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DEPARTMENT OF
WATER RESOURCES

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IN THE DISTRICT COURT OF THE FIFTH JUDICIAL DISTRICT
OF THE STATE OF IDAHO, IN AND FOR THE COUNTY OF TWIN FALLS

In Re SRBA	)	Subcase nos. 01-0023B, 01-00297, 35-02543, & 35-04246
	)	
	)	
	)	
Case No. 39576	)	IDAHO EXHIBIT 3: AFFIDAVIT OF DAVID J.
	)	BARBER DATED APRIL 16, 2009
	)	
	)	
STATE OF IDAHO	)	
	) ss	
County of Ada	)	

DAVID J. BARBER, being first duly sworn deposes and states:

1. I am a competent adult, over the age of eighteen years, and have personal knowledge of the facts stated herein. I am a deputy attorney general assigned to the Snake River Basin Adjudication (hereinafter the "SRBA").

2. Attached hereto as Attachment 1 are true and correct copies of unnumbered pages i through viii, numbered pages 4 through 8, and numbered page 15 of "STATE OF IDAHO - THE OBJECTIVES - STATE WATER PLAN - PART ONE," which was issued by the Idaho Water Resource Board in 1974. I obtained the copies in Attachment 1 from the website of the Idaho Department of Water Resources, at the following URL:

http://www.idwr.idaho.gov/waterboard/Planning/State_Planning/Documents/StatePlans/1974ObjectivesPart1.pdf.

3. Attached hereto as Attachment 2 is a true and correct copy of Exhibit 7 to the "Fourth Affidavit of Michael C. Orr," which was filed in the SRBA in Consolidated Subcase 00-92023 on October 17, 2008 ("Fourth Orr Affidavit").

4. Attached hereto as Attachment 3 is a true and correct copy of Exhibit 8 to the Fourth Orr Affidavit.

5. Attached hereto as Attachment 4 is a true and correct copy of Exhibit 13 to the Fourth Orr Affidavit.

6. Attached hereto as Attachment 5 is a true and correct copy of Exhibit 14 to the Fourth Orr Affidavit.

7. Attached hereto as Attachment 6 is a true and correct copy of Exhibit 16 to the Fourth Orr Affidavit.

9. Attached hereto as Attachment 7 is a true and correct copy of Exhibit 17 to the Fourth Orr Affidavit.

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CERTIFICATE OF SERVICE

I certify that on this 16th day of April 2009 I caused to be served the original and/or copy of IDAHO EXHIBIT 3: AFFIDAVIT OF DAVID J. BARBER DATED APRIL 16, 2009 on each of the following persons by the indicated method:

1. Original and three copies to:

Clerk of the District Court
Snake River Basin Adjudication
253 Third Avenue North
PO Box 2707
Twin Falls, ID 83303-2707

- ☐ U.S. Mail, postage prepaid
- ☒ Hand Delivery
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United States Department of Justice
Environment and Natural Resource Division
550 West Fort Street, MSC 033
Boise, ID 83724

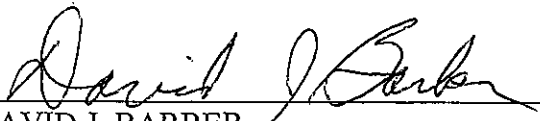
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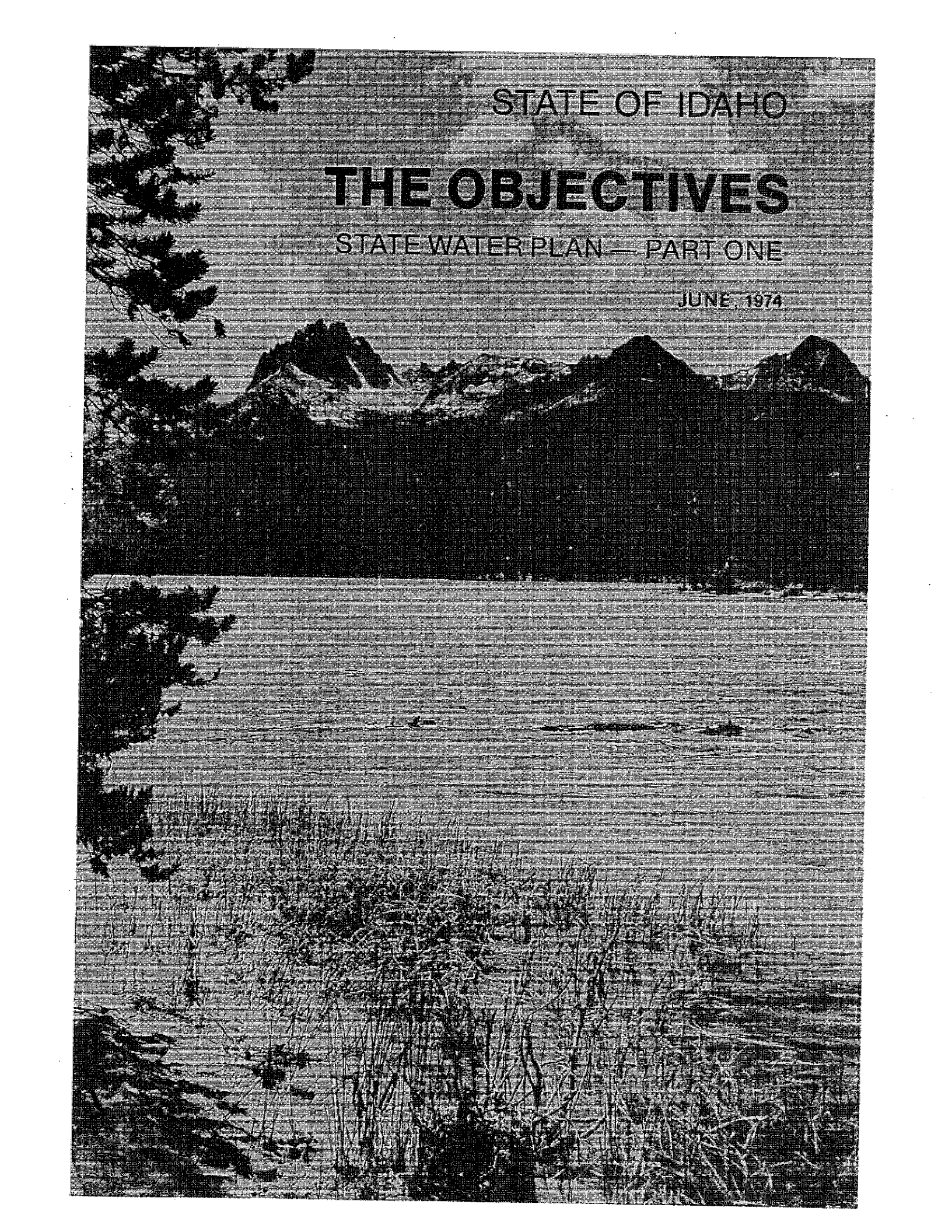
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Chief of Natural Resource Division
Office of the Attorney General
State of Idaho
P.O. Box 44449
Boise, Idaho 83711-4449

Not Applicable



DAVID J. BARBER
Deputy Attorney General

A black and white photograph of a lake with mountains in the background and reeds in the foreground. The image is used as a background for the title page of a report.

STATE OF IDAHO

THE OBJECTIVES

STATE WATER PLAN — PART ONE

JUNE, 1974

STATE OF IDAHO

CECIL D. ANDRUS
Governor

"There shall be constituted a State Water Resource Agency composed as the Legislature may now or hereafter prescribe which shall have power to formulate and implement a state water plan for optimum development of water resources in the public interest . . ."

Constitutional Amendment

IDAHO WATER RESOURCE BOARD

C. Stephen Allred, *Director*

BOARD MEMBERS

John F. Streiff, *Chairman*

George L. Yost, *Vice Chairman*

Ferris M. Kunz

Joseph H. Nettleton

Scott W. Reed

Donald R. Kramer

Franklin Jones

Edwin C. Schlender

R. Keith Higginson

THE OBJECTIVES

Part I
of the
STATE WATER PLAN

JUNE 1974

Third Printing – April 1975

IDAHO WATER RESOURCE BOARD
STATEHOUSE
BOISE, IDAHO

RESOLUTION TO ADOPT

MARCH 8, 1974

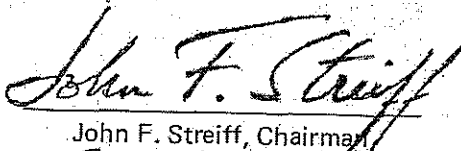
WHEREAS, the Idaho Water Resource Board is charged with the task of formulating a coordinated, integrated, multiple-use water resource policy, and

WHEREAS, the Board did approve on August 17, 1973, a planning procedure for the preparation of an Objectives Report and Basins Reports to implement this policy, and

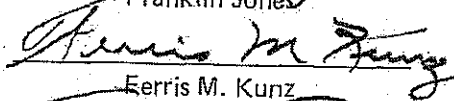
WHEREAS, the Board endorses the statements of planning objectives as contained in this report and desires to make these expressions available to guide the public, other governmental agencies, and the Board staff in formulating a state water resource plan,

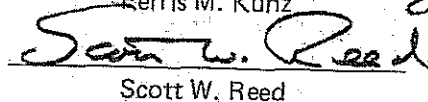
NOW, THEREFORE, BE IT RESOLVED, that this report entitled *The Objectives, Part I of the State Water Plan* be adopted as expressing the water resource policy to be followed in preparation of the State Water Plan,

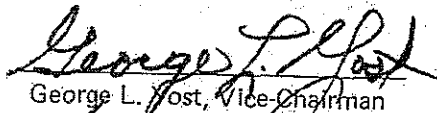
BE IT FURTHER RESOLVED, that the Board, in recognition of constantly changing economic and environmental conditions which must be considered in establishing a state water resource policy, will review these planning objectives annually or upon formal request to determine if revisions in the state water resource policy are warranted.

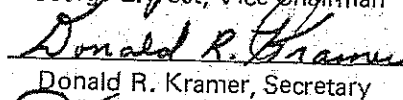

John F. Streiff, Chairman

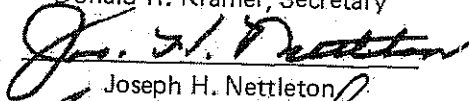

Franklin Jones

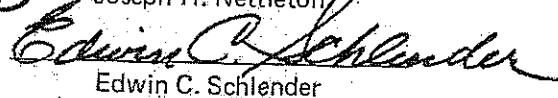

Ferris M. Kunz


Scott W. Reed


George L. Jost, Vice-Chairman


Donald R. Kramer, Secretary


Joseph H. Nettleton


Edwin C. Schlender

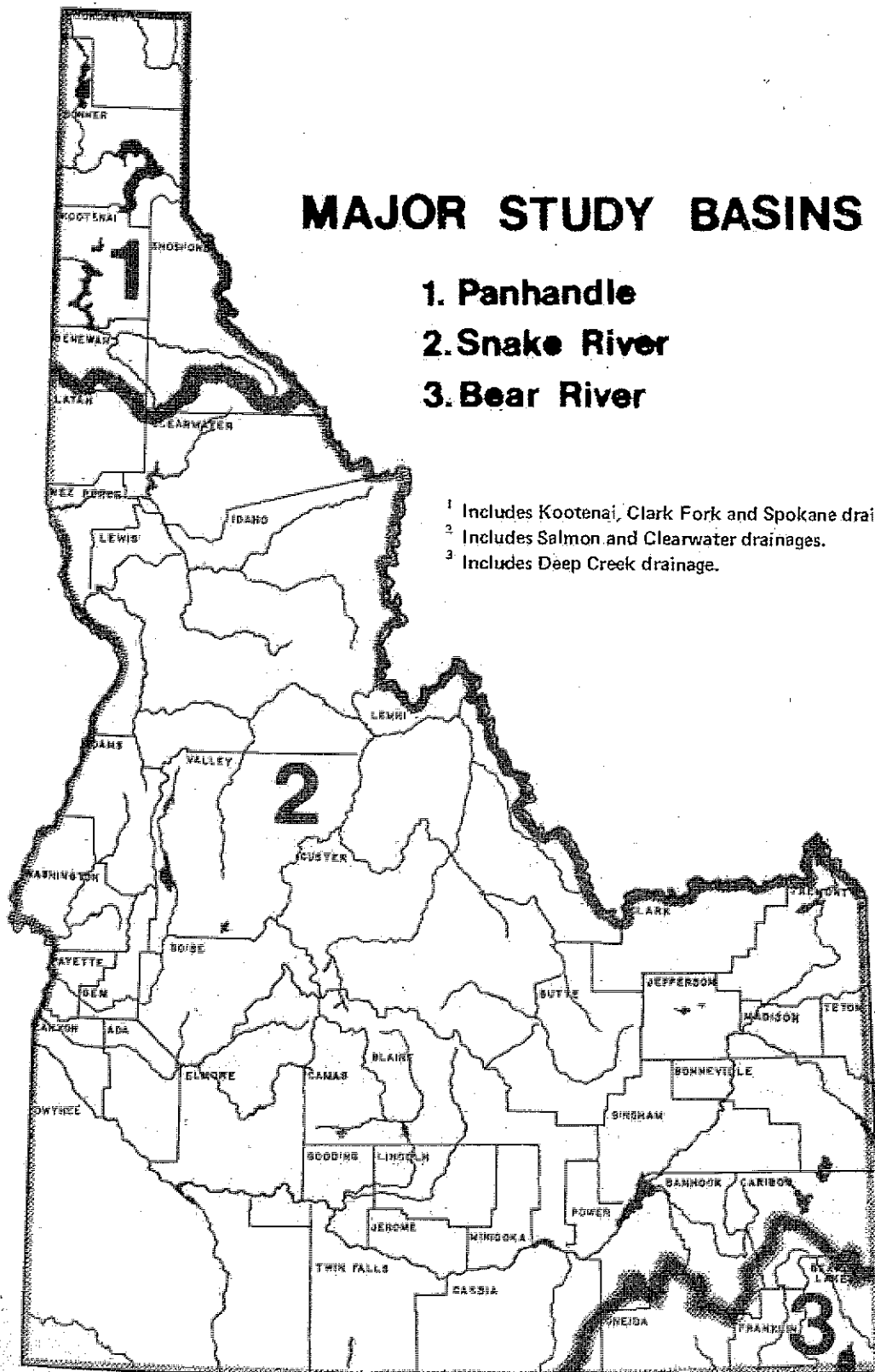
MAJOR STUDY BASINS

1. Panhandle

2. Snake River

3. Bear River

- ¹ Includes Kootenai, Clark Fork and Spokane drainages.
- ² Includes Salmon and Clearwater drainages.
- ³ Includes Deep Creek drainage.



FOREWORD

The Objectives is the first of a series of documents which will comprise the State Water Plan. The purpose of the report is to identify and define the policies and objectives which the Idaho Water Resource Board has adopted to govern the planning, development, and conservation of the state's water and related lands.

The projects and programs necessary to implement the objectives will be identified and evaluated for each major river basin and presented in separate basin reports. Basin reports will be prepared for the Panhandle basins, Snake River basins, and Bear River basins. These three major reports, to be completed by 1977, and *The Objectives*, will constitute the Idaho State Water Plan.

The objectives presented in this report are responsive to public input obtained through public information meetings, public hearings, and public opinion surveys which had been conducted after the Interim State Water Plan report was published. Board members, in adopting these objectives, have considered the complex inter-relationship of economic, social, and environmental factors. Legal and institutional restraints were also considered.

The State Water Plan will serve as a valuable guide to Idaho citizens and public officials. It will help to insure that decisions made regarding the state's water and related land resources are compatible and will be designed to help meet present and future water needs.

COVER PHOTO: Redfish Lake in Stanley Basin lies in the valley of the Sawtooth Mountains in central Idaho. (Photo courtesy of Marshall Edson)

PHOTO CREDITS: Bureau of Reclamation — 29, 34; Commerce and Development — 2, 20, 22, 32, 35, 38; Corps of Engineers — 18 (inset); Fish and Game — 9, 16, 23, 24, 39, 40; Forest Service — 28; Idaho Power Co. — 11, 26, 30; Portland and General Electric Co. — 18; Union Pacific Railroad — 35; Water Resource Board — 16.

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near Pocatello and Idaho Falls. Higher mountain valleys often average less than one month per year without freezing temperatures.

Precipitation levels differ greatly because of the topography. Large areas in the mountain portions of the Clearwater, Payette, Boise, Salmon, and Priest river basins receive from 40 to 50 inches of rainfall annually, while some arid plains in southern Idaho record less than 10 inches. Challis (Custer County) has the lowest recorded average annual precipitation of 7.09 inches and Deadwood Summit (Valley County) has the highest of 98.6.

LAND

Land area of Idaho is 52,910,000 acres — about that of Great Britain.

Ownership is an important factor affecting land use and management. About 64 percent of Idaho area is owned by the federal government. Private interests own about 30 percent and almost 6 percent is owned by state and local communities. The Forest Service and the Bureau of Land Management are the dominant governmental land holders — with over 96 percent of the total federal lands.

The 1970 acreages of land use are given in Table 1; they are illustrated by percentages in Figure 1.

WATER

Idaho is fortunate to have significant quantities of both surface water and groundwater.

Runoff of the principal streams is illustrated in Figure 2. Relative mean annual runoff is based on streamflow records of 1929 to 1958, adjusted to reflect the 1970 level of development. The pattern and magnitude of seasonal flows of the Snake River and many of its tributary streams are affected greatly by storage facilities, diversions and return flows from irrigation. In dry years, flows of many southern Idaho streams are almost entirely diverted.

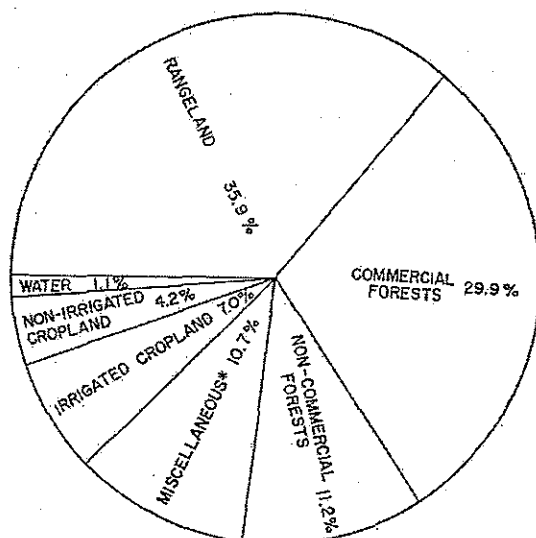
TABLE 1
LAND USE, 1970

USE	Acres (Approx.)
Cropland, irrigated	3,750,000
Cropland, nonirrigated	2,250,000
Forests, commercial	16,000,000
Forests, noncommercial	6,000,000
Rangeland ¹	19,200,000
Miscellaneous urban, road, waste-lands, escarpments, and other	5,710,000
Total land	52,910,000
Water area	565,000
Total land and water	53,475,000

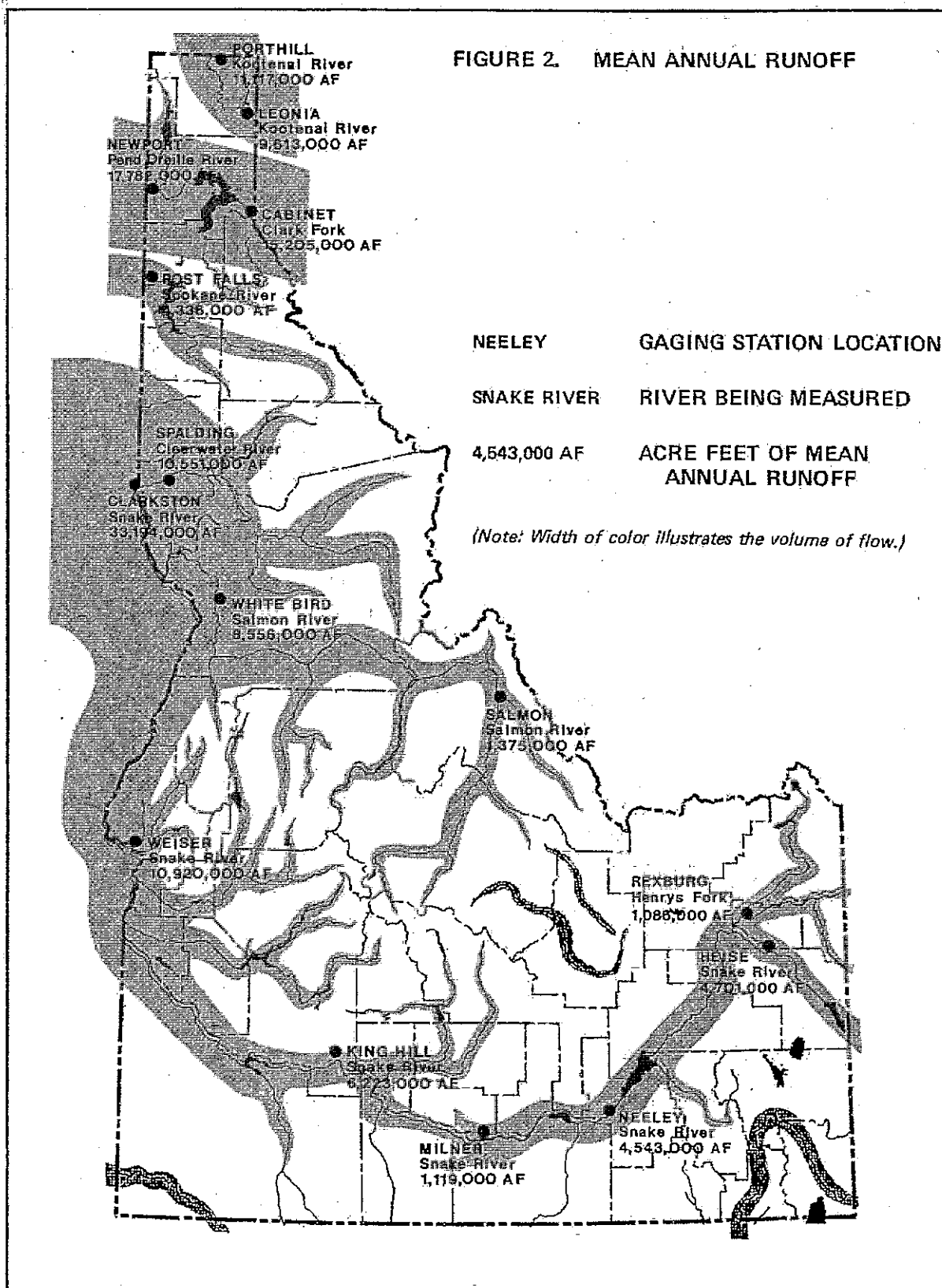
¹U.S. Census of Agriculture 1964 to reflect 1970 conditions.

