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October 7, 2008

101-73.1

John Kessler, Project Manager
California Energy Commission
1516 Ninth Street
Sacramento, California 95814
Email: Jkessler@energy.state.ca.us

Subject: CPV Sentinel, LLC Energy Project (07-AFC-3)
Mission Creek Ground Water Subbasin

Dear Mr. Kessler:

David K. Luker, General Manager of Desert Water Agency, has requested Krieger & Stewart to comment on the estimated time it takes water infiltrated at the Mission Creek Recharge Basins to reach the underlying ground water table and the estimated transmissivity of the Mission Creek Ground Water Subbasin aquifer, particularly within the vicinity of the aforementioned recharge basins and CPV Sentinel, LLC's Energy Project.

A. ESTIMATED TIME TO REACH GROUND WATER TABLE

Figure 1, attached, shows water levels in the Mission Creek Monitoring Well (MCMW) located at the Mission Creek Recharge Basins and in Mission Springs Water District's (MSWD) Well 30, both as related to ground water recharge. Water levels are expressed in measured depth to the water table and recharge is based on Metropolitan Water District month-end water delivery meter readings.

Recharge activities at the Mission Creek Recharge Basins were initiated in November 2002. During 2002, approximately 4,733 acre-feet (AF) were recharged through the Mission Creek Recharge Facilities. Subsequent recharge events occurred in 2004, 2005, 2006, and 2007 wherein approximately 5,822, 24,723, 19,900, and 1,012 AF, respectively, were recharged through the Mission Creek Recharge Facilities.

The first indication of rising water level in the MCMW was on May 29, 2003 (about seven months after initiation of recharge activities), when the water level rose 1.5 feet (ft) from the previous measurement, which was made on April 18, 2003 (about six months after initiation of recharge activities).

Since no water level measurements were made during 2003 before April 18, 2003 or between April 18 and May 29, the water level may have begun to rise sooner. If the slope of the declining water level were projected in a linear fashion based on the two earliest water level measurements (May 27, 1997 and August 29, 2000, see dashed line on Figure 1), it is likely that water levels had begun to rise by the April 18, 2003 water level measurement and perhaps even sooner, specifically six months or less.

Since no water level measurements were made during and immediately following initial recharge, it is impossible to accurately determine when the water level actually began to rise. Further, the unsaturated formations underlying the spreading basins had to be saturated from the basins to the water table. Because of these complications, we elected to ignore the 2002 recharge event in our calculation.

The initial and subsequent recharge events are set forth as follows:

Ground Water Recharge Events

Recharge				Water Level Rise		
Event Number	**Date Initiated**	**Quantity (AF)**	**Duration (Months)**	**Date Measured**	**Elapsed Time (Months)**	**Increase (Ft)**
1	11/2002	4,733	2	05/29/2003	7	1.5
2	10/2004	5,822	3	02/12/2005	4	0.3
3	03/2005	24,723	10	ID	ID	ID
4	03/2006	19,900	8	05/01/2006	2	19.6
5	09/2007	1,012	2	ID	ID	ID

ID = Insufficient Data

Based on the above (taking into account the frequency of MWD meter readings, MCMW water level measurements, and excluding the initial recharge event due to insufficient water level measurement data), we conclude that the time required for water discharged into the Mission Creek Recharge Basins to reach the underlying aquifer ranges between two and four months, depending upon the extent of time between recharge events, based on 2004 and 2006 recharge events.

B. ESTIMATED TRANSMISSIVITIES WITHIN GROUND WATER SUBBASIN

In order to address transmissivity, we have reviewed the data, memoranda, and reports prepared by URS for the CPV Energy Project (2008). We have also reviewed the Slade report (May 2000) and the GTC report (1979), both of which were authored by Slade; United States Geological Survey reports (1971, 1978, and 1992) authored by Tyley, Swain, and Richards and Meadows, respectively; and ground water assessment reports (1978 through 2008) prepared by Krieger & Stewart.

