18%	37%	60%	80%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
97	0%	0%	0%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
98	0%	5%	10%	20%	40%	70%	85%	90%	93%	97%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
99	0%	0%	0%	11%	16%	19%	21%	23%	31%	39%	47%	74%	100%	100%	100%	100%	100%	100%	100%	100%	100%
100	0%	0%	0%	15%	35%	45%	49%	56%	71%	85%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
101	0%	25%	50%	80%	95%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
102	0%	10%	20%	75%	78%	85%	90%	95%	97%	98%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
201	0%	0%	0%	44%	75%	85%	86%	89%	90%	91%	92%	92%	92%	93%	94%	95%	96%	97%	98%	99%	100%
202	9%	10%	10%	46%	74%	82%	86%	88%	89%	90%	91%	92%	92%	93%	94%	95%	96%	97%	98%	99%	100%
203	0%	0%	0%	36%	47%	53%	57%	60%	62%	64%	66%	72%	78%	81%	84%	86%	89%	92%	95%	97%	100%
204	7%	8%	9%	36%	49%	53%	56%	58%	61%	63%	66%	72%	78%	81%	84%	86%	89%	92%	95%	97%	100%
205	13%	19%	24%	35%	44%	50%	56%	71%	76%	81%	86%	87%	88%	90%	91%	93%	94%	96%	97%	99%	100%
206	25%	32%	38%	64%	82%	87%	92%	94%	94%	95%	95%	95%	95%	96%	96%	97%	98%	98%	99%	99%	100%
207	0%	0%	0%	51%	76%	85%	89%	92%	93%	94%	95%	96%	96%	97%	97%	98%	98%	99%	99%	100%	100%
208	25%	32%	38%	64%	82%	89%	92%	94%	96%	98%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
209	0%	0%	0%	44%	75%	85%	88%	89%	93%	96%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
210	9%	10%	10%	46%	74%	82%	86%	88%	80%	73%	65%	71%	77%	80%	83%	86%	89%	91%	94%	97%	100%
211	0%	0%	0%	35%	75%	85%	95%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
212	0%	0%	0%	35%	75%	85%	95%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
213	0%	0%	0%	6%	30%	30%	30%	31%	33%	36%	38%	43%	47%	54%	60%	67%	74%	80%	87%	93%	100%
214	8%	13%	17%	24%	33%	52%	70%	75%	80%	85%	90%	95%	100%	100%	100%	100%	100%	100%	100%	100%	100%
215	0%	0%	0%	10%	16%	21%	25%	30%	37%	45%	52%	64%	76%	79%	82%	85%	88%	91%	94%	97%	100%
216	0%	0%	0%	10%	16%	21%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%
217	0%	0%	0%	5%	10%	13%	16%	19%	24%	28%	33%	40%	47%	54%	60%	67%	74%	80%	87%	93%	100%
218	0%	0%	0%	16%	21%	24%	25%	26%	29%	33%	36%	43%	50%	56%	63%	69%	75%	81%	88%	94%	100%
219	0%	25%	50%	80%	95%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
220	0%	25%	50%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
221	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
222	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
223	0%	0%	0%	10%	16%	21%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%
224	0%	4%	8%	11%	22%	28%	33%	37%	40%	43%	46%	50%	54%	60%	66%	71%	77%	83%	89%	94%	100%
225	0%	0%	0%	11%	16%	19%	21%	23%	31%	39%	47%	74%	100%	100%	100%	100%	100%	100%	100%	100%	100%
226	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
227	0%	4%	8%	11%	22%	28%	33%	37%	40%	43%	46%	50%	54%	60%	66%	71%	77%	83%	89%	94%	100%
228	0%	0%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%
901	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
902	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
903	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
904	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

