

WATER DEPLETION CALCULATIONS

November 1993

**AMENDED BEAR RIVER COMPACT
COMMISSION-APPROVED PROCEDURES
November 1993**

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I. INTRODUCTION

The Amended Bear River Compact was ratified by Congress in 1980 and established depletion amounts to which states were entitled. The Amended Compact did not spell out in detail how depletions would be calculated, nor how and when additional storage would take place depending upon Bear Lake operations. Instead, the Amended Compact directed that these depletion calculations and additional storage determinations would be completed in accordance with "Commission-approved procedures." In November of 1989, the Commission adopted interim approved procedures with an understanding that with time and experience, the States may choose to amend the approved procedures. This document constitutes the current procedures approved by the Commission.

The phrase "Commission-approved procedure" is found three places within the Amended Bear River Compact. These places are as follows:

Article V.C.: "Water depletions permitted under provisions of subparagraphs (1), (2), (3), and (4) above, shall be calculated and administered by a *Commission-approved procedure*."

Article VI.B.: "Water depletions permitted under this Paragraph B shall be calculated and administered by a *Commission-approved procedure*."

Article VI.C.: "The availability of such water and the operation of reservoir space to store water above Bear Lake under this paragraph shall be determined by a *Commission-approved procedure*."

These procedures will set out how water depletions and additional storage based on Bear Lake operations will be determined. These procedures are set forth as general guidelines to be used by the states to report to the Bear River Commission (Commission) the additional depletions that have occurred as provided for under the Amended Bear River Compact. The Commission will account for depletions forward from January 1, 1976. A Commission-approved mapping project was completed and approved April 1992 to establish base data from which future maps and tabulations of new depletions could be prepared.

To account for the irrigation requirements of crops grown in the Bear River Basin, the Commission contracted with Utah State University, in cooperation with the University of Idaho and the University of Wyoming, to estimate irrigation depletions for subbasins within the Bear River basin. A map of the subbasins and Compact division boundaries is shown in Appendix A. Appendix B shows the amount of depletion per acre that was estimated for each subbasin. The following procedures will describe methods for determining depletions for new irrigation,

supplemental irrigation, municipal and industrial use, and also determining when additional storage may take place above Bear Lake.

Depletions from both surface water and groundwater sources will be reported. In order for groundwater depletions to be exempt from compact allocation, the state must provide documentation acceptable to the Commission to show the source of water for the depletions is not tributary to the Bear River.

II. DEPLETION PROCEDURES

A. Irrigation Depletion

1. New Irrigated Lands

Depletion amounts from new irrigated lands, put in production since January 1, 1976, will be determined by multiplying the acreage brought into production by the irrigation depletion of the crop mix within a subbasin. The irrigation of new lands will be charged an irrigation depletion based on the values reported in Table 15 of Research Report #125, by Robert W. Hill, Charles E. Brockway, Robert D. Burman, L. Niel Allen and Clarence W. Robinson, Utah Agricultural Experiment Station, Utah State University, in cooperation with the University of Idaho and the University of Wyoming, January 31, 1989.

The depletion values in Research Report #125 are based on the weighted average crop mix for each subbasin. These values are summarized in Appendix B. Depletion values from the above referenced report will be used, but may be modified by the Commission. Modifications will require supporting information, and appropriate adjusted tables to verify depletion values. Any modifications made by a state will be documented to the satisfaction of the other two states. Justification as to why the modification was desirable will be included in the documentation and approved by the Commission.

An example depletion calculation for new acreage brought into irrigated agricultural production is made as follows:

Example area - Thomas Fork Subbasin:

Criteria: 40 new acres of irrigation brought into production

40 acres x 1.04 acre-feet* = 41.6 acre-feet of annual depletion

*(Based on Estimated Depletion from Appendix B)

By definition, depletion by the native vegetation or dryland crops is equal to the effective precipitation. No adjustment of the calculated depletion to account for prior use of the land, such as dryland agriculture converted to irrigation, will be required. Lands classified by the Commission as "meadow/wetland" which are drained and then irrigated will not be assessed an additional depletion.

