

TIM PHILLIPS
FYI DAVE

Normal Flow Explained



Salt River Valley Water User's Association

117.019

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CLASSES OF WATER AVAILABLE IN THE SALT RIVER PROJECT

ASSESSMENT WATER—The amount of water released for use on member lands upon payment of the annual assessment. This normally entitles the shareholder to two acre-feet of water per acre.

STORED AND DEVELOPED WATER—Water allotted by the Board of Governors when the supply is over and above the amount needed for release as assessment water. (Developed water is water the Project develops by pumping.) One acre-foot per acre of this additional water, when available, is usually allotted to shareholders.

PUMP WATER—A cooperative pump program for all member lands which enable shareholders to purchase a maximum pump right to two acre-feet per acre. Pump water, being a permanent right appurtenant to the land, is in addition to any water allotted to member lands from the reservoirs.

TOWNSITE WATER—Water available on townsite lands set aside as non-agricultural. These lands have a water right and are eligible for irrigation under a yearly townsite contract, but are exempt from annual assessments. Payment for this water service is on an as-used basis.

NORMAL FLOW WATER—This is a right, established by the Kent Decree in 1910, to appropriate the flow of water in the rivers at its varying stages for use on lands which had been in continuous cultivation since their first irrigation beginning any year during the 40-year period, 1869 through 1909. This water may be used in addition to any of the other established allotments.

NORMAL FLOW EXPLAINED

Normal Flow Established in 1910

The principle of normal flow was established in 1910, when the legality of water rights among landowners was decided in the District Court. These decisions, known as the Kent Decree, were handed down by Chief Justice Edward Kent of the Arizona Territorial Court, sitting as district judge.

Definition of Normal Flow

Normal flow is a right to appropriate the unregulated flows of the Salt and Verde rivers. It was established in 1910 by the Kent Decree through proof of early diversions from the rivers to those lands which had been in continuous cultivation since their first irrigation any year during the period of 1869 through 1909. The 1869 land has the first right to the use of normal flow of the rivers, then the 1870 land, and so on through 1909.

Normal flow is pertinent only to 1869-1909 lands and is in addition to any assessment water the lands may have become entitled to in later years.

The Normal Flow Period

A normal flow period as set up by the Water Commissioner at the time of the Kent Decree consists of eight days. The length of the flow period was established on the basis that an average landowner irrigates his land once every eight days.

The amount of water available during any eight-day normal flow period is established by the measured river flow during the eight days prior to the flow period.

Maximum Normal Flow Available

Use of available normal flow water on an eligible shareholder's land is based on beneficial use. The beneficial use standard, set by the court and still in use by the Project, is 48 Arizona miners inches constant flow to the quarter section (160 acres) measured and delivered at the land. (An Arizona miners inch equals 11.25 gallons of flow per minute.) This means that in the eight-day flow period, the maximum amount of water the shareholder can receive is 19.04 acre-feet per quarter section, or .11901 acre-feet per acre. (An acre-foot of water totals 325,850 gallons.)

Measurement of River Flow

To determine the amount of water available for normal flow distribution, river flow is measured at the three gaging stations on the rivers and streams which feed runoff water into the Project reservoirs. These gaging stations are located on (1) the Verde River above Horseshoe Dam near Tangle Creek, (2) on Tonto Creek above Gun Creek north of Theodore Roosevelt Lake, and (3) on the Salt River above Theodore Roosevelt Lake near State Route 288 bridge.

The gaging stations are equipped with water stage recorders and short wave radio transmitters. At preset intervals the transmitters automatically send readings from each gaging station to a coding receiver at the Association Dispatching Center (ADC) in the Project's Operations Building. These code tapes (known as black tapes) are sent to the Records and Analysis Section, Water Engineering, where they are converted into flow data for use in ascertaining available normal flow.

Setting Up the Normal Flow Chart

River flow, as measured in the eight days preceding the normal flow period, is compared to a normal flow table based on a chart set up subsequent to the Kent Decree. (The chart, a revised version of one prepared originally by Frank P. Trott, water commissioner in 1910, appears on the opposite page.)

As an example, let us take the eight days of river measurement recorded during the period of September 14 through 21, 1970 upon which the September 22 through 29, 1970, normal flow period was based.

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NORMAL FLOW TABLE

Adjusted from the original Frank Trott Table

Year	At Upper Gaging Stations CFS	Available for Southside Indians M.I.	Year	At Upper Gaging Stations CFS	Available for Southside Indians M.I.
1869	19	0	1901	1275	335
1870	22	0	1902	1281	335
1871	46	0	1903	1285	335
1872	101	0	1904	1292	335
1873	147	0	1905	1302	335
1874	161	0	1906	1314	335
1875	168	0	1907	1344	335
1876	186	0	1908	1406	335
1877	225	0	1909	1469	335
	269	39		1524	335
	278	76		1540	340
	287	113		1567	346
1878	297	150		1593	351
	306	187		1619	357
	315	224		1646	362
	324	261		1672	368
	334	298		1698	373
	343	335		1725	379
1879	374	335		1751	384
1880	459	335		1777	390
1881	548	335		1803	395
1882	629	335		1830	401
1883	691	335		1856	406
1884	723	335		1882	412
1885	751	335		1909	417
1886	782	335		1935	423
1887	831	335		1961	428
1888	910	335		1988	434
1889	998	335		2014	439
1890	1058	335		2040	445
1891	1092	335		2067	450
1892	1140	335		2093	456
1893	1188	335		2119	461
1894	1207	335		2146	467
1895	1223	335		2172	472
1896	1238	335		2198	478
1897	1250	335		2225	483
1898	1260	335		2251	489
1899	1264	335		2277	494
1900	1268	335		2289	500

Adjusted measurements in cubic feet per second (cfs) were as follows:

Sept.		Sept.		Sept.	
14	1469 cfs	17	775 cfs	20	577 cfs
15	1049 cfs	18	677 cfs	21	550 cfs
16	887 cfs	19	627 cfs		

(A cubic foot per second flow totals 7.4805 gallons per second, or 448.8 gallons per minute.)