TABLE C-7

Flood Elevations for Selected Locations, Salinas River

River Mile	Without Project Elevation				With Project Elevation				100-Year Flood Effectiveness
	10-year	50-year	100-year	500-year	10-year	50-year	100-year	500-year	
1	9.8	12.6	14.0	16.8	7.0	9.0	10.0	12.0	4.0
2	13.3	16.3	20.0	24.9	9.0	11.0	13.5	16.8	6.5
3	16.4	19.7	21.0	26.0	12.5	15.0	16.0	19.8	5.0
4	20.0	22.8	24.0	25.3	17.0	19.4	20.4	21.5	3.6
5	22.8	25.9	27.0	28.9	20.3	23.0	24.0	25.7	3.0
6	25.4	28.6	30.0	32.1	21.4	24.1	25.3	27.1	4.7
8	27.6	32.6	34.0	35.1	26.0	30.7	32.0	33.0	2.0
9	32.2	35.6	37.0	37.9	29.0	32.0	33.3	34.1	3.7
10	34.3	37.9	39.0	41.9	32.1	35.5	36.5	39.2	2.5
11	36.8	40.9	43.0	45.2	35.9	39.9	41.9	44.0	1.1
12	43.2	47.7	50.0	52.3	38.0	42.0	44.0	46.0	6.0
13	47.2	51.8	54.0	56.3	41.0	45.0	46.9	48.9	7.1
14	49.4	54.5	57.0	59.7	43.2	47.6	49.8	52.2	7.2
15	52.4	59.2	63.0	67.4	47.2	53.4	56.8	60.8	6.2
16	53.7	61.4	65.0	70.0	48.1	55.0	58.2	62.7	6.8
17	58.8	63.8	67.0	71.5	52.6	57.0	59.9	63.9	7.1
18	59.8	64.1	68.0	72.4	54.1	58.0	61.5	65.5	6.5
19	63.2	65.3	68.0	71.2	59.0	61.0	63.5	66.5	4.5
20	63.2	65.3	68.0	71.2	59.9	62.0	64.5	67.5	3.5
21	64.6	66.8	69.5	72.6	62.3	64.4	67.0	70.0	2.5
22	66.0	68.2	71.0	74.1	63.2	65.3	68.0	71.0	3.0
23	70.6	73.0	76.0	79.1	67.8	70.1	73.0	76.0	3.0
26	77.6	80.2	83.5	86.6	75.7	78.3	81.5	84.5	2.0
27	80.8	83.6	87.0	90.1	78.0	80.7	84.0	87.0	3.0
28	89.2	92.2	96.0	99.1	85.9	88.9	92.5	95.5	3.5
29	92.0	95.1	99.0	102.1	89.2	92.2	96.0	99.0	3.0
30	93.8	97.0	101.0	104.1	91.1	94.1	98.0	101.0	3.0
31	95.7	98.9	103.0	106.0	94.3	97.5	101.5	104.5	1.5
32	97.1	100.4	104.5	107.6	95.2	98.5	102.5	105.5	2.0
35	111.5	115.3	120.0	123.0	110.1	113.8	118.5	121.5	1.5
36	97.6	100.9	105.0	108.1	94.8	98.0	102.0	105.0	3.0
37	118.5	122.5	127.5	130.6	116.1	120.1	125.0	128.0	2.5
45	153.8	159.0	165.5	168.5	151.9	157.1	163.5	166.5	2.0
46.2	163.1	168.6	175.5	178.6	159.8	165.2	172.0	175.0	3.5
46.4	163.5	169.1	176.0	179.1	160.7	166.2	173.0	176.0	3.0
57	221.1	228.6	238.0	241.0	219.3	226.7	236.0	239.0	2.0
70.5	283.9	293.5	305.5	308.5	281.5	291.1	303.0	306.0	2.5
71	285.7	295.4	307.5	310.5	282.5	292.0	304.0	307.0	3.5
81	347.5	359.3	374.0	377.0	344.2	355.9	370.5	373.5	3.5
81.5	353.1	365.0	380.0	383.0	349.4	361.2	376.0	379.0	4.0
82.6	357.7	369.8	385.0	388.0	354.9	367.0	382.0	385.0	3.0
85	370.3	382.8	398.5	401.5	367.9	380.4	396.0	399.0	2.5
Maximum									7.2
Minimum									1.1
Average									3.7

Sources: Schaaf & Wheeler; and FEMA, Federal Insurance Study