

MEMORANDUM

Date: August 23, 2017
To: Shelley Keen
From: Michele Edl
Re: reconsideration of volume for License No. 37-22815

A timely petition for reconsideration of License No. 37-22815 has prompted a fresh look at the volume recommendations.

In the petition, the petitioner Christian Petrich of SPF Water Engineering, proposed that: "the Department make one or more of the following changes to License 37-22815:

1. Establish one volume limit for heating *and* cooling uses, and adding to the volume a 50% margin-of-safety premium. This would result in an annual volume limit of 329 AF (210 AF + 9.2 AF = 219.2 AF + 50% = 329 AF).
2. Add a condition stating that the annual volume limit may be exceeded in a particularly cold or hot year.
3. Remove the volume limit entirely, recognizing that (the) use is entirely non-consumptive."

Only part of item 1 can be considered. Proposals 2 and 3 are in opposition to Idaho Code or Administrative Rules.

In my first recommendation of volumes for License No. 37-22815, I had considered the heating use separate from the cooling use and based the heating volume and the cooling volume on different extreme years. This approach to volume recommendations was not correct based on the IDAPA 37.03.02 Beneficial Use Examination Rules

035 j. states in part:

Annual diversion volumes for heating and cooling uses may be adjusted to account for documented weather conditions during any single heating or cooling season from among the fifty (50) years immediately prior to submitting proof of beneficial use for the permit.

The volumes for each use and the total volume have been recalculated to be based on the same year within the 50 years prior to proof (or since 1963). A heating and cooling system for this area would be designed to meet the demand for the dominant season which would be the heating season. The year with the maximum HDD was 1964. 9153 total HDDs were calculated from the 1964 temperatures. See the WRCC's HDD data for station 103942 Hailey 3 NNW.

During 1964, less cooling was needed than an average year. 196 total CDDs were calculated from the 1964 temperatures. See the WRCC's CDD data for station 103942 Hailey 3 NNW.

I used the same methodology to calculate the volume as before. The revised spreadsheet is attached. 223.5 AF of water would be needed to meet the heating requirements of this building in year like 1964. The CDD for the same year was used for the cooling use. 2.8 AF of water would be needed to meet the cooling requirements of this building in a year like 1964.

The revised volume recommendations for License No. 37-22815 are:

Heating use volume = 226.0 AF
Cooling use volume = 226.0 AF
Total volume = 226.0 AF

WR #37-22815		Hemingway Elementary School		Revised calculation by Michele Edl on 8/23/2017	
Heating volume calculations					
		totalizer data	date		comment
		82007000	12/31/2014		other heat sources (kids, lights, computers..) mostly absent
		81513600	12/30/2014		
	A	493400	gallons/ that day		
	B	62	HDD/that day		Hailey Airport station calculations by Wunderground
	A/B	7958.064516	gal / HDD that day		unitized as representative of the bldg
		gal/AF	325851.4319		conversion factor
	D	8131	long-term avg HDD		Hailey station calculations by WRCC
	A/B x D	64707022.58	gal / avg yr		
		198.578	convert gal to af		
		198.6	AF for heating avg yr		
	A/B	7958.064516	gal / HDD		
		gal/AF	325851.4319		conversion factor
	E	9153	highest HDD	1964	Hailey station calculations by WRCC
	A/B x E	72840164.52	gal / yr		
		223.538	convert gal to af		
		223.54	AF heating highest HDD		highest year within the last 50 years
Cooling volume calculations					
		totalizer data	date		comment
		167788700	8/31/2016	Wed	school in session so other heat sources in the bldg
		167746000	8/30/2016	Tue	
	A	42700	gallons / that day		
	B	8	CDD that day		Hailey Airport station calculations by Wunderground
		0	HDD that day		
	A/B	5337.5	gal / CDD		unitized as representative of the bldg
		gal/AF	325851.4319		conversion factor
	F	232	long-term avg CDD		
	A/B x F	1238300	gal / avg yr		
		3.800	AF for cooling avg CDD yr		
	A/B	5337.5	gal/CDD		
		gal/AF	325851.4319		conversion factor
	G	169		1964	Hailey station calculations by WRCC
	A/B x G	902037.5	gal / yr		
		2.77	AF for cooling during 1964		
reality check of system					
		126317200	12/15/2015		
		180199700	12/15/2016		
		53882500	gal per yr		
		165.3591015	afa '2016'		
		17396000	12/18/2013		
		77709800	12/18/2014		
		60313800	gal per yr		
		185.0960103	afa '2014'		
360 gpm run continuously yields 580.68 afa					

