

AMERICAN FALLS POWERPLANT

Minidoka Project, Idaho

DEFINITE PLAN REPORT

VOLUME 1

GENERAL PLAN

JULY 1956

93

SUMMARY

American Falls Powerplant, Idaho

LOCATION: Idaho, in Power County at American Falls.

AUTHORIZED: Public Law 864, 81st Congress, 2nd Session; approved September 30, 1950 with an expenditure limitation of \$6,600,000.

PLAN

The selected plan of development involves construction of a powerplant consisting of three 10,000-kilowatt units on the right bank of Snake River immediately below American Falls Dam. The powerplant will utilize water released to satisfy downstream irrigation and power rights and the power produced will be used to provide pumping energy needed on the Minidoka North Side and Michaud Flats Projects. The operation of the powerplant will be coordinated with the Palisades and Minidoka powerplants.

PHYSICAL FEATURES

American Falls Powerplant

Installed capacity (3 units at 10,000 kw.) -	30,000 kw.
Powerhouse -	70 feet wide by 147 feet long
Operating head -	50 to 107 feet

HYDROLOGY

American Falls Reservoir is operated in coordination with Jackson Lake, Island Park, Palisades and Lake Walcott Reservoirs to supply irrigation water to several hundred thousand acres of land in the upper Snake River Basin. Releases from American Falls Reservoir for irrigation downstream, power requirements and waste will be passed through the American Falls powerplant up to the capacity of the plant.

COSTS (Official Estimate dated April 20, 1956)

Powerplant	\$8,291,000
Switchyard	654,000
Total construction cost	<u>\$8,945,000</u>

BENEFITS, ALLOCATIONS AND REPAYMENT

	<u>Benefits</u> <u>Annual</u>	<u>Cost</u> <u>Allocation</u>	<u>Repayment</u>
Power	\$515,910	\$8,945,000	\$8,945,000
Commercial	0	0	0
Irrigation	515,910	8,945,000	8,945,000

Summary - American Falls Powerplant, Idaho

The American Falls powerplant will be integrated financially with the Palisades powerplant for payout purposes. Under this plan all financial requirements of the two plants will be met 34 years after the installation of the last generating unit at Palisades.

C O N T E N T S

	Page
CHAPTER I, INTRODUCTION	1
LOCATION, PURPOSE AND GENERAL PLAN	1
HISTORY	2
IDAHO POWER COMPANY PLANTS	2
PREVIOUS INVESTIGATIONS AND LEGISLATIVE AUTHORIZATIONS	2
CHAPTER II, PLAN OF DEVELOPMENT	4
GEOLOGY	4
Foundation Rock	4
Faulting	6
Ground Water	6
Construction Materials	6
POWER FACILITIES	7
Powerplant	7
Engineering Preparations	7
Design	7
Penstocks	7
Fixed-Wheel Gates	8
Electrical Features	8
Turbines	8
Generators, Generator Circuit Breakers, and Protective Equipment	9
Accessory Electrical Equipment	9
Powerplant Mechanical Equipment	10
Transformers and Switchyard	10
Transmission Line	11
ACCESS ROAD	11
GENERAL PROPERTY AND TEMPORARY CONSTRUCTION FACILITIES	11
ESTIMATED COST	12
Construction	12
Operation, Maintenance and Reserve for Replacement Costs	12
CHAPTER III, WATER SUPPLY	13
CONTRACTS WITH IDAHO POWER COMPANY	13
Contract No. Ilr-733, June 15, 1923	14
Rights Acquired by the United States	14
Rights Reserved by the Idaho Power Company	15
Storage Rights Granted the Idaho Power Company	17
Contract No. Ilr-801 - October 1, 1934	19
MINIDOKA POWER RIGHT	20
STREAM REGULATION AND STORAGE	20
River Operation Studies	21
Study Period	21
Irrigated Areas	21
Irrigation Requirements	22
Domestic Requirements	22
Power Requirements	22
Henrys Fork Operations	22

