

**State of Hawaii
COMMISSION ON WATER RESOURCE MANAGEMENT
Department of Land and Natural Resources**

05/24/01 P3:43 05/24/01 P3:10

PETITION TO AMEND INTERIM INSTREAM FLOW STANDARDS

EAST WAILUAIKI STREAM, EAST MAUI

Instructions: Please print in ink or type and send completed petition with attachments to the Commission on Water Resource Management, P.O. Box 621, Honolulu, Hawaii 96809. Petition must be accompanied by a non-refundable filing fee of \$25.00 payable to the Dept. of Land and Natural Resources. The Commission may not accept incomplete applications. For assistance, call the Regulation Branch at 587-0225.

1. PETITIONER

Firm/Name Na Moku 'Aupuni o Ko'olau Hui c/o Native Hawaiian Legal Corporation
 Contact Person Alan Murakami, Attorney Ph: 521-2302
 Address 1164 Bishop Street, Honolulu, Hawai'i 96813

2. STREAMFLOW DATA

USGS stream gaging station 16517000 Period of Record Gage Inactive
 Location/Reach SEE ATTACHED
 (Attach a USGS map, scale 1"=2000', and a property tax map showing diversion location referenced to established property boundaries.)

TABLE 1. PERIOD OF RECORD AVERAGE MONTHLY STREAMFLOW WITHIN THE AFFECTED STREAM REACH, IN CFS

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	--------

Annual Median flow in cfs =

TABLE 2. PROPOSED AVERAGE MONTHLY STREAMFLOW DIVERSION FROM AFFECTED STREAM REACH, IN CFS

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
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NONE.

Annual Median flow in cfs =

RESTORATION

TABLE 3. AVERAGE MONTHLY STREAMFLOW IN AFFECTED STREAM REACH AFTER ~~RESTORATION~~ (min release flow), IN CFS

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
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NATURAL STREAMFLOW EXCEPT FOR EXERCISE OF APPURTENANT WATER RIGHTS.

Annual Median flow in cfs =

3. EXISTING INSTREAM AND OFFSTREAM WATER USES FOR ENTIRE STREAM REACH

TMK	OWNER	USE
	RESEARCH IN PROGRESS.	

(If more space is necessary, attach an extended list following above format)

4. ANTICIPATED IMPACTS ON STREAM AND BASIS FOR SUCH IMPACTS:

RESTORATION OF INSTREAM NATURAL HABITAT AND BIOTA, AND BENEFICIAL APPURTENANT AND GATHERING USES.

(Attach supporting documentation, plans, letters, etc.)

NATIVE HAWAIIAN LEGAL CORPORATION

May 24, 2001

Signature

Alan Murakami
 Alan Murakami Petitioner
 Attorney for Na Moku 'Aupuni o Ko'olau Hui

For Official Use

Date Received _____

Date Accepted _____

West and East Wailuaiki Streams

Although these streams do not converge, they are quite similar and hence will be discussed together in this section. Both streams are headed 6.6 mi inland at 6,000 ft altitude (plate 1). The streams rise steeply from sea level to 600 ft altitude 0.5 mi from the coast (a gradient of 1,130 ft/mi) and at this altitude, the valleys are incised 240 ft below the upland surface. The stream valleys lie on Kula Volcanics along much of their length but Honomanu Basalt can be found as far as 2,000 ft from the ocean (Stearns and Macdonald, 1942). Streamflow is captured by the Koolau Ditch diversion system at 1,300 ft altitude (table 4).

West Wailuaiki Stream (1921–97) and East Wailuaiki Stream (1922–58) have never been dry at the gaging stations (5180, 5170) upstream of the Koolau Ditch (table 2, plate 1). The average annual gains from ground water upstream of the gaging stations are about 4.53 and 4.82 Mgal/d, respectively (table 2, fig. 15M). A streamflow measurement made on June 25, 1962 at the West Wailuaiki gaging station shows a flow of 0.90 Mgal/d (table 17). About 82 percent of this flow was gained downstream of 3,000 ft altitude where a set of measurements were made on two stream branches (U.S. Geological Survey, 1962). Measurements made March 21, 1984 on a shorter stream section show that 72 percent of the flow at the gaging station was gained downstream of 2,565 ft altitude and the largest gains were between 2,565 ft and 2,400 ft altitude (Chinn, Tateishi, and Yee, 1985). Measurements made in March 1928 by EMI personnel at 500 ft altitude in both West and East Wailuaiki Streams show gains of 0.5 and 0.2 Mgal/d, respectively, downstream of 1,300 ft altitude (table 10).

The area upstream of gaging station 5180 is 3.67 mi² and in the water budget, 33.11 Mgal/d of rainfall and 9.28 Mgal/d of fog drip is apportioned into 18.75 Mgal/d of runoff, 5.05 Mgal/d of evapotranspiration, and 18.59 Mgal/d of recharge (table 1, fig. 6) (Shade, 1999). The estimated base flow at the gaging station is about 25 percent of the recharge to the subbasin. The results for the 3.11-mi² subbasin upstream of gaging station 5170 are similar; 30.20 Mgal/d of rainfall, 8.46 Mgal/d of fog drip, 14.90 Mgal/d of runoff, 4.33 Mgal/d of evapotranspiration, and 19.43 Mgal/d of recharge (table 1, fig. 6). Although this subbasin receives less total precipitation, it receives slightly more recharge

because less runoff and evapotranspiration occur. The base flow for the East Wailuaiki Stream subbasin is about 25 percent of the estimated recharge.

WAILUAIKI (East)

DURATION CURVE STATISTICAL CHARACTERISTICS FOR ...
 STATION ID: 16517000 EAST WAILUAIKI STREAM NEAR KEANAE, MAUI, HI
 PARAMETER CODE = 00060
 STATISTIC CODE - 00003 MEAN

DURATION DATA VALUES ARE INTERPOLATED FROM DURATION TABLE:
 DATA ARE NOT ANALYTICALLY FITTED TO A PARTICULAR STATISTICAL DISTRIBUTION,
 AND THE USER IS RESPONSIBLE FOR ASSESSMENT AND INTERPRETATION.

ADDITIONAL CONDITIONS FOR THIS RUN ARE:
 STATISTICS ARE BASED ON LOGARITHMS (BASE 10).
 NUMBER OF VALUES IS REDUCED FOR EACH NEAR-ZERO OR ZERO VALUE.

