

Section V - Water Rights Accounting and Reporting

5.1 Overview of the BRA Water Rights Accounting Plan

The BRA has developed an Accounting Plan to report compliance with the terms and conditions of the System Operation Permit and its use of water under other BRA water rights. The Accounting Plan consists of a series of tables in Excel workbooks that cover a calendar year, with each new Accounting Plan starting on January 1 of each year. Entries in the Accounting Plan will be made regularly by BRA staff. The Accounting Plan includes:

- Customer water use, including delivery of water to downstream customers adjusted for travel time and losses;
- System reservoir operations, including inflows, diversions, water supply releases, passage of instream flows, and storage and use of water under the applicable BRA authorizations;
- Diversions made under the new appropriation contained in the proposed System Operation Permit, including use of return flows;
- Compliance with environmental flow criteria found in the WMP; and
- Summaries that show use under the various BRA water rights.

Two versions of the Accounting Plan have been developed, to reflect the two approaches to appropriation of return flows: the BRA's preferred approach and the TCEQ ED's preferred approach. In the BRA's preferred approach, discharged return flows that are not reused under prior authorizations are available for use by all water rights, distributed in priority order. In the ED's preferred approach, only discharged return flows that originate from BRA sources or from BRA-owned wastewater treatment plants are available for use, again subject to reuse that has already been permitted. The differences between the two versions of the Accounting Plan are noted in the sections below.

The Accounting Plan consists of five Microsoft Excel workbooks and associated documentation, included as Appendix H-1 (BRA approach version) and Appendix H-2 (ED approach version). The five workbooks are:

Reference.xlsb	Miscellaneous data used in other workbooks, including historical data, reservoir information, conversion factors, etc.
IFCalcs.xlsb	Instream flow calculations
Reservoirs.xlsb	Information on the operation of the eleven existing BRA System reservoirs (Allens Creek not included at this time)
Reaches.xlsb	Tracking of water supply releases and return flows
Summary.xlsb	Summary and water rights reporting

In accordance with TCEQ policies and the requirements of the proposed System Operation Permit, the Accounting Plan will be available for public inspection at BRA headquarters in Waco during normal business hours.

The following sections briefly describe the methods used in the Accounting Plan. More detailed information is contained in the documentation for the Accounting Plan in Appendices H-1 and H-2.

5.2 Customer Water Use Accounting

The Accounting Plan includes daily entries for all BRA customer water use during the year. For customers that report water use to BRA on a monthly basis, the total volume used during the month will be divided by the number of days in the month or converted to daily use by some other method appropriate for that particular water user. Most customers will have an individual entry. However, entries may be aggregated for smaller customers with the same type of use that divert water from the same reach or reservoir.

5.3 Daily Reservoir Accounting

The Accounting Plan includes daily reservoir accounting for all eleven BRA System reservoirs (Allens Creek Reservoir is not included at this time because it has not yet been constructed). The daily reservoir accounting calculates inflow, assigns diversions and downstream releases to either inflows or reservoir storage according to the procedures described in Section 5.4.6 below, and calculates conditions under which water is being impounded using the System Operation Permit.

The reservoir accounting uses a “pool” system that tracks water stored under the reservoir’s current water right (one of BRA’s reservoir water rights numbered COA 12-5155 to COA 12-5165) and storage of water released from upstream BRA System reservoirs. For the ED’s approach to return flows, an additional pool is added to track storage of return flows under the System Operation Permit. In the unique case of Lake Whitney, the BRA contracts with USACE for 22% of the storage space (approximately 50,000 acft) between elevations 520.0 ft-msl and 533.0 ft-msl. The remaining 78% of the storage between these elevations is under the control of the Southwestern Power Administration (SWPA) and is used for hydropower generation. Brazos Electric Power Cooperative (BEPC) currently holds an electric service agreement with SWPA for use of this water. The USACE keeps daily accounting to determine the volume of water available to the BRA, taking into account evaporation losses, leakage, lakeside pumping, turbine and gate releases, surface runoff and transportation losses. Therefore, Lake Whitney has an additional pool that accounts for the non-BRA portion of the reservoir used for hydropower generation.

If storage is emptied by the System Operation Permit, as opposed to the reservoir’s existing water right, that storage can only be refilled with water appropriated by the System Operation Permit. The reservoir accounting plan tracks where storage would be if there were no System Operation Permit diversions and identifies days in which water was used to fill storage under the System Operation Permit. In general, if a reservoir would have had any empty storage if operating solely under its existing right, then all available inflows are appropriated under its existing right.