2. Supplemental Supplies from New Water Development

a. Project Developments

To evaluate supplemental use of water on lands irrigated prior to 1976, any change in use will require documentation from the state proposing the change in use and quantifying the additional depletion. The documentation should address the area, extent of lands to receive supplemental supply, source of the water, and other necessary information. This paragraph refers to areas of land whose supplemental supplies are being developed as a project to supply supplemental water. Depletion estimates will be made from system design and operation studies submitted to and approved by the Commission.

b. Other Development

The depletion assigned to the smaller supplemental rights or filings may be calculated through a similar procedure as for new lands, i.e., take 40 acres in Thomas Fork that previously had an irrigated right, for which an applicant chooses to make an application to firm the supply. The depletion of 41.6 acre-feet would then be multiplied by the average shortage rate in the subbasin of the Bear River. Shortage rates by subbasin are listed in Appendix C. Any change in shortage rate will be reported to the Bear River Commission by each state with appropriate documentation to substantiate the numbers provided. The shortage rate is the value (percentage divided by 100) applied to account for an average water requirement deficiency in each subbasin. Depletion estimates and any shortage rate changes will be submitted to and approved by the Commission.

A state may also account for their supplemental supply uses by monitoring measuring devices installed by individual irrigators using supplemental rights, or by an alternative accounting method accepted by the Commission.

3. Irrigation Depletion Accounting Procedure

Each state will be responsible for obtaining, analyzing, and reporting its own data. An accepted standard mapping and database manager will be used. All

map and tabular information will be submitted in a form and format approved by the Commission.

The following data elements should be used in developing the data for the state reports:

- a. State
- b. Compact division
- c. Subbasin from Appendix A
- d. Section, township, and range (quarter-quarter of section optional but preferred)
- e. New acreage put into production or acreage receiving supplemental supply
- f. For supplemental supplies, the shortage rate for the subbasin (from Appendix C)
- g. Irrigated land, in acres, taken out of production (negative acreage value for banking, as described under II.D.)
- h. Irrigation depletion in acre-feet per acre from Appendix B
- i. Depletion by Compact section: This value is the sum of acreage within a section. A section may have a negative acreage value if a majority of the land was taken out of production. The acreage values from elements "e" and "g" are multiplied by the irrigation depletion (element "h") and shortage rate (element "f") for supplemental, and input to element "i."
- j. Division totals: This is the summation of all the depletion attributable to a state by Compact division. Compact division boundaries are shown on the approved 1976 base maps.
- k. Number of acres held in water rights banked by State and Compact division

B. Municipal Depletion

The definition for "municipal" use in the calculation of depletions is "any organization that supplies potable water and is required to report its activity as per the National Safe Drinking Water Act." The Amended Bear River Compact specifically exempts self-supplied domestic and stockwater use in the Upper and Central divisions from depletion charges. In order to be consistent, this exemption is extended to the Lower Division as well.

The increased or decreased depletion attributed to municipal uses since January 1, 1976, will be calculated, tabulated, and reported as provided for under Section F. The reports should consider including the following information elements:

1. Name of municipality or water-using group
2. Total diversion rate prior to January 1, 1976, known or estimated, in acre-feet
3. Diversion rate in acre-feet as of current reporting date
4. Total diversion increase or decrease in acre-feet since 1976
5. Total depletion increase or decrease in acre-feet since January 1, 1976, the depletion will be an agreed-upon factor representing the percent of the diversion which is consumed, times the total diversion increase or decrease.
6. State and division

Division totals within each state will be reported.

Where measured or metered data are not available, estimated use based on population or other indirect methods may be used and a mathematical calculation made to determine water use increase or decrease after January 1, 1976. The Commission will require that documentation be submitted which outlines the process the state used to determine the depletion. Municipal depletions will be submitted to and approved by the Commission.

