

**POTENTIAL FLOOD IMPACTS,
LAGUNA DE SANTA ROSA
FLOODPLAIN AND RUSSIAN RIVER
FLOODPLAIN**

SANTA ROSA SUBREGIONAL
LONG-TERM WASTEWATER PROJECT

Prepared for

City of Santa Rosa
and
U.S. Army Corps of Engineers

January 1996

Prepared by

DAMES & MOORE, INC.
221 Main Street, Suite 600, San Francisco, CA 94105 • 415/896-5858

For

HARLAND BARTHOLOMEW & ASSOCIATES, INC.

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Final

TECHNICAL MEMORANDUM

Potential Flood Impacts, Laguna de Santa Rosa Floodplain and Russian River Floodplain

TO: Harland Bartholomew & Associates, Inc.

FROM: Patrick Kaspari - Dames & Moore, San Francisco

DATE: January 1996

RE: Santa Rosa Subregional Long-Term Wastewater Project
Potential Flood Impacts, Laguna de Santa Rosa Floodplain and Russian River Floodplain

SUMMARY

An analysis was performed to identify potential impacts on flood levels that might occur due to discharge of reclaimed water from the Laguna Waste Water Treatment Plant (WWTP). There are two principal discharge points on the Laguna de Santa Rosa; the Meadow Lane Ponds, located west of Llano Road near the WWTP, and the Delta Pond, located south of Highway 12. In addition, there is one proposed new discharge point on the Russian River. Existing floodplain delineation maps and floodplain hydrology parameters were compiled and evaluated to determine if the discharge from any of the discharge points would increase the flood hazard in the Laguna de Santa Rosa or the Russian River. The conclusion of the analysis is that discharge of reclaimed water will increase the 100-year flood level less than 0.1 feet in either the Laguna or the Russian River.

PURPOSE

Determine whether or not discharge from the Laguna WWTP into the Laguna de Santa Rosa during the winter could increase the flood hazard in the Laguna or the Russian River. Determine whether or not direct discharge to the Russian River could increase flood hazards along the river.

METHODOLOGY

The scope of work for this task included:

1. Compile existing flood inundation mapping and flood hydrology parameters for use in determining the potential impact associated with alternative operation policies.

2. Compare the proposed operation of the discharge facilities to the existing flood hazards.
3. If potential significant impacts are identified, make recommendations for operation modifications to avoid or lessen the impacts. (A significant impact is defined as more than 0.10 foot-increase in the 100-year flood level.)
4. Delineate the new floodplain if any of the operation modifications increase peak flood levels by more than 0.10 feet.

FINDINGS

The "Flood Insurance Study" for Sonoma County, California (unincorporated areas) (FEMA, 1991; FEMA, 1992) was obtained from the United States Federal Emergency Management Agency. The peak flood flow rates and flood profiles from this study were analyzed in order to compare the proposed operation of the discharge facilities to the current flood hazard. The potential impact from the two principal discharge points on the Laguna de Santa Rosa, Meadow Lane Ponds and Delta Pond, were evaluated separately. The potential impact from direct discharge to the Russian River was also evaluated.

Meadow Lane Ponds

The discharge point for the Meadow Lane Ponds is located just upstream from the confluence of the Laguna de Santa Rosa and Colgan Creek. Based on the Flood Insurance Study, the 100-year peak flow in the Laguna at this point is 12,850 cubic feet per second (cfs). The 100-year flood water elevation at this point is 77.25 feet NGVD (National Geodetic Vertical Datum).

The maximum possible discharge rate from the Meadow Lane Ponds during a 100-year flood is approximately 95 cfs. This flow is based on the maximum gravity discharge from Meadow Lane Ponds through existing 36-inch-diameter pipes while the pond is at its maximum operating level of 94 feet NGVD and an additional discharge through the pumps located at the pond. The capacity of the gravity flow pipes is 49 cfs and the capacity of the pumps is 46 cfs, giving a combined discharge capacity of about 95 cfs. The addition of 95 cfs to the 100-year peak flow would yield a flow in the Laguna of 12,945 cfs. Based on the flood elevation and flood flow data presented in the Flood Insurance Study, the water surface elevation of the Laguna at 12,945 cfs is 77.265 ft. This is an increase of 0.015 feet. This increase in water surface elevation would probably not be measurable, and therefore the addition of this flow is expected to have a less than significant impact on the flood water elevations.

Delta Pond

The discharge point for Delta Pond is located immediately upstream of the point where the Santa Rosa Flood Control Channel joins the Laguna de Santa Rosa. Based on the Flood Insurance Study for this area, the 100-year peak flow at this point for the Laguna de Santa Rosa is 28,000 cfs. The 100-year flood water elevations in the Laguna de Santa Rosa at Delta Pond is 75.00 feet. This water surface elevation is due to backwater from the Russian River via the Laguna de Santa Rosa and remains constant at 75 feet from the mouth of the Laguna to a point in the Laguna approximately 6,000 feet upstream of Delta Pond.

The Delta Pond levee crest is at elevation 77 feet NGVD and the maximum operating water level is 75 feet NGVD. Because the maximum operating level is equal to the 100-year flood level, it is impossible to discharge water by gravity flow at the flood peak.

Water can be pumped from the treatment plant to a discharge point located at Delta Pond using the same pumps that can be used to pump water out of Meadow Lane Pond. The pump capacity is 46 cfs. Water can also be discharged from the West College pipeline at a maximum flow rate of 39 cfs. This gives a maximum total discharge rate of 85 cfs.

Water discharged from Delta Pond during large floods flows into the ponded area along the Laguna de Santa Rosa where backwater flow from the Russian River accumulates. It is difficult to estimate the change in flood levels that would occur due to the discharge without using a detailed hydraulic model. However, the maximum possible increase in flood levels can be estimated based on conservative assumptions about the flow of water through the backwater area. Assuming that no outflow from the Laguna de Santa Rosa to the Russian River occurs, the change in elevation would be equal to the volume of water discharged divided by the surface area of the flood plain.

Flood levels in the Laguna typically are high for 3 or 4 days during large floods and at peak levels for up to 2 days. Assuming no outflow from the backwater area for 2 days, the increase in flood levels due to wastewater discharge at a rate of 134 cfs (85 cfs from Delta Pond and 49 cfs by gravity from Meadow Lane Ponds) would be 0.11 feet. In reality there will be some flow through the ponded area which will tend to decrease the affect on flood levels. Therefore it is assumed that the increase in flood levels will be less than 0.10 feet.

Russian River

Direct discharge of reclaimed water to the Russian River is one alternative under consideration for the long term wastewater project. Water would be discharged at a peak rate of 40 cfs (775 MG per month). The town of Guerneville is located downstream from the discharge point and is the location where potential increases in flood levels could have a significant impact.

