SOUTHWEST WELL FIELD RECHARGE FEASIBILITY STUDY

INDIAN WELLS VALLEY WATER DISTRICT
P. O. Box 1329
Ridgecrest, California 93556-1329

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HISTORY:

The Indian Wells Valley Water District (IWVWD) is located within the Indian Wells Valley in the eastern part of Kern County and is surrounded by the Sierra Nevada Mountains to the west, the El Paso Mountains to the south, Coso Mountains to the north and the Argus Mountains to the east. The water shed for the Indian Wells Valley is approximately 860 square miles consisting of 500 square miles in the mountains and approximately 360 square miles on the valley floor. About 200,000 acrefeet (AF) of precipitation falls annually on the surrounding mountains and 100,000 AF of precipitation falls on the valley floor.

The Indian Wells Valley's only water source is from ground water extracted from the Indian Wells Valley Basin, so designated by the California Department of Water resources (see CDWR Bulletin 118-75). The ground water aquifer has been pumped by all Valley water producers for many years and the valley has experienced a growing population. Also, water is pumped from the Indian Wells Valley and exported to Searles Valley for use in the Trona and Argus communities. Well monitoring programs indicate the static ground water surface is declining about one foot to one and a half feet per year. This information was presented in detail in the "Preliminary Project Analysis and Detailed Project Work Plan" October 2003. Should the ground water become critically in an overdraft state, other water sources would have to be found. The new source of water would have to be treated and put into the distribution system or banked and used as an addition to the existing ground water. A grant was secured from the Department of Water Resources by IWVWD under the Safe Drinking Water, Watershed Protection and Flood Protection Act, commonly referred to as Proposition 13, for a feasibility study for recharging water into the ground in the Southwest Well Field which is within the Indian Wells Valley water aquifer.

PURPOSE:

The District's annual water production required to service the District's area has increased steadily since it inception in 1955. The District pumped about 1300 AF in 1965 to serve its customers and now pumps approximately 9500 AF. With an anticipated population growth, required pumping to service the District will be about 14,000 AF in the year 2030. With a declining ground water, other measures will be required.

The purpose of the Southwest Well Field Recharge Feasibility Study was to determine if water can be percolated into the ground in the Southwest Well Field to supplement the existing ground water by creating a localized ground water mound. Should the recharged water not form a localized mound, it would mean that it might be scattered throughout the aquifer or distributed in a manner that the efficiency of recovery would be less than desired. Also, should the water not reach the existing ground water and for some reason stay in the vadose zone, it would be useless as a supplemental source of water.

Any water for recharging the aquifer would come from a source outside of the Indian Wells Valley.

The most likely source of imported water would be water pumped through the Los Angeles Aqueduct. The imported water could possibly originate from outside Kern County or result from an exchange with Los Angeles Department of Water and Power for State project water and be wheeled to a place in Indian Wells Canyon, which is the closest location to the IWVWD's transmission lines. This water would be piped from the canyon to the Southwest Well Field and placed in percolation ponds. The feasibility pilot study would determine whether or not the water added to the recharge ponds will reach the existing ground water and exist in such a manner that it can be reasonably and efficiently extracted.

PROJECT:

To supplement the Detailed Project Work Plan as submitted to the California Department of Water Resources, the following is provided.

The project was begun by providing a CEQA document to clear and grub a two plus acre area for the construction of two percolation/recharge ponds. The location of the ponds are adjacent to existing Well 18 in the Southwest Well Field. The accompanying picture entitled "The Project Area" shows the ponds monitoring wells and production well and their location to one another. They are approximately one-acre each. They are designated as the East and West ponds. The total area was fenced using a six-foot high chain-link fence with tortoise fencing as required by CEQA. Piping to the pond are an 8-inch pipe from the transmission line between Wells 18 and 33. The outlets of the pipes are located at the north end of each pond. The outlets consist of stand pipes with a 180° bends at the top so the water impinges on a surface of broken concrete rip rap, see accompanying photos. The rip rap is used as an energy dissipater. The ponds were constructed with flat bottoms and 1½ to 1 side slopes with 10-foot wide berms. Floats were installed in each pond for the purpose of sensing the height of the water for the on/off switch to the well motor. The height settings were between one and two feet. A corrugated metal pipe surrounded the float to prevent wave action. A depth gauge was set adjacent to the float, outside the corrugated pipe so that the depth could be physically read.

Two 6-inch monitoring wells were constructed to 440 feet below ground surface which were perforated from 360 to 420 feet below ground surface and had an annular seal from 0 to 350 feet below ground surface. Monitoring well at the surface in shown in the accompanying photos. These wells are located on the north and south end of the recharge ponds outside the ponds along the centerline between the ponds. They were located in the immediate vicinity to identify when recharge water reaches the existing saturation zone. The monitoring wells are equipped with continuous data loggers that record water pressure at the probe setting, barometric pressure, pH, and conductance. The data loggers are down loaded once a week.

A weather station was installed to record wind speed, atmospheric temperature, and rainfall. An evaporation pan was constructed to estimate the onsite evaporation rate and was supplied with water from a source that replenished the evaporated water daily at midnight, see accompanying photos. Total evaporation is determined from the evaporation pan and is correlated with the depth of the ponds to determine surface area effected by the evaporation.

The original grading and clearing began in 1999-2000. The feasibility study began October 16, 2003 by pumping water into the west recharge pond. It was concluded that the well could only pump during the periods of low water demand months and would have to be returned to supplying the District distribution system during the spring and summer months or periods of heavy water demands. A spreadsheet is utilize to track data for the quantities of water pumped in the ponds, pond depths, evaporation, and rainfall and compute the net evaporation and infiltration rates, see Tables. The water was supplied continuously, stopping only when the water level of the pond reached 2 feet actuating the float switch. On February 6, 2004, the District switched from the west recharge pond to the east recharge pond because the rate of infiltration in the west pond had slowed significantly. A net total of 260 acre-feet of water percolated into the ground in the west pond. This pond was then disced after it had dried out. The discing was necessary to rework the bottom surface of the pond to eliminate or reduce algae buildup.

Water was pumped into the east recharge pond from February 6, 2004 until March 31, 2004 with a total net quantity of 190 acre-feet of water. During this time there was no indications of recharge water reaching the existing ground water. On March 31, 2004 the recharge water was again switched to the west pond and pumped into the west pond until April 30, 2004. Recharge operations were then discontinued because the District's distribution system demands required Well 18 to supply water into the distribution system. The accumulative total net quantity of water pumped into the west recharge pond was 337 acre-feet. The total net quantity of water pumped into the recharge ponds was 527 acre-feet. The data collectors in the two monitoring wells are read each week and are still monitored after many months of not pumping into the ponds. The data loggers indicate that the ground water elevation has not risen.