Contents

	Page
Available Water	23
Winter Water Saving	23
Jackson Lake Reservoir	23
Palisades Reservoir	24
Palisades Powerplant	24
American Falls Reservoir	24
American Falls Powerplant	24
Lake Walcott	25
Minidoka Powerplant	25
Allocation of Reserved Space, American Falls Reservoir	25
Available Water Supply, American Falls Powerplant	26
 CHAPTER IV, POWER	 28
POWER PRODUCTION	28
Allocation of Power to the Idaho Power Company Plant at American Falls	31
Coordination with Palisades Powerplant	31
POWER MARKET	33
 CHAPTER V, FINANCIAL ANALYSIS	 35
ECONOMIC JUSTIFICATION	35
Costs	35
Benefits	35
Benefit-Cost Ratio	36
Power System Financial Analysis	36
 CHAPTER VI, ADDITION OF PROPOSED BURNS CREEK POWERPLANT	 39
POWER PRODUCTION	39
Sales and Revenue	39
Transmission Service	40
Costs	40
FINANCIAL ANALYSIS	41
Justification	41
Repayment	41
 CHAPTER VII, ALTERNATE PLAN OF DEVELOPMENT	 42
PLAN OF DEVELOPMENT	42
ESTIMATED COSTS	42
POWER PRODUCTION	43
COST OF INCREMENTAL POWER	43

Contents

LIST OF TABLES

Table No.		Page
A	Total flow past American Falls Dam	27
B	Power generation - 30,000-kw. American Falls Federal Powerplant, Idaho	29
C	Power generation - average of 26-year period (1928-1953)	30
D	Allocation of power to the Idaho Power Company	32
E	Power system average rate and repayment study follows page	37
F	Power system average rate and repayment study follows page	41

LIST OF MAPS AND CHARTS

	Follows page
Site Plan, Proposed American Falls Powerplant	4
115Y/115Δ/138Y Kv. Pipe-Bus Switchyard	11
Cable Trench-Types "A" and "B", Outline and Reinforcement .	11
American Falls Powerplant, General Plan, Powerhouse and Switchyard	12
American Falls Powerplant, Preliminary General Arrangement .	12
Official Estimate, PF-1	12
Control Schedule, PF-2	12

CHAPTER III

W A T E R S U P P L Y

The need for conserving water for irrigation use has required the limiting of the water supply for power generation, particularly the supply for the proposed American Falls powerplant, to those flows that are incidental to the operation of the Snake River reservoir system for existing and proposed irrigation development and for satisfying domestic water rights. During years of low runoff, the flow at American Falls Dam will be completely regulated.

As described elsewhere in this report, the American Falls Dam is located just above the American Falls on the Snake River. Prior to construction of the dam, the Idaho Power Company had in operation a small powerplant below the falls on the east side of the river and owned also two other small plants, one on an island below the falls and the other on the west side of the river. When the United States constructed the American Falls Dam, it acquired from the company, among other properties and rights, the Island powerplant and the West Side plant and certain power and irrigation water rights with the intention to construct a 30,000-kilowatt powerplant on the west side of the river, also below the falls. These transactions with the company are covered by contract Ilr-733, dated June 15, 1923.

CONTRACTS WITH IDAHO POWER COMPANY

Although license No. 4118 granted by the Commissioner of Reclamation, State of Idaho, with a priority date of March 30, 1921, gives the United States the right to store 1,800,000 acre-feet of water in American Falls Reservoir for domestic and irrigation purposes, the June 15, 1923 contract limits the flow available at American Falls for power production at that point by either the United States or the Idaho Power Company primarily to releases for irrigation, power, and domestic water rights downstream. The provisions of the contract dealing with division of power water rights between the company plant and the proposed United States plant are complex and guarded with many provisos and cross references. Hence, each situation requires careful analysis for proper interpretation of the contract. However, a general discussion in terms of usual operations will serve to develop a reasonably accurate but not precise description of the water rights.

In the contract, the company (1) reserved for its use certain water rights and (2) acquired, in addition, two storage rights in the American Falls Reservoir in order to have some control in the release of its water. In general, the company primary water right for the period April to October, inclusive, is a specific quantity of water each day. Also, the company may use through its plant

Water Supply

any additional water released from American Falls Reservoir that is in excess of the primary right of the company plant and the secondary right of the United States plant.

During the period beginning October 1, each year, until the American Falls Reservoir first fills the succeeding year, the company has the right to use 300,000 acre-feet of water, of which 195,000 acre-feet must be used by April 1 and not more than 45,000 (primary storage) can be carried over beyond the time the reservoir first fills or beyond June 10, whichever occurs first. The 45,000 acre-feet must be released by the following November 15. If the company does not utilize the water in the quantities and within the times above stated, it relinquishes its rights to the unused water.