The reservoir storage accounting also includes provisions for temporarily tracking flows stored under the System Operation Permit that are later released to meet environmental flow requirements. Appropriation for storage under the proposed System Operation Permit can occur only when environmental flow requirements are met and water is available for impoundment at the priority date of the System Operation Permit.

5.4 New Appropriation Accounting Plan

The Accounting Plan tracks diversions made from run-of-river flows, reservoir inflows and reservoir storage on a daily basis. It also tracks water appropriated under the System Operation Permit that is used to fill reservoir storage. Diversions are summed on a monthly basis for annual reporting to the TCEQ. The assignment of diversions to the System Operation Permit is discussed in Section 5.4.6 below.

5.4.1 Environmental Flows

The WMP contains environmental flow special conditions at twelve applicable measurement point (USGS stream gage) locations, in accordance with TCEQ's adopted environmental flow standards for the Brazos basin (Subchapter G, Chapter 298 of Title 30 of the Texas Administrative Code (adopted February 12, 2014)). These environmental flow conditions consist of base and subsistence flows and HFPs that vary by season and hydrologic condition. The environmental flow special conditions are described in Section 4.4.2 of this Technical Report.

Diversion or storage of water under the proposed System Operation Permit cannot occur if base or subsistence flow criteria are not met at the applicable measurement point, as described in Section 4.4.3 of this Technical Report. Under HFP conditions, diversion or storage under the proposed System Operation Permit may be limited as well, as described in Sections 4.4.3 and 4.4.4 of this Technical Report. The environmental flows portion of the Accounting Plan tracks what happened with respect to environmental flow requirements experienced during each annual reporting period.

5.4.1.1 Classification of High Flow Pulses (HFPs)

The Accounting Plan includes calculations that classify HFPs according to the flow, duration and volume of a pulse event. An HFP is initiated when flows are greater than the pulse trigger flow. An HFP is terminated when either the volume amount has passed the applicable measurement point or the duration time has passed since the high flow pulse trigger level was initiated. BRA staff will enter daily stream gage flows at the twelve WMP measurement points into the Accounting Plan spreadsheets. The spreadsheet will automatically classify each day as either base flow or an HFP, according to the WMP's environmental flow criteria. Specifically, an HFP begins when flows exceed the high flow pulse trigger level. An HFP is terminated when either the flow volume or duration criteria has been met.

Once an HFP flow event meets the duration or volume criteria it is known as a Qualifying HFP. Diversion or storage under the proposed System Operation Permit may not cause flows to drop below the HFP trigger level, or prevent flows from reaching the larger HFP trigger level for measurement points with small and large pulses, unless the required number of these events has already occurred in the current season. Section 4.4.4.1 of this Technical Report describes other situations where System Operation Permit diversions may occur during Qualifying HFP events.

Diversion and storage of water may occur under other BRA water rights during a Qualifying HFP event. This is described in more detail in Section 5.4.1.4 below.

5.4.1.2 Seasonal Schedule of High Flow Pulse Criteria

Tables 4.13a through 4.13l in Section 4.4.2.1 of this Technical Report show the peak flow, duration and volume criteria for the WMP environmental flow measurement point locations. These tables also include the frequency criteria, which is the number of Qualifying HFP events that meet the requirements for each season.

5.4.1.3 Carry-Over of High Flow Pulse Event

In accordance with Section 298.475 of Title 30 of the Texas Administrative Code, the WMP does not include provisions to carry over HFP events from one season to another.

If the required number of HFP events does not occur during a particular season, the deficit does not carry over to the next season. Similarly, a surplus of Qualifying HFP events during a season is not carried over into the next season.

5.4.1.4 Diversion and Storage of High Flow Pulses

For BRA contracts that take water from a stream reach, diversion of run-of-river flows (including both natural flows and return flows) made under the System Operation Permit are subject to environmental flow requirements. (Diversion of water released from upstream storage is not subject to these requirements.) Diversion of run-of-river flows under the System Operation Permit will be curtailed when such diversions would cause flows to drop below the applicable HFP trigger level, or prevent flows from achieving the larger HFP trigger for measurement points with small and large pulses. Diversion curtailment would cease once the HFP becomes a Qualifying HFP (i.e. either volume or duration criteria have been met). However, there are several situations in which diversion from a stream reach can occur during a Qualifying HFP without such limits. Section 4.4.4.1 of this Technical Report defines conditions where HFP standards do not apply based on diversion rates. Diversions under the proposed System Operation Permit may also occur if the frequency criterion for Qualifying HFP events has been met during the current season. In all cases the applicable base flow criteria still apply.

