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TIDAL AND LUNAR DATA FOR POINT MUGU, SAN NICOLAS ISLAND, AND THE BARKING SANDS AREA DURING 1989

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COMPILED BY
RICH DIXON
GEOPHYSICS DIVISION

31 DECEMBER 1988

APPROVED FOR PUBLIC RELEASE; DISTRIBUTION IS UNLIMITED

PACIFIC MISSILE TEST CENTER
Point Mugu, California 93042-5000

88 12 21

PACIFIC MISSILE TEST CENTER

AN ACTIVITY OF THE NAVAL AIR SYSTEMS COMMAND

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Basic lunar and tidal data for Point Mugu, San Nicolas Island and the Barking Sands Area during 1989 are provided. The data presented are (1) Tidal data, (2) times of moonrise and moonset, (3) times of lunar phases, and (4) times of sunrise and sunset.

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INTRODUCTION

This publication combines into a single source all tidal and lunar data for operational locations of the Pacific Missile Test Center for use in Calendar Year 1989.

The data presentations are in two main divisions: one for Point Mugu and San Nicolas Island, and the other for the Barking Sands area. Within each division, the times of moonrise and moonset and tidal data are given. Appendixes provide information on lunar phases, sunrise and sunset times and calculation of the tide at any time. This publication is issued annually. Information regarding this data may be obtained from the Geophysics Division of the Range Operations Department.

DATA SOURCE AND TIME REFERENCES

The data given here have been prepared from information contained in Tide Tables for the West Coast of North and South America including the Hawaiian Islands, 1989, published by the National Ocean Service.

For Point Mugu and San Nicolas Island, all times listed are Pacific Standard Time (PST); add eight hours to obtain Universal Coordinated Time (UCT or Z). When Daylight Savings Time (PDT) is in effect, 1 hour is to be added to the times given. In 1989, Pacific Daylight Time is scheduled to commence at 0200 PST on Sunday 2 April, and to end at 0200 PDT on Sunday 29 October.

For the Barking Sands Area, all times listed are Alaska-Hawaii Standard Time (AHST); add ten hours to obtain UCT. Daylight Savings Time is not observed in Hawaii.

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TIDAL DATA

The ranges of tidal heights that may be expected at Point Mugu and San Nicolas Island are shown in table 1. The range of heights for the primary harbor in the Barking Sands area, Port Allen, is shown in table 2. The times and height of high and low tides for 1989 at Point Mugu are given in the even-numbered tables 4 through 26, and at San Nicolas Island in the odd-numbered tables 5 through 27. Similar tide data for Port Allen are given in tables 29 through 40.

Table 1. Tidal ranges for Point Mugu and San Nicolas Island

Tidal Levels	Point Mugu Height (Ft)	San Nicolas Is. Height (Ft)
Extreme high water	7.3	6.7
Mean higher high water	5.3	4.9
Mean high water	4.5	4.1
Mean tide level (mean sea level)	2.7	2.5
Mean low water	0.9	0.8
Mean lower low water	0.0	0.0
Extreme low water	-2.0	-1.8

Table 2. Tidal Ranges for Port Allen

Tidal Levels	Height (Ft)
Extreme high water	2.6
Mean higher high water	1.6
Mean high water	1.2
Mean tide level (mean sea level)	0.7
Mean low water	0.2
Mean lower low water	0.0
Extreme low water	-0.4

These tables list the times and heights of high and low tide for each month of the year and chronologically through each day. The heights are all measured from mean lower low water and are values for a sea unaffected by wind waves or swell. The height and character of the sea surface are influenced by factors other than the predictable positions of the moon and sun, and thus are likely to be higher or lower than computed values indicate.

LUNAR DATA

Times of moonrise and moonset for the Point Mugu-San Nicolas Island area in 1989 are given in table 3, and for the Barking Sands area in table 28, preceding the tidal data for the respective stations. Information regarding the phases of the moon in 1989 is found in appendix B.

	° ′
Latitude	34 07 N
Longitude	119 07 W

Point Mugu NAS, California
Moonrise and Moonset for 1989

Pacific Standard Time

Nautical Almanac Office
U.S. Naval Observatory
Washington, D.C. 20392-5100

	Jan.		Feb.		Mar.		Apr.		May		June		July		Aug.		Sept.		Oct.		Nov.		Dec.	
Day	Rise	Set	Rise	Set	Rise	Set	Rise	Set	Rise	Set	Rise	Set	Rise	Set	Rise	Set	Rise	Set	Rise	Set	Rise	Set	Rise	Set
	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
1	0110	1211	0301	1236	0148	1118	0258	1326	0235	1439	0242	1709	0258	1820	0502	1913	0650	1900	0731	1820	0917	1853	0944	1941
2	0209	1241	0403	1333	0246	1217	0334	1437	0305	1550	0324	1823	0359	1916	0605	1942	0746	1924	0829	1851	1012	1946	1024	2045
3	0311	1316	0500	1438	0338	1324	0407	1549	0336	1702	0414	1933	0504	2003	0705	2008	0842	1949	0927	1926	1101	2045	1100	2149
4	0415	1359	0551	1550	0424	1436	0438	1701	0410	1817	0512	2035	0611	2042	0802	2033	0938	2017	1026	2008	1145	2147	1131	2254
5	0519	1451	0635	1704	0504	1550	0509	1815	0450	1933	0616	2127	0716	2114	0859	2057	1037	2049	1123	2056	1224	2252	1200	2359
6	0620	1553	0712	1818	0540	1703	0542	1930	0536	2046	0723	2210	0818	2142	0954	2121	1136	2127	1217	2151	1259	2358	1229	
7	0715	1702	0745	1930	0612	1816	0618	2045	0629	2153	0828	2245	0917	2207	1051	2147	1235	2211	1306	2253	1330		1259	0105
8	0802	1815	0816	2041	0643	1929	0700	2200	0730	2250	0931	2315	1013	2231	1148	2217	1332	2303	1349	2358	1400	0104	1331	0214
9	0842	1927	0846	2152	0714	2043	0749	2309	0835	2337	1031	2341	1109	2254	1247	2251	1425		1427		1430	0212	1409	0325
10	0916	2038	0917	2302	0748	2156	0845		0940		1128		1205	2319	1347	2332	1513	0003	1501	0106	1502	0322	1453	0440
11	0947	2148	0951		0826	2309	0946	0009	1044	0015	1224	0005	1301	2347	1447		1555	0108	1533	0214	1538	0435	1547	0555
12	1016	2256	1029	0013	0909		1050	0100	1144	0047	1319	0029	1400		1544	0020	1633	0217	1604	0324	1619	0551	1649	0706
13	1045		1113	0123	0959	0019	1153	0142	1241	0115	1415	0053	1500	0019	1637	0117	1706	0328	1635	0435	1709	0708	1757	0808
14	1116	0004	1204	0229	1056	0123	1254	0217	1337	0140	1513	0119	1601	0056	1723	0221	1738	0439	1709	0549	1807	0822	1907	0900
15	1150	0113	1302	0329	1156	0218	1352	0246	1432	0203	1612	0148	1701	0140	1803	0330	1809	0550	1748	0704	1912	0929	2015	0943
16	1230	0222	1403	0421	1259	0304	1449	0312	1528	0226	1713	0222	1757	0233	1838	0441	1841	0702	1833	0821	2020	1025	2120	1017
17	1316	0330	1505	0504	1400	0343	1544	0336	1624	0251	1815	0302	1847	0334	1910	0552	1916	0816	1925	0936	2128	1111	2221	1047
18	1409	0435	1607	0541	1500	0415	1639	0359	1723	0318	1913	0350	1930	0441	1941	0702	1956	0931	2025	1046	2233	1149	2318	1114
19	1508	0533	1707	0612	1558	0443	1735	0423	1823	0348	2006	0446	2007	0551	2011	0812	2042	1045	2130	1146	2334	1220		1138
20	1611	0623	1804	0639	1654	0508	1832	0448	1924	0424	2053	0549	2040	0701	2043	0923	2136	1155	2236	1235		1247	0015	1203
21	1715	0705	1900	0704	1749	0532	1931	0516	2024	0507	2133	0656	2111	0810	2118	1035	2236	1259	2341	1316	0032	1312	0111	1228
22	1816	0740	1955	0727	1845	0555	2031	0547	2120	0557	2208	0804	2140	0918	2159	1147	2340	1353		1350	0128	1336	0207	1256
23	1916	0810	2051	0750	1941	0618	2132	0625	2211	0655	2239	0912	2210	1026	2247	1257		1438	0042	1419	0223	1401	0304	1327
24	2013	0836	2147	0814	2038	0644	2230	0709	2254	0758	2308	1019	2242	1135	2342	1404	0045	1516	0141	1445	0319	1427	0403	1403
25	2108	0900	2245	0840	2138	0712	2325	0801	2332	0905	2337	1126	2318	1245		1504	0148	1548	0238	1509	0415	1455	0502	1445
26	2203	0923	2346	0910	2238	0746		0900		1012		1233		1356	0042	1555	0248	1615	0334	1533	0514	1528	0559	1535
27	2259	0946		0945	2338	0825	0013	1005	0006	1119	0007	1343	0000	1505	0147	1638	0347	1640	0429	1557	0612	1606	0653	1631
28	2356	1011	0047	1027		0911	0055	1112	0036	1226	0040	1454	0050	1611	0251	1714	0443	1704	0525	1624	0711	1651	0742	1733
29		1039			0036	1006	0132	1221	0105	1334	0118	1606	0147	1709	0354	1744	0539	1728	0622	1653	0807	1742	0824	1837
30	0056	1111			0129	1108	0204	1330	0134	1443	0204	1716	0250	1758	0455	1811	0635	1753	0721	1727	0859	1839	0901	1942
31	0158	1149			0217	1216			0206	1555			0356	1839	0553	1836			0819	1807			0934	2047

POINT MUGU TIDES
JANUARY 1989
34 DEG 07 MIN N, 119 DEG 07 MIN W - OCEAN PIER

DATE	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT
1	0411	4.5	1154	1.2	1751	2.7	2154	2.2
2	0452	4.8	1243	.7	1901	2.9	2253	2.4
3	0532	5.2	1318	.1	1953	3.1	2348	2.5
4	0614	5.6	1356	-.4	2030	3.3	----	---
5	0034	2.5	0652	5.9	1432	-.9	2103	3.5
6	0116	2.4	0731	6.2	1507	-1.2	2137	3.6
7	0201	2.2	0812	6.4	1542	-1.3	2210	3.7
8	0244	2.1	0854	6.4	1618	-1.3	2246	3.9
9	0332	1.9	0936	6.3	1656	-1.2	2321	4.0
10	0425	1.9	1022	5.9	1733	-.9	0000	4.3*
11	0526	1.8	1111	5.2	1811	-.3	----	---
12	0045	4.5	0635	1.7	1206	4.4	1851	.4
13	0131	4.7	0801	1.5	1324	3.6	1936	1.1
14	0226	5.0	0941	1.2	1512	2.9	2028	1.6
15	0324	5.2	1110	.6	1719	2.8	2134	2.1
16	0427	5.5	1219	-.1	1854	3.1	2253	2.4
17	0527	5.7	1316	-.6	1953	3.3	0002	2.4*
18	0616	5.9	1400	-1.0	2035	3.6	----	---
19	0054	2.3	0705	6.0	1438	-1.2	2110	3.6
20	0143	2.2	0747	6.1	1511	-1.2	2139	3.7
21	0222	2.0	0824	6.0	1544	-1.1	2207	3.8
22	0259	1.9	0858	6.0	1612	-.9	2236	3.9
23	0335	1.8	0933	5.7	1641	-.6	2301	4.0
24	0414	1.8	1005	5.2	1706	-.2	2326	4.0
25	0453	1.8	1037	4.7	1731	.3	2358	4.1
26	0539	1.9	1112	4.1	1754	.8	----	---
27	0026	4.1	0632	1.9	1151	3.5	1814	1.2
28	0058	4.1	0751	1.9	1251	2.8	1829	1.7
29	0141	4.2	0939	1.7	1500	2.3	1844	2.1
30	0241	4.3	1122	1.2	----	---	----	---
31	0351	4.5	1222	.6	----	---	----	---

* -- TIDE OCCURS ON NEXT DATE.
ADD ONE HOUR WHEN DAYLIGHT SAVINGS TIME IS IN EFFECT.

SAN NICOLAS ISLAND TIDES
JANUARY 1989
33 DEG 13 MIN N, 119 DEG 27 MIN W - BARGE LANDING

DATE	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT
1	0418	4.1	1204	1.1	1758	2.5	2204	2.0
2	0459	4.4	1253	.6	1908	2.6	2303	2.2
3	0539	4.8	1328	.1	2000	2.8	2358	2.3
4	0621	5.1	1406	-.4	2037	3.0	----	---
5	0044	2.3	0659	5.4	1442	-.8	2110	3.2
6	0126	2.2	0738	5.7	1517	-1.1	2144	3.3
7	0211	2.0	0819	5.9	1552	-1.2	2217	3.4
8	0254	1.9	0901	5.9	1628	-1.2	2253	3.6
9	0342	1.8	0943	5.8	1706	-1.1	2328	3.7
10	0435	1.8	1029	5.4	1743	-.8	0007	4.0*
11	0536	1.7	1118	4.8	1821	-.3	----	---
12	0052	4.1	0645	1.6	1213	4.0	1901	.4
13	0138	4.3	0811	1.4	1331	3.3	1946	1.0
14	0233	4.6	0951	1.1	1519	2.6	2038	1.5
15	0331	4.8	1120	.5	1726	2.6	2144	1.9
16	0434	5.0	1229	-.1	1901	2.8	2303	2.2
17	0534	5.2	1326	-.5	2000	3.0	0012	2.2*
18	0623	5.4	1410	-.9	2042	3.3	----	---
19	0104	2.1	0712	5.5	1448	-1.1	2117	3.3
20	0153	2.0	0754	5.6	1521	-1.1	2146	3.4
21	0232	1.8	0831	5.5	1554	-1.0	2214	3.5
22	0309	1.8	0905	5.5	1622	-.8	2243	3.6
23	0345	1.7	0940	5.2	1651	-.5	2308	3.7
24	0424	1.7	1012	4.8	1716	-.2	2333	3.7
25	0503	1.7	1044	4.3	1741	.3	0005	3.8*
26	0549	1.8	1119	3.8	1804	.7	----	---
27	0033	3.8	0642	1.8	1158	3.2	1824	1.1
28	0105	3.8	0801	1.8	1258	2.6	1839	1.6
29	0148	3.9	0949	1.6	1507	2.1	1854	1.9
30	0248	4.0	1132	1.1	----	---	----	---
31	0358	4.1	1232	.5	----	---	----	---

* -- TIDE OCCURS ON NEXT DATE.
ADD ONE HOUR WHEN DAYLIGHT SAVINGS TIME IS IN EFFECT.

POINT MUGU TIDES
FEBRUARY 1989
34 DEG 07 MIN N, 119 DEG 07 MIN W - OCEAN PIER

DATE	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT
1	0456	4.9	1302	0.0	1958	3.1	2326	2.7
2	0551	5.3	1338	-.5	2016	3.4	----	---
3	0025	2.5	0636	5.8	1410	-1.0	2038	3.6
4	0114	2.1	0718	6.1	1442	-1.2	2103	3.8
5	0200	1.7	0804	6.4	1515	-1.4	2135	4.2
6	0244	1.3	0846	6.4	1550	-1.3	2203	4.5
7	0332	1.1	0929	6.1	1625	-1.1	2236	4.7
8	0422	.9	1017	5.6	1657	-.5	2310	5.0
9	0517	.8	1107	4.8	1729	.2	2349	5.1
10	0620	.8	1204	3.9	1805	.9	----	---
11	0035	5.1	0739	.8	1327	3.1	1843	1.5
12	0132	5.1	0918	.7	1541	2.6	1928	2.2
13	0242	5.0	1100	.3	1810	2.8	2111	2.6
14	0403	5.0	1214	-.2	1915	3.2	2304	2.7
15	0516	5.2	1305	-.6	1951	3.5	----	---
16	0017	2.5	0614	5.5	1346	-.8	2019	3.7
17	0106	2.1	0702	5.6	1420	-.9	2045	3.9
18	0145	1.8	0739	5.7	1448	-.9	2106	4.0
19	0219	1.5	0814	5.7	1515	-.7	2128	4.1
20	0253	1.3	0846	5.5	1537	-.5	2146	4.3
21	0325	1.2	0918	5.2	1559	-.2	2208	4.4
22	0358	1.1	0948	4.8	1620	.2	2227	4.4
23	0430	1.1	1019	4.3	1638	.7	2248	4.5
24	0508	1.1	1053	3.7	1654	1.1	2313	4.5
25	0554	1.2	1131	3.2	1705	1.5	2339	4.4
26	0653	1.2	1227	2.6	1713	1.9	----	---
27	0016	4.3	0826	1.3	----	---	----	---
28	0111	4.2	1029	1.1	----	---	----	---

* -- TIDE OCCURS ON NEXT DATE.
ADD ONE HOUR WHEN DAYLIGHT SAVINGS TIME IS IN EFFECT.