Flood stage at Guerneville (Hacienda Bridge) is defined by the U.S. Geological Survey as 32.00 feet stage (52.01 feet NGVD). According to the latest rating table for the streamflow gage at Guerneville dated January 9, 1995 this corresponds to a flow rate of 39,530 cfs. The table also shows that the difference in flood elevation between a flow of 39,530 cfs and 39,570 cfs (flow plus peak reclaimed water discharge) is approximately 0.015 feet.

If reclaimed water was discharged from the Meadow Lane Ponds, Delta Ponds and the direct discharge point on the Russian River at the same time, the combined increase in flow would be 174 cfs (95 cfs from Meadow Lane, 39 cfs from Delta Pond and 40 cfs direct discharge). The rating table for the gage at Guerneville indicates that the difference in flood elevation between a flow of 39,530 cfs and 39,704 cfs is 0.07 feet.

CONCLUSION

The proposed discharge from the primary discharge points on the Laguna de Santa Rosa or the Russian River will increase flood elevations less than 0.1 feet. The flood plain delineations developed by the Federal Emergency Management Agency do not provide sufficient detail to delineate this small change in the flooded area.

REFERENCES

1. Federal Emergency Management Agency (FEMA), Sept. 2, 1992. Flood Insurance Study, Sonoma County, California (unincorporated areas).
2. Ibid, revised April 2, 1991. Flood Insurance Rate Maps, Sonoma County, California (unincorporated areas), panels 060375-520 B, 060375-0660 B, 060375-0680 B, 060375-0690 B, 060375-0695 B, & 0600375-0835 B.
3. Project Description Summary, Santa Rosa Subregional Long-Term Wastewater Project. City of Santa Rosa, California. September 29, 1995.
4. CH2M Hill, Santa Rosa Subregional Water Reclamation System Long-Term Detailed Study, Phase 1: Development of Reclamation Alternative, February, 1989.
5. Pond operating parameters. Randy Piazza, City of Santa Rosa, July 6, 1995.

APPENDIX

RATING TABLE - GUERNEVILLE

UNITED STATES DEPARTMENT OF INTERIOR - GEOLOGICAL SURVEY - WATER RESOURCES DIVISION
 19467000
 PLEASANT R. NR. BISHOPVILLE, CA
 OFFSET: 1.00
 DATE PROCESSED: 9-09-1998 BY: 12-21 04 PHL/FFB
 TYPE: 100
 TYPE: 001
 RATING NO: 0037
 START DATE/TIME: 02-24-93 (0230)
 BASED ON _____ DISCHARGE MEASUREMENTS, NOS _____ AND _____ AND IS _____ WELL DEFINED BETWEEN _____ AND _____ CFS
 CORP. BY _____ DATE _____ CHK. BY _____ DATE _____
 BASED ON CWS, S 527-535

HEIGHT (FEET)	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09	DIFF IN 6 PER TENTH FT
1.70	56.00*	57.26	58.52	59.80	61.08	62.38	63.68	65.00	66.32	67.66	13.00
1.80	69.00*	70.27	71.54	72.82	74.11	75.41	76.71	78.03	79.34	80.67	13.00
1.90	82.00*	83.37	84.74	86.12	87.51	88.91	90.31	91.72	93.14	94.57	14.00
2.00	96.00*	97.37	98.75	100.1	101.5	102.9	104.3	105.7	107.2	108.6	14.00
2.10	110.0*	111.5	113.0	114.5	116.1	117.6	119.1	120.7	122.2	123.8	15.40
2.20	125.4	126.9	128.5	130.1	131.7	133.3	134.9	136.5	138.1	139.7	16.00
2.30	141.4	143.0	144.7	146.3	148.0	149.6	151.3	153.0	154.6	156.3	16.60
2.40	158.0	159.7	161.4	163.1	164.9	166.6	168.3	170.0	171.8	173.5	17.30
2.50	175.3	177.0	178.8	180.6	182.3	184.1	185.9	187.7	189.5	191.3	17.80
2.60	193.1	194.9	196.8	198.6	200.4	202.3	204.1	206.0	207.8	209.7	18.40
2.70	211.5	213.4	215.3	217.2	219.1	220.9	222.8	224.8	226.7	228.6	19.00
2.80	230.5	232.4	234.4	236.3	238.2	240.2	242.1	244.1	246.1	248.0	19.50
2.90	250.0*	252.0	254.0	255.9	257.9	259.9	261.9	263.9	266.0	268.0	20.00
3.00	270.0*	272.0	274.0	276.0	277.9	279.9	281.9	284.0	286.0	288.0	20.00
3.10	290.0*	292.0	294.0	296.0	298.0	299.9	302.0	304.0	306.0	308.0	20.00
3.20	310.0*	312.2	314.4	316.5	318.7	320.9	323.1	325.3	327.6	329.8	22.00
3.30	332.0*	334.2	336.4	338.5	340.7	342.9	345.1	347.3	349.6	351.8	22.00
3.40	354.0*	356.2	358.4	360.6	362.7	364.9	367.1	369.4	371.6	373.8	22.00
3.50	376.0*	378.2	380.4	382.6	384.8	387.0	389.2	391.4	393.6	395.8	22.00
3.60	398.0*	400.2	402.4	404.6	406.8	409.0	411.2	413.4	415.6	417.8	22.00
3.70	420.0*	422.3	424.6	426.9	429.2	431.5	433.8	436.1	438.4	440.7	23.00
3.80	443.0*	445.4	447.8	450.2	452.5	454.9	457.3	459.8	462.2	464.6	24.00
3.90	467.0*	469.5	472.0	474.5	476.9	479.4	481.9	484.5	487.0	489.5	25.00
4.00	492.0*	494.6	497.2	499.7	502.3	504.9	507.5	510.1	512.8	515.4	26.00
4.10	518.0*	520.8	523.6	526.3	529.1	531.9	534.7	537.5	540.4	543.2	28.00
4.20	546.0*	548.8	551.6	554.3	557.1	559.9	562.7	565.5	568.4	571.2	28.00
4.30	574.0*	576.8	579.6	582.3	585.1	587.9	590.7	593.5	596.4	599.2	28.00
4.40	602.0*	605.0	608.0	610.9	613.9	616.9	619.9	622.9	626.0	629.0	30.00
4.50	632.0*	635.1	638.1	641.2	644.3	647.4	650.5	653.6	656.8	659.9	31.00
4.60	663.0*	666.2	669.3	672.5	675.7	678.9	682.1	685.3	688.5	691.8	32.00
4.70	695.0*	698.3	701.5	704.8	708.1	711.4	714.7	718.0	721.3	724.7	33.00
4.80	728.0*	731.4	734.7	738.1	741.5	744.9	748.3	751.7	755.1	758.6	34.00
4.90	762.0*	765.5	768.9	772.4	775.9	779.4	782.9	786.4	789.9	793.5	35.00
5.00	797.0*	800.6	804.1	807.7	811.3	814.9	818.5	822.1	825.7	829.4	36.00
5.10	833.0*	836.7	840.3	844.2	848.0	851.8	855.6	859.3	863.1	866.9	37.80
5.20	870.8	874.6	878.4	882.2	886.1	889.9	893.8	897.6	901.5	905.4	38.50
5.30	909.3	913.2	917.1	921.0	924.9	928.8	932.7	936.7	940.6	944.6	39.20
5.40	948.5	952.5	956.5	960.5	964.5	968.5	972.5	976.5	980.5	984.5	40.10