HAILEY 3 NNW, IDAHO

Monthly Total Heating Degree Days

(103942)

Base Temperature = 65 F

File last updated on Apr 4, 2013

*** Note *** Provisional Data *** After Year/Month 198810

a = 1 day missing, b = 2 days missing, c = 3 days, ..etc.,

z = 26 or more days missing, A = Accumulations present

Long-term means based on columns; thus, the monthly row may not sum (or average) to the long-term annual value.

Months with 5 missing days or less use mean for missing day(s)

Individual Months not used for annual or monthly statistics if more than 5 days are missing.

Individual Years not used for annual statistics if any month in that year has more than 5 days missing.

YEAR (S)	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN
1893	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00
1894	0.00z	0.00z	0.00z	689.50	383.50	325.00	20.00	21.00	351.00	567.50	702.50	1389.50	4449.50
1895	1433.50	1101.50	1070.00	590.00	310.50g	97.00n	48.88e	26.00	352.00	348.00	0.00z	0.00z	4969.88
1896	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00
1897	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00
1898	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00
1899	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00
1900	0.00z	0.00z	239.50v	512.50	220.50	26.00	17.50	57.00	253.50	568.00	0.00z	0.00z	1655.00
1901	820.00m	1182.50	1085.50	759.00	264.00	315.50	27.50	11.00	355.00	426.00	784.50	1277.00	6487.50
1902	1325.00	988.50	1199.00	694.00	392.50	153.50	92.00	70.00	246.00	0.00z	0.00z	1342.50	6503.00
1903	0.00z	0.00z	1156.00	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	1156.00
1904	0.00z	0.00z	0.00z	753.50	0.00z	0.00z	97.00	25.50	150.50	0.00z	0.00z	0.00z	1026.50
1905	0.00z	0.00z	0.00z	0.00z	0.00z	273.50	0.00z	17.00	213.50	724.50	823.50	1323.50	3375.50
1906	1213.50	0.00z	1092.00	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	2305.50
1907	0.00z	0.00z	0.00z	0.00z	416.50	305.00	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	721.50
1908	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	338.50w	0.00
1909	1212.10a	1149.50	1042.00	791.00	499.50	150.50	59.00	7.00	305.00	579.59c	934.50	1575.50	8305.19
1910	1506.50	1286.50	809.00	460.00	321.00	116.50	15.00	66.65a	206.00	522.87a	910.50	1297.19b	7517.71
1911	1356.00	1333.50	1074.50	756.00	479.50	152.00	40.00	58.50	324.00	665.00	1098.50	1399.98c	8737.48
1912	1367.50	1106.64d	1095.00	712.50	434.50	104.00g	78.53a	101.35e	423.50	728.50a	938.00	1343.50	8329.52
1913	1550.50	1333.50	1128.50	667.50	345.50	204.00	92.00	16.00	246.50	689.23a	886.00	1337.50	8496.73
1914	1289.50	1178.00	1028.00	594.50	322.92a	278.50	25.00	44.00	341.50	548.00	853.50	1476.50	7979.92
1915	1405.50	1015.00	861.50	449.00	512.50	293.50	90.00	3.21b	304.00	508.00	1024.00	1307.50	7773.71
1916	1533.50	1104.00	956.00	608.00	558.00	276.50	43.50	64.58a	231.50	667.00	1084.50	1552.50	8679.58
1917	1625.00	1263.00	1385.00	895.50	519.00	267.00	10.50	15.00	149.50	499.00	741.50	1004.50	8374.50
1918	1197.00	1147.50	946.50	711.00	489.00	68.00	31.50	121.00	174.00	528.00	1012.50	1301.00	7727.00
1919	1322.00	1216.00	1111.50	620.00	350.50	151.00	4.50	16.50	144.00	756.50	999.83a	1389.00	8081.33
1920	1313.50	1091.50	1083.00	806.50	487.50	241.00	8.00	97.50	278.50	728.50	994.00	1365.00	8494.50
1921	1360.00	1191.50	990.50	787.00	446.00	163.50	46.00	47.00	442.50	492.00	893.50	1239.00	8098.50
1922	1654.00	1289.00	1219.50	870.50	445.50	93.50	28.00	17.00	146.50	518.00	986.50	1414.00	8682.00
1923	1370.50	1299.50	1173.00	694.50	438.50	314.50	13.00	36.50	189.00	671.00	829.00	1401.50	8430.50
1924	1447.00	957.00	1061.00	638.50	264.50	178.85d	29.00	57.50	254.50	625.50	1033.00	1494.50	8040.85
1925	1384.00	1059.50	988.50	613.50	328.50	269.50	3.00	94.00	288.00	642.00	981.00	1145.50	7797.00
1926	1387.50	1043.50	892.50	496.50	400.00	133.00	20.00	49.50	440.00	550.50	904.00	1411.50	7728.50
1927	1308.50	1147.50	1115.00	772.50	552.50	198.50	36.00	112.50	350.50	586.50	878.50	1493.00	8551.50
1928	1309.00	1219.50	931.00	791.00	295.00	321.50	69.50	122.00	237.50	621.00	981.50	1453.50	8352.00