Source: 1968 Idaho Water Resources Inventory, Table 1, Page 9.

FIGURE 1. PERCENTAGE OF LAND USE



* MISCELLANEOUS: URBAN, ROADS, WASTELANDS, ESCARPMENTS, OTHERS.



To determine water availability under present levels of development, records of runoff covering many years are adjusted to a comparable level of water-supply development and water use. Adjusted streamflows in cubic feet per second (cfs) are shown in Figure 3 for the Snake River. Comparable flows are simulated graphically for the Coeur d'Alene and Clearwater. This figure also demonstrates the wide variations in annual flows: 1931 and 1937 were "dry" years and 1943 and 1956 were years of abundant water.

Natural lakes occur mostly in the central mountainous area; the largest, however, is north Idaho's Pend Oreille with 148 square miles of surface area. The largest man-made reservoir is behind Dworshak Dam. This lake is 53 miles long, has a surface area of 17,000 acres and contains 3,468 million acre-feet of water when full.

A number of natural lakes are regulated within prescribed limits by outlet dams, and thus provide a certain amount of storage water that can be released as desired. Included in this category are Payette, Bear, Coeur d'Alene, Priest and Pend Oreille lakes. A Wyoming lake, Jackson Lake, was constructed primarily to provide water for irrigation in Idaho.

Many large reservoirs were built as multi-purpose, having allotted spaces of storage amounts for power production, irrigation supply, fish and wildlife, flood control and other purposes. The operation criteria established for each reservoir is dependent upon the purposes authorized for the project and the relative priorities assigned.

The overall groundwater sources of Idaho have barely been tapped although over-development has occurred in some parts of the state. The principal aquifers occur in the Snake River Plain, Rathdrum Prairie, and along the western side of the state. Over-development of the groundwater resource has occurred in the Raft River Valley, the Blue Gulch area west of Twin Falls, and in a portion of the Goose Creek drainage south of Burley.

Groundwater provides for the flows of springs — Thousand Springs for example — and to lakes, reservoirs and streams. Projects and uses which influence groundwaters often affect the surface systems. Changes in surface systems likewise affect associated groundwater systems.

Approximately one million acres of land are irrigated with groundwater in the state. In addition, nearly all water requirements for municipal, industrial, domestic and livestock uses are met from groundwater. Many uses have nearly constant demands; but the largest use, irrigation, has primarily a seasonal demand.

Various state and federal studies are being made to explore the possibility of developing the Snake Plain aquifer to supply pumped irrigation water and store excess surface flows as recharge. The quality of groundwater is generally excellent. However, the chemical compatibility of recharge water with that already in the aquifer requires study, as does the problem of how the recharge water moves from the original site, the possible water-logging of adjacent lands, biological and mechanical plugging of recharge facilities, and other operational problems.

GEOTHERMAL WATER

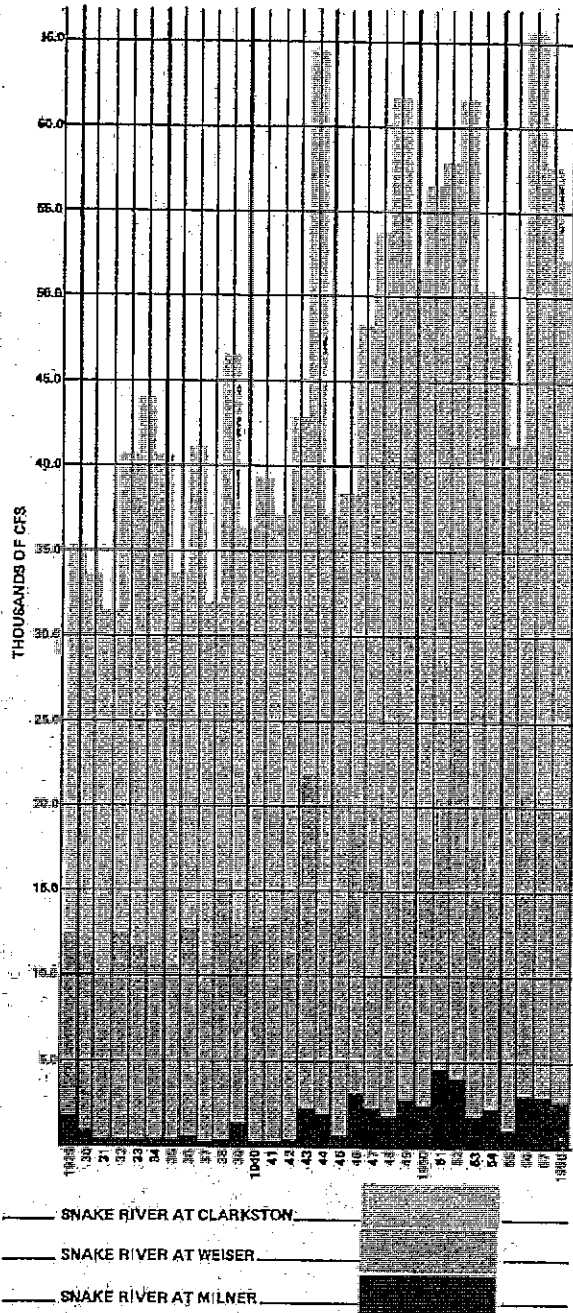
There are at least 380 hot springs and wells which have been identified in the central and southern parts of Idaho. A 1973 study of the Idaho Department of Water Administration inventoried 124 of these hot water sources as possible geothermal resource sites. That study identified 25 areas as having potential geothermal possibilities based upon geochemical investigations.

The Idaho legislature has declared that the geothermal resource of the state is a public resource. Laws have been enacted to control the development of geothermal resources within the state and to provide for the leasing of state lands for geothermal resource development purposes.

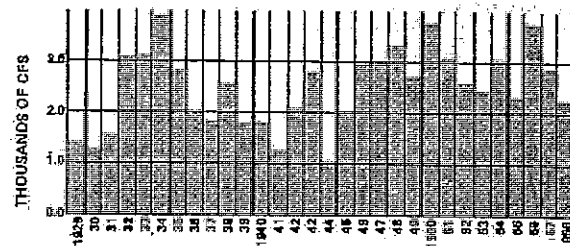
The federal Geothermal Act of 1970 provides for the classification of public lands valuable for geothermal steam and associated geothermal

FIGURE 3. STREAMFLOW VARIATIONS
(RECORDED 1929 THROUGH 1958)

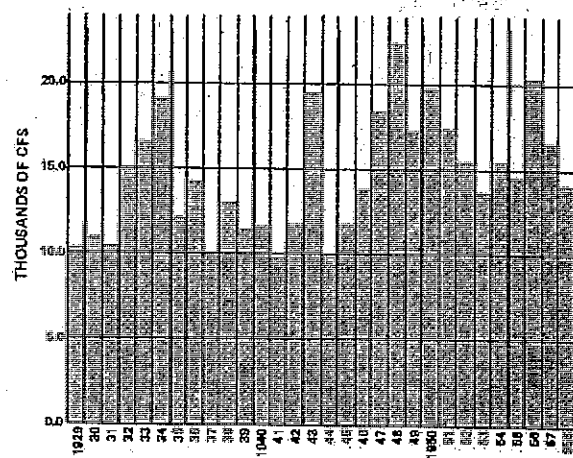
SNAKE RIVER AT THREE LOCATIONS



COEUR D'ALENE RIVER AT CATALDO



CLEARWATER RIVER AT SPALDING



resources. Land so classified is reserved in federal ownership. Classification assists the Department of the Interior to determine which lands are within the "known geothermal resource area" (KGRA) and thus subject to the competitive leasing provision of the act. Two areas in Idaho totaling 21,800 acres have been classified as KGRA; one is in the Raft River Basin and the other close to Yellowstone National Park in eastern Fremont County. There are also large state-owned land areas within the known geothermal areas.

Potential uses for geothermal water include power generation, space heating, raising certain kinds of crops and fish, recreation and mineral production.

MINERALS

Mining of resources played a prominent role in the state's early settlement and economic growth. Many metal deposits which dominated the industry's early years still produce valuable yields. Idaho leads the nation in silver production; the state produces major amounts of lead and zinc. Remaining deposits of these three metals should allow continued production at present rates.

By far the greatest part of metal production occurs in the Coeur d'Alene mining district of Shoshone County. The region is famous for its yields of lead, silver, zinc, and copper, but it also contributes small amounts of gold, antimony, and tungsten.

The growth of a market for phosphate in recent years has caused a phenomenal increase in its production in the state. Abundant quantities are found in bedded sedimentary deposits throughout the southeastern sections. Gypsum is utilized as a fertilizer and in construction; it is found mainly along the Snake River north of Weiser.

Construction minerals include limestone and shale, mica, pumice, cement, sand and gravel, perlite, stone (especially basalt), clay and volcanic cinder. Uranium deposits are found in

several locations, but only the deposit near Stanley has been actively mined.

Beryllium has been discovered in several places in Idaho. The largest deposit is in the Sawtooth Mountains northwest of Sun Valley. Other minerals found are titanium, antimony, mercury, tungsten, cobalt, thorium, columbium-tantalum, vanadium and cadmium. Among the 72 varieties of Idaho stones are agates, jasper, opals, sapphires, rubies and garnets.

TIMBER

Idaho is fifteenth nationally in total commercial forest area and fifth nationally in volume of standing saw timber (115 billion board feet). Unlike most other states, more than half of Idaho's timber output comes from federally owned land. Some of the federal forest lies in the Primitive or Wilderness areas and is not presently available for harvest.

Shoshone, Clearwater, Valley, Idaho and Lemhi counties are leaders in commercial forest acreage; each has more than 1.2 million acres. Although the number of sawmills statewide declined nearly 50 percent between 1956 and 1966, increased efficiency and expansion in the remaining mills caused almost a doubling in mill productivity. In-state annual production per mill increased from 5.2 million board feet in 1956 to 9.7 million board feet in 1966. In 1971, activities related to timber production accounted for \$117 million per year in wages — about 36 percent of the state's manufacturing payroll.

Commercial forest trees are primarily conifers, with softwoods harvested predominating over hardwood in a ratio of 2,000 to 1. Douglas fir, true firs, and white and ponderosa pine are among the most commercially significant native trees.

FISH AND WILDLIFE

Anadromous fish in Idaho waters include chinook salmon, steelhead trout and sockeye salmon. These fish now spawn only in the Salmon and Clearwater river drainages in Idaho and in the Snake River below Hells Canyon. Dam developments on the Boise and Payette

THE OBJECTIVES

Beneficial and efficient water use

OBJECTIVE: The policy of the Idaho Water Resource Board is to follow a broader definition of the term "beneficial use of water" to include all water uses, both consumptive and nonconsumptive (for example stream resource maintenance flows) and to seek implementation of those water resource projects and programs which provide for this definition through efficient water use practices.

The criteria by which the Board will evaluate water resource projects and programs as to whether they are in compliance with this objective are as follows:

1. All new water uses, both consumptive and nonconsumptive such as irrigation, municipal, industrial, power, mining, fish and wildlife, recreation, aquatic life, and water quality will be judged to have equal desirability as beneficial uses, except in some cases as may be affected by Article XV, Section 3 of the State Constitution.¹
2. When conflicts occur between meeting new water uses, the decision will be based on an evaluation of the beneficial and adverse environmental, economic, and social impacts.
3. Protection will be provided for all existing water rights as long as they are efficiently and beneficially used.

¹The Constitution provides a designation of preference between four uses: domestic, agricultural, manufacturing, and mining.

4. All projects and programs submitted for Board approval must be designed and operated to achieve maximum efficiency for water use that can reasonably be expected under current technology and in the public interest.
5. Priority will be given to projects and programs designed to help achieve more efficient use of water from existing systems.

DISCUSSION: The adoption of this objective by the Board means that state water resource policy will provide an equal opportunity to plan and implement those projects and programs designed to meet the needs of all water use functions. Where competition exists, the decision as to which water use will be met, will be made after a full evaluation of all adverse and beneficial effects. The efficient use of water, insofar as technologically and economically feasible, must be incorporated as part of the design and operation of all water resource projects and programs.

Fourth Orr Affidavit
Exhibit 7:

**“Future Upstream Depletion Above Hells
Canyon” by Lynn Crandall (Apr. 6, 1953)**

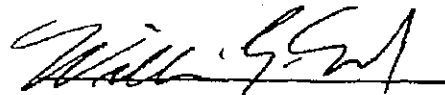
**(Exhibit 119 in Formal Hearings Before the Federal Power Commission,
Project No. 1971, P-2132, P-2133) (admitted Jan. 13, 1954)**

UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

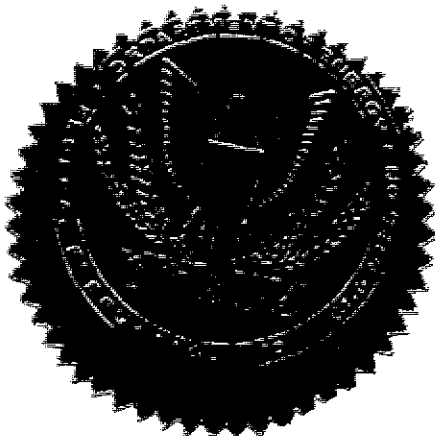
CERTIFICATION

I hereby certify that the attached 8 pages are
true and correct copies of a document on file with the
Commission.

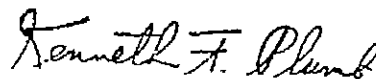
MAY 18, 1984
Date



Records Officer



I hereby certify that the Records
Officer, whose signature appears above,
is official custodian of the records of
the Federal Energy Regulatory Com-
mission which certification is made
and was such official custodian at
the time of executing the above
certification.



SECRETARY

WATER POWER COMMISSION

File No. P-1986, chd Filed with Exam. Certification
 Serial No. 119 dated 5/6/55
 Date Identified 8-6-53 FUTURE UPSTREAM DEPLETION ABOVE HELLS CANYON
 Date Admitted 1-13-54 By Lynn Crandall 1/

April 6, 1953

19936

The discussion of this subject will be divided into various sections as follows:

1. The Snake River Plain

This term as used herein applies to the area north of Snake River extending southwest from St. Anthony to Bliss, beneath which the great Snake River ground-water flow moves. Generally speaking, the soils in this area, where they exist, are of a satisfactory quality for agricultural use outside of local areas of sand dunes. There exists, however, a wide range of soil depths and depths to ground water. A large portion of the area is either bare lava rock or shallow soils. About 300 feet is assumed to be the maximum pumping lift likely to be sustained during the Hells Canyon payout period for profitable farming operations in this region. It is possible that greater lifts than this may prove feasible under certain conditions but the additional acreage involved is not likely to be of great magnitude. After examining the available information on this area, including my own observations from driving over it for many years, I believe that possibly 400,000 acres may be feasible of development by ground-water pumping. This figure and other similar ones in this report include the pumping developments already made since 1947. In this section the ground-water supply is believed to be adequate generally and the controlling elements are good land and feasible pumping lifts.

2. Minor tributary streams from the North, Camas Creek to Big Wood River

In this section ground-water pumping will be limited in some cases by available supplies contributed from the tributary streams. In some of the valleys pumping may be used as supplemental supply for lands that do not now receive a full supply in dry years. It is believed that the total use might be the equivalent of supplying about 45,000 acres of new lands. This would include any new storage developments on these streams.

3. Fort Hall Project

There are about 40,000 acres of new land on this project susceptible of irrigation, probably mostly by pumping from ground water. Some lawyers claim that the Indians' treaty rights would entitle them to so use the water even if it interfered with downstream Snake River rights. Some small developments are already under way by leasing the land for a term of years to whites who agree to provide a well on the land. About half of this area is south of the Portneuf River in the Michaud Flat-Bannock Creek region and about half in the vicinity of Fort Hall. The lands around Fort Hall have mostly somewhat sandy soils.

1/ District Engineer, U. S. Geological Survey, Idaho Falls, Idaho, and Snake River Watermaster, Idaho State Department of Reclamation.

4. Marginal increases to existing projects above American Falls

There is a narrow fringe of good land along the benches bordering the lands at present irrigated from Snake River along the east side of the valley between Ririe and Blackfoot. This may be irrigated partly by pumping from ground-water and partly by pumping from existing canals whose water supply will be augmented from Palisades reservoir. Some similar areas exist west of Snake River between Roberts and Shelley. During recent years there has been considerable clearing of brush lands and those subject to flooding in high-water years between Heise and Roberts. All these and others somewhat similar elsewhere are estimated to total 15,000 acres starting from 1947.

5. Tributary valleys south of Snake River, from Portneuf River to Salmon Falls River, inclusive.

In most of this section ground-water pumping developments will be limited by water supply or pumping lift. In some of the tributary valleys ground-water pumping might be used as supplemental supply; in others it would be used on new land. It is estimated that the total use for both purposes might be equivalent to irrigating 60,000 acres of new land.

6. Bruneau Project

The Bruneau Project of about 400,000 acres as heretofore proposed required the construction of a dam about 500 feet high on Snake River near Bliss, Idaho, and the creation of a reservoir which would flood Hagerman Valley, including about 10,000 acres of irrigated land and 4 power plants of the Idaho Power Company. Owing to the likelihood of large leakage thru the porous inter-canyon lava fill at the damsite it does not now appear feasible to construct the proposed dam. This fact, together with the large costs for property damage, appears to me to warrant discarding the proposed large Bruneau project for consideration within the foreseeable future. A possibility exists, however, of building a smaller dam on Snake River in the vicinity of the mouth of Salmon Falls Creek that would back the water upstream to the foot of Shoshone Falls and water could be diverted from above this dam to irrigate a portion of the Bruneau Project. Snake River at this point has at present a dependable flow of about 2800 second-feet that enters the river below Milner which would be sufficient to irrigate about 110,000 acres of the Bruneau Project. This flow may be appreciably lessened by future pumping developments on the Snake River Plains. This plan has not been studied in detail as to its feasibility and although it would doubtless be quite costly per acre of land irrigated I have included 80,000 acres in the list of projects that might conceivably be built during the 50-year payout period for the Hells Canyon project, assuming some decrease in present water supply due to upstream ground-water pumping.

7. Mountain Home Project

If the high dam near Bliss heretofore proposed for the Bruneau Project is discarded it will not be possible to supply the second unit of the Mountain Home project as contemplated in previous plans of the Bureau of Reclamation. Mr. W. G. Sloan has proposed a plan for irrigation of 123,000 acres of the Mountain Home project, by a combination of pumping from Snake River to Deer Flat Reservoir and ground-water pumping in Boise Valley. If this is done it would then be possible to irrigate an additional 192,000 acres from Payette-Boise River sources making a total of 315,000 acres on the Mountain Home project without use of the high diversion dam near Bliss. If this area is placed under irrigation on the Mountain Home project the ground-water levels beneath the project could very well rise to a level that would permit of ground-water pumping for the remaining 57,000 acres on the Mountain Home project heretofore proposed. Although these matters are somewhat speculative, the good quality of land and favorable location of this project appear to me to warrant the belief that some plan will eventually be devised for irrigating the full acreage of 372,000 acres.

Permits granted by the State of Idaho for ground-water pumping since interest in this subject started in 1947 are as follows:

<u>Year</u>	<u>New Land</u> <u>(acres)</u>	<u>Supplemental supply</u> <u>for lands now irrigated</u> <u>(acres)</u>
1947	12,400	7,600
1948	192,600	34,200
1949	39,000	73,000
1950	75,200	18,600
1951	104,400	104,600
1952	<u>114,270</u>	<u>6,500</u>
Total	537,870	244,500

Figures are for the entire State but nearly all are in the Snake River drainage area in southern Idaho. Some of these permits or water filings are no doubt speculative and will be canceled for failure to do the development work within the time allowed by the permits. In some areas also the permits cover more land than can be irrigated from the locally available water supply. However, additional filings are being made all the time at the rate of 100,000 acres annually and many wells are being drilled by individuals without permits. Under the provisions of the Idaho Constitution water rights can be so established without requiring authorization by the State and about 20% of irrigation wells drilled to date have been developed without applying to the State for a permit. Considering these various matters it appears from these water permit figures that the total acreage

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- 4 -

of feasible ground-water pumping projects in Idaho on Snake River above Hells Canyon could possibly be as much as 700,000 acres of new land since 1947.

New land areas (acres) that might be irrigated by 2010
(Figures include developments since 1947)

Michaud Flat to Nealey (outside of Fort Hall Reservation)	25,000
Minidoka North Side Extension from river flow	13,000
*Snake River plains ground-water pumping	400,000
*Minor tributaries Camas Creek to Big Wood River	45,000
*Fort Hall Reservation	40,000
*Marginal increases to existing projects	15,000
*Tributaries Portneuf to Salmon Falls River	60,000
Bruneau Project	80,000
Bruneau River	40,000
*Mountain Home project	372,000
Grandview pumping	18,000
*Weiser River basin	25,000
*Owyhee River basin	15,000
*Other tributaries below King Hill	20,000
*Miscellaneous ground-water pumping areas not listed above	132,000
Total	1,300,000

*All or partly ground-water pumping

The total consumptive use of water in this area will average about 2.3 acre-feet per acre actually irrigated. Assuming that 0.3 acre-foot per acre of this will be available from precipitation now used by native vegetation and that 10% of the area will be occupied by roads, buildings, small rocky areas, etc., we arrive at a consumptive water use of 1.8 acre-feet per acre from sources other than local precipitation applicable to the gross acreage.

Supplemental use on currently irrigated lands either by ground-water pumping, or from storage in reservoirs such as Palisades and Anderson, will also increase the consumptive use. This is a matter that cannot be calculated with any exactness because it would be small in good water years and larger in dry years. It might be estimated roughly at 270,000 acre-feet annually which would supply 1,000,000 acres with one-half of its consumptive use in three out of 10 years.

Evaporation losses on new reservoirs constructed since 1947 or proposed for new construction, in excess of water losses on the flooded areas prior to reservoir construction, will be of the magnitude of 130,000 acre-feet annually.

The sum of these three items, consumptive use on 1,300,000 acres of new lands, additional consumptive use from supplemental supply on lands now irrigated, and evaporation losses from new reservoirs will amount to about 2,740,000 acre-feet annually at the end of the 50 years Hells Canyon payout period.

If we assume that the Hells Canyon project will be completed by 1960, the end of the 50-year period would be 2010. The figures heretofore given refer to developments beginning in 1947 when the ground-water pumping projects started. Probably close to 150,000 acres of new lands have already been developed since 1947, mostly from ground-water pumping. Assuming a uniform rate of increase from now until 2010 the average additional consumptive use since 1947, during the Hells Canyon payout period, would be 1,650,000 acre-feet annually.