NUMBER OF VALUES = 19 (NUMBER OF NEAR-ZERO VALUES = 0)
 LISTING OF DATA FOLLOWS:

PERCENT OF TIME VALUE EQUALED OR EXCEEDED	DATA VALUE	(LOG =
95.0	3.11	0.49319)
90.0	3.86	(LOG = 0.58702)
85.0	4.48	(LOG = 0.65095)
80.0	5.13	(LOG = 0.71013)
75.0	5.84	(LOG = 0.76667)
70.0	6.60	(LOG = 0.81947)
65.0	7.35	(LOG = 0.86630)
60.0	8.10	(LOG = 0.90854)
55.0	9.12	(LOG = 0.95980)
50.0	10.3	(LOG = 1.01280)
45.0	12.2	(LOG = 1.08464)
40.0	14.1	(LOG = 1.14857)
35.0	16.3	(LOG = 1.21311)
30.0	19.5	(LOG = 1.28966)
25.0	24.2	(LOG = 1.38358)
20.0	31.9	(LOG = 1.50333)
15.0	44.9	(LOG = 1.65199)
10.0	67.8	(LOG = 1.83131)
5.0	129.6	(LOG = 2.11250)

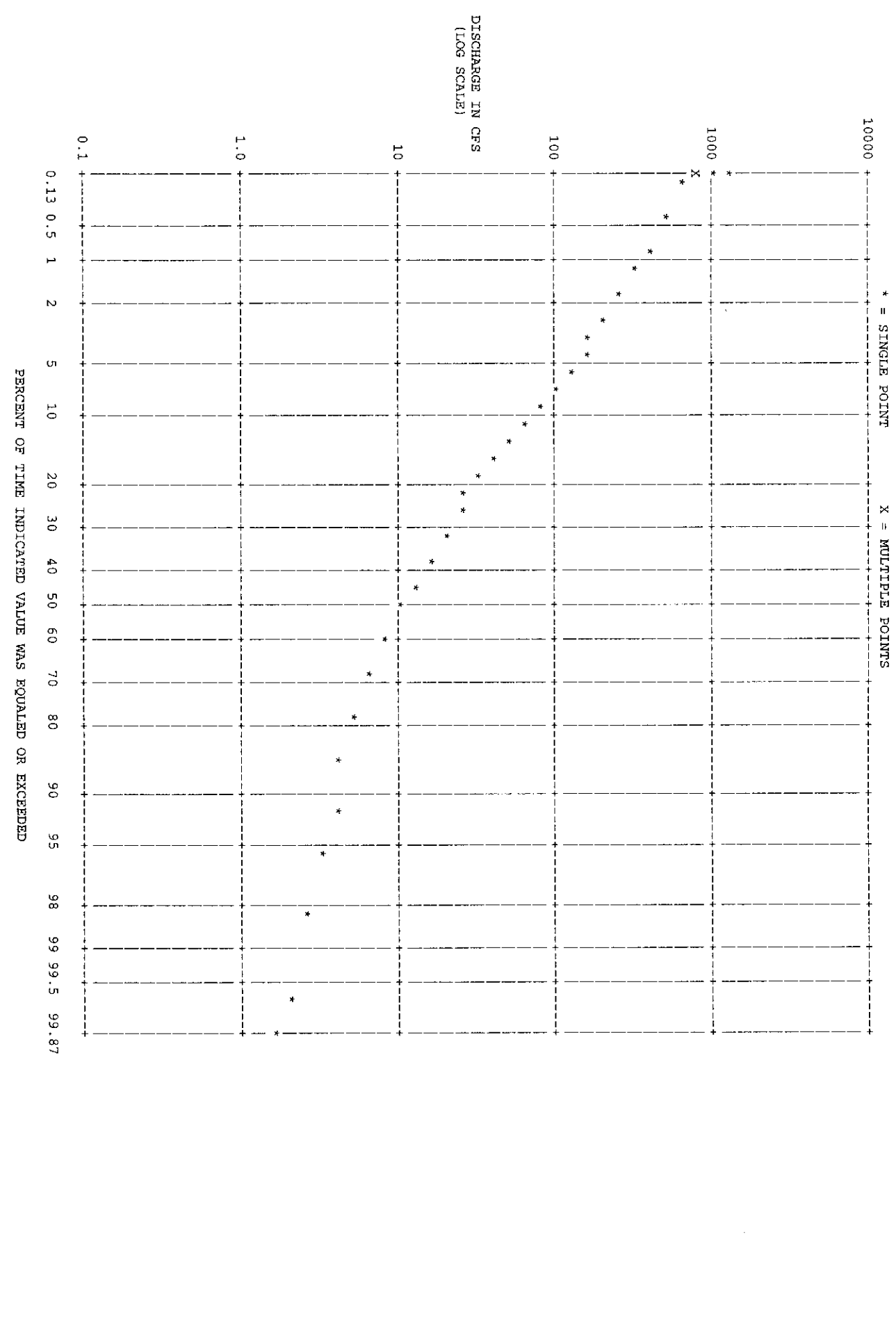
MEAN OF LOGS = 1.10493

STANDARD DEVIATION OF LOGS = 0.43793 (VARIABILITY INDEX - SEE USGS WSP 1542-A)

COEFFICIENT OF VARIATION = 0.39634

COEFFICIENT OF SKEW = 0.77816

LOG-NORMAL DURATION PLOT FOR PERIOD OCT TO SEP
 STATION ID: 16517000 EAST WAILUAIKI STREAM NEAR KEANAE, MAUI, HI (YEARS 1914 - 1958)
 PARAMETER CODE - 00060 DISCHARGE
 STATISTIC CODE - 00003 MEAN



DVSTAT - DAILY VALUES STATISTICAL PROGRAM

STATION ID - 16517000
 EAST MATIUAIKI STREAM NEAR KEANAE, MAUI, HI
 PARAMETER CODE - 00060 DISCHARGE
 STATISTIC CODE - 00003 MEAN

