Estimate of Water Availability to Accompany Water Right Application 31560 of Michael F. and Kelly J. Nichelini

California Water Code Section 1260(k) requires that every application for a permit to appropriate water shall include "sufficient information to demonstrate a reasonable likelihood that unappropriated water is available for the proposed appropriation." This narrative and accompanying calculations provide the required information.

The subject Application includes a point of diversion (POD) on an unnamed stream tributary to Oak Moss Creek thence Capell Creek thence Putah Creek (Lake Berryessa) thence Yolo Bypass in Napa County (see attached map). The following describes the methodology used to demonstrate a *reasonable* likelihood that water is physically available for the proposed appropriation.

The attached map shows the proposed point of diversion and the watershed area tributary thereto. The map also shows lines of equal mean annual runoff as shown on the map included with the document entitled *Mean Annual Runoff in the San Francisco Bay Region, California, 1931-70 by S.E. Rantz, 1974.*[1] An excerpt of this map is attached (Rantz map).

The weighted mean annual runoff for the watershed tributary to POD #1 was computed based on the Rantz map. Mean *seasonal* runoff for the subject watershed was estimated by adjusting the mean annual runoff assuming that the ratio of seasonal to annual runoff is identical to the ratio of seasonal to annual mean precipitation. The Napa State Hospital precipitation station was used for this purpose. The resulting seasonal runoff value was adjusted by deducting the *face value* of any senior water rights in the watershed above the proposed points of diversion.

Calculations for the foregoing methodology are attached. These calculations show that in an average water year, approximately 17.2 acre-feet would accrue to POD #1. This would be ample to fill the 10 acre-foot reservoir at POD #1, leaving about 7.2 acre-feet of runoff remaining. Accordingly, it is reasonable to conclude that water is available for the subject Application.

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[1] USGS Miscellaneous Field Studies Map MF-613, prepared in cooperation with the California Department of Water Resources.

Mean Annual Runoff in the San Francisco Bay Region, California, 1931-70 (Miscellaneous Field Studies Map MF-613), by S.E. Rantz, 1974.

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Estimate of Water Availability

Point of Diversion #1

Monthly Precipitation[1]

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Month	Mean Precipitation (in)
October	1.37
November	3.04
December	4.69
January	4.87
February	4.53
March	3.32
April	1.67
May	0.70
June	0.22
July	0.02
August	0.08
September	0.27
Annual	**24.78**

Mean Precipitation for requested diversion season (11/15 - 4/15):	19.78 in
Precipitation during requested diversion season as a percentage of total precipitation:	79.82%
Mean Annual Runoff:[2]	12.0 in
Estimated Mean Seasonal Runoff:[3]	9.6 in
Watershed Area for Point of Diversion #1:	21.5 ac

Total Estimated Mean Seasonal Runoff at Point of Diversion #1:	17.2 ac-ft
Senior Diverters of Record within subject watershed (face value):	0.0 ac-ft
Subtotal water available:	17.2 ac-ft
Requested diversion amount:	10.0 ac-ft
Total seasonal amount remaining in stream after diversion:	7.2 ac-ft

Notes:

[1] Source: California Climate Data Archive website (http://www.calclim.dri.edu/ccda/data.html) accessed January 8, 2009.

[2] *Mean Annual Runoff in the San Francisco Bay Region, California, 1931-70 (Miscellaneous Field Studies Map MF-613)*, by S.E. Rantz, 1974.

[3] Estimated mean seasonal runoff is computed by multiplying mean annual runoff by percent seasonal precipitation.