This additional consumptive use will not, however, decrease the stream flow at a uniform similar annual rate. The flood waters in years of ample runoff will be stored in new reservoirs such as Palisades and will be fed out onto the lands in dry years. Ground-water pumping will draw to some extent during dry years on water stored in the ground, with the ground-water supply being replenished in wet years. As a result the stream flow at Hells Canyon will generally be depleted more than the average in wet years and less than the average in dry years.

By reference to the attached Plate No. 1 it will be observed that the gain, excluding surface runoff from Big Wood River, in Snake River between Milner and King Hill has been steadily increasing during the past decade and from 1946-50 was running over 300,000 acre-feet annually greater than it was during the 1928-30 and 1938-41 periods in spite of steadily increasing irrigated acreage upstream. This would appear to be a permanent increase during the future as compared to past years except as it would be modified by new upstream ground-water pumping, and is doubtless due to increased canal diversions shown on the diagram. If the increased gain noted in 1951 and 1952 continues in future years the permanent gain would be greater than the 300,000 acre-feet above mentioned.

The Gooding project which began sizable diversions from Snake River in 1931 probably is responsible to a considerable extent for the increased gain as this project has contributed about 300,000 acre-feet of Snake River water annually to the ground water for a number of years past. The project had previously contributed a lesser amount when it received an inadequate water supply from Big Wood River. The recent gain is even greater if compared to the 1931-35 period but it is believed that the comparison will be more useful if made with years of similar precipitation on the plains and similar discharge from the streams whose runoff reaches the plains from the north. From Plate No. 1A it will be noted that a moderate decrease in the gain occurred from 1946 to 1950. This may represent the decreased contributions from river losses and canal diversions in the upper valley above American Falls in 1931 and 1934 indicating a time of travel of around 15 years before the ground water from those sources appears in the Hagorman Valley springs. In any event the gain appears to have resumed its upward trend in 1951 and 1952.

The years of critical water supply for power production at Hells Canyon occur in the period 1929-37 as shown on accompanying Plate No. 2. From the mid-date, 1933, until 1947, when the increased consumptive use figures

used herein start, there was an increase of about 200,000 acres in the irrigated area above Hells Canyon which would consume 360,000 acre-feet annually. This factor, as far as flow during low-water periods is concerned, is probably more than offset by new supplemental storage in such reservoirs as Anderson, Lucky Peak, and Palisades that will increase the river flow in low-water periods over that which occurred in the past.

Past experience on the river has been that irrigation of new land from surface flow of the streams above return-flow sections has increased downstream flow during low-water periods. Future expansion of the irrigated area by pumping from ground water or diversion of water from the stream in or below the return-flow sections will, however, directly reduce the downstream flow during low-water periods.

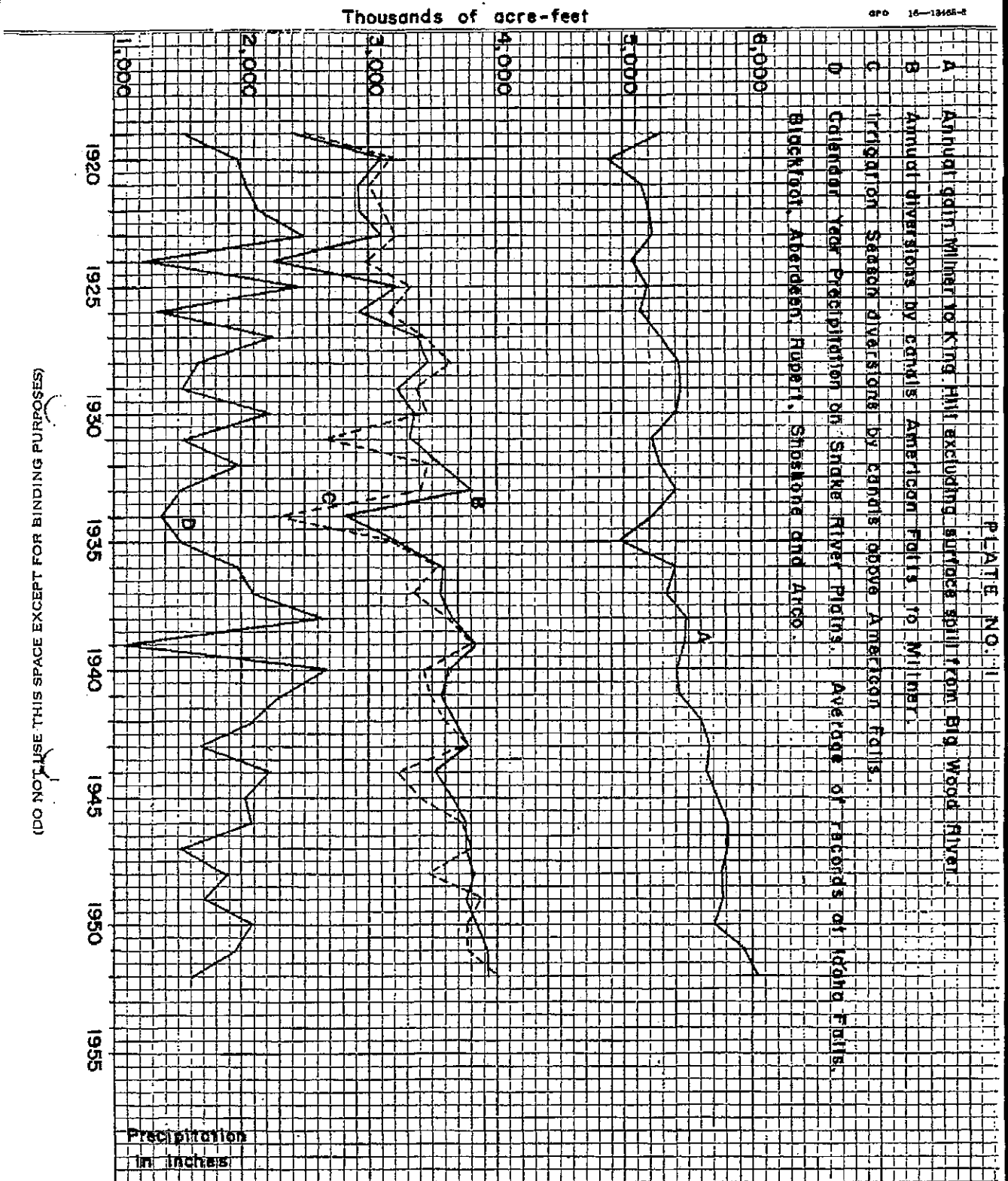
The drought during the early 1930's was the most severe and prolonged of any that have occurred during the 62 past years of stream-flow records on Snake River. The possibility exists that one of equal severity might not occur during the Hells Canyon payout period. If one should occur at the midpoint of the payout period, it is my opinion, considering all the matters herein discussed, that it might result in a runoff at Hells Canyon of about 1,300,000 acre-feet less annually than the historic flows that occurred 1929-37. If a dry period of this severity should occur at the end of the payout period rather than the midpoint, with more land in cultivation, the decrease below the historic flows of 1929-37 might be of the magnitude of 2,200,000 acre-feet annually.

Except in years of well above normal runoff it is quite likely that future years will see the flow of upper Snake River controlled so as to practically eliminate spills past Milner except for storage rights owned by the Idaho Power Company that usually require the discharge of about 155,000 acre-feet annually over Milner dam for downstream use by the Power Company.

Additional storage of about 350,000 acre-feet may be developed on the river above Heise and surplus flood flows that would otherwise spill past Milner can be diverted by new canals onto the Snake River plains, allowed to spread over as large an area as possible, and be dissipated by percolation and recharge wells into the lavas, thereby replacing in part the water consumed by ground-water pumping. Such a project would be expensive and would probably require government financial aid. Similarly any surplus flood waters of Big Wood River could in wet years be diverted onto the lava beds north of Shoshone. The ground-water reservoir beneath these plains is of great capacity. Water contributed to it in the vicinity of Idaho Falls, for example, has to travel 150 miles underground before it reappears in Hagerman Valley, probably requiring a number of years to do so. Return flow from irrigation use below American Falls will of course reappear in lesser time, ranging from several months on portions of the North Side Canal Project to perhaps a year or more from the Minidoka project. If new upstream reservoirs are built and if the surplus flood waters are diverted to this ground-water reservoir it would result in a nearly equalized flow of Snake River at King Hill with an increased flow during low-water periods and less future depletion at Hells Canyon during low-water years than the figures herein suggested.

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER RESOURCES BRANCH

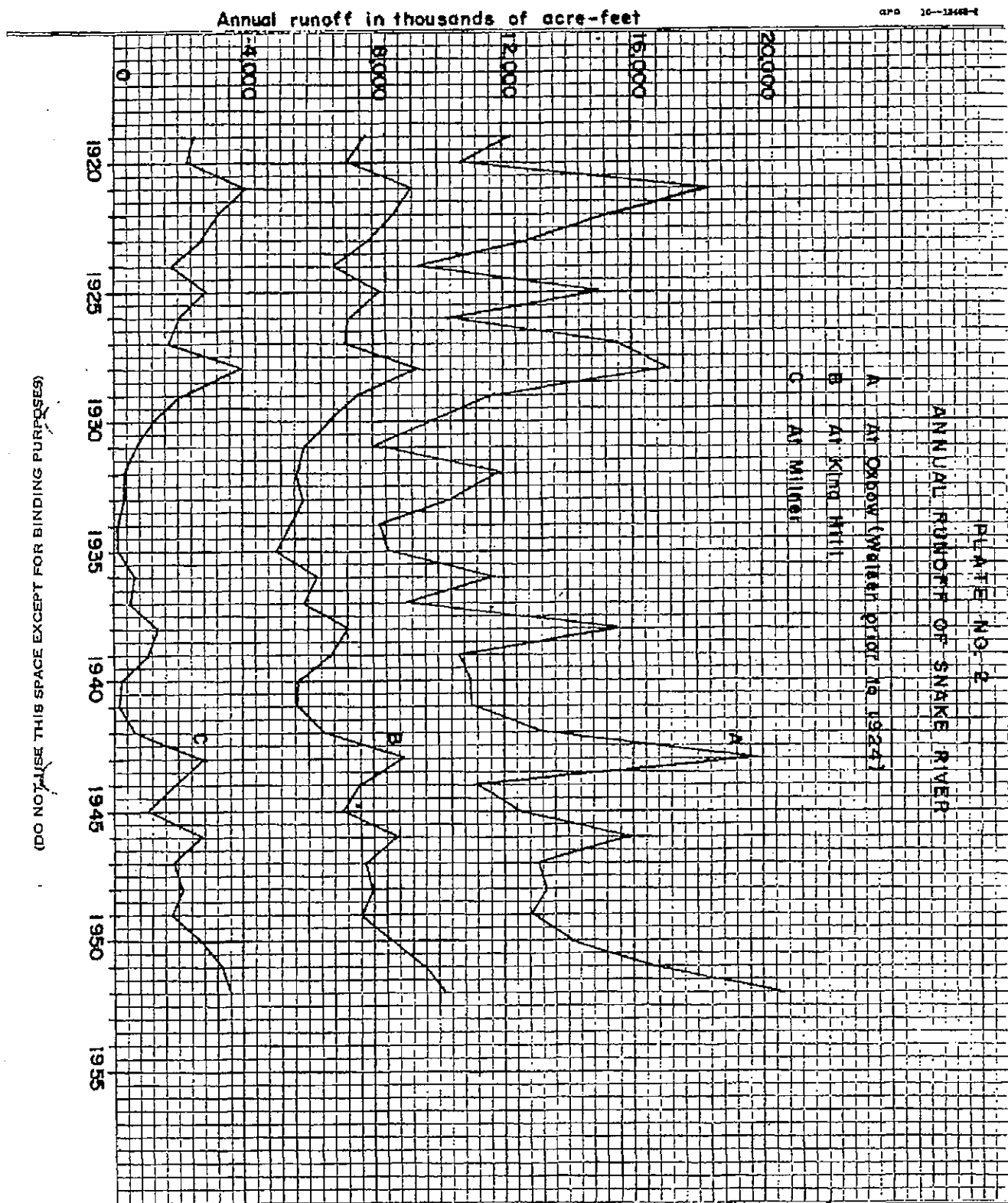
File { Washington
Number { District 10342



(DO NOT USE THIS SPACE EXCEPT FOR BINDING PURPOSES)

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER RESOURCES BRANCH

File { Washington
Number { District { 1443



Fourth Orr Affidavit
Exhibit 8:

**Excerpted Pages of Transcript of
Examination of Lynn Crandall, Formal
Hearings Before the Federal Power
Commission,
Project No. 1971, P-2132, P-2133**

Part 41 - January 12, 1954 to January 13, 1954

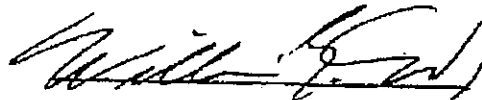
Part 42 - January 14, 1954 to January 15, 1954

UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

CERTIFICATION

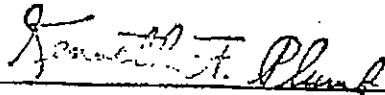
I hereby certify that the attached* 134 pages are
true and correct copies of a document on file with the
Commission.

May 18, 1984
Date

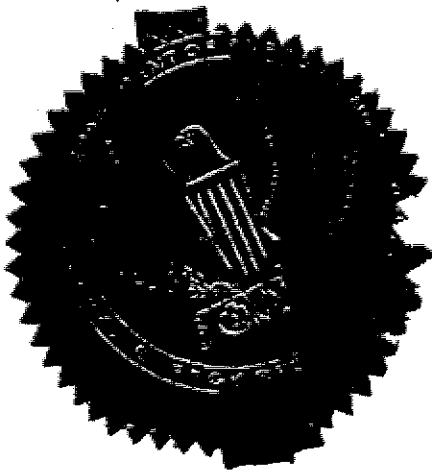


Records Officer

I hereby certify that the Records
Officer, whose signature appears above,
is official custodian of the records of
the Federal Energy Regulatory Com-
mission which certification is made
and was such official custodian at
the time of executing the above
certification.



SECRETARY



FERC-03-F-028

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DAGSF08-019357

ACCESSION NO. 38-A-161 BOX 213

F. P. C. Form No. 39

FEDERAL POWER COMMISSION

PROJECT NO. 1971
P-2132 7 P-2133

IDAHO POWER COMPANY
(Hearing 7-14-52 on)

FORMAL
HEARINGS

IMPORTANT

This file constitutes a part of the official records of the Commission. Do not separate or remove any paper. Any necessary detachments must be made only by Mail and Files Section, with approval of Chief of that Section.

All files should be returned promptly to the file room.

January 12, 1954

TO

January 13, 1954

Part 41

U. S. GOVERNMENT PRINTING OFFICE 16-6470-3

FILE No.

100-2

PROJECT NO. 1971
(HEARING) Part 41

1 PRESIDING EXAMINER: Come to order, please.

2 Do you have another witness to present, Mr. Mason?

3 MR. MASON: Yes, sir, Mr. Examiner, but before I call
4 that witness, who will be Mr. Lynn Crandall, I should like
5 to take up a matter of procedure. You will recall, Mr.
6 Examiner, and counsel will also, that a document entitled
7 "Future Upstream Depletion Above Hell's Canyon", which bears
8 the date of April 28, 1953, has been identified as Exhibit
9 119. You will also recall, Mr. Examiner, that a ruling on
10 the admissibility of Exhibit 119 was deferred.

11 I have been supplied from the Department of the Interior
12 a report bearing the same title by Mr. Lynn Crandall, bear-
13 ing the date of April 6, 1953, and it also carries a foot-
14 note on the first page which is not carried on the document
15 identified as Exhibit 119.

16 I also direct attention to the fact, Mr. Examiner, that
17 the document dated April 6, 1953 gives much better prints of
18 the two charts attached to the report. And I would move at
19 this time that the present Exhibit 119 be withdrawn and we
20 substitute for that exhibit this same, or substantially the
21 same document bearing the date of April 6, 1953, and with the
22 footnote on the first page which is missing from the present
23 Exhibit 119.

24 MR. PARRY: May I inquire, is the text identical?

25 MR. MASON: I think it is. Mr. Crandall has informed me

1 that the reports are identical except for the footnote which
2 was omitted from page one of the copies you had, and that
3 the difference in date occurs because the first supply of
4 copies was exhausted and additional runs were made, and it
5 carried the date of the new run rather than the date of the
6 original run.

7 MR. PARRY: We have no objection to it, Mr. Examiner.

8 PRESIDING EXAMINER: Mr. Parry, it is your exhibit.

9 MR. PARRY: Yes, we have no objection to it.

10 PRESIDING EXAMINER: You will have to withdraw it if
11 it is to be withdrawn.

12 MR. PARRY: In order to accommodate Mr. Mason, I will
13 ask to withdraw the copies heretofore marked as Exhibit 119
14 and ask that the ones now supplied by Mr. Mason be substituted
15 in lieu thereof with the same number.

16 PRESIDING EXAMINER: Very well, that may be done, and I
17 will ask the reporter to instruct his firm to send over the
18 copies of Exhibit 119 which they are holding over there as
19 identified but not received, and we will make the substitu-
20 tion here with the copies with the copies that Mr. Mason is
21 now furnishing as Exhibit No. 119 for identification. As
22 far as the sponsorship of the exhibit is concerned, I don't
23 think that is going to trouble us very much.

24 MR. PARRY: No.

25 MR. MASON: Then, under those circumstances, I would

1 assume it is appropriate for me to make available to Mr.
2 Parry four copies for the record for substitution purposes,
3 and I would presume, Mr. Examiner, that the identification
4 date of the exhibit would remain the same, namely, August
5 6, 1953, and this is merely a physical substitution of
6 copies. Is that correct?

7 MR. INMAN: April 6..

8 MR. MASON: August 6. I was talking about the date it
9 was identified, August 6.

10 PRESIDING EXAMINER: At page 4315, according to the index
11 that we have.

12 MR. MASON: That is correct.

13 PRESIDING EXAMINER: Especially so since one of the
14 witnesses, or perhaps two of the applicants' witnesses,
15 made reference to it in their testimony at about that time.
16 It would have to relate back to those dates.

17 MR. MASON: That is what I had in mind, Mr. Examiner.
18 I knew it had been used in the testimony.

19 At this time I will call Mr. Lynn Crandall to the stand.
20 Whereupon,

21 LYNN CRANDALL

22 was called as a witness, and, having been first duly sworn,
23 was examined and testified as follows:

24 DIRECT EXAMINATION

25 BY MR. MASON:

Q Will you please state your name and address for the record?

A Lynn Crandall, Idaho Falls, Idaho.

Q Will you state by whom you are employed and in what position?

A I am District Engineer of the United States Geological Survey of the upper Snake River. I am also Watermaster of Water District No. 36, which includes the irrigated lands from the Snake River in ^{Idaho} ~~Idaho~~ which is a State position, being elected annually by the water users. I am also a deputy State reclamation engineer for the State of Idaho, which is an annual appointment, in charge of the delivery of stored water from the Snake River reservoirs.

Q For what period of years have you been the Snake River Watermaster?

A From 1930 to date.

Q Continuously?

A Yes, sir.

Q Now, would you please give us, Mr. Crandall, a statement of your education and experience, if you will, please, sir.

A I graduated from the College of Civil Engineering at Cornell University in 1910. From 1910 to 1916 I was employed by the U. S. Geological Survey on stream gauging work in Idaho and Utah. From 1916 to 1920 I was hydraulic engineer with the Twin Falls Northside Land and Water Company, in charge of

1 investigations of use of water and water supply on a 170,000-
2 acre irrigation project in the Snake River Valley in Idaho.
3 From 1920 to 1930 I was Commissioner of the United States
4 District Court of the District of Idaho in charge of the
5 distribution of water on Big Lost River, Idaho, and a study
6 for the court of the use of water on that stream and the
7 effect the storage of water in a reservoir had upon the
8 supply of natural flow rights.. During the last four years
9 of that period, from 1928 to 1930, I was also Commissioner
10 for the same court in charge of the distribution of water
11 on Salmon Falls River, a tributary of the Snake River, which
12 rises in Nevada and flows into Idaho. During the same period
13 I also carried on a general engineering practice at times
14 when I wasn't occupied with work in these other positions,
15 and I made numerous reports and investigations in connection
16 with water problems on the Snake River and its principal
17 tributaries. From 1930 to date, as I said, I have occupied
18 this position as District Engineer of the Geological Survey,
19 and Watermaster on the river.

20 Q Could you , please, sir, just generally, give us
21 some idea of your duties in your present positions?

22 A Well, as District Engineer I have charge of the
23 collection of stream flow and reservoir records in that
24 portion of Idaho on the upper Snake River and its tributaries
25 above Milner Dam, and as Watermaster I have charge of the

1 distribution of the natural flow of the stream, and as
2 Deputy State Reclamation Engineer the distribution of the
3 stored waters, most of those to about one hundred canal
4 companies serving a million and a quarter acres of irrigated
5 land.

6 I am also the author of the annual reports of Water
7 District 36, which is an extensive volume of report, and I
8 am joint author of many water supply papers published by the
9 Geological Survey, including "Geology and Ground Waters of
10 the Snake River Plains", "The Geology and Ground Waters of
11 the Mud Lake Region", "The Wells on the Snake River Plains",
12 and many publications giving the result of stream flow
13 measurements in that area.

14 Q Do you have before you, Mr. Crandall, a copy of a
15 document entitled "Future Upstream Depletion Above Hell's
16 Canyon" by Lynn Crandall, dated April 6, 1953, which has been
17 identified here as Exhibit 119?

18 A Yes.

19 Q Was that document or report, including the two plates
20 attached thereto, prepared by you or under your supervision?

21 A Yes, it was prepared by me.

22 Q Would you please tell us what source material and
23 data and other information you had available and used in the
24 preparation of this report that is not stated in the document
25 itself?

1 A Well, the information is largely of my personal
2 knowledge acquired during these 40-odd years that I have
3 worked in the area, supplemented by the reports of the
4 Geological Survey, reports of the State Reclamation Engineer,
5 and reports by the U. S. Bureau of Reclamation in their
6 files in their Boise office, and personal conferences with
7 many individuals who lived in these tributary areas, and
8 from watermasters on the projects and things of that kind.

9 Q Do you have any further explanation that you would
10 like to make, Mr. Crandall, in connection with your report
11 that you think ought to be brought out or that would make it
12 clearer in any respect?

13 A Well, I don't know. I might make a general state-
14 ment of the basis upon which I prepared this report, if you
15 would like.