UNITED STATES DEPARTMENT OF INTERIOR - GEOLOGICAL SURVEY - WATER RESOURCES DIVISION

PAGE 2

EXPANDED RATING TABLE

TYPE: LOG

11467000

RUSSIAN R NR GUERNEVILLE CA

OFFSET: 1.00

DATE PROCESSED: 01-09-1995 @ 15:31 BY PSMIFFER

DD: 6 TYPE: 001 RATING NO: 0037

START DATE/TIME: 02-24-93 (0230)

BASED ON CHM.3 527-535

HEIGHT (FEET)	DISCHARGE IN CUBIC FEET PER SECOND (EXPANDED PRECISION)										DIFF IN R PER TENTH FT
	.0	.01	.02	.03	.04	.05	.06	.07	.08	.09	
5.50	988.6	992.6	996.7	1001	1005	1009	1013	1017	1021	1025	40.40
5.60	1029	1033	1038	1042	1046	1050	1054	1058	1063	1067	42.00
5.70	1071	1075	1079	1084	1088	1092	1096	1100	1105	1109	42.00
5.80	1113	1117	1122	1126	1130	1135	1139	1143	1148	1152	43.00
5.90	1156	1161	1165	1169	1174	1178	1182	1187	1191	1196	44.00
6.00	1200*	1205	1209	1214	1218	1223	1228	1232	1237	1242	46.00
6.10	1246	1251	1256	1260	1265	1270	1274	1279	1284	1289	47.00
6.20	1293	1298	1303	1308	1312	1317	1322	1327	1332	1336	48.00
6.30	1341	1346	1351	1356	1361	1366	1370	1375	1380	1385	49.00
6.40	1390	1395	1400	1405	1410	1415	1420	1425	1430	1435	50.00
6.50	1440	1445	1450	1455	1460	1465	1470	1475	1480	1485	50.00
6.60	1490	1495	1500	1505	1510	1516	1521	1526	1531	1536	51.00
6.70	1541	1546	1552	1557	1562	1567	1572	1578	1583	1588	52.00
6.80	1593	1599	1604	1609	1614	1620	1625	1630	1636	1641	53.00
6.90	1646	1652	1657	1662	1668	1673	1678	1684	1689	1695	54.00
7.00	1700*	1705	1711	1716	1722	1727	1733	1738	1744	1749	55.00
7.10	1755	1761	1766	1772	1777	1783	1788	1794	1800	1805	56.00
7.20	1811	1817	1822	1828	1833	1839	1845	1851	1856	1862	57.00
7.30	1868	1873	1879	1885	1891	1896	1902	1908	1914	1919	57.00
7.40	1925	1931	1937	1943	1948	1954	1960	1966	1972	1978	59.00
7.50	1984	1989	1995	2001	2007	2013	2019	2025	2031	2037	59.00
7.60	2043	2049	2055	2061	2067	2073	2079	2085	2091	2097	60.00
7.70	2103	2109	2115	2121	2127	2133	2139	2145	2152	2158	61.00
7.80	2164	2170	2176	2182	2188	2195	2201	2207	2213	2219	62.00
7.90	2226	2232	2238	2244	2250	2257	2263	2269	2276	2282	62.00
8.00	2288	2294	2301	2307	2313	2320	2326	2332	2339	2345	64.00
8.10	2352	2358	2364	2371	2377	2384	2390	2396	2403	2409	64.00
8.20	2416	2422	2429	2435	2442	2448	2455	2461	2468	2474	65.00
8.30	2481	2487	2494	2501	2507	2514	2520	2527	2533	2540	66.00
8.40	2547	2553	2560	2567	2573	2580	2587	2593	2600	2607	66.00
8.50	2613	2620	2627	2634	2640	2647	2654	2661	2667	2674	68.00
8.60	2681	2688	2695	2701	2708	2715	2722	2729	2736	2743	68.00
8.70	2749	2756	2763	2770	2777	2784	2791	2798	2805	2812	70.00
8.80	2819	2826	2833	2840	2847	2854	2861	2868	2875	2882	70.00
8.90	2889	2896	2903	2910	2917	2924	2931	2938	2945	2953	71.00
9.00	2960	2967	2974	2981	2988	2995	3003	3010	3017	3024	71.00
9.10	3031	3039	3046	3053	3060	3068	3075	3082	3089	3097	73.00
9.20	3104	3111	3118	3126	3133	3140	3148	3155	3163	3170	73.00

UNITED STATES DEPARTMENT OF INTERIOR - GEOLOGICAL SURVEY - WATER RESOURCES DIVISION

PAGE 3

EXPANDED RATING TABLE

TYPE: LOG

11467000

RUSSIAN R NR GUERNEVILLE CA

OFFSET: 1.00

DATE PROCESSED: 01-09-1995 @ 15:31 BY PSHIFFER

DD: 6 TYPE: 001 RATING NO: 0037

START DATE/TIME: 02-24-93 (0230)