With regard to the Tyley report and Tyley's determination of transmissivity for the Mission Creek Ground Water Subbasin, available data was sparse, so Tyley had to make numerous assumptions and extrapolations. Most, if not all, of the MSWD wells had not been constructed when Tyley conducted his investigation. He essentially completed data collection in 1967, analyzed and processed said data the following two years, and then produced an advance copy of the draft report for review and comment in early 1970.

The wells that Tyley considered in the determination of transmissivity within the Mission Creek Ground Water Subbasin were, for the most part, small, shallow, and of questionable construction. Several of the wells penetrated the water table 60 ft or less and became unusable with the declining water table. Also, some of the wells were constructed by local well drillers who used Indio Hills Mud for drilling fluid rather than commercial grade material such as bentonite, and Indio Hills Mud tended to seal the aquifer formation and reduce specific capacity.

Most of the wells currently operated by MSWD and Coachella Valley Water District (CVWD) were constructed using reverse rotary circulation techniques; however, a few of the wells were constructed using direct circulation techniques. Regardless, both direct and reverse circulation wells were developed more thoroughly and the wells are larger, deeper, and penetrate the ground water aquifer to greater depths, thus more closely reflecting the ground water aquifer characteristics within the upper portion (upper 1,000 ft) of the saturated aquifer and the data from these wells provides more reliable data for estimating transmissivity.

Tyley's preferred method of determining transmissivity was to use the modified non-equilibrium (Jacob) equation to estimate transmissivity at a well (in this case, this involves multiplying the specific capacity of a well by a factor of 1,800). In the absence of specific capacity information, Tyley estimated, based on available well logs, conductivity by zone and thereafter converted that to average transmissivity for the well. Since Tyley extrapolated westerly estimated transmissivities from limited, sparse data, his transmissivity estimates, although best under the circumstances, appear to be conservatively low.

Using the same procedure as Tyley, the estimated average transmissivities within the Mission Creek Subbasin range between 22,000 and 366,000 gallons per day per foot (gpd/ft) (based on average specific capacities ranging between 12.2 and 203.2 gallons per minute per foot of drawdown (gpm/ft dd) as shown in Table 1), from the wells shown on Figure 2 (MSWD Wells 22, 24, 27, 28, 29, 30, 31, 32, and 34; CVWD Wells 3408, 3409, and 3410; and CPV Well PW-1). The well with the lowest average specific capacity of those evaluated was MSWD Well 34 at 12.2 gpm/ft dd. The well with the highest specific capacity of those evaluated was MSWD Well 29 at 203.2 gpm/ft dd. The estimated maximum transmissivities, based on the maximum specific capacities of the same wells (with unreasonably high outliers omitted), range between 47,000 and 530,000 gpd/ft. The specific capacities were based on pumping data collected between May 1970 and December 2007.

Our estimated transmissivity ranges are shown on Figure 3, using Tyley's original transmissivity distribution patterns to show approximate regions with similar transmissivities. As shown thereon, MSWD Wells 27, 31, and 32 and CVWD Well 3410 fall within the 300,000 transmissivity zone (with CVWD Well 3410 close to the boundary with the 200,000 zone); MSWD Wells 22, 24, and 29 and CVWD Wells 3408 and 3409 fall within the 200,000 transmissivity zone (with CVWD Well 3409 close to the boundary with the 300,000 zone); MSWD Wells 28 and 30 and the CPV PW-1 Well fall within the 100,000 transmissivity zone; and MSWD Well 34 falls on the boundary between the 20,000 and 40,000 transmissivity zones. MSWD Well 34 is currently not in operation. Although MSWD Well 34 operated initially with a specific capacity of approximately 26 gpm/ft dd, corresponding to a transmissivity of about 47,000 gpd/ft, the specific capacity declined precipitously over time to less than 5 gpm/ft dd, at which point the pump, damaged by cavitation, was removed from service. Based on the calculated transmissivities at the above-noted well locations, some adjustments to the original Tyley transmissivity distribution are warranted. Regardless, based on data available subsequent to Tyley's investigation, Tyley's transmissivity figures can safely be increased by a factor of 1.5 to 2.