16 Q If you would, please, sir.

17 A It is a difficult matter in any line of human en-
18 deavor to make estimates of what is going to happen a long
19 distance in the future. That is particularly true in so
20 complex a matter as water supply available during the pay-
21 out period for the Hell's Canyon project. Not only must we
22 base it on the stream flows of the past but it will be
23 modified by additional development. That development will
24 depend on the availability of land and water, it will depend
25 on the future price of farm crops, whether and to what extent

1 those prices may be subsidized or supported by the govern-
2 ment, the extent to which the government might subsidize
3 some of these proposed irrigation projects; all of those
4 things make it extremely difficult to arrive at a figure
5 with a great deal of assurance. I had some acquaintance
6 years ago with a number of irrigation projects in southern
7 Idaho that were either complete or partial failures on ac-
8 count of the water supply turning out not to be as great
9 as had been estimated, and on that account I have a tendency,
10 I think, to be somewhat conservative in estimating future
11 water supplies. It is something like when an engineer de-
12 signs a bridge or a dam; he allows what he calls a factor
13 of safety, and makes the structure a little stronger than
14 would actually be required to stand the computed stresses,
15 and I think that in a project of this kind that involves the
16 expenditure of so much money that some similar procedure
17 ought to be applied in determining the water supply.

18 Accordingly, in determining these acreages and areas
19 that might be irrigated in the future, I have included gener-
20 ally all areas that, according to my feeling, have an adequate
21 water supply and good land, and in which there is a reason-
22 able possibility of their being developed during this period
23 of time. That may result in a somewhat moderately greater
24 figure than might otherwise be arrived at, but I believe
25 that is the basis I would like to set it up on if I was

1 investing my money in building the Hell's Canyon project.
2 And that basis will follow through these various calcula-
3 tions that are given here in these tabulations.

4 Q By the tabulations you mean Exhibit 119?

5 A Yes.

6 MR. MASON: I might inquire whether there are any clari-
7 fying questions on the part of counsel before I offer Exhibit
8 119. That concludes the direct of this witness.

9 MR. PARRY: Our position, Mr. Examiner, is this, that
10 because of our long acquaintance with and confidence in Mr.
11 Crandall and his report, we have heretofore offered it as
12 the applicant's exhibit, so I guess it might be appropriate
13 to either reoffer it or to join in Mr. Mason's offer, which-
14 ever is proper.

15 MR. MASON: Do you have any comments, Mrs. Cooper?

16 MRS. COOPER: Just one question, Mr. Mason.

17 BY MRS. COOPER:

18 Q Mr. Crandall, can you tell us the circumstances
19 under which the preparation of this report was undertaken?

20 A Michael Straus, who was Commissioner of Reclamation
21 late in the summer of 1952, requested the Secretary of the
22 Interior to ask the Director of the Geological Survey to
23 have me make this report. I prepared the preliminary copy
24 of the report in the fall of 1952 and awaited final comple-
25 tion, waiting for the availability of some 1952 stream flow

1 records that had not then been computed. And meanwhile it
2 was circulated around amongst the engineers of the Geological
3 Survey in that area and in Washington, and was reviewed by
4 them, and, based on their review, my original estimate, I
5 think, of the irrigated acreage which was 1,170,000 acres --
6 which is on page 4 of the exhibit -- my original estimate
7 was 1,170,000 acres, and as a result of that review that
8 total was raised to 1,300,000 acres, with suggestions about
9 various little areas that they thought there was more land
10 available there than I had first included. And then the re-
11 port was finally prepared and gotten out here. It just lay
12 quiescent then until these hearings developed, and I finally
13 got it out last April. It is the same form as it was pre-
14 pared in the preceding September except for raising that
15 acreage from 1,170,000 to 1,300,000.

16 Q When Mr. Straus' request for the preparation of
17 this report was relayed to you did you understand that the
18 report was wanted by the Interior Department in connection
19 with its consideration of the Hell's Canyon project?

20 A Yes; particularly I was advised that they wanted it
21 in consideration of the Hell's Canyon project, and I might
22 be asked to come back here and testify before some Congress-
23 sional committees in support of the project.

24 MRS. COOPER: That is all, Mr. Examiner.

25 PRESIDING EXAMINER: Mr. Crandall, there is something I

1 am not clear on. Are you an employee of both the State
2 government of Idaho and the U. S. Geological Survey, or
3 just one of those?

4 THE WITNESS: Yes, both of them, and there is an execut-
5 ive order outstanding authorizing me to hold both federal
6 and state positions as a part of the cooperative work be-
7 tween the Geological Survey and the State of Idaho.

8 PRESIDING EXAMINER: And you receive a salary from both
9 places?

10 THE WITNESS: I may charge my salary to either one. I
11 just have my federal salary, but it may be paid at times
12 out of State funds. If it is paid out of State funds I go
13 off of the federal payroll. I just get the regular salary.
14 But its source may come intermittently from either way,
15 depending on how much particular work I do.

16 PRESIDING EXAMINER: You have to keep track of the time
17 you spend working for the State as against the time you
18 spend working for the U. S. G. S.?

19 THE WITNESS: The way the thing is arranged there, a
20 large part of this work as watermaster is constituted of
21 the collection and study of the stream flow records and
22 the geological survey contributes an amount of money into
23 this operation fund which they would otherwise spend on
24 maintenance of a number of gauging stations which we have
25 there under their regular program.

1 The State of Idaho contributes some money, and the bal-
2 ance of the money is paid by the Snake River water users.
3 So it is somewhat elastic. A bill comes in and it might
4 be charged to one of those funds or the other. The total
5 for the year is all we are particularly concerned with.

6 PRESIDING EXAMINER: You have a regular office at Idaho
7 Falls, Idaho? Is that right?

8 THE WITNESS: Yes, in the Federal Building there.

9 PRESIDING EXAMINER: And a number of engineers work
10 under you, is that it?

11 THE WITNESS: Well, we have three permanent civil service
12 employees, one engineering assistant, one clerk, and during
13 the summertime we hire a half dozen additional hydrographers
14 and a number of people to regulate the head gates, who are
15 just employed during the period of water regulation in the
16 summer months. And we keep the records of the stream flow
17 year round, and we work up all these reports and so forth.

18 PRESIDING EXAMINER: And this work of drafting and pre-
19 paration of reports of this kind would be all done in Idaho
20 Falls?

21 THE WITNESS: Yes.

22 PRESIDING EXAMINER: That is all I have to ask, Mr. Mason.

23 MR. MASON: I have one further question.

24 PRESIDING EXAMINER: Yes.

25 BY MR. MASON:

1 Q I would like to refer a minute, Mr. Crandall, to
2 your previous answer with respect to the raising of the
3 number of acres that you refer to on page 4 of your report.

4 A Yes, from my original figure in the tentative re-
5 port, you mean.

6 Q That is correct. And I want to ask you whether
7 the figure included in the report now of 1,300,000 acres
8 is your own best judgment, after the review of the others
9 and these matters were brought to your attention?

10 A Yes. There was some small areas with which I
11 wasn't so intimately familiar as I am with the area above
12 Milner, the area between King Hill and Oxbow, for example,
13 including the Boise River, and the Owyhee and Malheur and
14 various other tributaries; while I have worked on them in a
15 general way, I wasn't so familiar with the immediate future
16 possibilities on those streams, and I had originally used
17 some figures from the Bureau of Reclamation's reports, and
18 Mr. Nace, who is the District Geologist of the Geological
19 Survey at Boise and who has made an intimate study of the
20 ground water possibility of that area, felt that those fig-
21 ures were too low, and, on reviewing the matter with him, I
22 concluded that he was correct, and I raised them accordingly.
23 That is a common practice, as you know, in all these govern-
24 ment departments, that somebody prepares a preliminary report
25 and it is circulated around amongst the engineers and employees

1 and hashed over and finally comes out in the final form,
2 and this is the final form on which we stand.

3 MR. MASON: We have a technicality as to who offered
4 Exhibit 119. Mr. Parry, as far as I am concerned, it is
5 immaterial who offers it. I raised a technical objection
6 to it originally because I thought there was no foundation
7 for it, which has certainly been supplied now.

8 PRESIDING EXAMINER: Since the report is practically all
9 of the direct testimony of the witness, there is a question
10 as to whether Mr. Parry has any right to cross-examine.

11 MR. PARRY: I am not going to argue about that.

12 PRESIDING EXAMINER: Or whether the staff has any right
13 to cross-examine. I don't know, maybe Mrs. Cooper will have
14 to bear the principal burden here, since this witness comes
15 from, primarily, two sources. This report, which is his
16 direct testimony, was offered by the applicant, and now the
17 staff has adopted it for its presentation.

18 MR. MASON: I think Mr. Parry's difficulty is he anti-
19 cipated too soon. I do not raise any technical objection
20 to his right to ask the witness any questions. That is what
21 the staff brought him here for, to develop the record on this
22 subject. But I am not raising any technical objection against
23 Mr. Parry's right to ask questions, and I have asked the wit-
24 ness all the questions I have, and I understand he has given
25 the testimony here he desired to give in connection with his

ACCESSION NO. 58-A-161 BOX 213

F. P. C. Form No. 28

FEDERAL POWER COMMISSION

PROJECT NO. 1971
P-2132 & P-2133

IDAHO POWER COMPANY
(Hearing 7-14-52 on)

FORMAL
HEARINGS

FILE No. 100-2

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January 14, 1954

TO

January 15, 1954

Part 42

U. S. GOVERNMENT PRINTING OFFICE 16-6070-1

PROJECT NO. 1971
(Hearing) Part 42

1 with this morning?

2 MR. MASON: Yes. Mr. Crandall is present, and he has
3 obtained the tabulation with respect to diversions which was
4 requested yesterday by Mr. Parry. I had just received copies
5 of his tabulation; that is, Mr. Crandall's, and have not shown
6 it to Mrs. Cooper. It might save a little time to go off the
7 record and examine these before we put the witness on because
8 I am not familiar with it.

9 PRESIDING EXAMINER: All right. I will excuse you now,
10 Mr. Koessner, temporarily.

11 (Witness temporarily excused.)

12 PRESIDING EXAMINER: We will take a five-minute recess.

13 ~~XXXXXXXXXX~~ (Whereupon, at 11:30 a.m., a recess was taken until
14 11:35 a.m.)

15 PRESIDING EXAMINER: Come to order, please.

16 Mr. Mason, you wish to have Mr. Crandall come back, is
17 that correct?

18 MR. MASON: That is correct.

19 Whereupon,

20 LYNN CRANDALL

21 was recalled to the stand, and having been previously duly
22 sworn, was examined and testified further as follows:

23 DIRECT EXAMINATION

24 BY MR. MASON:

25 Q You will recall yesterday Mr. Parry asked for certain

1 data with respect to diversions above Milner on the Snake
2 River and storage diversions. I understand now that in response
3 to that request, Mr. Crandall, you have prepared a computation,
4 copies of which have been made available to counsel. Do you
5 have before you a single sheet, being a tabulation bearing the
6 title at the top, "Snake River, Idaho," with a column "Diver-
7 sions Above Milner," and a column "Storage Diversions"?

8 A Yes.

9 Q That was prepared by you in response to a request
10 by Mr. Parry?

11 A Yes.

12 MR. MASON: I would like to ask a question or two about
13 this tabulation if I may.

14 PRESIDING EXAMINER: You may, indeed.

15 BY MR. MASON:

16 Q Could you give us for the record, Mr. Crandall, the
17 source of the data shown on the statement I have just referred
18 to, the one you have before you?

19 A It is annual reports of Water District No. 36 of
20 the State of Idaho and the Water Supply Papers of the U. S.
21 Geological Survey.

22 Q Now would you refer to the vertical column headed
23 "Storage Diversions" and tell me whether or not the amounts
24 shown for each year under that column heading are included
25 in the amounts shown for each respective year under the vertical

1 column headed "Diversions Above Milner"?

2 A Yes, they are so included.

3 Q Now referring again to the vertical column headed
4 "Storage Diversions," will you tell me whether the figures
5 shown for each year in that column includes any allowance for
6 evaporation?

7 A No, they do not. It has been our experience on Snake
8 River after many years of observation that the reservoirs
9 generally under ordinary conditions have enough return flow
10 from what we call bank storage; that is, water that is stored
11 in the adjacent soils and gravels, so that as that drains out
12 it just about equals the evaporation losses.

13 Q Referring again to the figures for each year under
14 the vertical column "Storage Diversions," is each figure for
15 each year intended to show the volume of water, stored water,
16 leaving the storage reservoirs?

17 A And diverted by the canals.

18 Q But that figure for each year in that vertical column
19 does not necessarily represent the exact amount of water that
20 actually reached the irrigated areas, does it?

21 A Well, it is approximately the amount at the heads
22 of the canals, but not the amount that reached the lands.
23 There are some transmission losses in the stored water charged
5 24 to stored water going down the river channels. We also have
25 an item of storage water gain to the river from the Minidoka

1 project, which in the aggregate just about offsets the losses
2 charged to the stored water charged to transmission down to
3 the channels. So that for the purposes of this tabulation I
4 have taken drop in the reservoirs and allowed the river loss
5 to balance the storage gain from the Minidoka project and used
6 the same figures to represent diversion by the canals in this
7 tabulation. That is approximately correct. There might be
8 small differences in some of the years that would not be sig-
9 nificant for the purposes that Mr. Parry might have in mind
10 using this information.

11 MR. MASON: I might at this point ask Mr. Parry if this
12 tabulation supplies the data he requested?

13 MR. PARRY: It does.

14 PRESIDING EXAMINER: Could I ask a question here to be
15 sure I understand what this is?

16 MR. MASON: Yes, sir.

17 PRESIDING EXAMINER: Take the year 1952 on your tabulation
18 there, for example. If I understand this correctly there was
19 used --

20 THE WITNESS: Was diverted.

21 PRESIDING EXAMINER: Was diverted and therefore used, I
22 presume?

23 THE WITNESS: I mean, some of it wastes back to the river,
24 but it was diverted from the stream.

25 PRESIDING EXAMINER: Taken from the stream?

1 THE WITNESS: Yes.

2 PRESIDING EXAMINER: Above Milner Dam in thousand acre-
3 feet, 7941 thousand acre-feet?

4 THE WITNESS: That would be 7,941,000 acre-feet. You
5 just add three ciphers. It was merely tabulated this way to
6 save the stenographer putting on all those extra zeroes.

7 PRESIDING EXAMINER: I understand. And of that amount
8 that was diverted there was 1,723,000 acre-feet which came
9 from storage which had been accumulated at some prior time?

10 THE WITNESS: That is correct.

11 PRESIDING EXAMINER: So you get the impression from this
12 tabulation in the early years from 1919 on through 1927 or
13 1926, thereabouts, there was less storage used than there was
14 in subsequent years?

15 THE WITNESS: There was less storage available. The
16 American Falls Reservoir ^{which} was not built until 1927, was the
17 first year that was in use. So it is a combination of two
18 things, increasing acreage going into cultivation and addi-
19 tional stored water being available. Other reservoirs were
20 made available about 1939, ~~and to other reservoirs.~~

21 PRESIDING EXAMINER: Now the wide difference between the
22 storage diversion shown for 1951 and 1952 --

23 THE WITNESS: That depends on the character of the year.
24 Some years the water supplied from the melting snow holds up
25 well into the year. In other years it drops off and that just

1 reflects runoff conditions.

2 PRESIDING EXAMINER: 1951 was one of those good water
3 years so that less storage was needed to supply the needs of
4 the owners of the canal?

5 THE WITNESS: That is right. There wasn't much differ-
6 ence in the total diversions, but, the natural flow water held
7 up a long time, and they didn't need to draw on their storage.

8 PRESIDING EXAMINER: I think I understand it now.

9 MR. MASON: I have one or two further questions.

10 PRESIDING EXAMINER: All right.

11 BY MR. MASON:

12 Q Will you refer to your note on the bottom which
13 starts out "Column 3." Do you find that?

14 A Yes.

15 Q In that note you use the term at the end "During
16 regulation period." Would you define that for us?

17 A In the early part of the season when the flood
18 waters are on there is plenty of water for everybody, and we
19 are usually spilling water to waste past Milner which goes
20 down to the Pacific Ocean. We don't attempt to regulate any-
21 body's diversion at this time according to their rights. The
22 water is in ample supply; it is being wasted, and we don't put
23 our regulation river riders to work until the stream flow
24 drops to a point where we no longer have any water to waste
25 and have to ^{begin} ~~begin~~ the use of stored water.

1 From then until the end of September or early October is
2 what we call the regulation period when the canals are under
3 regulation and the water being delivered according to their
4 priority rights and stored water being delivered from the
5 reservoirs.

6 Q Now is that waste that you speak of past Milner,
7 does that occur only during the flood period or might it occur
8 at other periods during the year?

9 A Well, if the amount of water held in storage in the
10 reservoirs at the end of the season is of considerable magni-
11 tude so that we feel sure that some of them at least will fill
12 then instead of filling them during the winter first we figure
13 how much could be spared for power production, and we spill
14 that water gradually during the winter and get a use out of
15 it for power production at the downstream plants rather than
16 to wait and fill the reservoirs and then spill it in large
17 flood flows.

18 We also sometimes spill water to reserve space in the
19 reservoirs for flood control. So that under those conditions
20 there may be substantial spills during the winter months and
21 extending on through the spring months, usually into about early
22 July.

23 Q In deriving your figures as shown in the vertical
24 column, the third column --

25 MR. PARRY: Mr. Mason, could I make this suggestion? I

1 have been mentally wondering what the record would look like.
2 Since the recess we have been talking about a tabulation that
3 has not been identified or put in the record.

4 MR. MASON: I have identified it, and I intend to put
5 it in the record when we have these qualifying questions in.

6 MR. PARRY: I simply asked this to keep the record straight.

7 MR. MASON: If you would feel better about it, I would
8 offer it at this time. I have no feeling one way or the other.

9 MR. PARRY: That is agreeable with us, to incorporate it
10 in the record.

11 MR. MASON: I thought it would be well to have these
12 explanations of the tabulation before incorporating it in the
13 record; that was my plan of procedure.

14 PRESIDING EXAMINER: I would think so, too.

15 Mrs. Cooper, are you going to have any questions about
16 this before it goes into the record? That is the time to ask
17 the questions, it would seem to me.

18 MR. PARRY: I withdraw.

19 PRESIDING EXAMINER: Do you have any further questions,
20 Mr. Mason?

21 MR. MASON: I have one more.

22 PRESIDING EXAMINER: Let's finish up with your questions,
23 Mr. Mason.

24 BY MR. MASON:

25 Q Mr. Crandall, in deriving the figures shown for each

1 year under Column 3 headed "Storage Diversions," did you
2 assume that all flow past the Milner Dam in the regulation
3 period to be diversion storage?

4 A That is true usually except in some instances where
5 due to perhaps a canal shutting some water off unexpectedly
6 or something of that nature there was some water spilled for
7 short times. Ordinarily we charge the water spilled past
8 Milner during the regulation period as storage. The Idaho
9 Power Company has certain storage rights which it draws past
10 there and in the operation of the river, many reservoirs and
11 canals, there is occasionally a little stored water spilled
12 which has to be charged up to the various canals as operation
13 waste. It doesn't amount to much.

14 MR. MASON: I have no further questions, Mr. Examiner.

15 PRESIDING EXAMINER: Did I understand that you had some
16 questions, Mrs. Cooper?

17 MRS. COOPER: Are you assuming that Mr. Parry has none?

18 PRESIDING EXAMINER: I am.

19 MR. PARRY: I have no more on this. I have two more that
20 I am going to ask Mr. Crandall independent of the tabulation.

21 MRS. COOPER: Mr. Examiner, we have no questions on this
22 tabulation.

23 MR. MASON: Then, Mr. Examiner, if there are no further
24 questions and if there are no objections I move that this
25 tabulation about which we have had testimony of the Witness

1 Crandall be incorporated in the transcript of the record.

2 PRESIDING EXAMINER: Without objection then, that may be
3 done by the reporter at this point.

4 (The information referred to above is as follows:)

5 Snake River, Idaho

6 Year	Diversions above 7 Milner (1,000 acre-feet)	Storage Diversions (1,000 acre-feet)
8 1919	4,839	705
9 1920	6,296	590
10 1921	5,957	590
11 1922	6,051	644
12 1923	6,352	741
13 1924	5,298	664
14 1925	6,582	487
15 1926	6,049	1,003
16 1927	6,822	608
17 1928	7,130	1,017
18 1929	6,628	1,279
19 1930	6,851	1,381
20 1931	6,960	2,152
21 1932	7,052	1,562
22 1933	7,234	1,906
23 1934	5,039	1,641
24 1935	6,423	1,652

25

1	1936	7,164	1,616
2	1937	6,890	1,979
3	1938	7,220	1,498
4	1939	7,659	2,091
5	1940	7,059	2,420
6	1941	7,036	2,031
7	1942	7,265	1,906
8	1943	7,565	1,080
9	1944	6,759	1,837
10	1945	7,043	1,231
11	1946	7,501	1,544
12	1947	7,609	1,490
13	1948	7,364	1,804
14	1949	7,649	1,828
15	1950	7,619	1,091
16	1951	7,697	907
17	1952	7,941	1,723

Note: Diversions between American Falls and Milner are for entire year ending Sept. 30. Diversions above American Falls are for irrigation season, May to September, inclusive. The totals of these two items are combined to get the figures in column 2 of the above tabulation.

Column 3 is the combined drop in the reservoirs during period of storage draft less stored water spilled past Milner during regulation period.

1 MR. PARRY: Might I ask Mr. Crandall then one or two
2 other questions?

3 PRESIDING EXAMINER: Yes. This is not cross examination?

4 MR. PARRY: No.

5 PRESIDING EXAMINER: It is clarifying material?

6 MR. PARRY: That is what it is intended to be.

7 PRESIDING EXAMINER: All right.

8 BY MR. PARRY:

9 Q What, Mr. Crandall, is the total usable reservoir
10 capacity above Milner Dam in your district at this time ex-
11 clusive of Pallsades, which, as I understand, is still under
12 construction?

13 A 2,872,000 acre-feet.

14 Q Do I understand your testimony that that is filled
15 annually in the spring where necessary and to the extent of
16 the available water at each reservoir?

17 A That is correct. If the water is there we can store
18 that much.

19 Q Is that your custom, to fill each of those reservoirs
20 each year?

21 A If the water is available.

22 MR. PARRY: That is all I have of Mr. Crandall.

23 PRESIDING EXAMINER: All right. What arrangements did
24 you make with Mr. Hilmer for cross examination of Mr. Crandall?

25 MRS. COOPER: I checked with Mr. Hilmer during the morning

1 Q Does the 80,000 figure represent the maximum
2 possible with such a dam, or is that a --

3 A It is a question of water supply available at
4 the point of diversion. As I state, the river now has a
5 flow there sufficient to irrigate about 110,000 acres.
6 There is a much greater acreage available, and I cut that
7 down to 80,000 acres to allow for a possible diminution
8 in the flow at that point due to pumping from ground waters
9 on the Snake River plains.