BASED OF CHM, S 527-535

GAGE (FEET)	DISCHARGE IN CUBIC FEET PER SECOND (EXPANDED PRECISION)										DIFF IN Q PER TENTH FT
	.0	.01	.02	.03	.04	.05	.06	.07	.08	.09	
9.30	3177	3185	3192	3199	3207	3214	3222	3229	3237	3244	74.00
9.40	3251	3259	3266	3274	3281	3289	3296	3304	3311	3319	75.00
9.50	3326	3334	3342	3349	3357	3364	3372	3379	3387	3395	76.00
9.60	3402	3410	3418	3425	3433	3441	3448	3456	3464	3471	77.00
9.70	3479	3487	3494	3502	3510	3518	3525	3533	3541	3549	77.00
9.80	3556	3564	3572	3580	3588	3595	3603	3611	3619	3627	79.00
9.90	3635	3643	3650	3658	3666	3674	3682	3690	3698	3706	79.00
10.00	3714	3722	3730	3738	3746	3754	3762	3770	3778	3786	80.00
10.10	3794	3802	3810	3818	3826	3834	3842	3850	3858	3866	81.00
10.20	3875	3883	3891	3899	3907	3915	3923	3932	3940	3948	81.00
10.30	3956	3964	3973	3981	3989	3997	4005	4014	4022	4030	83.00
10.40	4039	4047	4055	4063	4072	4080	4088	4097	4105	4113	83.00
10.50	4122	4130	4138	4147	4155	4164	4172	4180	4189	4197	84.00
10.60	4206	4214	4223	4231	4240	4248	4257	4265	4274	4282	85.00
10.70	4291	4299	4308	4316	4325	4333	4342	4350	4359	4368	85.00
10.80	4376	4385	4393	4402	4411	4419	4428	4437	4445	4454	87.00
10.90	4463	4471	4480	4489	4498	4506	4515	4524	4532	4541	87.00
11.00	4550*	4559	4567	4576	4585	4594	4602	4611	4620	4629	88.00
11.10	4638	4646	4655	4664	4673	4682	4691	4699	4708	4717	88.00
11.20	4726	4735	4744	4753	4762	4770	4779	4788	4797	4806	89.00
11.30	4815	4824	4833	4842	4851	4860	4869	4878	4887	4896	90.00
11.40	4905	4914	4923	4932	4941	4950	4960	4969	4978	4987	91.00
11.50	4996	5005	5014	5023	5033	5042	5051	5060	5069	5078	92.00
11.60	5088	5097	5106	5115	5124	5134	5143	5152	5161	5171	92.00
11.70	5180	5189	5199	5208	5217	5226	5236	5245	5254	5264	93.00
11.80	5273	5282	5292	5301	5311	5320	5329	5339	5348	5358	94.00
11.90	5367	5377	5386	5395	5405	5414	5424	5433	5443	5452	95.00
12.00	5462	5471	5481	5490	5500	5510	5519	5529	5538	5548	95.00
12.10	5557	5567	5577	5586	5596	5606	5615	5625	5634	5644	97.00
12.20	5654	5663	5673	5683	5693	5702	5712	5722	5731	5741	97.00
12.30	5751	5761	5770	5780	5790	5800	5810	5819	5829	5839	98.00
12.40	5849	5859	5869	5878	5888	5898	5908	5918	5928	5938	99.00
12.50	5948	5957	5967	5977	5987	5997	6007	6017	6027	6037	99.00
12.60	6047	6057	6067	6077	6087	6097	6107	6117	6127	6137	100.0
12.70	6147	6157	6168	6178	6188	6198	6208	6218	6228	6238	102.0
12.80	6249	6259	6269	6279	6289	6299	6310	6320	6330	6340	101.0
12.90	6350	6361	6371	6381	6391	6402	6412	6422	6432	6443	103.0

UNITED STATES DEPARTMENT OF INTERIOR - GEOLOGICAL SURVEY - WATER RESOURCES DIVISION

PAGE 4

EXPANDED RATING TABLE

TYPE: LOG

1467000

JSSIAN R NR GUERNEVILLE CA

PFSET: 1.00

DATE PROCESSED: 01-09-1995 @ 15:31 BY PSHIFFER

DO: 6 TYPE: 001 RATING NO: 0037

START DATE/TIME: 02-24-93 (0230)

BASED ON CHM, S 527-535

GAGE HEIGHT (FEET)	DISCHARGE IN CUBIC FEET PER SECOND (EXPANDED PRECISION)										DIFF IN Q PER TENTH FT
	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09	
13.00	6453	6463	6474	6484	6494	6505	6515	6525	6536	6546	104.0
13.10	6557	6567	6577	6588	6598	6609	6619	6629	6640	6650	104.0
13.20	6661	6671	6682	6692	6703	6713	6724	6734	6745	6755	105.0
13.30	6766	6776	6787	6797	6808	6819	6829	6840	6850	6861	106.0
13.40	6872	6882	6893	6903	6914	6925	6935	6946	6957	6968	106.0
13.50	6978	6989	7000	7010	7021	7032	7043	7053	7064	7075	108.0
13.60	7086	7096	7107	7118	7129	7140	7150	7161	7172	7183	108.0
13.70	7194	7205	7215	7226	7237	7248	7259	7270	7281	7292	109.0
13.80	7303	7314	7325	7336	7347	7357	7368	7379	7390	7401	109.0
13.90	7412	7423	7434	7446	7457	7468	7479	7490	7501	7512	111.0
14.00	7523	7534	7545	7556	7567	7579	7590	7601	7612	7623	111.0
14.10	7634	7645	7657	7668	7679	7690	7701	7713	7724	7735	112.0
14.20	7746	7758	7769	7780	7791	7803	7814	7825	7837	7848	113.0
14.30	7859	7871	7882	7893	7905	7916	7927	7939	7950	7961	114.0
14.40	7973	7984	7996	8007	8019	8030	8041	8053	8064	8076	114.0
14.50	8087	8099	8110	8122	8133	8145	8156	8168	8179	8191	115.0
14.60	8202	8214	8226	8237	8249	8260	8272	8284	8295	8307	116.0
14.70	8318	8330	8342	8353	8365	8377	8388	8400	8412	8423	117.0
14.80	8435	8447	8459	8470	8482	8494	8506	8517	8529	8541	118.0
14.90	8553	8565	8576	8588	8600	8612	8624	8635	8647	8659	118.0
15.00	8671	8683	8695	8707	8719	8731	8742	8754	8766	8778	119.0
15.10	8790	8802	8814	8826	8838	8850	8862	8874	8886	8898	120.0
15.20	8910	8922	8934	8946	8958	8970	8982	8994	9006	9019	121.0
15.30	9031	9043	9055	9067	9079	9091	9103	9116	9128	9140	121.0
15.40	9152	9164	9176	9189	9201	9213	9225	9238	9250	9262	122.0
15.50	9274	9287	9299	9311	9323	9336	9348	9360	9373	9385	123.0
15.60	9397	9410	9422	9434	9447	9459	9471	9484	9496	9509	124.0
15.70	9521	9533	9546	9558	9571	9583	9596	9608	9621	9633	125.0
15.80	9646	9658	9671	9683	9696	9708	9721	9733	9746	9758	125.0
15.90	9771	9783	9796	9809	9821	9834	9846	9859	9872	9884	126.0
16.00	9897	9910	9922	9935	9948	9960	9973	9986	9998	10010	123.0
16.10	10020	10040	10050	10060	10070	10090	10100	10110	10130	10140	130.0
16.20	10150	10160	10180	10190	10200	10220	10230	10240	10250	10270	130.0
16.30	10280	10290	10310	10320	10330	10340	10360	10370	10380	10400	130.0
16.40	10410	10420	10430	10450	10460	10470	10490	10500	10510	10530	130.0
16.50	10540	10550	10560	10580	10590	10600	10620	10630	10640	10660	130.0
16.60	10670	10680	10700	10710	10720	10740	10750	10760	10770	10790	130.0
16.70	10800	10810	10830	10840	10850	10870	10880	10890	10910	10920	130.0