SAN NICOLAS ISLAND TIDES
FEBRUARY 1989
33 DEG 13 MIN N, 119 DEG 27 MIN W - BARGE LANDING

DATE	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT
1	0503	4.5	1312	0.0	2005	2.8	2336	2.5
2	0558	4.8	1348	-.4	2023	3.1	----	---
3	0035	2.3	0643	5.3	1420	-.9	2045	3.3
4	0124	1.9	0725	5.6	1452	-1.1	2110	3.5
5	0210	1.6	0811	5.9	1525	-1.3	2142	3.9
6	0254	1.2	0853	5.9	1600	-1.2	2210	4.1
7	0342	1.0	0936	5.6	1635	-1.0	2243	4.3
8	0432	.8	1024	5.1	1707	-.4	2317	4.6
9	0527	.7	1114	4.4	1739	.2	2356	4.7
10	0630	.7	1211	3.6	1815	.8	----	---
11	0042	4.7	0749	.7	1334	2.8	1853	1.4
12	0139	4.7	0928	.6	1548	2.4	1938	2.0
13	0249	4.6	1110	.3	1817	2.6	2121	2.4
14	0410	4.6	1224	-.2	1922	2.9	2314	2.5
15	0523	4.8	1315	-.5	1958	3.2	----	---
16	0027	2.3	0621	5.0	1356	-.7	2026	3.4
17	0116	1.9	0709	5.1	1430	-.8	2052	3.6
18	0155	1.7	0746	5.2	1458	-.8	2113	3.7
19	0229	1.4	0821	5.2	1525	-.6	2135	3.8
20	0303	1.2	0853	5.0	1547	-.4	2153	4.0
21	0335	1.1	0925	4.8	1609	-.2	2215	4.0
22	0408	1.0	0955	4.4	1630	.2	2234	4.0
23	0440	1.0	1026	4.0	1648	.6	2255	4.1
24	0518	1.0	1100	3.4	1704	1.0	2320	4.1
25	0604	1.1	1138	2.9	1715	1.4	2346	4.0
26	0703	1.1	1234	2.4	1723	1.8	----	---
27	0023	4.0	0836	1.2	----	---	----	---
28	0118	3.9	1039	1.0	----	---	----	---

* -- TIDE OCCURS ON NEXT DATE.
ADD ONE HOUR WHEN DAYLIGHT SAVINGS TIME IS IN EFFECT.

POINT MUGU TIDES
MARCH 1989
34 DEG 07 MIN N, 119 DEG 07 MIN W - OCEAN PIER

DATE	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT
1	0244	4.3	1143	.5	----	---	----	---
2	0419	4.6	1228	-.1	1929	3.3	2322	2.7
3	0527	5.0	1304	-.6	1939	3.6	----	---
4	0020	2.2	0618	5.5	1337	-.9	1959	3.9
5	0108	1.6	0706	5.9	1411	-1.1	2024	4.3
6	0152	1.0	0752	6.0	1442	-1.1	2049	4.8
7	0238	.4	0837	5.9	1514	-.9	2121	5.2
8	0324	0.0	0923	5.6	1547	-.4	2153	5.5
9	0413	-.3	1012	4.9	1619	.2	2225	5.6
10	0505	-.3	1105	4.2	1651	.9	2305	5.6
11	0606	-.2	1211	3.5	1725	1.4	2350	5.4
12	0720	.1	1342	2.8	1802	2.1	----	---
13	0045	5.0	0856	.2	1622	2.7	1859	2.6
14	0204	4.7	1036	.1	1814	3.1	2133	2.9
15	0346	4.6	1148	-.2	1857	3.5	2320	2.6
16	0503	4.7	1238	-.4	1922	3.7	----	---
17	0022	2.2	0603	4.9	1315	-.5	1943	3.9
18	0103	1.7	0651	5.0	1347	-.4	2005	4.1
19	0138	1.3	0727	5.0	1413	-.3	2024	4.3
20	0210	1.0	0802	4.9	1434	-.1	2039	4.5
21	0239	.7	0831	4.8	1454	.2	2057	4.7
22	0311	.5	0902	4.5	1512	.5	2115	4.8
23	0342	.3	0937	4.2	1532	.9	2135	4.9
24	0414	.3	1009	3.8	1550	1.2	2156	4.9
25	0450	.3	1048	3.4	1604	1.5	2220	4.8
26	0534	.5	1134	2.9	1619	1.9	2246	4.7
27	0627	.6	1245	2.5	1620	2.2	2321	4.5
28	0746	.8	----	---	----	---	----	---
29	0018	4.3	0929	.6	----	---	---	---
30	0157	4.2	1047	.3	1834	3.2	2[illegible]	3.0
31	0340	4.3	1137	-.1	1833	3.5	231[illegible]	2.4

* -- TIDE OCCURS ON NEXT DATE.
ADD ONE HOUR WHEN DAYLIGHT SAVINGS TIME IS IN EFFECT.

SAN NICOLAS ISLAND TIDES
MARCH 1989
33 DEG 13 MIN N, 119 DEG 27 MIN W - BARGE LANDING

DATE	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT
1	0251	4.0	1153	.4	----	---	----	---
2	0426	4.2	1238	-.1	1936	3.0	2332	2.5
3	0534	4.6	1314	-.5	1946	3.3	----	---
4	0030	2.0	0625	5.0	1347	-.8	2006	3.6
5	0118	1.5	0713	5.4	1421	-1.0	2031	4.0
6	0202	.9	0759	5.5	1452	-1.0	2056	4.4
7	0248	.4	0844	5.4	1524	-.8	2128	4.8
8	0334	0.0	0930	5.1	1557	-.4	2200	5.0
9	0423	-.3	1019	4.5	1629	.2	2232	5.1
10	0515	-.3	1112	3.9	1701	.8	2312	5.1
11	0616	-.2	1218	3.2	1735	1.3	2357	4.9
12	0730	.1	1349	2.6	1812	1.9	----	---
13	0052	4.6	0906	.2	1629	2.5	1909	2.4
14	0211	4.3	1046	.1	1821	2.8	2143	2.6
15	0353	4.2	1158	-.2	1904	3.2	2330	2.4
16	0510	4.3	1248	-.4	1929	3.4	----	---
17	0072	2.0	0610	4.5	1325	-.4	1950	3.6
18	0113	1.6	0658	4.6	1357	-.4	2012	3.8
19	0148	1.2	0734	4.6	1423	-.3	2031	4.0
20	0220	.9	0809	4.5	1444	-.1	2046	4.1
21	0249	.6	0838	4.4	1504	.2	2104	4.3
22	0321	.4	0909	4.1	1522	.4	2122	4.4
23	0352	.3	0944	3.9	1542	.8	2142	4.5
24	0424	.3	1016	3.5	1600	1.1	2203	4.5
25	0500	.3	1055	3.1	1614	1.4	2227	4.4
26	0544	.4	1141	2.6	1629	1.8	2253	4.3
27	0637	.5	1252	2.3	1630	2.0	2328	4.1
28	0756	.7	----	---	----	---	----	---
29	0025	4.0	0939	.5	----	---	----	---
30	0204	3.9	1057	.3	1841	2.9	2156	2.7
31	0347	4.0	1147	-.1	1840	3.2	2326	2.2

* -- TIDE OCCURS ON NEXT DATE.
ADD ONE HOUR WHEN DAYLIGHT SAVINGS TIME IS IN EFFECT.

POINT MUGU TIDES
APRIL 1989
34 DEG 07 MIN N, 119 DEG 07 MIN W - OCEAN PIER

DATE	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT
1	0500	4.7	1217	-.4	1849	3.9	----	---
2	0012	1.7	0559	5.0	1254	-.6	1912	4.4
3	0059	1.0	0649	5.2	1326	-.5	1938	5.0
4	0145	.2	0740	5.2	1400	-.3	2006	5.5
5	0230	-.5	0830	5.1	1435	0.0	2038	5.9
6	0315	-1.0	0921	4.7	1507	.5	2112	6.0
7	0404	-1.2	1014	4.2	1542	1.0	2148	6.0
8	0456	-1.1	1112	3.6	1618	1.5	2230	5.9
9	0558	-.8	1224	3.2	1654	2.0	2315	5.5
10	0704	-.5	1403	2.9	1738	2.5	----	---
11	0013	4.9	0831	-.2	1613	3.1	1914	2.9
12	0133	4.4	0953	0.0	1729	3.4	2142	2.8
13	0315	4.2	1102	0.0	1804	3.7	2314	2.4
14	0438	4.1	1152	0.0	1833	3.9	0008	1.9*
15	0540	4.2	1230	.1	1854	4.2	----	---
16	0049	1.4	0629	4.2	1259	.2	1915	4.4
17	0123	1.0	0708	4.2	1325	.5	1934	4.7
18	0155	.6	0746	4.1	1346	.7	1952	4.9
19	0227	.2	0821	4.0	1408	1.0	2010	5.1
20	0255	-.1	0858	3.8	1426	1.2	2032	5.2
21	0327	-.2	0934	3.6	1448	1.4	2053	5.3
22	0402	-.3	1012	3.4	1508	1.7	2117	5.3
23	0441	-.2	1059	3.1	1528	2.0	2144	5.2
24	0523	-.1	1155	2.8	1547	2.3	2218	5.0
25	0619	0.0	1324	2.7	1559	2.5	2257	4.8
26	0724	.1	2359	4.5	----	---	----	---
27	0835	.1	1653	3.1	1914	3.0	----	---
28	0122	4.2	0944	.1	1708	3.5	2142	2.7
29	0308	4.1	1039	0.0	1730	3.9	2259	2.0
30	0427	4.2	1123	0.0	1755	4.4	2359	1.2

* -- TIDE OCCURS ON NEXT DATE.
ADD ONE HOUR WHEN DAYLIGHT SAVINGS TIME IS IN EFFECT.

SAN NICOLAS ISLAND TIDES
APRIL 1989
33 DEG 13 MIN N, 119 DEG 27 MIN W - BARGE LANDING

DATE	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT
1	0507	4.3	1227	-.4	1856	3.6	----	---
2	0022	1.6	0606	4.6	1304	-.5	1919	4.0
3	0109	.9	0656	4.8	1336	-.4	1945	4.6
4	0155	.2	0747	4.8	1410	-.3	2013	5.0
5	0240	-.4	0837	4.7	1445	0.0	2045	5.4
6	0325	-.9	0928	4.3	1517	.4	2119	5.5
7	0414	-1.1	1021	3.9	1552	.9	2155	5.5
8	0506	-1.0	1119	3.3	1628	1.4	2237	5.4
9	0608	-.7	1231	2.9	1704	1.8	2322	5.0
10	0714	-.4	1410	2.6	1748	2.3	----	---
11	0020	4.5	0841	-.2	1620	2.8	1924	2.6
12	0140	4.0	1003	0.0	1736	3.1	2152	2.6
13	0322	3.9	1112	0.0	1811	3.4	2324	2.2
14	0445	3.8	1202	0.0	1840	3.6	0018	1.8*
15	0547	3.9	1240	.1	1901	3.9	----	---
16	0059	1.3	0636	3.9	1309	.2	1922	4.0
17	0133	.9	0715	3.9	1335	.4	1941	4.3
18	0205	.5	0753	3.8	1356	.6	1959	4.5
19	0237	.2	0828	3.7	1418	.9	2017	4.7
20	0305	-.1	0905	3.5	1436	1.1	2039	4.8
21	0337	-.2	0941	3.3	1458	1.3	2100	4.8
22	0412	-.3	1019	3.1	1518	1.6	2124	4.8
23	0451	-.2	1106	2.8	1538	1.8	2151	4.8
24	0533	-.1	1202	2.6	1557	2.1	2225	4.6
25	0629	0.0	1331	2.5	1609	2.3	2304	4.4
26	0734	.1	0006	4.1	----	---	----	---
27	0845	.1	1700	2.8	1924	2.7	----	---
28	0129	3.9	0954	.1	1715	3.2	2152	2.5
29	0315	3.8	1049	0.0	1737	3.6	2309	1.8
30	0434	3.9	1133	0.0	1802	4.0	0009	1.1*

* -- TIDE OCCURS ON NEXT DATE.
ADD ONE HOUR WHEN DAYLIGHT SAVINGS TIME IS IN EFFECT.

POINT MUGU TIDES
MAY 1989
34 DEG 07 MIN N, 119 DEG 07 MIN W - OCEAN PIER

DATE	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT
1	0540	4.3	1203	.1	1822	5.0	----	---
2	0049	.3	0639	4.3	1242	.3	1854	5.6
3	0135	-.5	0737	4.3	1318	.6	1926	6.0
4	0224	-1.1	0832	4.2	1356	1.0	2002	6.3
5	0310	-1.4	0923	3.9	1432	1.3	2040	6.4
6	0359	-1.5	1021	3.7	1510	1.7	2122	6.3
7	0451	-1.4	1121	3.5	1552	2.0	2206	6.0
8	0547	-1.1	1232	3.3	1638	2.4	2254	5.5
9	0646	-.7	1354	3.2	1741	2.7	2348	4.9
10	0753	-.3	1517	3.4	1916	2.9	----	---
11	0056	4.4	0857	0.0	1623	3.6	2113	2.8
12	0223	3.9	0957	.2	1703	3.9	2243	2.3
13	0346	3.6	1046	.5	1733	4.2	2342	1.8
14	0501	3.6	1125	.7	1759	4.4	----	---
15	0028	1.2	0600	3.6	1200	1.0	1822	4.7
16	0107	.8	0652	3.5	1228	1.2	1842	5.0
17	0139	.3	0737	3.5	1254	1.4	1905	5.2
18	0211	-.1	0820	3.5	1322	1.7	1929	5.4
19	0246	-.4	0900	3.4	1347	1.9	1956	5.6
20	0318	-.6	0939	3.3	1412	2.0	2024	5.6
21	0356	-.7	1025	3.2	1441	2.2	2056	5.6
22	0436	-.7	1113	3.1	1509	2.4	2129	5.6
23	0518	-.6	1206	3.1	1545	2.6	2209	5.4
24	0606	-.5	1312	3.1	1638	2.8	2257	5.1
25	0656	-.4	1421	3.3	1755	2.9	2350	4.7
26	0751	-.2	1509	3.6	1940	2.8	----	---
27	0106	4.2	0844	.1	1552	3.9	2125	2.3
28	0236	3.8	0938	.4	1626	4.5	2247	1.6
29	0408	3.6	1025	.7	1702	5.0	2350	.8
30	0529	3.6	1111	1.0	1740	5.6	----	---
31	0042	-.1	0640	3.6	1156	1.2	1816	6.0

* -- TIDE OCCURS ON NEXT DATE.
ADD ONE HOUR WHEN DAYLIGHT SAVINGS TIME IS IN EFFECT.

SAN NICOLAS ISLAND TIDES
MAY 1989
33 DEG 13 MIN N, 119 DEG 27 MIN W - BARGE LANDING

DATE	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT
1	0547	4.0	1213	.1	1829	4.6	----	---
2	0059	.3	0646	4.0	1252	.3	1901	5.1
3	0145	-.4	0744	4.0	1328	.5	1933	5.5
4	0234	-1.0	0839	3.9	1406	.9	2009	5.8
5	0320	-1.3	0930	3.6	1442	1.2	2047	5.9
6	0409	-1.4	1028	3.4	1520	1.6	2129	5.8
7	0501	-1.3	1128	3.2	1602	1.8	2213	5.5
8	0557	-1.0	1239	3.0	1648	2.2	2301	5.0
9	0656	-.6	1401	2.9	1751	2.5	2355	4.5
10	0803	-.3	1524	3.1	1926	2.6	----	---
11	0103	4.0	0907	0.0	1630	3.3	2123	2.6
12	0230	3.6	1007	.2	1710	3.6	2253	2.1
13	0353	3.3	1056	.4	1740	3.9	2352	1.7
14	0508	3.3	1135	.6	1806	4.0	----	---
15	0038	1.1	0607	3.3	1210	.9	1829	4.3
16	0117	.7	0659	3.2	1238	1.1	1849	4.6
17	0149	.3	0744	3.2	1304	1.3	1912	4.8
18	0221	-.1	0827	3.2	1332	1.6	1936	4.9
19	0256	-.4	0907	3.1	1357	1.8	2003	5.1
20	0328	-.5	0946	3.0	1422	1.8	2031	5.1
21	0406	-.6	1032	2.9	1451	2.0	2103	5.1
22	0446	-.6	1120	2.8	1519	2.2	2136	5.1
23	0528	-.5	1213	2.8	1555	2.4	2216	4.9
24	0616	-.4	1319	2.8	1648	2.6	2304	4.7
25	0706	-.4	1428	3.0	1805	2.6	2357	4.3
26	0801	-.2	1516	3.3	1950	2.6	----	---
27	0113	3.9	0854	.1	1559	3.6	2135	2.1
28	0243	3.5	0948	.4	1633	4.1	2257	1.5
29	0415	3.3	1035	.6	1709	4.6	0000	.7*
30	0536	3.3	1121	.9	1747	5.1	----	---
31	0052	-.1	0647	3.3	1206	1.1	1823	5.5

* -- TIDE OCCURS ON NEXT DATE.
ADD ONE HOUR WHEN DAYLIGHT SAVINGS TIME IS IN EFFECT.

