

Guidelines for Decision-Making in Operation of Wyoming's Contracted Space in Palisades Reservoir

Bureau of Reclamation
Snake River Area Office

State of Wyoming
State Engineer's Office

September 1996

I. Introduction	1
II. Minidoka Project Overview	3
III. Overview of Wyoming's Role	10
IV. Project Water Operations and Accounting	12
V. Forecasting	15
VI. Flood Operations	17
VII. Operating Criteria	18
VIII. Sample Operations	24
IX. Data Collection and Accounting	28
X. Upper Snake River Rental Pool	34
XI. Review of these Guidelines	36

Operating Guidelines

I. Introduction

The State of Wyoming (Wyoming) has entered into a contract with the Bureau of Reclamation (Reclamation). By this contract, Wyoming purchased 2.75% of the joint use space in Palisades Reservoir. This presently amounts to 33,000 acre-feet (af). This space had been previously reserved in Palisades to enable Wyoming to meet its obligations to Idaho under the terms of the Snake River Compact (Compact). Nothing in this document shall relieve Wyoming from its obligations under the terms of the Compact.

This 33,000 af of space will be utilized by Wyoming to provide, through exchange, water in Jackson Lake for use by Wyoming. This storage will be used at the discretion of Wyoming as either a volume retained in Jackson Lake to maintain higher lake levels or released to supplement low fall and winter stream flows, or some combination as deemed necessary. Wyoming also has the option of marketing their Palisades storage through the Rental Pool, and as a spaceholder in the reservoir system, Wyoming may also purchase water for these purposes. If Wyoming markets its water through the Rental Pool, all rules of the Rental Pool will apply.

1. Purpose of this document:

The purpose of this document is to provide information regarding Reclamation's current operating criteria for Jackson Lake and Palisades by describing both physical and institutional constraints, the flexibility within these constraints, and what operational alternatives exist. In addition, these guidelines will address the water accounting procedures used to track storage rights and water exchanges between reservoirs in general, and specifically, as it relates to the Palisades space contracted for by Wyoming. These operating guidelines will also attempt to define the relationship between Reclamation and Wyoming in the operations of Jackson Lake.

The Minidoka Project is a complex system of interdependent reservoirs, located in two states, requiring the balance of a variety of multipurpose demands and water rights. It is essential that a high level of flexibility be maintained in the operation of this system given the ever changing water supply conditions, changes in irrigation demand patterns, the expanding needs for recreation, and fish and wildlife concerns. Creative planning, sound management, and coordination are essential to meet the increasing demands on the water resource. These guidelines are intended to enhance the understanding and coordination of efforts between Reclamation and Wyoming.

2. Background:

The previously uncontracted space in Palisades Reservoir included 33,000 af of space that was set aside to compensate Idaho under the terms of the Compact. Reclamation has held this space as a replacement option for depletions in the water supply due to future development in Wyoming that may occur after the signing date of the Compact, October 10, 1949. The Compact was approved by Congress on March 21, 1950, and allocated the waters of the Snake River to each State, Idaho (96 percent) and Wyoming (4 percent), for storage or direct diversion in addition to established Wyoming water rights. Established Wyoming Snake River water rights meant those validly established prior to July 1, 1949. The four percent has been commonly quantified as approximately 200,000 af per year based on average annual runoff at the Wyoming/Idaho state line.

The Compact allows for future direct diversion or storage development in Wyoming. Idaho is to be compensated with storage by Wyoming if certain "trigger" criteria are exceeded. The Compact allows one-half of Wyoming's allotment (100,000 af) to be used without restriction. However, use in Wyoming of the remaining one-half (100,000 af) requires replacement storage in the amount of one-third of such use for the benefit of existing Idaho waterusers. Therefore, 33,000 af of space in Palisades Reservoir has historically been identified for that purpose, thus the term Wyoming Compact Space.

Wyoming and Idaho will develop an interstate agreement or rules as a part of the two State compact to clarify several compact administration issues including replacement storage, separate and apart from the contract and this document. They will agree to a procedure that establishes when Idaho may receive replacement storage because of development of new storage, or diversions in Wyoming have reached the above described threshold.

Little or no significant water development has occurred in Wyoming since the Compact was signed. Therefore, Wyoming has not needed water from the Compact Space to replace diversion or storage developments. Wyoming has, however, expressed a need for water in Jackson Lake and the Snake River below Jackson Lake Dam for fishery and other recreational purposes. The State of Wyoming or entities within Wyoming have not presently contracted for any storage space in Jackson Lake Reservoir. All the space was contracted to waterusers in Idaho when Jackson Lake Dam was constructed in the early 1900's.

The emphasis on recreation and the importance of recreational and aesthetic values at Jackson Lake Reservoir and on the Snake River below the reservoir have increased tremendously. Wyoming and Reclamation have worked together to find a means to provide water to meet some of these new needs within the existing physical and legal framework of this river basin. Potential sources of water were sought to meet these

needs. The Palisades Wyoming Compact Space has now been contracted to Wyoming as a possible partial solution.

Reclamation recognizes the value of the fishery in the Snake River below Jackson Lake Dam and the value of maintaining instream flows. Reclamation will continue to cooperate with Wyoming to maintain instream flows within the constraints and flexibility of the reservoir system, hydrological conditions, and demands on the system, while continuing to meet all existing contractual obligations.

II. Minidoka Project Overview

1. Authorizing Legislation:

The basic authority for the construction of the Minidoka Project is the Act of Congress approved June 17, 1902, (32 Stat. 388), and acts amendatory thereof or supplementary thereto, all of which acts are commonly known and referred to as the Federal Reclamation Laws.

2. Overview and Project Data:

Irrigation development along the Upper Snake River in Idaho began in the 1860's. Early settlers had modest resources and were ambitious in developing family farms and the irrigation facilities to serve them. Reclamation's role in developing the area has been primarily to continue that tradition and improve the water supply to those privately developed lands. In addition a full water supply has been provided to several individual irrigation districts.

Reclamation involvement on the project began in 1904 with construction of Minidoka Dam. The most recent construction by Reclamation (except for Teton Dam) was accomplished in the mid-1950's when Palisades Dam and the North Side Pumping Division, which is largely supplied by ground water, were constructed. The Corps of Engineers constructed Ririe Reservoir in the early 1970's, and it was first filled in 1977.

The Minidoka and Palisades Projects include a complex system of storage and distribution facilities serving approximately 1.2 million acres, encompassing an area from Ashton and Driggs in the northeast part of Idaho to Bliss in the south central part of the State. Water is stored in eight Federally constructed, and two privately constructed reservoirs on the Snake River and its tributaries. The capacity of the combined facilities totals 4,165,708 af. Storage reservoirs serving the northern part of the project area are Henrys Lake, Island Park, and Grassy Lake. Storage facilities serving the southern part of the project are Jackson Lake Dam, American Falls Dam, Palisades Dam, and Minidoka Dam. Ririe Dam was constructed by the Corps of Engineers as a flood control and

irrigation storage project. Ririe was transferred to Reclamation for operation and maintenance shortly after construction.

Four power plants located at Palisades Dam, Minidoka Dam, Island Park Dam, and American Falls Dam are operated in conjunction with Project facilities. The power plant at American Falls is owned and operated by the Idaho Power Company and has a capacity of 110 megawatts. Presently under construction is a new power plant at Minidoka Dam. When this plant is completed, the rated generating capacity will increase to 27.9 mw, from an original capacity 15.2 mw. Palisades has recently been uprated and the capacity has been increased from 125 mw to 178 mw. The Fall River Electric Cooperative has completed construction of power plant at Island Park Dam, with a rated capacity of 4.8 mw. In addition there are approximately 30 powerplants located within project facilities.

The first major storage reservoir constructed in the Upper Snake area was Jackson Lake Dam, under a permit from Wyoming for use in Idaho. Minidoka and American Falls Dams were later constructed on the main stem of the Snake. Island Park, Henrys Lake, and Grassy Lake Dams were constructed on the Henrys Fork to serve the northern part of the project.