Diversions or storage under the System Operation Permit from inflows into a System reservoir are also subject to the WMP environmental flow requirements. Conditions where this applies are defined in Section 5.4.6.2 below.

The WMP allows the BRA to temporarily store pulse events. BRA staff will monitor inflows into each System reservoir to determine if (a) storage is occurring under the System Operation Permit, and (b) applicable environmental flow conditions are being met. If impounded flows would prevent achievement of a Qualifying HFP at the applicable measurement point and must be released, BRA staff will coordinate the operational release pattern with the USACE, Fort Worth District in accordance with the USACE water control plan and rule curves for flood regulation, as discussed in Section

4.4.6 of this Technical Report. The schedule of releases will be recorded in the Accounting Plan for each reservoir.

5.4.2 Return Flow Accounting Plan

There are two versions of the Accounting Plan, one using the BRA's approach to return flow appropriation and one using the ED's approach to return flow appropriation. The BRA will implement the version of the Accounting Plan that is consistent with the approach to return flow appropriation adopted in the final version of the System Operation Permit.

In order to use and account for return flow discharges, the proposed System Operation Permit requires the BRA to verify that there are measuring device(s) at the discharge point of each wastewater treatment plant. There are established regulations for all wastewater treatment facilities that address this proposed permit requirement. Monthly return flow (effluent discharges) volumes are reported to the TCEQ using the Discharge Monthly Report (DMR). Each discharge permit requires that the volume of water discharged be measured with a flow measuring device and that volume be reported on the DMR. Section 217.33(a) of Title 30 of the Texas Administrative Code states that a wastewater treatment facility must have a means to accurately measure effluent discharges. The DMRs provide a historical record of the return flows discharged in the Brazos basin that are used in the Accounting Plan.

In the BRA's approach to return flow accounting, return flows are considered to be state water available for appropriation unless there is an existing permit authorizing reuse of those return flows. Like natural flows, the return flows that are in the stream and not dedicated to another permit are appropriated according to the prior appropriation system. Because there is no differentiation between return flows and natural flows, the only accounting needed for return flows is information on how these return flows affect the available supply of the BRA System. Available supplies are determined by system modeling, which includes assumptions about available return flows. Therefore, the return flow accounting includes verification of the assumptions used to determine these supplies. The BRA approach version of the Accounting Plan includes reported monthly

return flows for dischargers that have a permitted discharge greater than or equal to 1 million gallons per day (MGD). These monthly amounts will be compared to the assumed amounts used during the time period of this initial WMP. If return flows are substantially less than the amounts used in the modeling, the assumptions used in the model will be adjusted and the model re-run to examine impacts on yield.

In the ED's approach to return flow appropriation, only return flows from BRA sources or BRA-owned or operated wastewater treatment plants are available for appropriation under the proposed System Operation Permit. These return flows must be tracked by source and diversion location on a daily basis. The ED approach version of the Accounting Plan includes BRA return flows in the reach and reservoir accounting workbooks. The availability and use of these return flows is tracked in the Accounting Plan.

Currently, the BRA, like all other water right holders, can make use of return flows under its existing water rights, subject to use by more senior rights. TCEQ recognizes this fact when they analyze the availability of return flows for reuse permits. TCEQ includes historically discharged return flows in the WAM, and the model distributes these return flows to existing rights in priority order. The permittee is then granted the authorization to reuse those return flows less the amount that is subject to priority call by existing rights. Therefore, the Accounting Plan version using the ED's approach to return flows includes provisions for tracking the use of return flows to satisfy diversions from reservoirs made under BRA's existing water rights. This kind of tracking is not needed in the BRA approach, where return flows are considered state water and therefore do not need to be tracked separately from other state water.

5.4.3 Bed and Banks Delivery Plan

The BRA makes water supply releases for a wide variety of uses from its System reservoirs. Some of these releases are made continuously. Others are only made when needed to meet customer requests; this typically happens during drier times. The BRA's procedures for making these reservoir releases are described in Section 4.1 of this Technical Report.

5.4.3.1 Procedure to Estimate Daily Deliveries of Water

The Accounting Plan divides the Brazos River basin from Possum Kingdom Lake to the Gulf of Mexico into the 40 reaches listed in Table 5.1. Some reaches are reservoirs, and include the area from the headwaters of the conservation pool of the reservoir to the dam. Other reaches are stream segments bounded by a reservoir, stream gage or confluence. The reach accounting section tracks BRA water supply releases as they travel through these reaches throughout the year, applying corrections for travel times and losses. In the version of the Accounting Plan using the ED’s approach to return flows, BRA return flow discharges are tracked as well. The reach accounting also tracks the diversion of the water. Reach accounting is described in detail in Appendices H-1 and H-2.