POINT MUGU TIDES
JUNE 1989
34 DEG 07 MIN N, 119 DEG 07 MIN W - OCEAN PIER

DATE	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT
1	0134	-.8	0743	3.6	1238	1.5	1857	6.3
2	0222	-1.2	0840	3.6	1324	1.7	1938	6.5
3	0308	-1.5	0936	3.6	1409	1.9	2020	6.5
4	0354	-1.5	1028	3.6	1454	2.1	2105	6.3
5	0441	-1.4	1121	3.6	1540	2.3	2151	6.0
6	0529	-1.2	1216	3.6	1633	2.5	2236	5.6
7	0619	-.8	1312	3.6	1734	2.7	2323	5.0
8	0706	-.3	1407	3.6	1848	2.7	----	---
9	0019	4.4	0754	.2	1500	3.8	2020	2.6
10	0120	3.8	0841	.6	1545	4.1	2152	2.3
11	0242	3.4	0926	1.1	1624	4.3	2308	1.8
12	0415	3.1	1005	1.4	1656	4.6	0002	1.2*
13	0538	3.0	1050	1.7	1725	4.9	----	---
14	0049	.8	0644	3.0	1127	2.0	1756	5.1
15	0126	.3	0737	3.1	1204	2.2	1825	5.4
16	0201	-.1	0824	3.2	1240	2.3	1859	5.6
17	0238	-.5	0906	3.3	1315	2.4	1933	5.8
18	0310	-.7	0948	3.4	1354	2.4	2008	6.0
19	0348	-.9	1020	3.4	1432	2.4	2043	6.0
20	0425	-1.0	1102	3.5	1513	2.5	2125	6.0
21	0504	-.9	1144	3.6	1602	2.5	2208	5.8
22	0544	-.8	1226	3.7	1659	2.5	2253	5.4
23	0625	-.5	1311	3.9	1808	2.5	2347	4.8
24	0704	-.1	1357	4.2	1933	2.3	----	---
25	0051	4.1	0750	.4	1442	4.6	2106	1.8
26	0220	3.6	0840	1.0	1530	5.0	2232	1.2
27	0403	3.2	0929	1.4	1617	5.5	2344	.5
28	0540	3.1	1026	1.8	1706	5.9	----	---
29	0042	-.3	0700	3.3	1124	2.1	1754	6.1
30	0135	-.8	0800	3.4	1220	2.2	1842	6.4

* -- TIDE OCCURS ON NEXT DATE.
ADD ONE HOUR WHEN DAYLIGHT SAVINGS TIME IS IN EFFECT.

SAN NICOLAS ISLAND TIDES
JUNE 1989
33 DEG 13 MIN N, 119 DEG 27 MIN W - BARGE LANDING

DATE	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT
1	0144	-.7	0750	3.3	1248	1.4	1904	5.8
2	0232	-1.1	0847	3.3	1334	1.6	1945	6.0
3	0318	-1.4	0943	3.3	1419	1.8	2027	6.0
4	0404	-1.4	1035	3.3	1504	1.9	2112	5.8
5	0451	-1.3	1128	3.3	1550	2.1	2158	5.5
6	0539	-1.1	1223	3.3	1643	2.3	2243	5.1
7	0629	-.7	1319	3.3	1744	2.5	2330	4.6
8	0716	-.3	1414	3.3	1858	2.5	----	---
9	0026	4.0	0804	.2	1507	3.5	2030	2.4
10	0127	3.5	0851	.5	1552	3.8	2202	2.1
11	0249	3.1	0936	1.0	1631	4.0	2318	1.7
12	0422	2.8	1015	1.3	1703	4.2	0012	1.1*
13	0545	2.7	1100	1.6	1732	4.5	----	---
14	0059	.7	0651	2.7	1137	1.8	1803	4.7
15	0136	.3	0744	2.8	1214	2.0	1832	4.9
16	0211	-.1	0831	2.9	1250	2.1	1906	5.1
17	0248	-.4	0913	3.0	1325	2.2	1940	5.3
18	0320	-.6	0955	3.1	1404	2.2	2015	5.5
19	0358	-.8	1027	3.1	1442	2.2	2050	5.5
20	0435	-.9	1109	3.2	1523	2.3	2132	5.5
21	0514	-.8	1151	3.3	1612	2.3	2215	5.3
22	0554	-.7	1233	3.4	1709	2.3	2300	4.9
23	0635	-.4	1318	3.6	1818	2.3	2354	4.4
24	0714	-.1	1404	3.9	1943	2.1	----	---
25	0058	3.8	0800	.4	1449	4.2	2116	1.7
26	0227	3.3	0850	.9	1537	4.6	2242	1.1
27	0410	2.9	0939	1.3	1624	5.0	2354	.4
28	0547	2.8	1036	1.7	1713	5.4	----	---
29	0052	-.3	0707	3.0	1134	1.9	1801	5.6
30	0145	-.7	0807	3.1	1230	2.0	1849	5.9

* -- TIDE OCCURS ON NEXT DATE.
ADD ONE HOUR WHEN DAYLIGHT SAVINGS TIME IS IN EFFECT.

POINT MUGU TIDES
JULY 1989
34 DEG 07 MIN N, 119 DEG 07 MIN W - OCEAN PIER

DATE	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT
1	0221	-1.2	0852	3.6	1312	2.3	1929	6.5
2	0305	-1.3	0937	3.6	1403	2.3	2013	6.5
3	0347	-1.3	1016	3.7	1450	2.3	2055	6.3
4	0426	-1.2	1055	3.8	1535	2.3	2136	6.0
5	0502	-.9	1134	3.9	1621	2.3	2218	5.7
6	0539	-.5	1215	3.9	1713	2.4	2256	5.1
7	0613	0.0	1251	4.0	1810	2.4	2339	4.4
8	0648	.5	1333	4.1	1917	2.4	----	---
9	0027	3.8	0718	1.1	1415	4.2	2041	2.2
10	0136	3.2	0753	1.5	1457	4.4	2218	1.9
11	0323	2.8	0828	2.0	1543	4.6	2333	1.4
12	0529	2.7	0917	2.4	1629	4.8	----	---
13	0030	.9	0702	2.9	1023	2.6	1714	5.1
14	0112	.4	0753	3.1	1125	2.7	1757	5.4
15	0147	-.1	0825	3.3	1217	2.7	1839	5.8
16	0222	-.5	0857	3.5	1306	2.6	1918	6.0
17	0254	-.8	0926	3.6	1348	2.4	1959	6.2
18	0329	-1.0	0954	3.8	1430	2.2	2038	6.3
19	0401	-1.0	1026	4.0	1516	2.1	2120	6.2
20	0436	-.9	1058	4.2	1606	1.9	2202	6.0
21	0510	-.6	1133	4.4	1659	1.8	2248	5.4
22	0544	-.1	1211	4.7	1802	1.7	2342	4.7
23	0620	.5	1254	4.9	1917	1.6	----	---
24	0045	3.8	0659	1.1	1343	5.1	2044	1.3
25	0220	3.2	0744	1.7	1439	5.4	2223	.9
26	0426	2.9	0843	2.2	1542	5.6	2341	.3
27	0617	3.1	1000	2.6	1647	5.8	----	---
28	0041	-.3	0726	3.4	1125	2.7	1745	6.0
29	0132	-.7	0814	3.6	1228	2.6	1839	6.2
30	0216	-.9	0847	3.8	1320	2.4	1924	6.3
31	0252	-1.0	0915	4.0	1406	2.2	2007	6.3

* -- TIDE OCCURS ON NEXT DATE.
ADD ONE HOUR WHEN DAYLIGHT SAVINGS TIME IS IN EFFECT.

SAN NICOLAS ISLAND TIDES
JULY 1989
33 DEG 13 MIN N, 119 DEG 27 MIN W - BARGE LANDING

DATE	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT
1	0231	-1.1	0859	3.3	1322	2.1	1936	6.0
2	0315	-1.2	0944	3.3	1413	2.1	2020	6.0
3	0357	-1.2	1023	3.4	1500	2.1	2102	5.8
4	0436	-1.1	1102	3.5	1545	2.1	2143	5.5
5	0512	-.8	1141	3.6	1631	2.1	2225	5.2
6	0549	-.4	1222	3.6	1723	2.2	2303	4.7
7	0623	0.0	1258	3.7	1820	2.2	2346	4.0
8	0658	.4	1340	3.8	1927	2.2	----	---
9	0034	3.5	0728	1.0	1422	3.9	2051	2.0
10	0143	2.9	0803	1.4	1504	4.0	2228	1.8
11	0330	2.6	0838	1.8	1550	4.2	2343	1.3
12	0536	2.5	0927	2.2	1636	4.4	----	---
13	0040	.8	0709	2.6	1033	2.4	1721	4.7
14	0122	.4	0800	2.8	1135	2.5	1804	4.9
15	0157	-.1	0832	3.0	1227	2.5	1846	5.3
16	0232	-.4	0904	3.2	1316	2.4	1925	5.5
17	0304	-.7	0933	3.3	1358	2.2	2006	5.7
18	0339	-.9	1001	3.5	1440	2.0	2045	5.8
19	0411	-.9	1033	3.7	1526	1.9	2127	5.7
20	0446	-.8	1105	3.9	1616	1.8	2209	5.5
21	0520	-.5	1140	4.0	1709	1.7	2255	4.9
22	0554	-.1	1218	4.3	1812	1.6	2349	4.3
23	0630	.4	1301	4.5	1927	1.5	----	---
24	0052	3.5	0709	1.0	1350	4.7	2054	1.2
25	0227	2.9	0754	1.6	1446	4.9	2233	.8
26	0433	2.6	0853	2.0	1549	5.1	2351	.3
27	0624	2.8	1010	2.4	1654	5.3	----	---
28	0051	-.3	0733	3.1	1135	2.5	1752	5.5
29	0142	-.6	0821	3.3	1238	2.4	1846	5.7
30	0226	-.8	0854	3.5	1330	2.2	1931	5.8
31	0302	-.9	0922	3.7	1416	2.0	2014	5.8

* -- TIDE OCCURS ON NEXT DATE.
ADD ONE HOUR WHEN DAYLIGHT SAVINGS TIME IS IN EFFECT.

POINT MUGU TIDES
AUGUST 1989
34 DEG 07 MIN N, 119 DEG 07 MIN W - OCEAN PIER

DATE	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT
1	0326	-.9	0947	4.1	1446	2.0	2045	6.2
2	0358	-.7	1016	4.2	1525	1.9	2121	5.9
3	0425	-.4	1043	4.3	1604	1.8	2156	5.5
4	0453	.1	1109	4.4	1646	1.8	2231	5.0
5	0518	.5	1138	4.5	1731	1.9	2309	4.3
6	0541	1.1	1206	4.5	1823	1.9	2352	3.7
7	0602	1.5	1238	4.5	1936	2.0	----	---
8	0048	3.1	0616	2.0	1320	4.5	2112	1.8
9	0254	2.7	0611	2.5	1417	4.5	2258	1.4
10	1530	4.7	0004	1.0	----	---	----	---
11	1639	5.0	----	---	----	---	----	---
12	0049	.5	0748	3.4	1117	3.0	1734	5.4
13	0123	0.0	0803	3.6	1215	2.8	1820	5.8
14	0153	-.4	0824	3.8	1259	2.4	1902	6.1
15	0225	-.7	0846	4.1	1343	2.0	1944	6.3
16	0255	-.8	0911	4.4	1424	1.6	2026	6.4
17	0327	-.8	0937	4.7	1510	1.3	2108	6.2
18	0359	-.5	1008	5.0	1558	1.1	2153	5.8
19	0431	-.1	1040	5.3	1649	.9	2242	5.1
20	0502	.5	1118	5.5	1750	.9	2339	4.3
21	0534	1.2	1200	5.5	1859	.9	----	---
22	0053	3.6	0613	1.8	1251	5.5	2034	.8
23	0248	3.1	0658	2.5	1357	5.4	2211	.6
24	0523	3.1	0824	2.9	1522	5.4	2334	.2
25	0639	3.5	1021	3.0	1642	5.5	----	---
26	0033	-.2	0721	3.8	1145	2.8	1745	5.8
27	0118	-.5	0752	4.1	1241	2.4	1837	6.0
28	0155	-.6	0818	4.3	1325	2.1	1919	6.0
29	0226	-.5	0842	4.5	1404	1.7	1957	6.0
30	0255	-.3	0905	4.6	1438	1.5	2033	5.8
31	0317	0.0	0927	4.8	1513	1.3	2105	5.5

* -- TIDE OCCURS ON NEXT DATE.
ADD ONE HOUR WHEN DAYLIGHT SAVINGS TIME IS IN EFFECT.

SAN NICOLAS ISLAND TIDES
AUGUST 1989
33 DEG 13 MIN N, 119 DEG 27 MIN W - BARGE LANDING

DATE	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT
1	0336	-.8	0954	3.8	1456	1.8	2052	5.7
2	0408	-.6	1023	3.9	1535	1.8	2128	5.4
3	0435	-.4	1050	4.0	1614	1.7	2203	5.0
4	0503	.1	1116	4.0	1656	1.7	2238	4.6
5	0528	.4	1145	4.1	1741	1.8	2316	4.0
6	0551	1.0	1213	4.1	1833	1.8	2359	3.4
7	0612	1.4	1245	4.1	1946	1.8	----	---
8	0055	2.8	0626	1.8	1327	4.1	2122	1.7
9	0301	2.5	0621	2.3	1424	4.1	2308	1.3
10	1537	4.3	0014	.9	----	---	----	---
11	1646	4.6	----	---	----	---	----	---
12	0059	.4	0755	3.1	1127	2.7	1741	4.9
13	0133	0.0	0810	3.3	1225	2.6	1827	5.3
14	0203	-.4	0831	3.5	1309	2.2	1909	5.6
15	0235	-.6	0853	3.8	1353	1.8	1951	5.8
16	0305	-.7	0918	4.0	1434	1.5	2033	5.9
17	0337	-.7	0944	4.3	1520	1.2	2115	5.7
18	0409	-.4	1015	4.6	1608	1.0	2200	5.3
19	0441	-.1	1047	4.8	1659	.8	2249	4.7
20	0512	.4	1125	5.0	1800	.8	2346	4.0
21	0544	1.1	1207	5.0	1909	.8	----	---
22	0100	3.3	0623	1.7	1258	5.0	2044	.7
23	0255	2.8	0708	2.3	1404	4.9	2221	.5
24	0530	2.8	0834	2.6	1529	4.9	2344	.2
25	0646	3.2	1031	2.7	1649	5.0	----	---
26	0043	-.2	0728	3.5	1155	2.6	1752	5.3
27	0128	-.4	0759	3.8	1251	2.2	1844	5.5
28	0205	-.5	0825	4.0	1335	1.9	1926	5.5
29	0236	-.4	0849	4.1	1414	1.6	2004	5.5
30	0305	-.3	0912	4.2	1448	1.4	2040	5.3
31	0327	0.0	0934	4.4	1523	1.2	2112	5.0

* -- TIDE OCCURS ON NEXT DATE.
ADD ONE HOUR WHEN DAYLIGHT SAVINGS TIME IS IN EFFECT.

POINT MUGU TIDES
SEPTEMBER 1989
34 DEG 07 MIN N, 119 DEG 07 MIN W - OCEAN PIER

DATE	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT
1	0342	.3	0945	4.9	1545	1.2	2137	5.1
2	0401	.7	1009	4.9	1620	1.2	2212	4.6
3	0422	1.2	1028	4.9	1659	1.2	2245	4.0
4	0438	1.6	1054	4.9	1744	1.3	2326	3.6
5	0453	2.0	1121	4.8	1840	1.5	----	---
6	0027	3.0	0454	2.4	1154	4.7	2013	1.6
7	1250	4.5	2209	1.3	----	---	----	---
8	1425	4.5	2325	1.0	----	---	----	---
9	0730	3.5	0938	3.4	1603	4.7	0009	.5*
10	0712	3.6	1116	3.1	1709	5.1	----	---
11	0044	.1	0720	3.9	1206	2.6	1801	5.6
12	0115	-.2	0737	4.3	1252	2.0	1846	5.9
13	0144	-.4	0757	4.7	1334	1.4	1929	6.0
14	0216	-.4	0822	5.1	1417	.8	2014	6.0
15	0245	-.2	0851	5.6	1500	.3	2059	5.8
16	0316	.2	0923	5.9	1549	0.0	2148	5.2
17	0348	.7	0955	6.0	1641	-.1	2243	4.6
18	0423	1.2	1033	6.0	1739	0.0	2346	3.9
19	0456	1.9	1116	5.9	1847	.2	----	---
20	0114	3.4	0534	2.5	1211	5.6	2016	.4
21	0334	3.2	0631	3.0	1325	5.2	2152	.3
22	0531	3.6	0851	3.3	1504	5.0	2308	.1
23	0617	3.9	1047	3.0	1631	5.1	0004	-.1*
24	0649	4.2	1156	2.5	1739	5.3	----	---
25	0046	-.1	0714	4.5	1242	2.0	1828	5.4
26	0121	0.0	0739	4.7	1321	1.6	1910	5.4
27	0147	.2	0800	4.9	1353	1.2	1945	5.2
28	0212	.4	0818	5.1	1426	1.0	2018	5.0
29	0234	.7	0836	5.3	1457	.7	2053	4.8
30	0252	1.1	0856	5.4	1529	.6	2124	4.4

* -- TIDE OCCURS ON NEXT DATE.
ADD ONE HOUR WHEN DAYLIGHT SAVINGS TIME IS IN EFFECT.