Minidoka Dam was constructed after the first Jackson Lake Dam was built, and prior to the second Jackson Lake Dam. It serves primarily as a diversion facility with an active storage capacity of 95,180 af. All of these facilities constructed by the end of the 1930's. As each dam was constructed, contracting entities (Irrigation Districts individuals, municipalities and canal companies) entered into contracts with the United States for the use of reservoir space and repayment of the construction costs and annual maintenance obligations.

During the extreme water shortages of the 1930's, the reservoirs that were completed at the time did not meet the needs of the irrigators and other users. Additional storage was ardently sought. During this time, winter diversions for livestock and domestic use severely limited the storable water in the river. An innovative nonstructural program (winter water savings) was developed and provided the justification to construct additional storage at Palisades. Construction began in 1951, and was completed in 1957. The winter water savings program was implemented by giving the participants in the program a storage right with a priority date one day senior to the American Falls storage right. This virtually guaranteed that their winter water savings space would fill every year. This right was given in exchange for the participants agreeing to curtail their winter diversions for a period of 150 consecutive days during the non-irrigation season.

The majority of the participants received this right for a portion of the space purchased in Palisades Reservoir. The amount was limited to the volume previously lost due to winter diversions. All of the winter diversions have ceased below Minidoka Dam while a small

number continue above American Falls. Some entities who participated in the winter water savings program did not purchase Palisades space. They were also compensated for curtailing winter diversions by giving them a similar priority date in American Falls Reservoir.

The Corps of Engineers constructed Ririe Dam and Flood Channel from 1970-1977. Reclamation operates and maintains these facilities. Ririe Reservoir has the poorest refill capability of any Minidoka Project reservoir for two reasons. It is on Willow Creek a relatively small tributary watershed that has a small yield, and the storage rights are junior to all other project storage rights.

All of the joint use storage space in Ririe Reservoir has been committed to Mitigation Incorporated. This entity was set up to contract for Ririe space and the remainder of the previously uncontracted Palisades space for the benefit of those wateruser entities that are injured as a result of the Shoshone Bannock water rights agreement. A contract for this space has been completed with Mitigation Inc. Recreation use is highly developed at Ririe.

3. Water Right Priorities

The storage rights and priorities are quite complex, with multiple water rights within the reservoirs. They roughly follow the order in which the reservoirs were constructed with the exception of the winter water savings rights in Palisades and American Falls. A graphic illustration of the Storage rights, titled, Reservoir Allocations Upper Snake River, is included in appendix A-1. These storage rights are primarily in effect during the non-irrigation season. In most water years storage may continue into the irrigation season, until such time as the demand to fill senior natural flow rights equals or exceeds the available natural flow in the river. This illustration shows only the storage rights in the system and does not include the natural flow rights. A listing of water rights in District 1 is included in appendix B-1.

4. Capacities of Reservoirs:

The active capacities of Minidoka Project reservoirs are as follows:

Dam and Reservoir	Active Capacity	Storage Contracted	Minimum\ Dead Pool	Exclusive Flood Space
American Falls	1,672,590	1,672,590		0
Grassy Lake	15,200	15,200		6
Island Park	135,205	135,205		200
Jackson Lake	847,0000	847000		*
Minidoka	95,180	95,180	115,900	0
Palisades	1,200,000	1,199,500	201,000	0
Ririe	80,500	80,500	10,000	10,000

* The natural lake of unknown quantity cannot be evacuated.

5. Major Diversions:

The lands served by the reservoir system are divided roughly in half at American Falls Dam. Approximately 600,000 acres below American Falls receive water from project storage facilities and are served by six major Irrigation entities. These include Twin Falls Canal Company with 202,000 acres, North Side Canal Company with 180,000 acres, American Falls Reservoir District No. 2 with 98,944.89 acres, Burley Irrigation District with 48,000 acres, A&B Irrigation District with 82,010.3 acres, and the Minidoka Irrigation District with 78,000 acres.

The area above American Falls consists of more than 50 smaller Irrigation entities serving areas from Ashton in the north to the Wyoming border in the Teton river drainage to the east with a large portion of the irrigated lands in the Idaho Falls and Blackfoot areas.

6. Stream Gages:

Real time flow measurements are essential in the operation of the Upper Snake River system of reservoirs and diversions. All of the gaging stations on the river and many tributary stations are telemetered via satellite to Reclamation's Hydromet computer system in Boise, Idaho. In addition all but the smallest canal diversions are also on the HYDROMET system described in section VIII.

River and reservoir gaging stations on the main stem of the Snake River above Milner Dam, together with two gages on the Henrys Fork, are included in the following list. The bold faced, three or four letter, names in the left-hand column are computer

designated names by which these stations can be accessed on the HYDROMET computer system. The computer designations are followed by the common name by which these stations are known, along with a brief description of the information available and location of the station is also included. The gaging stations are listed in downstream order:

FLGY - Flagg Ranch, River gage, located on the main stem of the Snake River near Flagg Ranch, Wyoming.

JCK - Jackson Lake Dam, River, Reservoir and weather gage, located at the dam.

PCY - Pacific Creek, River gage, located on Pacific Creek near the U. S. Highway 191 crossing near the confluence with the Snake.

BFKY - Buffalo Fork, River gage, located near the U. S. Highway 26 Bridge 4 miles upstream from the confluence with the Snake.

GROY - Gros Ventre, River gage, located near the confluence with the snake river

JKSY - Snake River near Flat Creek, River gage, located on the left abutment of the Swinging bridge south of the city of Jackson.

✧ **ALPY** - Snake River near Alpine, River gage, located on the main stem upstream from the city of Alpine, Wyoming.

GREY - Greys River, River gage, located on the Greys River near the entrance to Palisades Reservoir.

SALY - Salt River, River gage, located on the Salt River near the confluence with the Snake.

PAL - Palisades Reservoir, Reservoir gage, located at the dam.

PALI - Irwin or Palisades, River gage, located on the main stem just downstream from the dam.

HEII - Snake River near Heise, River gage, located on the main stem at river mile 853.6 near the Heise Hot Springs Resort.

LORI - Snake River near Lorenzo, River gage, located just downstream from the U.S. Highway 20 crossing near Lorenzo, Idaho.

SIFI - Snake River at Idaho Falls, River gage, located on the main stem in the city of Idaho Falls.

SHYI - Snake River near Shelley, River gage, located at River mile 787.8 near the city of Shelley, Idaho.

SNAI - Snake River at Blackfoot, River gage, located in the city of Blackfoot, Idaho.

BFTI - Snake River near Blackfoot, River gage, located on the main stem just downstream from the Tilden Bridge just prior to the river entering American Falls Reservoir.

AMF - American Falls, River, Reservoir, and weather gage, located at the dam and at the Neeley gaging station on the main stem of the river about one mile below the dam.

MIN - Minidoka Dam, Reservoir gage, located at the dam.

MINI - Snake River at Minidoka, River gage, located just downstream from the dam.

MIL - Milner Dam, Reservoir gage, located at the dam.

MHPI - Milner Dam Powerhouse, **QE** is the gage on the 17ft diameter penstock. **QZ**, is the gage on the 9ft penstock.

MILI - Snake River at Milner, River gage, located just downstream from Milner Dam.

REXI - North Fork near Rexburg, River Gage, located on the north or Henrys Fork of the river near the right abutment of the State Highway 33 bridge near Rexburg, Idaho.

ANTI - North Fork near St. Anthony, River Gage, located at river mile 14.4 on the north fork.

Note: The Rexburg and St. Anthony gages are important in the operation of the river system to determine the total supply in the system on any given day.

A complete listing of all the stations on the HYDROMET system is available on request, from The Snake River Area Office.

7. Status of Spaceholder Contracts:

The Fremont Madison Irrigation District is the only contracting entity, holding federal storage on the Henrys Fork. Outside the Henrys Fork drainage, some 63 contracting entities hold space in either Jackson Lake, American Falls, or Palisades.

A breakdown of contracts in each reservoir follows:

	No. of Contractors
American Falls, Jackson, and Palisades	21
American Falls and Jackson only	5
American Falls and Palisades only	4
Jackson and Palisades only	3
American Falls only	4
Jackson only	2
Palisades only (including Wyoming)	25
TOTAL	63

A complete listing of all the spaceholders and the amounts they hold in each reservoir is included in appendix A-2.

