Texas Commission on Environmental Quality

INTEROFFICE MEMORANDUM

To: David Koinm, Application Manager
Water Rights Team
Water Rights Permitting & Availability Section

Date: November 19, 2007

Through: Bill Billingsley, Team Leader
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Water Rights Permitting & Availability Section

From: Wendy Gordon, Ph.D., Aquatic Scientist
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Subject: Brazos River Authority
WRPERM 5851
CN600506794
RN104319736
Brazos River Basin

Environmental reviews of water right applications are conducted in accordance with §11.042, §11.147, §11.1491, §11.150, and §11.152 of the Texas Water Code and with TCEQ administrative rules which include 30 TAC §297.53 through §297.56. These statutes and rules require the TCEQ to consider the possible impacts of the granting of a water right on fish and wildlife habitat, water quality, and instream uses associated with the affected body of water. Possible impacts to bays and estuaries are also addressed.

APPLICATION SUMMARY

The Brazos River Authority has applied for a permit, designated its "System Operation Permit," to authorize: 1) appropriation of state water for multiple use purposes; 2) appropriation of current and future return flows; 3) an exempt interbasin transfer of the water requested; 4) operational flexibility; 5) recognition that the System Operation Permit will prevail over inconsistent provisions in its existing water rights; and 6) the use of the bed and banks of the Brazos River, its tributaries, and BRA's reservoirs for the storage, conveyance and subsequent diversion of state water appropriated pursuant to this application and from other sources.

The BRA owns the following water rights, which comprise BRA's system of reservoirs for the purposes of this application: Certificate of Adjudication (Certificate) No. 12-5155 (Possum Kingdom Lake), Certificate No. 12-5156 (Lake Granbury), Certificate No. 12-5165 (Lake Limestone),

Certificate No. 12-5157 (Lake Whitney), Certificate No. 12-5160 (Lake Belton), Certificate No. 12-5159 (Lake Proctor), Certificate No. 12-5164 (Lake Somerville), Certificate No. 12-5161 (Lake Stillhouse Hollow), Certificate No. 12-5163 (Lake Granger), Certificate No. 12-5162 (Lake Georgetown) and Certificate No. 12-5158 (Lake Aquilla). The BRA, along with the Texas Water Development Board and the City of Houston, owns Water Use Permit 2925A (Allens Creek Reservoir). The BRA also owns Certificate Nos. 5166 and 5167, which authorize various uses of water within the applicant's other certificates and permits.

The applicant is currently authorized, pursuant to a TCEQ order, to manage and operate its tributary reservoirs as elements of a system, coordinating releases and diversions from the tributary reservoirs with releases and diversions from the applicant's main-stem reservoirs to minimize waste, and to conserve water in reservoirs in which the supply is short by making releases from tributary reservoirs in which the supply is more abundant.

The applicant seeks a Water Use Permit to authorize:

1. A new appropriation of state water in the amount of 421,449 acre-feet per year for multiple use purposes, including domestic, municipal, agricultural, industrial, mining, and other beneficial uses on a firm basis in the Brazos River Basin. The amount of this new appropriation of water includes the current and future return flows requested in this application. BRA indicates that the entire amount of 421,449 acre-feet of water per year is available only if all of it is diverted at the mouth of the Brazos River, and can only be made available by the BRA through the system operation of its water rights. To the extent water is diverted upstream, the remaining unappropriated water downstream is reduced and will itself vary depending upon the location of its diversion and use. Out of the 421,449 acre-feet per year of unappropriated water being requested, the maximum amount of unappropriated water that will be available if such water is diverted upstream at USGS gage No. 08091000 near Glen Rose, Texas is 150,538 acre-feet per year firm, and if such unappropriated water is diverted upstream at USGS gage No. 08098290 near Highbank, Texas, the maximum amount of unappropriated water that will be available at that location is 144,306 acre-feet per year.

2. Diversion of the water authorized by this amendment, if granted, from: (i) the existing diversion points authorized by BRA's existing water rights; (ii) the Brazos River at the USGS gage No. 08091000 near Glen Rose, Texas; (iii) the Brazos River at USGS gage No. 08098290 near Highbank, Texas; (iv) the Brazos River at the Gulf of Mexico; and (v) at such other diversion points that may be identified and included in BRA's proposed Water Management Plan which is subject to TCEQ's approval.