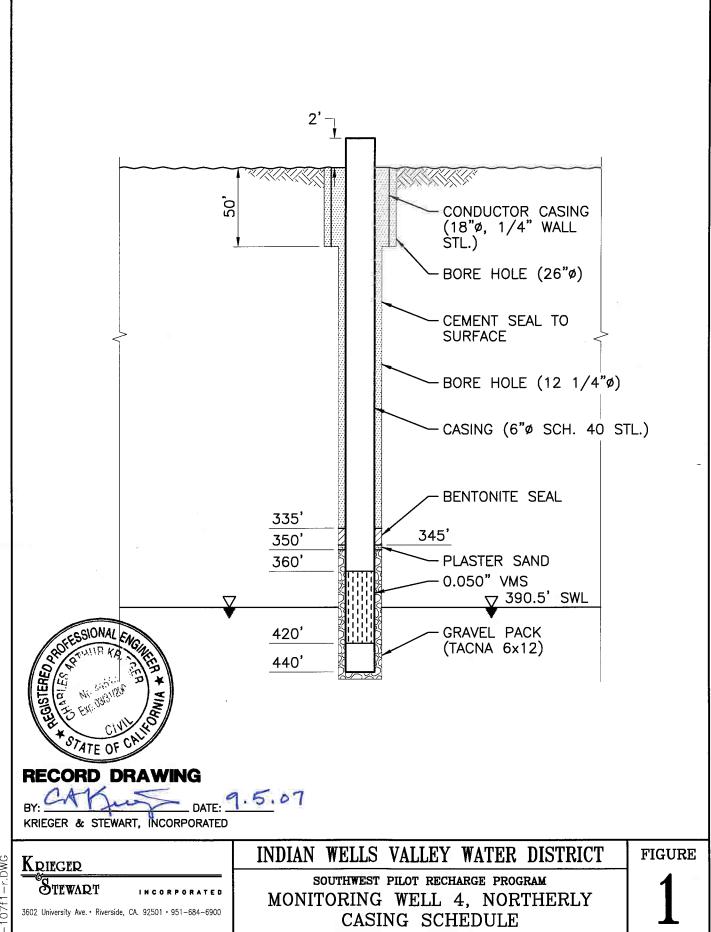
DISCUSSION:

There has been no reaction from the probes in the monitoring wells which would indicate the water has not reached the aquifer. Has the water gone down to a certain elevation and encountered a clay layer? Has the water found that the path of least resistance was to spread out in a porous coarse sand/gravel zone? Is the surface tension of the water between sand particles greater that the force of gravity? Or does it take a very long time for the percolated water to reach the water table? The only one of these questions that is significant is the later; the rest are academic. If it does not reach the water table, you can not pump it.

The water has not reached the water table at the time of writing this report. The District could drill a series of small diameter shallow monitoring wells around the pond in an effort to determine where the water went. This would be an expensive effort for an academic exercise in "nice to know" which would not add to the ultimate question "is it feasible to bank water in the Southwest Well Field?".

CONCLUSIONS:

The water has not reach the saturation zone and may take a long time to percolate to the zone. The distance from the surface to the saturation zone is greater than most percolation projects. The monitoring wells with data loggers will be continually monitored now and into the future.