10 Q Would you put any of the 80,000 acres in the
11 period up to the mid point of 1985?

12 A Well, I would say it would be quite doubtful if
13 it would be developed by the mid point.

14 Q I notice your statement in connection with this
15 80,000 acre Bruneau project, that the flow below Milner
16 that you referred to "may be appreciably lessened by future
17 pumping developments on the Snake River plains."

18 Could you explain that statement a little further?

19 A That is the same thing that we were discussing
20 yesterday relating to the irrigation of this 400,000 acres
21 which I estimated on the Snake River plains. And in my
22 opinion, that will eventually reduce the present ground
23 water in-flow into the river below Milner.

24 Q That involves some assumptions with respect to
25 time lag, does it not?

1 A Yes.

2 Q Does that also involve the assumption that the
3 cycle of use will be established before the 50-year pay-out
4 period is concluded?

5 A Yes; essentially, or at least in major part.

6 Q What difference, if any, would exist in this
7 situation in dry years, as opposed to wet?

8 A In extremely dry years, when the canal systems
9 are seriously short of water, or, rather, in the year follow-
10 ing such years, the in-flow drops down considerably.

11 Q I notice your statement in connection with this
12 possible project, that it would doubtless be quite costly
13 per acre of land irrigated. Could you give us some idea
14 of the cost you had in mind?

15 A I don't know exactly, and I couldn't give a def-
16 inite figure except that I am certain in my own mind that
17 it would be greatly in excess of the cost that could be
18 repaid by the irrigators, and that additional cost would
19 have to be subsidized in some way, either by payment from
20 sale of power or a direct government subsidy.

21 Q Do you know whether there has been any land clas-
22 sification or soil analysis in this area of your contem-
23 plated Bruneau project?

24 A I don't think there has been any.

25 Q Does the 80,000 acre estimate include any use of

1 would be somewhat more precipitation falling on the plain it-
2 self, and these minor streams from the north, which run down
3 and during the flood water periods flood out over the margins
4 of the plain, would contribute a little more.

5 But this water table beneath this whole area is a
6 considerable depth below the land, considerable depth below
7 the river face even, and I don't see how the lowering of
8 the water table a few feet will in any way induce a greater
9 inflow in it.

10 The possibility exists of an artificial recharge.

11 Q I was about to ask you about that because I noticed --

12 MR. HILMER: It is getting a little after our usual
13 recess time. Perhaps we could save this artificial recharge
14 subject until we reconvene.

15 PRESIDING EXAMINER: If you would like to have a
16 little rest, we will take our ten-minute break at this
17 time.

a.m.
recess

18 (Whereupon, at 11:15 o'clock a.m. a recess was taken
19 until 11:25 o'clock a.m.)

20 PRESIDING EXAMINER: Come to order, please.

21 BY MR. HILMER:

22 Q Just before the recess, Mr. Crandall, we were
23 about to get into the subject of artificial recharging of
24 the ground water basin, which is discussed on page 6 of
25 your report.

1 Will you describe what you had in mind there and expand
2 on it a little for us?

3 A There are a number of possibilities where water
4 could be diverted from the Snake River or its tributaries in
5 the vicinity of Idaho Falls and carried out onto the plain
6 and allowed to spread over the surface of depressions and
7 porous lava flows and things of that kind, and contribute
8 it to the water table to provide greater storage and offset
9 to some extent depletions arising out of ground water pumping.

10 One of these possibilities is in the diversion of
11 water from Henry's Fork, in the vicinity of St. Anthony,
12 and carrying it over into the Mud Lake basin over a low
13 divide that exists between those two areas, and dissipate it
14 into the ground by flooding.

15 The ditch would be constructed so that as it crosses
16 swells and depressions, only the lower bank would be built,
17 and water allowed to flood as far up the depressions and
18 over as large an area as possible to induce a greater rate
19 of recharge into the underlying ground waters.

20 There are also possibilities of diversions of water
21 from the main Snake River between the mouth of Henry's Fork
22 and the vicinity of Roberts. And the water could be car-
23 ried by gravity through canals out over the plains and
24 similarly be spread over as large areas as are available to
25 dissipate the flow of the stream.

1 There are some sections along the river channel where
2 the river itself is flowing as a perched channel at con-
3 siderable distance above the water table. And at such points
4 it might be possible to recharge the ground water by wells
5 drilled along the shoreline of the river.

6 Any of these projects would be quite costly. They
7 would have to be financed by the government, perhaps as a
8 work relief project or something of that nature, in times
9 of depression, or on account of the general widespread ben-
10 efits. But I believe it is quite possible that they might
11 be able to put in an additional perhaps half million acre
12 feet of water a year in years when it was available over
13 and above filling the present reservoirs, put this addi-
14 tional amount into the ground in the valley by artificial
15 recharge, provided the government would finance the cost.

16 Q First, as to the physical aspects, under what
17 conditions could this type of diversion for ground water
18 recharging occur?

19 A It would occur at times when all prior water
20 rights on the river were being filled, the canals were draw-
21 ing what they wanted, and the reservoirs were either filled
22 or assured of filling; so that this would be the diversion
23 of waters that would otherwise spill down the river past
24 Milner into the Columbia.

25 Q Would that condition be uncommon, in your judgment?

1 A No. Outside of the 1928 to '35 period it would
2 occur in the majority of years.

3 Q Can you not conceive of financial arrangements
4 other than through federal subsidy that might aid this kind
5 of project or make it possible?

6 A I am a little dubious about it because the Snake
7 River plain rises considerably in elevation as you go west
8 from Idaho Falls, and the construction of the canals for
9 long enough distances to flood areas sufficient to allow
10 this water to sink into the soil would represent a consider-
11 able investment, I think, running into some millions of
12 dollars.

13 I don't know exactly how much. It might run to \$15
14 or \$20 million.

15 Q Do you know of any similar projects outside of the
16 Snake basin where the financing has not depended on govern-
17 ment subsidy?

18 A Yes. There are considerable areas in California
19 where the waters are spread and allowed to sink. And they
20 have all been financed by local interests.

21 However, I don't think in those areas that any canals
22 as long as those that would be required in the Snake River
23 or that would be necessary to dispose of as large volumes
24 of water have been built elsewhere.

25 Q Do you know of any other similar projects outside

1 of those you mentioned in California?

2 A I read in the Engineering Press from time to time
3 in some of the eastern areas around Long Island and some
4 places, water is spread that way for municipal or industrial
5 water supplies. If the costs were paid privately, they
6 would have to be paid by the downstream water users who
7 would benefit from their greater return flow, I take it.

8 Q Applying the same standards of likelihood and
9 feasibility that you have applied to the various projects
10 listed on page 4 of your report, would you say that the
11 artificial recharging, which is discussed on page 6 of
12 your report, is a likely development?

13 A I think that depends on circumstances. If this
14 irrigation development takes place and the stream flow
15 down below is greatly depleted so that in the dry years it
16 is markedly less than has been estimated, I think there would
17 be quite a favorable chance of relief being forthcoming
18 from this artificial recharge. That is a kind of a matter
19 that you might think of as being held in reserve to meet
20 some unfortunate contingency that wasn't anticipated.

21 Q If the artificial recharging development should
22 occur, what effect would it have on your depletion estimates
23 in dry years?

24 A If it was of a magnitude that would put a half
25 million acre feet into storage during the years when it

1 was available, I would think that you could safely say
2 that, not being available in some years, you could say that
3 it would increase the river flow down below by an average
4 annual amount of probably half of that.

5 Q Half of what?

6 A Half of the 500,000 ^{acre-feet} that you would put in in
7 years when it was available would produce an average annual
8 outflow of half of that amount, of 250,000 ^{acre-feet}.

9 Q So that, on the average, under the circumstances
10 you have described, such recharging would practically offset
11 the depletion that you have estimated would occur from the
12 development of some 678,000 acres of irrigation east of
13 King Hill, would it not?

14 A No, I don't think that is true. I estimated the
15 average annual depletion during the pay-out period was
16 1,650,000 acre feet. And if this water recharge was put
17 into existence and that produced an average annual inflow
18 of 250,000 acre feet, that would result in reducing my
19 average annual depletion from 1,650,000 to 1,400,000 acre
20 feet.

21 Q I was trying to relate it to the areas east of
22 King Hill, Mr. Crandall.

23 A I haven't made any distinction in those ultimate
24 figures between east and west of King Hill, I think it
25 is just a question of so much depletion in the basin.

1 There are substantial depletions above ^{King}~~Snake~~ Hill
2 besides those that are included in this area beneath the
3 plains.

4 Q Could you give us your judgment, Mr. Crandall,
5 on the storage and regulating aspects of the ground water
6 basin in the Snake Valley?

7 A It in effect is sort of an equalizing reservoir
8 by which the waters are poured into it from these various
9 sources, principally from irrigation uses. And the outflow
10 is at a relatively uniform rate, with minor variations. So
11 that you might think of it as a big equalizing reservoir.

12 Q Turning now to the subject of surface water irri-
13 gation rather than ground water, in your ^{judgment}~~judgment~~ is there
14 likely to be any appreciable amount of new surface water
15 irrigation in the Snake basin without additional storage
16 development?

17 A In that list of projects that appears on page 4,
18 the items that are not starred are principally almost entirely
19 surface water irrigation, and some of the starred items,
20 such as the Mountain Home project, 192,000 acres of that
21 would be surface irrigation.

22 So that more than half of the area would be irrigated
23 from pumping, but there still would be substantial surface
24 irrigation projects.

25 Q The question is, though, whether that is all

Fourth Orr Affidavit
Exhibit 13:

**Information Bulletin on a Study of Water
Resource Development Possibilities –
Upper Snake River Basin (U.S. Bureau of
Reclamation & U.S. Army Corps of
Engineers) (Sept. 29, 1960)**

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Boise State University

P.W.
Upper Snake

U. S. Bureau of Reclamation
Region 1 - Box 937
Boise, Idaho

U. S. Army Engineer District, Walla Walla
Building 602, City-County Airport
Walla Walla, Washington

September 29, 1960

STATUS OF
UPPER SNAKE RIVER BASIN INVESTIGATION

Pursuant to resolution adopted 19 March 1954 by the Committee on Public Works of the United States Senate, directed to the Corps of Engineers, and in accordance with the authority granted by Federal Reclamation Laws (Act of June 17, 1902, 32 Stat. 388 and acts amendatory thereof or supplementary thereto), a joint study was undertaken by the Corps and Bureau of Reclamation to investigate and report on the need for and potential of development of the land and water resources of the Snake River Basin from its headwaters in Wyoming downstream to and including the Powder River in Oregon.

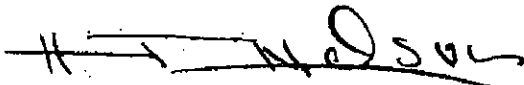
A series of preliminary hearings were held in February 1955 for the purpose of obtaining views and comments of those interested in water resource development.

A resume of the resultant findings of the Upper Snake River Basin study to date, together with limited project information on water resource development possibilities, are presented in the attached information bulletin.

A summary report on the Upper Snake River Basin, which will present the findings of the study in much more detail, will be made available for public examination in the near future. Following release of this report and in order that all interested parties may be afforded an opportunity to express their views concerning the development possibilities or other water resource potentials that are pertinent, additional public hearings will be held jointly by the District Engineer, U. S. Army Engineer District, Walla Walla, and the Regional Director, Region 1, Bureau of Reclamation, Boise, Idaho. These hearings are tentatively scheduled to be held in Idaho Falls and Boise, Idaho, in December. Definite dates will be announced later.

Persons having specific questions on the studies as summarized in the bulletin are invited to correspond with or visit the office of the Regional Director or District Engineer, preferably in advance of the hearings.

Please bring the foregoing to the attention of persons known to you to be interested in the matter.


Harold T. Nelson
Regional Director, Region 1
U. S. Bureau of Reclamation
P. O. Box 937
Boise, Idaho


Paul H. Symbol
District Engineer
U. S. Army Engr. Dist., Walla Walla
Bldg. 602, City-County Airport
Walla Walla, Washington

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INFORMATION BULLETIN ON A STUDY OF
WATER RESOURCE DEVELOPMENT POSSIBILITIES
UPPER SNAKE RIVER BASIN

The Upper Snake River Basin investigation, a joint effort by the Corps of Engineers and the Bureau of Reclamation, covers an area of about 73,000 square miles drained by Snake River and tributaries from its headwaters in Wyoming downstream to and including the Powder River in Oregon. Included are the streams in southeast Idaho north of Snake River which are tributary from a ground-water standpoint but do not reach Snake River as surface flows. This reach of Snake River drains western Wyoming, all of south Idaho except the extreme southeast corner, the extreme northwest corner of Utah, the northeast corner of Nevada, and the southeastern part of Oregon.

Objectives of this investigation are to identify unused and uncontrolled components of water and land resources and to set forth development possibilities to meet the many related needs of the area.

The investigation was begun using as a starting basis the physical data, development plans, and reports accumulated over the past half century by public and private agencies and individuals having responsibilities for water and land-resource development.

From this extensive record, the knowledge of the area by the Bureau of Reclamation, the Corps of Engineers, and other interested State and Federal agencies, and from consultation with other organizations and individuals, a master listing of all identified developments was compiled. This listing included over 500 potentials. Study criteria were formulated and applied to this inventory and available information on physical characteristics and limitations was considered. Alternatives were evaluated and situations where developments were found mutually exclusive were analyzed. This elimination process reduced the listing to some 100 possibilities which were then given more thorough study.

Essential physical data not available from earlier project-type studies were obtained. Subsurface explorations were performed at 27 dam and other major structure sites. About 45 reservoir and damsites were mapped topographically. A land-resource inventory covering nearly 9,000,000 acres was performed. Flood damage data were collected, and streamflow conditions studied. From this investigative effort, design and water supply studies, and preliminary identification of project benefits the list was further refined. Engineering, hydrologic, power, flood control, and other specific studies were then performed to more definitely determine the characteristics of each development possibility.

Unused ground-water resources were recognized early in the investigation as an important water-supply factor, the extent and nature of which

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would determine to an important degree the amount of future irrigation that might be possible in some major areas. To evaluate the ground water potential for various uses, it was necessary to determine so far as possible the quantity of ground water available in various parts of the basin, depth to water, water quality, quantity that could be withdrawn, and the effects that would result from making sizable withdrawals. The Ground Water Branch of the Geological Survey undertook this determination on a cooperative basis.

Studies relating to other uses of the water resources were undertaken in collaboration with other agencies such as the National Park Service, Fish and Wildlife Service, Public Health Service, Soil Conservation Service, and the Forest Service. Agencies cooperating in the investigation were kept informed and their work guided by preliminary data as such data became available.

BASIN RESOURCES

Land elevations in the basin range from 13,700 feet, the highest peak in the Grand Tetons, to 1845 at the mouth of the Powder River. The total fall of the river from Jackson Lake Reservoir downstream to Brownlee pool is about 4,700 feet. Runoff is largely of snowmelt origin and is subject to forecasting.

Control of many reaches of the Snake River and its tributaries against flooding has been accomplished by levee and channel works and storage regulation. There are now over 100 miles of levee and channel works scattered throughout the basin, protecting highly developed urban and agricultural areas. In addition, three multipurpose storage projects have authorized flood control features while many others built primarily for irrigation effect considerable flood regulation.

There are about 3,190,000 acres now under irrigation in this basin. Of this total, some 1,462,000 acres are irrigated from the surface waters of the Snake River and tributaries above Milner Dam. This includes the service areas from those streams which enter the plain from the north but which do not reach the Snake River as surface flows. In this reach above Milner, there are about 478,000 acres that are irrigated, using underground water as a supply. Below Milner, there are 1,178,000 acres served from surface waters and 72,000 acres served from ground water.

Some 49 reservoirs with a capacity greater than 5,000 acre-feet each have been developed over the years. They have a total capacity of 9,900,000 acre-feet, of which some 8,600,000 acre-feet are considered as usable. The greatest share of this capacity is operated to meet irrigation requirements.

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Production of power is an important water-resource use in the basin and some 18 non-Federal hydroelectric plants with a total capacity of about 362,200 kilowatts have been installed. There are five Federal hydroelectric plants with a total capacity of 163,900 kilowatts. Other important water uses are for municipal, industrial, sanitation, fish and wildlife, and recreational purposes.

It is estimated that there are about 5,800,000 acres of unirrigated arable lands in the basin which have favorable physical characteristics for irrigation if water could be made available. Most of these lands are in southern Idaho. Some 800,000 acres of this total are now dry farmed to the extent that natural precipitation and accumulated soil moisture will support crops. About 2,300,000 acres of the total are within that part of the drainage basin above Milner Dam and the remainder of 3,500,000 acres are below. The individual areas of greatest significance to future development occur in the broad flat valley of Raft River, the Salmon Falls area, the Bruneau Plateau, the Mountain Home Plateau, and portions of the plain north of Snake River. Soils of the arable areas, for the most part, are fine-textured loessal type with high mineral fertility and excellent water-holding capacity. The abundant production from sustained irrigation of similar lands over more than half a century attest to the high capability of such soils under irrigation.

The historical runoff of Snake River, adjusted to reflect the present stage of development, averages 1,020,000 acre-feet annually at Moran, Wyoming. The average runoff under the same conditions at Weiser, Idaho, is some 11,700,000 acre-feet. Between these two points, there are wide variations in runoff. The flow of the river in below-normal years is largely stored and diverted above Milner Dam for irrigation uses. Below Milner, return flows from irrigation and the outflow of a large number of springs enter the Snake River to largely make up the flow measured at King Hill. Average annual runoff of the river at King Hill is estimated at 6,760,000 acre-feet. Discharge of the springs which enter mostly between Twin Falls and Bliss averages 6,500 cubic feet per second, or 4,700,000 acre-feet per year. The inflow from the Bruneau, Owyhee, Boise, Payette, Malheur, and Weiser Rivers, together with lesser tributaries, combine to make up the total average flow at Weiser.

The present water-resource picture of the Snake River is generally one of complete surface water utilization in dry periods above Milner Dam, with quick recovery in the river from inflows below Milner Dam. These inflows represent a sizable usable water supply that increases progressively downstream from Milner Dam.

Another water resource of great importance to future land development is underground water. That part of the Snake River Plain, principally on the north side of the river, from the upper topographic limits of the plain down to the Thousand Springs area near Bliss, Idaho, includes

a large ground-water resource. This comprises a hydraulic system in which aquifers of the Snake River basalts and interbedded sediments serve both as a vast storage reservoir and as a ground-water conduit. Transmissibilities are high, and the virtually evaporation-free storage capacity is tremendous. The plain itself is about 250 miles long, averages 60 to 70 miles wide, and includes some 13,000 square miles. Tributary valleys furnish the principal recharge to the aquifers of the plain which also receive substantial contributions from percolating irrigation water.

DEVELOPMENT NEEDS

There are many well-recognized needs for an orderly continuing program of development of unused water and land resources.

Opportunities for establishing new farm families, economic growth, greater agricultural production for an expanding population and stabilization of farming in supplemental water areas are among such needs for the expansion of irrigation. During 1957 crops valued at an estimated \$257,000,000 were produced from the irrigated lands in the investigated area of the Snake River Basin. This production and the related economic activity in the communities and agricultural product processing industries are a measure for judging the value of future irrigation.

Residential, commercial, and agricultural developments at a number of locations in the basin suffer flood damages. Greatly increased demands are predicted by private utilities and public agencies concerned with power development for future power requirements in the Snake Basin area. Power demand is expanding as a result of many factors, including unprecedented growth of irrigation pumping, population increases, increased per capita power consumption, industrial expansion, and greater variety of domestic uses. It is strongly apparent that the hydroelectric potential of the area will be utilized as rapidly as it can be developed under any presently foreseeable schedule. Municipal and industrial water needs are climbing as cities grow and new commercial activity becomes established.

There is tremendous interest in water-associated sports, and pressures on fish and wildlife habitat that depend on surface waters and watersheds are at an alltime high and increasing. Increasing urban populations have made pollution control and provision of safe water supplies a problem of great importance in many communities in the basin.

DEVELOPMENT PROBLEMS AND CONSIDERATIONS

The mature stage of present development together with the unique physical characteristics of the area will have a strong influence on future development in the Snake River Basin. Surface waters are fully

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used during dry periods at some locations, and most of the readily attainable, inexpensive developments for irrigation, flood control, and power have been in operation for many years. Future development is now limited to the fairly difficult, intricate, and costly situations.

From a land and water resource development standpoint, the Basin is divided at Milner Dam. Above Milner, all of the surface water in dry cycles is already storable, appropriated and used for the present development.

During the period 1928 through 1957, with the present development in the Snake River Basin, estimated flows past Milner Dam would average 1,305,000 acre-feet a year. Studies show that the only flows passing Milner Dam during the dry periods of 1931-1938 and 1940-1942 would be those required to satisfy prior downstream rights. Including a small amount of spill in 1930 and 1939, the flows past Milner Dam would average only about 260,000 acre-feet a year during the entire 13-year dry period (1930-1942). If the flows now passing Milner Dam were stored and held for irrigation use, an additional 685,000 acre-feet of water a year would be required to satisfy the new water requirements in the 13-year dry period. Holdover storage was considered as a possible means of meeting these depletions. It was determined that nearly 9,000,000 acre-feet of active capacity in new storage reservoirs would be required. Because of the lack of feasible reservoir sites where large amounts of relatively inexpensive storage could be provided, other means of meeting these water shortages are required.

There are several opportunities for obtaining a new water supply for irrigation use above Milner Dam during dry years. The most promising source is the ground-water resource known to exist beneath the Snake River Plain. In a sense, the ground water is storage. In considering future development it could be used much as a conventional surface storage reservoir. However, the use of ground water raises new problems. Most of the ground water occurs where there are no suitable lands that can be served directly or it occurs beneath lands now irrigated. This creates a need for exchanging ground water for present surface-water uses so that the surface water might be diverted to new developments in that part of the area served by diversion above Milner.

Most new developments above Milner, because of their location and elevation, must be served by pumping. Because of this factor and use of ground water on an exchange basis, double pumping is required with high annual costs and heavy demands for power.

These requirements have led to consideration of plans to use storage in the periods of normal or wet years and ground water during the dry periods. The complimentary use of surface and ground water would permit irrigation development to proceed in Upper Snake Basin. Also, surface

waters could be used in wet years on lands now served exclusively from ground water to relieve overdrafting of local ground-water supplies. In such situations ground water would be the dry year water supply. These concepts of combined ground and surface water applications would achieve a fuller use of the basin water resources.

Even though the existing $4\frac{1}{2}$ million acre-feet of usable storage above Milner Dam affords a good degree of stream regulation during flood periods, there are many reaches still subject to flood damage. Multiple-purpose storage is the most desirable way of affording additional control. Such storage, together with the presently undeveloped head, would also help to meet future power needs in the area.