3. Use of up to 90,000 acre-feet of water per year of its firm supply (part of the 421,449 acre-feet of firm water requested above) to produce, along with other unappropriated flows, an interruptible water supply of 670,000 acre-feet per year and the appropriation of that interruptible water supply. BRA indicates that the entire amount of 1,001,449 acre-feet of water (331,449 acre-feet of firm water and 670,000 acre-feet of interruptible water) is available only if all of it is diverted at the mouth of the Brazos River, and can only be made available by the BRA through the system operation of its water rights. To the extent water is diverted upstream, the remaining unappropriated water

downstream is reduced and will itself vary depending on the location of its diversion and use. This new appropriation of water includes the current and future return flows requested in this application. Out of the 1,001,449 acre-feet of firm and interruptible water being requested, the maximum amount of firm and interruptible water that will be available if such water is diverted upstream at USGS Gage No. 08091000 near Glen Rose, Texas is 60,538 acre-feet of firm water per year and 157,000 acre-feet of interruptible water per year and if such water is diverted upstream at USGS Gage No. 08098290 near Highbank, Texas, the maximum amount of firm water is 54,306 acre-feet of water per year and 303,000 acre-feet of interruptible water per year.

4. An exempt interbasin transfer authorization to transfer and use, on a firm and interruptible basis, such water in the adjoining San Jacinto-Brazos Coastal Basin and the Brazos-Colorado Coastal Basin, and to transfer such water to any county or municipality or the municipality's retail service area that is partially within the Brazos River Basin for use, on a firm and interruptible basis, in that part of the county or municipality and the municipality's retail service area not within the Brazos River Basin.

5. An appropriation of current and future return flows (treated sewage effluent and brine bypass/return) to the extent that such return flows continue to be discharged or returned into the bed and banks of the Brazos River, its tributaries, and applicant's reservoirs. BRA indicates that such appropriation of return flows would be subject to interruption by direct use or indirect use within the discharging entity's city limits, extraterritorial jurisdiction, or contiguous water certificate of convenience and necessity boundary. Specified discharge points and amounts of water will be accounted for on a monthly basis as part of BRA's Water Management Plan which is subject to TCEQ's approval.

6. Operational flexibility to (1) use any source of water available to the applicant to satisfy the diversion requirements of senior water rights to the same extent that those water rights would have been satisfied by passing inflows through the applicant's reservoirs on a priority basis; and (2) release, pump and transport water from any of the applicant's reservoirs for subsequent storage, diversion and use throughout the applicant's service area.

7. Recognition that the System Operation Permit approved pursuant to this application will prevail over inconsistent provisions in the applicant's existing water rights regarding system operation.

8. Use of the bed and banks of the Brazos River, its tributaries and the applicant's reservoirs for the conveyance, storage, and subsequent diversion of (i) water that the applicant seeks to appropriate under this application; (ii) waters that are being conveyed via pipelines and subsequently discharged into the Brazos River, its tributaries or stored in the applicant's reservoirs; (iii) surface water imported from areas located outside the Brazos River Basin for subsequent use; (iv) in-basin surface water and groundwater subject to the applicant's control;(v) waters developed from future applicant projects; and (vi) current and future reuse of surface and groundwater based effluent requested by this application. This bed and banks authorization is subject to applicant, after identifying specific points of discharge and diversion and conveyance and other losses, obtaining future authorizations to satisfy the requirements of TWC § 11.042. Such points of discharge and diversion and

conveyance and other losses may also be identified and included in BRA's proposed Water Management Plan which is subject to TCEQ's approval.

9. Until the construction of Allens Creek Reservoir is completed, the applicant requests that the System Operation Permit include special conditions which authorize:

A. The applicant to appropriate state water in the amount of 425,099 acre-feet per year for multiple use purposes, including domestic, municipal, agricultural, industrial, mining, and other beneficial uses on a firm basis in the Brazos River Basin. This amount includes the current and future return flows requested in this application. This amount is available if all of the water is diverted at the mouth of the Brazos River, and can only be made available by the BRA through the system operation of its water rights. To the extent water is diverted upstream, the remaining unappropriated water downstream is reduced and will itself vary depending upon the location of its diversion and use. Out of the 425,099 acre-feet per year of unappropriated water being requested, the maximum amount of unappropriated water that will be available if such water is diverted upstream at USGS Gage 08091000 near Glen Rose, Texas is 150,538 acre-feet per year firm and if such unappropriated water is diverted upstream at USGS Gage 08098290 near Highbank, Texas the maximum amount of unappropriated water that will be available is, at that location, 175,306 acre-feet per year firm;

B. The applicant to use up to 90,000 acre-feet of water per year of its firm supply to produce, along with other unappropriated flows an interruptible water supply of 869,000 acre-feet per year. This amount includes the current and future return flows requested in this application. BRA indicates that the entire amount of 1,204,099 acre-feet of water (335,099 acre-feet of firm water and 869,000 acre-feet of interruptible water) is only available if all of it is diverted at the mouth of the Brazos River, and can only be made available by the BRA through the system operation of its water rights. To the extent water is diverted upstream, the remaining unappropriated water downstream is reduced and will itself vary depending upon the location of its diversion and use. Out of the the 1,204,099 acre-feet of firm and interruptible water being requested, the maximum amount of firm and interruptible water that will be available if such water is diverted upstream at USGS Gage No. 08091000 near Glen Rose, Texas, will be 60,538 acre-feet of firm water per year and 190,000 acre-feet of interruptible water per year and if such water is diverted upstream at USGS Gage No. 08098290 near Highbank, Texas the maximum amount of firm water will be 85,306 acre-feet of water per year and 284,000 acre-feet of interruptible water per year; and