UNITED STATES DEPARTMENT OF INTERIOR - GEOLOGICAL SURVEY - WATER RESOURCES DIVISION

PAGE 5

EXPANDED RATING TABLE

TYPE: LOG

11467000

RUSSIAN R NR GUERNEVILLE CA

FFSET: 1.00

DATE PROCESSED: 01-09-1995 @ 15:31 BY PSHIFFER

DD: 6 TYPE: 001 RATING NO: 0037

START DATE/TIME: 02-24-93 (0230)

BASED ON CHM, S 527-535

GAGE HEIGHT (FEET)		DISCHARGE IN CUBIC FEET PER SECOND (EXPANDED PRECISION)									DIFF IN Q PER TENTH FT
		.01	.02	.03	.04	.05	.06	.07	.08	.09	
16.80	10930	10950	10960	10970	10990	11000	11010	11030	11040	11050	140.0
16.90	11070	11080	11090	11110	11120	11130	11150	11160	11170	11190	130.0
17.00	11200*	11210	11230	11240	11250	11270	11280	11290	11310	11320	130.0
17.10	11330	11350	11360	11370	11390	11400	11410	11430	11440	11450	140.0
17.20	11470	11480	11500	11510	11520	11540	11550	11560	11580	11590	130.0
17.30	11600	11620	11630	11640	11660	11670	11690	11700	11710	11730	140.0
17.40	11740	11750	11770	11780	11790	11810	11820	11840	11850	11860	140.0
17.50	11880	11890	11900	11920	11930	11950	11960	11970	11990	12000	130.0
17.60	12010	12030	12040	12060	12070	12080	12100	12110	12130	12140	140.0
17.70	12150	12170	12180	12190	12210	12220	12240	12250	12260	12280	140.0
17.80	12290	12310	12320	12330	12350	12360	12380	12390	12400	12420	140.0
17.90	12430	12450	12460	12470	12490	12500	12520	12530	12540	12560	140.0
18.00	12570	12590	12600	12610	12630	12640	12660	12670	12690	12700	140.0
18.10	12710	12730	12740	12760	12770	12780	12800	12810	12830	12840	150.0
18.20	12860	12870	12880	12900	12910	12930	12940	12960	12970	12980	140.0
18.30	13000	13010	13030	13040	13060	13070	13090	13100	13110	13130	140.0
18.40	13140	13160	13170	13190	13200	13210	13230	13240	13260	13270	150.0
18.50	13290	13300	13320	13330	13350	13360	13370	13390	13400	13420	140.0
18.60	13430	13450	13460	13480	13490	13510	13520	13530	13550	13560	150.0
18.70	13580	13590	13610	13620	13640	13650	13670	13680	13700	13710	140.0
18.80	13720	13740	13750	13770	13780	13800	13810	13830	13840	13860	150.0
18.90	13870	13890	13900	13920	13930	13950	13960	13980	13990	14010	150.0
19.00	14020	14040	14050	14060	14080	14090	14110	14120	14140	14150	150.0
19.10	14170	14180	14200	14210	14230	14240	14260	14270	14290	14300	150.0
19.20	14320	14330	14350	14360	14380	14390	14410	14420	14440	14450	150.0
19.30	14470	14480	14500	14510	14530	14540	14560	14580	14590	14610	150.0
19.40	14620	14640	14650	14670	14680	14700	14710	14730	14740	14760	150.0
19.50	14770	14790	14800	14820	14830	14850	14860	14880	14890	14910	150.0
19.60	14920	14940	14960	14970	14990	15000	15020	15030	15050	15060	160.0
19.70	15080	15090	15110	15120	15140	15160	15170	15190	15200	15220	150.0
19.80	15230	15250	15260	15280	15290	15310	15330	15340	15360	15370	160.0
19.90	15390	15400	15420	15430	15450	15470	15480	15500	15510	15530	150.0
20.00	15540	15560	15570	15590	15610	15620	15640	15650	15670	15680	160.0
20.10	15700	15720	15730	15750	15760	15780	15790	15810	15820	15840	160.0
20.20	15860	15870	15890	15900	15920	15940	15950	15970	15980	16000	150.0
20.30	16010	16030	16050	16060	16080	16090	16110	16130	16140	16160	160.0
20.40	16170	16190	16200	16220	16240	16250	16270	16280	16300	16320	160.0

UNITED STATES DEPARTMENT OF INTERIOR - GEOLOGICAL SURVEY - WATER RESOURCES DIVISION

PAGE 6

EXPANDED RATING TABLE

TYPE: LOG

1467000

USSIAN R NR GUERNEVILLE CA

FFSET: 1.00

DATE PROCESSED: 01-09-1995 @ 15:31 BY PSHIFFER

DD: 6 TYPE: 001 RATINGS NO: 0037

START DATE/TIME: 02-24-93 (0230)

