

**Table 2-1. Municipal Production Well Data**

Well	Depth (ft bgs)	Screened Interval (ft bgs)	Year Extraction Began	Average Monthly Extraction Rate (acre ft)	Maximum Monthly Extraction Rate (acre ft)	Month of Maximum Extraction Rate
Sunset	751	245-728 Intermittent	1944	108	325	July 1967
Bangham	680	540-660	1993	107	255	Aug. 1997
Garfield	629	192-629 Intermittent	1944	96.3	323	July 1961
Villa	953	212-741 Intermittent	1944	135	405	July 1962
Copelin	700	188-668 Intermittent	1944	93.4	349	Nov. 1960
Sheldon	196	NA	1944	3.11	38.5	May 1945
RCLWA 4	626	160-347 Intermittent	1944	22.3	165	Sept. 1948
RCLWA 7	NA	NA	1987	88.9	219	Aug. 1995
Las Flores 2	540	240-510 Intermittent	1944	31.2	93.2	Aug. 1950
LAWC 3	507	261-501	1944	28.8	135	May 1995
LAWC 5	588	390-556	1971	28.9	144	Sept. 1993
VWC-1	450	155-352 Intermittent	1944	27.8	149	July 2000
VWC-2	500	NA	1944	11.4	155	July 1994
VWC-3	591	NA	1944	19.2	211	July 1947
VWC-4	592	262-540 Intermittent	1962	43.2	151	Aug. 1993
LCID-1	492	200-480 Intermittent	1944	7.32	69.8	June 1955
LCID-6	550	310-490 Intermittent	1947	14.0	110	Aug. 1950

NA = data not available

**Table 2-2. Summary of Injection Data for VWC and Selected City of Pasadena Wells**

Well	Month of Initial Injection	Total Volume Injected (acre-ft)	Month of Maximum Injection	Maximum Injection Volume (acre-ft)
Bangham	September 1993	9.21	September 1993	9.21
Garfield	October 1992	2,190	October 1993	236
VWC-2	June 1992	4,748 (1)	July 2002	108.98
VWC-3	July 1993	881 (1)	November 1997	109.41

Notes: Data compiled from RBMB Watermaster reports and RBMB database.

In water years 1996-1997 and 1997-1998, the RBMB Watermaster Reports indicated the LCID injected 225.7 and 130 acre-ft of water, respectively. In addition, in water year 2001-2002 the RBMB Watermaster Report indicates the LAWG injected 207.2 acre-ft of water. These data are not included separately in the RBMB database; it is assumed the water was injected in the VWC wells.

- (1) Watermaster RBMB Report data for water years 1993-1994 and 1994-1995 divided equally between VWC-2 and VWC-3.

**Table 2-3. Summary of Sewer Installations for Selected Buildings at JPL**

<b>Building Number</b>	<b>Year Connected to Sewer</b>	<b>Notes</b>
<i>Existing Buildings</i>		
11	1956	
86	1956	
90	1956	
97	1956	
98	1956	
103	1956	
107	1956	
117	1956	
197	1961	Building connected to sewer when initially built in 1961.
<i>Demolished Buildings</i>		
2	Never	Building not shown on 1956 Sewer Connection Plan - assumed demolished prior to 1956.
3	Never	Building not shown on 1956 Sewer Connection Plan - assumed demolished prior to 1956.
4	Never	Building not shown on 1956 Sewer Connection Plan - assumed demolished prior to 1956.
12	1956	
13	1956	
17	1956	
19	1956	
22	Never	Building not shown on 1956 Sewer Connection Plan - assumed demolished prior to 1956.
32	1956	
34	1956	
46	1956	
55	1956	
59	1956	
63	1956	
65	1956	
68	Never	Building not shown on 1956 Sewer Connection Plan - assumed demolished prior to 1956.
71	1956	
74	1956	
77	1961	
78	1956	
81	1956	
101	1956	
112	1956	
127	Never	Building not shown on 1956 Sewer Connection Plan - assumed demolished prior to 1956.

Notes: Sewer mains were constructed at JPL in 1955.  
Sewer mains were available for use and connection to buildings in 1956.  
Dates of construction are based on 1956 "As-Constructed" Army Corps of Engineers drawings.