In the area below Milner Dam, problems also stem from the relative location of land to water supply. For example, to reach the arable land area of the Bruneau Plateau in the vicinity of Thousand Springs, pump lifts of up to 600 feet would be involved. The Mountain Home Plateau is more than 800 feet in elevation above the pool of C. J. Strike Reservoir.

Further the tributary streams below Milner Dam have their own peculiarities. On the Boise River there is a high degree of present water use with little remaining water, but there are large blocks of irrigable land nearby needing a water supply. The 1928 through 1957 annual average runoff at the Boise River Diversion Dam is 1,890,000 acre-feet. The present water requirements at Boise Diversion Dam are estimated to be 1,450,000 acre-feet, leaving a surplus of 440,000 acre-feet.

In contrast, there is presently an average of 2,074,000 acre-feet annually which flows from the Payette River Basin. Even if irrigation of all lands that have a potential for development in the Payette Basin was accomplished, 1,400,000 acre-feet of unused water would still pass Black Canyon Dam annually.

On the Owyhee River, the Owyhee Reservoir with present development would have spilled in only 12 years during the 30-year period from 1928 through 1957. In contrast, there is an estimated 724,000 acre-feet of water annually leaving the Weiser River Basin with only very minor remaining undeveloped land areas.

With this varying range of stream control and water utilization there are still many areas in the basin below Milner Dam in need of additional regulation for irrigation, flood control, and other multiple uses. For instance, flood control facilities are needed on the lower valleys of most of the tributaries and along Snake River from Marsing to Weiser. Also, sites below Milner Dam, both in the Snake River channel and on major tributary streams, offer excellent opportunities for development of the hydro-electric power potential. In addition to regulation of the Payette River for local use and protection, control of this stream at critical times of flooding in the lower Columbia River will afford measurable downstream benefits.

In considering the future basin development potentialities, it was found necessary to establish some criteria to guide the planning process. Six basic premises are as follows:

1. There would be no export or import of water between the Snake River Basin and neighboring drainages.
2. All existing irrigation and domestic water rights and uses would be recognized and fully provided for in any analysis of future developments and in determining resources available for new uses.
3. That development plans would not be formulated on the basis of projects being completed on a predetermined time schedule but the possibilities presented would represent the full level of development considered practical from a physical and engineering viewpoint.
4. That economic justification on current levels would not be a limiting criteria for including or excluding particular development possibilities in the overall plans.
5. Water and land-resource development possibilities evaluated and considered for the future would not be located within National Parks or Monuments.
6. That plans for potential land development would be formulated with anticipation that an exchange of water source between new and existing uses could be expected.

POTENTIAL PROJECTS

The attached tabulation is a summary of 80 potential developments analyzed for this study which meet the criteria established. Taken together they represent a rather full utilization of the land and water resources of the Basin. Some of the development possibilities listed are not presently feasible or acceptable and their development or an alternate may not come about for many years in the future.

The tabulation includes a total of 46 reservoirs, most of which are multipurpose and have a combined active capacity of 7,041,000 acre-feet. Granite Creek, Elbow, Alpine and Burns Creek Reservoirs, all above Heise, could supplement the existing Jackson Lake and Palisades Reservoirs for irrigation, power, and regulation of floods from near Heise to the mouth of Henrys Fork. Driggs and Fremont Reservoirs on Teton River could be operated for local irrigation and to regulate floods on lower Teton River and adjacent Henrys Fork reaches. Warm River and Ashton are primarily power projects and together with Driggs and Fremont could be used

to reduce floods on Henrys Fork near Rexburg. These reservoirs would provide additional regulation on the Snake River above American Falls to create irrigation, flood control, power, recreation, fish and wildlife, and related benefits.

Below Milner Dam, Clear Lakes Reservoir could provide storage for major irrigation development. The potential Thousand Springs Reservoir could provide storage for power and limited flood control. The Guffey Reservoir, with irrigation and power facilities, could also make possible the exchange of Boise River water supply for use on a large irrigable area. The potential Twin Springs Reservoir and a power installation at existing Lucky Peak Dam could afford additional and more flexible utilization of all storage on Boise River for irrigation, flood control, and power production. Duncan Ferry Reservoir on Owyhee River and Mason Dam and Reservoir on Powder River could provide additional irrigation water supply and local flood control. On Payette River, the Garden Valley Reservoir could provide a substantial water supply for new lands, flood control both local and downstream on Columbia River, and a large quantity of power. Storage on the Weiser River would be for irrigation and local flood control. There are a number of additional reservoirs throughout the Basin which could provide local irrigation and flood control benefits. The control of floods would be accomplished without detriment to primary use of the projects for irrigation and with only minor effect on operation of the projects for other uses.

Seventeen projects included in the tabulation have been found practical for producing hydroelectric power and could have a total installed capacity of 1,241,500 kilowatts. This future power potential would greatly expand the present generating capacity in the Basin. The Brownlee, Oxbow, Hells Canyon plants, just downstream from the basin area, will have 1,138,000 kilowatts of capacity. The total hydroelectric capacity available to the area with these projects would be some 2,874,000 kilowatts.

When compared to the load growth as analyzed by the Federal Power Commission for this study, the potential plants, in combination with the existing system, would be adequate for only about 20 years of growth, or until about 1980. It is understood, of course, that the potential power facilities cannot be realized in such a short space of time, and accordingly, a large segment of future load growth for the Basin must be supplied from other sources. Analysis of the irrigation pumping power requirements for the possible future irrigation projects presented in the table indicates that such a load will consume on an average about 35 to 40 percent of the incremental power production at the listed potential hydro plants. Accordingly, economical hydroelectric power development must precede or accompany the development of new irrigation projects.

For the area diverting above Milner Dam, there are some 294,000 acres of new lands, located principally south of Snake River and including such

areas as Fremont, Raft River, Oakley Fan and Salmon Falls, considered to be within practical reach of identified water sources. There are also 823,000 acres requiring supplemental water that might be served. A replacement or exchange water supply is considered prerequisite to development of most of these new and supplemental lands. The most reasonable approach to providing a water supply to serve identified lands would be through a combination of ground-water pumping and storage. Ground water would be utilized when surplus surface waters were not available. Exchange or replacement water could be obtained in three selected ground-water pumping areas in the plain, and by pumping from two streams that enter below Milner Dam.

An optimum level of irrigation development can be achieved only on the basis of a coordinated and integrated group or system of projects involving both surface storage and ground-water pumping. This group or system would have to be considered as a single development composed of land areas, multipurpose storage reservoirs, and facilities for producing the exchange and replacement water supplies at various locations.

Associated with the vast underground reservoir beneath the plain is the possibility of artificially recharging it by diverting surplus flows, beyond requirements of existing and future developments, from the Snake River during the flood season into highly permeable areas of raw volcanics. In this manner, drawdown from expanded pumping could be decreased, the flow of the river might be smoothed out to the benefit of downstream power, and a measure of flood control could be realized from diversion of spring-time flow peaks.

Of the total area above Milner Dam, there are 3,250 acres of new land and 26,000 acres requiring supplemental water in Wyoming that could be developed under terms of the Idaho-Wyoming Compact.

Expansion of private ground-water development of 245,000 acres in Snake Plain is anticipated.

Below Milner Dam multipurpose developments primarily for irrigation appear possible for the Bruneau Plateau; on the broad upland between the Boise and Snake Rivers near Mountain Home; and in the basins of Payette, Weiser, Owyhee, Burnt, Malheur, and Powder Rivers. Also, there are developments for the future which appear practical in the basins and on the alluvial fans of the streams north of the plain which sink into the lavas before reaching Snake River above Milner Dam. Altogether, optimum development in these areas would provide for the irrigation of about 591,000 acres of new lands and provide supplemental or replacement water to about 278,000 acres.

There are six levee and channel projects scattered throughout the Basin to protect particular local flood problem areas which need such

local protective works in addition to any storage facilities, existing or proposed.

SUMMARY

For the basin area as a whole, and from an engineering and physical viewpoint only, it appears that 1,130,000 acres of new lands could be served, and a supplemental water supply provided to 1,101,000 acres now in need of supplemental water. The 46 new reservoirs, included in the tabulation, with a total capacity of 7,041,000 acre-feet, in addition to serving irrigation requirements, could afford much needed flood control, increase recreational opportunities, and allow for the production of substantial blocks of hydroelectric power at some 17 powerplants with an estimated capacity of 1,241,500 kilowatts.

SNAKE RIVER runoff past Milner Dam under 1960 conditions of development and water use are estimated to average 1,305,000 acre-feet per year. Further depletions of streamflow by the development of additional lands as presented in this study would amount to an estimated average of 910,000 acre-feet annually. Existing and future flow conditions past Milner, assuming a repetition of the 1928 through 1957 runoff pattern, are illustrated on the accompanying chart titled "Flows past Milner." A similar reduction and reregulation of flows in the Snake River below Thousand Springs would be experienced. The present runoff at the Murphy gage, below Guffey damsite, estimated to average 7,048,000 acre-feet annually for the same 30-year period, would be reduced by about 1,471,000 acre-feet annually. This reduction is illustrated on the attached typical monthly flow chart titled "Monthly Runoff - Snake River below Guffey Damsite."

Full utilization of the land and water resources of the Upper Snake Basin will require a great many years; however, additional incremental or stage development can be achieved as economic conditions dictate. Any consideration of full comprehensive development must recognize that there are many complex and very difficult water use, economic, and legal problems that must be solved. Foremost among them is agreement to the water exchanges involved.

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POTENTIAL PROJECTS
UPPER SNAKE RIVER BASIN

Sheet 1 of 1

Project	Total Res. Capacity Ac.-Ft.	Active Res. Capacity Ac.-Ft.	Power Plant Capacity Kilowatts	Area Served Acres How Supp.	Exchange Water Ac.-Ft.	Source of Water Supply	Construction cost Dollars	Remarks
Jackson Hole Irrig. Proj.	-	-	-	2,050	8,300	-	Snake Riv.	800,000
Lower Jackson Hole Channel Proj.	-	-	-	Levees and channel work - Fish Cr. to South Park Feed Grounds.				418,000
Camilla Cr. Dam & Res.	410,000	401,000	16,000	-	-	-	Roback	27,610,000
Snake-Marrows Proj.	1,078,000	818,000	170,000	-	(650,000)	-	Snake Riv.	101,840,000
Alpine Irr. Proj.	-	-	-	1,200	-	-	Snake Riv.	675,000
Elbow Dam & Res.	406,000	310,000	14,000	-	-	-	Coeys Riv.	30,530,000
Oppart Star Valley Proj.	27,000	14,300	-	-	21,700	-	Crow Cr.	4,140,000
Svan Valley Proj.	-	-	-	400	1,500	-	Snake Riv.	790,000
Yalofonds Proj., Burns Cr. Dam, Res. & Power Plant	134,000	111,000	90,000	-	650,000	-	Snake Riv.	62,112,000
Horn Falls Proj.	-	-	15,000	-	-	-	Henry's Fork	6,120,000
Horn River Proj.	140,000	75,000	30,000	-	-	-	Henry's Fork	25,474,000
Ashcroft Res. Project	48,700	40,000	11,000	-	-	-	Henry's Fork	7,428,000
Squirrel Meadows Proj.	10,140	10,000	-	5,100	5,000	-	Squirrel Cr.	2,145,000
Snake Fish Hatchery	Diversion of flood flows up to 1,300 cfs maximum from Henry's Fork or Snake River from St. Anthony to about Shelley.							
Upper 2nd Proj.	30,000	35,000	-	15,200	17,800	-	C.W. & 2nd Riv.	14,000,000
Alta Proj.	5,420	5,400	-	-	5,400	-	Teton Cr.	
Lower 2nd Div. Proj. Fremont Dam & Res. Irrigation Proj.	515,000	200,000	22,000	59,000	30,000	-	Teton R. 2nd R.	21,370,000 17,030,000
Helena-Roberts channel Proj.	-	-	-	Levees and channel works - Helise to Henry's Fork.				1,194,000
Little Rock Div. Proj. Little Dam & Res. Irrigation Proj.	155,000	125,000	-	4,550	-	-	Willow Cr. Willow Cr.	3,420,000 2,180,000
Water Replacement Works Jernigan-Hendall Area Blackfoot Area Roberts-McDonald Area Rock Creek Surface Water	-	-	-	-	-	110,000 110,000 600,000 90,000	C.W. C.W. C.W. Rock Cr.	2,900,000 2,910,000 4,250,000 2,640,000
Blackfoot Xle. Res.	451,000	451,000	-	-	-	-	Blackfoot R.	801,000
Fort Hall Indian Reservation	11,500	9,000	-	14,900	800	-	C.W., Blackfoot R., Bannock cr & Misc.	
St. Anthony-American Falls N. Side Area	-	-	-	245,000	-	-	C.W.	
Minnesota Proj., American Falls Power Div.	-	-	30,000	-	-	-	Snake R.	10,130,000
Esprit Rock Power Proj.	-	-	30,000	-	-	-	Snake R.	11,190,000
Rockland Proj.	1,200	6,500	-	560	5,140	-	Rock cr.	2,330,000
Lake Channel Proj.	-	-	-	2,500	-	-	Snake R.	690,000
Left River Proj.	-	-	-	96,000	-	-	Snake R.	79,680,000
Alma Proj.	5,300	5,000	-	-	5,140	-	Left R.	1,655,000
Canals cr. Proj.	7,000	1,000	-	-	11,000	-	Canals cr.	
Oakley Fan Proj.	-	-	-	60,000	1,000	-	Snake R.	52,190,000
Salmon Falls Proj.	-	-	-	51,600	61,800	-	Snake R. & G.W.	86,350,000
Mud Lake & Little Lost Irrig. Dev.	-	-	-	50,000	15,300	-	C.W.	
Medicine Lodge Proj.	12,120	12,000	-	-	5,040	-	Med. Lodge cr.	5,510,000
Birch cr. Proj.	14,000	22,000	-	6,300	-	-	Birch cr.	5,524,000
Big Lost Riv. Proj. Acres Div. G.W. Division	8,000	7,500	-	-	16,000	-	Antelope cr. C.W.	5,190,000 6,270,000
Big Lost Riv. channel Proj.	-	-	-	Levees and channel work vicinity Arco.				187,000

POTENTIAL PROJECTS
UPPER SNAKE RIVER BASIN

Sheet 2 of 2

Project	Total Res. Capacity Ac.-ft.	Active Res. Capacity Ac.-ft.	Power Plant Capacity Kilowatts	Area Served Acres	Exchange Water Ac.-ft.	Source of Water Supply	Construction Cost Dollars	Remarks
Bruneau Proj. Bruneau Div.	1,070,000 115,000	186,000 102,000	-	167,000	-	Snake R.	205,500,000	Pumping from Snake R.
Thousand Springs	750,000	400,000	150,000	-	-	Snake R.	60,884,000	
Boulder Flats Dam & Res.	61,500	60,000	-	-	-	Hig Wood	7,270,000	
Hig Wood Riv. Proj.	-	-	-	-	15,000	C.W. or Hig Wood	790,000	C.W. pumping
Hig Wood Riv. Channel Proj.	-	-	-	-	-	Levee and channel works vicinity Holey and Bellevue.	160,800	
Bennett Cr. Proj.	2,500	2,300	-	-	1,500	Bennett Cr.	762,000	
Snake River Proj. Mr. Hoan Div., Duffey, & Long Tom, & Hillcrest Units	530,000	27,000	85,000 25,000 30,000	119,140	12,460	Snake R. Boise R. & C.W.	171,435,000	
Twin Springs Proj.	410,000	285,000	40,000	-	-	M.F. of Boise R.	29,700,000	
Lucky Peak Power Plant	-	-	(60,000)	-	-	Boise R.	17,249,000	Addition to existing dam & res.
Snake River Project Garden Valley Div: Gold Fork Unit Long & Round Valley Unit Garden Valley & Scriver Cr. Units Moutour M & S Units Northside Unit Willow Cr. Unit	80,000 - - 2,400,000 - - 6,500 -	78,000 - - 1,940,000 - - 6,000 -	- - - 368,500 - - - -	9,210 9,600 - - 2,500 25,000 10,000	18,150 10,500 - - - - -	Gold Fork M.F. Payette Payette R. Payette R. Payette R. Payette R.	6,608,000 7,060,000 159,690,000 1,485,000 34,382,000 9,860,000	Pump from Cascade Res.
Snake River Proj. Mr. Hoan Div. Initial Reservoir	-	-	-	82,000	-	Payette R.	137,040,000	Revolves Boise R. exchange
Boise Proj. Payette Div. Payette Heights Unit	-	-	-	1,543	-	Payette R.	675,000	
Couetil Proj.	50,500	49,200	-	1,656	2,560	Leat Cr.	2,165,000	
Hoover Cr. Proj.	2,000	1,900	-	-	1,760	Hoover Cr.	635,000	
Male Weiser Proj.	250,000	100,000	-	14,270	5,150	Weiser R.	27,120,000	
Little Weiser Riv. Zrr. Proj.	12,450	12,200	-	2,000	-	L. Weiser Riv.	2,770,000	
Mann Cr. Proj.	13,000	11,000	-	595	4,465	Mann Cr.	2,965,000	
Zodiac Cove Proj.	-	-	-	5,620	-	Snake R.	3,865,000	
Edgington Proj.	-	-	-	8,040	-	Snake R.	6,120,000	
Bruneau Proj. Wickahoury Div.	-	-	-	34,950	1,800	Snake & Bruneau R.	16,170,000	
Castle Cr. Proj.	8,700	7,500	-	870	570	Castle Cr.	3,430,000	
Sinker Cr. Proj.	5,000	2,500	-	-	860	Sinker Cr.	3,370,000	
Sucker Cr. Proj.	8,000	7,200	-	-	1,600	Guthrie Cr.	1,317,000	
Sucker Cr. Channel Proj.	-	-	-	-	-	Channel and levee work vicinity Homedale.	150,000	
Duck Valley Irr. Proj.	95,500	95,000	-	19,400	16,800	Owyhee R.	-	But of Zodiac Affluents Proj.
Upper Owyhee Proj. Jordan Cr. Dam & Res. Duncan Ferry Dam & Res.	60,000 1,000,000	57,000 743,000	- 10,000	- -	8,860 118,000	Jordan Cr. Owyhee R.	4,523,000 22,475,000	
Jacobson Gulch Proj.	-	-	-	4,660	-	Snake R.	5,210,000	
Burns R. Proj. H.P. Div. S.P. Div. Dark Canyon Div.	6,600 11,000 8,300	6,000 10,000 3,000	- - -	200 800 1,220	1,350 3,700 680	H.P. Burns R. S.P. Burns R. Burns R.	1,500,000 1,575,000 3,270,000	
Baker Project Upper Div. Wolf Cr. Div.	100,000 17,800	95,000 16,400	- -	4,010 -	13,990 5,600	Powder R. Wolf Cr.	6,550,000 5,050,000	
Powder Riv. Channel Proj.	-	-	-	-	-	Local protection through and below Baker.	-	

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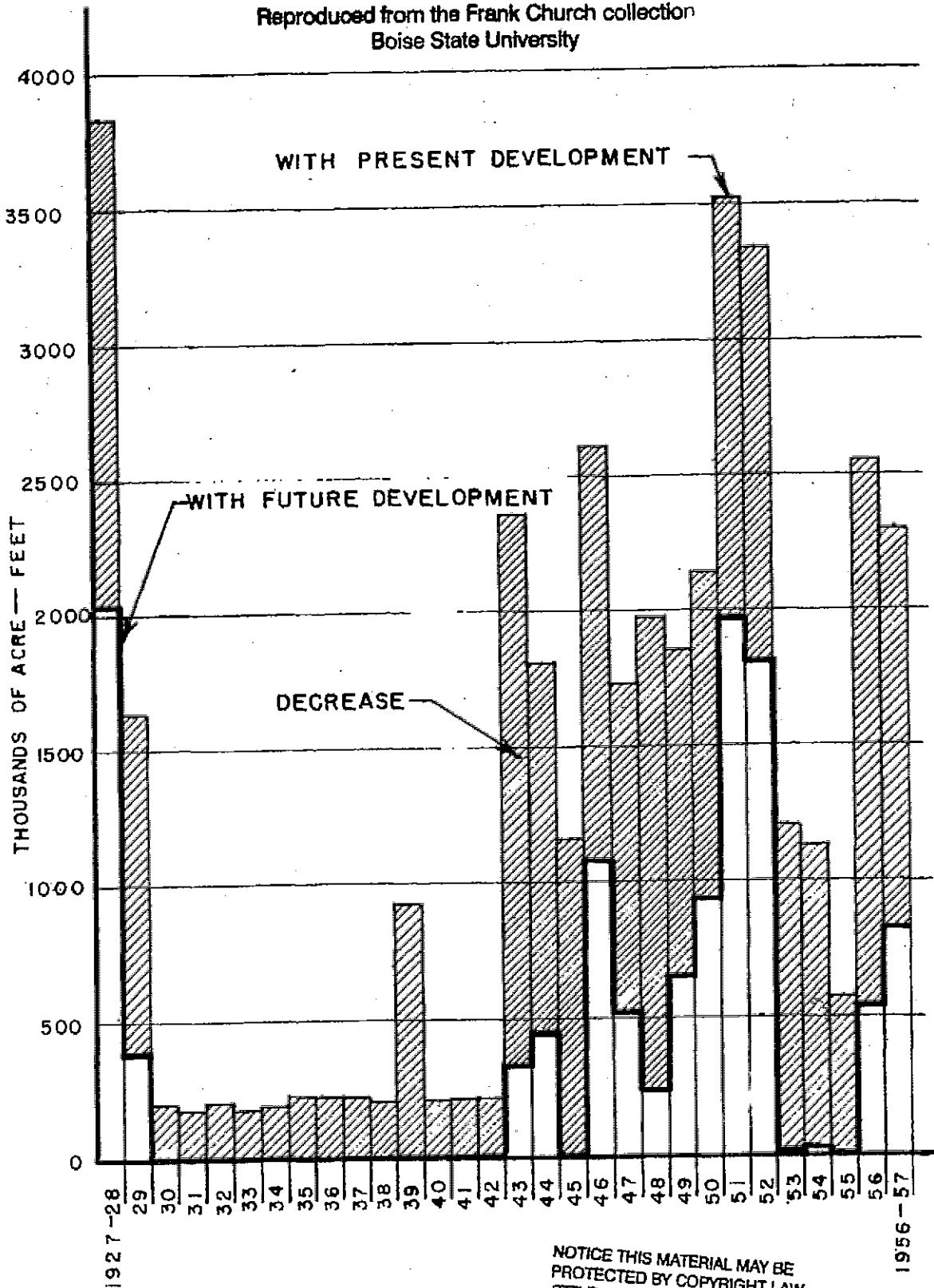
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Snake River - Flows Past Milner Dam