BASED ON CHM, S 527-535

GAGE HEIGHT (FEET)		DISCHARGE IN CUBIC FEET PER SECOND (EXPANDED PRECISION)									DIFF IN Q PER TENTH FT
		.01	.02	.03	.04	.05	.06	.07	.08	.09	
20.50	16330	16350	16360	16380	16400	16410	16430	16440	16460	16480	160.0
20.60	16490	16510	16520	16540	16560	16570	16590	16600	16620	16640	160.0
20.70	16650	16670	16690	16700	16720	16730	16750	16770	16780	16800	160.0
20.80	16810	16830	16850	16860	16880	16900	16910	16930	16940	16960	170.0
20.90	16980	16990	17010	17030	17040	17060	17070	17090	17110	17120	160.0
21.00	17140	17160	17170	17190	17210	17220	17240	17250	17270	17290	160.0
21.10	17300	17320	17340	17350	17370	17390	17400	17420	17440	17450	170.0
21.20	17470	17480	17500	17520	17530	17550	17570	17580	17600	17620	160.0
21.30	17630	17650	17670	17680	17700	17720	17730	17750	17770	17780	170.0
21.40	17800	17820	17830	17850	17870	17880	17900	17920	17930	17950	170.0
21.50	17970	17980	18000	18020	18030	18050	18070	18080	18100	18120	160.0
21.60	18130	18150	18170	18180	18200	18220	18230	18250	18270	18290	170.0
21.70	18300	18320	18340	18350	18370	18390	18400	18420	18440	18450	170.0
21.80	18470	18490	18510	18520	18540	18560	18570	18590	18610	18620	170.0
21.90	18640	18660	18670	18690	18710	18730	18740	18760	18780	18790	170.0
22.00	18810	18830	18850	18860	18880	18900	18910	18930	18950	18970	170.0
22.10	18980	19000	19020	19030	19050	19070	19090	19100	19120	19140	170.0
22.20	19150	19170	19190	19210	19220	19240	19260	19280	19290	19310	180.0
22.30	19330	19340	19360	19380	19400	19410	19430	19450	19470	19480	170.0
22.40	19500	19520	19540	19550	19570	19590	19600	19620	19640	19660	170.0
22.50	19670	19690	19710	19730	19740	19760	19780	19800	19810	19830	180.0
22.60	19850	19870	19880	19900	19920	19940	19950	19970	19990	20010	180.0
22.70	20030	20040	20060	20080	20100	20110	20130	20150	20170	20180	170.0
22.80	20200	20220	20240	20250	20270	20290	20310	20330	20340	20360	180.0
22.90	20380	20400	20410	20430	20450	20470	20480	20500	20520	20540	180.0
23.00	20560	20570	20590	20610	20630	20650	20660	20680	20700	20720	170.0
23.10	20730	20750	20770	20790	20810	20820	20840	20860	20880	20900	180.0
23.20	20910	20930	20950	20970	20990	21000	21020	21040	21060	21080	180.0
23.30	21090	21110	21130	21150	21170	21180	21200	21220	21240	21260	180.0
23.40	21270	21290	21310	21330	21350	21370	21380	21400	21420	21440	190.0
23.50	21460	21470	21490	21510	21530	21550	21570	21580	21600	21620	180.0
23.60	21640	21660	21680	21690	21710	21730	21750	21770	21780	21800	180.0
23.70	21820	21840	21860	21880	21890	21910	21930	21950	21970	21990	190.0
23.80	22010	22020	22040	22060	22080	22100	22120	22130	22150	22170	180.0
23.90	22190	22210	22230	22250	22260	22280	22300	22320	22340	22360	180.0
24.00	22370	22390	22410	22430	22450	22470	22490	22500	22520	22540	190.0
24.10	22560	22580	22600	22620	22640	22650	22670	22690	22710	22730	190.0
24.20	22750	22770	22780	22800	22820	22840	22860	22880	22900	22920	180.0

UNITED STATES DEPARTMENT OF INTERIOR - GEOLOGICAL SURVEY - WATER RESOURCES DIVISION
EXPANDED RATING TABLE

PAGE 7
TYPE: LOG

114467000
RUSSIAN R NR GUERNEVILLE CA
OFFSET: 1.00

DATE PROCESSED: 01-09-1995 @ 15:31 BY PSHIFFER

DD: 6 TYPE: 001 RATING NO: 0037
START DATE/TIME: 02-24-93 (0230)

BASED OF CMM, S 527-535

GAGE HEIGHT		DISCHARGE IN CUBIC FEET PER SECOND (EXPANDED PRECISION)									DIFF IN Q PER TENTH FT
		.01	.02	.03	.04	.05	.06	.07	.08	.09	
24.30	22950	22950	22970	22990	23010	23030	23050	23070	23080	23100	190.0
24.40	23120	23140	23160	23180	23200	23220	23240	23250	23270	23290	190.0
24.50	23310	23330	23350	23370	23390	23410	23430	23440	23460	23480	190.0
24.60	23500	23520	23540	23560	23580	23600	23610	23630	23650	23670	190.0
24.70	23690	23710	23730	23750	23770	23790	23810	23820	23840	23860	190.0
24.80	23880	23900	23920	23940	23960	23980	24000	24020	24060	24090	190.0
24.90	24070	24090	24110	24130	24150	24170	24190	24210	24230	24250	200.0
25.00	24270	24290	24300	24320	24340	24360	24380	24400	24420	24440	190.0
25.10	24460	24480	24500	24520	24540	24560	24580	24600	24610	24630	190.0
25.20	24650	24670	24680	24710	24730	24750	24770	24790	24810	24830	200.0
25.30	24850	24870	24880	24910	24930	24950	24970	24980	25000	25020	190.0
25.40	25040	25060	25080	25100	25120	25140	25160	25180	25200	25220	200.0
25.50	25240	25260	25280	25300	25320	25340	25360	25380	25400	25420	200.0
25.60	25440	25460	25480	25500	25520	25530	25550	25570	25590	25610	190.0
25.70	25630	25650	25670	25690	25710	25730	25750	25770	25790	25810	200.0
25.80	25830	25850	25870	25890	25910	25930	25950	25970	25990	26010	200.0
25.90	26030	26050	26070	26090	26110	26130	26150	26170	26190	26210	200.0
26.00	26230	26250	26270	26290	26310	26330	26350	26370	26390	26410	200.0
26.10	26430	26450	26470	26490	26510	26530	26550	26570	26590	26610	200.0
26.20	26630	26650	26670	26690	26710	26730	26750	26770	26790	26810	200.0
26.30	26830	26850	26870	26890	26920	26940	26960	26980	27000	27020	210.0
26.40	27040	27060	27080	27100	27120	27140	27160	27180	27200	27220	200.0
26.50	27240	27260	27280	27300	27320	27340	27360	27380	27400	27420	200.0
26.60	27440	27460	27490	27510	27530	27550	27570	27590	27610	27630	210.0
26.70	27650	27670	27690	27710	27730	27750	27770	27790	27810	27830	200.0
26.80	27850	27880	27900	27920	27940	27960	27980	28000	28020	28040	210.0
26.90	28060	28080	28100	28120	28140	28160	28180	28210	28230	28250	210.0
27.00	28270	28290	28310	28330	28350	28370	28390	28410	28430	28450	210.0
27.10	28480	28500	28520	28540	28560	28580	28600	28620	28640	28660	200.0
27.20	28680	28700	28730	28750	28770	28790	28810	28830	28850	28870	210.0
27.30	28890	28910	28930	28940	28980	29000	29020	29040	29060	29080	210.0
27.40	29100	29120	29140	29170	29190	29210	29230	29250	29270	29290	210.0
27.50	29310	29330	29340	29380	29400	29420	29440	29460	29480	29500	210.0
27.60	29520	29530	29570	29590	29610	29630	29650	29670	29690	29720	220.0
27.70	29740	29760	29780	29800	29820	29840	29860	29890	29910	29930	210.0
27.80	29950	29970	29990	30010	30030	30060	30080	30100	30120	30140	210.0
27.90	30160	30180	30210	30230	30250	30270	30290	30310	30330	30360	220.0