**Table 3-1. Summary of CCl<sub>4</sub>, PCE, TCE, and Perchlorate Groundwater Concentration Data in the Sunset Reservoir Wells and Select JPL Monitoring Wells**

Chemical	Parameter	Well															
		MW-19 <sup>(1)</sup>					MW-20 <sup>(1)</sup>					Sheldon	Sunset	Bangham	Copelin	Garfield	Villa
		1	2	3	4	5	1	2	3	4	5						
CCl <sub>4</sub>	Number of Samples	27	27	27	27	27	25	27	27	27	27	3	49	45	56	29	28
	Number of Detections	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	Number of Detections at or above MCL	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	Maximum Detection (µg/L)	ND	ND	ND	<b>0.5</b>	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
TCE	Number of Samples	27	27	27	27	27	25	27	27	27	27	3	61	53	74	29	28
	Number of Detections	0	21	16	12	10	0	0	0	0	0	0	46	5	46	0	0
	Number of Detections at or above MCL	0	0	0	0	0	0	0	0	0	0	0	18	0	7	0	0
	Maximum Detection (µg/L)	ND	1.7	1.1	1.5	0.6	ND	ND	ND	ND	ND	ND	<b>31.1</b>	3.7	<b>10</b>	ND	ND
PCE	Number of Samples	27	27	27	27	27	25	27	27	27	27	3	61	53	73	29	28
	Number of Detections	0	18	27	6	27	0	0	1	0	0	0	44	5	45	0	0
	Number of Detections at or above MCL	0	0	0	0	0	0	0	0	0	0	0	14	0	0	0	0
	Maximum Detection (µg/L)	ND	2.0	3.1	1.0	4.5	ND	ND	0.3	ND	ND	ND	<b>23.2</b>	2.8	4	ND	ND
Perchlorate	Number of Samples	24	24	24	24	24	23	24	24	24	24	0	64	76	77	45	42
	Number of Detections	0	4	11	1	3	15	0	0	5	2	0	57	58	68	28	26
	Number of Detections at or above AL	0	0	1	0	0	7	0	0	5	1	0	51	29	64	2	2
	Maximum Detection (µg/L)	ND	4.5	<b>7.2</b>	4.9	4.4	<b>7.8</b>	ND	ND	<b>124</b>	<b>8.2</b>	N/A	<b>12.8</b>	<b>9</b>	<b>17.4</b>	<b>27.7</b>	<b>7.2</b>

Note: Bold highlight indicates regulatory level was exceeded.

(1) Well has five well screens at varying depths; additional columns represent each well screen in descending order with depth.

ND = not detected.

N/A = not analyzed.

**Table 3-2. Summary of CCl<sub>4</sub>, PCE, TCE, and Perchlorate Groundwater Concentration Data in RCLWA, LAWC, Las Flores Water Company, and Select JPL Monitoring Wells**

Chemical	Parameter	Well					
		LAWC 3	LAWC 5	JPL MW-20 <sup>(1)</sup>	Rubio Canyon 4	Rubio Canyon 7	Las Flores 2
CCl <sub>4</sub>	Number of Samples	71	43	133	11	10	26
	Number of Detections	33	18	0	0	0	0
	Number of Detections at or above MCL	32	15	0	0	0	0
	Maximum Detection (µg/L)	<b>2.6</b>	<b>1.9</b>	ND	ND	ND	ND
TCE	Number of Samples	116	103	133	12	60	27
	Number of Detections	98	100	0	0	9	0
	Number of Detections at or above MCL	60	84	0	0	0	0
	Maximum Detection (µg/L)	<b>31</b>	<b>57.4</b>	ND	ND	3.4	ND
PCE	Number of Samples	71	45	133	11	10	216
	Number of Detections	33	25	1 <sup>(2)</sup>	0	0	203
	Number of Detections at or above MCL	0	0	0	0	0	189
	Maximum Detection (µg/L)	2.9	2.6	0.3 <sup>(2)</sup>	ND	ND	<b>17.2</b>
Perchlorate	Number of Samples	37	20	23 (Layer 1) 24 (Layer 2) 24 (Layer 3) 24 (Layer 4) 24 (Layer 5)	11	12	44
	Number of Detections	32	16	15 (Layer 1) 0 (Layer 2) 0 (Layer 3) 5 (Layer 4) 2 (Layer 5)	7	0	43
	Number of Detections above Action Level	21	2	7 (Layer 1) 0 (Layer 2) 0 (Layer 3) 5 (Layer 4) 1 (Layer 5)	1	0	31
	Maximum Detection (µg/L)	<b>16</b>	<b>6</b>	7.8 (Layer 1) ND (Layer 2) ND (Layer 3) <b>124</b> (Layer 4) <b>8.2</b> (Layer 5)	<b>6</b>	ND	<b>9</b>

Note: Bold highlight indicates regulatory level was exceeded.