SAN NICOLAS ISLAND TIDES
SEPTEMBER 1989
33 DEG 13 MIN N, 119 DEG 27 MIN W - BARGE LANDING

DATE	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT
1	0352	.3	0952	4.5	1555	1.1	2144	4.7
2	0411	.6	1016	4.5	1630	1.1	2219	4.2
3	0432	1.1	1035	4.5	1709	1.1	2252	3.7
4	0448	1.5	1101	4.5	1754	1.2	2333	3.3
5	0503	1.8	1128	4.4	1850	1.4	----	---
6	0034	2.7	0504	2.2	1201	4.3	2023	1.5
7	1257	4.1	2219	1.2	----	---	----	---
8	1432	4.1	2335	.9	----	---	----	---
9	0737	3.2	0948	3.1	1610	4.3	0019	.4*
10	0719	3.3	1126	2.8	1716	4.7	----	---
11	0054	.1	0727	3.6	1216	2.4	1808	5.1
12	0125	-.2	0744	4.0	1302	1.8	1853	5.4
13	0154	-.4	0804	4.3	1344	1.3	1936	5.5
14	0226	-.4	0829	4.7	1427	.7	2021	5.5
15	0255	-.2	0858	5.1	1510	.3	2106	5.3
16	0326	.2	0930	5.4	1559	0.0	2155	4.8
17	0358	.6	1002	5.5	1651	-.1	2250	4.2
18	0433	1.1	1040	5.5	1749	0.0	2353	3.6
19	0506	1.8	1123	5.4	1857	.2	----	---
20	0121	3.1	0544	2.3	1218	5.1	2026	.4
21	0341	2.9	0641	2.7	1332	4.8	2202	.3
22	0538	3.3	0901	3.0	1511	4.6	2318	.1
23	0624	3.6	1057	2.7	1638	4.7	0014	-.1*
24	0656	3.9	1206	2.3	1746	4.8	----	---
25	0056	-.1	0721	4.1	1252	1.8	1825	4.9
26	0131	0.0	0746	4.3	1331	1.5	1917	4.9
27	0157	.2	0807	4.5	1403	1.1	1952	4.8
28	0222	.4	0825	4.7	1436	.9	2025	4.6
29	0244	.6	0843	4.8	1507	.6	2100	4.4
30	0302	1.0	0903	4.9	1539	.5	2131	4.0

* -- TIDE OCCURS ON NEXT DATE.
ADD ONE HOUR WHEN DAYLIGHT SAVINGS TIME IS IN EFFECT.

POINT MUGU TIDES
OCTOBER 1989
34 DEG 07 MIN N, 119 DEG 07 MIN W - OCEAN PIER

DATE	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT
1	0311	1.3	0914	5.4	1601	.6	2200	4.0
2	0329	1.7	0936	5.4	1637	.6	2238	3.6
3	0344	2.1	0958	5.3	1718	.8	2328	3.3
4	0359	2.4	1026	5.1	1811	1.0	----	---
5	0042	2.9	0352	2.7	1059	4.9	1927	1.1
6	1150	4.6	2106	1.1	----	---	----	---
7	1324	4.4	2223	.8	----	---	----	---
8	0624	3.6	0942	3.5	1514	4.5	2314	.5
9	0616	3.9	1103	2.9	1633	4.7	2351	.2
10	0628	4.3	1156	2.2	1735	5.1	----	---
11	0028	.1	0646	4.8	1238	1.4	1828	5.3
12	0100	.1	0710	5.4	1321	.6	1916	5.3
13	0131	.3	0739	5.9	1407	-.1	2005	5.2
14	0205	.6	0808	6.2	1452	-.6	2057	5.0
15	0237	1.0	0844	6.5	1538	-.9	2150	4.5
16	0312	1.4	0920	6.6	1630	-.9	2248	4.0
17	0348	1.9	1001	6.4	1729	-.7	2357	3.6
18	0426	2.4	1046	6.0	1835	-.4	----	---
19	0133	3.4	0515	2.9	1142	5.6	1954	-.1
20	0331	3.5	0644	3.3	1302	5.0	2117	.1
21	0452	3.8	0905	3.3	1438	4.7	2229	.2
22	0534	4.1	1047	2.8	1608	4.5	2322	.3
23	0606	4.5	1146	2.2	1717	4.5	0004	.4*
24	0630	4.8	1234	1.6	1809	4.5	----	---
25	0036	.6	0654	5.0	1310	1.2	1854	4.5
26	0102	.9	0715	5.3	1345	.8	1934	4.3
27	0126	1.2	0733	5.4	1414	.4	2010	4.2
28	0148	1.4	0753	5.6	1445	.2	2047	4.0
29	0208	1.7	0813	5.7	1516	0.0	2124	3.8
30	0228	1.9	0835	5.7	1551	0.0	2204	3.6
31	0247	2.2	0858	5.7	1625	.1	2246	3.4

* -- TIDE OCCURS ON NEXT DATE.
ADD ONE HOUR WHEN DAYLIGHT SAVINGS TIME IS IN EFFECT.

SAN NICOLAS ISLAND TIDES
OCTOBER 1989
33 DEG 13 MIN N, 119 DEG 27 MIN W - BARGE LANDING

DATE	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT
1	0321	1.2	0921	4.9	1611	.5	2207	3.7
2	0339	1.6	0943	4.9	1647	.5	2245	3.3
3	0354	1.9	1005	4.8	1728	.7	2335	3.0
4	0409	2.2	1033	4.7	1821	.9	----	---
5	0049	2.6	0402	2.5	1106	4.5	1937	1.0
6	1157	4.2	2116	1.0	----	---	----	---
7	1331	4.0	2233	.7	----	---	----	---
8	0631	3.3	0952	3.2	1521	4.1	2324	.4
9	0623	3.6	1113	2.6	1640	4.3	0001	.2*
10	0635	4.0	1206	2.0	1742	4.7	----	---
11	0038	.1	0653	4.4	1248	1.3	1835	4.8
12	0110	.1	0717	4.9	1331	.5	1923	4.8
13	0141	.3	0746	5.4	1417	-.1	2012	4.8
14	0215	.5	0815	5.7	1502	-.5	2104	4.6
15	0247	.9	0851	6.0	1548	-.8	2157	4.1
16	0322	1.3	0927	6.1	1640	-.8	2255	3.7
17	0358	1.8	1008	5.9	1739	-.6	0004	3.3*
18	0436	2.2	1053	5.5	1845	-.4	----	---
19	0140	3.1	0525	2.6	1149	5.1	2004	-.1
20	0338	3.2	0654	3.0	1309	4.6	2127	.1
21	0459	3.5	0915	3.0	1445	4.3	2239	.2
22	0541	3.8	1057	2.6	1615	4.1	2332	.3
23	0613	4.1	1156	2.0	1724	4.1	0014	.4*
24	0637	4.4	1244	1.5	1816	4.1	----	---
25	0046	.5	0701	4.6	1320	1.1	1901	4.1
26	0112	.8	0722	4.8	1355	.7	1941	4.0
27	0136	1.1	0740	4.9	1424	.4	2017	3.9
28	0158	1.3	0800	5.1	1455	.2	2054	3.7
29	0218	1.6	0820	5.2	1526	0.0	2131	3.5
30	0238	1.8	0842	5.2	1601	0.0	2211	3.3
31	0257	2.0	0905	5.2	1635	.1	2253	3.1

* -- TIDE OCCURS ON NEXT DATE.
ADD ONE HOUR WHEN DAYLIGHT SAVINGS TIME IS IN EFFECT.

POINT MUGU TIDES
NOVEMBER 1989
34 DEG 07 MIN N, 119 DEG 07 MIN W - OCEAN PIER

DATE	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT
1	0308	2.4	0926	5.6	1707	.2	2345	3.2
2	0323	5.4	0958	5.4	1758	.4	----	---
3	0111	3.0	0335	2.9	1033	5.1	1858	.5
4	1123	4.8	2010	.6	----	---	----	---
5	1243	4.4	2114	.6	----	---	----	---
6	0452	3.7	0917	3.2	1428	4.2	2207	.5
7	0507	4.2	1042	2.5	1557	4.2	2252	.5
8	0532	4.7	1138	1.7	1710	4.3	2333	.6
9	0557	5.3	1230	.8	1815	4.4	----	---
10	0012	.8	0627	5.9	1313	-.1	1912	4.4
11	0047	1.1	0659	6.3	1400	-.8	2008	4.3
12	0126	1.3	0735	6.7	1447	-1.2	2101	4.2
13	0205	1.6	0814	6.9	1535	-1.4	2157	4.0
14	0244	1.9	0856	6.8	1625	-1.3	2254	3.7
15	0327	2.2	0941	6.6	1720	-1.2	0002	3.6*
16	0414	2.6	1029	6.1	1819	-.8	----	---
17	0121	3.6	0510	2.9	1121	5.5	1920	-.3
18	0237	3.6	0643	3.1	1230	4.9	2026	.1
19	0346	3.9	0840	3.0	1353	4.3	2126	.4
20	0435	4.2	1018	2.6	1522	3.9	2220	.7
21	0510	4.6	1127	2.0	1645	3.7	2303	1.0
22	0540	4.8	1218	1.4	1748	3.6	2340	1.2
23	0607	5.1	1257	.9	1846	3.6	----	---
24	0012	1.5	0628	5.3	1333	.5	1931	3.6
25	0041	1.8	0653	5.6	1405	.1	2013	3.6
26	0107	2.0	0718	5.7	1437	-.2	2052	3.6
27	0134	2.2	0743	5.8	1509	-.4	2132	3.5
28	0159	2.3	0811	5.9	1544	-.5	2212	3.5
29	0226	2.4	0841	5.9	1622	-.4	2257	3.4
30	0256	2.6	0914	5.8	1701	-.4	2346	3.3

* -- TIDE OCCURS ON NEXT DATE.
ADD ONE HOUR WHEN DAYLIGHT SAVINGS TIME IS IN EFFECT.

SAN NICOLAS ISLAND TIDES
NOVEMBER 1989
33 DEG 13 MIN N, 119 DEG 27 MIN W - BARGE LANDING

DATE	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT
1	0318	2.2	0933	5.1	1717	.2	2352	2.9
2	0333	4.9	1005	4.9	1808	.4	----	---
3	0118	2.7	0345	2.6	1040	4.7	1908	.4
4	1130	4.4	2020	.5	----	---	----	---
5	1250	4.0	2124	.5	----	---	----	---
6	0459	3.4	0927	2.9	1435	3.9	2217	.4
7	0514	3.9	1052	2.3	1604	3.9	2302	.4
8	0539	4.3	1148	1.6	1717	4.0	2343	.5
9	0604	4.8	1240	.7	1822	4.0	----	---
10	0022	.7	0634	5.4	1323	-.1	1919	4.0
11	0057	1.0	0706	5.8	1410	-.7	2015	4.0
12	0136	1.2	0742	6.2	1457	-1.1	2108	3.9
13	0215	1.5	0821	6.3	1545	-1.3	2204	3.7
14	0254	1.8	0903	6.2	1635	-1.2	2301	3.4
15	0337	2.0	0948	6.1	1730	-1.1	0009	3.3*
16	0424	2.4	1036	5.6	1829	-.7	----	---
17	0128	3.3	0520	2.6	1128	5.0	1930	-.3
18	0244	3.3	0653	2.8	1237	4.5	2036	.1
19	0353	3.6	0850	2.7	1400	4.0	2136	.4
20	0442	3.9	1028	2.4	1529	3.6	2230	.6
21	0517	4.2	1137	1.8	1652	3.4	2313	.9
22	0547	4.4	1228	1.3	1755	3.3	2350	1.1
23	0614	4.7	1307	.8	1853	3.3	----	---
24	0022	1.4	0635	4.8	1343	.4	1938	3.3
25	0051	1.7	0700	5.1	1415	.1	2020	3.3
26	0117	1.8	0725	5.2	1447	-.2	2059	3.3
27	0144	2.0	0750	5.3	1519	-.4	2139	3.2
28	0209	2.1	0818	5.4	1554	-.4	2219	3.2
29	0236	2.2	0848	5.4	1632	-.4	2304	3.1
30	0306	2.4	0921	5.3	1711	-.4	2353	3.0

* -- TIDE OCCURS ON NEXT DATE.
ADD ONE HOUR WHEN DAYLIGHT SAVINGS TIME IS IN EFFECT.

POINT MUGU TIDES
DECEMBER 1989
34 DEG 07 MIN N, 119 DEG 07 MIN W - OCEAN PIER

DATE	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT
1	0328	2.7	0949	5.6	1743	-.3	----	---
2	0042	3.3	0414	2.9	1028	5.3	1829	-.1
3	0141	3.5	0517	3.0	1118	4.9	1916	.1
4	0233	3.6	0651	3.1	1219	4.4	2004	.4
5	0318	4.0	0844	2.7	1346	3.9	2057	.7
6	0357	4.5	1015	2.0	1528	3.6	2148	1.0
7	0434	5.0	1125	1.2	1658	3.5	2239	1.2
8	0511	5.6	1222	.3	1817	3.6	2326	1.5
9	0552	6.0	1311	-.6	1922	3.6	----	---
10	0015	1.7	0633	6.5	1400	-1.2	2019	3.7
11	0100	1.9	0716	6.8	1445	-1.5	2112	3.8
12	0146	2.0	0800	6.9	1533	-1.6	2202	3.8
13	0232	2.1	0846	6.8	1619	-1.5	2251	3.7
14	0321	2.2	0928	6.5	1705	-1.3	2342	3.7
15	0412	2.4	1017	6.0	1751	-.9	----	---
16	0035	3.7	0510	2.5	1105	5.5	1837	-.4
17	0130	3.8	0618	2.7	1154	4.7	1923	.1
18	0223	4.0	0742	2.7	1257	4.0	2010	.7
19	0315	4.2	0922	2.4	1416	3.4	2056	1.2
20	0400	4.4	1051	1.9	1557	3.0	2145	1.6
21	0439	4.7	1156	1.3	1735	3.0	2234	1.9
22	0514	4.9	1244	.8	1848	3.0	2316	2.2
23	0547	5.2	1323	.3	1945	3.2	0001	2.4*
24	0622	5.4	1400	-.1	2027	3.3	----	---
25	0038	2.4	0654	5.6	1431	-.4	2103	3.4
26	0113	2.4	0726	5.8	1503	-.6	2135	3.5
27	0148	2.4	0800	6.0	1535	-.8	2206	3.5
28	0224	2.4	0834	6.0	1609	-.9	2242	3.6
29	0302	2.4	0909	6.0	1644	-.8	2314	3.6
30	0344	2.4	0945	5.8	1716	-.7	2352	3.7
31	0433	2.4	1026	5.4	1751	-.4	----	---

* -- TIDE OCCURS ON NEXT DATE.
ADD ONE HOUR WHEN DAYLIGHT SAVINGS TIME IS IN EFFECT.

SAN NICOLAS ISLAND TIDES
DECEMBER 1989
33 DEG 13 MIN N, 119 DEG 27 MIN W - BARGE LANDING

DATE	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT
1	0338	2.5	0956	5.1	1753	-.3	----	---
2	0049	3.0	0424	2.6	1035	4.8	1839	-.1
3	0148	3.2	0527	2.7	1125	4.5	1926	.1
4	0240	3.3	0701	2.8	1226	4.0	2014	.4
5	0325	3.7	0854	2.5	1353	3.6	2107	.6
6	0404	4.1	1025	1.8	1535	3.3	2158	.9
7	0441	4.6	1135	1.1	1705	3.2	2249	1.1
8	0518	5.1	1232	.3	1824	3.3	2336	1.4
9	0559	5.5	1321	-.5	1929	3.3	----	---
10	0025	1.6	0640	6.0	1410	-1.1	2026	3.4
11	0110	1.8	0723	6.2	1455	-1.4	2119	3.5
12	0156	1.8	0807	6.3	1543	-1.5	2209	3.5
13	0242	1.9	0853	6.2	1629	-1.4	2258	3.4
14	0331	2.0	0935	6.0	1715	-1.2	2349	3.4
15	0422	2.2	1024	5.5	1801	-.8	----	---
16	0042	3.4	0520	2.3	1112	5.0	1847	-.4
17	0137	3.5	0628	2.5	1201	4.3	1933	.1
18	0230	3.7	0752	2.5	1304	3.7	2020	.6
19	0322	3.9	0932	2.2	1423	3.1	2106	1.1
20	0407	4.0	1101	1.8	1604	2.7	2155	1.5
21	0446	4.3	1206	1.2	1742	2.7	2244	1.8
22	0521	4.5	1254	.7	1855	2.7	2326	2.0
23	0554	4.8	1333	.3	1952	2.9	0011	2.2*
24	0629	4.9	1410	-.1	2034	3.0	----	---
25	0048	2.2	0701	5.1	1441	-.4	2110	3.1
26	0123	2.2	0733	5.3	1513	-.5	2142	3.2
27	0158	2.2	0807	5.5	1545	-.7	2213	3.2
28	0234	2.2	0841	5.5	1619	-.8	2249	3.3
29	0312	2.2	0916	5.5	1654	-.7	2321	3.3
30	0354	2.2	0952	5.3	1726	-.6	2359	3.4
31	0443	2.2	1033	4.9	1801	-.4	----	---

* -- TIDE OCCURS ON NEXT DATE.
ADD ONE HOUR WHEN DAYLIGHT SAVINGS TIME IS IN EFFECT.