In summary, water infiltrated at the Mission Creek Recharge Basins will reach the underlying ground water table in two to four months based on two specific recharge events (2004 and 2006), and estimated transmissivity within the Mission Creek Ground Water Subbasin Aquifer is 1.5 to 2 times Tyley's estimates based on data which became available subsequent to Tyley's investigation. We have increased Tyley's transmissivity estimates from 200,000 gpd/ft to 300,000 gpd/ft, from 100,000 gpd/ft to 200,000 gpd/ft, from 50,000 gpd/ft to 100,000 gpd/ft, from 25,000 gpd/ft to 40,000 gpd/ft, and from 10,000 gpd/ft to 20,000 gpd/ft based on such data.

Sincerely,

KRIEGER & STEWART

Robert A. Krieger

RAK/blt
101-73P1-JK-L1

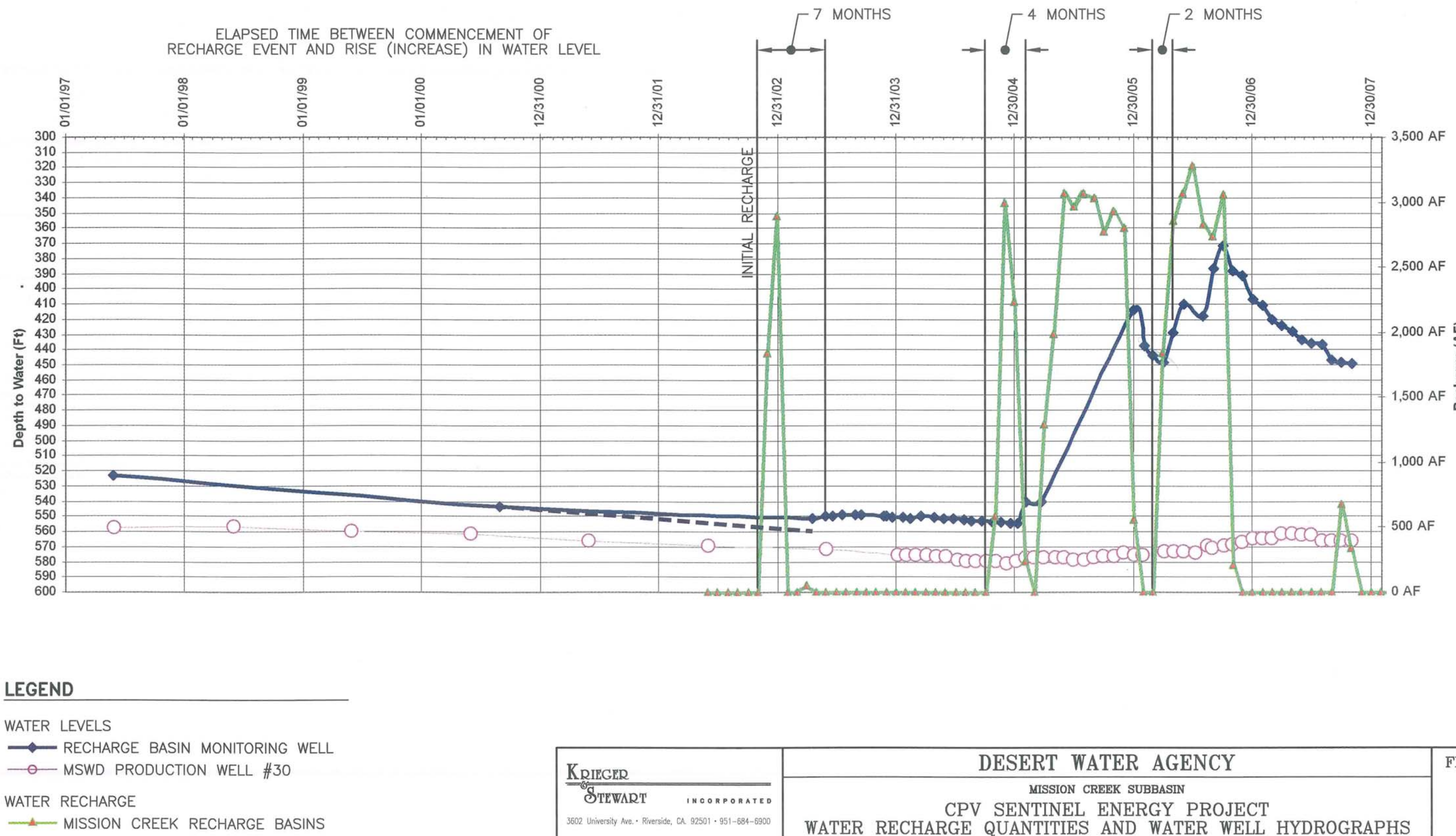
Attachments: Table 1 – Summary of Calculated Specific Capacity and Transmissivity Data
Figure 1 – Water Recharge Quantities and Water Well Hydrographs
Figure 2 – Well Locations
Figure 3 – Transmissivity Values