8. Definitions:

In these guidelines the terms "normal," "above normal," and "below normal," years are used frequently. These terms are defined below as a reference.

A normal year is when the runoff has been within approximately 10% of average (normal).

Above normal indicates a year when runoff is more than 10% above average.

A below normal year indicates runoff that is more than 10% below average.

9. Discussion of Spaceholder Contracts:

All of the storage contracts in the Minidoka Project are spaceholder contracts. They provide the schedule for repayment to the United States, and for the annual operation and maintenance costs, along with and the allocation of storage space to the contract holder. Each contractor holds a percentage of the space in the reservoir and a proportionate share of the reservoir's water rights.

Contracting entities are entitled to carry over, in the space they hold, any unused water for use in subsequent years. Carryover may be a significant part of a subsequent years supply. This often means the difference between a shortage and an adequate supply.

The contracts that are in place with the wateruser entities including Wyoming are "spaceholder" contracts. The way these contracts are administered differs from the way water service is handled in many other Reclamation projects. Spaceholder contracts do not convey a specific amount of water.

With "spaceholder" contracts, a spaceholder may make full use of their available water supply in years of poor supply. In years of normal or above normal precipitation and the exercising of conservation techniques, the water not used simply stays in the reservoir under the control of the spaceholder. This type of contract also permits the spaceholders to have their storage delivered to them upon demand during the irrigation season, within the physical constraints of the system. A table showing comparisons between Reclamation Water Service, Repayment, and Spaceholder contracts is included in Appendix A-4.

Since virtually all space in the Minidoka Project has been contracted, Reclamation has very little storage. Because of the demand for flow augmentation and other purposes under the Endangered Species Act, Reclamation has initiated an aggressive program to purchase available reservoir space or other water rights. Spaceholders may market water in their storage accounts through the Water District 1 Rental Pool. This marketing tool can sometimes be used to meet new uses without injury to the spaceholders on a willing seller willing buyer basis.

10. Project Map:

A map showing the Major Project facilities and lands served is included in Appendix A-5. Larger copies of this map are available upon request.

III. Overview of Wyoming's Role

1. Wyoming's Obligations:

Wyoming has purchased 2.750% of the active storage capacity of Palisades Reservoir. This presently amounts to 33,000 af (.02750 X 1,200,000). The storage amount could change in the event of resurvey, sedimentation or if the reservoir were restricted for Safety of Dams or other considerations.

Wyoming paid the construction charges associated with the space. They will also be responsible for the annual operation and maintenance charges. Wyoming is a space

holder in Palisades Reservoir, along with 53 other space holders. They will be treated as a space holder with rights and responsibilities, similar to other spaceholders. Wyoming will be assessed its proportionate share of the Palisades evaporation loss each year.

Water will accrue to this Palisades space according to its priority date, July 28, 1939. In most years once the reservoir water right is filed that reservoir cannot demand additional water. However, a second fill is sometimes possible under certain hydrological and storage conditions, and if no junior rights are injured.

2. Wyoming's Rights:

Wyoming may call for water from its space pursuant to contract provisions. As is the case with other spaceholders, Wyoming may carry over unused water from year to year, but it cannot accumulate water in excess of the capacity of that space. During each season, new accruals will be credited up to the capacity of the 33,000 af of space. The space is not guaranteed to be filled or to be full each year.

Wyoming's contract provides the flexibility to make releases from or to hold water in Jackson Lake, on an exchange basis with Palisades. Coordinated project operations of Jackson Lake and Palisades make this possible. An accounting exchange will be made between Palisades Reservoir and Jackson Lake by the Water District 1 Watermaster, with the concurrence of Reclamation. Through this exchange, water then can be provided to meet Wyoming's needs from Jackson Lake when water is available from the Palisades space.

Wyoming will make the determination of how and when the water from the space will be used. Wyoming will be responsible to coordinate input from interested agencies and/or the public to make the determination of how best to use the water from the space. It can choose to have the water left in Jackson Lake to maintain higher lake levels or to call for a release of that water to provide additional flow below Jackson Lake Dam or for other uses as consistent with its contract.

3. Anticipated Usage:

Wyoming generally plans to use the storage in this space for non-consumptive uses. It may occasionally allow small amounts to be used for consumptive uses including municipal, industrial, construction or other similar uses. It is anticipated that Wyoming storage water will be left in Jackson Lake to maintain higher lake levels and will then be released during times of low fall and winter flows to supplement flows in the Snake River below Jackson Dam.

Wyoming may also elect to leave the water in Palisades Reservoir and could choose to place it in the Upper Snake River Rental Pool for rent to other water users pursuant to

the Rental Pool rules and procedures.

The use or call on water from this storage space will change from year to year. Wyoming can select how available stored water may be used. In some sequences of years, the water may reside in Jackson Lake for several years in succession without being released. In a series of dry years like 1987, 1988, and 1989, it may be used to increase river flow several years in a row. If used for stream flow augmentation, 33,000 af would provide a continuous flow of 100 cfs for 166 days or 50 cfs for 332 days. If left in Jackson Lake, it would provide an additional 1.3 to 1.4 feet of water in Jackson Lake at lake elevations of 6758 feet (23,800 surface acres) to 6769 feet (25,540 acres). These operation scenarios are provided as examples only. The actual operation and use of water from this 33,000 af of space will of course vary, depending on the decisions Wyoming makes to call upon water stored in this space.

When a call is made for a release from Jackson Lake, it will remain under the jurisdiction of the State of Wyoming until it crosses the Wyoming/Idaho state line. The water will come under the jurisdiction of Idaho water law once it passes the Wyoming/Idaho state line. The accounting of the water in Wyoming's account will be made by the Water District 1 Watermaster in cooperation with Snake River Area Office. Reclamation's Snake River Area Office in Burley, Idaho will cooperate with the Watermaster to determine which reservoir the water belongs to. Water will accrue to this space as it does to other spaceholders with this priority date, July 28, 1939.

4. Refill Potential:

Recent history of Palisades shows that from 1980 through 1987, Palisades would have accrued enough water to fill the 1939 priority space nearly 100 percent each year. However, in 1988, this priority accrued 34 percent; in 1989, it accrued 43 percent; and in 1990, it accrued 18 percent. For the 33,000 af of space, this would equate to 11,200 af in 1988, to 14,200 af in 1989, and to 5900 af in 1990. In these instances, carryover is an important component of the water that fills the space.

IV. Project Water Operations and Accounting Procedures

Minidoka Project reservoirs are operated as a coordinated storage system. Water is stored and released in a manner to maximize the capabilities of the project reservoirs to meet varying demands. In order to insure maximum benefits, water is physically stored where it has the greatest chance of remaining in the system. Water is released from the reservoir that maximizes the potential for full system refill the following year.

1. Accounting Procedures:

Accurate data assure proper accounting of storage, accrual and use through (1) water

right accounting, of water allocated and released to spaceholders by reservoir, and (2) physical operation of water by actual location. Water available to an individual spaceholder may be limited by: (1) water right priority, (2) limitation of the storage facilities, (3) water supply. When storing and releasing water, the physical accounting governs. The paper accounting method is used to determine when water can be legally stored and released, to which reservoir the water is credited, and the entitlement of each spaceholder. Water allocation and water accounting are nearly interchangeable terms used to describe the process of distributing available water supplies.

These methods of accounting allow the entire system to be operated as one system. The objective is to maintain the available storage physically as high in the system as possible, regardless of storage right priorities. The spaceholder contracts provide for the temporary exchange of water between project reservoirs.

Palisades Dam and Reservoir storage rights are junior, in priority, to those of American Falls Reservoir. Because of its location on the river, water right priority, and the inflow from springs in the area, American Falls has the greatest probability of refill of any project reservoir except Minidoka.

The allocation process used by the state of Idaho credits all water that is available to a reservoir right to that right irrespective of where the water is actually stored. Thus, American Falls and Minidoka accrue water from all of the drainage located above them. Jackson Lake and Palisades Reservoirs are limited to the drainage of the Snake River lying upstream.