1929	1678.00	1404.50	1037.50	800.00	448.00	231.00	21.00	1.00	367.00	533.50	1009.50	1087.00	8618.00
1930	1607.50	971.00	947.50	502.00	475.00	225.00	7.48b	17.50	252.00	649.00	1094.50	1465.00	8213.48
1931	1365.00	1099.00	1017.00	638.50	358.00	105.50	21.00	19.50	269.00	559.50	1157.50	1424.00	8033.50
1932	1639.50	1299.50	1101.50	704.00	430.38a	237.00	60.50	96.50	214.00	669.00	871.00	1501.00	8823.88
1933	1470.50	1508.00	1087.50	737.00	569.50	96.50	8.50	73.50	301.50	446.50	808.50	1131.00	8238.50
1934	1238.00	865.00	684.00	402.00	238.00	177.00	7.50	1.50	302.50	479.50	802.00	1269.50	6466.50
1935	1354.50	1113.50	1072.00	702.50	494.00	186.50	36.00	50.50	166.00	616.50	1223.00	1371.50	8386.50
1936	1516.50	1324.50	1175.00	619.00	274.50	146.50	5.50	33.00	253.50	498.50	947.00	1259.50	8053.00
1937	1827.50	1247.00	1010.50	746.00	306.00	223.50	10.00	51.50	151.50	467.50	894.50	1227.50	8163.00
1938	1334.00	1136.00	1071.50	674.50	454.50	141.00	65.00	60.00	107.14b	548.00	1139.50	1273.00	8004.14
1939	1386.50	1344.00	1011.00	529.50	265.50	218.28a	20.50	18.50	177.00	573.00	791.00	1051.00	7385.78
1940	1299.50	1070.50	915.00	615.50	269.50	113.00	13.00	13.50	270.00	517.50	1111.00	1177.50	7385.50
1941	1310.00	1004.50	884.50	635.50	352.50	212.50	8.50	81.00	397.24a	601.50	832.50	1185.50	7505.74
1942	1443.00	1276.00	1153.50	561.50	520.00	278.50	9.00	54.00	186.00	494.00	778.50f	1292.59c	7268.09
1943	1419.36c	1115.13e	1174.56d	489.00e	466.19e	281.25b	56.32a	50.00	106.50	528.00	829.50	1123.00	7638.80
1944	1387.50	1115.00	1151.00	691.00	386.50	317.50	59.50	71.00	227.00	385.00	1034.50	1316.50	8142.00
1945	1271.50	1075.50	1064.50	744.50	417.00	297.50	18.50	22.50	350.00	444.00	1068.10a	1420.50	8194.10
1946	1463.50	1214.50	978.00	539.50	383.00	180.00	12.50	31.50	268.00	773.00	1007.59a	1165.00	8016.09
1947	1494.00	975.50	853.00	604.00	244.00	257.50	5.00	51.50	217.50	550.50	1168.50	1258.00	7679.00
1948	1330.00	1175.50	1107.50	700.50	429.00	124.00	34.00	47.00	231.00	523.00	1111.50	1523.50	8336.50
1949	1820.00	1265.00	965.50	516.00	299.50	179.50	28.50	15.00	150.00	709.50	711.00	1335.07a	7994.57
1950	1535.00	1152.50	1106.00	709.00	464.00	197.00	30.50	37.00	284.00	486.50	882.50	1155.55b	8039.55
1951	1442.50	1100.00	1185.00	586.00	384.40a	283.00	37.50	83.50	219.00	669.00	1061.50	1553.00	8604.40
1952	1530.50	1340.50	1191.50	647.00	345.00	172.00	57.50	33.00	114.00	361.00	1103.50	1339.00	8234.50
1953	1096.50	1099.00	984.00	703.50	0.00z	283.00	13.50	44.50	153.50	456.50	810.50	1301.50	6946.00
1954	1267.38a	1046.50	1106.00	633.00	345.00	339.50	45.50	137.50	326.50	692.00	813.00	1381.00	8132.88
1955	1675.50	0.00z	1331.50	882.00	513.00	217.00	125.00	11.50	346.00	638.50	1180.50	1309.50	8230.00
1956	1353.67a	1445.00	1108.50	665.50	0.00z	241.50	47.00	104.00	247.00	665.98a	1057.00	1317.00	8252.15