LOWEST MEAN VALUE AND RANKING FOR THE FOLLOWING NUMBER OF CONSECUTIVE DAYS
 FOR PERIOD OCT TO SEP

WATER YEAR RANGE	1	3	7	14	30	60	90	120	183
1916 1916	6.00 37	6.33 37	6.77 37	7.14 36	11.3 35	26.3 37	23.3 36	31.5 36	50.0 37
1917 1917	1.90 4	1.90 4	1.99 4	2.15 4	2.57 4	4.39 4	5.39 3	6.42 2	11.5 4
1923 1923	2.30 11	2.43 13	2.61 14	2.82 13	4.71 22	13.3 29	14.8 25	15.0 18	20.1 20
1924 1924	4.00 30	4.07 29	4.19 29	4.38 28	5.05 24	7.13 15	12.2 17	11.6 12	18.3 14
1925 1925	4.30 33	4.43 33	4.51 30	4.95 30	5.58 28	8.75 20	14.7 24	17.3 25	26.4 28
1926 1926	2.90 20	3.03 20	3.17 21	3.24 18	3.37 9	4.29 3	4.69 1	6.21 1	7.67 1
1927 1927	3.70 26	3.70 26	3.81 26	3.97 25	4.44 16	11.2 26	11.8 15	16.9 24	19.2 16
1928 1928	4.00 31	4.07 30	4.17 28	4.42 29	5.26 25	14.1 31	20.4 33	23.7 34	24.3 27
1929 1929	3.90 28	3.93 28	3.97 27	4.14 27	5.44 26	7.53 17	9.18 10	12.5 14	16.2 12
1930 1930	3.40 25	3.47 25	3.56 24	3.73 23	4.14 13	20.6 36	22.2 35	23.9 35	38.2 34
1931 1931	2.30 12	2.47 14	2.76 15	2.96 15	4.36 14	10.3 23	10.8 13	13.5 16	20.5 22
1932 1932	3.70 27	3.87 27	4.51 31	5.67 33	8.34 33	10.5 24	19.7 32	17.9 27	31.1 33
1933 1933	2.20 9	2.27 10	2.57 12	2.66 10	3.02 8	4.87 6	6.02 5	6.68 3	9.12 2
1934 1934	1.70 2	1.83 3	1.89 2	2.03 2	2.43 2	5.07 8	11.9 16	10.7 10	13.5 10
1935 1935	4.20 32	4.33 32	4.70 32	5.34 31	6.81 30	11.0 25	12.5 18	12.9 15	19.9 17
1936 1936	2.00 7	2.13 7	2.26 8	2.37 7	2.72 6	4.97 7	5.08 2	9.25 8	13.3 8
1937 1937	4.50 34	4.60 34	4.84 34	5.49 32	16.5 37	18.7 35	36.1 37	36.6 37	39.2 35
1938 1938	4.60 36	4.77 35	4.97 35	5.74 34	9.79 34	13.4 30	13.8 21	18.3 28	40.6 36
1939 1939	4.50 35	4.90 36	5.97 36	7.40 37	13.8 36	15.8 33	19.6 31	19.8 32	28.6 30
1940 1940	2.70 19	2.73 16	2.84 17	2.95 14	3.60 11	6.73 13	8.54 8	8.80 6	12.1 7
1941 1941	3.10 22	3.17 22	3.26 22	3.59 22	4.56 18	6.45 12	15.1 26	15.7 20	21.7 23
1942 1942	3.20 23	3.43 24	3.57 25	4.02 26	4.63 20	7.50 16	15.1 27	16.0 21	24.2 26
1943 1943	2.30 13	2.37 11	2.47 9	2.69 11	4.72 23	11.3 27	18.5 29	17.5 26	20.0 19
1944 1944	1.90 5	1.97 5	1.99 5	2.21 5	2.42 1	4.42 5	10.8 14	10.6 9	12.0 6
1945 1945	2.20 10	2.20 9	2.20 6	2.31 6	2.79 7	4.15 2	5.89 4	9.03 7	15.8 11
1946 1946	3.20 24	3.30 23	3.51 23	3.74 24	4.61 19	5.79 11	13.7 20	14.4 17	20.2 21
1947 1947	3.00 21	3.03 21	3.14 20	3.41 19	4.50 17	12.0 28	14.6 22	18.6 30	22.2 25
1948 1948	3.90 29	4.10 31	4.81 33	6.01 35	7.24 31	16.7 34	21.1 34	19.3 31	28.7 31
1949 1949	2.60 16	2.83 19	3.09 19	3.52 21	4.37 15	6.90 14	8.66 9	11.1 11	13.3 9
1950 1950	2.50 15	2.60 15	2.60 13	3.48 20	5.74 29	14.6 32	19.1 30	18.5 29	28.4 29
1951 1951	2.60 17	2.73 17	2.87 18	3.11 17	4.65 21	5.52 10	6.79 6	8.37 5	11.7 5
1952 1952	1.90 6	2.00 6	2.56 11	2.59 9	7.69 32	10.1 22	13.5 19	15.4 19	18.3 15
1953 1953	1.70 3	1.80 2	1.93 3	2.13 3	2.48 3	4.06 1	8.05 7	8.06 4	11.2 3
1954 1954	1.60 1	1.60 1	1.74 1	1.97 1	2.62 5	9.98 21	10.6 12	11.8 13	16.2 13
1955 1955	2.10 8	2.13 8	2.24 7	2.51 8	5.54 27	7.63 18	17.4 28	16.5 22	22.1 24

DVSTAT - DAILY VALUES STATISTICAL PROGRAM

STATION ID - 16517000
 EAST WAILUAIKI STREAM NEAR KEANAE, MAUI, HI
 PARAMETER CODE - 00060 DISCHARGE
 STATISTIC CODE - 00003 MEAN

LOWEST MEAN VALUE AND RANKING FOR THE FOLLOWING NUMBER OF CONSECUTIVE DAYS
 FOR PERIOD OCT TO SEP

WATER YEAR RANGE	1	3	7	14	30	60	90	120	183
1956 1956	2.30 14	2.40 12	2.54 10	2.81 12	3.85 12	8.01 19	14.6 23	20.3 33	28.7 32
1957 1957	2.60 18	2.73 18	2.83 16	3.06 16	3.54 10	5.14 9	10.1 11	16.8 23	19.9 18

DVSTAT - DAILY VALUES STATISTICAL PROGRAM

STATION ID - 16517000
 EAST WAILUAIKI STREAM NEAR KEANAE, MAUI, HI
 PARAMETER CODE - 00060 DISCHARGE
 STATISTIC CODE - 00003 MEAN