As the storage system is being filled, water is physically stored in Palisades Reservoir and is credited to American Falls. Storing water in this manner improves the chance of filling the entire system. While water may be physically located in Palisades, the water right accounting attributes water to American Falls, Jackson, Island Park or Palisades accounts, as water right priorities dictate.

When the American Falls right is filled, water that continues to be available to Palisades goes to fill the Palisades right. By the time American Falls reservoir is filled physically, the water that was credited to American Falls but stored in other reservoirs is then credited to the reservoir in which it is stored. If this type of operation were not accomplished, American Falls Reservoir would fill in late winter and a considerable quantity, approximately 10,000 af per day, of storable water would be lost to the Upper Snake. This would seriously jeopardize the ability to fill the system.

2. Irrigation Season Operations:

During the irrigation season, the actual physical operation of the river system is considered in four individual segments.

- a. From Jackson Lake to Palisades the river is operated to meet downstream demands and to provide flood control space in Jackson Lake Reservoir. To the extent possible releases are managed to accommodate the desires of recreation interests.
- b. On the Henrys Fork, releases from Island Park and Grassy Lake are made to maintain target flows in the Henrys Fork. Target flow is approximately 100 cfs plus the diversions that are being diverted immediately below the gage at St. Anthony, and 250 cfs at the Rexburg Gage. Releases on the Henrys Fork are coordinated with the Fremont Madison Irrigation District to assure storage deliveries are made to the Fremont Madison shareholders.
- c. Releases in the section of the river from Palisades to the near Blackfoot gage are dictated by the diversions of approximately 50 canals. Storage is released from Palisades to assure a target flow in the river at the Blackfoot gaging station. Additional releases are sometimes required to move upstream storage downstream to spaceholders in the lower valley. Target flows are determined through frequent consultation between Reclamation and the Watermaster. Consequently, the desired flow at Blackfoot will vary through the summer. Target flows typically range from 1,200 to 1,500 cfs in the spring to 700 to 800 cfs in the fall.
- d. Flows in the portion of the river below American Falls are regulated by varying the releases from American Falls Dam. Generally, all releases are made through the Idaho Power Company powerplant. Some re-regulation and storage releases are made from Minidoka Dam. Through most of the irrigation season, Minidoka Reservoir is held at or near the full mark to insure deliveries to the canals and to maximize the power head and power generation through the powerplant. During dry years, the reservoir is drafted in late September and early October, and storage is delivered from Minidoka.

3. Water Use Debiting Criteria:

As water is released to meet spaceholder demands, accounts are debited starting with, (assuming all reservoirs are full), the top one foot of Island Park. Next, water is taken from the Minidoka Dam account, which by virtue of its small size and location well down the river, has certain refill potential. The next water debited is from the 200,000 af of flood control space that must be evacuated from Jackson Lake because of flood control requirements. These requirements dictate that at least 200,000 af of space must be available by the end of the irrigation season in October.

American Falls storage is debited next, then Palisades storage, and last of all, the

remaining Jackson Lake water is debited. These storage debiting criteria are based on the physical requirements and refill potential of the reservoirs.

4. Additional Factors Affecting Operations:

The contract with Mitigation Incorporated for Ririe space will not significantly change the operation of Ririe Reservoir. Physical operations will continue much as they have in the past with water delivered from system reservoirs in the same order. Necessary irrigation releases will be made as late as practical in the season to minimize impacts on recreation.

During the irrigation season, the Idaho State water plan calls for "zero" flow at Milner Dam, and except for special circumstances, all the water in the river is diverted upstream from Milner Dam to satisfy irrigation water rights. River flows return below Milner Dam. The source of water is a combination of surface return flows and groundwater discharge through thousands of springs. These flows have been adequate to meet the water rights of downstream users and the rights established in the settlement of the Swan Falls litigation. That agreement required a minimum flow at Swan Falls of 3,900 cfs during the irrigation season and 5,600 cfs during the non-irrigation season.

The Shoshone Bannock settlement could impact existing natural flow water rights. As mitigation, Congress provided 99,480 ac ft of storage in Palisades and Ririe Reservoirs.

All water rights claimed in the Snake River Basin in Idaho are currently being reviewed by the Idaho District Court. Through this process, all rights established under Idaho State and Federal Law will be decreed by the court. The water rights of Federal Reclamation Projects were established under State Law. Jackson Lake water rights will not be adjudicated through this process as the reservoir is located in Wyoming.

V. Forecasting

The anticipated inflows into Jackson Lake and Palisades reservoirs are forecast each year as described below. Forecasting provides data for determining the upcoming seasons operations.

In addition to the formal monthly snow measuring surveys and runoff forecasting discussed in this section, personnel from the Area Office conduct at least two informal snow surveys each spring. A ground tour of the watershed areas accessible from highways is made. Snow on several points in the watershed is visited and photographed. An aerial survey is also made. It is timed to be as close to the peak of the runoff as possible. This is done by photographing 20 selected mountain locations, making observations and visual comparisons with previous years photographs and records of residual runoff. This is done to visually verify the mathematical

forecasting and to determine if there are any localized patterns in the snowpack that would not be recorded on the regular snow courses or forecast formulas.

1. Snow Surveys:

Reclamation cooperates with the Natural Resources Conservation Service (NRCS) in measuring snow in the Upper Snake River Basin. Reclamation has the major requirement for information from several of the snow courses and has personnel in the area, and measures several of the courses. Other courses are measured by the National Park Service, Forest Service, State of Wyoming, and Soil Conservation Service. Courses measured by Reclamation include Lewis Lake Divide, Thumb Divide, Aster Creek, Snake River Station, Grassy Lake, Glade Creek, Huckleberry Divide, Moran Headquarters (Jackson Lake Dam), Base Camp, Four Mile Meadow, Turpin Meadow, and Togwotee Pass. Many of these stations have automated snow pillows that provide real time information through the Reclamation HYDROMET system or the NRCS SNOTEL system.

Ground truth measurements are made in addition to automated snow course measurements to correlate the historical data with data from the real time instruments.

2. Runoff Forecasting:

Reclamation forecasts the inflow into Jackson Lake Dam, the Snake River at Heise, the Teton Basin, Island Park Reservoir, and Ririe Reservoir. The forecasts are prepared the first of each month from January through July for the runoff period from October through July. Runoff from the start of the forecast period (October) through the current time is subtracted from the October through July forecast to obtain the residual forecast.

Terms in the forecast equations include: fall-winter precipitation, spring precipitation, April 1 snow water content, and antecedent runoff for a period in the fall. Subsequent data not yet available is treated three ways:

- a. For the normal forecast, subsequent weather and precipitation is assumed to be average.
- b. Low ranges assume 50 percent of normal precipitation for the remainder of the forecast period.
- c. High ranges assume 150 percent of normal precipitation for the remainder of the forecast period.

For example on February 1, April 1 snow is estimated by taking the February 1 snow water equivalent and adding the average accumulations for February and March for the normal subsequent condition.

The forecast equation for the 1992 runoff season was:

$$Y_{Heise} = 4.5949X_1 + 13.5213X_2 + 12.0863X_3 + 29.2269X_4 - 2170.32$$

Where:

Y_{Heise} = October-July natural runoff at Heise (1,000 acre-feet).

X_1 = Antecedent October-November natural runoff at Heise (1,000 acre-feet).

X_2 = October through March Precipitation. Afton + Bondurant + Jackson (83001) + Moran x 2 + Palisades + Snake River in inches.

X_3 = April 1 snow water content. East Rim Divide + Huckleberry Divide + Lewis Lake Divide + Poison Meadows x 2 + Salt River Summit x 2 + Thumb + Togwotee Pass in inches.

X_4 = April-May + 2/3 June precipitation for the same stations with the same weights as in X_2 in inches.

The operating forecast for flood control regulations is coordinated with the Corps of Engineers (Corps) as required by Section 7 of the Flood Control Act of 1949. The Corps generates an independent forecast, and once both forecasts are prepared, a concurrent operating forecast is negotiated. Generally the two forecast procedures project comparable runoff conditions. However, the Corps forecast is primarily for flood control purposes, and the Reclamation forecast is primarily to determine total yield of the watershed. The involvement of the Corps is documented in the documents contained in appendix A-6 and B-11 through B-13.