5.4.4 Diversion Points

Table 5.1 identifies the reaches where diversions under the System Operation Permit are allowed to occur. All diversions within these reaches by BRA customers must be within the diversion limits for the applicable reach (Table 4.17). The BRA will add new diversion points as authorized by Section 297.102(b) of Title 30 of the Texas Administrative Code.

Table 5.1 – Accounting Plan Diversion Reaches	
Reach Name	
	Possum Kingdom Lake
	Possum Kingdom Lake Dam to Palo Pinto gage
	Palo Pinto gage to Dennis gage
	Dennis gage to Lake Granbury Dam
	Lake Granbury Dam to Glen Rose gage
	Glen Rose gage to Lake Whitney Dam
	Lake Whitney Dam to Aquilla Creek/Brazos Rv confluence
	Lake Aquilla
	Lake Aquilla Dam to Aquilla Creek gage
	Aquilla Creek gage to Aquilla Creek/Brazos Rv confluence
	Aquilla Creek/ Brazos confluence to Highbank gage
	Lake Proctor
	Lake Proctor Dam to Leon Rv at Gatesville gage
	Leon Rv at Gatesville to Lake Belton Dam
	Lake Belton Dam to Leon Rv nr Belton gage

Table 5.1 – Accounting Plan Diversion Reaches	
Reach Name	
Leon Rv nr Belton gage to Little River gage	
Lake Stillhouse Hollow	
Lake Stillhouse Hollow Dam to Lampasas Rv nr Belton gage	
Lampasas Rv nr Belton gage to Little River gage	
Little River gage to Little Rv/San Gabriel Rv confluence	
Lake Georgetown	
Lake Georgetown Dam to N San Gabriel gage	
N San Gabriel gage to Lake Granger Dam	
Lake Granger Dam to Laneport gage	
Laneport gage to Little Rv/San Gabriel confluence	
Little/San Gabriel confluence to Little Rv at Cameron gage	
Cameron gage to Brazos Rv/Little Rv confluence	
Highbank gage to Brazos Rv/Little Rv confluence	
Brazos Rv/Little Rv confluence to Bryan gage	
Bryan gage to Brazos Rv/Yegua Crk confluence	
Lake Somerville	
Lake Somerville Dam to Yegua Crk gage	
Yegua Crk gage to Brazos Rv/Yegua Crk confluence	
Brazos Rv/Yegua Crk confluence to Brazos Rv/Navasota Rv confluence	
Lake Limestone	
Lake Limestone Dam to Easterly gage	
Easterly gage to Brazos Rv/Navasota Rv confluence	
Brazos Rv/Navasota Rv confluence to Hempstead gage	
Hempstead gage to Richmond gage	
Richmond gage to Gulf of Mexico	

5.4.5 Firm and Non-Firm Water Availability by Location

Upon issuance of the System Operation Permit and approval of this initial WMP, the BRA anticipates entering into new long-term water supply contracts consistent with water strategy recommendations in the State Water Plan. Potential scenarios for the sale and use of water, along with the modeling supporting those scenarios, are described in Section 4 of this Technical Report. Once these new long-term water supply contracts are executed, they may be physically supplied from either existing BRA water rights or from the System Operation Permit. Additionally, existing BRA contracts may also be supplied from the System Operation Permit.

Current TCEQ rules define return flows as inherently being non-firm water. Both versions of the Accounting Plan report return flows by geographic location.

The BRA defines firm supplies as the reliable supply available from the BRA System given existing or expected authorizations, infrastructure, reservoir sedimentation and contracts. This supply has been determined using the modeling described in Sections 2.4 and 4.3 of this Technical Report. The BRA definition is somewhat different, in that non-firm return flows and run-of-river flows may be used, when available and when special conditions of the proposed System Operation Permit are met, to supply long-term firm water supply contracts.

Currently, the BRA does not have policies in place for entering into new contracts strictly for use of non-firm water under the proposed System Operation Permit. The use of non-firm appropriations will be determined and approved in future WMPs.