A further limitation operates to control releases of water for the company in the nonirrigation period in the form of a schedule of flows for stated periods, and it is this latter limitation that usually governs the amounts of water available for release through the company plants during the period October 1 through June 10 or until the reservoir fills.

The United States power water right during the period April 1 to October 31, inclusive, is expressed in terms of a limitation on the average daily generation. The quantity of water that may be used for power generation is also specified but is not the limiting factor. The United States water right during the period November to March, inclusive, is the right to generate such power and energy as is needed supplemental to the Minidoka powerplant generation to satisfy the requirements of a load at Minidoka having a 10,000-kilowatt half-hour peak. This winter right has priority over the company winter rights and, of course, requires that Minidoka make the most efficient use of water available to it for power generation.

Contract No. Ilr-733, June 15, 1923

The various provisions of the June 15, 1923 contract between the United States and the Idaho Power Company, which are outlined above in general terms, are discussed in greater detail in the following paragraphs.

Rights Acquired by the United States

The United States, as against the Idaho Power Company, acquired the following water rights at American Falls:

- (a) Summer Power Right, April 1 to October 31
(Secondary to Idaho Power Company Summer Right). A

Water Supply

secondary right to that amount of water which will generate continuously for delivery from the generator bus bars in the Government power station at American Falls, 6,700 kilowatts beginning on April 1, increasing uniformly to 25,000 kilowatts on May 1 and to 30,000 kilowatts on June 1, continuing at that amount to August 15, inclusive, then decreasing uniformly to 25,000 kilowatts on September 15 and to 5,500 kilowatts on October 31. In no case, however, shall the water utilized under this power right exceed a daily average of 1,500 second-feet on April 1, increasing uniformly to 5,000 second-feet on May 1, and to 6,000 second-feet on June 1, continuing at that amount to September 15, inclusive, and decreasing uniformly to 1,500 second-feet on October 31.

(b) Winter Power Right, November 1 to March 31 (Primary to Idaho Power Company Winter Right). A primary right for developing not to exceed a half-hour peak of 10,000 kilowatts of power needed to supply the power demands and uses on the Minidoka Project and its proposed extensions. The United States shall secure all of this winter power at the Minidoka powerplant insofar as it is reasonably practicable to secure that power from the installed machinery at the Minidoka plant without releasing water which otherwise might be held for irrigation, generating at American Falls the balance, if any, of the amount required. The United States has the right to generate the full ten thousand kilowatts at its American Falls plant when the Minidoka plant is out of operation on account of enlargement, improvement, or repairs.

(c) Storage Rights. The primary right, as against the Idaho Power Company, to build, fill, and use 3,000,000 acre-feet of storage capacity, including the capacity of the American Falls Reservoir, anywhere on the Snake River, in addition to the storage capacity available in 1923 in Jackson Lake Reservoir and Lake Walcott. The United States, as against the Idaho Power Company, also has the right to store and use for irrigation and domestic purposes the water authorized to be used for the generation of the 10,000 kilowatts of winter power, and the water authorized to be used by the United States for generation of summer power, whenever the Secretary of the Interior shall decide such water is required for irrigation purposes.

Rights Reserved by the Idaho Power Company

The Idaho Power Company specifically reserved the following water rights out of those conveyed to the United States under the terms of the 1923 contract:

(a) Summer Power Right, April 1 to October 31 (Primary to the United States Summer Right). The right to use

Water Supply

for power production at American Falls the following amounts of water: 100 cubic feet per second beginning April 1, and increasing uniformly to 2,500 cubic feet per second on May 1 and continuing at that amount to September 15, inclusive, then decreasing uniformly to 100 second-feet on October 31.

(b) Additional Summer Power Right. A tertiary power right at American Falls to all additional water released, or wasted, from the reservoir, by the United States from April 1 to October 1, inclusive, over and above the amounts required to furnish the primary rights reserved by the company and the secondary rights granted to the United States. Records of flows past American Falls Dam in recent years indicate that the maximum controlled summer release is about 12,000 cubic feet per second. Since the existing irrigation developments below American Falls received a full supply of water in years of maximum controlled summer releases, and plans for future irrigation development using surface water of the Snake River below American Falls, are limited to the development of about 13,000 acres in the Minidoka Project, it is unlikely that the maximum release will be materially increased over that in the past. Of this maximum release about 6,000 cubic feet per second would accrue to the United States summer power right and about 6,000 cubic feet to the company under its primary and tertiary summer power rights. Since the Idaho Power Company's powerplant at American Falls (completed in 1927) has a hydraulic capacity of about 8,400 cubic feet per second, at normal head and normal tailwater, all of the company's right can be utilized for generation of power at its American Falls plant. River operation studies indicate that it will be necessary to waste limited amounts of water at American Falls during the summer period at infrequent intervals in addition to required releases. Under its tertiary summer right the Idaho Power Company is entitled to use such water up to the limits of installed capacity. The remaining wasted water is unappropriated and available for use by either party during such infrequent periods.