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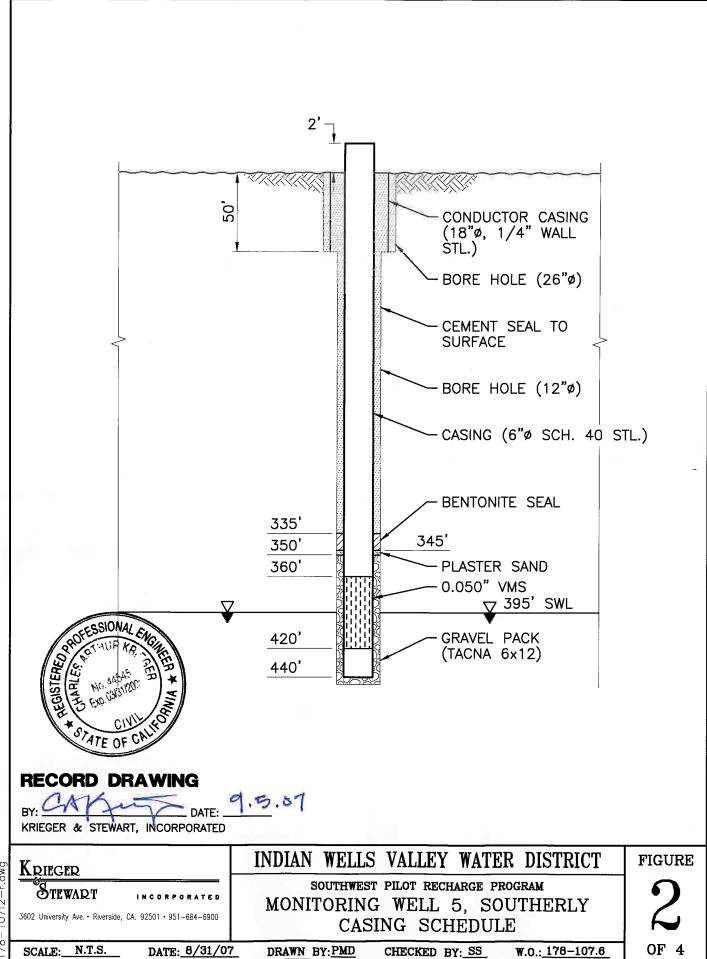
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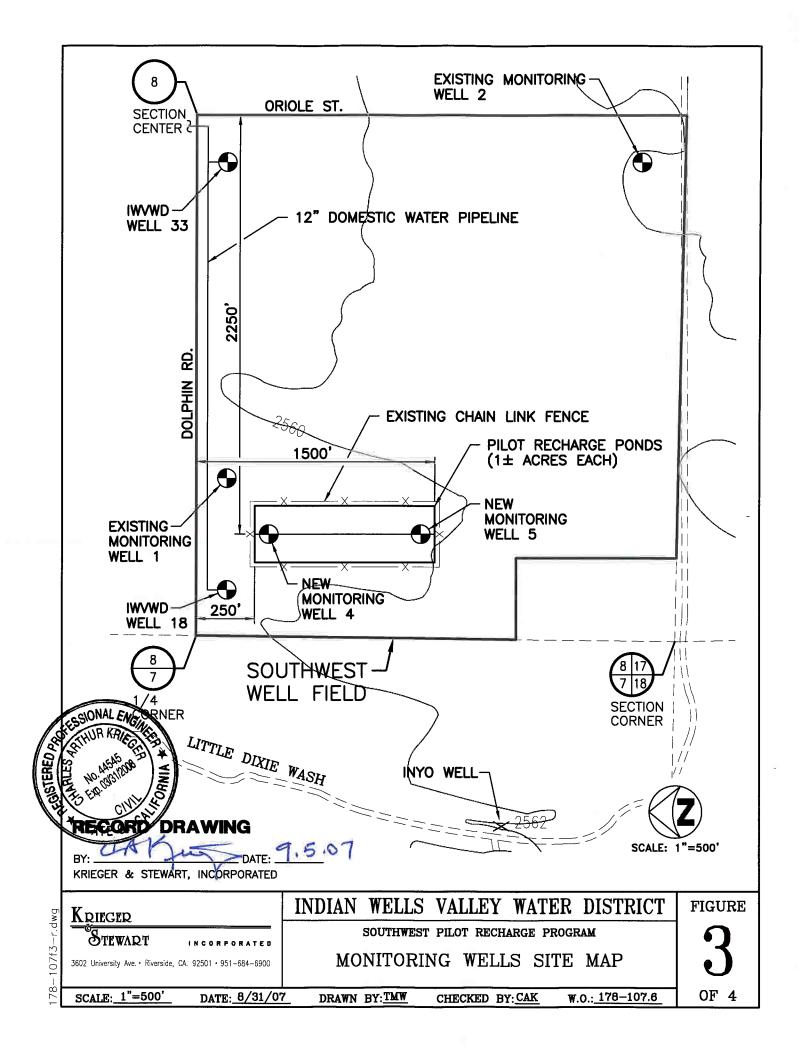
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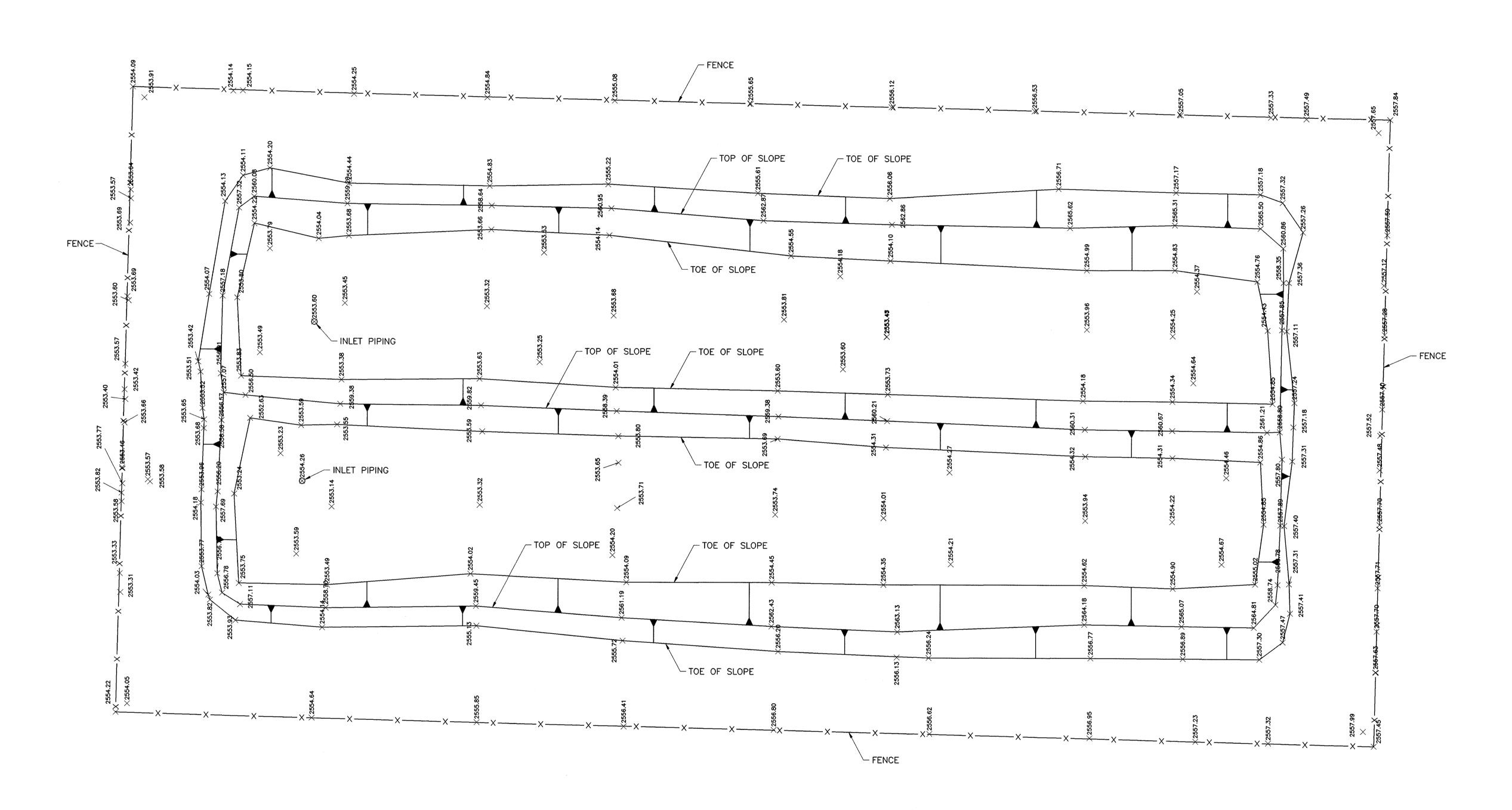
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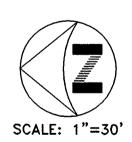
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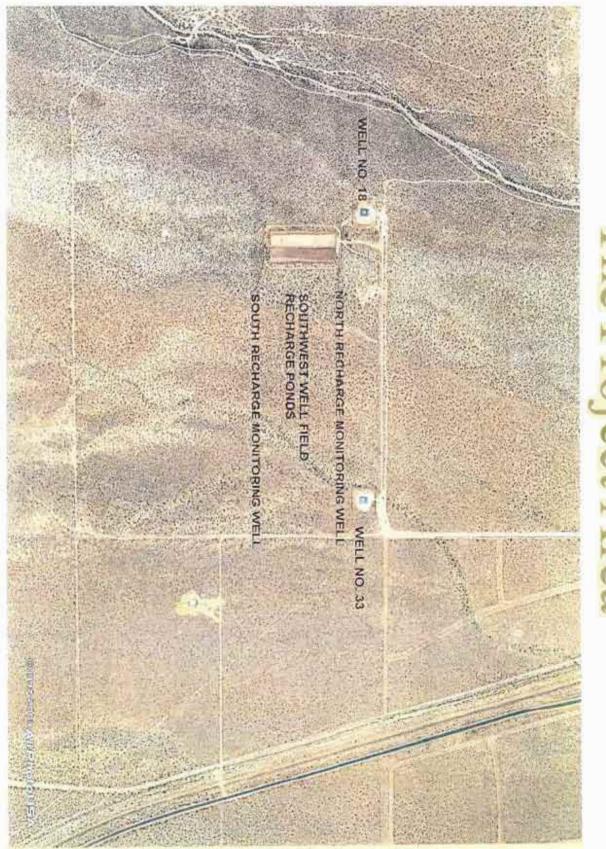


RECORD DRAWING

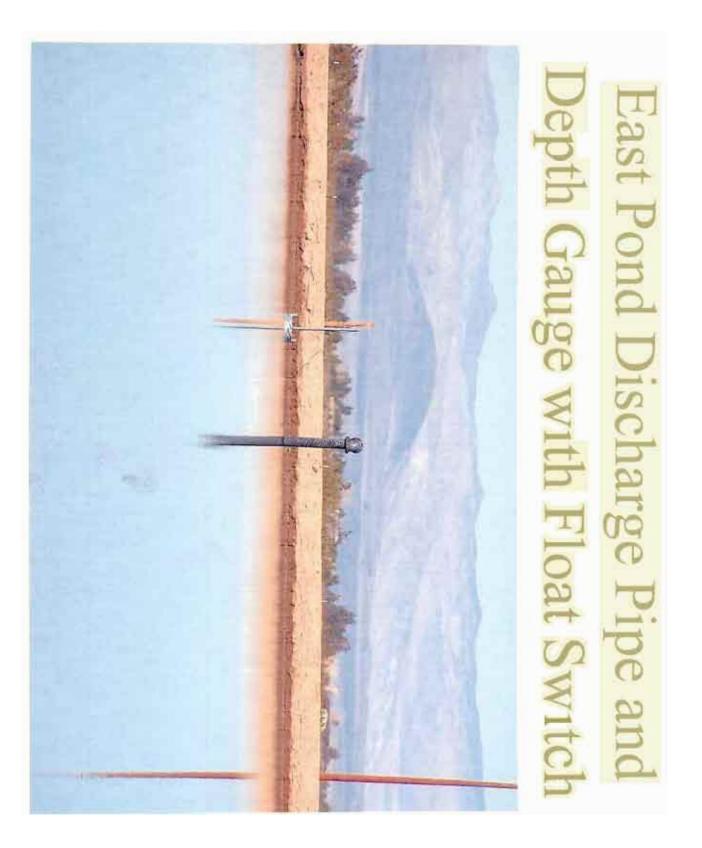
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KRIEGER & STEWART, NCORPORATED