VI. Flood Operations

The criteria for operating the reservoirs during the spring runoff season are determined by the Flood Control Storage Reservation Diagram, No. SN-902-1/1, which is included in Appendix A-6. Decisions regarding releases from Jackson and Palisades and the amount of space that must be made available on any given day are made according to the rules and procedures outlined by this document.

In brief, these criteria require that the flows at the Heise gage be controlled to 20,000 cfs or less, unless there is a very large forecast. The document also requires that 75% of the amount of flood control space required should be available in Palisades Reservoir. The other 25% of the required space should be in Jackson Lake Reservoir. Additional operating criteria are also included in Appendix B-11.

The calculations necessary for the use of this rule curve are made daily during the runoff season. The input is determined by using the forecasted runoff at Heise, the procedures are outlined in Section V of this document, plus the total amount of water that has flowed past the Heise gage. These calculations determine the amount of flood space required in the two reservoirs.

Examination of the notes included with the diagram and the additional criteria from the Palisades Standing Operating Procedure in Appendix B-11 will explain more fully, the operating criteria.

VII. Operating Criteria

This section will deal with the decision process for determining the releases from Jackson Lake and Palisades reservoirs, during normal or average conditions. These are "target" releases and will occur except in years where there is a high likelihood that Jackson Lake water rights will not fill, and water belonging to the Jackson Lake Right will be lost from the system. If the circumstances indicate that this will be the case, Reclamation will notify Wyoming of the projected releases and provide Wyoming at least two weeks to respond before dropping the releases from Jackson Lake to an amount less than 280 cfs. Average monthly inflows less than 280 cfs have been observed in four of the past 85 Novembers. This is the event most likely to indicate a decision to reduce discharge below 280 cfs. Assuming the present degree of operating flexibility is maintained, this approximates the frequency when Reclamation would ask to discharge less than 280 cfs. Any drafting of the reservoir beyond Oct. 1 will be coordinated with the Wyoming Game and Fish Department and the Wyoming State Engineer's Office.

1. Fall and Winter Releases, Jackson Lake Dam:

Reclamation, the Wyoming State Engineer's Office, and the Wyoming Game and Fish Department agree to meet, together with other interested parties, the week of September 15, annually. The purpose of the meeting will be to assist Wyoming and Reclamation in the planning for releases for the non-irrigation season.

At the beginning of the storage season, approximately October 1, decisions are made regarding the release to be made during the winter.

With normal summertime reservoir operation, the October 1 lake elevation will be near 6760.95. This elevation provides the 200,000 af of required winter flood control space.

With these conditions, the decision will be to release 280 cfs or computed inflow which ever is greater. With these conditions, the attempt will be to fill the reservoir during the recession of the spring runoff.

If the reservoir is below 6760.95, the release will be 280 cfs or computed inflow whichever is less. Water drafted from storage desired to supplement natural inflows to bring the release up to 280 cfs or some other target flow as determined by Wyoming will be supplied from Wyoming's storage. Reclamation will notify Wyoming during the meeting described in subsection 1 above if the inflows and releases at Jackson Lake Dam are anticipated to be less than 280 cfs at the end of the irrigation season.

All of these scenarios assume that Reclamation's contractual commitments for storage in other spaceholders space can be maintained. In the event conditions are such that it becomes apparent that releases from Jackson Lake will be lost from the system, the difference between 50 cfs, (which is the minimum flow agreed upon by the Committee of Nine), and the desired releases determined by Wyoming will be debited from Wyoming's storage as described further in section IX.3.

2. Spring Releases, Jackson Lake Dam:

In a normal year when the runoff begins to fill the reservoir, decisions are made after considering the forecasted inflows, anticipated and current weather patterns, and the manner in which the runoff is occurring. The timing and increases in the spring releases are determined. The governing criteria are as follows:

- a. Sufficient space must remain in the reservoir to control the runoff while it is increasing.
- b. Outflows are generally then reduced to fill the reservoir during the recession of the runoff.
- c. The quantities and timing of these releases are made on a case by case basis each year. The parameters that influence these decisions include the weather, snowpack, downstream demand, timing and magnitude of the runoff and others.

On occasion during the spring runoff period, conditions within the Teton County levee system downstream from Jackson Lake become critical. Reclamation's policy is to cooperate with the county to alleviate high flows in the levee system and avoid damage if possible. This has resulted in releases from the dam lower than 280 cfs in the past.

3. Summer Releases, Jackson Lake Dam:

The releases that will be made from the time after the spring runoff is essentially complete in mid-June until October 1 are also driven by many of the same factors discussed above regarding spring releases.

Each spring near the middle of May, a public meeting is held in the City of Jackson. At that meeting, Reclamation presents to the recreation interests and other interested parties the variable conditions that will affect summer releases and the recreation season. At that meeting, an attempt is made to balance the varied interests with the available water supply and thus determine an operating scenario that will provide the maximum benefit for the greatest number of interests.

The various groups' desires as expressed in previous meetings are summarized as follows:

- a. The lake boating interests would like to have Jackson Lake remain as high as possible for as long as possible.
- b. The white-water rafters like to have additional, supplementary flows in the river, as the natural inflows in the canyon below the city of Jackson begin to diminish during late July and August.
- c. The scenic floaters who use the upper stretches of the river in Grand Teton National Park desire a floating season lasting until at least September 30. (As a matter of interest, this date has steadily moved later over the past few years from after the Labor Day weekend to September 30).
- d. Fishing interests prefer steady flows with no large changes in releases especially prior to the fishing contests that occur on the river each year.
- e. The Wyoming Game and Fish Department also have special requests from time to time to provide low, steady flows in order to accomplish habitat census and other studies on the river.

When a summer operating plan is determined at the May public meeting, Reclamation attempts to adhere to that scenario. Most of the time these commitments can be met. However, changing conditions in inflows, demands and precipitation will, on occasion, necessitate a deviation from those commitments.

The most probable normal scenario is that Jackson Lake will be held at the full mark as long as possible to prolong boating on the lake. Then, as the normal runoff begins to recede, the river is supplemented with increased releases from the dam. This keeps sufficient flows in the river for good white-water floating and also gives Reclamation sufficient time to move water to meet downstream commitments. Reclamation also

attempts to select a flow that can be sustained for most of the summer and make the available water last for recreation purposes through September 30.

The total volume of water that must be moved downstream in a normal year will be 200,000 af plus summertime inflows. The actual quantity will vary from year to year. In below normal years, depending upon the condition of downstream reservoirs and irrigation demands, it will from time to time become necessary to release varying amounts of storage. This can range up to a large percentage of capacity of the reservoir as in 1992, when a majority of the storage was released. Above normal and below normal conditions are further described in section VIII.

4. River Gains, Jackson to Palisades:

Decisions regarding releases are also influenced by the condition of the river between Jackson and Palisades. In many instances when gains in the river are large, it will become necessary to adjust flows from Jackson Lake Dam to prevent damages to the levee system through the valley near Jackson. Reclamation works in close cooperation with Teton County and the Corps of Engineers to insure that damage to the levee system is minimized and avoid any breaching of the levee system.

The quantity of water that can safely be passed through the levee system has decreased through the years from approximately 24,000 cfs to approximately 18,000 cfs presently.

Gains from the tributaries in this section of the river at times are sufficiently large that adjustments in the releases from the dam are made to relieve potential flooding. Tables showing the average gains in the reaches of the river between Jackson Lake Dam and the Flat Creek gage (JKSY) and from the Flat Creek gage to the Alpine gage (ALPY) are shown in Appendix A-12 and A-13. They show the average monthly gains for the period of record for JKSY.

5. Fall and Winter Releases, Palisades Dam:

The State of Idaho recognizes November 1 as the end of the irrigation season for areas served by the Minidoka Project. Near that time decisions are made regarding fall and winter release from Palisades Reservoir. The factors that go into this decision are:

- a. the contents of the various reservoirs, most importantly Palisades and American Falls;
- b. the carryover storage in the system;
- c. the amount of space that needs to be filled;

d. the effect of anticipated spring flood control criteria if any.