C. Industrial Depletion

Changes in industrial use will be accounted for by the states, and a total increase or decrease in water use by division and state will be compiled. Reports produced by each state should include the following information elements:

1. Name of the industrial or commercial establishment
2. Type of use (Standard Industrial Code [SIC] preferred)
3. Total diversion in acre-feet prior to January 1, 1976, estimated or known
4. Diversion rate in acre-feet as of current reporting date
5. Total diversion increase or decrease in acre-feet since January 1, 1976 (decrease will be a negative value)
6. Total depletion increase or decrease in acre-feet since 1976
7. Location, latitude, and longitude, and/or section, township, and range (quarter-quarter section optional but preferred) for place of use
8. State and division

These data will be reported in such a way that totals for divisions within a state will be shown.

Where data are not available to document use as of January 1, 1976, current use data may be used and a mathematical calculation made to determine water use changes since January 1, 1976. The Commission will require that documentation be submitted which outlines the process the state used to determine the depletion. Documentation will be reviewed and approved by the Commission.

D. Banking Procedures

When water uses with a pre-1976 state water right are discontinued, the state may transfer the depletion from that water right to uses with post-1976 priorities without a new depletion charge, or the water may be "banked." Each state will be responsible for maintaining an accounting system documenting the transferred water right and the post-1976 priorities to offset any new depletion. Any pre-1976 depletions that have not been "re-appropriated" to a post-1976 water right may be "banked."

Prior to banking allotments approved by the Commission, the state requesting the allotments will prepare a document for presentation to the Commission showing the process by which the water will be accounted. This report will include the procedures used and provide data, including water use, place of use, associated water rights, and previous depletions. Banked water must be approved by the Commission.

E. Reservoir Evaporation

There will be an accounting for any change in net evaporation as a result of increased storage. Any decrease in evaporation from reservoir abandonment or reduced storage may be banked. Evapotranspiration from inundated lands may also be included in determining net evaporation at the storage site. The state accounting for the net evaporation change will use acceptable procedures, and those procedures will be reported to the Commission.

F. Reporting Requirements

1. Reporting of Depletion Amounts

a. Background

As a part of the base mapping project completed by the Commission in 1992, an estimation was made of the changes in irrigation, municipal and industrial uses in each Compact division from 1976 to 1990. These estimates were reported to the Commission at their April 1992 meeting. There was wide variation in the percentages of allocation being put to beneficial use in the various divisions. Idaho's portion of the Central Division was the closest to reaching the allocation amount, with 64 percent of their allocation being depleted. At the other end of the spectrum was the Lower Division, where between 2-6 percent of their allocation to Utah and Idaho are being depleted. Because of this dichotomy, the reporting requirements for the Compact divisions will vary.

b. Reporting Intervals

Every five years, or as determined by the Commission, a review of the changes in depletions since 1976 occurring in the Central Division portion in Idaho will be determined. Every ten years, or as determined by the Commission, a determination of the depletion changes occurring in the Upper Division, the Wyoming portion of the Central Division, and the Lower Division will be made.

The determinations will include depletions from both new irrigation development and supplemental irrigation, and municipal and industrial uses. The determinations may utilize aerial photography, satellite imagery, or other remote sensing data for the estimation of any changes in land use since 1976. Municipal and industrial uses will be calculated as described in these procedures. An updated map showing the changes will be produced if the Commission determines that the changes were significant enough to warrant an update.

Each state will submit a report summarizing the information required in Section II. The report will also include a comparison of total depletions and the Compact allotments by division for each state. A report will be sent by the states to the Engineer-Manager, as directed by the Commission. The Engineer-Manager will circulate the report to Commission members four weeks prior to the Commission meeting at which the report is to be presented. If the report is acceptable, it will be adopted by the Commission as the official depletion estimate record. If there are questions regarding the states' methodology or total depletion estimates, the concerns will be addressed by the states, and a report will be resubmitted at the next Commission meeting.