cc: David K. Luker, Desert Water Agency
Kris Helm, Consultant

TABLE 1
SUMMARY OF CALCULATED
AVERAGE SPECIFIC CAPACITY AND TRANSMISSIVITY DATA

Well No.	Specific Capacity (gpm/ft dd)		Transmissivity (gpd/ft)	
	Max	Avg	Max	Avg
MSWD 30	87.0	64.5	156,600	116,189
MSWD 28	68.3	58.8	122,940	105,777
MSWD 22	160.9	113.0	289,620	203,394
MSWD 24	159.9	111.3	287,820	200,393
MSWD 29	293.1	203.2	527,580	365,813
MSWD 27	203.7	145.3	366,660	261,460
MSWD 31	206.5	165.4	371,700	297,731
MSWD 32	254.6	195.9	458,280	352,678
MSWD 34	26.0	12.2	46,782	21,948
CVWD 3408	112.8	109.9	203,040	197,730
CVWD 3409	89.8	88.0	161,640	158,400
CVWD 3410	111.1	111.1	199,980	199,980
CPV PW-1	85.8	85.8	154,440	154,440

Note: Transmissivity above has been derived by multiplying specific capacity by 1800, the same factor used by Tyler (1974).



KRIEGER & STEWART INCORPORATED 3602 University Ave. • Riverside, CA. 92501 • 951-684-6900	DESERT WATER AGENCY MISSION CREEK SUBBASIN CPV SENTINEL ENERGY PROJECT WATER RECHARGE QUANTITIES AND WATER WELL HYDROGRAPHS	FIGURE 1 OF 3
SCALE: N.T.S.	DATE: 10/6/08 DRAWN BY: TMW CHECKED BY: DFS W.O.: 101-73	