1957	1597.50	1068.50	1011.50	721.50	431.50	219.50	51.00	45.47a	208.50	610.50	1131.00	1229.50	8325.97
1958	1391.50	993.50	1119.00	831.50	257.00	205.00	63.50	13.00	290.50	491.00	985.00	1071.50	7712.00
1959	1313.00	1171.85a	1089.50	636.00	578.67a	148.50	54.50	86.50	384.00	629.50	1003.50	1263.50	8359.02
1960	1533.00	1315.00	1065.00	673.50	504.50	134.50	15.50	139.00	191.00	639.00	987.00	1082.50f	7197.00
1961	1294.00	1050.00	1098.00	743.50	481.00	87.32b	3.50	6.00	381.11c	657.50	1001.00	1415.00	8217.93
1962	1270.50f	1152.00	1140.00	586.50	518.50	247.50	78.53a	110.50	189.31a	502.00	870.00	1210.00	6604.84
1963	1569.50	873.50	980.00	778.50	397.46c	315.00	46.00	45.98a	168.89c	465.00	1006.50	1438.50	8084.84
1964	1539.50	1433.00	1314.00	783.50	487.50	300.50	21.50	110.50	312.00	477.50	1040.50	1333.52a	9153.52
1965	1318.50	1164.50	1155.00	666.50	553.50	241.00	59.00	136.00	432.32b	431.00	790.56c	1269.00	8216.88
1966	1407.50	1210.50	1018.00	643.00	289.50	200.00	22.73a	53.00	135.50	611.50	883.50	1398.10a	7872.83
1967	1288.50	1129.50	1034.00	844.00	422.50	272.00	5.00	7.00	144.00	444.50f	721.50f	1457.50	6604.00
1968	1409.50	947.00	0.00z	725.50	490.50	225.56c	25.50	179.05b	208.00f	607.00	363.50t	1391.00	6000.61
1969	1326.50	716.50k	1158.62c	659.48a	295.50	244.50	69.23a	26.35a	185.00	739.50	906.96b	1236.50	6848.16
1970	1277.50	990.00	1025.50	852.00	426.00	170.00c	29.45a	2.50	307.50h	709.00	918.00	1409.50	7809.45
1971	1317.50	1194.00	1160.50	743.00	401.50	246.00	50.50	9.00	377.50	655.00	1045.50	1488.53b	8688.53
1972	1445.50	1173.50	832.87a	713.00	410.75a	137.00	58.79b	11.37a	386.38a	0.00z	0.00z	1435.96c	6605.12
1973	1457.00	1170.00	1079.50	788.00	383.00	219.81d	0.00z	46.50a	0.00z	0.00z	344.50s	1238.21e	6382.02
1974	1457.53b	1220.00	1000.50	665.00	477.06d	110.56c	41.85a	75.95a	165.56c	442.00f	282.50u	1293.73a	6507.74
1975	1543.50	1190.00a	1111.50	930.00c	518.98b	249.23d	19.00	132.50	217.00	392.50k	397.00t	776.00j	5911.71
1976	1290.38c	1146.02a	825.00h	534.50h	260.50h	236.11c	31.00	169.98a	221.50	288.00p	0.00z	426.50t	3094.99
1977	658.00r	549.00n	561.00o	514.14a	630.13e	78.00e	64.14b	90.79c	318.33c	264.50n	0.00z	850.50j	1695.53
1978	744.50m	671.00l	629.00j	397.50n	264.00p	129.00h	48.00	81.00k	349.82b	491.50	1000.00	1501.50	3390.82
1979	1629.64b	1135.00	983.00	676.00	378.50	189.00	24.00	57.50	121.00	483.50	1067.50	1203.00	7947.64
1980	1427.50	999.00	1051.00	586.50	0.00z	0.00z	0.00z	88.00	235.50	558.00	944.50	1174.00	7064.00
1981	1108.50	1080.00	870.50	623.50	482.50	247.50	22.39d	14.50	215.00	690.00	869.50	1210.50	7434.39
1982	1473.00	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	1473.00
1983	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00
1984	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	185.50i	723.16b	0.00z	0.00z	723.16