HIGHEST MEAN VALUE AND RANKING FOR THE FOLLOWING NUMBER OF CONSECUTIVE DAYS
 FOR PERIOD OCT TO SEP

WATER YEAR RANGE	1	3	7	15	30	60	90	120	183
1916 1916	982 7	601 7	531 4	294 3	164 5	102 5	100 4	82.1 5	74.1 3
1917 1917	647 14	513 10	294 12	195 11	120 12	83.5 13	64.4 15	52.5 19	41.1 19
1923 1923	684 12	588 8	588 2	469 1	245 1	138 2	112 2	94.3 2	73.9 4
1924 1924	506 24	354 18	203 20	125 21	74.2 25	61.5 21	47.5 22	46.2 21	38.7 21
1925 1925	746 10	363 16	198 21	141 17	110 16	65.8 19	50.6 21	42.5 22	38.1 22
1926 1926	240 37	101 37	62.3 37	39.4 37	29.6 37	19.8 37	18.4 37	16.1 37	12.6 37
1927 1927	654 13	289 27	147 29	80.2 30	47.8 34	35.9 34	30.6 34	31.3 33	26.1 34
1928 1928	339 32	246 29	119 31	68.6 34	51.3 32	43.3 32	40.5 28	32.2 30	33.9 27
1929 1929	554 19	345 19	244 14	153 16	113 15	74.6 16	61.6 18	56.2 15	46.9 14
1930 1930	523 22	373 14	314 10	183 13	109 17	99.3 6	76.4 8	79.9 7	66.7 6
1931 1931	602 18	362 17	180 23	92.9 28	69.8 29	46.1 29	39.0 31	35.5 29	36.5 23
1932 1932	614 17	341 20	235 15	180 14	128 8	83.8 12	74.7 9	69.1 9	58.6 9
1933 1933	732 11	422 13	212 18	108 26	73.9 26	48.5 26	44.5 23	38.8 25	30.9 29
1934 1934	1080 4	426 12	215 17	177 15	116 14	77.3 15	65.4 14	56.6 14	43.5 17
1935 1935	1000 5	714 4	403 8	202 10	122 11	84.4 11	66.6 12	61.4 10	52.8 10
1936 1936	252 36	129 36	75.0 35	61.4 35	50.1 33	43.6 30	41.0 27	36.0 28	33.5 28
1937 1937	511 23	480 11	306 11	240 6	166 4	125 3	108 3	95.3 1	78.2 1
1938 1938	1280 2	862 2	556 3	280 4	186 3	114 4	96.0 5	81.8 6	70.1 5
1939 1939	623 16	302 23	220 16	128 19	72.4 27	66.1 18	54.4 20	54.3 18	44.6 15
1940 1940	541 20	370 15	211 19	125 20	88.5 19	53.3 24	40.0 30	32.2 31	27.5 33
1941 1941	492 26	299 25	159 26	90.3 29	59.7 30	43.2 33	35.6 33	38.9 24	34.2 26
1942 1942	1240 3	826 3	599 1	360 2	240 2	156 1	116 1	90.0 3	74.6 2
1943 1943	328 33	139 34	77.6 34	69.3 33	45.0 35	35.8 35	30.4 35	28.6 35	25.7 35
1944 1944	268 35	130 35	68.1 36	48.6 36	33.4 36	27.0 36	24.0 36	20.9 36	18.6 36
1945 1945	356 31	232 30	157 27	123 22	77.6 21	52.7 25	36.7 32	29.9 34	29.1 31
1946 1946	639 15	265 28	146 30	116 23	77.5 22	61.0 22	61.7 17	55.6 16	44.6 16
1947 1947	837 8	629 5	435 5	231 7	154 7	92.9 8	69.9 11	57.0 13	48.6 12
1948 1948	1430 1	954 1	430 7	206 9	125 9	88.8 10	89.5 7	78.2 8	66.2 8
1949 1949	501 25	295 26	178 25	135 18	106 18	72.9 17	63.5 16	51.2 20	42.3 18
1950 1950	466 27	299 24	247 13	183 12	118 13	91.4 9	71.2 10	60.4 11	48.0 13
1951 1951	529 21	304 22	180 24	113 24	79.8 20	63.1 20	61.2 19	54.7 17	41.1 20
1952 1952	370 30	181 33	151 28	109 25	76.4 23	47.2 27	41.5 25	40.5 23	35.4 25
1953 1953	422 28	200 32	117 32	76.7 32	71.7 28	57.4 23	41.5 26	32.0 32	28.0 32
1954 1954	319 34	210 31	107 33	76.8 31	56.5 31	43.4 31	40.5 29	38.4 26	35.7 24
1955 1955	784 9	567 9	433 6	248 5	157 6	95.2 7	94.1 6	84.3 4	66.5 7

DV/STAT - DAILY VALUES STATISTICAL PROGRAM

STATION ID - 16517000
 EAST WAIIUAIKI STREAM NEAR KEANAE, MAUI, HI
 PARAMETER CODE - 00060 DISCHARGE
 STATISTIC CODE - 00003 MEAN

HIGHEST MEAN VALUE AND RANKING FOR THE FOLLOWING NUMBER OF CONSECUTIVE DAYS
 FOR PERIOD OCT TO SEP

WATER YEAR RANGE	1	3	7	15	30	60	90	120	183
1956 1956	990 6	617 6	323 9	227 8	124 10	82.6 14	66.3 13	59.1 12	50.7 11
1957 1957	401 29	307 21	194 22	101 27	75.6 24	46.8 28	43.5 24	37.6 27	30.5 30

DVSTAT - DAILY VALUES STATISTICAL PROGRAM

STATION ID - 16517000
 EAST WAIIAIIKI STREAM NEAR KEANAE, MAUI, HI
 PARAMETER CODE - 00060 DISCHARGE
 STATISTIC CODE - 00003 MEAN