EXPANDED RATING TABLE

TYPE: LOG

1467000

JESSIE R NR GUERNEVILLE CA

DATE PROCESSED: 01-09-1995 @ 15:31 BY PSHIFFER

DB: 6 TYPE: 001 RATING NO: 0037

PSET: 1.00

START DATE/TIME: 02-24-93 (0230)

BASED OF CHM, S 527-535

GAGE HEIGHT (FEET)	DISCHARGE IN CUBIC FEET PER SECOND (EXPANDED PRECISION)										DIFF IN Q PER TENTH FT
	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09	
28.00	30380	30400	30420	30440	30460	30480	30510	30530	30550	30570	210.0
28.10	30590	30610	30640	30660	30680	30700	30720	30740	30760	30790	220.0
28.20	30810	30830	30850	30870	30890	30920	30940	30960	30980	31000	210.0
28.30	31020	31050	31070	31090	31110	31130	31150	31180	31200	31220	220.0
28.40	31240	31260	31280	31310	31330	31350	31370	31390	31420	31440	220.0
28.50	31460	31480	31500	31520	31550	31570	31590	31610	31630	31660	220.0
28.60	31680	31700	31720	31740	31760	31790	31810	31830	31850	31870	220.0
28.70	31900	31920	31940	31960	31980	32010	32030	32050	32070	32090	220.0
28.80	32120	32140	32160	32180	32200	32230	32250	32270	32290	32310	220.0
28.90	32340	32360	32380	32400	32430	32450	32470	32490	32510	32540	220.0
29.00	32560	32580	32600	32620	32650	32670	32690	32710	32740	32760	220.0
29.10	32780	32800	32830	32850	32870	32890	32910	32940	32960	32980	220.0
29.20	33000	33030	33050	33070	33090	33120	33140	33160	33180	33200	230.0
29.30	33230	33250	33270	33290	33320	33340	33360	33380	33410	33430	220.0
29.40	33450	33470	33500	33520	33540	33560	33590	33610	33630	33650	230.0
29.50	33680	33700	33720	33740	33770	33790	33810	33830	33860	33880	220.0
29.60	33900	33920	33950	33970	33990	34010	34040	34060	34080	34110	230.0
29.70	34130	34150	34170	34200	34220	34240	34260	34290	34310	34330	230.0
29.80	34360	34380	34400	34420	34450	34470	34490	34510	34540	34560	220.0
29.90	34580	34610	34630	34650	34670	34700	34720	34740	34770	34790	230.0
30.00	34810	34830	34860	34880	34900	34930	34950	34970	35000	35020	230.0
30.10	35040	35060	35090	35110	35130	35160	35180	35200	35220	35250	230.0
30.20	35270	35290	35320	35340	35360	35390	35410	35430	35460	35480	230.0
30.30	35500	35520	35550	35570	35590	35620	35640	35660	35690	35710	230.0
30.40	35730	35760	35780	35800	35830	35850	35870	35900	35920	35940	240.0
30.50	35970	35990	36010	36030	36060	36080	36100	36130	36150	36170	230.0
30.60	36200	36220	36240	36270	36290	36310	36340	36360	36380	36410	230.0
30.70	36430	36450	36480	36500	36530	36550	36570	36600	36620	36640	240.0
30.80	36670	36690	36710	36740	36760	36780	36810	36830	36850	36880	230.0
30.90	36900	36920	36950	36970	36990	37020	37040	37070	37090	37110	240.0
31.00	37140	37160	37180	37210	37230	37250	37280	37300	37330	37350	230.0
31.10	37370	37400	37420	37440	37470	37490	37520	37540	37560	37590	240.0
31.20	37610	37630	37660	37680	37700	37730	37750	37780	37800	37820	240.0
31.30	37850	37870	37900	37920	37940	37970	37990	38010	38040	38060	240.0
31.40	38090	38110	38130	38160	38180	38210	38230	38250	38280	38300	240.0
31.50	38330	38350	38370	38400	38420	38450	38470	38490	38520	38540	240.0
31.60	38570	38590	38610	38640	38660	38690	38710	38730	38760	38780	240.0
31.70	38810	38830	38850	38880	38900	38930	38950	38980	39000	39020	240.0

UNITED STATES DEPARTMENT OF INTERIOR - GEOLOGICAL SURVEY - WATER RESOURCES DIVISION

PAGE 9

EXPANDED RATING TABLE

TYPE: LOG

1467000

YSSIAN R NR GUERNEVILLE CA

DATE PROCESSED: 01-09-1995 @ 15:31 BY PSHIFFER

DD: 6 TYPE: 001 RATING NO: 0037

FSET: 1.00

START DATE/TIME: 02-24-93 (0230)