After these factors are considered, a winter target release from Palisades is determined. This target flow will be the **largest** that can be released without causing injury to other water rights in the system. When demands between Palisades and American Falls go down in the fall, releases from Palisades are reduced until the target flows are reached. Flows are reduced at a rate that will maintain sufficient water in critical sections of this reach of the river.

In below normal years this release is in the range of 750 to 1200 cfs. In above normal years it can range as high as 5,000 to 7,000 cfs. In normal years it is near 2,000 cfs.

6. Spring Releases, Palisades Dam:

When the forecast indicates that the flood control criteria discussed in Section VI will be in effect, releases may be increased to evacuate flood space. Flood control rules require releases to be maintained at or below 20,000 cfs as measured at the Heise gage. In Palisades, as in Jackson, space must remain available in the reservoir in order to accommodate increasing runoff. The effort will then be to fill the reservoir on the recession of the runoff. Releases are also affected by the irrigation demand occurring at the time. Recent maximum and minimum releases in cubic feet per second from Palisades are shown in the following table:

YEAR	DATE	MAXIMUM	DATE	MINIMUM
1986	JUN 17	25000	NOV 8	1780
1987	JUN 29	12800	MAR 2	1000
1988	JUN 8	14600	DEC 11	719
1989	JUL 8	13800	FEB 17	689
1990	JUL 14	13491	DEC 19	1179
1991	JUN 15	22248	DEC 28	1129
1992	MAY 7	13964	DEC 3	804
1993	JUN 4	17900	NOV 5	1210
1994	MAY 14	17200	DEC 25	1440
1995	JUL 14	21482	FEB 2	1173

7. Summer Releases, Palisades Dam:

After the threat of flooding is past and the requirements of the flood control criteria are satisfied, summer operations at Palisades Dam begin. These operations are driven by three major criteria:

a. Irrigation demand in the area upstream from American Falls Reservoir and the Idaho Falls area. There are more than 50 irrigation entities in this area, and close coordination is required between Reclamation and Water District 1 in order to insure that water is available at the various diversion headworks at the time it is needed.

b. Maintaining reasonable flow in the section of the river in the area near the city of Blackfoot is also of concern. The Blackfoot area is approximately two days river travel time from Palisades. Sufficient notification by the irrigation entities of increases or decreases in diversions is essential. The diversion request communicated to Water District 1 and coordinated with Reclamation on a daily basis.

c. Moving storage water from Palisades to downstream users is also a major consideration. Stored water frequently must be released from Palisades and Jackson to meet the demand below Blackfoot.

Irrigation demand will frequently require releases from Palisades in the range of 13,000 to 14,000 cfs.

8. Power Operations, Palisades Dam:

The Palisades powerplant is essentially a run of the river operation. No releases are made from Jackson Lake or Palisades specifically for power production. Releases up to 10,500 cfs, which is present powerplant capacity at Palisades, are made through the plant, and any additional water needed for downstream uses is bypassed through the outlet works.

All power production including any changes is scheduled through the Bonneville Power Administration (BPA) in Portland Oregon. When releases are being made through the powerplant, any changes in downstream demand, that result in changes in the amount of power being produced, must be scheduled with BPA. Water user demands take precedent over power demands in almost all cases.

VIII. Sample Operations

This section will discuss the factors that enter into the decision making process during various scenarios. In reality there are far too many possibilities to cover them all in this document. It will only deal with the typical operations of Jackson Lake and Palisades reservoirs. None of the quantities given in this section should be construed as a commitment. They are included in this section for discussion purposes only. The discussion will proceed chronologically starting at the beginning of the water year on October 1 and ending September 30.

The definitions in section II.8 apply to the following scenarios. Operations are also determined by the status of carryover storage in the reservoirs and the type of water supply in the previous year.

Two graphs showing the statistical averages of water levels in Jackson Lake together with an explanation of the graphs are included in appendix A-7, A-8, and A-9. They show the range of reservoir contents before the construction of Palisades Dam (A-8), and also after construction (A-9). These graphs illustrate the wide range of possibilities that exist.

1. Operations of Jackson in Normal Years:

On October 1 the reservoir will be at the winter operational level of 6760.95 ft. and contain 647,000 af of water.

Releases would be adjusted to match inflow into the reservoir, and will normally be in the range of 450 to 500 cfs. It should be noted that this water would be credited to Jackson Lake accounts even though not stored in Jackson Lake. The volume could be as much as 135,000 ac ft.

The outflow from the Dam would be matched to the inflow until spring runoff begins and the reservoir begins to fill.

Releases would remain steady until it became necessary to increase as described in Section VII. Some flood space would also have to be maintained to meet requirements.

The reservoir will fill in early June and summertime releases would begin. Summer and early fall inflows plus 200,000 af of water would be released. Flows would be held as steady as possible through the summer until approximately September 30, when the cycle would repeat.

2. Operations of Jackson in Above Normal Years:

On October 1, the reservoir will be at the winter operational level of 6760.95 ft. and contain 647,000 af of water.

Releases would be adjusted to match inflow into the reservoir which would be in the range of 500 to 600 cfs.

The reservoir would be held at a constant elevation until mid-February. When the flood control regulations begin to call for flood control space, releases to evacuate flood space would then begin. The quantity of the release would depend upon the magnitude of the forecast, and could be quite large.

The reservoir would be filled on the recession of the runoff, usually by the second week in June.

The 200,000 af of water in the winter flood control space will be released plus summer and early fall inflows, by a target date of October 1. These flows would be greater than those experienced in a normal year, because of the larger snowpack. Then the cycle would repeat.

3. Operations of Jackson in Below Normal Years:

During many years, the operations during below normal years would not differ perceptibly from those described above. However, when a series of dry years follow back to back and downstream reservoirs are depleted and a below average year is forecasted, the operations will differ.

On October 1, the reservoir would be at an elevation below 6760.95. In this case the water residing in Jackson Lake would be carryover storage water belonging to the accounts of several spaceholders. This carryover water could also be water belonging to other reservoirs, such as Palisades, and temporarily stored in Jackson Lake space. The storage conditions described in this paragraph also apply in normal, and above normal years as well.

Releases would be reduced to a quantity matching inflows unless Wyoming chooses to use its storage to supplement natural inflows. During this time, there will be extreme pressure by the spaceholders to store as much water in the system as possible.

The reservoir may or may not fill depending upon the magnitude and the timing of the runoff.

If the reservoir does not fill and irrigation demand is light, the summer flows could be lower than normally experienced. The winter flood requirement is for 200,000 af of space. If the top 200,000 af of space doesn't fill in the spring, then less water will have to be moved to meet the flood control requirement. However, if the second year is also dry, the water will probably have to be delivered downstream for irrigation purposes.

4. Operations of Palisades in Normal Years:

A graph showing the statistical averages of the water levels in Palisades is included in Appendix A-10. This graph illustrates the wide range of possibilities.

At the beginning of the water year, the reservoir will contain perhaps 400,000 to 600,000 af of water. Releases will be reduced to a level that will store some water and fill the

reservoir to a level dictated by anticipated flood control requirements. Releases could be in the range of 2,000 to 3,000 cfs.

When the flood control regulations take effect, releases will be governed by the rule curve. Releases will be adjusted with the goal to fill the reservoir on the recession of the runoff.

Palisades summer releases will be driven by irrigation demand as explained in section VII. The cycle will repeat beginning approximately November 1.

5. Operations of Palisades in Above Normal Years:

At the beginning of the water year, the reservoir will be higher and may be full or nearly full, as occurred in 1986. Releases will be set at a flow, approximating inflow, in the 4,000 to 5,000 cfs range.

Early in February, if the forecast is large, releases will increase to evacuate flood space and operate in accordance with the flood rule curve. These flows could be in the 10,000 cfs range.

The operation would be adjusted daily in order to insure filling the reservoir on the recession of the runoff.

Summer releases will continue to be dictated by irrigation demand until the last part of October, as described in Section VII.

6. Operations of Palisades in Below Normal Years:

On November 1, the reservoir contents could be as low as 1,000 to 10,000 af.