Latitude 22° 02' N
Longitude 159° 47' W

Barking Sands Training Area, Kauai, Hawaiian Islands
Moonrise and Moonset for 1989

Hawaii-Aleutian Standard Time

Nautical Almanac Office
U.S. Naval Observatory
Washington, D.C. 20392-5100

Day	Jan. Rise	Jan. Set	Feb. Rise	Feb. Set	Mar. Rise	Mar. Set	Apr. Rise	Apr. Set	May Rise	May Set	June Rise	June Set	July Rise	July Set	Aug. Rise	Aug. Set	Sept. Rise	Sept. Set	Oct. Rise	Oct. Set	Nov. Rise	Nov. Set	Dec. Rise	Dec. Set
	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
1	0144	1315	0315	1401	0201	1244	0320	1438	0316	1531	0352	1733	0422	1834	0615	1940	0738	1949	0802	1927	0931	2017	1001	2100
2	0237	1351	0415	1459	0258	1343	0403	1542	0354	1633	0441	1841	0524	1931	0711	2015	0827	2020	0854	2003	1025	2110	1046	2158
3	0333	1433	0513	1603	0353	1447	0444	1645	0433	1738	0537	1947	0627	2022	0804	2048	0917	2052	0947	2044	1116	2207	1126	2256
4	0432	1522	0608	1709	0444	1553	0523	1749	0516	1845	0637	2049	0728	2105	0855	2118	1007	2126	1042	2130	1203	2305	1204	2353
5	0533	1617	0657	1816	0530	1659	0602	1854	0603	1954	0740	2143	0826	2143	0944	2148	1100	2204	1136	2220	1247		1240	
6	0633	1719	0742	1922	0613	1804	0643	2001	0656	2102	0843	2230	0921	2217	1033	2219	1154	2247	1230	2315	1327	0004	1316	0051
7	0730	1825	0823	2026	0653	1908	0728	2109	0754	2207	0943	2311	1013	2248	1123	2252	1249	2335	1321		1405	0102	1354	0150
8	0822	1931	0901	2129	0732	2013	0818	2217	0856	2304	1039	2347	1103	2319	1215	2328	1345		1408	0014	1443	0202	1434	0251
9	0908	2036	0939	2231	0812	2117	0912	2323	0958	2355	1131		1152	2349	1308		1439	0028	1452	0114	1520	0302	1520	0355
10	0949	2139	1018	2334	0854	2223	1011		1058		1222	0019	1241		1404	0008	1530	0127	1532	0215	1601	0404	1612	0503
11	1028	2240	1100		0939	2329	1111	0023	1155	0038	1311	0049	1332	0020	1501	0053	1617	0228	1611	0317	1645	0509	1710	0613
12	1104	2340	1145	0037	1029		1211	0115	1249	0115	1359	0119	1425	0054	1557	0145	1700	0331	1650	0418	1734	0618	1814	0721
13	1141		1235	0141	1124	0034	1308	0201	1339	0149	1449	0150	1520	0132	1651	0242	1741	0434	1730	0522	1830	0728	1920	0823
14	1220	0040	1330	0243	1221	0135	1403	0241	1428	0220	1541	0222	1617	0215	1741	0344	1820	0537	1812	0627	1932	0838	2025	0918
15	1301	0141	1427	0341	1320	0231	1455	0316	1517	0249	1635	0257	1714	0304	1827	0447	1859	0640	1859	0734	2037	0943	2127	1006
16	1348	0244	1525	0434	1418	0320	1544	0348	1606	0319	1731	0337	1810	0359	1910	0551	1940	0744	1951	0844	2141	1041	2224	1046
17	1439	0347	1623	0521	1514	0403	1633	0418	1656	0350	1829	0423	1903	0459	1949	0654	2023	0850	2049	0954	2243	1131	2318	1122
18	1535	0448	1719	0603	1607	0441	1721	0448	1749	0423	1926	0514	1951	0601	2027	0756	2111	0957	2151	1100	2341	1214		1155
19	1633	0546	1812	0639	1658	0515	1811	0518	1844	0500	2021	0611	2035	0705	2105	0858	2204	1104	2254	1200		1251	0009	1226
20	1733	0638	1902	0713	1748	0546	1902	0549	1941	0542	2111	0712	2115	0807	2145	1001	2301	1210	2355	1253	0035	1325	0058	1257
21	1830	0724	1952	0743	1836	0616	1955	0623	2038	0629	2156	0814	2152	0908	2229	1105		1312		1338	0126	1356	0148	1328
22	1926	0804	2040	0813	1925	0645	2050	0701	2134	0722	2237	0916	2229	1008	2317	1210	0001	1408	0053	1417	0215	1426	0238	1402
23	2018	0840	2129	0842	2015	0715	2147	0744	2226	0820	2315	1016	2307	1109		1315	0102	1456	0148	1452	0304	1457	0330	1439
24	2108	0912	2219	0913	2106	0747	2243	0833	2314	0920	2352	1115	2347	1210	0009	1418	0202	1539	0240	1524	0354	1529	0423	1521
25	2157	0942	2311	0946	2200	0822	2338	0927	2357	1021		1214		1312	0107	1518	0258	1616	0330	1554	0445	1604	0518	1607
26	2246	1011		1022	2255	0901		1025		1122	0028	1314	0030	1417	0207	1611	0352	1650	0419	1624	0537	1642	0613	1659
27	2335	1041	0006	1103	2352	0946	0029	1125	0037	1221	0106	1416	0119	1522	0308	1658	0444	1721	0508	1655	0631	1725	0707	1755
28		1113	0103	1150		1036	0115	1227	0114	1321	0147	1519	0214	1624	0407	1739	0533	1752	0558	1728	0726	1813	0758	1853
29	0026	1147			0049	1132	0158	1328	0151	1420	0233	1625	0313	1723	0503	1815	0623	1822	0649	1804	0821	1906	0844	1952
30	0120	1225			0143	1232	0238	1429	0228	1522	0325	1731	0414	1815	0557	1848	0712	1853	0742	1843	0913	2002	0926	2051
31	0216	1310			0234	1335			0308	1626			0516	1900	0648	1919			0837	1928			1005	2149

PORT ALLEN TIDES
JANUARY 1989
21 DEG 54 MIN N, 159 DEG 35 MIN W - HANAPEPE BAY

DATE	TIME AHS	HGT FT	TIME AHS	HGT FT	TIME AHS	HGT FT	TIME AHS	HGT FT
1	2335	1.3*	0638	.7	0924	.8	1640	0.0
2	0020	1.4	0804	.5	1040	.6	1720	0.0
3	0102	1.6	0856	.4	1156	.5	1759	-.1
4	0141	1.8	0935	.3	1258	.4	1844	-.1
5	0219	2.0	1010	.2	1347	.4	1926	-.2
6	0257	2.0	1044	.1	1435	.4	2008	-.2
7	0334	2.1	1113	.1	1521	.5	2051	-.2
8	0411	2.1	1146	0.0	1611	.5	2136	-.2
9	0449	2.0	1218	0.0	1702	.6	2225	0.0
10	0524	1.9	1250	0.0	1803	.8	2320	.2
11	0603	1.7	1325	-.1	1910	.9	----	---
12	0023	.3	0639	1.4	1359	-.1	2026	1.0
13	0150	.6	0716	1.2	1438	-.1	2145	1.2
14	0351	.7	0802	.9	1519	-.1	2300	1.4
15	0624	.6	0857	.7	1609	-.1	----	---
16	0002	1.6	0814	.4	1033	.5	1703	-.1
17	0055	1.8	0903	.3	1206	.4	1756	-.1
18	0141	2.0	0942	.2	1315	.4	1847	-.2
19	0223	2.0	1013	.1	1408	.4	1933	-.2
20	0301	2.0	1042	.1	1451	.5	2015	-.2
21	0335	2.0	1111	.1	1530	.5	2057	-.1
22	0407	1.9	1135	.1	1609	.6	2132	0.0
23	0436	1.8	1158	.1	1648	.7	2214	.1
24	0501	1.6	1219	.1	1730	.8	2253	.2
25	0528	1.5	1241	.1	1816	.9	2335	.3
26	0554	1.4	1305	.1	1911	.9	----	---
27	0034	.5	0616	1.1	1329	.1	2014	1.0
28	0150	.6	0641	.9	1400	.1	2126	1.1
29	0409	.7	0659	.8	1437	.1	2239	1.3
30	1526	.1	----	---	----	---	----	---
31	2340	1.4	1627	0.0	----	---	----	---

* -- TIDE OCCURS ON PREVIOUS DATE.

PORT ALLEN TIDES
FEBRUARY 1989
21 DEG 54 MIN N, 159 DEG 35 MIN W - HANAPEPE BAY

DATE	TIME AHS	HGT FT	TIME AHS	HGT FT	TIME AHS	HGT FT	TIME AHS	HGT FT
1	0030	1.6	0848	.3	1145	.4	1726	0.0
2	0115	1.8	0913	.2	1252	.4	1823	-.1
3	0156	2.0	0938	.1	1342	.5	1917	-.2
4	0234	2.0	1003	.1	1432	.6	2006	-.2
5	0310	2.0	1031	0.0	1518	.7	2055	-.2
6	0347	2.0	1057	-.1	1600	.9	2144	-.1
7	0424	1.9	1125	-.1	1650	.9	2236	0.0
8	0457	1.6	1154	-.1	1742	1.1	2332	.2
9	0530	1.4	1224	-.2	1843	1.2	----	---
10	0041	.3	0605	1.1	1257	-.1	1950	1.3
11	0213	.5	0637	.9	1334	-.1	2106	1.4
12	0433	.5	0712	.6	1420	-.1	2224	1.5
13	1518	0.0	----	---	----	---	----	---
14	2338	1.6*	0822	.3	1055	.3	1632	0.0
15	0034	1.7	0848	.2	1228	.3	1741	0.0
16	0124	1.8	0913	.2	1323	.4	1842	0.0
17	0203	1.8	0935	.1	1405	.5	1931	0.0
18	0238	1.8	1000	.1	1443	.7	2016	0.0
19	0309	1.8	1018	.1	1519	.8	2055	0.0
20	0337	1.6	1036	.1	1551	.9	2134	.1
21	0402	1.5	1055	.1	1623	.9	2212	.2
22	0424	1.4	1112	.1	1658	1.0	2255	.3
23	0449	1.3	1129	0.0	1736	1.1	----	---
24	2340	.3*	0511	1.1	1151	.1	1821	1.2
25	0033	.4	0529	.9	1214	.1	1914	1.2
26	0152	.6	0551	.8	1241	.1	2020	1.3
27	1320	.1	2136	1.4	----	---	----	---
28	1419	.1	2250	1.4	----	---	----	---

* -- TIDE OCCURS ON PREVIOUS DATE.

PORT ALLEN TIDES
MARCH 1989
21 DEG 54 MIN N, 159 DEG 35 MIN W - HANAPEPE BAY

DATE	TIME AHS	HGT FT	TIME AHS	HGT FT	TIME AHS	HGT FT	TIME AHS	HGT FT
1	0757	.3	1001	.3	1541	.1	----	---
2	2353	1.6*	0805	.3	1148	.4	1701	.1
3	0040	1.7	0827	.2	1250	.5	1813	0.0
4	0124	1.8	0849	.1	1336	.7	1909	-.1
5	0203	1.9	0914	0.0	1418	.9	2005	-.1
6	0240	1.8	0939	-.1	1503	1.0	2057	-.1
7	0319	1.7	1004	-.2	1549	1.2	2152	0.0
8	0354	1.5	1031	-.2	1633	1.4	2249	.1
9	0429	1.3	1057	-.2	1723	1.4	----	---
10	2349	.2*	0501	1.0	1129	-.2	1815	1.5
11	0102	.3	0536	.8	1158	-.1	1917	1.5
12	0241	.4	0610	.6	1236	-.1	2027	1.5
13	0505	.3	0700	.4	1323	0.0	2146	1.5
14	0655	.3	0917	.3	1432	.1	2300	1.6
15	0733	.2	1130	.3	1615	.2	----	---
16	0002	1.6	0804	.2	1236	.5	1735	.2
17	0049	1.6	0822	.1	1321	.6	1840	.1
18	0129	1.6	0844	.1	1353	.8	1929	.1
19	0203	1.5	0902	.1	1428	.9	2015	.1
20	0233	1.4	0919	0.0	1459	1.0	2057	.1
21	0258	1.4	0935	0.0	1531	1.2	2137	.2
22	0324	1.2	0952	0.0	1559	1.3	2219	.2
23	0345	1.1	1010	0.0	1632	1.4	2302	.3
24	0410	.9	1028	0.0	1707	1.4	----	---
25	2351	.3*	0435	.8	1049	0.0	1745	1.4
26	0049	.4	0457	.7	1111	0.0	1832	1.4
27	0209	.4	0526	.5	1140	.1	1933	1.4
28	1220	.1	2043	1.4	----	---	----	---
29	0602	.3	0754	.3	1323	.2	2157	1.5
30	0639	.3	1029	.3	1503	.2	2300	1.5
31	0702	.2	1149	.5	1645	.2	----	---

* -- TIDE OCCURS ON PREVIOUS DATE.

PORT ALLEN TIDES
APRIL 1989
21 DEG 54 MIN N, 159 DEG 35 MIN W - HANAPEPE BAY

DATE	TIME AHS	HGT FT	TIME AHS	HGT FT	TIME AHS	HGT FT	TIME AHS	HGT FT
1	2353	1.6*	0724	.1	1242	.7	1802	.2
2	0043	1.6	0753	0.0	1324	.9	1910	.1
3	0125	1.5	0817	-.1	1405	1.2	2009	0.0
4	0204	1.4	0842	-.2	1447	1.4	2108	0.0
5	0246	1.3	0908	-.3	1530	1.6	2207	.1
6	0322	1.0	0936	-.3	1615	1.7	2306	.1
7	0401	.9	1007	-.3	1701	1.8	----	---
8	0011	.2	0439	.7	1036	-.2	1753	1.8
9	0127	.3	0521	.5	1111	-.1	1848	1.7
10	0256	.3	0606	.3	1152	0.0	1951	1.6
11	0436	.3	0736	.3	1241	.1	2100	1.5
12	0545	.2	0952	.3	1400	.3	2210	1.5
13	0627	.2	1128	.5	1547	.3	2309	1.4
14	0656	.1	1220	.7	1717	.3	----	---
15	0001	1.4	0719	.1	1302	.9	1829	.3
16	0041	1.3	0737	0.0	1334	1.0	1927	.3
17	0115	1.2	0757	0.0	1406	1.2	2016	.3
18	0148	1.1	0815	0.0	1438	1.4	2103	.3
19	0217	1.0	0834	-.1	1506	1.4	2146	.3
20	0246	.9	0853	-.1	1538	1.5	2231	.3
21	0313	.8	0911	-.1	1607	1.6	2319	.3
22	0341	.7	0934	-.1	1645	1.6	----	---
23	0012	.3	0410	.5	0957	-.1	1723	1.7
24	0108	.3	0445	.4	1028	0.0	1809	1.6
25	0224	.3	0527	.3	1059	0.0	1902	1.6
26	0340	.3	0646	.3	1148	.1	2002	1.6
27	0439	.2	0848	.3	1301	.2	2105	1.5
28	0521	.1	1032	.5	1447	.3	2206	1.5
29	0552	0.0	1133	.7	1633	.3	2302	1.4
30	0623	-.1	1226	.9	1759	.3	----	---

* -- TIDE OCCURS ON PREVIOUS DATE.