1985	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00
1986	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	458.00	595.00	1023.50	3348.50
1987	1499.50	1035.50	932.50	489.00	375.00	166.50	132.00	0.00z	0.00z	0.00z	934.50	1335.50	6900.00
1988	1438.00	1138.00	967.50	584.50	486.70a	0.00z	4.00q	46.00	326.00	400.93a	0.00z	0.00z	5387.63
1989	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00
1990	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00
1991	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00
1992	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00
1993	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00
1994	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00
1995	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00
1996	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00
1997	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00
1998	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00
1999	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00
2000	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00
2001	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00
2002	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00
2003	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00
2004	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00
2005	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00
2006	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00
2007	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00
2008	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00
2009	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00
2010	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00
2011	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00
2012	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	754.52c	881.00	1314.50	2950.02
2013	1554.65a	1134.50	960.50	16.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	3649.65

Period of Record Statistics

MEAN	1419.95	1154.68	1053.59	673.03	413.02	209.38	37.77	54.86	259.06	576.24	958.36	1322.88	8113.93
S.D.	143.48	130.43	117.94	111.33	94.38	71.89	28.29	42.30	90.35	102.62	119.71	125.54	449.32
SKEW	0.48	0.30	-0.14	-0.10	-0.14	-0.26	1.11	0.87	0.30	-0.06	-0.02	-0.22	-0.76
MAX	1827.50	1508.00	1385.00	930.00	630.13	339.50	132.00	179.05	458.00	773.00	1223.00	1575.50	9153.52
MIN	1096.50	865.00	684.00	402.00	220.50	26.00	3.00	1.00	106.50	348.00	702.50	1004.50	6466.50
NO YRS	77	75	77	79	75	77	78	80	79	75	70	76	54

HAILEY 3 NNW, IDAHO

Monthly Total Cooling Degree Days

(103942)

Base Temperature = 65 F

File last updated on Apr 4, 2013

*** Note *** Provisional Data *** After Year/Month 198810

a = 1 day missing, b = 2 days missing, c = 3 days, ..etc.,

z = 26 or more days missing, A = Accumulations present

Long-term means based on columns; thus, the monthly row may not sum (or average) to the long-term annual value.

Months with 5 missing days or less use mean for missing day(s)

Individual Months not used for annual or monthly statistics if more than 5 days are missing.

Individual Years not used for annual statistics if any month in that year has more than 5 days missing.