(c) Reserved Water Right. The right (for power development at American Falls and for power development below Milner Dam within limits discussed hereafter under Idaho Power Company Secondary Storage Right) to the first 300,000 acre-feet flowing into the American Falls reservoir after October 1 of each year and actually storable therein. Precedence, however, must be given to the release through the American Falls Dam of the amount of water, if any, required to satisfy the Government's winter power right. The water required to fill the 45,000 acre-feet of primary storage capacity conveyed to the Idaho Power Company by the United States and discussed hereafter is part of the above 300,000 acre-feet of water reserved

Water Supply

by the company. The remaining 255,000 acre-feet of this reserved water is regulated in the Idaho Power Company's secondary storage space in American Falls Reservoir. Releases therefrom for the Idaho Power Company's use are limited to those required to maintain certain minimum flows below Milner Dam during the period October 1 to June 10 as discussed hereafter under the Idaho Power Company Secondary Storage Right. The company has no right to require the release of more than 300,000 acre-feet in any one year beginning October 1, in addition to the company's primary summer power rights and the hold-over in its 45,000 acre-feet of primary storage capacity.

(d) Power Right to Winter Waste. The right, as against the United States, to use for power purposes at American Falls water released, or wasted, between November 1 and March 31, in excess of the amount allowed the United States under the United States winter power and storage right granted by the contract. The contract provides that the Bureau of Reclamation shall determine the amount available for waste by assuming for a water year beginning October 1, 200,000 acre-feet less storable runoff than the lowest year of record at the time of such determination, and that such water as under this assumption is not necessary to provide 300,000 acre-feet for the company and to fill existing storage capacity, will be considered available for wasting. A storable runoff of about 1,050,000 acre-feet was recorded in 1934 and is the minimum of record. The contract provides that available waste shall be released as nearly uniformly as practicable so as to make it available for beneficial use for power development.

Storage Rights Granted the Idaho Power Company

The United States granted to the Idaho Power Company the following rights to use of space in American Falls Reservoir:

(a) Primary Storage Capacity. The right to perpetual use of 45,000 acre-feet of storage capacity in American Falls Reservoir to regulate its reserved water within the limitations of the contract. The company has the privilege of holding after October 1 and until November 15 of each year, any water which it may have in its primary storage capacity of 45,000 acre-feet, but the company's right to such water expires on November 15.

(b) Secondary Storage Capacity. A secondary right between October 1 and June 10 to use not to exceed 255,000 acre-feet of storage capacity in American Falls Reservoir, when such capacity is not then required and not being used by the

Water Supply

owners of irrigation storage rights. This secondary right to storage capacity was granted the company for the purpose of regulating and controlling the water reserved to the company under their reserved water right of 300,000 acre-feet during the winter and spring months. However, the right to use any part of this 255,000 acre-feet of storage capacity and to any water stored therein is relinquished as soon as the reservoir is first filled each year, and further, the company releases on April 1 of each year all right and claim to such capacity and water stored therein, except 60,000 acre-feet, and releases all right and claim to the remainder, if any, on June 10 each year.

(c) Summer Regulation of 5,000 Acre-Feet. The company has the right to accumulate from time to time, in storage capacity that would otherwise be unused in the American Falls Reservoir, out of the amounts of water to which it is entitled under its primary summer power right, an amount not exceeding 5,000 acre-feet, and use the same as desired, except that after the reservoir has been filled in any year, the company shall be entitled to only that part of the 5,000 acre-feet accumulated after the filling of the reservoir. The company must release, upon demand by the United States, such portion of the 5,000 acre-feet as the company may have accumulated, whenever the available stored water in the American Falls Reservoir to which the present Minidoka Project and extensions thereof diverting from Lake Walcott are entitled, amounts to less than 5,000 acre-feet, and in any event, the company has no claim to any part of the 5,000 acre-feet of accumulated water remaining after September 30.