5.4.6 Reservoir Storage and Withdrawal Plans

Sections 4.1, 4.3 and 4.4 of this Technical Report describe the expected operation of the BRA System reservoirs during the time period of the initial WMP. Storage and withdrawal of water from the System reservoirs under the various BRA authorizations will be tracked in the reservoir section of the Accounting Plan. The reservoir section of the Accounting Plan is described in detail in Appendices H-1 and H-2.

5.4.6.1 Accounting by Priority Date

BRA staff will assign all diversions made during the year to one of the existing BRA reservoir authorizations (water rights numbered COA 12-5155 through COA 12-5165), the Excess Flows Permit (COA 12-5166, as amended), or the System Operation Permit. This assignment will be shown in the Accounting Plan. If the ED's approach to return flows is adopted, the use of return flows under the System Operation Permit will be recorded as well. BRA staff will use the following general guidelines for assigning diversions to water rights under this initial WMP:

1. Reservoir diversions and water supply releases will first be assigned to one of the existing BRA reservoir priority rights (COA 12-5155 through COA 12-5165). Use will be assigned the priority date of the existing right.

2. If flows at the Richmond gage are greater than 2,000 cfs, use by NRG will be assigned to BRA's Excess Flows Permit (COA 12-5166, as amended) in accordance with the contract between NRG and BRA. This is a non-priority use.
3. If diversions or releases exceed the priority authorization of a System reservoir, the use will be assigned to another System reservoir's existing authorization under the System Order, if such authorizations are available. This is a non-priority use.
4. If System Order water is not available for reservoir diversions or releases that exceed the priority authorization of a System reservoir, then the use will be assigned to the System Operation Permit.
5. Water released or transferred via pipeline from one BRA System reservoir to another and stored in the receiving reservoir for later use will be assigned to the water right associated with the reservoir where the water originated. The use will be assigned to the originating reservoir (using that reservoir's priority date) at the time that the water was pumped or released from the originating reservoir. Subsequent use of this stored water is not assigned a priority date and does not count against the water use from the receiving reservoir.
6. Diversion of run-of-river flows will be assigned to the System Operation Permit, using that permit's priority date. (Use of downstream releases will be assigned to the water right of the reservoir where the release originated, either from the reservoir's water right or another water right pursuant to the System Order.)
7. If the ED's approach to return flows is adopted, use of return flows at run-of-river diversions will be assigned to the System Operation Permit. For return flows used at a BRA System reservoir, use of return flows will occur under the reservoir's existing priority right. However, if System Operation Permit diversions are occurring at the reservoir, return flows flowing into the reservoir may be used to the extent they are available and will be assigned the System Operation Permit priority date.

5.4.6.2 Conditions for Refilling Storage Emptied Under the Proposed System Operation Permit

If storage is emptied by the proposed System Operation Permit, as opposed to the reservoir's existing water right, that storage can only be refilled with water appropriated at the priority date of the System Operation Permit. The reservoir accounting plan tracks where storage would be if there were no System Operation Permit diversions and identifies days in which water was used to fill storage under the System Operation Permit. This calculation identifies days when the terms and conditions of the proposed System Operation Permit regarding reservoir storage are engaged. In general, if a reservoir fills storage that would be emptied if the reservoir were operating solely under its existing right, then all inflows available to BRA after senior rights are satisfied are appropriated under the reservoir's existing right. More information on this calculation can be found in Appendices H-1 and H-2.

5.4.6.3 Accounting for High Flow Pulses Impounded Under the Proposed System Operation Permit

Accounting for high flow pulses for reservoir inflow is only needed at reservoirs where diversions or releases have been made under the System Operation Permit and have created empty storage under the System Operation Permit. The reservoir accounting described in the previous section will track storage emptied under the proposed System Operation Permit. BRA staff will monitor these calculations. When storage emptied under the System Operation Permit is being refilled, BRA staff will monitor the inflows to see if these flows qualify as a high flow pulse. (In most situations that will be the case). If necessary, some of these inflows may need to be passed to meet environmental flow criteria using the guidelines discussed in Section 5.4.1.4 above.

A Qualifying HFP often exceeds the pulse flow trigger level, volume and/or duration criteria. The BRA is not obligated to pass the entire pulse – only enough flow to meet or exceed the applicable pulse flow trigger level, and to meet either the volume or duration criteria. These criteria define a window within which the Qualifying HFP occurs. If this

window happens to cross a seasonal boundary, then the credit for the Qualifying HFP will be given to the season in which the HFP ends.

5.5 State Water Use Reports

The TCEQ requires annual submission of a monthly report of water use for each water right, by type of use. The Accounting Plan generates monthly summary tables that can be used to generate these reports.