YEAR (S)	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN
1893	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00
1894	0.00z	0.00z	0.00z	0.00	0.00	0.00	91.50	184.50	0.00	0.00	0.00	0.00	276.00
1895	0.00	0.00	0.00	0.00	0.00g	16.50n	105.52e	154.50	0.50	0.00	0.00z	0.00z	260.52
1896	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00
1897	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00
1898	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00
1899	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00
1900	0.00z	0.00z	0.00v	0.00	4.00	161.50	210.50	55.50	6.50	0.00	0.00z	0.00z	438.00
1901	0.00m	0.00	0.00	0.00	0.00	1.50	178.00	145.50	0.00	0.00	0.00	0.00	325.00
1902	0.00	0.00	0.00	0.00	2.00	35.00	79.00	74.50	24.50	0.00z	0.00z	0.00	215.00
1903	0.00z	0.00z	0.00	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00
1904	0.00z	0.00z	0.00z	0.00	0.00z	0.00z	73.00	130.50	24.50	0.00z	0.00z	0.00z	228.00
1905	0.00z	0.00z	0.00z	0.00z	0.00z	0.00	0.00z	89.00	3.00	0.00	0.00	0.00	92.00
1906	0.00	0.00z	0.00	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00
1907	0.00z	0.00z	0.00z	0.00z	0.00	10.00	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	10.00
1908	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00w	0.00
1909	0.00a	0.00	0.00	0.00	0.00	18.50	90.50	119.50	0.00	0.00c	0.00	0.00	228.50
1910	0.00	0.00	0.00	0.00	4.50	26.50	201.00	69.23a	1.00	0.00a	0.00	0.00b	302.23
1911	0.00	0.00	0.00	0.00	0.00	25.50	117.50	38.50	7.00	0.00	0.00	0.00c	188.50
1912	0.00	0.00d	0.00	0.00	0.00	12.50g	73.37a	22.65e	0.00	0.00a	0.00	0.00	96.02
1913	0.00	0.00	0.00	0.00	0.00	0.00	66.50	111.50	2.00	0.00a	0.00	0.00	180.00
1914	0.00	0.00	0.00	0.00	1.55a	8.00	94.50	65.00	1.00	0.00	0.00	0.00	170.05
1915	0.00	0.00	0.00	0.00	0.00	7.00	48.50	166.76b	3.00	0.00	0.00	0.00	225.26
1916	0.00	0.00	0.00	0.00	0.00	15.00	92.50	72.33a	11.00	0.00	0.00	0.00	190.83
1917	0.00	0.00	0.00	0.00	0.00	1.00	170.00	70.50	3.50	0.00	0.00	0.00	245.00
1918	0.00	0.00	0.00	0.00	0.00	109.00	89.50	14.50	3.00	0.00	0.00	0.00	216.00