(d) Rights below Milner Dam. The right to demand the release of water from the American Falls Reservoir, for release by and use below Milner Dam, is limited to the 45,000 acre-feet of primary storage rights described above, and to such portion of the 255,000 acre-feet of secondary storage rights described above, as is needed for beneficial use for power development at Shoshone Falls or Twin Falls. The releases of secondary storage must be limited so as not to exceed the amounts necessary to make the total flow at the Idaho Power Company Twin Falls powerplant:

- 690 second-feet - October 1 to November 30, inclusive
- 790 second-feet - December 1 to January 31, inclusive
- 690 second-feet - February 1 to February 12, inclusive
- 590 second-feet - February 13 to April 15, inclusive
- 690 second-feet - April 16 to June 10, inclusive

These releases must be made from American Falls Reservoir in such a way that the required flow can be maintained at Twin

Water Supply

Falls by the utilization of not to exceed 3,000 acre-feet of storage capacity in Lake Walcott. These operations do not in any way abridge the company's right to require the release from the American Falls Reservoir and have passed by Milner Dam, at any time, any part of its 45,000 acre-feet of primary storage.

Contract No. Ilr-801 - October 1, 1934

Because of a series of dry years which occurred during the early 1930's, the June 15, 1923 contract was further modified by a new contract between the United States and the Idaho Power Company, dated October 1, 1934, Symbol and No. Ilr-801. The objective sought in the October 1, 1934 contract was to curtail the winter release of water by the company at American Falls Dam and to permit the storage of the saved water for irrigation purposes. Releases from American Falls Reservoir, to satisfy Idaho Power Company rights, were made under the terms of the October 1, 1934 contract until December 16, 1950, the effective date of a new contract, Symbol and No. Il74r-1506, which terminated the October 1, 1934 contract, thus restoring on December 16, 1950, the conditions of the June 15, 1923 contract as regards the water rights of the Idaho Power Company and the United States.

The 1934 contract provided a primary storage right of about 45,000 acre-feet for Island Park Reservoir in addition to the more substantial benefits which accrued to the American Falls Reservoir. Section I of the 1934 contract included the following statement: "It is agreed that the water conserved and made available by the terms of this agreement is for storage in the American Falls Reservoir, except the water saved by the company's release of the right to have water discharged over Milner Dam which water may be stored in Island Park or Teton reservoirs if built, and is in lieu of water that would otherwise be conserved and so stored by construction of the said generating unit at American Falls Reservoir and shall inure to the benefit of all parties interested in American Falls Reservoir in like manner and extent." The estimated average annual saving during the 1930-34 period resulting from the reduction in releases past Milner Dam for the company is 45,000 acre-feet. During the life of the 1934 contract this saving was credited toward filling Island Park Reservoir each year. Provision of a similar storage right for Island Park Reservoir has been incorporated in contracts with the Snake River water users regarding the sale of the reserved space in American Falls Reservoir and the space in Palisades Reservoir.

Water Supply

MINIDOKA POWER RIGHT

The Foster Decree of June 20, 1931, recognizes two power rights at Minidoka Dam for a total flow of 2,700 cubic feet per second. The amounts and priority dates are as follows: 2,500 cubic feet per second, June 15, 1909, and 200 cubic feet per second, July 1, 1912. During periods of low runoff, operation of American Falls Reservoir for the purpose of maintaining flows at the Power Company's Twin Falls plant at the minimum flows provided in the contract of June 15, 1923 and meeting the minimum requirements of canals diverting below American Falls has the effect of precluding the full use of the power rights at Minidoka Dam during the months October through March. It is planned to offset this decrease by generation at the proposed United States powerplant at American Falls. In the case of Burley Irrigation District v. Ickes (116 Fed. 2d, 529), the court ruled that the United States, acting through the Secretary of the Interior, as the holder of title to the powerplant and the related water right, with the right to manage, control and operate the works, could curtail power production at Minidoka Dam and that, when curtailment was part of a program to save water for irrigation (with at least incidental benefit to the Burley Irrigation District), the action could not be attacked as arbitrary. Since water savings from such curtailment accrue primarily to water users other than the Burley and Minidoka Irrigation Districts, the curtailment is conditioned on reasonable compensation being made to the Minidoka powerplant.