Palisades releases would be reduced to the range of 1,000 to 1,200 cfs. Lower releases probably would not be necessary because American Falls Reservoir would also be very low, and the water from Palisades could be contained without loss from the system.

These flows would then continue until irrigation demand requires that they be increased, usually in mid April.

Releases would be made to meet irrigation demand and target flows at the Near Blackfoot gaging station through the summer until the storage season begins.

7. Operations in Critical Storage Years:

The most critical scenario in terms of instream flows will occur under the following conditions: when the forecasted water supply is below normal to slightly below normal, when downstream reservoirs are filling and have a very strong possibility of filling, and when the forecast for the Jackson watershed indicates that the possibility of not filling the rights is likely. This scenario will result in a situation in which releases from the reservoirs must be reduced. The reduction is necessary so water belonging to storage rights will not pass beyond Milner Dam and thus be lost to the storage system. If storable water is allowed to flow past Milner Dam, Reclamation must determine whose water was lost from the Upper Snake River system.

When these conditions occur, it may become necessary to curtail releases to 50 cfs from Jackson. This is the situation that occurred in 1987 and 1988. In these situations it is agreed that Reclamation, Wyoming State Engineer's Office, Wyoming Game and Fish, and Idaho will meet to determine the best course of action. Flows used for these purposes may be used from Wyoming's storage to avoid injury to other water right holders.

Nothing in this section shall be construed as giving Wyoming authority over Reclamation's decision making processes in the operation of the reservoir system, other than those granted by Wyoming water law.

8. Summary Section VIII:

The above scenarios are very simplified. They become much more complicated by the type of water year that precedes or follows a dry or wet or normal year, weather patterns and demands within the system.

IX. Data Collection and Accounting

All water distribution accounting is done by Water District 1.

Data collection is a cooperative effort between Reclamation, Water District 1 within an agreement with the Idaho Department of Water Resources USGS and others. The majority of the data is collected by automated data collection platforms (DCPs) that are a part of Reclamations HYDROMET system described in sub section 1 below. All important river gages and the majority of canal diversions are a part of this system. Reclamation and Wyoming have agreed to share HYDROMET information by giving Wyoming an account on Reclamation's computer system.

There are some canal diversions that are not on the HYDROMET system. Flow and diversion data not transmitted by the HYDROMET system are collected by water district personnel. In a few cases diversion data are provided by canal managers.

At the end of the irrigation season Reclamation reviews Water District 1 storage use and carryover figures. Wyoming's account will be included in the Water District 1 distribution records and will be available to Wyoming the same as other canal companies.

1. HYDROMET Data Collection:

The Pacific Northwest Region of the Bureau of Reclamation operates a satellite-based telemetry system for collection of hydrologic and meteorologic data on a near real-time basis. The system is commonly known as HYDROMET. HYDROMET was developed for the Boise and Minidoka Projects now called the Snake River Area Office (SRAO).

The SRAO is the largest user of the system. The data collection platform (DCP) is a microprocessor that receives data from a number of sensors and stores the data until a programmed transmit time. Most parameters are stored every 15 minutes and transmitted at four hour intervals. When data exceed a preset level or change more rapidly than a programmed rule, random transmissions then take place. This is done in order to transmit potential problems to central system more rapidly.

HYDROMET STATIONS ON SNAKE RIVER ABOVE IRWIN, IDAHO

Station Code	Station Name	Parameters
FLGY	Snake River near Flag Ranch	GH,Q,HJ
JCK	Snake River at Moran	FB,AF,GH,Q,HJ,OB,PC,SP
PCKY	Pacific Creek	GH,Q,HJ
BFKY	Buffalo Fork	GH,Q,HJ
GROY	Gros Ventre	GH,Q,HJ
JKSY	Snake River below Flat Creek	GH,Q,HJ
ALPY	Snake River at Alpine	GH,Q,HJ
SALY	Salt River	GH,Q,HJ
GREY	Greys River	GH,Q,HJ
PAL	Palisades Reservoir	FB,AF
PALI	Snake River near Irwin	GH,Q,HJ,OB,PC

The Boise-Minidoka HYDROMET system also loads data from other sources such as the USDA Soil Conservation Services Snow Telemetry (SNOTEL) system through computer networks.

HYDROMET WEATHER STATIONS ABOVE PALISADES RESERVOIR

Station Code	Station Name	Parameters
THMY	Thumb Divide	OB,PC,SP,TV
HKBY	Huckleberry Divide	OB,PC,SP
GCKY	Glade Creek	OB,PC,SP
SKRY	Snake River Ranger Station	OB,PC,SP
JKNY	City of Jackson	OB,PC
BONY	Bondurant	OB,PC
AFTY	Afton	OB,PC,TU,TP,WD

SNOTEL SITES ACCESSIBLE IN ARCHIVES

Station Code	Station Name	Parameters
BSCY	Base Camp	SE
CLWY	Cottonwood Lake	SE
COUY	Coulter Creek	SE
GLRY	Grassy Lake	SE
LWSY	Lewis Lake Divide	SE
PHBY	Philips Bench	SE
SCDY	Spring Creek Divide (Replaces Poison Meadows)	SE
SLTY	Salt River Summit	SE
TOGY	Togwotee Pass	SE

From the basic data transmitted from the DCPs, the HYDROMET system computes values from equations and tables. Of particular interest is the computation of discharge from stage observations. For stations under cooperative agreements between Reclamation and the United States Geological Survey (USGS), tables and procedures identical to those used by USGS are maintained on the HYDROMET system. When measurements are made and processed by USGS, an electronic mail message is generated to update the HYDROMET system.

HYDROMET PARAMETER CODES

Parameter code	Meaning	Archive code	Relation
AF	Reservoir contents in Acre-Feet	AF	last
FB	Reservoir water surface elevation in feet	FB	last
GH	River Stage in feet	GD	mean
HJ	River gage shift in feet	HJ	last
OB	Temperature, °F	MX,MN, MN	max,min,mean
PC	Content of precipitation can in Inches	PC,PP	last, change
Q	Discharge in cubic feet per second	QD	mean
SE ¹	Snow water content, inches, from SNOTEL		
SP	Snow water content, inches, snow pillow on HYDROMET	SP	last
TP ²	Dew point temperature, °F		
TU ²	Relative humidity, %		
WD ²	Wind direction, degrees clockwise from North		
WS	Wind Speed, miles per hour	WR	integral

2. Role of Water District 1:

Water distribution in Idaho is the responsibility of the director of the Idaho Department of Water Resources (IDWR). There are provisions in the Idaho statutes for the creation of water districts. A water District is an instrumentality of the State created for the purpose distributing water among those holding rights to its use. The watermaster, who is elected by the waterusers of the district and appointed by the director of the IDWR, is

¹ SE is an ARCHIVE only code

² These are AGRIMET station parameters. Several others are computed and recorded in ARCHIVES. More information is available upon request.

responsible for the distribution of all natural flow and storage rights within the district to which he is appointed.

Water District 1 computes, on a daily basis, the amount of natural flow available in the system and allocates it to users in order of priority. The natural flow available is determined by calculating reach gains or losses in 36 reaches of the Snake River and tributaries above Milner Dam. A schematic diagram showing this system for water right accounting is included in Appendix A-11.

The priority of the last right that can be filled by the available natural flow determines the last right filled in the watermaster's daily accounting. Water District 1 also accounts, on a daily basis, the amount of storage water that is being used by each of the diverters and from which reservoir account it is being used.

The spaceholder contracts specify that the storage season begins on October 1st, and ends when no more water is available for storage.

The end of the storage season for a particular reservoir is either the date that all reservoir entitlements are filled or the date when the rights predating the reservoir rights demand all of the available natural flow. This date has occurred as early as April 6 and as late as July 24. It usually occurs in June on the recession of the runoff. The end of the storage season is sometimes commonly referred to as the "date of regulation." When this occurs the amount of new accrual available in the reservoir is determined. The amount of new accrual together with the carryover balance, if any, determines the total amount of storage available for the coming year. The available supply is then computed for each of the individual storage accounts within the reservoir. This information is then conveyed to Reclamation and the waterusers.