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Monthly Total Precipitation (inches)

(46074)

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WY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	ANN
1917				0 z	6.19	1.28	0.92	0.51	0	0	0	0.09	-
1918	0	0.47	1.3	1.04	6.48	2.91	0.75	0.06	0	0	0	2.65	15.66
1919	0.43	3.61	1.82	3.75	11.46	2.98 a	0.14	0.02	0	0	0	0.44	24.65
1920	0.37	0.3	4.62	0.39	1.03	3.53	1.54	0	0.18	0	0	0.15	12.11
1921	1.91	4.56	6.19	6.44	1.28	1.55	0.64	1.19	0	0	0	0.04 a	23.8
1922	0.62	1.55	0 z	2.16	5.87	2.46	0.68	0.38	0.21	0	0	0	-
1923	3.86	4.45	9.21	3.09	0.54	0.02	4.92	0	0	0	0.26	0.64	26.99
1924	0.26	0.35	0.84	2.58	3.53	1.35	0.35	0.1	0	0 d	0.16	0	9.52
1925	3.2	2.5	6.27	1.37	10.39	2.64	2.49	2.83	0.02	0	0	0.45	32.16
1926	0.56	2.91	1.14	5.15	8.27	0.12	4.98	0.5	0	0	0.07	0	23.7
1927	2.31	10.35	1.21	3.56	10.83	2.96	2.5	0.56	0.51	0	0	0	34.79
1928	2.21 a	4.04	5.77	3.19	2.21	6.54	0.63	0.32	0	0	0	0.01	24.92
1929	0.07	0.75	4.96	1.08	1.18	1.8	1.87	0.08	1.95	0	0	0	13.74
1930	0.04	0	5.1	5.3	2.47	3.9	1.36	0.54	0	0	0	0.96	19.67
1931	1.6	1.88	0.56	6.2	0.95	2.01	0.62	1.46	0.52	0	0	0	15.8
1932	0.66	2.88	11.58	3.81	1.45	0.96	1.01	0.95	0.12	0 a	0	0	23.42
1933	0	0.83	3.16	5.59	1.07	2.02 j	1.87 a	0.08	1.95	0	0	0	-
1934	2.19	0	4.91	1.52	3.96	0.42	0.68	0.78	0.04	0	0.05	0.03	14.58
1935	1.52	5.07	3.34	5.54	1.85	4.42	3.52	0.02	0	0	0.21	0.02	25.51
1936	2.1	0.88	2.45	5.98	8.69	1.85	1.62	0.26	0.7	0.03	0.04	0	24.6
1937	0.3	0	2.94	4.14	6.27	6.4	0.91	0.03	0.65	0.2	0	0	21.84
1938	1.23	3.75	5.17	4.29	11.38	6.31	1.88	0	0	0	0	0.11	34.12
1939	1.49	1.14	1.12	2.58	1.87	2.38	0.36	1.22	0	0	0	0.03	12.19
1940	0.49 c	0.12	1.32	10.11	9.47	6.31	0.76	1.32	0	0	0	0.2	30.1
1941	1.26	1.61	10.9	8.84	7.27	5.26	5.2	1.45	0.07	0	0	0	41.86
1942	2.6	2.88	9.52	5.32	6.35	4.07	4.51	1.36	0	0	0	0.01	36.62
1943	1.15	4.81	4.29	8.17	1.68	3.47	1.6	0	0.06	0	0	0	25.23
1944	0.66	1.54	2.29	4.93	6.9	1.47	1.94	1.25	0.99	0	0	0	21.97
1945	1.58	4.67	2.01 g	1.1	4.87	3.88	0.26	0.95	0	0	0	0	-
1946	3.4	3.21	9.69	1.26	1.96	2.03	0.25	0.62	0 b	0.01	0 a	0.03	22.46
1947	0.34	0 z	3.24	0.8	2.87	4.63	0.78	0.43	1.16	0	0	0	-
1948	4.65	0.96	0.58	1.7	1.21	4.08	4.61	1.35	0.09	0	0	0.21	19.44
1949	0.9	1.24	3.98	1.87	2.75	6.33	0	0.2	0	0	0.2 a	0	17.47
1950	0	2.44	2.16	7.71	3.75	2.41	1.07	0.28	0	0	0	0	19.82
1951	3.17	6.81	8.18	5.59	2.11	2.09	0.84	1.52	0	0	0	0.06	30.37
1952	1.24	3.83	8.64	10.05	2.32	4.46	0.77	0.37	0.59	0	0	0.02	32.29