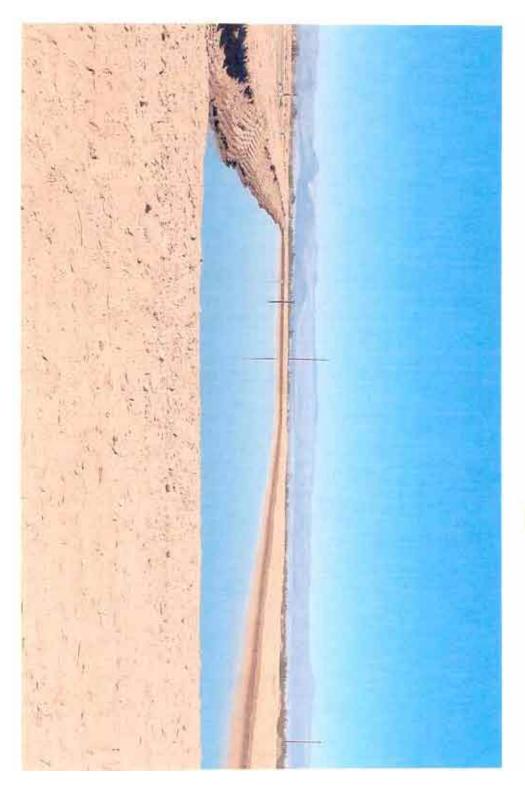
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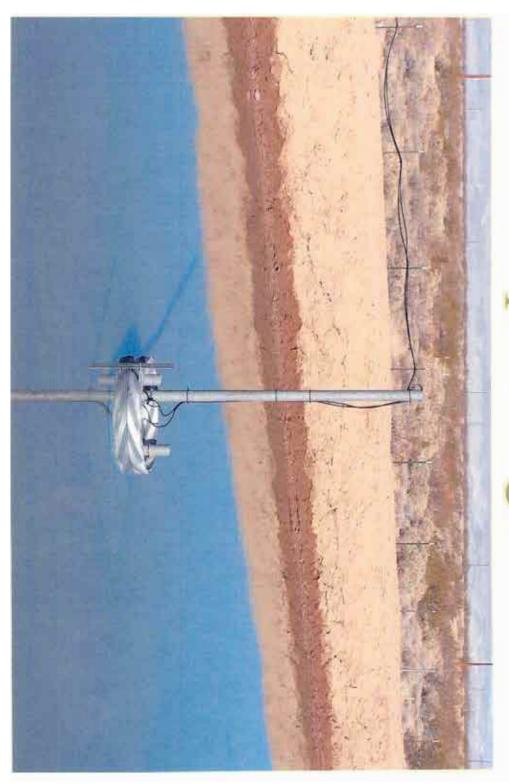
The Project Area



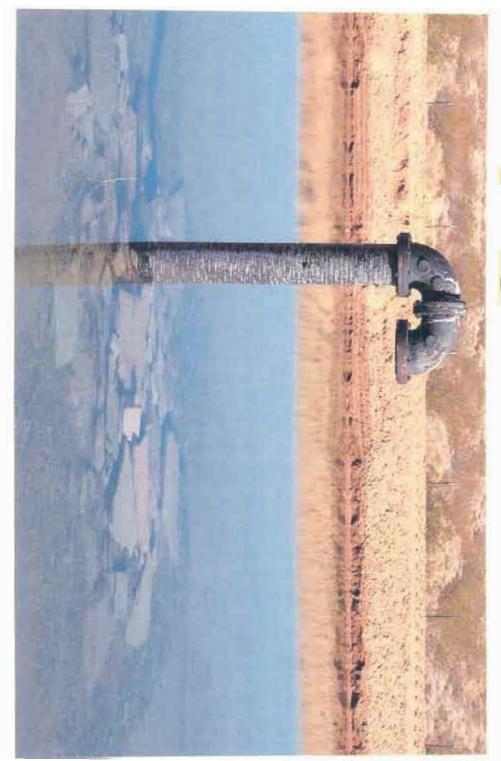
East Pond Looking North



East Pond Float Switch and Depth Gauge



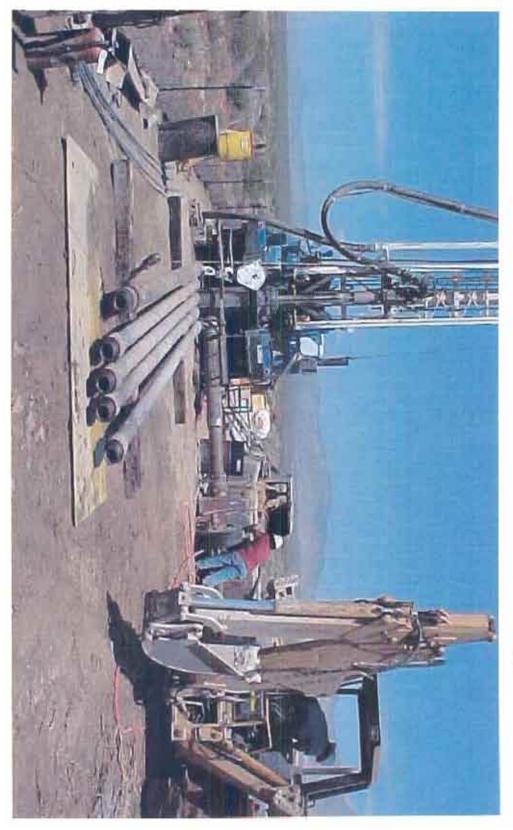
East Pond Discharge Pipe wi Rip Rap in the Bottom