3. Wyoming's Account:

Wyoming's account will be treated the same as any other Palisades space holder, with some exceptions. The exceptions are that Wyoming's space is in Palisades Reservoir and the contract with Wyoming allows for deliveries to be made from Jackson Lake, and that water will probably not be used for irrigation purposes. Storage used to supplement river flows below Jackson Lake Dam will in most cases be delivered to Wyoming during the non-irrigation season.

Any water delivered from Wyoming's account, within a current water year or water delivered through March 31, will be debited from the previous water years accounting. If additional flows are necessary beyond December 15, Wyoming will supply Reclamation and District 1 with its anticipated needs in total acre feet. This amount will then be debited from the previous year's account. The timing and quantity of the release

would be as agreed upon between Reclamation and Wyoming. The overall accounting philosophy is discussed in Section IX-4.

Water delivered from Wyoming's space as a result of Snake River Rental Pool transactions will be subject to the Rental Pool rules in effect at the time.

4. Typical Accounting Example:

The purpose of this sub-section is to clarify the operations of the watermaster's accounting program. The watermaster's accounting program keeps track of water delivered to all recorded water rights within Water District 1 through the entire year. The majority of the work deals with irrigation uses. It is anticipated that Wyoming's uses will be, for the most part, at times and purposes other than traditional irrigation season deliveries.

The water distribution year for Water District 1 begins November 1 and runs through October 31, of each year. This is different from the "water year" and the "storage season" that are discussed elsewhere in this document. It coincides approximately with the irrigation season as defined by Idaho law in the Upper Snake area. The end of the distribution year is a result of court decrees which dictate the end of the period when irrigation rights can be recognized by the watermaster.

There may be deliveries of storage water that extend into the succeeding year (beyond the October 31 cutoff date). Water leased from the Rental Pool that has been contracted for in advance may be delivered through February.

The watermaster may not have final data for the year for several months after the end of the water distribution year. This delay is also necessary because the final accounting for determining carryover in the individual accounts is dependent upon the final processing of canal gaging shifts and the inclusion of the final stream discharge records from the U. S. Geological Survey.

It has been the practice to account for water delivered after October 31 **as if it had been delivered on the 31st of October.** At the same time any water accruing to a storage right will be credited to that account.

The following example illustrates how a typical accounting would be handled. Dates and quantities are for illustration purposes only.

Assume that on November 1, 1993, which is the beginning of water distribution year 1994, Wyoming's account is full containing 33,000 af of water. No new accrual can be credited to the account since it is full. During the year, Palisades Reservoir is charged evaporation at the rate of 1.5% which equals 495 af for Wyoming's portion. During the

water distribution year, Wyoming elects to release 7,505 af, (approximately 126.1 cfs for a period of 30 days). This would result in a temporary balance in the account on October 31, 1994, of 25,000 af. Further assume that Wyoming elects to release 10,000 af between November 1, 1994 and January 1, 1995, (approximately 125 cfs per day for 40 days). This 10,000 af of water would be storage used prior to the watermaster resetting the storage rights. It will be charged against the previous years storage use. This would result in a carryover balance in Wyoming's account of 15,000 af, with an effective date of October 31, 1994.

Further assume that from October 1, 1994, through the end of the storage season in the spring of 1995, Wyoming's share of the new accrual to the 1939 Palisades storage right totals 16,500 af. This would result in a new balance of 31,500 af in Wyoming's account at the end of the storage season in 1995. The cycle would then repeat.

X. Upper Snake River Rental Pool

This section briefly outlines the operations of the Rental Pool formerly known as the Water Bank. The rental pool is operated by the Committee of Nine who determine the rules and policy. A complete set of the current rental pool rules is included in Appendix B-14. These rules are subject to revision by the Committee of Nine subject to approval by the Idaho State Water Resource Board.

1. History:

The practice of renting or exchanging surplus storage water to alleviate shortages in irrigation supplies started as early as 1915. Contracts with storage spaceholders were based upon the perceptions of need that existed at the time. It was widely accepted that surplus supplies would exist in many years due to the supplemental nature of the new storage. The repayment contracts provided that stored water may be rented to others. Water rentals occurred in many years, with considerable activity in the dry year of 1977. In 1979, due to concerns in the State that water rentals could become a continuing obligation and that water rentals violated the transfer provisions of Idaho code 42-222, the Idaho State legislature authorized the establishment of water banks and rental pools statewide.

The dry conditions in 1987 and 1988 saw increased demand on the reservoirs and some contracting entities were still able to place significant water supplies in the Upper Snake River Rental Pool.

Others had unused storage available, but did not place it in the rental pool. Over 200,000 af was made available to the rental pool in the very dry year of 1988. The Idaho Power Company rented 50,000 af and irrigators used less than 150,000 af. The 1992 irrigation season saw the first time in the history of the rental pool when the demand

exceeded the supply. Only 4,500 af of water was supplied while the demand for water exceeded 150,000 af.

The State of Idaho through the Water Board is the final authority on all matters pertaining to water banks and local rental pools. Rental of storage water is managed by local committees and rental of natural flows is managed by The State Water Board. All spaceholders in Federal reservoirs are required to make rental transactions through the local Rental Pool. In the case of spaceholders within the Minidoka Project, this is the District 1 Rental Pool.

2. Administration:

The Rental Pool, sometimes referred to as The Water Bank, is administered by the Committee of Nine. Reclamation recognizes this Committee as the Advisory Committee for Project activities involving storage accounting and rental pool activities. The District 1 Watermaster provides day to day operation of the pool on behalf of the Committee of Nine in accordance with rules and regulations adopted by the Committee.

Key provisions include:

- a. All water provided to the bank by July 1 each year is placed into a common pool and the lessors share the proceeds from the pool in proportion to the water they made available that year.
- b. In 1996, lessees pay \$2.95 per acre-foot, for water delivered above Milner Dam. The Watermaster retains \$.75, which is used to fund system improvements. \$.20 is paid to the State Water Board and \$2.00 is returned to the lessor. Lessees pay \$10.50 per acre-foot for water leased past Milner. \$7.00 to the lessor, \$.75 to the Watermaster, \$.70 to the Idaho Water Resource Board, and \$2.05 to a fund for the Watermaster to use to seek additional water for ESA flow augmentation if the 427,000 acre-foot goal is not met in any year through 1999. At the end of this 4-year period, the fund will be available for system improvements. This fee structure is subject to change.
- c. Space evacuated from project reservoirs to provide flows below Milner Dam becomes the last space to fill in the following year in each respective reservoir in accordance with Rental Pool rule 3.6.

3. Last to fill provisions - Rule 3.6:

The increased use of stored irrigation water through rental pool activity results in a poorer chance of filling the system for the subsequent year. Injury to other rights could occur when a spaceholder provides water through the rental pool for uses below Milner.

Without the last to fill provision, new storage accruals would go into the accounts of all waterusers with space available, including those who provided water for uses below Milner Dam. The last to fill provision insures that the current year's water supply is fully available to the rights of those space-holders who did not risk the refill potential. In above average water years the last to fill space will likely fill. Rule 3.6 is in place to protect other spaceholders from injury.

4. Long Term Leases:

The language in the original Palisades spaceholder contracts that permitted the leasing of water also constrained any leases to one year only. At the urging of State and other interested parties, Reclamation offered contract amendments to all spaceholders in 1987 and 1988, allowing them to lease their space for up to 20 years. All long term leases are subject Reclamation approval. Eight contractors have responded favorably to this offer, and it is expected that water will be potentially available for long term lease. No long term leases have so far been consummated.

5. Wyoming's Rights:

Wyoming, as a Palisades spaceholder, will have the same rights in the Rental Pool as any other spaceholder. They will be able, at their discretion, to place water in the Pool for rental. They will be subject to all the current rules that exist at the time. Rentals of Palisades water will only be allowed through the Rental Pool.

XI. Review of these Guidelines

In addition to the annual meetings outlined in section VII, Reclamation and Wyoming agree to meet five years from the date of the release of these guidelines. The purpose will be to review and update these guidelines if necessary. Changes or modifications in these guidelines may be made at any time upon agreement of both parties.