ANNUAL AND/OR SEMI-ANNUAL VALUES

MEAN VALUE AND RANKING FOR PERIOD INCLUDED IN LOW-VALUE ANALYSIS (OCT-SEP)		MEAN VALUE AND RANKING FOR PERIOD INCLUDED IN HIGH-VALUE ANALYSIS (OCT-SEP)	
WATER YEAR RANGE		WATER YEAR RANGE	
1916 1916	57.3	1916 1916	57.3
1917 1917	25.7	1917 1917	25.7
1923 1923	46.6	1923 1923	46.6
1924 1924	28.6	1924 1924	28.6
1925 1925	29.6	1925 1925	29.6
1926 1926	12.3	1926 1926	12.3
1927 1927	20.7	1927 1927	20.7
1928 1928	26.5	1928 1928	26.5
1929 1929	29.4	1929 1929	29.4
1930 1930	43.5	1930 1930	43.5
1931 1931	28.4	1931 1931	28.4
1932 1932	40.5	1932 1932	40.5
1933 1933	18.3	1933 1933	18.3
1934 1934	27.9	1934 1934	27.9
1935 1935	33.2	1935 1935	33.2
1936 1936	22.7	1936 1936	22.7
1937 1937	54.0	1937 1937	54.0
1938 1938	44.3	1938 1938	44.3
1939 1939	31.2	1939 1939	31.2
1940 1940	20.9	1940 1940	20.9
1941 1941	25.3	1941 1941	25.3
1942 1942	49.5	1942 1942	49.5
1943 1943	21.1	1943 1943	21.1
1944 1944	13.6	1944 1944	13.6
1945 1945	20.7	1945 1945	20.7
1946 1946	28.6	1946 1946	28.6
1947 1947	33.7	1947 1947	33.7
1948 1948	44.0	1948 1948	44.0
1949 1949	27.1	1949 1949	27.1
1950 1950	32.7	1950 1950	32.7
1951 1951	26.1	1951 1951	26.1
1952 1952	24.4	1952 1952	24.4
1953 1953	19.7	1953 1953	19.7
1954 1954	24.5	1954 1954	24.5
1955 1955	39.9	1955 1955	39.9
1956 1956	32.4	1956 1956	32.4
1957 1957	25.9	1957 1957	25.9

DVSTAT - DAILY VALUES STATISTICAL PROGRAM

STATION ID - 16517000
EAST WAIIUAIKI STREAM NEAR KEANAE, MAUI, HI
PARAMETER CODE - 00060 DISCHARGE
STATISTIC CODE - 00003 MEAN

ANNUAL AND/OR SEMI-ANNUAL VALUES

MEAN VALUE AND RANKING FOR
PERIOD INCLUDED IN LOW-VALUE ANALYSIS
(OCT-SEP)
WATER YEAR
RANGE

MEAN VALUE AND RANKING FOR
PERIOD INCLUDED IN HIGH-VALUE ANALYSIS
(OCT-SEP)
WATER YEAR
RANGE

DVSTXT - DAILY VALUES STATISTICAL PROGRAM

STATION ID - 16520000
 EAST WAILIUNUI STREAM NEAR KEANAE, MAUI, HI
 PARAMETER CODE - 00060 DISCHARGE
 STATISTIC CODE - 00003 MEAN

DURATION TABLE OF DAILY VALUES

CLASS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35		
WATER YEAR					15	17	10	14	25	27	27	35	23	26	25	18	15	15	9	17	10	14	8	6	5	3	1										
1954 1954					5	8	10	25	24	35	35	34	35	19	40	15	23	11	11	18	9	12	11	5	4	1	7	1	2								
1955 1955																																					
1956 1956						6	11	9	40	24	25	42	26	27	24	19	20	10	14	12	10	19	9	6	2	1	4	1	2							1	
1957 1957						11	9	9	38	58	40	38	23	22	14	24	13	9	8	13	4	9	3	3	6	5	2	3									
CLASS	0.00	0.31	0.38	0.47	0.58	0.72	0.88	1.10	1.30	1.60	2.00	2.50	3.10	3.80	4.70	5.80	7.20	8.80	11.00	13.00	17.00	20.00	25.00	31.00	38.00	47.00	58.00	71.00	88.00	109.00	134.00	165.00	203.00	251.00	309.00		
TOTAL	0	6	43	9	122	241	297	646	867	931	1162	1467	13	14	15	17	20	454	492	572	295	345	284	208	25	26	27	28	29	30	31	32	33	34	35		
ACCUM	13880	13880	13874	13831	13822	13700	13459	13162	12516	11649	10718	9556	8089	6892	5717	4691	3835	3214	2760	2268	1696	1401	1056	772	564	372	265	164	102	60	37	20	10	8	2		
PERCT	100.00	100.00	99.96	99.65	99.58	98.70	96.97	94.83	90.17	83.93	77.22	68.85	58.28	49.65	41.19	33.80	27.63	23.16	19.88	16.34	12.22	10.09	7.61	5.56	4.06	2.68	1.91	1.18	0.73	0.43	0.27	0.14	0.07	0.06	0.01		
CLASS		13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35													
VALUE		3.10	3.80	4.70	5.80	7.20	8.80	11.00	13.00	17.00	20.00	25.00	31.00	38.00	47.00	58.00	71.00	88.00	109.00	134.00	165.00	203.00	251.00	309.00													
TOTAL	1197	1175	1026	856	621	454	492	572	295	345	284	208	192	107	101	62	42	23	17	10	2	6	2	2	192	192	107	101	62	42	23	17	10	2	6	2	
ACCUM	8089	6892	5717	4691	3835	3214	2760	2268	1696	1401	1056	772	564	372	265	164	102	60	37	20	10	8	2	2	564	372	265	164	102	60	37	20	10	8	2	2	
PERCT	58.28	49.65	41.19	33.80	27.63	23.16	19.88	16.34	12.22	10.09	7.61	5.56	4.06	2.68	1.91	1.18	0.73	0.43	0.27	0.14	0.07	0.06	0.01		4.06	2.68	1.91	1.18	0.73	0.43	0.27	0.14	0.07	0.06	0.01		

DURATION CURVE STATISTICAL CHARACTERISTICS FOR ...
 STATION ID: 16520000 EAST WAIUANANI STREAM NEAR KEANAE, MAUI, HI
 PARAMETER CODE = 00060
 STATISTIC CODE = 00003 MEAN

DURATION DATA VALUES ARE INTERPOLATED FROM DURATION TABLE:
 DATA ARE NOT ANALYTICALLY FITTED TO A PARTICULAR STATISTICAL DISTRIBUTION,
 AND THE USER IS RESPONSIBLE FOR ASSESSMENT AND INTERPRETATION.

ADDITIONAL CONDITIONS FOR THIS RUN ARE:
 STATISTICS ARE BASED ON LOGARITHMS (BASE 10).
 NUMBER OF VALUES IS REDUCED FOR EACH NEAR-ZERO OR ZERO VALUE.