West Pond Drying out after Recharge Water Rotated to East Pond



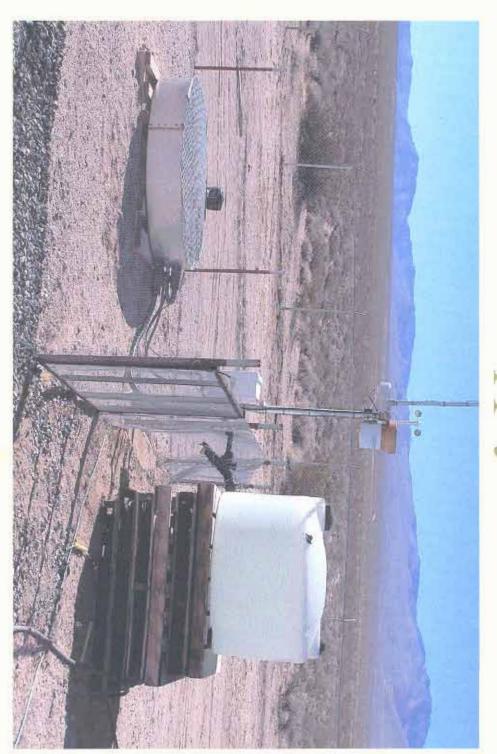
Construction of Monitoring Well



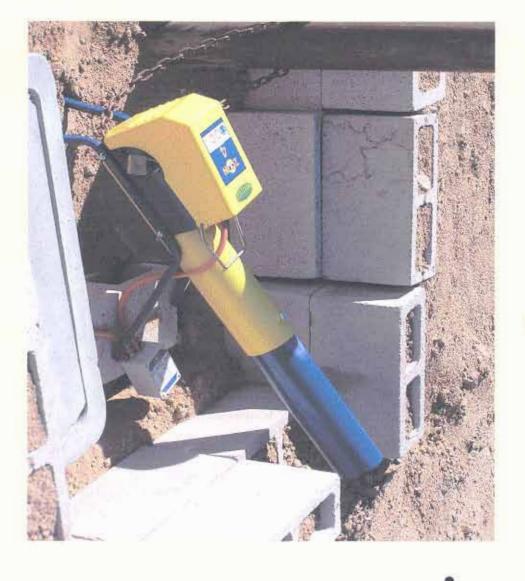
Jorth Monitoring Well

Evaporation Pan and Weather Station

Evaporation Pan and Water Supply Tank



Propane Cannon



This is part of the CEQA
Mitigation for the protection of young tortoise from ravens.

SOUTHWEST WELL FIELD RECHARGE PILOT PROJECT

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LEAN RIZ 67 Z/COMILO/	c	1000	90/00	10076	r			=	COUCZIN
200	2	0.000	20,000	40004	7	I	1	_	2000
7188471 041005 20 274	0	0.085 750B	70274	42230	5	N N		<	* DICCID
858684 20 2.49 0.20	0.00	0.252	0	0	0.00	5407999 0	710000	TUESDAY	0/21/03
069/999 /61765 17 2,43 6320	0.00	0270	0	0		A98/600	DECE LAG	MONDAY	0/20/03
2007000 451450 451	2	2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3			1	ĺ	1	1	10000
5005660 660340 45 243 0000	0000	0260	0	0	0.00	5005686	691333	SHNDAY	0/19/03
4315333 576916 13 2.43 0.25	0.00	0,252	0	0	0.00	4315333	691333	4	0/18/03
Carlotte Activities (1)	0.00	2000			0.00	SOCHOOD O	1	b	00111100
303,000	0	0.384.0	0	0	1		Ī	4	P-COLUMN P-
2819000 376872 9 4.96 0.30	0.00	0.397	0	0	0.00	2819000 0	414000	3	0/16/03
3405000 187834 4 ?	0.00	0.407	0	0		1405000		WEDNESDAY	0/15/03
A.1. REP. I. PARTIES IN	000		0		1	1	I	100000	COUNT
107000	200	0.080	0	0	200	1405000	1	THESONY	SULPHINE STATE
1405000 187834 4	0.00	0.286	0	0	0.00	1405000		MONDAY	0/13/03
1405000 187834 4 0.31	0.00	0.265	0	ū	0.00	1405000		SUNDAY	0/12/03
18/834 4	0,00	U.ANS U	c	0	ß			SATURDAY	0/11/03
1000000	Ī				1		- NAMARAL		10000
0 1405000 187834 4 4.93 0.41	0	0	0	0	0.00		405000	FRIDAY	0/10/03
(GAL) (CF) (AF) (FT/DAY) EVAP (IN) PAN : CITY RATIO RAIN (IN)	(IN) (GAL) (GAL)	(IN) (GAL)	(*14)	(FT')	N) (FT)	CUMULATIVE ON	DAILY CU		
COMOUNTAE MET (2) NATE	f	45	404	WINN INWINDS	OSP 10	AL DEPTH		_	
County Article Meet in	EVAPO		50	MINEACH AND	DEBTH		100		î
	NET							DAY	DATE
CITY OF RIDGECREST DATA	Constant of the constant of th								
	SOLAT LIMING				-			T	
INFILTRATION		WEST BASIN	WES			METER	WELL 18 METER		