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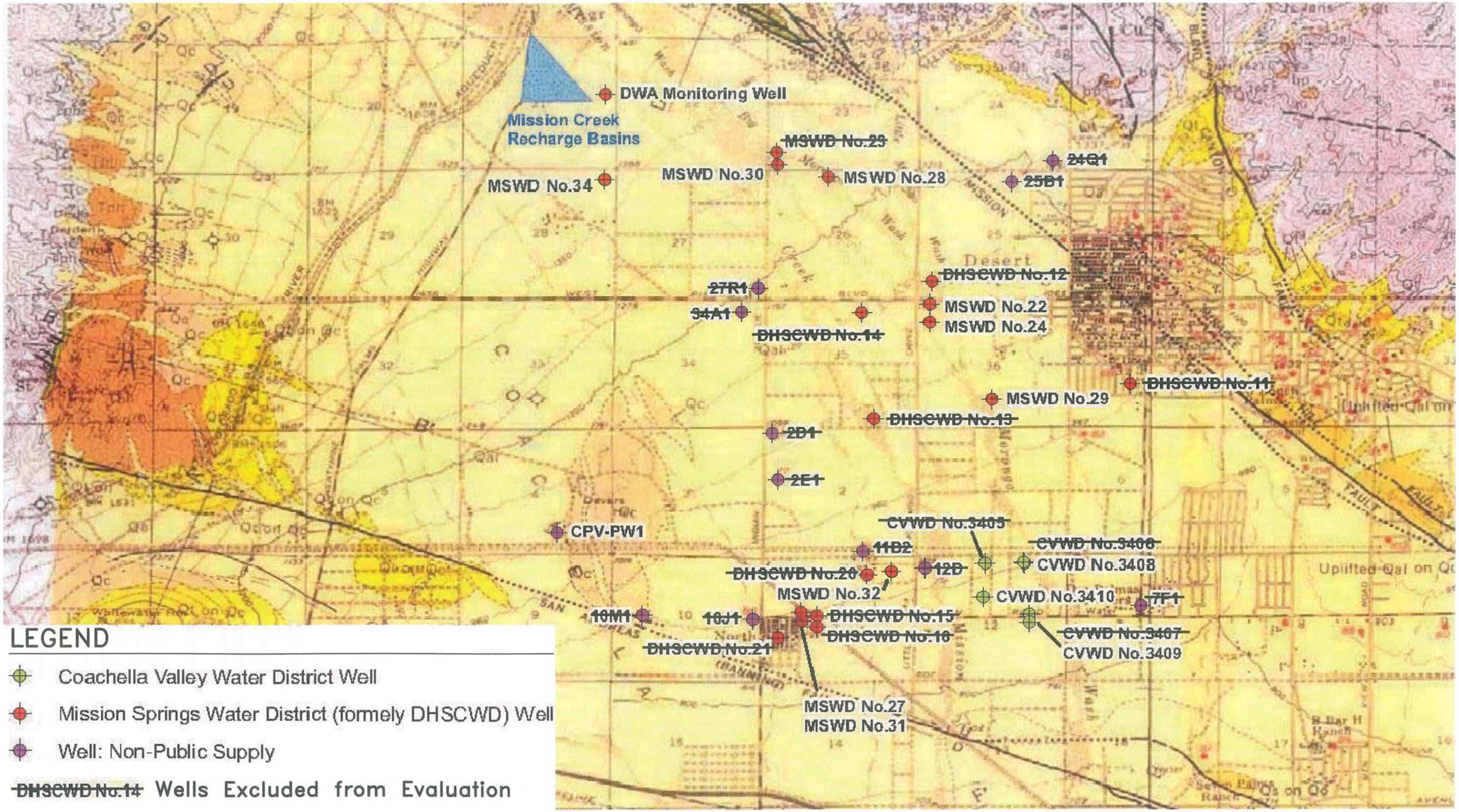

REFERENCE: State of Califorina, The Resources Agency, Department of Conservation, Division of Mines and Geology, Desert Hot Springs Area, Riverside County, California, 1968, Special Report 94 by R.J. Proctor

SOURCE: URS July 2008 (Mission Springs Water District Wells 32 and 34 Added)

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DESERT WATER AGENCY
MISSION CREEK SUBBASIN
CPV SENTINEL ENERGY PROJECT
WELL LOCATIONS