If a mapping update is deemed necessary by the Commission, the update will show the new lands added and lands taken out of production since January 1, 1976. This information will be provided by each state using an acceptable database manager and sent to the Engineer-Manager. Each state will document how the map products were derived and how the information was verified. At the Commission's direction, map information will be compiled and merged to form updated 1:100,000 scale maps.

There may be a variety of future potential uses for Bear River water by the three states that are not presently known. It is not the intent to limit future uses with these depletion procedures. Depletion from uses such as out-of-basin exports, depletion from wildlife or aesthetic uses will be estimated by the respective states as new uses occur. The

Commission-approved procedures will be revised as necessary to accommodate these new uses.

2. Article XI Reporting Requirement

Article XI states that, "The official of each State in charge of water administration shall, at intervals and in the format established by the Commission, report on the status of use of the respective allocations." The Commission has determined that the Commission's Biennial Report shall serve as the mechanism for fulfilling this reporting requirement. Each state will, in cooperation with the Engineer-Manager, compile an annual narrative report of significant water-related activities for each of the past two water years. From the state reports, the Engineer-Manager will determine which issues are of interest to the Commission and will include them in the Biennial Report. This report may not necessarily include the numeric amounts of new depletions during the biennium, but will highlight the major water-related activities in the Basin. The Biennial Report will also include a table showing the latest depletion estimates for each state by Compact division.

III. BEAR LAKE SPILLS

Article VI, Paragraph C, states, "In addition to the rights defined in Article VI, Paragraphs A and B, Idaho, Utah and Wyoming are granted the right to store and use water above Stewart Dam that otherwise would be bypassed or released from Bear Lake at times when all other direct flow and storage rights are satisfied."

No single physical observation or measurement can be made to assess when additional Article VI storage may take place. Both senior and junior appropriators of Bear River waters will be diverting to storage during peak run-off. Use of Article VI water is not to be included in the storage and depletion allowances above Stewart Dam if the Commission determines that additional storage waters are available under Article VI, Paragraph C of the Compact.

To ensure that prior rights are delivered their full requirement of water, the following procedure will be followed. The Engineer-Manager will act as chairperson of a Bear Lake Spills Subcommittee of the Bear River Commission. The Subcommittee will be comprised of the Operations Committee, a representative of Utah Power, and the Engineer-Manager. This Subcommittee will be responsible for obtaining the necessary data through cooperation with federal, state and private organizations to assess the hydrologic situation of the Bear River system and determine if there is potential for additional rights being defined as provided for under Article VI, Paragraph C of the Compact. The Subcommittee may determine that waters are not going to be available for these additional rights. The Subcommittee may review storage that has occurred and determine whether additional waters are available. If the Subcommittee determines that additional waters were stored and additional rights were not available, then the Subcommittee will instruct the Engineer-Manager concerning how to release the unauthorized

storage into the system. The Subcommittee will report to the Commission any of its actions and or findings at the next Commission meeting.

The Subcommittee should evaluate at least the following criteria:

1. Bear Lake elevation
2. Storage space available upstream from Bear Lake.
3. The amount of water stored weekly in each reservoir during the run-off period from March through June of each year
4. An estimation of the probable Article VI, Paragraph C water
5. The time interval in which storage of water may occur
6. The time interval in which stored water may be released to prior appropriators
7. An accounting system for tracking stored water
8. Any of the signatory states of the Amended Bear River Compact, upon showing of importance, may have other criteria evaluated by the Bear Lake Spills Subcommittee during meetings of the Subcommittee
9. Stewart Dam and Rainbow Canal flows

IV. CONCLUSIONS

The Commission was to establish "Commission-approved procedures" for estimating depletion and determining when additional storage may take place based on Bear Lake operations, as mandated by the Amended Bear River Compact. These procedures may be revised by the Commission at a regular or annual Commission meeting should changes in the Commission-approved procedures be necessary.