TEST_REST	178-107.7	no so logorari
TLISH-WEST		DOM: OF THE PARTY

Note Day	DFS							- [1	-				- {	MBM	Krieger & Stewart	
March Marc		4.25	264	11667245	87270990	245978	0 0	T	I	J.	42156	172	20.63			SUNDAY	2/8/04
Dec Part		5.86	260	11341672	84835703	241300	0				41188	1.31	15.75	-	- MA	FRIDAY	2/8/04
Mark		0.98	255	11118533	83166628	239375	0			lun l	42429	1.83	22		by	THURSDA	2/6/04
Color Colo		0.54	254	11081091	82886564	236439	0		62 1110	68517	42131	1.71	20.5		len)	WEDNESDA	2/4/04
ANY Column Colu		0.83	254	11060358	82731479	233524	0 0		T		42828	193	23	1		TUESDAY	2/3/04
ANY Column Mart		0.90	252	11004797	BOARSARO BOARSARO	20007	0 0		T	NO DE	42379	181	21.15	T	J	MONDAY	2/2/04
ANY Color Martin Million Color		0.90	252	10955919	81950276	227061	0		T	100	42378	1.81	21.75	1		SATURDA	1/31/04
ANY CALL METER		1.12	261	10921740	81694615	223386	0				42379	1.81	21,75		230	FRIDAY	1/30/04
DAY CALL METER		0.58	250	10679054	81375321	217683	0				42031	1.67	20	1		THURSDA	1/28/04
DAY		1.10	249	10857134	81211365	215639	0 0		1		42230	1.75	2 1	T		WEDNESDA	1/28/04
DAY CALL NETTER NETTER NETT		0.90	167	C/ACL/OIL	24000000	21712	000	Ï	ľ		00778	17.75	2 6	1		HUNDAI	1/20/UG
DAY CALL NEITER		0.85	245	10734807	90588907	210800	5 8	1	T	oka	42230	1.70	2.60		No.	SUNDAY	#17070A
DAY CALL NETTER NETTER NETT		0.94	246	10688762	80026743	208927	0			100	42230	1.75	12		4	SATURDA	1/24/04
DAY Communication Control of Part Contro		1.12	245	10862802	79757761	208242	0				42429	1,83	22	120	100	FRIDAY	1/23/04
DAY Communication Commun		1.11	244	10620072	79438141	203862	0			ca	42628	1.92	22	10	lica	THURSDA	1/22/04
DAY Communicative Commun		1.11	243	10577866	79122436	200567	0				42429	1.83	22			MEDNESD	1/21/04
Column C		1.17	242	10535481	78905398	197605	0				42379	1.81	21,75			TUESDA)	1/20/04
Color Colo		1.17	241	10491037	78472959	195544	0	79 07	0.003		42454	100	22 125			MONDAY	1/18/04
DAY CALLA DEFEN:		1.17	240	10446329	78138538	195466	0	79 0.1	0.003	J	42454	1.84	22 125	1		SUNDAY	1/18/04
DAY CALL DEFTEX PROPERTY DEFTEX PROPERTY DEFTEX PROPERTY DEFTEX PROPERTY DEFTEX DEFTEX PROPERTY DEFTEX DEFTE		1 17	239	10401620	77804118	195385	0 0	79 07	0.003	J	42454	200	22 126		40	SATURDA	1/17/04
Color Colo		4 40	220	PROMERON	77489897	303,301	500	000	0.000		2630	1 20	200			FRIDAY	PUNBAL
DAY		2 90	236	10297298	77023777	186228	5 0	79 0.0	0.003	68517	42131	1.74	205			THURSDA	POSSI/I
DAY		4.04	355	10253500	70000000	871301	200	52 00	2000	79800	02020	1 80	9.5	T		WEDNESD.	AUGUNA
DAY CAMILLY INFERE VIET METER VIET MATERIAL VIET VIET MATERIAL V		1.00	100	02006101	20017001	1 PUCS I	5 6	200	0,000	90007	20016	3.00	24			THORON	40001
DAY CALL NETER CALL NETER CALL		1.00	107	14171001	65040637 610/1661	COCHE	500		0,001		46000	1 70	6.12	1	1	BONDAY	FWGHT
DAY CALL METER: WELL 19 METER: WEST BASEN COMPANSION PRECEDENT NOTE COMPANSION		1.00	200	10077002	74502040	CORPE	000	T	0.001	I	42000	1 70	o n		1	SINDAY	PULL III
DAY CIALL IN NETER WELL IN NETER WEST BASIN WELL IN NET BASIN WELL IN NE		200	222	10017667	TARGODAT TOUR TOUR TOUR TOUR TOUR TOUR TOUR TOU	Control	5 6	0 00	0.000		02020	4 70	24.6			SATIBOA	PU/UM
DAY CALL IN NETER		200	197	2000000	78457007	900000	5 6	200	0.000	T	90,904	300	200	1		AVUIGE	AGION A
DAY CIMILLY IN INTER:		2.40	220	8900610	73047007	CORPE	5 6	0 0	0,000	000047	00000	1,00	2000	T		VUSSILIAL	Walson MALLIN
DAY CIALL 19 METER		2.28	223	100000	/203900/	DONNE	000	0.0	0.000		423/8	1.90	01.77			MEDITORION	6019/1
DAY CGAL DEPH D		2.61	221	8623672	71885067	194836	0	0	0.000	1	42628	1.92	23		J	MONDAY	1/5/04
DAY		2.61	218	8524251	71241400	194936	0	1			42554		22,625			SUNDAY	\$44/04
MACK CALL METER WEEL 18 METER WEEL 1		2.61	216	9424969	70496767	193902	0	T			42554	L	22.625			SATURDA	1/3/04
DAY CALL 18 NETER		2.04	214	9325552	69755127	193875	0			L	42479	Į,	22.25	1	100	FRIDAY	1/2/04
DALY CIALL 18 NETER		2,05	212	8247849	69173908	189427	0			74696	42479		22.25		DUN.	THURSDA	1/1/04
DAY COMULATIVE INQ DEPTH SURFACE AREA VOL EVAPORATION PREDIPTATION CUMULATIVE MET POR COMPARISON) PREDIPTATION CUMULATIVE MATE POR COMPARISON) PANI CITY OF RIDGECRISTS DI COMPARISON PANI CITY OF		2.05	211	9169735	68589618	188050	0 0	0	-0.001		42479	Į,	22.25		883	WEDNESD.	12/31/03
DAY CALL 18 METER		312	209	9091437	88003951	188050	0	50 0	0.006	i i	42828		224		-	TUESDA)	12/30/03
DAY CALL DEPTH		3.32	206	8972608	67115111	167890	0	0	0000		42628	1.92	23	1		MONDAY	12/29/03
DAY CIMILLATIVE CIMILLAT		3 5 5 5	2nd	8848138	11168130	187890	0 0	0	0000		42330	97.1	NI I	1		SUMDAY	12/28/03
DAY CALL 18 METER WEST BASIN WEST BA		235	101	8710867	65777111	167890	200	0 0	D DOG		42330	1 70	21.5	1		SATURDA	12/27/03
DAY		92.0	200	Checuse Obertone	DOLUMOCO	100001	3 6	70 0	2000	1	10124	1 87	20.00	T	USAN	MONOR	45/55/64
DAY		3.29	285	2797568	62403190	156/81	000	0	0.000	T	42230	1./0	2 22		21000	MEDMEST	COMPTE
DAY		3.37	188	8208041	61381190	187811	00	250 0.	0.086 22	L	41981	1.65	19.76	T	02.59	TUESDA	12/23/03
DAY		3.54	185	8077589	60420440	185561	00 00				41932	1.63	18,5		1	MONDAY	12/22/03
DAY		3,53	182	7942886	59412630	185038	00 00		0.140 36	66764	42031	1.67	20			SUNDAY	12/21/03
DAY GAL DEPTH		53.54	179	7808551	58407965	181370	00		1	1545	42031	1.67	20			SATURDA	12/20/03
DAY		3 0	175	7673748	57399630	181370	00	T	1	1	42131	171	20.5			FRIDAY	12/19/03
DAY		3.40	170	7413017	581048350	17683/	38	T	1	1	41832	1,00			_	MEDMERIN	12/11/03
DAY GALJ DEPTH		338	167	7283622	54481495	176507	00	1	N.	08090	42180	1.73	20.75	T	the s	TUESDA	12/16/03
WELL 18 METER WEST BASIN		3.44	164	7154613	53515756	174246	00	U	1		42529	1.88	22.5		1	MONDAY	12/16/03
WELL 18 METER WEST BASIN		3.44	161	7023354	52534692	172310	00	Г		un	42579	1.90	22.75			SUNDAY	12/14/03
WELL 18 METER		3.45	158	6892363	51554876	169126	00 00				42579	1.90	22.75		0.2	SATURDA	12/13/03
DAY GAL) DEPTH DEPTH SURFACE AREA VOL EVAPORATION PRECIPITATION CIMULATIVE NET (FOR COMPARISON) PRECIPITATION CIMULATIVE NET (FOR COMPARISON) PRECIPITATION CIMULATIVE NET (AF) (FIDAY) FOR COMPARISON) PRECIPITATION CIMULATIVE NET (AF) (FIDAY) PAN: CITY RATIO PRECIPITATION CIMULATIVE NET (AF) (FIDAY) EVAP (IN) PAN: CITY RATIO PAN: CITY RA		3.48	155	6760946	50571876	169126	00		1		42828	1 92	21		-	FRIDAY	12/12/03
DAY GAL) DEPTH DEPTH SURFACE AREA VOL EVAPORATION PRECIPITATION (GAL) (G		377	160	5069698	49579720	CBCSBI	0 0				42479	3 88	22.25			THURSDA	12/11/03
DAY (GAL) DEPTH DEPTH SURFACE AREA VOL EVAPORATION PRECIPITATION (T) CUMULATIVE CUMULATIVE EVAPORATION CUMULATIVE EVAPORATION (T) CUMULATIVE NET (2) RATE FOR COMPARISON)	PAN : CITT MATEU	PHONI	(AF)	(GF)	(Lines)	(UAL)	1	NI IN	-	GF64	(F1)	100		-		WEDNIEGH	40,40,000
DAY WELL 18 METER WEST BASIN CUMULATIVE WET EVAPORATION WELL 18 METER WEST BASIN CUMULATIVE EVAPORATION	7	RATE	ET (2)	UMULATIVE		(3)	IPITATION	+	EVAPORATIO	1		-	_	-			
WEST BASIN CUMULATIVE INFILTRATION	(FOR COMPARISON)					EVAPORATION	_	_				_				DAY	DATE
WESTRASIN	CITY OF RIDGECREST DATA					CUMULATIVE											
			4	INFILTRATION					BASIN	WEST				ELL 18 METER	TVE.		