STREAM REGULATION AND STORAGE

An engineering determination of the amount of water available for power production at the proposed American Falls powerplant must take into account the many diverse and interrelated factors governing the administration and use of the surface flow of the upper Snake River. Foremost among these is the multitude of natural flow and storage rights which have been adjudicated by the courts over the past four decades and which now serve as a basis for distributing the available water supply. The effect of future irrigation and power developments and of the 1923 contract with the Idaho Power Company must also be considered.

A comprehensive study of the operation of the upper Snake River system since 1918 was made by the Bureau of Reclamation for the purpose of determining, first, where winter diversions could be economically eliminated; second, the most feasible means of eliminating such diversions; and third, the best use of water so conserved and thus made available for storage. Results of this study, which was begun in 1942, were published in October 1946 in Project

Water Supply

Planning Report No. 1-5.17-1, "Water Supply for Palisades Reservoir Project." This report is the basis for subsequent agreements with the water users as to the extent of the winter water saving program to be carried out when Palisades Reservoir is placed in operation and as to the allocation of the reserved irrigation space in American Falls Reservoir between existing and new land projects.

River Operation Studies

The original operation studies in the above report were revised to reflect the terms of the current agreements with the water users regarding winter water saving and the allotment of the reserved irrigation space in American Falls Reservoir and to reflect the terms of the June 15, 1923 contract with the Idaho Power Company. In line with current plans Palisades Reservoir was operated on a forecast basis and American Falls Reservoir was operated on the basis of a rule curve in order to increase the winter power production at Minidoka. The basic data on streamflow, diversion requirements, and river gains and losses used in the revised studies are the same as used in the original studies, except that the period of study was changed from 1919-1942 to 1928-1953. The important criteria and assumptions used in the revised study are summarized as follows:

Study Period

The study was confined to the period October 1, 1927 through September 30, 1953. Reservoir contents at the beginning of the period were estimated on the basis of previous studies. The study period includes one average wet cycle and the driest cycle since about 1870, the earliest date for which any precipitation records are available for Idaho.

Irrigated Areas

All existing irrigation projects diverting from the Snake River or its tributaries, above Milner Dam were included. Two new land projects, Unit A, North Side Pumping Division, Minidoka Project, and the Michaud Flats Project, were included. Unit A includes an irrigable area of 13,650 acres as discussed in Project Planning Report No. 1-5.53.1-1 dated April 1949. The area included in the Michaud Flats Project is limited by the allotment of American Falls storage space. Sufficient area will be developed to utilize the water available under the storage allotment in American Falls Reservoir supplemented by Palisades storage. This water supply will be delivered by pumping from American Falls Reservoir.

Water Supply

Irrigation Requirements

Requirements for existing projects are the same as used in the original studies. Records of past diversions were used except during periods of shortage which were adjusted to provide a full supply of irrigation water. Estimated annual requirements of 56,000 acre-feet and 170,000 acre-feet, respectively, were used for Unit A, North Side Pumping Division, Minidoka Project and for the Michaud Project.

Domestic Requirements

Domestic requirements during summer are included as part of the irrigation requirement. Winter diversions were limited to the recorded diversions to the South Side Twin Falls Canal and to the North Side Twin Falls Canal, plus a stock water run of 5,000 acre-feet for the Milner-Gooding Canal. Winter diversions (October-March) by the North Side Twin Falls Canal in excess of 126,000 acre-feet were charged to storage owned by that company in years when American Falls Reservoir failed to fill.

Power Requirements

The only set power requirement included in the study is that at Milner Dam for downstream Idaho Power Company plants. Power production at Palisades, American Falls, and Minidoka was considered as incidental to the operation for irrigation and domestic water. Required releases for the Idaho Power Company's plants below Milner Dam were computed on the basis of the 1923 contract. The company's 45,000 acre-feet of primary storage capacity in American Falls Reservoir was assumed to fill each year and the water was released in line with past use of this water by the company. The company's secondary storage water was released to maintain specified minimum flows at Twin Falls during the period October 1 through June 10 as required by the 1923 contract, as shown below. The required minimum flows at Twin Falls are as follows except in years when American Falls Reservoir fills prior to June 10. The company has no right to secondary storage water after the reservoir first fills each year.