Only the lands entitled to water during the day of the lowest flow, according to the Trott table, may receive a continuous supply for eight days or 100 percent of the normal flow period. Other normal flow lands receive water only for a proportionate percentage of the period.

For example, the lowest day's flow recorded in the September 14-21 measurements was on September 21—a total of 550 cfs. When compared to the Trott normal flow table, it showed that only lands dating from 1869 to 1881 were eligible for the full eight days of the normal flow period, or 100 percent.

In other words, if there were no dams on the rivers, the 550 cfs of river flow would only be enough water to irrigate the 1869 to 1881 land with the maximum 48 inches constant flow to the quarter section as allowable for normal flow water.

The Trott table shows that none of the other lands became eligible on the next two lowest flow days—September 20 (577 cfs) and September 19 (627 cfs). On September 18 (677 cfs), 1882 lands became entitled to normal flow. They received five days of flow, or 62½ percent. The next lowest flow day, September 17 (775 cfs), 1883 to 1885 lands became eligible to receive four days of flow, or 50 percent.

Eligibility of the remaining lands were as follows: (887 cfs) 1886-1887 lands—three days, or 37½ percent; (1049 cfs) 1888-1889 lands—two days, or 25 percent; (1469 cfs) 1890-1909 lands, one day, or 12½ percent.

How Shareholders Obtain Normal Flow Information

A simplified chart for the normal flow period is set up and sent to Irrigation Services, the Project's irrigation divisions, and the branch business offices. Eligible normal flow users obtain this information by contacting any of the above offices. In addition, the information is printed in the daily water reports

which appear in the classified sections of the Phoenix Gazette and Arizona Republic.

The form of the simplified chart or schedule is shown here as set up for the September 22-29 period:

NORMAL FLOW

Period No. 34

The normal flow for the period from 12:01 a.m., September 22, 1970, to 11:59 p.m., September 29, 1970, is for use on lands as follows:

YEAR	DAYS	PERCENTAGE
1881	8	100
1882	5	62½
1885	4	50
1887	3	37½
1889	2	25
1909	1	12½

Theoretically, the normal flow water is stored in the Project reservoirs until the end of the eight-day measurement period, and then released for use as normal flow in the following eight days.

However, if the normal flow user has sufficient regular assessment water for irrigation at the beginning of the flow period and irrigates his land with this water to the extent of his normal flow allotment, his normal flow water is credited to his account to be used any time before the end of the year. But if he doesn't irrigate equal to the amount of his allotted normal flow for the period, he is given normal flow credit only for the water used.

For example, if he is entitled to 100 percent of the maximum normal flow on 160 acres, or a total of 19.04 acre-feet of water, and he irrigates with assessment water to the same amount of his normal flow during the eight-day period, he will automatically receive credit for the entire 19.04 acre-feet. On the other hand, if he irrigates less than the amount of his normal flow using, say, 15 acre-feet, he will be credited only with 15 acre-feet, thus losing 4.04 acre-feet of his allotted normal flow.

These accumulated credits of normal flow must be used by the end of the year. If the shareholder fails to do so, this water reverts to the Project's general storage to be delivered as stored water to member lands.

(continued on next page)

River Flow also Available on Indian Lands

Under the Kent Decree, U.S. Indian reservation lands in the Salt River Valley also are entitled to water from the rivers. In some cases they are entitled to continual flow—water they receive prior to the distribution and diversion of the remaining flow in the rivers. Other reservation lands receive amounts depending upon water available during the normal flow period. Indian lands are entitled to this water by virtue of prior water rights over Project member lands.

The Project is obligated under the Kent Decree to supply the Fort McDowell Indian Reservation with 390 Arizona miners inches continual flow, which is delivered approximately three miles north of Fort McDowell on the Verde River.

The Salt River Indian Reservation lands north of the Salt River are allotted 700 miners inches of continual flow. The Salt River Reservation lands on the south side of the river have daily normal flow rights up to 500 miners inches. This amount varies, depending upon the flow of the river.

During the September 22-29 Normal Flow period, the Fort McDowell Indian Reservation was entitled to 390 miners inches; Salt River Reservation, north side—700 miners inches; Salt River Reservation, south side, was entitled up to 500 miners inches, depending upon the day to day river flow. By checking the Trott chart, the latter Indian lands received only 335 miners inches for each day of the eight-day normal flow period.



February 1971
Paul Selonke

NORMAL FLOW EXAMPLE

6-05.0 - 32.0

127.25 Acres

Class A 1876

100% Normal Flow
Based on river flows

15.14 A.F. Maximum w/n
the specific NF Period

Order

72 Hours @ 250" = 37.20 A.F.

Scheduled

On July 10 @ 6.00 A

Off July 13 @ 6.00 A

		<u>Water Run</u>	<u>N.F. Period</u>	<u>N.F. This Day</u>	<u>N.F. Acc. This Period</u>	<u>N.F. To Date</u>
July 10	18 Hours	9.30	24	9.30	9.30	9.30
July 11	24 Hours	12.40	24	5.84	15.14	15.14
July 12	24 Hours	12.40	25	12.40	12.40	27.54
July 13	6 Hours	3.10	25	2.74	15.14	30.28

Total Water Delivered

37.20 A.F.

Normal Flow Accumulated

30.28 A.F.

Balance Charged to Other Than
N.F.

6.92 A.F.

Balance Charged will be to lowest priced water at end-of-year.

Irrigation Services
February 1971