INDIAN WELLS VALLET WATER DISTRICT

SOUTHWEST WELL FIELD RECHARGE PILOT PROJECT

Charles Char						-	The second secon				Olave and and a			
A Annuary 1984 1984 1987		ARELIA SO METERS					500				1000			CITY OF RIDGECREST DATA (FOR COMPARISON)
			DEPTH		URFACE AREA	VOL	EVAPORATE	-	1	1	CUMULATIVE		FT/DAY	
Mathy Primary Primar	+				41981	65888	10	0.00	ωľ	85075040	11373658	787	(Finday)	-
Ballache 197000		1217666	22.63	1.89	42656	76033		0.00		88287985	11535827	265	426	
Manipulary Man		1217666	22 63	1 89	42555	76033		0.00		87503861	11696350	269	4.27	
Marie Tripication Tripic	1	1217666	25.5	27.5	43447	86722	Ī	0.00		88718457	11860756	272	4.28	14
WITH MERSON Microsopie Mi	1		24	2.00	43134	81311	18	0.00		89867284	12014343	276	4.03	
		0000286	24 25	2.02	43186	82210		0.00		90856404	12146578	279	3,47	
PRINCE PRINCE 198000 1941/101 255 231 45555 6094 1000 2014 1001 0 22154 22194 128940 289		1109000	25.25	210	43396	85817		0.00		91961861	12294366	282	3.88	
SATINESSAY 191000 65272201 28 5 2.0 64342 66914 0000 20 22401 000 0 224401 0000 20 22401 00000 20 22401 00000 20 22401 00000 20 22401 00000 20 22401 00000 20 22401 00000			25.5	2.21	43656	90361		0.00		93118647	12449044	285	4.06	
BANDAY 13000 540000 75 208 65942 5995 5000 0 0 27941 59595 520 520197 260 50000 0 27941 59595 27941 5000 50000 0 27941 500000 27941 50000 27941 500000 27941 500000 27941 50			26	208	43342	84914		Г	24450	94247651	12599940	289	3 86	
Maintana			25	2.08	43342	84914			27341	85375680	12750757	293	3.96	
			225	2.08	43342	84914			32393	96501608	12901284	296	3.95	
WITH PROBLEMY Tracked Section 196 265 24729 2586 2089 271 2624 2714 2715 2726 2714 2715 2726 2714 2715 2726 2714 2715 2726 2714 2715 2726 2715 2		1131000	23.5	1.96	43030	79516			36470	97628531	13051943	300	3,85	
M PHUNESANY 189800 005/00/01 203 177 4295 7749 0000 200 000 0 44627 0000074 (199800 30) 374 4895 841 4995 841 4		790000	10	0.83	40239	32681			38627	98416374	13157269	302	2.76	
Ma SHRIJAN (1989)000 (1005/100) 21/13 1/76 42595 77/000 0000 00 44527 (1006)174 (3500)00 317 4 4551 177 4 42595 77/000 000 000 0 44527 (1006)174 (3500)00 317 4 4551 177 4 42595 77/000 000 00 0 44527 (1006)174 (3500)00 317 4 4551 177 4 42595 77/000 000 000 0 44527 (1006)174 (3500)00 317 4 4551 177 4 42595 77/000 000 000 000 0 44527 (1006)174 (3500)00 317 4 4551 177 4 42595 77/000 000 000 000 000 0 44527 (1006)174 (3500) 317 4 4551 177 4 42595 77/000 000 000 000 000 000 000 000 000		1515000	24	2.00	43134	813/1	Į,	0.00		98928174	13356362	307	5.30	
MI SATURIAN 1178000 (1002/1001) 21/13 1/15 (2455) 71000 (2400) (240	+	1081000	21 25	1.77	42562	71495		0.00		101009174	13503900	310	3.79	
Sulticity 170000 700,425001 211 1716 24200 77000 2000			2 2 2 2 2	97. 9	10000	74000	1	000		00000000	1380080	200	440	
BURNAY 178000 10240101 21 2 12 12 12 12 12	1		61.12	0.70	10026	7 1000		0.00		ROBORI 201	10000000	0 0 3	3,16	
Balt		1	21,13	7.76	75026	71000	0.000			ADRIBGEOU	Springland	31/	4.16	An a second
March Price Pric			100	3.70	42510	70505	-	0.00		104533883	13970118	321	4,12	
M. PEDIANA 6850000 1054000 284 2 (200 43/34 173 0.00 173 0.00 0.00 48507 (07)318984 144/3748 239 M. BERTANA 1900000 1050000 100 200 <th< td=""><td></td><td>1255000</td><td>80,00</td><td>1,96</td><td>43030</td><td>01007</td><td></td><td>-</td><td>44032</td><td>100/85458</td><td>14142570</td><td>325</td><td>4.40</td><td></td></th<>		1255000	80,00	1,96	43030	01007		-	44032	100/85458	14142570	325	4.40	
Martinary Colore Color		1534000	24	200	43134	81311		Ī	46307	107318694	14347419	329	5.38	
M. PRINDAY 100/4000 (10/44507) 28.56 (177) 42.592 (277) 71/461 (10/45 (278) 17/10 (10/45 (278)) 10/40 (278) 10/40 (278) 10/40 (278)		1046000	22.5	1.88	42822	75938			48682	108362319	14488941	333	3.66	
64 SAFLURDAY 125539 110796343 21.25 177 42592 71-49 0.001 6.94225 110717709 1480/037 34.0 64 SHURDAY 125333 110326000 22.5 1.94 42592 7.000 0 62272 110791700 346 64 HURSDAY 120000 1253000 22.5 1.94 2000 22.5 1.94 11032000 22.5 1.94 11032000 22.5 1.94 11032000 22.5 1.94 11032000 22.5 1.94 11032000 22.5 1.94 11032000 22.5 1.94 11032000 22.5 1.94		1074000 1	21.25	1,77	42562	71491	0.066	751 0.00 0	50433	109434566	14630290	336	3.76	
Machichay 124333 1124/18/17 2125 174 42/562 0001 772 0.00 0 62746 11/94/5627 144/57/503 44/4/57/544 11/94/5627 2125 14/4 24/57/544 34/5 27/54/5 27/54/4 27/54/5 2			21.25	1.77	42562	71491			84825	110711700	14801031	340	4.48	
Machical			21.25	1.77	42562	71491			82345	111985322	14971300	344	4.47	
A		4	23.25	1.94	42978	78620	10000	27 0.00 0	62372	113266628	15142597	348	4.50	
WEDNESOAN 1197000 119257000 23.5 1.96 42722 71939 7000 27.7 0 62425 1157857A 1579A4A 355		_	24	2.00	43134	81311	0.001	27	62399	114556601	15316390	352	4.56	
M THURSDAY 1564000 117300000 21,75 1,81 4,2666 72,567 1,000 27 0,000 24,557 1,117174,46 156,6814 360 44 45,770 114,7714,46 156,6814 360 44 44,770 44,470 114,770 114,7714,46 156,6814 360 44 44,770 44,470 114,770 114,7714,46 116,7714		1197000 1	22.5	1,88	42822	76938	0.001	27 0	62426	115783574	15476414	355	4.20	
M. FRIDAY 1077000 11645/1000 27.35 1.94 42278 79620 0.0002 64 0 0.22508 11655444 11655440 15056400 377		1554000 11	21.75	1.81	42868	73267	0.001	27	62452	117317548	15684164	360	5.45	
Mac SATURDAY 134000 11900000 23.25 1.94 42978 78500 0.002 64 0.0 6290 11974040 1906400 8378		1077000 1	23.25	194	42978	78620	0.002	2	62508	118384494	15828141	363	3.78	
MA MINNAM 3440000 121469000 23.25 194 42978 71485 1004 100 0 0 0 0 0 0 0 0		1346000 1	23,25	194	42978	78620	0.002	2	62560	119740440	16006080	367	4.72	
Marchinary 13,0000 122,05000 21.5 1.77 42502 1.95 42710 10.094 10.6 0 69746 122,05264 16557481 376 10.094 10.094 10.094 10.094 10.094 122,052647 123,0546770 122,0526770 123,057700 24 2.00 43734 67371 10.094 10.094 10.094 122,0526770 123,057700 24 2.00 43734 67371 10.094 10.094 10.094 123,05770		1346000	23.25	1.0X	42978	78620	0.003	80	62640	121086360	16188016	372	4.72	
M TrueSDAY 1200000 (240120000 22 1.83 42718 74186 0.1233 3275 0 660d1 123544679 12554479 125151 390 old HURBDAY 1130000 123540000 23 1,76 42510 79516 0 66043 123546000 126715500 24 200 43134 81311 0,00 66340 125268635 15674158 394 OIA FINITARY 1280000 123775000 24 2,00 43134 81311 0,00 66347 12364635 396 OIA FINITARY 128000 130247000 24 2,00 43134 81311 0,00 66447 1236483 170635 396 OIA FINITARY 128000 130247000 22 1,88 42822 75838 0,24 200 43134 81311 0,00 66447 12764635 399 OIA TUBSDAY 110000130249000 22.5 1,88			21.25	1.77	42562	71491	0.004	106	62746	122432254	16367948	376	4.72	
MYELDMESIANY 134000 12530000 23, 1,16, 3000 793/16 0,000 27, 1,16, 3000 1253000 12530000 1		1526000 1	22	1.83	42718	74156	Ē	275	66021	123854979	16571521	380	5.34	
da THURSDAY 1330000 124,4070000 24 2,015 2,021 2,015 0,004 2,911 0 66340 126,009900 128,009916 68844 388 odd SATURDAY 1280000 24 2,00 43,134 81311 0,00 69,471 128,00973 128,00973 108,00 69,00 69,00 108,00 69,00 108,00		1314000	23.5	8	43030	79516	0.001	27	68048	125268952	16747186	384	4.81	
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SOUTHWEST WELL FIELD RECHARGE PILOT PROJECT