NUMBER OF VALUES = 19 (NUMBER OF NEAR-ZERO VALUES = 0)
 LISTING OF DATA FOLLOWS:

PERCENT OF TIME VALUE EQUALED OR EXCEEDED	DATA VALUE	(LOG =
95.0	1.08	0.03432)
90.0	1.31	(LOG = 0.11671)
85.0	1.55	(LOG = 0.18990)
80.0	1.83	(LOG = 0.26344)
75.0	2.13	(LOG = 0.32890)
70.0	2.43	(LOG = 0.38581)
65.0	2.72	(LOG = 0.43431)
60.0	3.00	(LOG = 0.47745)
55.0	3.37	(LOG = 0.52712)
50.0	3.77	(LOG = 0.57656)
45.0	4.29	(LOG = 0.62394)
40.0	4.88	(LOG = 0.68814)
35.0	5.62	(LOG = 0.74981)
30.0	6.66	(LOG = 0.82360)
25.0	8.14	(LOG = 0.91065)
20.0	10.9	(LOG = 1.03832)
15.0	14.3	(LOG = 1.15536)
10.0	20.2	(LOG = 1.30510)
5.0	33.6	(LOG = 1.52666)

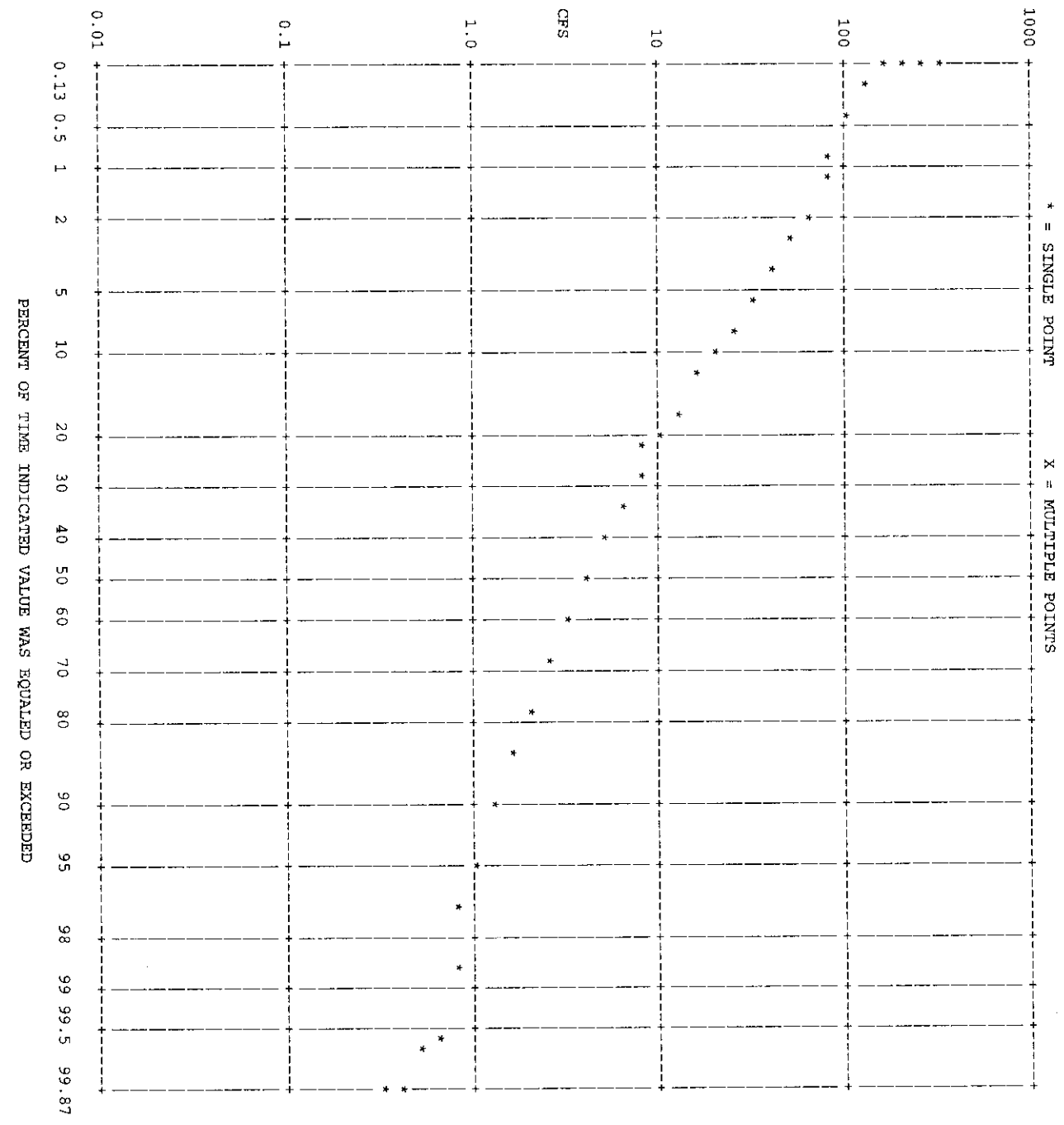
MEAN OF LOGS = 0.64027

STANDARD DEVIATION OF LOGS = 0.40867 (VARIABILITY INDEX - SEE USGS MSP 1542-A)

COEFFICIENT OF VARIATION = 0.63827

COEFFICIENT OF SKEW = 0.58687

LOG-NORMAL DURATION PLOT FOR PERIOD OCT TO SEP (YEARS 1914 - 1958)
 STATION ID: 16520000 EAST WAILUANI STREAM NEAR KEANAE, MAUI, HI
 PARAMETER CODE - 00060 DISCHARGE
 STATISTIC CODE - 00003 MEAN



DVSTAT - DAILY VALUES STATISTICAL PROGRAM

STATION ID - 16520000
 EAST MAUIUANUI STREAM NEAR KEANAE, MAUI, HI
 PARAMETER CODE - 00060 DISCHARGE
 STATISTIC CODE - 00003 MEAN