PORT ALLEN TIDES
MAY 1989
21 DEG 54 MIN N, 159 DEG 35 MIN W - HANAPEPE BAY

DATE	TIME AHS	HGT FT	TIME AHS	HGT FT	TIME AHS	HGT FT	TIME AHS	HGT FT
1	2354	1.3*	0650	-.2	1312	1.3	1915	.3
2	0040	1.2	0719	-.2	1354	1.5	2023	.2
3	0128	1.0	0748	-.3	1436	1.7	2126	.2
4	0214	.9	0820	-.3	1518	1.9	2228	.1
5	0256	.7	0852	-.3	1600	2.0	2327	.1
6	0341	.5	0924	-.3	1645	2.0	----	---
7	0029	.1	0424	.4	0959	-.2	1734	2.0
8	0135	.1	0512	.3	1037	-.1	1822	1.9
9	0241	.2	0623	.3	1120	0.0	1917	1.7
10	0347	.2	0753	.3	1208	.2	2010	1.6
11	0435	.1	0936	.4	1328	.3	2107	1.4
12	0513	.1	1106	.6	1511	.4	2200	1.3
13	0541	.1	1151	.8	1651	.5	2249	1.2
14	0607	0.0	1233	1.0	1818	.5	----	---
15	2335	1.0*	0631	0.0	1310	1.2	1927	.4
16	0017	.9	0652	-.1	1342	1.4	2023	.3
17	0058	.8	0714	-.1	1414	1.5	2115	.3
18	0133	.7	0739	-.1	1446	1.7	2201	.3
19	0212	.6	0804	-.1	1519	1.8	2250	.3
20	0247	.5	0829	-.1	1555	1.8	2335	.2
21	0322	.4	0858	-.1	1630	1.9	----	---
22	0024	.2	0401	.4	0927	-.1	1709	1.9
23	0113	.2	0450	.3	1005	-.1	1750	1.9
24	0202	.2	0550	.3	1047	0.0	1835	1.8
25	0251	.1	0710	.3	1143	.2	1924	1.7
26	0333	.1	0847	.5	1255	.3	2015	1.5
27	0411	0.0	1006	.7	1438	.4	2107	1.4
28	0445	-.1	1115	.9	1631	.5	2206	1.2
29	0520	-.2	1204	1.3	1811	.5	2301	1.0
30	0553	-.2	1253	1.5	1935	.4	----	---
31	0000	.9	0627	-.3	1337	1.8	2048	.3

* -- TIDE OCCURS ON PREVIOUS DATE.

PORT ALLEN TIDES
JUNE 1989
21 DEG 54 MIN N, 159 DEG 35 MIN W - HANAPEPE BAY

DATE	TIME AHS	HGT FT	TIME AHS	HGT FT	TIME AHS	HGT FT	TIME AHS	HGT FT
1	0056	.7	0702	-.3	1423	2.0	2150	.2
2	0148	.5	0741	-.3	1506	2.0	2250	.1
3	0237	.4	0817	-.3	1548	2.1	----	---
4	2339	.1*	0329	.3	0856	-.3	1633	2.1
5	0031	.1	0419	.3	0935	-.2	1714	2.0
6	0120	.1	0512	.3	1019	-.1	1758	1.9
7	0202	.1	0614	.4	1104	.1	1839	1.7
8	0243	.1	0728	.4	1153	.3	1919	1.5
9	0319	.1	0853	.6	1259	.4	2001	1.4
10	0351	.1	1006	.8	1431	.6	2043	1.2
11	0422	.1	1111	.9	1622	.7	2129	1.0
12	0451	0.0	1200	1.2	1810	.6	2215	.9
13	0521	0.0	1239	1.4	1935	.5	2313	.7
14	0550	0.0	1318	1.5	2042	.4	----	---
15	0009	.6	0621	-.1	1350	1.7	2129	.3
16	0057	.5	0653	-.1	1425	1.8	2213	.3
17	0143	.4	0729	-.1	1503	2.0	2251	.2
18	0232	.4	0804	-.2	1538	2.0	2333	.2
19	0311	.4	0839	-.2	1614	2.0	----	---
20	0009	.2	0357	.4	0918	-.1	1652	2.0
21	0041	.1	0450	.4	1003	0.0	1729	2.0
22	0118	.1	0550	.5	1052	.1	1808	1.8
23	0152	0.0	0659	.6	1148	.3	1850	1.7
24	0229	0.0	0821	.8	1304	.4	1932	1.4
25	0305	-.1	0934	1.0	1443	.6	2018	1.2
26	0343	-.1	1045	1.3	1645	.7	2106	.9
27	0420	-.2	1145	1.5	1842	.6	2212	.8
28	0502	-.2	1237	1.8	2014	.4	----	---
29	2325	.6*	0544	-.2	1326	2.0	2117	.3
30	0038	.5	0631	-.2	1412	2.0	2206	.2

* -- TIDE OCCURS ON PREVIOUS DATE.

PORT ALLEN TIDES
JULY 1989
21 DEG 54 MIN N, 159 DEG 35 MIN W - HANAPEPE BAY

DATE	TIME AHS	HGT FT	TIME AHS	HGT FT	TIME AHS	HGT FT	TIME AHS	HGT FT
1	0138	.4	0719	-.2	1454	2.1	2248	.2
2	0235	.4	0800	-.2	1536	2.1	2327	.1
3	0322	.4	0846	-.2	1615	2.1	----	---
4	0004	.1	0412	.5	0928	-.1	1651	2.0
5	0034	.1	0457	.5	1010	0.0	1726	1.9
6	0105	.2	0548	.6	1052	.2	1758	1.7
7	0134	.2	0648	.7	1141	.3	1827	1.5
8	0203	.2	0751	.8	1241	.5	1859	1.4
9	0229	.1	0900	.9	1359	.7	1927	1.1
10	0301	.1	1012	1.1	1558	.8	2003	.9
11	0333	.1	1111	1.3	1815	.7	2051	.8
12	0412	.1	1201	1.4	1958	.5	2203	.6
13	0455	.1	1246	1.6	2047	.4	----	---
14	2330	.5*	0539	0.0	1326	1.8	2129	.3
15	0039	.5	0623	0.0	1406	2.0	2201	.3
16	0131	.5	0706	-.1	1442	2.0	2229	.3
17	0221	.5	0752	-.1	1518	2.1	2258	.2
18	0304	.6	0837	-.1	1553	2.1	2325	.2
19	0353	.6	0919	-.1	1628	2.0	----	---
20	2353	.1*	0442	.8	1008	.1	1701	2.0
21	0022	.1	0536	.9	1100	.2	1739	1.8
22	0053	0.0	0636	.9	1201	.3	1811	1.5
23	0126	0.0	0745	1.1	1317	.6	1850	1.3
24	0200	0.0	0858	1.3	1503	.7	1928	1.0
25	0242	0.0	1014	1.5	1727	.7	2017	.8
26	0329	0.0	1123	1.7	1931	.5	2136	.6
27	0423	0.0	1222	1.9	2040	.4	----	---
28	2326	.5*	0522	0.0	1313	2.0	2115	.3
29	0049	.5	0614	0.0	1358	2.0	2150	.3
30	0147	.5	0711	-.1	1439	2.1	2221	.2
31	0233	.6	0759	0.0	1518	2.0	2247	.2

* -- TIDE OCCURS ON PREVIOUS DATE.

PORT ALLEN TIDES
AUGUST 1989
21 DEG 54 MIN N, 159 DEG 35 MIN W - HANAPEPE BAY

DATE	TIME AHS	HGT FT	TIME AHS	HGT FT	TIME AHS	HGT FT	TIME AHS	HGT FT
1	0315	.7	0841	0.0	1551	2.0	2313	.2
2	0353	.8	0923	.1	1619	1.9	2337	.2
3	0435	.9	1005	.2	1648	1.7	----	---
4	2356	.2*	0517	.9	1047	.3	1715	1.6
5	0020	.2	0603	1.0	1132	.4	1739	1.4
6	0041	.2	0655	1.1	1230	.6	1803	1.2
7	0105	.2	0754	1.2	1347	.8	1827	1.0
8	0138	.2	0903	1.3	1553	.8	1849	.9
9	0213	.3	1015	1.4	----	---	----	---
10	0303	.3	1118	1.5	----	---	----	---
11	0404	.2	1212	1.7	2028	.4	----	---
12	2332	.5*	0510	.2	1256	1.9	2053	.3
13	0036	.6	0605	.1	1338	2.0	2118	.3
14	0126	.7	0658	0.0	1415	2.0	2140	.3
15	0212	.8	0746	0.0	1449	2.0	2205	.2
16	0254	.9	0835	0.0	1524	2.0	2230	.2
17	0337	1.0	0924	.1	1557	1.9	2255	.1
18	0426	1.2	1016	.2	1631	1.7	2324	.1
19	0515	1.3	1112	.3	1707	1.5	----	---
20	2353	0.0*	0611	1.4	1218	.5	1739	1.3
21	0025	0.0	0712	1.5	1342	.6	1817	1.0
22	0101	.1	0826	1.6	1542	.7	1856	.8
23	0144	.1	0942	1.7	----	---	----	---
24	0242	.2	1057	1.8	1936	.4	2215	.5
25	0357	.2	1200	1.9	2014	.3	----	---
26	0001	.5	0513	.2	1254	2.0	2043	.3
27	0103	.7	0619	.2	1338	2.0	2111	.3
28	0147	.8	0711	.2	1415	2.0	2133	.3
29	0227	.9	0800	.2	1449	1.9	2155	.3
30	0259	1.0	0845	.2	1518	1.8	2213	.3
31	0334	1.1	0924	.3	1543	1.6	2231	.3

* -- TIDE OCCURS ON PREVIOUS DATE.

PORT ALLEN TIDES
SEPTEMBER 1989
21 DEG 54 MIN N, 159 DEG 35 MIN W - HANAPEPE BAY

DATE	TIME AHS	HGT FT	TIME AHS	HGT FT	TIME AHS	HGT FT	TIME AHS	HGT FT
1	0409	1.2	1004	.3	1608	1.5	2250	.3
2	0445	1.3	1048	.4	1633	1.4	2306	.3
3	0520	1.4	1134	.5	1655	1.2	2327	.3
4	0605	1.4	1230	.6	1720	1.0	----	---
5	2350	.3*	0653	1.4	1347	.7	1742	.9
6	0018	.3	0757	1.4	1608	.7	1800	.8
7	0057	.3	0913	1.5	----	---	----	---
8	0152	.3	1025	1.6	1923	.5	2200	.6
9	0318	.3	1128	1.7	1939	.4	----	---
10	2338	.6*	0444	.3	1217	1.9	2000	.3
11	0033	.8	0553	.3	1300	1.9	2022	.3
12	0115	.9	0652	.2	1339	2.0	2044	.2
13	0158	1.1	0745	.2	1415	1.9	2108	.2
14	0240	1.3	0838	.2	1452	1.8	2134	.1
15	0322	1.4	0932	.2	1527	1.6	2158	0.0
16	0408	1.6	1028	.3	1602	1.4	2226	0.0
17	0453	1.8	1129	.3	1638	1.2	2255	0.0
18	0545	1.8	1241	.5	1713	.9	2327	.1
19	0644	1.9	1411	.6	1749	.8	----	---
20	0006	.1	0750	1.8	1617	.5	1851	.6
21	0051	.2	0906	1.8	1808	.4	2057	.5
22	0202	.3	1023	1.8	1850	.3	2306	.6
23	0340	.3	1128	1.8	1928	.3	----	---
24	0018	.7	0511	.3	1221	1.8	1954	.3
25	0058	.9	0618	.3	1303	1.8	2017	.3
26	0138	1.0	0714	.3	1341	1.7	2035	.3
27	0212	1.2	0802	.3	1409	1.6	2054	.2
28	0242	1.3	0847	.3	1438	1.4	2110	.2
29	0314	1.4	0929	.3	1500	1.4	2128	.2
30	0343	1.5	1013	.4	1529	1.2	2146	.2

* -- TIDE OCCURS ON PREVIOUS DATE.

FORT ALLEN TIDES
OCTOBER 1989
21 DEG 54 MIN N, 159 DEG 35 MIN W - HANAPEPE BAY

DATE	TIME AHS	HGT FT	TIME AHS	HGT FT	TIME AHS	HGT FT	TIME AHS	HGT FT
1	0416	1.6	1055	.5	1554	1.0	2204	.2
2	0451	1.6	1144	.5	1619	.9	2225	.2
3	0530	1.7	1246	.6	1644	.9	2247	.3
4	0614	1.7	1405	.6	1709	.7	2315	.3
5	0711	1.6	----	---	----	---	----	---
6	2351	.3*	0817	1.6	1735	.4	1959	.5
7	0053	.4	0927	1.7	1811	.4	2223	.6
8	0232	.4	1033	1.7	1832	.3	----	---
9	2333	.7*	0422	.4	1126	1.7	1857	.3
10	0021	.9	0541	.4	1213	1.7	1919	.2
11	0102	1.2	0647	.3	1255	1.6	1947	.1
12	0143	1.4	0749	.3	1338	1.5	2012	0.0
13	0225	1.6	0847	.3	1416	1.4	2037	-.1
14	0307	1.9	0946	.3	1455	1.2	2106	-.1
15	0349	2.0	1045	.3	1531	1.0	2138	-.1
16	0437	2.0	1151	.3	1612	.9	2210	-.1
17	0526	2.1	1304	.3	1654	.7	2243	0.0
18	0619	2.0	1430	.4	1750	.5	2321	.2
19	0720	2.0	1602	.3	1914	.5	----	---
20	0014	.3	0829	1.9	1712	.3	2132	.5
21	0127	.4	0938	1.8	1757	.3	2308	.7
22	0320	.5	1039	1.6	1826	.3	----	---
23	0007	.9	0456	.5	1131	1.5	1852	.2
24	0046	1.0	0613	.5	1217	1.4	1914	.2
25	0121	1.3	0714	.5	1252	1.4	1935	.2
26	0153	1.4	0807	.5	1327	1.2	1953	.1
27	0225	1.5	0858	.4	1357	1.1	2012	.1
28	0253	1.7	0941	.4	1425	1.0	2032	.1
29	0322	1.8	1025	.4	1456	.9	2052	.1
30	0354	1.8	1111	.4	1521	.8	2115	.1
31	0429	1.9	1203	.4	1553	.7	2136	.1

* -- TIDE OCCURS ON PREVIOUS DATE.

PORT ALLEN TIDES
NOVEMBER 1989
21 DEG 54 MIN N, 159 DEG 35 MIN W - HANAPEPE BAY

DATE	TIME AHS	HGT FT	TIME AHS	HGT FT	TIME AHS	HGT FT	TIME AHS	HGT FT
1	0507	1.9	1302	.4	1625	.6	2205	.2
2	0550	1.8	1411	.4	1711	.5	2236	.2
3	0635	1.8	1520	.4	1822	.5	2318	.3
4	0733	1.7	1616	.3	2021	.5	----	---
5	0020	.4	0831	1.7	1654	.3	2212	.6
6	0207	.5	0931	1.6	1723	.2	2318	.9
7	0356	.6	1027	1.5	1753	.1	----	---
8	0006	1.1	0536	.5	1121	1.4	1821	0.0
9	0045	1.4	0653	.5	1207	1.3	1848	-.1
10	0131	1.7	0801	.4	1258	1.1	1920	-.2
11	0209	2.0	0905	.3	1345	.9	1952	-.2
12	0255	2.1	1005	.3	1429	.8	2025	-.2
13	0337	2.2	1107	.3	1515	.7	2100	-.2
14	0422	2.2	1206	.3	1600	.5	2132	-.1
15	0510	2.2	1307	.3	1652	.5	2214	0.0
16	0557	2.1	1411	.3	1755	.4	2256	.1
17	0651	2.0	1517	.3	1922	.4	----	---
18	2349	.3*	0743	1.8	1606	.3	2109	.5
19	0058	.4	0837	1.6	1645	.2	2242	.8
20	0241	.6	0933	1.4	1721	.2	----	---
21	2338	.9*	0434	.7	1025	1.3	1746	.1
22	0023	1.2	0608	.7	1111	1.1	1810	.1
23	0059	1.4	0721	.6	1156	1.0	1834	.1
24	0131	1.5	0820	.5	1238	.9	1858	0.0
25	0206	1.7	0913	.4	1320	.8	1922	0.0
26	0236	1.8	0958	.3	1355	.7	1946	0.0
27	0308	1.9	1043	.3	1431	.6	2012	0.0
28	0340	2.0	1124	.3	1509	.5	2041	0.0
29	0413	2.0	1209	.3	1545	.5	2113	0.0
30	0449	2.0	1253	.3	1628	.4	2145	0.0

* -- TIDE OCCURS ON PREVIOUS DATE.