ND = not detected.

(1) Well installed in 1996 and has five well screens at varying depths.

(2) The lone PCE detection in JPL MW-20 occurred in Screen 3 in January/February 2002.

**Table 3-3. Summary of Groundwater Quality Data for RCLWA, LAWC,  
and Las Flores Water Company Production Wells**

<b>Well</b>	<b>Date</b>	<b>TDS (mg/L)</b>	<b>Groundwater Type</b>
Rubio Canyon 4	01/13/1986	420	1
	06/20/1989	468	1
	12/27/1994	321	1
	04/24/2000	324	1
	01/13/2003	320	1
Rubio Canyon 7	01/05/1987	260	1/2
	06/07/1993	292	1
	12/27/1994	259	2
	04/24/2000	270	1
	01/13/2003	300	2
Las Flores 2	02/26/1981	432	1/3
	02/26/1990	350	1/3
	09/19/1994	364	1/3
	12/19/1994	374	1/3
	12/08/1997	410	1/3
	12/13/1999	423	1/3
	11/19/2001	420	1/3
LAWC 3	04/16/1993	247	1
	04/04/1994	215	1
	06/12/1995	225	1
	06/01/1998	216	1
	05/23/2001	230	1
LAWC 5	04/16/1993	242	2/1
	04/04/1994	247	1
	06/12/1995	253	1
	06/01/1998	230	1
	05/23/2001	250	1

**Table 3-4. Summary of CCl<sub>4</sub>, PCE, TCE, and Perchlorate Groundwater Concentration Data in VWC, LCID and Select JPL Monitoring Wells**

Chemical	Parameter	Well												
		LCID-1	LCID-6	VWC-1	VWC-2	VWC-3	VWC-4	JPL MW-14 <sup>(1)</sup>					JPL MW-6	JPL MW-7
								1	2	3	4	5		
CCl <sub>4</sub>	Number of Samples	14	6	55	53	37	62	26	27	27	27	26	27	23
	Number of Detections	0	0	0	0	0	1	0	0	0	0	0	0	23
	Number of Detections at or above MCL	0	0	0	0	0	1	0	0	0	0	0	0	23
	Maximum Detection (µg/L)	ND	ND	ND	ND	ND	0.6	ND	ND	ND	ND	ND	ND	<b>208</b>
TCE	Number of Samples	14	6	68	53	37	79	26	27	27	27	26	27	23
	Number of Detections	0	0	60	32	11	57	3	24	14	1	0	6	23
	Number of Detections at or above MCL	0	0	2	0	0	3	0	3	0	0	0	0	21
	Maximum Detection (µg/L)	ND	ND	<b>6.3</b>	1.5	0.8	<b>9.6</b>	3.7	<b>6.2</b>	4.0	0.5	ND	0.8	<b>39</b>
PCE	Number of Samples	25	12	76	54	37	162	26	27	27	27	26	27	23
	Number of Detections	7	6	73	45	36	156	16	26	10	2	0	20	22
	Number of Detections at or above MCL	0	0	58	36	3	108	0	0	0	0	0	1	7
	Maximum Detection (µg/L)	1.4	1.4	<b>110</b>	<b>32</b>	<b>6</b>	<b>290</b>	1.4	1.9	0.7	0.4	ND	<b>5.0</b>	<b>32.8</b>
Perchlorate	Number of Samples	14	13	17	17	17	15	23	24	24	24	24	24	22
	Number of Detections	1	0	7	6	9	6	11	13	17	8	0	11	22
	Number of Detections at or above Action Level	0	0	1	3	5	3	1	3	8	1	0	1	22
	Maximum Detection (µg/L)	4.8	ND	<b>6.4</b>	<b>7.4</b>	<b>7.3</b>	<b>8</b>	<b>6.6</b>	<b>9.6</b>	<b>7.9</b>	<b>9.9</b>	ND	<b>15.4</b>	<b>13,300</b>

Note: Bold highlight indicates regulatory level was exceeded.

ND = not detected.

(1) Well has five well screens at varying depths; additional columns represent each well screen in descending order with depth.