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AM SENDANY (27000) Bigariest 20.53 1.72 42150 69274 0.078 1891 0.001 0 247946 88690779 119919417 278 AM FRIBIANY 880000 91976467 12 1.9 41954 69782 01186 90007 0 247977 96200700 21519977 225 AM FRIBIANY 880000 914536677 18 1.50 41954 89782 01180 900 225153 9223154 72344448 286 AM SATURDAY 680000 914536677 18 1.50 41954 69782 01180 378 0 225153 9221544 7244448 286 AM FRIBANY 680000 91451867 22 1.8 1.4524 4.0529 72.2 1.8 4.2429 72.2 1.8 0.2 0.2 1.2 1.2 4.2439 97.2 0.2 2.2 1.2 1.2 1.2 1.2 1.2	MONDAY	97.	88730001	0	0.00	38198	0	0.106	2524	0.00		13	88504088	11832097	272	4.33	Contractor of the last	Chicago and Company of the Company	The second
M. PRIDAY THURISAN CONTROLOR 012-08-08 4.09 4.09 4.09 0.02-08 0.02-08 0.02-08 0.02-08 0.02-08 0.02-08 0.02-08 0.02-08 0.02-08 0.02-08 0.02-08 0.02-08 0.02-08 0.02-08-08 <td>SUNDAY</td> <td>1217666</td> <td>89847667</td> <td>20.63</td> <td>1.72</td> <td>42156</td> <td>68974</td> <td>0.076</td> <td>1971</td> <td>0.00</td> <td></td> <td>48</td> <td>88698719</td> <td>11991941</td> <td>275</td> <td>4.20</td> <td></td> <td></td> <td></td>	SUNDAY	1217666	89847667	20.63	1.72	42156	68974	0.076	1971	0.00		48	88698719	11991941	275	4.20			
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DWR Grant Contract F77006 (Proposition 13) Project Progress

ITEM	DATE
Original Workplan with completion date of January 2003	2/12/2001
Monitoring wells drilled by Howard Pump (now Layne Christensen) of Yermo, CA	5/12 - 6/12/2003
Preliminary Project Analysis and Detailed Project Workplan The following items are listed as "complete" in this new Workplan: Construction of tortoise-proof fence Construction of pilot recharge basins Construction of the monitoring wells Installation of monitoring well equipment Installation of evaporation rate equipment	June 2003 (revised October 2003)
Commenced recording evaporation data	7/9/2003
First Quarterly Report submitted to DWR (delays noted due to personnel changes)	8/6/2003
Started the filling of westerly recharge pond	10/10/2003
Commenced recording of water level, pH and TDS. Also installed propane- powered cannon to scare off ravens that threaten the desert tortoise.	10/15/2003
Second Quarterly Report submitted to DWR Site grading completed Well 18 dedicated to the recharge project All facilities installed & operational Sides of ponds sloped & bottoms scarified Wells equipped with sensors to record water level, pH and TDS	January 2004
Commence filling of easterly pond.	2/4/2004
Stop filling easterly pond and redirect Well 18 to fill west pond.	3/31/2004
Scarify floor of west pond.	Feb and Mar 2004
Third Quarterly Report submitted to DWR	4/29/2004
Suspend recharge project. Well 18 needed to provide water to distribution system.	4/30/2004
Letter from DWR extending completion date of study from 10/31/04 to 4/30/05 and report submission from 1/31/05 to 7/31/05 at the request of	1/24/2005
General Manager Tom Mulvihill.	

September 12, 2007

As General Manager of the Indian Wells Valley Water District, I certify that project work conducted under DWR Grant Contract F77006 (Proposition 13) was completed in accordance with the approved work plan submitted June 2003 (revised October 2003).

Thomas Muhlell
Thomas Muhvihill