PORT ALLEN TIDES
DECEMBER 1989
21 DEG 54 MIN N, 159 DEG 35 MIN W - HANAPEPE BAY

DATE	TIME AHS	HGT FT	TIME AHS	HGT FT	TIME AHS	HGT FT	TIME AHS	HGT FT
1	0529	2.0	1338	.3	1721	.4	2224	.1
2	0611	1.9	1421	.3	1836	.5	2313	.3
3	0653	1.8	1459	.2	2003	.6	----	---
4	0017	.4	0739	1.6	1538	.1	2133	.8
5	0151	.6	0830	1.4	1612	.1	2242	1.0
6	0348	.7	0922	1.3	1647	0.0	----	---
7	2341	1.3*	0544	.6	1021	1.0	1723	-.1
8	0030	1.6	0716	.5	1124	.9	1800	-.2
9	0115	1.9	0829	.3	1226	.7	1839	-.3
10	0200	2.0	0931	.3	1318	.6	1917	-.3
11	0243	2.2	1026	.2	1417	.5	1956	-.3
12	0327	2.3	1115	.1	1506	.4	2038	-.3
13	0409	2.2	1201	.1	1556	.4	2120	-.2
14	0452	2.2	1250	.1	1648	.4	2203	-.1
15	0536	2.0	1332	.1	1748	.5	2245	.1
16	0615	1.9	1411	.2	1854	.5	2333	.3
17	0656	1.7	1449	.2	2016	.7	----	---
18	0035	.4	0735	1.4	1524	.1	2143	.8
19	0205	.6	0817	1.3	1556	.1	2249	1.0
20	0405	.8	0859	1.0	1629	.1	----	---
21	2348	1.2*	0607	.7	0951	.9	1701	.1
22	0029	1.4	0740	.6	1050	.7	1733	0.0
23	0108	1.6	0846	.5	1156	.6	1809	0.0
24	0143	1.7	0928	.3	1251	.5	1844	0.0
25	0219	1.9	1005	.3	1340	.5	1919	-.1
26	0251	2.0	1041	.3	1422	.4	1954	-.1
27	0325	2.0	1114	.2	1501	.4	2029	-.1
28	0400	2.0	1145	.1	1544	.4	2108	-.1
29	0435	2.0	1217	.1	1630	.5	2147	0.0
30	0507	2.0	1249	.1	1719	.5	2229	.1
31	0541	1.8	1318	.1	1821	.6	2319	.3

* -- TIDE OCCURS ON PREVIOUS DATE.

APPENDIX A

HEIGHT OF THE TIDE AT ANY TIME*

The height of the tide at times intermediate to the times of high and low water is needed on occasion, and may be computed by either numerical or graphical methods. One example of each method is presented here, using the predicted tides for a day at Point Mugu.

Problem: Given that the predicted times and heights of the tides are:

Time	Height	Time	Height	Time	Height	Time	Height
0039	4.9	0814	0.2	1510	3.1	1933	2.4

Find the height of the tide at 0300.

Numerical Method

The duration of fall is $08^h\ 14^m - 00^h\ 39^m = 7^h\ 35^m$.

The time after high water for which the height is required is $03^h\ 00^m - 00^h\ 39^m = 02^h\ 21^m$.

The range of tide is 4.9–0.2 = 4.7 feet.

Entering table A-1 at the duration of fall of $7^h\ 40^m$, which is the nearest value to $7^h\ 35^m$, the nearest value on the horizontal line to $2^h\ 21^m$ is $2^h\ 18^m$ after high water. Following down this column to its intersection with a range of 4.5 feet which is the nearest tabular value to 4.7 feet, one obtains 0.9 which, being calculated from high water, must be subtracted from it. The approximate height at $03^h\ 00^m$ is, therefore, 4.9–0.9 = 4.0 feet.

When the duration of rise or fall is greater than $10^h\ 40^m$, enter the table with one-half the given duration and with one-half the time from the nearest high or low water; but if the duration of rise or fall is less than 4 hours, enter the table with double the given duration and with double the time from the nearest high or low water.

*This information is adapted from table 3 of the data source for this publication (see page 1).

Table A-1. Height of the Tide at Any Time

Duration of rise or fall, see footnote.	Time from the nearest high water or low water																			
h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
4 00	0 08	0 16	0 24	0 32	0 40	0 48	0 56	1 04	1 12	1 20	1 28	1 36	1 44	1 52	2 00					
4 20	0 09	0 17	0 26	0 35	0 43	0 52	1 01	1 09	1 18	1 27	1 35	1 44	1 53	2 01	2 10					
4 40	0 09	0 19	0 28	0 37	0 47	0 56	1 05	1 15	1 24	1 33	1 43	1 52	2 01	2 11	2 20					
5 00	0 10	0 20	0 30	0 40	0 50	1 00	1 10	1 20	1 30	1 40	1 50	2 00	2 10	2 20	2 30					
5 20	0 11	0 21	0 32	0 43	0 53	1 04	1 15	1 25	1 36	1 47	1 57	2 08	2 19	2 29	2 40					
5 40	0 11	0 23	0 34	0 45	0 57	1 08	1 19	1 31	1 42	1 53	2 05	2 16	2 27	2 39	2 50					
6 00	0 12	0 24	0 36	0 48	1 00	1 12	1 24	1 36	1 48	2 00	2 12	2 24	2 36	2 48	3 00					
6 20	0 13	0 25	0 38	0 51	1 03	1 16	1 29	1 41	1 54	2 07	2 19	2 32	2 45	2 57	3 10					
6 40	0 13	0 27	0 40	0 53	1 07	1 20	1 33	1 47	2 00	2 13	2 27	2 40	2 53	3 07	3 20					
7 00	0 14	0 28	0 42	0 56	1 10	1 24	1 38	1 52	2 06	2 20	2 34	2 48	3 02	3 16	3 30					
7 20	0 15	0 29	0 44	0 59	1 13	1 28	1 43	1 57	2 12	2 27	2 41	2 56	3 11	3 25	3 40					
7 40	0 15	0 31	0 46	1 01	1 17	1 32	1 47	2 03	2 18	2 33	2 49	3 04	3 19	3 35	3 50					
8 00	0 16	0 32	0 48	1 04	1 20	1 36	1 52	2 08	2 24	2 40	2 56	3 12	3 28	3 44	4 00					
8 20	0 17	0 33	0 50	1 07	1 23	1 40	1 57	2 13	2 30	2 47	3 03	3 20	3 37	3 53	4 10					
8 40	0 17	0 35	0 52	1 09	1 27	1 44	2 01	2 19	2 36	2 53	3 11	3 28	3 45	4 03	4 20					
9 00	0 18	0 36	0 54	1 12	1 30	1 48	2 06	2 24	2 42	3 00	3 18	3 36	3 54	4 12	4 30					
9 20	0 19	0 37	0 56	1 15	1 33	1 52	2 11	2 29	2 48	3 07	3 25	3 44	4 03	4 21	4 40					
9 40	0 19	0 39	0 58	1 17	1 37	1 56	2 15	2 35	2 54	3 13	3 33	3 52	4 11	4 31	4 50					
10 00	0 20	0 40	1 00	1 20	1 40	2 00	2 20	2 40	3 00	3 20	3 40	4 00	4 20	4 40	5 00					
10 20	0 21	0 41	1 02	1 23	1 43	2 04	2 25	2 45	3 06	3 27	3 47	4 08	4 29	4 49	5 10					
10 40	0 21	0 43	1 04	1 27	1 47	2 08	2 29	2 51	3 12	3 34	3 55	4 16	4 37	4 59	5 20					

Range of tide, see footnote.	Correction to height															
Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft
0.5	0 0	0 0	0 0	0 0	0 0	0 0	0.1	0.1	0 1	0 1	0 1	0 2	0 2	0 2	0 2	
1.0	0 0	0 0	0 0	0 0	0 1	0 1	0.1	0.2	0 2	0.2	0 3	0 3	0 4	0 4	0 5	
1.5	0 0	0 0	0 0	0 1	0 1	0 1	0 2	0.2	0 3	0 4	0 4	0 5	0 6	0 7	0 8	
2.0	0 0	0 0	0 0	0 1	0 1	0 2	0 3	0.3	0 4	0 5	0 6	0 7	0 8	0.9	1 0	
2.5	0 0	0 0	0 1	0 1	0 2	0 2	0 3	0.4	0 5	0 6	0 7	0 9	1 0	1 1	1 2	
3.0	0 0	0 0	0 1	0 1	0 2	0 3	0.4	0 5	0 6	0 8	0 9	1 0	1 2	1 3	1 5	
3.5	0 0	0 0	0 1	0 2	0 2	0 3	0 4	0 6	0 7	0 9	1 0	1 2	1 4	1 6	1 8	
4.0	0 0	0 0	0 1	0 2	0 3	0 4	0 5	0 7	0 8	1 0	1 2	1 4	1 6	1 8	2 0	
4.5	0 0	0 0	0 1	0 2	0 3	0 4	0 6	0 7	0 9	1 1	1 3	1 6	1 8	2 0	2 2	
5.0	0 0	0 1	0 1	0 2	0 3	0 5	0.6	0 8	1 0	1 2	1 5	1 7	2 0	2.2	2 5	
5.5	0 0	0 1	0 1	0 2	0 4	0 5	0.7	0 9	1.1	1.4	1 6	1 9	2 2	2 5	2.8	
6.0	0 0	0 1	0 1	0 3	0 4	0 6	0.8	1 0	1.2	1 5	1 8	2 1	2 4	2 7	3 0	
6.5	0 0	0 1	0 2	0 3	0 4	0 6	0 8	1 1	1 3	1 6	1 9	2 2	2 6	2 9	3.2	
7.0	0 0	0 1	0 2	0 3	0 5	0.7	0 9	1 2	1.4	1.8	2.1	2 4	2 8	3 1	3.5	
7.5	0 0	0 1	0 2	0 3	0 5	0 7	1 0	1 2	1 5	1 9	2.2	2 6	3 0	3 4	3 8	
8.0	0 0	0 1	0 2	0 3	0 5	0 8	1.0	1 3	1.6	2 0	2 4	2 8	3 2	3 6	4 0	
8.5	0 0	0 1	0 2	0 4	0 6	0 8	1.1	1 4	1 8	2 1	2.5	2 9	3 4	3 8	4 2	
9.0	0 0	0 1	0 2	0 4	0 6	0 9	1.2	1.5	1 9	2 2	2 7	3 1	3 6	4 0	4 5	
9.5	0 0	0 1	0 2	0.4	0 6	0 9	1.2	1 6	2 0	2.4	2 8	3 3	3 8	4 3	4 8	
10.0	0 0	0 1	0 2	0 4	0 7	1 0	1.3	1 7	2 1	2.5	3 0	3 5	4 0	4.5	5 0	
10.5	0 0	0 1	0 3	0 5	0 7	1 0	1.3	1 7	2 2	2 6	3.1	3 6	4 2	4 7	5.2	
11.0	0 0	0 1	0 3	0 5	0 7	1 1	1 4	1 8	2 3	2 8	3.3	3 8	4 4	4 9	5 5	
11.5	0 0	0 1	0 3	0 5	0 8	1 1	1 5	1.9	2 4	2 9	3.4	4 0	4.6	5 1	5 8	
12.0	0 0	0 1	0 3	0 5	0 8	1 1	1 5	2 0	2.5	3 0	3.6	4 1	4 8	5.4	6 0	
12.5	0 0	0 1	0 3	0 5	0 8	1 2	1.6	2.1	2 6	3.1	3.7	4 3	5 0	5 6	6.2	
13.0	0 0	0 1	0 3	0 6	0 9	1 2	1 7	2 2	2 7	3 2	3.9	4 5	5.1	5 8	6 5	
13.5	0 0	0 1	0 3	0 6	0 9	1 3	1 7	2 2	2 8	3 4	4 0	4 7	5 3	6 0	6 8	
14.0	0 0	0 2	0 3	0 6	0 9	1 3	1.8	2.3	2.9	3.5	4.2	4 8	5.5	6 3	7 0	
14.5	0 0	0 2	0 4	0 6	1 0	1 4	1.9	2 4	3 0	3 6	4.3	5 0	5 7	6 5	7 2	
15.0	0 0	0 2	0 4	0 6	1 0	1 4	1.9	2.5	3.1	3.8	4.4	5 2	5.9	6.7	7.5	
15.5	0 0	0 2	0 4	0 7	1 0	1 5	2.0	2.6	3.2	3 9	4.6	5 4	6 1	6 9	7 8	
16.0	0 0	0 2	0 4	0 7	1 1	1 5	2.1	2 6	3 3	4 0	4.7	5 5	6.3	7 2	8 0	
16.5	0 0	0 2	0 4	0 7	1 1	1 6	2.1	2 7	3 4	4.1	4 9	5 7	6 5	7.4	8 2	
17.0	0 0	0 2	0 4	0 7	1 1	1 6	2.2	2.8	3.5	4.2	5.0	5 9	6 7	7 6	8.5	
17.5	0 0	0 2	0 4	0 8	1 2	1 7	2.2	2.9	3.6	4.4	5.2	6.0	6.9	7.8	8.8	
18.0	0 0	0 2	0 4	0 8	1 2	1 7	2.3	3.0	3.7	4.5	5.3	6.2	7.1	8.1	9 0	
18.5	0 1	0 2	0 5	0 8	1 2	1 8	2.4	3.1	3.8	4.6	5.5	6 4	7.3	8 3	9 2	
19.0	0 1	0 2	0 5	0 8	1 3	1 8	2.4	3.1	3.9	4.8	5.6	6.6	7.5	8.5	9.5	
19.5	0 1	0 2	0 5	0 8	1 3	1 9	2.5	3 2	4 0	4.9	5.8	6.7	7.7	8.7	9 8	
20.0	0 1	0 2	0 5	0 9	1 3	1 9	2 6	3 3	4 1	5 0	5.9	6 9	7 9	9 0	10 0	

Obtain from the predictions the high water and low water, one of which is before and the other after the time for which the height is required. The difference between the times of occurrence of these tides is the duration of rise or fall, and the difference between their heights is the range of tide for the above table. Find the difference between the nearest high or low water and the time for which the height is required.

Enter the table with the duration of rise or fall, printed in heavy-faced type, which most nearly agrees with the actual value, and on that horizontal line find the time from the nearest high or low water which agrees most nearly with the corresponding actual difference. The correction sought is in the column directly below, on the line with the range of tide.

When the nearest tide is high water, subtract the correction.

When the nearest tide is low water, add the correction.

Graphical Method

If the height of the tide is required for a number of times on a certain day the full tide curve for the day may be obtained by the *one-quarter, one-tenth rule*. The procedure is as follows:

1. On cross-section paper plot the high and low water points in the order of their occurrence for the day measuring time horizontally and height vertically. These are the basic points for the curve.

2. Draw light straight lines connecting the points representing successive high and low waters.

3. Divide each of these straight lines into four equal parts. The halfway point of each line gives another point for the curve.

4. At the quarter point adjacent to high water, draw a vertical line above the point, and at the quarter point adjacent to low water, draw a vertical line below the point, making the length of these lines equal to one tenth of the range between the high and low waters used. The points marking the ends of these vertical lines give two additional intermediate points for the curve.

5. Draw a smooth curve through the points of high and low waters and the intermediate points, making the curve well rounded near high and low waters. This curve will approximate the actual tide curve and heights for any time of the day may be readily scaled from it. The resulting graph is shown in figure A-1.

CAUTION

Both methods presented are based on the assumption that the rise and fall conform to simple cosine curves. Therefore the heights obtained will be approximate. The roughness of approximation will vary as the tide curve differs from a cosine curve.

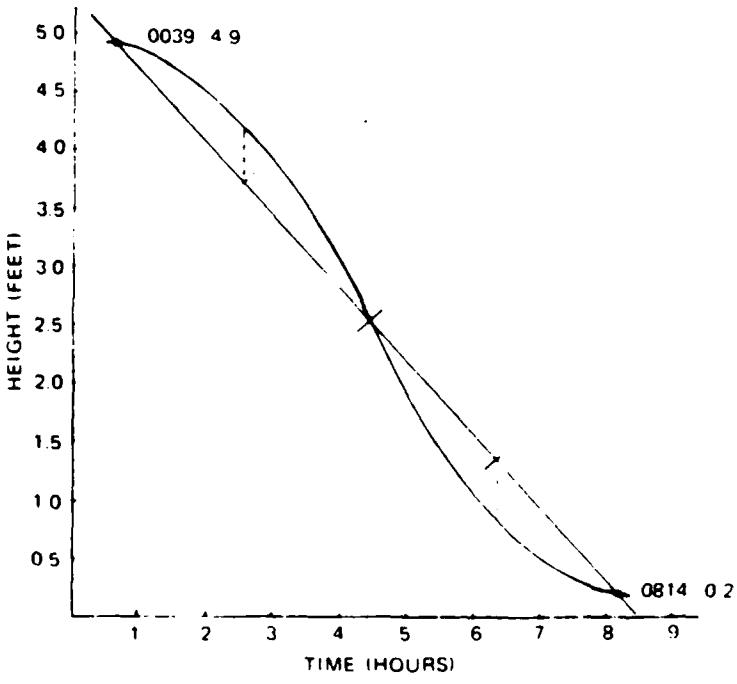

Figure A-1. Tidal Curve for Solution of the Problem.

APPENDIX B

EQUINOXES, SOLSTICES, AND LUNAR PHASES 1989

The dates and times for Vernal and Autumnal Equinoxes and Summer and Winter Solstices during 1989 are listed in table B-1. The 1989 dates and times for phases of the moon are given in table B-2. Times are Pacific Standard Time, add 1 hour when Daylight Savings Time is in effect; add 2 hours for times in the Barking Sands area.