1919	0.00	0.00	0.00	0.00	18.00	60.50	149.00	158.00	22.00	0.00	0.00 a	0.00	407.50
1920	0.00	0.00	0.00	0.00	0.00	3.00	124.00	111.00	5.00	0.00	0.00	0.00	243.00
1921	0.00	0.00	0.00	0.00	0.00	16.00	110.00	27.00	0.00	0.00	0.00	0.00	153.00
1922	0.00	0.00	0.00	0.00	0.00	30.00	106.00	89.50	4.00	0.00	0.00	0.00	229.50
1923	0.00	0.00	0.00	0.00	0.00	4.50	118.50	43.50	13.50	0.00	0.00	0.00	180.00
1924	0.00	0.00	0.00	0.00	0.00	9.81 d	123.50	82.50	22.50	0.00	0.00	0.00	238.31
1925	0.00	0.00	0.00	0.00	0.00	46.50	155.00	44.00	1.00	0.00	0.00	0.00	246.50
1926	0.00	0.00	0.00	0.00	0.00	81.50	114.00	75.50	0.00	0.00	0.00	0.00	271.00
1927	0.00	0.00	0.00	0.00	2.00	9.00	74.00	24.50	0.00	0.00	0.00	0.00	109.50
1928	0.00	0.00	0.00	0.00	2.50	4.00	103.50	34.00	4.00	0.00	0.00	0.00	148.00
1929	0.00	0.00	0.00	0.00	0.00	17.50	131.00	139.00	5.00	0.00	0.00	0.00	292.50
1930	0.00	0.00	0.00	0.00	0.00	7.00	153.40 b	72.50	3.00	0.00	0.00	0.00	235.90
1931	0.00	0.00	0.00	0.00	0.50	25.00	211.00	111.00	25.00	0.00	0.00	0.00	372.50
1932	0.00	0.00	0.00	0.00	0.00 a	39.00	87.00	60.00	2.00	0.00	0.00	0.00	188.00
1933	0.00	0.00	0.00	0.00	0.00	38.50	186.00	102.50	2.00	0.00	0.00	0.00	329.00
1934	0.00	0.00	0.00	0.00	3.50	9.50	165.50	146.00	11.00	0.00	0.00	0.00	335.50
1935	0.00	0.00	0.00	0.00	0.00	6.00	120.50	85.00	4.50	0.00	0.00	0.00	216.00
1936	0.00	0.00	0.00	0.00	4.00	71.00	214.50	111.00	0.00	0.00	0.00	0.00	400.50
1937	0.00	0.00	0.00	0.00	0.00	28.50	155.00	90.00	35.00	0.00	0.00	0.00	308.50
1938	0.00	0.00	0.00	0.00	2.00	20.00	85.50	52.50	5.89 b	0.00	0.00	0.00	165.89
1939	0.00	0.00	0.00	0.00	1.00	20.69 a	139.00	134.00	8.00	0.00	0.00	0.00	302.69
1940	0.00	0.00	0.00	0.00	2.00	98.00	141.00	121.00	11.00	0.00	0.00	0.00	373.00
1941	0.00	0.00	0.00	0.00	0.00	16.50	132.00	55.00	0.00 a	0.00	0.00	0.00	203.50
1942	0.00	0.00	0.00	0.00	0.50	1.50	142.00	125.00	14.50	0.00	0.00 f	0.00 c	283.50
1943	0.00 c	0.00 e	0.00 d	0.00 e	0.60 e	0.00 b	133.30 a	75.50	15.50	0.00	0.00	0.00	224.90
1944	0.00	0.00	0.00	0.00	0.00	4.50	45.00	25.00	15.50	0.00	0.00	0.00	90.00
1945	0.00	0.00	0.00	0.00	0.00	11.50	106.50	100.00	21.00	0.00	0.00 a	0.00	239.00
1946	0.00	0.00	0.00	0.00	0.00	0.50	144.50	81.50	1.50	0.00	0.00 a	0.00	228.00
1947	0.00	0.00	0.00	0.00	1.50	0.00	151.00	78.00	14.00	0.00	0.00	0.00	244.50
1948	0.00	0.00	0.00	0.00	0.50	28.00	77.50	59.50	12.00	0.00	0.00	0.00	177.50
1949	0.00	0.00	0.00	0.00	0.00	13.00	108.00	124.00	16.50	0.00	0.00	0.00 a	261.50
1950	0.00	0.00	0.00	0.00	0.00	19.50	89.00	68.00	58.00	0.00	0.00	0.00 b	234.50
1951	0.00	0.00	0.00	0.00	0.00 a	2.50	146.50	61.00	4.50	0.00	0.00	0.00	214.50
1952	0.00	0.00	0.00	0.00	0.00	18.50	87.50	66.00	7.00	0.00	0.00	0.00	179.00
1953	0.00	0.00	0.00	0.00	0.00 z	2.50	132.50	100.00	19.00	0.00	0.00	0.00	254.00
1954	0.00 a	0.00	0.00	0.00	12.00	23.00	118.00	24.00	1.50	0.00	0.00	0.00	178.50
1955	0.00	0.00 z	0.00	0.00	0.00	11.50	101.00	92.00	24.00	0.00	0.00	0.00	228.50
1956	0.00 a	0.00	0.00	0.00	0.00 z	2.50	110.00	47.00	0.00	0.00 a	0.00	0.00	159.50
1957	0.00	0.00	0.00	0.00	0.00	7.50	41.50	68.20 a	7.00	0.00	0.00	0.00	124.20
1958	0.00	0.00	0.00	0.00	2.00	12.00	33.50	139.50	6.00	0.00	0.00	0.00	193.00
1959	0.00	0.00 a	0.00	0.00	0.00 a	33.00	173.50	54.00	4.50	0.00	0.00	0.00	265.00
1960	0.00	0.00	0.00	0.00	0.00	10.00	217.50	50.00	7.50	0.00	0.00	0.00 f	285.00
1961	0.00	0.00	0.00	0.00	0.00	97.50 b	152.00	155.50	0.00 c	0.00	0.00	0.00	405.00
1962	0.00 f	0.00	0.00	0.00	0.00	9.00	43.92 a	28.00	0.52 a	0.00	0.00	0.00	81.43
1963	0.00	0.00	0.00	0.00	0.00 c	0.50	31.00	100.75 a	27.78 c	0.00	0.00	0.00	160.03
1964	0.00	0.00	0.00	0.00	0.00	7.00	115.00	47.00	0.00	0.00	0.00	0.00 a	169.00