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1953	0	2.39	11.7	5.03	0	3.37	3.17	0.63	0.58	0	0.1	0	26.97
1954	0.44	3.35	0.88	3.6	2.91	4.34	2.25	0.41	0.16	0	0.44	0	18.78
1955	0.15	3.13	5.26	3.04	1.96	0.53	1.93	0.2	0	0	0	0.58	16.78
1956	0.07	2.32	16.13	8.16	4.14	0.24	2.46	0.76	0.03	0	0 a	0.22	34.53
1957	1.77	0.06	0.42	2.95	5.18	2.06	1.57	3.6	0.25	0	0	1.31	19.17
1958	2.88	0.75	3.67	5.83	10.78	5.38	5.93	1.14	0.37	0	0	0	36.73
1959	0.15	0.12	1.4	5.48	7.6	1.09	0.19	0	0	0	0	2.37	18.4
1960	0	0	1.92	4.52	4.61	3.37	1.22	1.7	0	0	0	0	17.34
1961	0.23	4.23	3.05	4.1	1.63	3.92	1.21	0.21	0.03	0	0.08	0.23	18.92
1962	0.14	3.01	3.02	1.23	8.02	3.28	0.37	0	0	0	0.11	0.2	19.38
1963	10.37	0.97	3.93	4.71	3.79	4.91	5.66	0.44	0	0	0	0.29	35.07
1964	2.83	5.71	0.73	3.46	0.19	2.09	0.1	0.15	0.65	0.1	0.06	0	16.07
1965	1.48	3.37	7.93	5.18	0.8	1.68	3.29	0	0	0.04	0.85	0	24.62
1966	0.03	5.11	3.78	5.69	3.14	0.33	0.75	0.19	0.19	0.04	0.18	0.06	19.49
1967	0	6.61	4.55	11.65	0.46	6.08	5.42	0.12	1.95	0	0	0.09	36.93
1968	0.8	1.49	2.07	6.5	2.99	2.41	0.45	0.36	0	0	0.25	0	17.32
1969	1.62	2.9	4.87	8.3	7.58	1.03	1.59	0	0.03	0	0	0	27.92
1970	3.14	1.3	7.22	13.77	1.92	1.97	0.08	0	0.46	0	0	0	29.86
1971	1.55	7.28	8.4	1.68	0.28	3.57	0.49	0.21	0	0	0	0.24	23.7
1972	0.09	2.3	4.81	0.93	1.5	0.15	1.62	0.12	0.25	0	0	1.23	13
1973	3.34	6.95	3.39	11.37	5.61	3.1	0.11	0.02	0	0	0	0.41	34.3
1974	1.64	10.51	4.4	4.96	1.84	5.71	1.97	0.02	0	1.05	0	0	32.1
1975	1.04	0.99	2.92	2.39	6.79	7.17	1.3	0.03	0	0.14	0	0	22.77
1976	3.64	0.79	0.46	0.34	1.97	1.62	1.4	0	0	0	1.3	0.84	12.36
1977	0.46	1.26	1.27	1.75	1.5	2.58	0.48	1.21	0	0	0	0.72	11.23
1978	0.49	7.9	5.91	10.17	4.64	5.62	3.77	0.02	0	0	0	0.83	39.35
1979	0	2.53	1.11	10.34	5.35	1.98	1.79	0 z	0	0	0	0	-
1980	3.59	3.22	7.29	7.45	10.01	1.84	1.48	0.55	0.07	0.13	0	0	35.63
1981	0.24	0.19	3.32	5.92	1.58	4.03	0.32	0.44	0	0	0	0.17	16.21
1982	2.64	7.44	7.66	10.55	4.42	7.53	3.97	0	0	0	0	1.58	45.79
1983	3.63	7.74	3.41	7.7	10.62	11.12	3.94	0.49	0	0	0.73	0.86	50.24
1984	0.77	7.98	7.08	0.37	2.4	2.07	1.09	0.13	0.47	0.04	0.34	0.09	22.83
1985	2.03	7.77	1.48	1.75	2.79	4.42	0.07	0.03	0.05	0	0	0.79	21.18
1986	0.78	3.88	2.97	4.5	15.29	7.07	0.82	0.19	0	0	0	1.52	37.02
1987	0.26	0.15	1.98	4.11	4.63	4.28	0.16	0	0	0	0	0	15.57
1988	1.52	2.2	7.65	5.06	0.48	0.13	2.29	1.04	0.19	0	0	0	20.56