Table B-1. Equinoxes and Solstices, 1989, Point Mugu Area

Vernal Equinox	20 March	0728 PST	Beginning of Spring Day and night equal length
Summer Solstice	21 June	0153 PST	Beginning of Summer Greatest duration daylight
Autumnal Equinox	22 September	1720 PST	Beginning of Autumn Day and night equal length
Winter Solstice	21 December	1322 PST	Beginning of Winter Greatest duration darkness

Table B-2. Lunar Phases, 1989, Point Mugu Area

	JANUARY		FEBRUARY		MARCH		APRIL	
	DATE	TIME	DATE	TIME	DATE	TIME	DATE	TIME
New Moon	07	1122	05	2337	07	1019	05	1933
First Quarter	14	0558	12	1515	14	0211	12	1513
Full Moon	21	1333	20	0732	22	0158	20	1913
Last Quarter	29	1802	28	1208	30	0221	28	1246

	MAY		JUNE		JULY		AUGUST	
	DATE	TIME	DATE	TIME	DATE	TIME	DATE	TIME
New Moon	05	0346	03	1153	02	2059	01	0806
First Quarter	12	0619	10	2259	10	1619	09	0928
Full Moon	20	1016	18	2257	18	0942	16	1907
Last Quarter	27	2001	26	0109	25	0531	23	1040
New Moon	—	——	—	——	—	——	30	2144

	SEPTEMBER		OCTOBER		NOVEMBER		DECEMBER	
	DATE	TIME	DATE	TIME	DATE	TIME	DATE	TIME
First Quarter	08	0149	07	1652	06	0611	05	1726
Full Moon	15	0351	14	1232	12	2151	12	0830
Last Quarter	21	1810	21	0519	19	2044	19	1554
New Moon	29	1347	29	0727	28	0141	27	1920

Because the earth's period of revolution about the sun (365.24+ days) is not evenly divisible by the moon's period of revolution about the earth (27.32+ days), the dates and times of lunar phases, moonrise and moonset, and tidal data must be recomputed for each year. The following information, however, is based on geometrical relationships and holds true for all times:

1. The New Moon rises at sunrise, crosses the meridian at noon, and sets at sunset.

2. The First Quarter Moon rises at noon, crosses the meridian at sunset, and sets at midnight.

3. The Full Moon rises at sunset, crosses the meridian at midnight, and sets at sunrise.

4. The Last Quarter Moon rises at midnight, crosses the meridian at sunrise and sets at noon.

APPENDIX C

SUNRISE AND SUNSET TABLES

Sunrise, Sunset, and Duration of Twilight for Point Mugu, CA
34°07' N, 119°07' W

Note: All times are Pacific Standard Time (120th meridian); add 1 hour when Daylight Savings Time is in effect.

Date	January		February		March		April		May		June		Date
	Sunrise	Sunset	Sunrise	Sunset	Sunrise	Sunset	Sunrise	Sunset	Sunrise	Sunset	Sunrise	Sunset	
1	0702	1658	0654	1727	0626	1753	0544	1817	0507	1840	0446	1903	1
2	0703	1659	0653	1728	0624	1753	0543	1818	0506	1841	0446	1903	2
3	0703	1700	0652	1729	0623	1754	0541	1819	0505	1842	0445	1904	3
4	0703	1700	0652	1730	0622	1755	0540	1819	0504	1843	0445	1904	4
5	0703	1701	0651	1731	0621	1756	0539	1820	0503	1843	0445	1905	5
6	0703	1702	0650	1732	0619	1757	0537	1821	0502	1844	0445	1905	6
7	0703	1703	0649	1733	0618	1758	0536	1822	0502	1845	0445	1906	7
8	0703	1704	0648	1734	0617	1758	0535	1822	0501	1846	0444	1906	8
9	0703	1705	0647	1734	0615	1759	0533	1823	0500	1846	0444	1907	9
10	0703	1705	0647	1735	0614	1800	0532	1824	0459	1847	0444	1907	10
11	0703	1706	0646	1736	0613	1801	0531	1825	0458	1848	0444	1908	11
12	0703	1707	0645	1737	0611	1802	0530	1825	0457	1849	0444	1908	12
13	0703	1708	0644	1738	0610	1802	0528	1826	0456	1849	0444	1909	13
14	0702	1709	0643	1739	0609	1803	0527	1827	0456	1850	0444	1909	14
15	0702	1710	0642	1740	0607	1804	0526	1828	0455	1851	0444	1909	15
16	0702	1711	0641	1741	0606	1805	0525	1829	0454	1852	0444	1910	16
17	0702	1712	0640	1742	0605	1806	0523	1829	0453	1852	0444	1910	17
18	0701	1713	0638	1743	0603	1806	0522	1830	0453	1853	0445	1910	18
19	0701	1714	0637	1744	0602	1807	0521	1831	0452	1854	0445	1911	19
20	0701	1715	0636	1745	0601	1808	0520	1832	0451	1855	0445	1911	20
21	0700	1716	0635	1746	0559	1809	0518	1832	0451	1855	0445	1911	21
22	0700	1717	0634	1747	0558	1809	0517	1833	0450	1856	0445	1911	22
23	0659	1718	0633	1747	0556	1810	0516	1834	0450	1857	0446	1911	23
24	0659	1719	0632	1748	0555	1811	0515	1835	0449	1857	0446	1912	24
25	0658	1720	0630	1749	0554	1812	0514	1835	0449	1858	0446	1912	25
26	0658	1721	0629	1750	0552	1813	0513	1836	0448	1859	0446	1912	26
27	0657	1722	0628	1751	0551	1813	0512	1837	0448	1900	0447	1912	27
28	0657	1723	0627	1752	0550	1814	0511	1838	0447	1900	0447	1912	28
29	0656	1724	0626	1752	0548	1815	0509	1839	0447	1901	0447	1912	29
30	0655	1725			0547	1816	0508	1839	0447	1901	0448	1912	30
31	0655	1726			0546	1816			0446	1902			31
	Average twilight Civil: 27 min. Nautical: 58 min.		Average twilight Civil: 26 min. Nautical: 55 min.		Average twilight Civil: 25 min. Nautical: 54 min.		Average twilight Civil: 26 min. Nautical: 57 min.		Average twilight Civil: 28 min. Nautical: 61 min.		Average twilight Civil: 29 min. Nautical: 65 min.		

Date	July		August		September		October		November		December		Date
	Sunrise	Sunset	Sunrise	Sunset	Sunrise	Sunset	Sunrise	Sunset	Sunrise	Sunset	Sunrise	Sunset	
1	0448	1912	0507	1858	0530	1823	0551	1741	0616	1704	0644	1647	1
2	0449	1912	0508	1857	0530	1821	0551	1740	0617	1703	0645	1647	2
3	0449	1912	0509	1856	0531	1820	0552	1738	0618	1702	0646	1647	3
4	0450	1912	0510	1855	0532	1819	0553	1737	0619	1701	0646	1647	4
5	0450	1912	0510	1854	0532	1817	0554	1736	0620	1700	0647	1647	5
6	0451	1911	0511	1853	0533	1816	0554	1734	0621	1659	0648	1647	6
7	0451	1911	0512	1852	0534	1815	0555	1733	0621	1658	0649	1647	7
8	0452	1911	0512	1851	0535	1813	0556	1732	0622	1658	0650	1647	8
9	0452	1911	0513	1850	0535	1812	0557	1730	0623	1657	0650	1647	9
10	0453	1910	0514	1849	0536	1810	0557	1729	0624	1656	0651	1647	10
11	0453	1910	0515	1848	0537	1809	0558	1728	0625	1655	0652	1647	11
12	0454	1910	0515	1847	0537	1808	0559	1726	0626	1655	0653	1648	12
13	0454	1909	0516	1846	0538	1806	0600	1725	0627	1654	0653	1648	13
14	0455	1909	0517	1845	0539	1805	0601	1724	0628	1653	0654	1646	14
15	0456	1909	0518	1844	0539	1803	0601	1723	0629	1653	0655	1648	15
16	0456	1908	0518	1843	0540	1802	0602	1721	0630	1652	0655	1649	16
17	0457	1908	0519	1841	0541	1801	0603	1720	0631	1652	0656	1649	17
18	0458	1907	0520	1840	0541	1759	0604	1719	0632	1651	0657	1650	18
19	0458	1907	0520	1839	0542	1758	0605	1718	0633	1651	0657	1650	19
20	0459	1906	0521	1838	0543	1756	0606	1717	0634	1650	0658	1650	20
21	0500	1906	0522	1837	0544	1755	0606	1715	0635	1650	0658	1651	21
22	0500	1905	0523	1835	0544	1754	0607	1714	0636	1649	0659	1651	22
23	0501	1904	0523	1834	0545	1752	0608	1713	0637	1649	0659	1652	23
24	0502	1904	0524	1833	0546	1751	0609	1712	0637	1649	0700	1653	24
25	0502	1903	0525	1832	0546	1749	0610	1711	0638	1648	0700	1653	24
26	0503	1902	0525	1830	0547	1748	0611	1710	0639	1648	0700	1654	26
27	0504	1902	0526	1829	0548	1747	0611	1709	0640	1648	0701	1654	27
28	0504	1901	0527	1828	0549	1745	0612	1708	0641	1647	0701	1655	28
29	0505	1900	0528	1827	0549	1744	0613	1707	0642	1647	0702	1656	29
30	0506	1859	0528	1825	0550	1742	0614	1706	0643	1647	0702	1656	30
31	0507	1858	0529	1824			0615	1705			0702	1657	31
	Average twilight Civil: 29 min. Nautical: 63 min.		Average twilight Civil: 26 min. Nautical: 58 min.		Average twilight Civil: 25 min. Nautical: 55 min.		Average twilight Civil: 25 min. Nautical: 54 min.		Average twilight Civil: 27 min. Nautical: 57 min.		Average twilight Civil: [illegible] min. Nautical: 59 min.		

Retain for use in future years. These data valid through 2020.

Sunrise, Sunset, and Duration of Twilight for Barking Sands, Kauai, HI
22°02' N, 159°47' W

Note: All times are Alaska-Hawaii Standard Time (150th Meridian).

Date	January		February		March		April		May		June		Date
	Sunrise	Sunset	Sunrise	Sunset	Sunrise	Sunset	Sunrise	Sunset	Sunrise	Sunset	Sunrise	Sunset	
1	0718	1807	0718	1828	0700	1843	0632	1854	0607	1905	0555	1919	1
2	0719	1808	0717	1829	0659	1843	0631	1855	0607	1906	0555	1919	2
3	0719	1809	0717	1830	0659	1844	0630	1855	0606	1906	0555	1920	3
4	0719	1809	0716	1830	0658	1844	0629	1855	0606	1906	0555	1920	4
5	0719	1810	0716	1831	0657	1845	0628	1856	0605	1907	0555	1920	5
6	0720	1811	0715	1831	0656	1845	0627	1856	0604	1907	0555	1921	6
7	0720	1811	0715	1832	0655	1846	0627	1856	0604	1908	0555	1921	7
8	0720	1812	0714	1833	0654	1846	0626	1857	0603	1908	0555	1921	8
9	0720	1813	0714	1833	0653	1846	0625	1857	0603	1909	0555	1922	9
10	0720	1813	0713	1834	0653	1847	0624	1857	0602	1909	0555	1922	10
11	0720	1814	0713	1834	0652	1847	0623	1858	0602	1909	0555	1922	11
12	0721	1815	0712	1835	06[illegible]	1847	0622	1858	0601	1910	0555	1923	12
13	0721	1815	0712	1835	06[illegible]	1848	0621	1858	0601	1910	0555	1923	13
14	0721	1816	0711	1836	06[illegible]	1848	0620	1859	0600	1911	0555	1923	14
15	0721	1817	0710	1836	0648	1848	0620	1859	0600	1911	0555	1924	15
16	0721	1818	0710	1837	0647	1849	0619	1859	0559	1912	0555	1924	16
17	0721	1818	0709	1837	0646	1849	0618	1900	0559	1912	0556	1924	17
18	0721	1819	0709	1838	0645	1850	0617	1900	0559	1913	0556	1925	18
19	0721	1820	0708	1838	0644	1850	0616	1900	0558	1913	0556	1925	19
20	0720	1820	0707	1839	0643	1850	0615	1901	0558	1914	0556	1925	20
21	0720	1821	0706	1839	0642	1851	0615	1901	0558	1914	0556	1925	21
22	0720	1822	0706	1840	0641	1851	0614	1902	0557	1914	0557	1925	22
23	0720	1822	0705	1840	0641	1851	0613	1902	0557	1915	0557	1926	23
24	0720	1823	0704	1841	0640	1852	0612	1902	0557	1915	0557	1926	24
25	0720	1824	0703	1841	0639	1852	0612	1903	0557	1916	0557	1926	25
26	0719	1824	0703	1842	0638	1852	0611	1903	0556	1916	0558	1926	26
27	0719	1825	0702	1842	0637	1853	0610	1904	0556	1917	0558	1926	27
28	0719	1826	0701	1843	0636	1853	0609	1904	0556	1917	0558	1926	28
29	0719	1826	0701	1843	0635	1853	0609	1904	0556	1917	0558	1926	29
30	0718	1827			0634	1854	0608	1905	0555	1918	0559	1927	30
31	0718	1828			0633	1854			0555	1918			31
	Average twilight Civil: 24 min. Nautical: 51 min.		Average twilight Civil: 23 min. Nautical: 49 min.		Average twilight Civil: 22 min. Nautical: 48 min.		Average twilight Civil: 23 min. Nautical: 50 min.		Average twilight Civil: 24 min. Nautical: 53 min.		Average twilight Civil: 25 min. Nautical: 55 min.		

Date	July		August		September		October		November		December		Date
	Sunrise	Sunset	Sunrise	Sunset	Sunrise	Sunset	Sunrise	Sunset	Sunrise	Sunset	Sunrise	Sunset	
1	0559	1927	0611	1919	0622	1856	0630	1827	0643	1802	0702	1755	1
2	0559	1927	0612	1919	0622	1855	0631	1826	0643	1802	0702	1755	2
3	0600	1927	0612	1918	0623	1854	0631	1825	0644	1801	0703	1755	3
4	0600	1927	0612	1918	0623	1853	0631	1824	0645	1801	0703	1755	4
5	0600	1927	0613	1917	0623	1852	0632	1823	0645	1800	0704	1755	5
6	0601	1927	0613	1916	0623	1851	0632	1822	0646	1800	0705	1756	6
7	0601	1927	0614	1916	0624	1850	0632	1821	0646	1759	0705	1756	7
8	0602	1927	0614	1915	0624	1849	0633	1820	0647	1759	0706	1756	8
9	0602	1926	0614	1914	0624	1848	0633	1819	0647	1758	0707	1756	9
10	0602	1926	0615	1914	0625	1847	0633	1819	0648	1758	0707	1757	10
11	0603	1926	0615	1913	0625	1846	0634	1818	0649	1758	0708	1757	11
12	0603	1926	0616	1912	0625	1845	0634	1817	0649	1757	0709	1757	12
13	0603	1926	0616	1912	0625	1844	0634	1816	0650	1757	0709	1758	13
14	0604	1926	0616	1911	0626	1843	0635	1815	0650	1757	0710	1758	14
15	0604	1926	0617	1910	0626	1842	0635	1814	0651	1756	0710	1758	15
16	0605	1925	0617	1909	0626	1841	0636	1813	0652	1756	0711	1759	16
17	0605	1925	0617	1909	0626	1840	0636	1813	0652	1756	0712	1759	17
18	0606	1925	0618	1908	0627	1839	0636	1812	0653	1756	0712	1800	18
19	0606	1925	0618	1907	0627	1838	0637	1811	0654	1755	0713	1800	19
20	0606	1924	0618	1906	0627	1837	0637	1810	0654	1755	0713	1800	20
21	0607	1924	0619	1905	0628	1836	0638	1810	0655	1755	0714	1801	21
22	0607	1924	0619	1905	0628	1836	0638	1809	0656	1755	0714	1801	22
23	0608	1923	0619	1904	0628	1835	0639	1808	0656	1755	0715	1802	23
24	0608	1923	0620	1903	0628	1834	0639	1807	0657	1755	0715	1803	24
25	0608	1922	0620	1902	0629	1833	0639	1807	0658	1755	0716	1803	25
26	0609	1922	0620	1901	0629	1832	0640	1806	0658	1755	0716	1804	26
27	0609	1922	0621	1900	0629	1831	0640	1805	0659	1755	0716	1804	27
28	0610	1921	0621	1859	0630	1830	0641	1805	0700	1755	0717	1805	28
29	0610	1921	0621	1859	0630	1829	0641	1804	0700	1755	0717	1805	29
30	0610	1920	0621	1858	0630	1828	0642	1803	0701	1755	0718	1806	30
31	0611	1920	0622	1857			0642	1803			0718	1807	31
	Average twilight Civil: 25 min. Nautical: 54 min.		Average twilight Civil: 23 min. Nautical: 50 min.		Average twilight Civil: 22 min. Nautical: 48 min.		Average twilight Civil: 23 min. Nautical: 49 min.		Average twilight Civil: 24 min. Nautical: 51 min.		Average twilight Civil: 24 min. Nautical: 52 min.		

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