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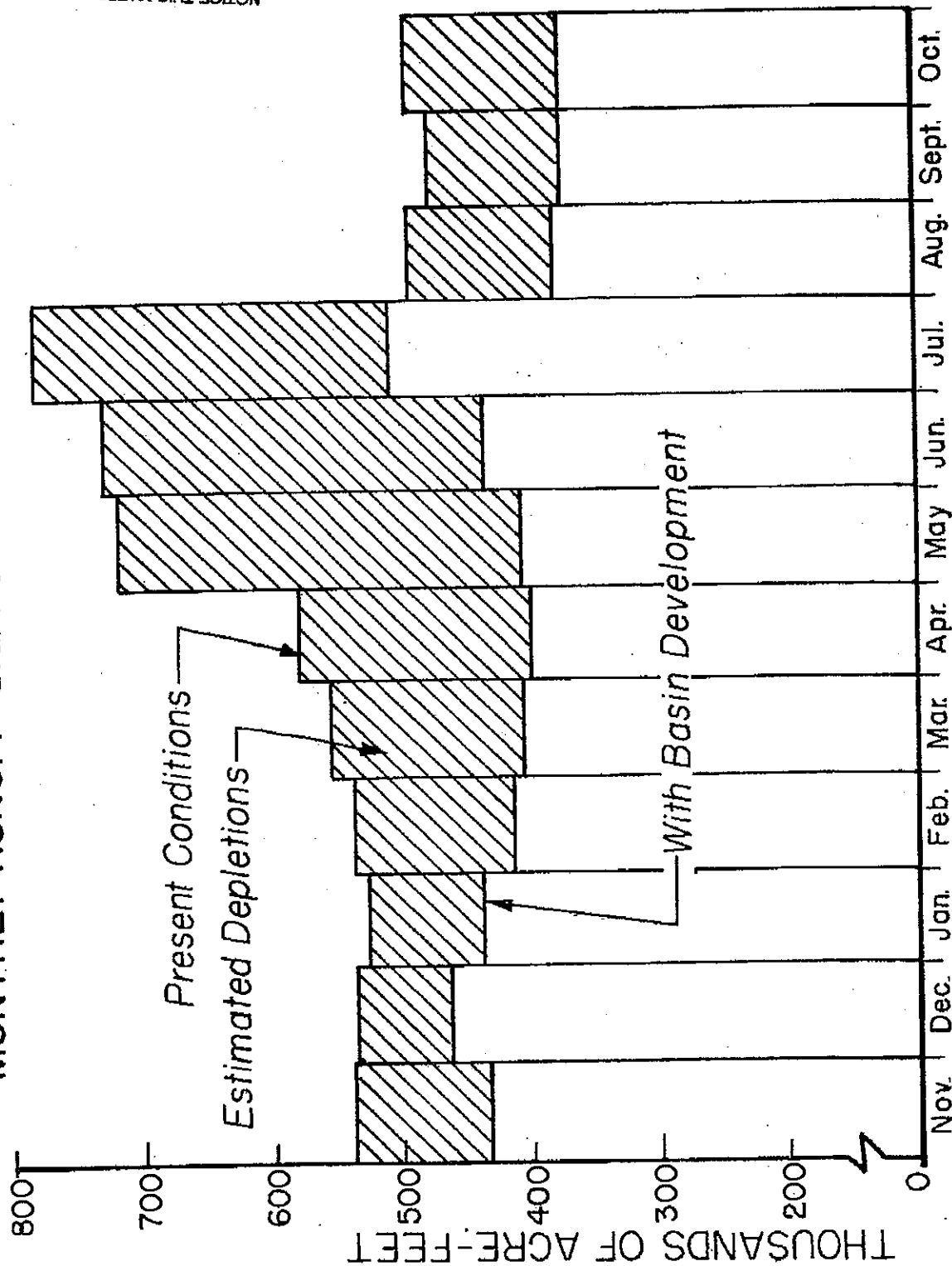
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MONTHLY RUNOFF-SNAKE RIVER BELOW GUFFEY



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1944-'45

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COPY

P.W.
Upper Snake
River Valley
Basin

October 25, 1960

Mr. J. A. Brown
The College of Idaho
Athletic Department
Caldwell, Idaho

Dear Mr. Brown:

I have received your recent letter in which you urge me to support and actively promote legislation to get the Guffey Irrigation Project underway.

On September 29, Col. Paul H. Symbol, of the Corps of Engineers, delivered to me a preliminary report on the joint studies which are being made by the Corps of Engineers and the Bureau of Reclamation on water resources of the Upper Snake River. The report states that there are about 80 potential development projects for the Upper Snake River Basin which, from an engineering and physical viewpoint, appear capable of adding some 1,130,000 acres of irrigable land, which would result from the creation of 46 new storage reservoirs with a total capacity of 7,041,000 acre feet, and which would allow for the production of 1,241,500 kilowatts of electricity. Among the projects included in this group are the Guffey, Long Tom, and Millcrest units (all dependent upon the Guffey power and storage reservoir), which would irrigate 119,140 new acres, and provide supplemental water for an additional 12,460 acres of land. Total cost for these projects is now estimated at \$172,635,000. The report states that their feasibility hinges upon agreements for water exchanges.

Now my position is this: I favor the maximum development and utilization of the water and land resources of the Upper Snake River Valley. When the studies now underway are completed, I expect to favor authorization of the various projects which prove to be feasible, as funds become available, and as the need for new crop land and hydro-electric power arises. I think the order of development should depend chiefly upon technical considerations, and I am not prepared at this time to assign a specific priority to the Guffey and related projects. In this, I will be guided, in part, by the recommendations of the experts in the Corps and in the Bureau. Idaho's growth and prosperity are clearly dependent upon the orderly development of these vast unused resources, however, and you may be sure that I will work for that objective.

Sincerely,

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JAC/WH/ag

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Box 123 Folder 13

Fourth Orr Affidavit
Exhibit 14:

**Statement by D.L. Crandall, Area
Engineer, Snake River Development
Office, Bureau of Reclamation
Columbia Basin Inter-Agency Committee
Meeting, Pocatello,
Idaho – January 11, 1961**

Statement by
D. L. Crandall, Area Engineer
Snake River Development Office
Bureau of Reclamation
Columbia Basin Inter-Agency Committee Meeting
Pocatello, Idaho - January 11, 1961

Although the joint Bureau of Reclamation-Corps of Engineers investigations in the Snake River Basin were directed to the identification of the future land- and water-resource development opportunities, it had to begin from a platform of knowledge about the present water- and land-resource uses. In the 73,000-square-mile area studied, there are some 3,200,000 acres now under irrigation, 49 reservoirs with capacities greater than 5,000 acre-feet, and 23 hydroelectric powerplants with a capacity of greater than 1,000 kilowatts. Irrigation in the Snake River Basin has been a continuing and dynamic process. Since World War II the 11,200-acre Michaud Flats Project and the 78,600-acre North Side Pumping Division of the Minidoka Project have been completed. There have been over 560,000 acres of land developed using ground water as a basic water-supply source. The development of the ground-water resources of the basin is continuing at a rapid rate where the land and ground water are in suitable relationship. 1960 promises to be one of the largest years of ground-water expansion of record. Beyond these plain, summarized facts, there is a picture of a great, stable, and valuable human accomplishment of water and land use, with irrigation being the dominant enterprise.

The more than one-half million people in the Snake River Basin area derive a livelihood that is well above the national average. Twin Falls and Jerome Counties are in the first one hundred counties of more than 3,000 in the nation in their farm level of living. Idaho farms produce 725 sacks of onions per acre against a national average of 374; 300 bushels of potatoes against a national average of 247. Sugar beet production in 1959 from two plants at Nampa and Nyssa of the Amalgamated Sugar Company had an output that added more than \$30,000,000 to the national economy. In 1959, Idaho hop production yielded 1,540 pounds per acre, while in Washington, California, and Oregon, the averages were respectively 1,640, 1,610, and 1,340 pounds per acre. Two Idaho Reclamation Projects are in the top ten of more than 97 Reclamation projects in the nation in total crop values in 1959.

There has been a growing industrialization in the Snake River Basin, based on the expansion of agricultural product processing. Potato processing has led this trend. In Southern Idaho, this industry has recently grown to include 20 plants with a combined output of 1,656,800,000 pounds. Of this amount, more than 967,000,000 pounds were for ready-to-eat food products. Idaho is the leading potato producing state with over 40,000,000 one-hundred-pound sacks grown in 1960. Excluding the nonshippable chips and shoestrings, Idaho delivered more than half the nation's processed potato products, and the largest portion of the nation's frozen french fries had their origin in the deep loessal soils of the Snake Basin. In 1959 Long Island potatoes were priced at \$2.50

alongside Idaho Russets selling for \$5.00. Soil, climate, and ability to control the moisture through irrigation accounts for the difference.

Corn canning, cattle feeding and slaughter, fruits, vegetable seeds, and processed livestock feeds have grown to positions of national importance. The markets of the West Coast are taking increasing proportions of agricultural production from the Snake River Basin. Irrigated crop values are more than one-quarter billion dollars annually.

In the predominantly agricultural counties of the Basin there appears to be a close relation between population increases and irrigation expansion. In Madison County since 1950 there has been a modest increase of 14% in irrigated area with a 3% population increase. In Minidoka County a 143% increase in irrigated area resulted in a 47% population increase. Management of water resources is a sizable job itself, involving some 55 separate irrigation districts in Idaho and three in Oregon. An example of what is before the water administrators and some of the varied benefits from careful water use and coordinated operations are present in the use of the storage reservoirs in the Upper Basin.

Operation of Snake River from Palisades Reservoir upstream under present conditions illustrates many of the requirements and problems facing the water-resource manager. The Jackson Hole country is one of the outstanding recreation areas of the nation, attracting vacationists and sportsmen from the entire United States, and Jackson Lake Reservoir is one of its prominent features. Also, water stored in Jackson Lake Reservoir has critical and important irrigation uses downstream. In order to preserve the beauty of the area, it is highly desirable to maintain the lake full throughout the tourist season. However, owners of valuable lakeshore properties prefer the lake level below full storage elevation in order to prevent erosion by wave action. Boat operators want the lake at a fairly high level all season so that docking areas do not become landlocked. Companion with demands for constant water-surface levels in Jackson Lake are requirements for a fairly high stage of the Snake River between Palisades Reservoir and Jackson Dam throughout the tourist season to float large rafts down the river on daily trips. Fishermen, however, want a low stream undisturbed by fluctuations so that conditions for wading and fly-casting are optimum. Irrigation diversions from the Snake River in Jackson Hole operate most effectively with a constant flow to avoid disturbance of diversion headworks settings. An undiminished elevation in Jackson Lake from October through mid-February each year is necessary for the mackinaw trout spawning to give sufficient depth over the spawning gravel bars and to prevent the exposure of the fingerlings or eggs. At the same time, continued release of the natural flow from Jackson Lake is desired during the winter storage period to provide a greater wetted perimeter of the river channel for optimum food production for the native cut-throat trout in the river. At times, drawdown of Jackson Reservoir is needed so there will be space in the reservoir for local flood control.

Along with all of these requirements, it is important that the level of Palisades Reservoir be maintained as high as possible to get maximum

power from limited off-season releases. Fortunately, with storage in Palisades Reservoir available to meet downstream irrigation requirements during most of the tourist season, it is possible to operate Jackson Reservoir and the river between Palisades Reservoir and Jackson Dam to meet the many and at times conflicting regulatory demands at least to an acceptable degree.

Resources for the Future

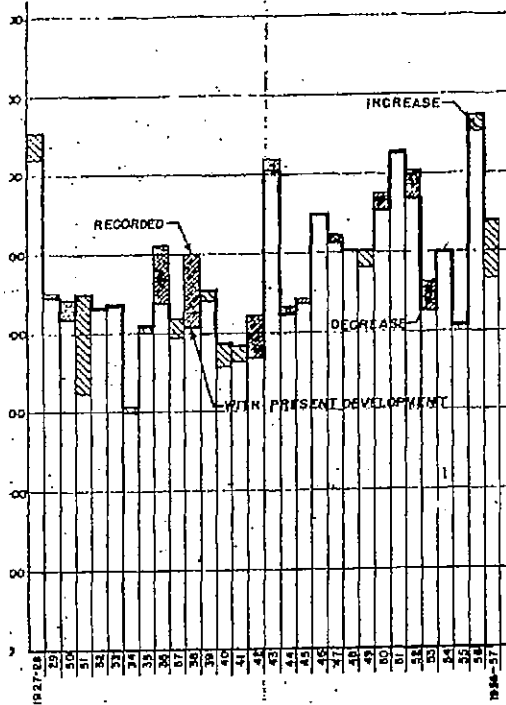
The Basin is still rich in undeveloped water and land resources. The investigation has identified 5,800,000 acres of unirrigated arable lands in the basin, most of which are in southern Idaho. We also know that with the present level of development there is an average annual outflow of 11,700,000 acre-feet of water past the Weiser gage. The basic aim of this investigation was to determine ways to bring together these undeveloped land and water resources.

About 2,300,000 acres of the total arable area are within that part of the drainage basin above Milner Dam and the remaining approximately 3,500,000 acres are below. Individual areas of greatest significance to future irrigation development occur in the broad flat valleys of Raft River and Goose Creek and on the Bruneau and Mountain Home Plateaus.

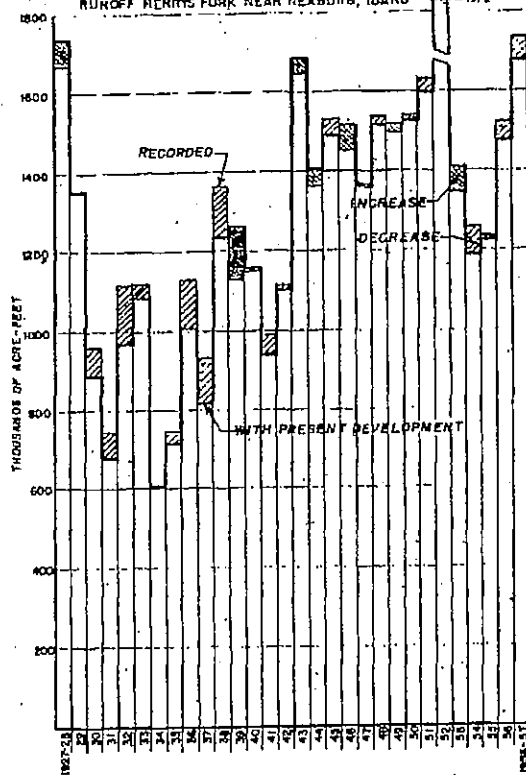
The historical flow of the Snake River, adjusted to present conditions, averages 1,016,000 acre-feet annually at Moran, Wyoming. Between Moran and the point where the river leaves the basin at Weiser, the flows in various reaches vary considerably. The flow of the river in below normal years is largely stored and diverted above Milner Dam for irrigation uses. Below Milner, return flows from irrigation and the outflow of a large number of springs enter the Snake River to make up the flow measured at King Hill which, on an average annual basis, is estimated to be 6,800,000 acre-feet. Discharge of the springs which enter mostly upstream from Bliss to below Twin Falls averages 6,500 cubic feet per second, or 4,700,000 acre-feet per year. The inflow from these upstream sources plus the inflow from the Bruneau, Owyhee, Boise, Payette, Malheur, and Weiser Rivers, together with lesser tributaries, combine to make up the total average flow at Weiser. A considerable portion of this water can be used for irrigation and other purposes. The historical runoff of Snake River adjusted to reflect the present level of development is shown on the accompanying charts, depicting flows at Heise, Milner and Murphy and on the Henrys Fork at Rexburg.

Another source of water of great importance to the future development of agricultural Idaho is the vast underground supply beneath the Snake River Plain. This Plain comprises a hydraulic system which serves both as a vast evaporation-free storage reservoir and as an excellent ground-water conduit with high transmissibility. The Plain itself is about 250 miles long, 60 to 70 miles wide, and includes some 13,000 square miles. Streams in valleys tributary to the Plain, and portions of the Henrys Fork and Snake River furnish the principal recharge to the aquifers which also receive substantial water contributions from percolating irrigation applications. Considered in its entirety, it is a reservoir, which

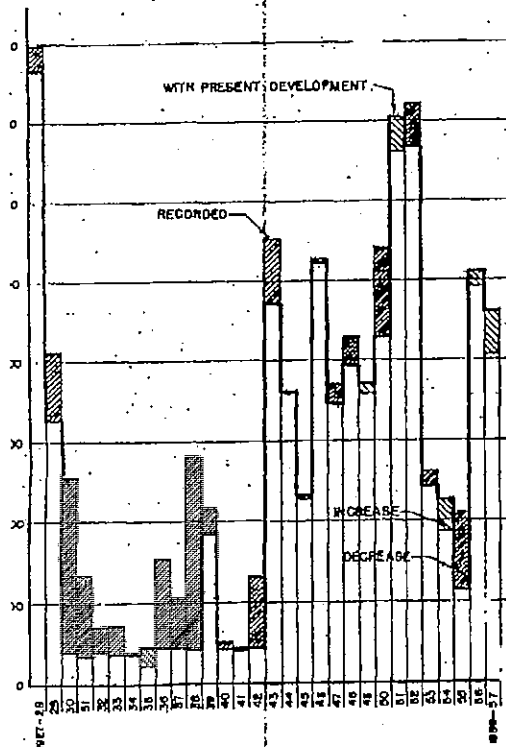
RUNOFF—SNAKE RIVER NEAR REISE, IDAHO



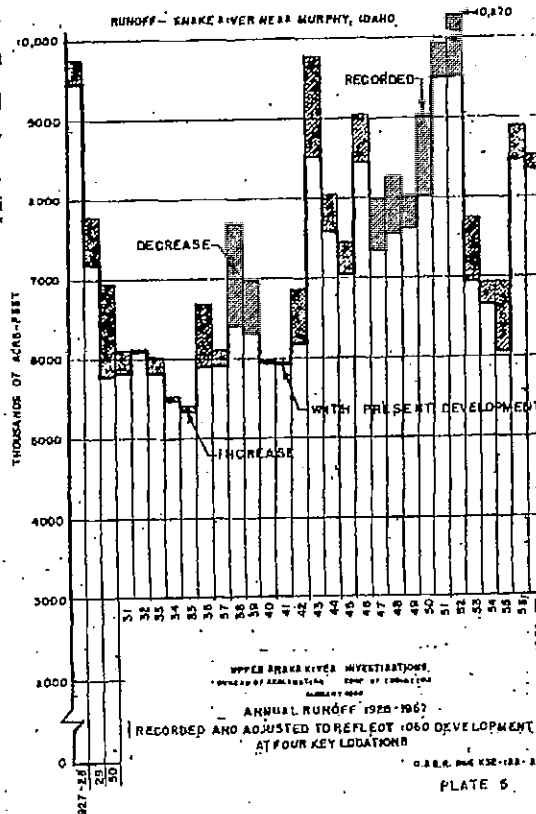
RUNOFF HENRY'S FORK NEAR REXBURG, IDAHO



RUNOFF—SNAKE RIVER BELOW MILNER, IDAHO



RUNOFF—SNAKE RIVER NEAR MURPHY, IDAHO



UPPER SNAKE RIVER INVESTIGATION
ANNUAL RUNOFF 1928-1967
RECORDED AND ADJUSTED TO REFLECT 1960 DEVELOPMENT
AT FOUR KEY LOCATIONS

involves no dislocations, from which several million acre-feet of water could be withdrawn by pumping with lifts that range from a comparatively few feet to several hundreds of feet. The natural discharge of this vast body of water is from the springs at the lower end of the basin from Twin Falls to Bliss.

From a water resource standpoint the Basin should be considered as separated into two major parts at Milner Dam. Above Milner, all of the surface water in dry cycles is already appropriated and used for the present development. Below Milner there is a large usable water supply in the river that increases progressively downstream. Although the average spill at Milner Dam, based on the present water uses, would be about 1,305,000 acre-feet, there is the period from 1931 to 1942, as illustrated on the bar chart, when there would have been no spills except for 769,000 acre-feet in the one year of 1939.

The two major unused components of the water resource available for future development in the service area above Milner are the ground waters beneath the Snake River Plain and the water spilling at Milner Dam. Much of the land to be served is remote from any practical ground-water source. Also, as illustrated on the chart, there is a long period of 11 out of 12 years when no spills occur at Milner. These factors have led to the combination of the two water supplies. In dry years the ground water could be delivered to present irrigation users in exchange for surface water diverted to new projects. In wet years the water that would otherwise spill at Milner would be saved through new storage.

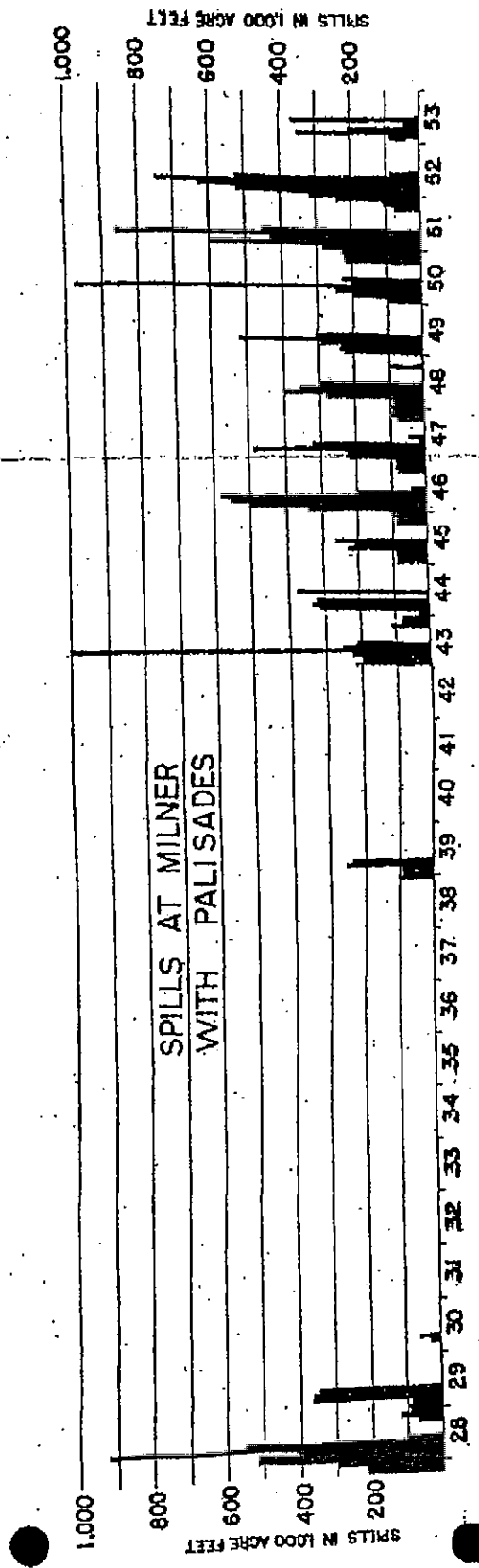
Redistribution of water in the manner suggested would be made under terms of and with full recognition of present water rights and uses. The present users would receive their full water entitlements as to quantity, quality, and timing; the only variation would be in the source of the water used.