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1989	0.11	4.41	3.39	1.37	1.37	6.79	0.9	0.08	0.09	0	0	2.31	20.82
1990	1.48	1.68	0	4.05	3.5	1.18	0.34	3.27	0	0	0	0.36	15.86
1991	0.23	0.54 e	0.99	0.46	3.05	10.64	0.33	0.15	0.4	0	0.16	0.01	16.96
1992	2.47	0.84	2.18	2.28	7.34	4.28	0.63	0	1.09	0	0	0	21.11
1993	3.09	0.27	8.28	8.9	5.87	2.08	1.18 a	1.39	0.71	0	0	0	31.77
1994	1.15	3.49	3.5	2.56	3.62	0.19	1.27	1.57	0.04	0	0	0	17.39
1995	1.31	6.17	3.84	13.66	0.54	11.97	1.26	3.1	0.9	0	0	0	42.75
1996	0	0.18	8.9	8.21	9.6 a	2.35 b	3.81	3.72	0	0	0	0.03	36.8
1997	1.94	3.18	12.92	10.5	0.46	0.86	0.57	0.79	0.23	0	0.82	0.03	32.3
1998	1.26	7.95	2.56	8.73	14.15	2.68	1.55	2.99	0.15	0	0	0.15	42.17
1999	0.76	4.76	1.02	3.15	9.83	2.7	2.88	0.13	0	0	0	0.04	25.27
2000	0.75	2.84	0.91	5.36	9.88	2.92	1.69	1.54	0.12	0	0	0.11	26.12
2001	2.29	1.34	1.22	4.34	7.26	1.08	0.46	0	0.26	0	0	0.5	18.75
2002	0.51	6.17	9.45	3.5	1.93	2.63	0.3	1.25	0	0	0	0	25.74
2003	0	3.38	13.21	2.68	3.99	4.98	3.97	1.85	0	0	0.62	0.03	34.71
2004	0.25	3.14	7.7	3.6	6.52	0.86	0.34	0.1	0	0	0	0.14	22.65
2005	2.48	2.51	7.93	4.31 a	3.88	3.42	1.57	2.37	0.9	0	0	0.01	29.38
2006	0.67	2.25	15.49	4.69	3.71	8.41	5.75	1.19	0.11	0	0	0	42.27
2007	0.66	3.3	3.71	0.36	5.12	0.35	1.29	0.35	0	0	0	0.05	15.19
2008	2.01	1.05	4.10	10.06	3.44	0.35	0.19	0.08	0.00	0.00	0.00	0.00	21.28
2009	0.59	2.68 b	0.00 z										-

Period of Record Statistics													
MEAN*	1.37	3.04	4.69	4.87	4.53	3.32	1.67	0.70	0.22	0.02	0.08	0.27	25.10
MAX	10.37	10.51	16.13	13.77	15.29	11.97	5.93	3.72	1.95	1.05	1.30	2.65	50.24
MIN	0.00	0.00	0.00	0.34	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	9.52
NO YRS	92	91	89	91	92	91	92	91	92	92	92	92	86

* The mean annual precipiation for the period of record (25.10 inches) includes only complete years of data, therefore, it does not equate to the sum of the mean monthly values (24.78 inches).

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Calculation of Weighted Mean Annual Runoff in POD Watershed

Watershed	Area (ac)	Mean Annual Runoff (in)	Volume (ac-in)
POD 1			
	19.3	12.0	231.6
	2.2	12.0	26.4
Total	**21.5**		**258.0**
Weighted Average		**12.0**	