BASED ON CWS 527-535

GAGE HEIGHT (FEET)	DISCHARGE IN CUBIC FEET PER SECOND (EXPANDED PRECISION)										DIFF IN Q PER TENTH FT
	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09	
31.80	39050	39070	39100	39120	39140	39170	39190	39220	39240	39270	240.0
31.90	39290	39310	39340	39360	39390	39410	39440	39460	39480	39510	240.0
32.00	39530	39560	39580	39610	39630	39650	39680	39700	39730	39750	250.0
32.10	39780	39800	39820	39850	39870	39900	39920	39950	39970	40000	240.0
32.20	40020	40040	40070	40090	40120	40140	40170	40190	40220	40240	250.0
32.30	40270	40290	40310	40340	40360	40390	40410	40440	40460	40490	240.0
32.40	40510	40540	40560	40580	40610	40630	40660	40680	40710	40730	250.0
32.50	40760	40780	40810	40830	40860	40880	40910	40930	40950	40980	240.0
32.60	41000	41030	41050	41080	41100	41130	41150	41180	41200	41230	250.0
32.70	41250	41280	41300	41330	41350	41380	41400	41430	41450	41480	250.0
32.80	41500	41530	41550	41580	41600	41630	41650	41680	41700	41730	250.0
32.90	41750	41770	41800	41820	41850	41870	41900	41920	41950	41970	250.0
33.00	42000	42030	42050	42080	42100	42130	42160	42180	42210	42230	260.0
33.10	42260	42280	42310	42340	42360	42390	42410	42440	42470	42490	260.0
33.20	42520	42540	42570	42600	42620	42650	42670	42700	42730	42750	260.0
33.30	42780	42800	42830	42860	42880	42910	42940	42960	42990	43010	260.0
33.40	43040	43070	43090	43120	43140	43170	43200	43220	43250	43280	260.0
33.50	43300	43330	43350	43380	43410	43430	43460	43490	43510	43540	260.0
33.60	43560	43590	43620	43640	43670	43700	43720	43750	43770	43800	270.0
33.70	43830	43850	43880	43910	43930	43960	43990	44010	44040	44070	260.0
33.80	44090	44120	44140	44170	44200	44220	44250	44280	44300	44330	270.0
33.90	44360	44380	44410	44440	44460	44490	44520	44540	44570	44600	260.0
34.00	44620	44650	44680	44700	44730	44760	44780	44810	44840	44860	270.0
34.10	44890	44920	44940	44970	45000	45020	45050	45080	45100	45130	270.0
34.20	45160	45180	45210	45240	45260	45290	45320	45340	45370	45400	260.0
34.30	45420	45450	45480	45510	45530	45560	45590	45610	45640	45670	270.0
34.40	45690	45720	45750	45770	45800	45830	45860	45880	45910	45940	270.0
34.50	45960	45990	46020	46040	46070	46100	46130	46150	46180	46210	270.0
34.60	46230	46260	46290	46320	46340	46370	46400	46420	46450	46480	280.0
34.70	46510	46530	46560	46590	46610	46640	46670	46700	46720	46750	270.0
34.80	46780	46800	46830	46860	46890	46910	46940	46970	47000	47020	270.0
34.90	47050	47080	47110	47130	47160	47190	47210	47240	47270	47300	270.0
35.00	47320	47350	47380	47410	47430	47460	47490	47520	47540	47570	280.0
35.10	47600	47630	47650	47680	47710	47740	47760	47790	47820	47850	270.0
35.20	47870	47900	47930	47960	47980	48010	48040	48070	48090	48120	280.0
35.30	48150	48180	48200	48230	48260	48290	48320	48340	48370	48400	280.0
35.40	48430	48450	48480	48510	48540	48570	48590	48620	48650	48680	270.0

UNITED STATES DEPARTMENT OF INTERIOR - GEOLOGICAL SURVEY - WATER RESOURCES DIVISION

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EXPANDED RATING TABLE

TYPE: LOG

11467000

RUSSIAN R NR GUERNEVILLE CA

OFFSET: 1.00

DATE PROCESSED: 01-09-1995 @ 15:31 BY PSHIFFER

00: 6 TYPE: 001 RATING NO: 0037

START DATE/TIME: 02-24-93 (0230)

BASED ON CHM, S 527-535

GAGE HEIGHT (FEET)	DISCHARGE IN CUBIC FEET PER SECOND (EXPANDED PRECISION)										DIFF IN Q PER TENTH FT
	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09	
35.50	48700	48730	48740	48790	48820	48840	48870	48900	48930	48950	280.0
35.60	48980	49010	49040	49070	49090	49120	49150	49180	49210	49230	280.0
35.70	49260	49290	49320	49350	49370	49400	49430	49460	49490	49510	280.0
35.80	49540	49570	49600	49630	49650	49680	49710	49740	49770	49790	280.0
35.90	49820	49850	49880	49910	49930	49960	49990	50020	50050	50080	280.0
36.00	50100	50130	50160	50190	50220	50240	50270	50300	50330	50360	290.0
36.10	50390	50410	50440	50470	50500	50530	50560	50580	50610	50640	280.0
36.20	50670	50700	50730	50750	50780	50810	50840	50870	50900	50920	280.0
36.30	50950	50980	51010	51040	51070	51090	51120	51150	51180	51210	290.0
36.40	51240	51270	51290	51320	51350	51380	51410	51440	51470	51490	280.0
36.50	51520	51550	51580	51610	51640	51670	51690	51720	51750	51780	290.0
36.60	51810	51840	51870	51890	51920	51950	51980	52010	52040	52070	290.0
36.70	52100	52120	52150	52180	52210	52240	52270	52300	52330	52350	280.0
36.80	52380	52410	52440	52470	52500	52530	52560	52580	52610	52640	290.0
36.90	52670	52700	52730	52760	52790	52820	52840	52870	52900	52930	290.0
37.00	52960	52990	53020	53050	53080	53110	53130	53160	53190	53220	290.0
37.10	53250	53280	53310	53340	53370	53400	53420	53450	53480	53510	290.0
37.20	53540	53570	53600	53630	53660	53690	53720	53750	53770	53800	290.0
37.30	53830	53860	53890	53920	53950	53980	54010	54040	54070	54100	300.0
37.40	54130	54150	54180	54210	54240	54270	54300	54330	54360	54390	290.0
37.50	54420	54450	54480	54510	54540	54570	54590	54620	54650	54680	290.0
37.60	54710	54740	54770	54800	54830	54860	54890	54920	54950	54980	300.0
37.70	55010	55040	55070	55100	55130	55150	55180	55210	55240	55270	290.0
37.80	55300	55330	55360	55390	55420	55450	55480	55510	55540	55570	300.0
37.90	55600	55630	55660	55690	55720	55750	55780	55810	55840	55870	300.0
38.00	55900	55930	55960	55990	56010	56040	56070	56100	56130	56160	290.0
38.10	56190	56220	56250	56280	56310	56340	56370	56400	56430	56460	300.0
38.20	56490	56520	56550	56580	56610	56640	56670	56700	56730	56760	300.0
38.30	56790	56820	56850	56880	56910	56940	56970	57000	57030	57060	300.0
38.40	57090	57120	57150	57180	57210	57240	57270	57300	57330	57360	300.0
38.50	57390	57420	57450	57480	57510	57540	57570	57600	57630	57660	300.0
38.60	57690	57720	57750	57790	57820	57850	57880	57910	57940	57970	310.0
38.70	58000	58030	58060	58090	58120	58150	58180	58210	58240	58270	300.0
38.80	58300	58330	58360	58390	58420	58450	58480	58510	58540	58570	300.0
38.90	58600	58630	58670	58700	58730	58760	58790	58820	58850	58880	310.0
39.00	58910	58940	58970	59000	59030	59060	59090	59120	59150	59180	300.0
39.10	59210	59250	59280	59310	59340	59370	59400	59430	59460	59490	310.0
39.20	59520	59550	59580	59610	59640	59670	59710	59740	59770	59800	310.0

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TYPE: LOG

DD: 6 TYPE: 001 RATING NO: 0037

START DATE/TIME: 02-24-93 (0230)

BASED OF CHN, S 527-535

[illegible]