**Table 3-5. Summary of Groundwater Quality Data for LCID and VWC Production Wells**

Well	Date(s)	Groundwater Type	Average TDS (mg/L)
VWC-1	03/06/1990	1	661
	02/02/1993 07/07/1999	3/1	678
	06/17/1994 12/13/1994 06/14/1995 06/05/1996 07/07/1997 06/01/1998 07/05/2000 07/01/2002	3	648
	12/30/1987 12/09/1993 07/05/2000	1	743
VWC-2	08/08/1994 12/13/1994 06/13/1995 06/04/1996 07/01/1997 07/07/1999 06/01/1998 07/01/2002	1/3	645
	06/12/1995 07/07/1999 07/05/2000 07/01/2002 06/05/1996 07/01/1997 06/01/1998	3	659
	03/06/1990 09/17/1991 09/16/1992 02/02/1993 12/13/1993 12/13/1994 07/07/1997 07/05/2000	3/1	574
	06/17/1994 06/14/1995 06/04/1996 06/01/1998 07/01/2002	3	604
LCID-1	08/31/1992 03/19/1995 06/20/1989 12/27/1994	1	350
	03/16/1998 03/19/2001	1/3	418
LCID-6	06/20/1989	1	308
	10/16/1997 12/18/2000	1/3	390

**Table 3-6. Summary of NASA Responsibility in Raymond Basin Wells**

Purveyor	Chemical Concentrations				Water Quality	Alternate Source	Groundwater Modeling	Other <sup>(1)</sup>
	PCE	TCE	CCl <sub>4</sub>	Perchlorate				
PWP (Sunset Reservoir)	-	-	O	-	-	-	-	-
LAWC	-	X	X	X	X	-	X	-
RCLWA	-	-	-	-	X	-	X	-
Los Flores Water Co.	O	-	-	-	O	-	-	-
VWC	O	-	O	-	O	O	O	O
LCID	O	-	O	-	O	O	O	O

X = Data indicate that NASA is the most likely source.

- = Data are inconclusive.

O = Data indicate that NASA is NOT the most likely source.

(1) Other lines of evidence include groundwater flux, production/extraction volumes, and groundwater-level elevations.

**Table 4-1. Proposed Schedule for Additional Monitoring Well Installation**

<b>Task Name</b>	<b>Duration (Days)</b>	<b>Start Date</b>	<b>End Date</b>
<b><i>Logistics Coordination</i></b>			
City of Pasadena:			
<i>Use Agreement and Right-of-Entry for Environmental Actions finalization</i>	TBD	TBD	TBD
Final Selection of Well Location	31	07/01/04	07/31/04
Permit Department Notifications	31	07/01/04	07/31/04
Utility Map Review	31	07/01/04	07/31/04
Raymond Basin Management Board Notification	1	07/01/04	07/01/04
<b><i>Well Construction</i></b>			
Drilling Notifications	30	09/01/04	09/30/04
Utility Clearance and Geophysical Survey	30	09/01/04	09/30/04
Well Drilling and Construction (3 months per well)	182	10/01/04	04/01/05
Initial Well Development			
First Well	15	02/01/05	02/15/05
Second Well	15	05/01/05	05/15/05
Westbay Equipment Installation			
First Well	15	05/16/05	05/31/05
Second Well	15	06/01/05	06/15/05
Westbay Screen Development			
First Well	7	06/01/05	06/07/05
Second Well	7	06/16/05	06/22/05
IDW Sampling, Profiling, and Disposal	259	10/15/04	07/01/05
Groundwater Sampling	TBD	TBD	TBD
<b><i>RI Addendum Report Preparation</i></b>			
Draft RI Addendum Report	60	06/30/05	08/30/05
Final RI Addendum Report	30	09/30/05	10/30/05

Notes: Schedule is tentative and subject to subcontractor availability. IDW handling will be ongoing throughout each aspect of the fieldwork. Wastes will be sampled, profiled, manifested and disposed of as efficiently as possible.

TBD = to be determined.

**Table 4-2. Analytes Included in Waste Characterization Sampling**

<b>Medium</b>	<b>Analysis</b>	<b>Analytical Method</b>
Soil	VOC	8260
	SVOC	8270
	CAM17 + Strontium	6010B
	Perchlorate	314
	Cyanide	335.2
	Hexavalent Chromium	7199
	TPH	8015
	RCI	TBD
Water	VOC	8260
	SVOC	8270
	CAM17 + Strontium	6010B
	Perchlorate	314
	Cyanide	335.2
	Hexavalent Chromium <sup>(1)</sup>	7199
	TPH	8015

(1) There is a maximum hold time for hexavalent chromium samples.

TBD = to be determined.