October 1 - November 30 - 690 cubic feet per second
December 1 - January 31 - 790 cubic feet per second
February 1 - February 12 - 690 cubic feet per second
February 13 - April 15 - 590 cubic feet per second
April 16 - June 10 - 690 cubic feet per second

Henrys Fork Operations

A separate operation study for existing projects and reservoirs on the Henrys Fork River was made to determine the inflow to the Snake River from the Henrys Fork as modified by changed conditions

Water Supply

since 1927. Changes over past operation of that system since 1940 are slight, being limited to a slight increase in supply which results from the coordinated operation of all reservoirs in the Henrys Fork River and the Snake River systems. The major change prior to 1940 resulted from extending the operation of Island Park and Grassy Lake Reservoirs back to 1927. Natural flows of the Henrys Fork, bypassed to those Snake River natural flow rights, which are senior to the Henrys Fork natural flow rights, are the same as recorded in the past. All reservoirs were operated on a holdover basis and storage water was shifted to and maintained as long as possible in the farthest upstream reservoirs in order to obtain a maximum amount of holdover storage for use in dry years. Water was stored adversely to downstream natural flow and storage rights and was released only as necessary to avoid shortages downstream after all downstream storage had been utilized.

Available Water

The modified flow of the Henrys Fork River at its mouth, as shown by the operation study of that river system, and the computed natural flow of Snake River where it emerges on the Snake River Plain near Heise, Idaho, were used as the original water supply available for regulation and use in the upper Snake River Valley.

Winter Water Saving

The winter water saving program, assumed to be in effect, was confined to the elimination of winter operation of canals above American Falls Reservoir and to the limiting of winter diversions of natural flow by the North Side Canal Company to 126,000 acre-feet annually in years when American Falls Reservoir fails to fill. It was assumed that the canals serving the Minidoka Project will continue to be shut off in the future as they have been in recent years. Winter diversions to the South Side Twin Falls Project were assumed to be the same as recorded in the past. The estimated winter saving of 135,000 acre-feet was assumed to be stored in Palisades Reservoir to the credit of the upper valley canals making the saving.

Jackson Lake Reservoir

It was assumed that no irrigation water would be drawn from this reservoir until all of Palisades irrigation storage had been completely used, except in years when a water shortage is forecast. Holdover privileges would be granted in Jackson Lake Reservoir. The storage content of this reservoir was limited to 647,000 acre-feet during the December through April period to protect the dam from ice damage. Special storage releases were made in October and November when necessary to meet this limitation.

Water Supply

Palisades Reservoir

The active capacity of 1,200,000 acre-feet in Palisades Reservoir was operated jointly for irrigation, flood control, and power. This reservoir was operated on a forecast basis in accordance with a tentative agreement between the Corps of Engineers and the Bureau of Reclamation. The 135,000 acre-feet of winter water saved in the upper valley was assumed to be stored in Palisades Reservoir to the credit of the upper valley canals. The bottom 200,000 acre-feet of space in Palisades Reservoir was reserved as dead storage to maintain a minimum power head. Irrigation releases from Palisades Reservoir were limited to those needed to supply the upper valley as long as irrigation storage was available in American Falls Reservoir.

Palisades Powerplant

The operation of the Palisades powerplant is entirely incidental to the operation of Palisades Reservoir for irrigation and flood control. Winter releases from this reservoir, required to fill the prior storage right of American Falls Reservoir, permit the generation of about 16,000 kilowatts of firm power. During the peak of the irrigation season and when storage is being evacuated for flood control, the plant could be operated at its rated capacity (114,000 kilowatts).

American Falls Reservoir

The inflow to American Falls Reservoir under future conditions was obtained by adjusting the recorded inflow to reflect the anticipated changes in water uses resulting from the operation of Palisades Reservoir and elimination of winter diversions. Using this modified inflow, American Falls Reservoir was operated to meet the anticipated water requirements downstream for irrigation, domestic, and power purposes. During the winter period, October through March, this reservoir was operated on a rule curve basis in order to increase and make more uniform the power production at the Government's Minidoka powerplant.

American Falls Powerplant

No water was released past American Falls specifically for power production at the proposed American Falls powerplant. The division of the incidental flow at this point between the Government's proposed powerplant and the existing Idaho Power Company plant at American Falls was computed on the basis of the 1923 contract between the United States and the Idaho Power Company. However, in the interest of optimum power production, all of the flows were utilized through the proposed American Falls powerplant

Water Supply

to the limit of its capacity and the Idaho Power Company plant was credited with the production which it could have achieved using water according to its right under the 1923 contract. Water in excess of plant capacity would be utilized through the Idaho Power Company plant to the extent of its capacity or as required to meet load. Water available for power production was determined by storage content rule curves for the four reservoirs (Jackson Lake, Palisades, American Falls and Lake Walcott) for the months October through December and on the basis of forecasted storable flow for the months January through April. In years of adequate irrigation supplies, the proposed American Falls powerplant was normally operated at the installed capacity of 30,000 kilowatts during the peak of the irrigation season when flows past American Falls Dam are high.