LOWEST MEAN VALUE AND RANKING FOR THE FOLLOWING NUMBER OF CONSECUTIVE DAYS
 FOR PERIOD OCT TO SEP

WATER YEAR RANGE	1	3	7	14	30	60	90	120	183
1915 1915	.39	.44	.49	.75	2.03	3.61	4.99	5.11	5.88
1916 1916	1.50	1.50	2.36	2.58	4.40	7.66	7.08	9.69	12.5
1917 1917	.46	.46	.46	.50	.78	1.31	1.62	2.06	3.27
1923 1923	1.20	1.27	1.40	1.50	2.04	4.32	5.37	5.23	6.15
1924 1924	.77	.77	.84	.94	1.34	1.93	4.03	3.60	5.58
1925 1925	1.10	1.17	1.19	1.36	1.95	3.21	4.12	5.62	7.75
1926 1926	.31	.36	.44	.52	.59	1.28	1.63	2.30	2.57
1927 1927	.62	.62	.78	.90	1.31	3.50	3.95	6.32	6.67
1928 1928	.31	.41	.51	.68	1.03	2.74	4.92	5.95	6.80
1929 1929	.62	.67	.82	.97	1.56	2.13	2.83	3.50	4.49
1930 1930	.46	.51	.55	.65	.96	6.11	8.25	9.72	11.8
1931 1931	.93	1.04	1.13	1.18	1.76	3.04	3.19	3.63	6.00
1932 1932	1.70	1.70	1.99	2.17	3.62	4.42	7.12	6.64	9.34
1933 1933	.93	.93	.98	1.02	1.17	2.01	2.63	2.84	3.13
1934 1934	.77	.77	.84	.85	.98	2.66	3.94	3.81	4.45
1935 1935	.90	.93	1.03	1.22	1.76	4.92	5.39	5.45	7.16
1936 1936	.79	.86	.96	1.00	1.27	2.25	2.43	3.70	5.06
1937 1937	1.50	1.63	1.79	2.10	4.59	5.85	10.6	10.2	11.4
1938 1938	1.50	1.50	1.67	2.13	3.63	5.38	5.52	6.61	9.91
1939 1939	1.80	1.80	2.16	2.59	4.97	6.31	7.24	8.13	9.53
1940 1940	.77	.82	.84	.88	1.23	2.44	3.50	3.76	4.67
1941 1941	.69	.74	.79	.90	1.38	2.30	5.78	5.84	7.24
1942 1942	.91	.94	1.03	1.26	1.50	2.83	4.67	5.62	7.66
1943 1943	.73	.79	.86	.94	1.30	2.54	5.27	5.21	6.55
1944 1944	.46	.50	.58	.68	.76	1.65	2.94	3.51	3.60
1945 1945	.46	.46	.46	.50	.66	1.23	2.38	2.86	4.40
1946 1946	.65	.65	.72	.81	.99	1.91	4.66	4.87	6.53
1947 1947	.65	.68	.75	.86	1.30	4.54	5.48	5.92	7.02
1948 1948	1.40	1.43	1.57	1.93	2.56	5.51	6.81	6.40	9.56
1949 1949	.63	.63	.63	.63	1.68	2.85	3.62	4.48	4.84
1950 1950	.91	.97	1.07	1.24	1.91	4.26	5.64	5.44	7.39
1951 1951	.82	.91	.98	1.12	1.77	1.90	2.53	2.97	4.14
1952 1952	.69	.71	.93	.97	2.43	4.20	5.47	6.76	6.93
1953 1953	.57	.61	.63	.63	.70	1.32	3.36	3.45	4.11
1954 1954	.63	.63	.70	.73	1.05	1.93	3.08	3.72	4.60
1955 1955	.85	.85	.88	.99	1.71	2.42	6.10	5.65	7.06

DVSTAT - DAILY VALUES STATISTICAL PROGRAM

STATION ID - 16520000
 EAST WAIIUANUI STREAM NEAR KEANAE, MAUI, HI
 PARAMETER CODE - 00060 DISCHARGE
 STATISTIC CODE - 00003 MEAN

HIGHEST MEAN VALUE AND RANKING FOR THE FOLLOWING NUMBER OF CONSECUTIVE DAYS
 FOR PERIOD OCT TO SEP

WATER YEAR RANGE	1	3	7	15	30	60	90	120	183
1915 1915	186 10	106 15	56.8 18	37.5 17	23.9 20	16.6 20	14.3 20	11.5 26	9.93 27
1916 1916	260 6	131 7	92.7 4	54.0 6	32.4 7	22.9 8	18.6 9	16.9 9	14.6 8
1917 1917	93.0 31	65.7 25	45.7 24	34.9 20	25.0 17	17.1 19	13.5 23	11.0 28	8.80 34
1923 1923	156 19	113 13	91.6 5	56.7 5	30.8 12	19.0 16	15.2 15	13.6 18	11.4 17
1924 1924	183 12	107 14	66.3 13	40.9 16	24.6 18	19.4 14	15.0 17	14.5 15	11.4 18
1925 1925	326 1	153 4	67.6 12	36.4 18	23.3 22	14.9 27	12.8 27	11.4 27	11.1 20
1926 1926	62.0 37	31.7 38	17.4 38	14.3 37	10.3 38	6.68 38	5.53 38	5.28 38	4.09 38
1927 1927	292 3	118 10	59.2 17	34.6 21	20.2 24	13.7 29	11.8 29	12.1 21	9.92 28
1928 1928	124 23	85.5 20	41.3 26	25.2 29	20.6 23	16.3 22	13.9 21	10.8 29	10.7 22
1929 1929	159 16	98.3 17	65.4 14	41.4 14	33.8 5	21.5 11	17.8 12	15.4 11	12.8 12
1930 1930	186 11	122 9	71.9 10	46.2 9	29.6 14	27.2 3	22.4 4	22.2 1	18.7 1
1931 1931	183 13	104 16	53.2 21	31.1 24	19.2 29	13.4 31	12.6 28	10.5 32	10.6 23
1932 1932	175 15	117 11	80.7 8	66.1 2	43.7 2	28.0 2	22.6 3	21.1 2	17.3 4
1933 1933	263 5	263 1	132 1	63.9 4	35.5 4	21.5 12	18.3 11	15.3 12	11.4 19
1934 1934	280 4	116 12	63.8 15	43.3 12	33.0 6	24.3 4	20.2 7	17.4 8	13.6 9
1935 1935	179 14	177 2	92.9 3	47.0 8	29.1 15	21.2 13	16.5 14	14.0 16	12.8 13
1936 1936	127 22	57.7 30	31.1 29	21.6 33	16.7 32	15.2 26	13.6 22	11.7 24	11.0 21
1937 1937	104 27	86.3 19	55.6 20	42.9 13	32.4 8	24.1 5	23.7 2	20.2 4	18.2 2
1938 1938	189 9	128 8	88.1 6	47.3 7	32.2 10	22.9 9	20.5 6	17.7 7	15.7 6
1939 1939	158 17	78.0 23	56.5 19	33.0 22	19.8 25	18.0 17	14.9 18	14.7 14	12.8 14
1940 1940	114 24	67.3 24	43.3 25	29.9 25	24.3 19	16.4 21	13.1 25	10.6 30	9.34 31
1941 1941	110 26	64.7 26	40.5 27	23.8 31	16.4 34	13.4 32	12.9 26	12.3 20	11.6 16
1942 1942	209 8	169 3	128 2	83.4 1	52.3 1	33.4 1	26.4 1	20.6 3	17.7 3
1943 1943	93.0 32	45.3 35	29.8 33	25.7 26	17.5 31	13.9 28	11.3 33	10.5 33	9.51 30
1944 1944	63.0 36	37.0 37	22.7 37	13.0 38	10.5 37	9.15 37	7.82 37	7.56 36	6.54 37
1945 1945	68.0 35	38.7 36	25.7 36	21.1 35	14.5 36	10.4 36	8.39 36	6.73 37	7.48 36
1946 1946	101 28	45.7 34	30.3 31	23.1 32	19.4 28	15.8 24	13.3 24	12.8 19	10.1 26
1947 1947	155 20	97.0 18	77.7 9	43.6 11	30.8 13	19.2 15	15.1 16	13.8 17	12.0 15
1948 1948	309 2	144 6	68.0 11	41.2 15	32.4 9	22.5 10	20.8 5	19.1 5	16.5 5
1949 1949	155 21	85.0 21	50.1 23	35.8 19	27.2 16	17.9 18	14.7 19	12.0 22	10.2 25
1950 1950	158 18	82.7 22	62.9 16	44.8 10	31.1 11	23.2 7	18.4 10	16.0 10	12.9 11
1951 1951	93.0 33	64.0 27	30.0 32	25.3 28	16.6 33	13.0 33	11.7 31	11.7 25	9.00 32
1952 1952	99.0 29	50.1 31	26.0 35	20.6 36	15.5 35	11.0 35	10.3 34	10.6 31	9.63 29
1953 1953	91.0 34	49.3 32	28.4 34	24.0 30	19.8 26	15.4 25	11.7 32	12.0 35	7.90 35
1954 1954	60.0 38	48.3 33	30.4 30	21.4 34	17.9 30	12.7 34	11.8 30	12.0 23	10.4 24
1955 1955	97.0 30	62.0 28	52.0 22	32.6 23	23.6 21	16.2 23	16.8 13	15.3 13	13.4 10