FIGURE 2 OF 3

SCALE: N.T.S. DATE: 10/6/08 DRAWN BY: TMW CHECKED BY: DFS W.O.: 101-73

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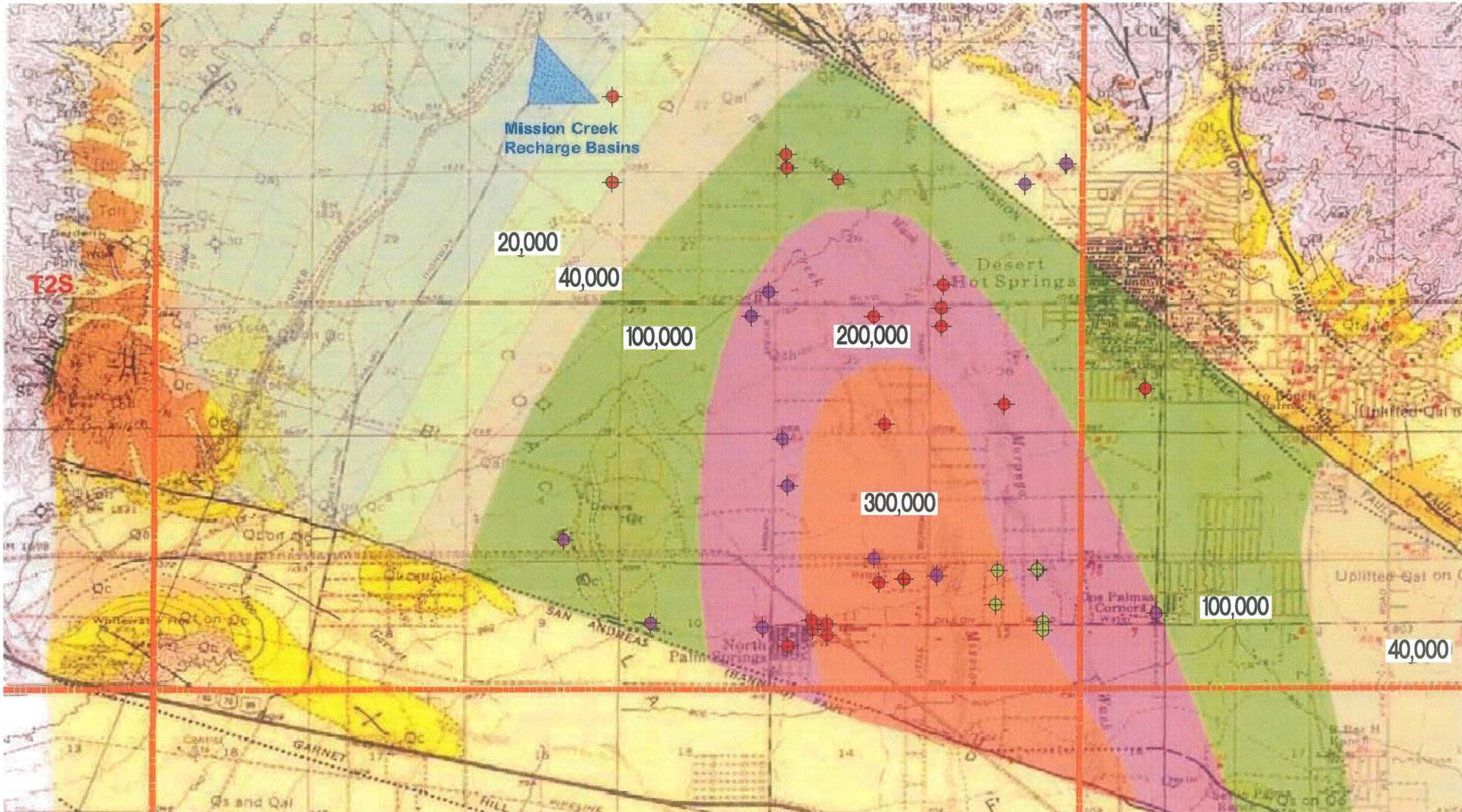

REFERENCE: State of Califorina, The Resources Agency, Department of Conservation, Division of Mines and Geology, Desert Hot Springs Area, Riverside County, California, 1968, Special Report 94 by R.J. Proctor

SOURCE: URS July 2008

Transmissivity Distribution Is Based on Tyley (1974). Transmissivity Values Are Based on Specific Capacity Data for Wells Constructed within Last 40 Years.

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DESERT WATER AGENCY

MISSION CREEK SUBBASIN

CPV SENTINEL ENERGY PROJECT TRANSMISSIVITY VALUES

SCALE: N.T.S. DATE: 10/6/08 DRAWN BY: TMW CHECKED BY: DFS W.O.: 101-73

FIGURE 3 OF 3

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