A variation in ground-water use would be to supply surface waters when available to existing ground-water areas now faced with declining levels. Their present ground-water resources could then be conserved for dry-year use.

In the area below Milner different considerations are more important because of the relative elevations of the land and available water supplies. Here the engineering and economic considerations are controlling factors in most cases.

Potential Projects

Application of the general principles described, and combining ground and surface waters to yield a firm water supply through even the dry years for the area above Milner, have led to definition of development possibilities illustrated on the large basin map. The areas indicated in yellow are new land areas that from a physical and engineering viewpoint could be irrigated. The areas of yellow with black dots are those which



are now irrigated with an inadequate water supply, for which supplemental water could be provided. The solid green areas are the presently irrigated lands with a satisfactory water supply.

Water now spilled past Milner Dam in wet years could be retained in upstream reservoirs which are:

<u>Reservoir</u>	<u>Stream</u>	<u>Capacity in acre-feet</u>	
		<u>Active</u>	<u>Total</u>
Alpine	Snake River	878,000	1,078,000
Granite Creek	Hoback River	403,000	470,000
Elbow	Greys River	310,000	406,000

This storage in combination with ground water from Snake Plain would allow irrigation in the following project areas:

<u>Project Areas</u>	<u>Benefited Area - Acres</u>	
	<u>New Land</u>	<u>Supplemental Areas</u>
Raft River	96,000	
Oakley Fan	62,000	2,000
Salmon Falls	51,620	61,700
Swan Valley	400	1,500
Lake Channel	1,500	

Further irrigation developments in Upper and Lower Teton Basins involve storage at the Fremont and Driggs sites of 200,000 and 35,000 acre-feet, respectively. The irrigation potential in each of these areas is:

	<u>Benefited Area - Acres</u>	
	<u>New Land</u>	<u>Supplemental Areas</u>
Upper Teton Basin	15,200	27,800
Lower Teton Basin	39,000	30,000

On Willow Creek, a storage reservoir of 20,000 acre-feet could be used for irrigation of 4,350 acres on Ririe Bench. In addition, there are a number of smaller developments scattered throughout the Upper Basin and along the northern limits of the plain which have an irrigation potential. Also, an estimated 145,000 acres of new irrigation can be expected in the future from individual private development of ground water north of the river upstream from American Falls. Perhaps 15,000 acres of this type of irrigation might take place in the Mud Lake Region in the future.

Below Milner, developments appear practical on an individual project basis. The larger of these are on the Bruneau and Mountain Home Plateaus. The Mountain Home Division of the Snake River Project, commonly referred to as the Guffey development, would provide irrigation water for about 132,000 acres through combined use of Boise and Snake Rivers and limited ground water in lower Boise Valley. The development of the part of the Bruneau Plateau which appears practical with Snake River water would add 187,000 acres. Garden Valley Division, involving 1,940,000 acre-feet of active capacity at Garden Valley Reservoir, would contribute to full development of Payette Basin irrigation potentials of some 75,000 acres and provide a substantial share of the power needed for new irrigation water uses throughout the basin.

Multipurpose storage of up to 200,000 acre-feet of active capacity on Weiser at Goodrich site is important to the irrigation of several areas in that Basin at scattered locations. In addition, there are a number of other project possibilities along the Malheur, Burnt, Powder and other streams.

Replenishment of the vast underground reservoir is possible by artificially recharging it through the diversion of surplus flows which are in excess of the requirements of future developments. This can be accomplished by diverting from Henrys Fork and Snake River into highly permeable areas. In this manner, drawdown from expanded pumping would be minimized, the flow of the river would be smoothed out to the benefit of downstream power, and a measure of flood control realized from diversion of flood peaks.

The combination of all the possibilities is a total of 74 individual irrigation and multipurpose developments providing for irrigation of approximately 1,130,000 acres of new land and 1,100,000 acres needing supplemental supplies. This new land area is approximately equal to one-third of the presently irrigated area in the basin.

In summary then, several principal considerations are apparent. New developments would become more and more interrelated with one another and with present irrigation. New storage would have to serve more than one irrigation possibility. Likewise, ground-water-development areas would provide dry-year water for more than one project. Almost all of the new irrigation water uses require pumping, so power in great quantity is needed to either lift the water from surface sources or to develop the necessary ground water. For all of the potential projects some 550,000 kilowatts of capacity are needed, and in an average situation some 2,140,000,000 kilowatt-hours of energy would be required annually. Another important factor involves the redistribution or exchange of water. Again, we emphasize that all plans are based on the preservation of existing water rights.

It is unquestioned that the reimbursable costs assigned to irrigation would substantially exceed the irrigators' repayment ability. In order for much development to go forward, it would mean that a source of financial assistance would have to be identified. Power revenue remaining after payment of all the allocations to power has been an important source of financial assistance in the past throughout the West.

The combined total of benefits at present price levels that might be expected should all the projects be achieved is about \$106,000,000 annually. The greatest contribution to this total would be from irrigation. The amount of new land involved would result in creation of perhaps 10,500 new farms. This compares to the estimated 32,000 farm families now earning their living from irrigated agriculture in the basin. The average 90-acre irrigated farm today required expenditures totaling \$40,000 per farm. Applying simple arithmetic results in an investment requirement of \$420,000,000 for the farms that would come into being if all the irrigation potentialities were accomplished.

The following tabulation, which represents the estimated annual benefits that would result from the 80 potential developments of all types analyzed in the report, demonstrates the importance of comprehensive development to the State of Idaho:

Irrigation	\$ 68,035,000
Power	32,417,000
Flood control	4,695,000
Recreation	<u>921,000</u>
Total	\$106,068,000

The power and flood control phases are to be detailed in the presentation by the Corps of Engineers to follow.

Fourth Orr Affidavit
Exhibit 16:

**Letter from Robert E. Smylie, Governor
of Idaho, to the Honorable Stewart L.
Udall, Secretary of the Interior
(Dec. 7, 1966)**



ROBERT E. EMYLIE
GOVERNOR

STATE OF IDAHO
OFFICE OF THE GOVERNOR
BOISE

December 7, 1966

Honorable Stewart L. Udall
Secretary of the Interior
Washington, D. C.

Dear Mr. Secretary:

This is the official reply of the State of Idaho to your letter of September 2, 1966 requesting comments on the June 1966 feasibility report of the U. S. Bureau of Reclamation on the Southwest Idaho Water Development Project. Public hearings have been held by the Idaho State Reclamation Engineer in each of the counties directly affected by this proposed project and the report has been approved by the Idaho Water Resource Board.

I am happy to inform you that the project has virtually unanimous support of the people in this area. Unanimity has been reached on the principle of water exchanges between river basins after several years of negotiations. The present plan integrates the flows of the Snake, Boise and Payette River Basins to provide for more efficient utilization of the water resource for multi-purpose development for irrigation, municipal, industrial, flood control, fish and wildlife and recreational uses. This comprehensive approach supplants the previous piecemeal planning efforts undertaken in the separate river basins.

There are, however, certain items which we request be considered and made a part of future studies and operational plans for this project. These are as follows:

- (1) Idaho has tremendous potential for irrigation development. Part of this potential lies in the Upper Snake River Basin above Milner Dam. Several projects have been proposed or authorized in this area including Ririe Dam, Lower Teton (Fremont), Lynn Crandall, Salmon Falls, ground water recharge, and projects connected with the proposed enlargement of American Falls Dam. We feel that these potential projects are feasible provided the water supply of the Southwest Idaho Water Development Project is not dependent upon spills past Milner Dam. We are

INFORMATION CO

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December 7, 1966

assured by Region 1, Bureau of Reclamation that inflows below Milner are sufficient to meet Southwest Idaho Project requirements.

(2) The water permits issued to the Bureau of Reclamation by the State of Idaho for the Guffey Dam and diversions contain the following language: "Provided that appropriators withdrawing water for irrigation of lands upstream or downstream of the Guffey Dam will not be required to reimburse the Bureau of Reclamation for the consequent loss of energy and also providing that the diversion of the waters of the Snake River and the construction, maintenance and operation of the storage and diversion works shall not in any way impede, interfere with or impair the use, operation and maintenance of the pumping plant of Gem Irrigation District of Marsing, Idaho." We feel that any required alteration of the pumping facilities of the Gem Irrigation District should be included as project costs.

(3) The Weiser River basin is subject to repeated flooding. The feasibility study for the Weiser Division should include a re-evaluation of the Goodrich Dam for flood protection as well as irrigation of lands not included in the initial reconnaissance report of Region 1, U. S. Bureau of Reclamation.

(4) A major portion of the potential irrigation development under the Garden Valley Division is outside of the Payette River basin. Local Payette River interests have requested that present studies and plans for out-of-basin diversion be limited to 600,000 acre feet annually. We are assured by officials of Region 1, Bureau of Reclamation that this limitation will not interfere with development of the Willow Slope and Initial Butte units of the project. Additional amounts above the 600,000 acre feet will be the subject of a further feasibility study.

(5) Studies of the irrigation features of the Garden Valley Division should include an investigation of the feasibility

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of draining the bottom lands of the Payette River below Black Canyon Dam for expansion of irrigation development.

(6) The Garden Valley Reservoir will inundate a major part of the privately owned agricultural lands of Boise County, which carry a substantial portion of the local tax load. Local interests have suggested that these measures be explored:

(a) Purchase by the displaced individuals of comparable federal lands;

(b) Provision for granting of concessions at developed recreational areas;

(c) Waiving of the normal acquisition by the United States of all lands within 300 feet of the maximum water surface to allow private ownership of the waters edge over part of the shoreline for recreation and summer home use; or

(d) Direct compensation to the county for loss of tax base as a project fixed cost.

(7) There are some 1,400,000 acres of arable dry land within the project area although about 900,000 acres are located at elevations where a water supply is not immediately available. Because of recent successful high-lift pump projects along the Snake River, future studies should consider the extension of the proposed Mountain Home, Guffey, Bruneau and Initial Butte Unit facilities.

(8) We are concerned that the project might be delayed because of the controversy over studies of importation of water to the Colorado River basin. If it is held up for political reasons, I fear that the people of Idaho will interpret the move as proof that the Southwest states want to take water that we could utilize, not merely that in excess of our needs.

Idaho gives unqualified endorsement of the Southwest Idaho Water Development Project as described in the June 1966 feasibility report. Consideration of the items mentioned above will not affect the feasibility of the project and should not prevent early authorization and appropriation of funds to begin construction. I would like to point out that there are many individuals

Honorable Stewart L. Udall

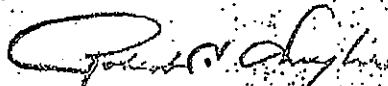
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December 7, 1966

who are willing to undertake private development of lands in the project area which are withdrawn for reclamation purposes. In the event that there is any prolonged delay in authorization of the project because of political considerations, I favor release of these lands to allow some development with private capital.

I urge your full support in recommending this project to the Congress.

Sincerely yours,


GOVERNOR

RES:c

cc: Honorable Len B. Jordan, United States Senator
Honorable Frank Church, United States Senator
Honorable George V. Hansen, Member of Congress
Honorable Compton I. White, Member of Congress
Honorable James McClure, M.C.-elect
Honorable Keith Higgenson, State Reclamation Engineer
Honorable Carl Tappan, Water Resources Board
Honorable George Crookham, Caldwell, Idaho, Chr. Water Board
Honorable W. W. Gartin, Chr. Southwest Idaho Water Development Ass'n,
c/o Terteling Co., First Security Bank Building, Boise, Idaho

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Box: 23
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Boxed 1965-1966

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Fourth Orr Affidavit
Exhibit 17:

**Letter from letter from Norman H.
Moore, Assistant Regional Director,
United States Bureau of Reclamation, to
Dr. Robert E. Lee, Director, Idaho Water
Resource Board (Oct. 27, 1967)**



UNITED STATES
DEPARTMENT OF THE INTERIOR

BUREAU OF RECLAMATION

REGIONAL OFFICE, REGION I
BOX 8008
BOISE, IDAHO 83707

IN REPLY
REFER TO:

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RECEIVED

OCT 11 1967

IDAHO WATER RESOURCE

57271007

Dr. Robert R. Lee, Director
Idaho Water Resource Board
Statehouse
Boise, Idaho 83707

Dear Dr. Lee:

At the meeting of the Idaho Water Resource Board, Thursday, October 19, 1967, Mr. F. M. Warnick responded to the questions set out in your letter of October 6, 1967. Additional questions from members of the Board were answered by Regional Director Nelson and Mr. Warnick. To complete your record, we are setting forth in this letter our answers to the questions in your October 6, 1967 letter.

Question 1. Review the quantity and location of the total estimated potentially irrigable lands in the Upper Snake River Basin.

Although no accurate information is available on the potentially irrigable land in the Upper Snake River Basin, reconnaissance studies of the Bureau have identified about 2,300,000 acres in addition to the 2,400,000 acres now irrigated. Large blocks of potentially irrigable land are located west of the Snake River from St. Anthony to American Falls Dam (250,000 acres). These lands lie adjacent to presently irrigated lands. South of the Snake River along Raft River, Goose Creek, and westward to Salmon Falls Creek are equally large blocks of potentially irrigable lands (225,000 acres). Along the many tributaries of the Snake River are smaller acreages that would respond to irrigation. Upwards of 1,000,000 acres of the presently irrigated area needs supplemental water. Areas experiencing frequent and substantial shortages are located along tributary streams where storage is lacking. Less severe shortages are experienced by some irrigated lands of the Snake Plain receiving water directly from the Snake River.

Questions 2 and 5. Areas that could be served by increased storage at Lynn Crandall Reservoir or American Falls Reservoir. The water supply situation with and without American Falls Dam enlargement.

	INI.	DATE
DIRECTOR	RLL	10/30
CHAIRMAN		
BOARD		
PLANNING	Ed	10/30
ENGINEERING		
ECONOMICS		
HYDROLOGY	RR	10/30
LAND CLASS.		
REPORTS		
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Uncontrolled and unused surface flows of the Snake River passing Milner Dam average 1,250,000 acre-feet annually, including Idaho Power Company primary and secondary rights passing the dam, although there were eight consecutive years in the 1930's when no water would be available for new uses. This quantity of water, if fully controlled and utilized, would supply only a fraction of the future needs in the basin. It therefore appears that major land and water resource development will only be possible with coordinated and complementary use of the unused surface and ground water supply. New storage space is needed for control and use of wet year surface flows and ground water pumping is required to meet the dry year deficiencies.

The attached chart shows more clearly the flows that pass Milner Dam, exclusive of Power Company water, that is uncommitted. If other developments are undertaken and placed in operation, such as Lynn Crandall Reservoir and Snake Plain Recharge, then uncommitted flows passing Milner Dam would average about 232,000 acre-feet. This is the water that may be stored in an enlarged American Falls Reservoir.

Question 3. What are the advantages and disadvantages of ground water recharge and ground water exchange?

The ground water resource beneath the Snake River Plain could be benefited by artificial recharge. Artificial recharge would consist of diverting surplus surface flows of wet years from Snake River or Henrys Fork to infiltration areas where this water would enter the porous materials of the Snake Plain aquifer. Thus, both the transient storage provided by the aquifer and the surplus surface water that is now unused would be beneficially joined.

If the concept of artificial recharge is considered in the light of present and future water resource developments in the Upper Snake River Basin above Bliss, it would have the following effects:

- (a) Put underground in an evaporation-free reservoir, surplus flows of Henrys Fork and Snake River that would otherwise spill past Milner unused;
- (b) Increase the flow from the aquifer into Snake River at various places between Idaho Falls and Bliss;
- (c) Make available water for a variety of purposes that might not otherwise be usable in this reach of the river;
- (d) Moderate a declining water level in some areas and forestall this trend in other areas; and
- (e) Provide flood control by diversion of peak flows of Henrys Fork and Snake River.



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As might be imagined, arriving at monetary benefits and identification of project beneficiaries to a sufficient degree for contracting repayment of project annual and construction costs, are questions perhaps more difficult to resolve than the physical relationships of getting excess surface water under ground. A disadvantage of artificial recharge is the inability to regulate the ground water storage reservoir. Additional pumping from the aquifer would have some adverse effect on present individual pumpers in localized areas because of lowering water tables; however, the aquifer as a whole is far from being fully developed and much further pumping can take place without mining the resource.

Question 4. What is the timing of the Bureau's studies on the American Falls Dam, the Lynn Crandall Dam, and the Snake Plain Recharge Project?

A report on replacement of American Falls Dam is to be completed in February 1968. The proposed report on Lynn Crandall is scheduled for completion in December 1968, and the proposed report on Snake Plain Recharge is scheduled for completion in August 1969. Because of the condition of the concrete in American Falls Dam, it no longer meets the standards of safety expected of a structure of this type. The primary problem there is replacement of the present structure as soon as it can be reasonably accomplished. Whether this replacement is the same size as the existing dam or is a larger dam is a decision which must be made. Whatever decision is made, the replacement should not be delayed pending authorization of Lynn Crandall or Snake Plain Recharge.

Question 6. What is the potential for irrigating lands in the Portneuf River Drainage by exchange from Blackfoot Reservoir, presuming that the Lynn Crandall Reservoir would supply the replacement water? The problem with respect to obtaining Indian approval and competition for water in downstream areas should be discussed.

During the investigations for the Upper Snake River Basin report, completed jointly by the Bureau of Reclamation and Corps. of Engineers, the Bureau of Reclamation made an inventory of the land resources in the Portneuf River Basin. This inventory showed there are about 75,000 acres that are dry farmed or idle that could be irrigated if sufficient water could be made available. In addition, there are about 47,000 acres presently irrigated which need supplemental water. It is physically possible to divert water from Blackfoot River below Blackfoot Reservoir into the headwaters of the Portneuf River Basin. Blackfoot Reservoir has usable capacity of 413,000 acre-feet. Operating limitations imposed by the Bureau of Indian Affairs limit the storage to about 340,000 acre-feet. Our preliminary studies indicate that the average annual yield from this reservoir is about 125,000 acre-feet. Physically, all this water is divertible to the Portneuf River Basin. This amount of water could be completely replaced to the Indian Reservation by use



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of storage in Lynn Crandall Reservoir during the wet years and ground water pumping in dry years. To accomplish this exchange, the Reservation Canal would have to be enlarged from Snake River to the point where the canal intersects Blackfoot River. The problems connected with this exchange are obtaining Indian approval to the exchange and competition for the water for downstream areas where there are more favorable growing seasons.

We appreciated the opportunity to discuss with your Board the replacement of American Falls Dam. If additional information is needed to aid in your consideration of this problem, please contact us.

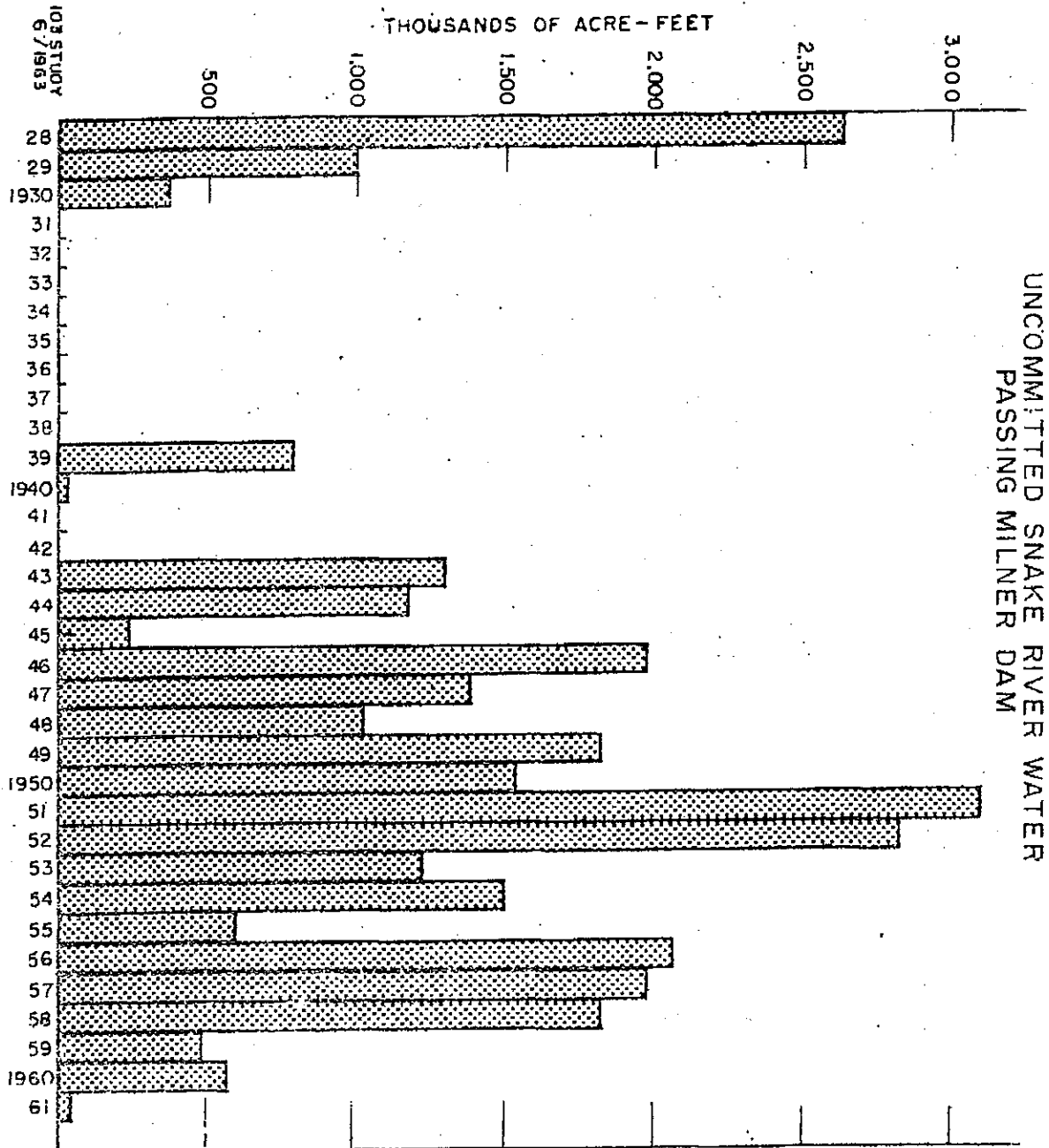
Sincerely yours,

Norman H. Rose

Assistant Regional Director

Attachment





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