Lake Walcott

The total active capacity of Lake Walcott is about 95,000 acre-feet; however, it was assumed that the normal drawdown would be limited to 55,000 acre-feet in order to maintain a higher effective head for power production at the Minidoka powerplant. In extremely dry years, a total drawdown of 80,000 acre-feet was assumed. Use of the remaining 15,000 acre-feet of storage is impracticable, since it seriously interferes with diversions by canals diverting from this reservoir.

Minidoka Powerplant

In order to conserve water for irrigation use, the water supply for this powerplant was assumed to be limited to irrigation and power releases necessary to meet requirements below Minidoka Dam and to spills from American Falls Reservoir. Operation of American Falls Reservoir on the basis of a rule curve permits the release of anticipated minimum spills during the winter months in some years and increases the power production at Minidoka. In some years, however, the basic power right of 2,700 cubic feet per second at Minidoka was curtailed in order to conserve water for irrigation uses. It is planned to make up this loss from power generated at the proposed American Falls powerplant. It was assumed that the incidental flow past Minidoka Dam will be utilized to the maximum extent practicable for generation of power at the Minidoka powerplant. The installed capacity of this plant is 13,400 kilowatts.

Allocation of Reserved Space, American Falls Reservoir

It was assumed that 315,000 acre-feet of the 433,000 acre-feet of unsold space in American Falls Reservoir would be allotted to existing projects and that the remaining 118,000 acre-feet would be allotted to new lands. Of the allotment to new land, 47,000 acre-feet were allotted to Unit A, North Side Pumping Division, Minidoka

Water Supply

Project and 71,000 acre-feet to the Michaud Flats Project. It was assumed that the water supply for the latter area would be delivered by pumping from American Falls Reservoir.

Available Water Supply, American Falls Powerplant

The revised river operation study discussed in the preceding paragraphs reflects expected future conditions. The estimated monthly runoff past American Falls Dam under future conditions of development and with streamflow similar to that of the 1928-1953 period is given in table A.

Table A.--Total flow past American Falls Dam
(Based on 1923 contract)

Year	O	N	D	J	F	M	A	M	J	J	A	S	Total
1928	392	282	364	579	572	509	1,147	1,172	687	683	700	423	7,510
29	236	147	161	130	142	437	497	923	625	702	693	387	5,080
1930	171	30	82	76	53	194	498	459	630	703	709	405	4,010
31	148	86	84	83	59	124	293	645	667	751	711	428	4,079
32	218	91	86	87	72	92	214	584	590	721	715	459	3,929
33	181	75	78	76	58	78	286	587	676	710	744	448	3,997
34	208	78	87	88	67	141	254	494	400	490	237	191	2,735
35	219	97	54	74	47	83	177	594	660	601	490	330	3,426
36	213	65	76	59	15	64	207	722	610	702	695	390	3,818
37	185	56	65	75	44	86	180	628	590	738	706	384	3,737
38	191	49	67	69	53	88	216	623	613	634	702	448	3,753
39	167	60	125	156	141	232	613	648	609	708	709	397	4,565
1940	169	60	76	66	43	79	237	656	666	709	704	389	3,854
41	131	56	64	65	45	85	255	666	577	693	693	375	3,705
42	130	33	60	90	55	86	252	541	597	727	722	415	3,708
43	194	60	56	281	256	311	1,241	888	731	707	722	427	5,874
44	336	156	160	107	355	424	476	533	817	723	712	433	5,232
45	198	62	67	164	141	186	436	766	825	705	714	398	4,662
46	358	152	168	346	537	602	779	836	672	620	706	356	6,132
47	208	149	159	289	532	518	578	682	564	732	709	405	5,525
48	244	155	161	286	164	479	559	1,009	951	729	707	394	5,838
49	215	127	107	284	260	451	739	925	627	756	722	381	5,594
1950	127	51	73	143	257	411	1,222	817	858	753	711	426	5,851
51	233	173	503	546	604	614	1,126	1,006	648	761	673	457	7,344
52	244	155	246	593	578	719	864	1,175	757	750	757	453	7,291
53	182	63	154	57	173	488	418	616	923	780	740	458	5,052