DVSTPT - DAILY VALUES STATISTICAL PROGRAM

STATION ID - 16520000
 EAST MAUI WAIUANUI STREAM NEAR KEANAE, MAUI, HI
 PARAMETER CODE - 00060 DISCHARGE
 STATISTIC CODE - 00003 MEAN

HIGHEST MEAN VALUE AND RANKING FOR THE FOLLOWING NUMBER OF CONSECUTIVE DAYS
 FOR PERIOD OCT TO SEP

WATER YEAR	1	3	7	15	30	60	90	120	183
RANGE	232	152	86.6	65.1	37.4	23.4	19.9	17.9	15.0
1956 1956	7	5	7	3	3	6	8	6	7
1957 1957	111	59.7	40.1	25.7	19.7	13.7	10.3	9.09	8.83
	25	29	28	27	27	30	35	34	33

DVSTAT - DAILY VALUES STATISTICAL PROGRAM

STATION ID - 16520000
 EAST MAIUNANI STREAM NEAR KEANAE, MAUI, HI
 PARAMETER CODE - 00060 DISCHARGE
 STATISTIC CODE - 00003 MEAN

ANNUAL AND/OR SEMI-ANNUAL VALUES

MEAN VALUE AND RANKING FOR PERIOD INCLUDED IN LOW-VALUE ANALYSIS (OCT-SEP)			MEAN VALUE AND RANKING FOR PERIOD INCLUDED IN HIGH-VALUE ANALYSIS (OCT-SEP)		
WATER YEAR RANGE			WATER YEAR RANGE		
1915 1915	8.21	18	1915 1915	8.21	21
1916 1916	13.2	36	1916 1916	13.2	3
1917 1917	5.85	4	1917 1917	5.85	35
1923 1923	8.75	22	1923 1923	8.75	17
1924 1924	8.70	21	1924 1924	8.70	18
1925 1925	9.28	29	1925 1925	9.28	10
1926 1926	3.99	1	1926 1926	3.99	38
1927 1927	7.72	15	1927 1927	7.72	24
1928 1928	8.47	19	1928 1928	8.47	20
1929 1929	8.16	17	1929 1929	8.16	22
1930 1930	13.4	38	1930 1930	13.4	1
1931 1931	8.51	20	1931 1931	8.51	19
1932 1932	12.2	34	1932 1932	12.2	5
1933 1933	6.88	7	1933 1933	6.88	32
1934 1934	8.97	25	1934 1934	8.97	14
1935 1935	9.14	28	1935 1935	9.14	11
1936 1936	7.81	16	1936 1936	7.81	23
1937 1937	13.3	37	1937 1937	13.3	2
1938 1938	11.0	32	1938 1938	11.0	7
1939 1939	10.0	31	1939 1939	10.0	8
1940 1940	7.55	13	1940 1940	7.55	26
1941 1941	8.98	26	1941 1941	8.98	13
1942 1942	12.7	35	1942 1942	12.7	4
1943 1943	7.30	10	1943 1943	7.30	29
1944 1944	4.95	2	1944 1944	4.95	37
1945 1945	5.77	3	1945 1945	5.77	36
1946 1946	7.22	8	1946 1946	7.22	31
1947 1947	9.05	27	1947 1947	9.05	12
1948 1948	11.7	33	1948 1948	11.7	6
1949 1949	7.35	12	1949 1949	7.35	27
1950 1950	8.92	23	1950 1950	8.92	16
1951 1951	6.50	6	1951 1951	6.50	33
1952 1952	7.58	14	1952 1952	7.58	25
1953 1953	6.02	5	1953 1953	6.02	34
1954 1954	7.31	11	1954 1954	7.31	28
1955 1955	8.93	24	1955 1955	8.93	15
1956 1956	9.80	30	1956 1956	9.80	9
1957 1957	7.29	9	1957 1957	7.29	30

DV/STAT - DAILY VALUES STATISTICAL PROGRAM

STATION ID - 16520000
EAST WAIIUANUI STREAM NEAR KEANAE, MAUI, HI
PARAMETER CODE - 00060 DISCHARGE
STATISTIC CODE - 00003 MEAN

ANNUAL AND/OR SEMI-ANNUAL VALUES

MEAN VALUE AND RANKING FOR
PERIOD INCLUDED IN LOW-VALUE ANALYSIS
(OCT-SEP)
WATER YEAR
RANGE

MEAN VALUE AND RANKING FOR
PERIOD INCLUDED IN HIGH-VALUE ANALYSIS
(OCT-SEP)
WATER YEAR
RANGE