1965	0.00	0.00	0.00	0.00	0.00	0.00	57.50	44.50	0.00b	0.00	0.00c	0.00	102.00
1966	0.00	0.00	0.00	0.00	4.00	20.00	129.68a	102.50	28.50	0.00	0.00	0.00a	284.68
1967	0.00	0.00	0.00	0.00	1.00	4.50	106.50	152.00	24.00	0.00f	0.00f	0.00	288.00
1968	0.00	0.00	0.00z	0.00	0.00	12.78c	107.50	49.17b	4.50f	0.00	0.00t	0.00	169.45
1969	0.00	0.00k	0.00c	0.00a	0.50	11.00	84.73a	137.95a	14.00	0.00	0.00b	0.00	248.18
1970	0.00	0.00	0.00	0.00	0.00	53.33c	92.48a	138.50	0.00h	0.00	0.00	0.00	284.32
1971	0.00	0.00	0.00	0.00	0.00	12.00	127.50	201.00	1.50	0.00	0.00	0.00b	342.00
1972	0.00	0.00	0.00a	0.00	1.03a	7.50	58.79b	115.73a	0.00a	0.00z	0.00z	0.00c	183.06
1973	0.00	0.00	0.00	0.00	1.00	31.15d	0.00z	85.25a	0.00z	0.00z	0.00s	0.00e	117.40
1974	0.00b	0.00	0.00	0.00	0.00d	83.89c	152.42a	73.37a	7.78c	0.00f	0.00u	0.00a	317.45
1975	0.00	0.00a	0.00	0.00c	0.00b	0.00d	176.50	22.50	1.50	0.00k	0.00t	0.00j	200.50
1976	0.00c	0.00a	0.00h	0.00h	0.00h	10.56c	110.00	14.98a	15.50	0.00p	0.00z	0.00t	151.04
1977	0.00r	0.00n	0.00o	0.00a	0.00e	45.60e	43.83b	65.32c	8.89c	0.00n	0.00z	0.00j	163.64
1978	0.00m	0.00l	0.00j	0.00n	0.00p	3.50h	99.00	53.50k	17.14b	0.00	0.00	0.00	116.14
1979	0.00b	0.00	0.00	0.00	0.00	41.50	105.50	69.00	17.00	2.50	0.00	0.00	235.50
1980	0.00	0.00	0.00	0.00	0.00z	0.00z	0.00z	18.50	2.50	0.00	0.00	0.00	21.00
1981	0.00	0.00	0.00	0.00	0.00	19.00	79.22d	139.50	13.00	0.00	0.00	0.00	250.72
1982	0.00	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00
1983	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00
1984	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	6.50i	0.00b	0.00z	0.00z	0.00
1985	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00
1986	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00	0.00	0.00	0.00	0.00
1987	0.00	0.00	0.00	0.00	0.00	10.00	37.00	0.00z	0.00z	0.00z	0.00	0.00	47.00
1988	0.00	0.00	0.00	0.00	0.00a	0.00z	72.00q	30.00	17.50	0.00a	0.00z	0.00z	47.50
1989	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00
1990	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00
1991	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00
1992	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00
1993	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00
1994	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00
1995	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00
1996	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00
1997	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00
1998	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00
1999	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00
2000	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00
2001	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00
2002	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00
2003	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00
2004	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00
2005	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00
2006	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00
2007	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00
2008	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00
2009	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00
2010	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00

2011	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00
2012	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00c	0.00	0.00	0.00
2013	0.00a	0.00	0.00	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00

Period of Record Statistics

MEAN	0.00	0.00	0.00	0.00	0.96	22.84	114.73	84.78	9.13	0.03	0.00	0.00	235.17
S.D.	0.00	0.00	0.00	0.00	2.64	29.32	44.79	44.08	10.40	0.29	0.00	0.00	75.79
SKEW	0.00	0.00	0.00	0.00	4.74	2.40	0.29	0.42	1.80	8.49	0.00	0.00	0.51
MAX	0.00	0.00	0.00	0.00	18.00	161.50	217.50	201.00	58.00	2.50	0.00	0.00	407.50
MIN	0.00	0.00	0.00	0.00	0.00	0.00	31.00	14.50	0.00	0.00	0.00	0.00	90.00
NO YRS	77	75	77	79	75	77	78	80	79	75	70	76	54