C. Exempt interbasin transfer authorization to transfer and use, on a firm and interruptible basis, such water in the adjoining San Jacinto-Brazos Coastal Basin and the Brazos-Colorado Coastal Basin, and to transfer such water to any county or municipality or the municipality's retail service area that is partially within the Brazos River Basin for use, on a firm and interruptible basis, in that part of the county or municipality and the municipality's retail service area not within the Brazos River Basin.

BRAZOS RIVER BASIN

The Brazos River is a Gulf Coast river of the southwestern United States. As such, it traverses a strong rainfall gradient, decreasing from east to west, and a temperature gradient from north to south that strongly influences vegetation, land use, and river flow (Dahm et al. 2005). The Brazos River is among the hundred longest rivers in the world. The Brazos River starts on the high plateau of the Texas Panhandle before passing through grasslands, prairies, savannahs, and forests (Dahm et al. 2005). The following is an excerpt from in *Rivers of North America* (Benke and Cushing 2005):

The Brazos River arises at the confluence of the Salt Fork and Double Mountain Fork and flows about 1390 km southeasterly across Texas to its mouth on the Gulf of Mexico southwest of Houston. The Brazos has the greatest channel length entirely within Texas and is the third longest of all Texas Rivers. Its drainage basin is about 115,600 km^2, with 94% in Texas. The Brazos heads in New Mexico, and its forks drain much of the southern panhandle, and parts of west Texas surrounding Lubbock, Texas, on the Llano Estacado. Both dry, hot summers and sudden icy winds and winter blizzards color and shape the landscape, and long cycles of drought often are devastating to inhabitants...

The Brazos flows through three physiographic provinces beginning with the Great Plains (GP) of the Texas panhandle and eastern New Mexico. The Brazos then passes through the Central Lowlands (CL), emerges back into the Great Plains, and then flows across the Coastal Plain (CP) province into the Gulf of Mexico. The Brazos also passes through six terrestrial ecoregions along its course: Western Short Grasslands, Central and Southern Mixed Grasslands, Central Forest/Grassland Transition Zone, Texas Blackland Prairies, East Central Texas Forests, and Western Gulf Coastal Grasslands...

Land use in the basin is a mix of grazing, agriculture, and urban development, with remnants of native vegetation throughout the region. The basin is approximately 57% grassland, 24$ cropland, 16% urban and suburban, and 3% forest...

The Brazos River shows varied geomorphic characteristics as it crosses Texas. The Upper Brazos of the high plains is generally a broad, shallow, sandy, spatially intermittent river in short grass country. Canyonlands exist at the breaks of the Llano Estacado and the Caprock escarpment. The Middle Brazos was relatively unspoiled until numerous dams were constructed in this section of the river beginning in the 1940s and continuing through the 1980s. Much of the Brazos was entrenched and confined in narrow valleys with steep sides or bluffs. Near Waco, the topography changes to gently rolling hills and the river is less constrained. The Lower Brazos of the Coastal Plain becomes a deep, broad river in agricultural lands. The Brazos starts at an elevation of 450 m above sea level and stream gradients diminish from 66 cm/km to 9 cm/km as the river flows from its headwaters to the mouth...

There have been some detailed geomorphic studies of the Brazos River...Migration rate [of meanders] has decreased substantially [from the 1930s to 1988] as regulated flows have diminished peak flows and reduced suspended sediment loads...

Mean discharge for the Brazos River is 249 m^3/s. Given the large size of the basin, however, runoff

is quite low, ranging from only 0.2 cm/mo during the winter to 0.8 cm/mo in May. The annual total runoff of about 4 to 5 cm is only 5% of annual precipitation and indicates high evapotranspiration and other losses. The discharge regime is strongly regulated by the dams upstream of Waco on both a daily and seasonal basis, with daily discharge commonly being reduced to <1 m^3/s below Lake Whitney Dam...

Water chemistry reflects the predominant marine clays, limestone and sandstone geology, and agricultural land use. Water is mildly alkaline and salty (pH 7.6, alkalinity 1.33 mg/L as $CaCO_3$, specific conductance 733 µS/cm) due to marine salts deposited in the region of the upper basin as an ancient inland sea evaporated. Nutrient loading (dairy farms) in the middle basin causes late summer algal blooms, especially in intermittent reaches. In recent years, toxic blooms of golden alga linked to nutrient loading in some reservoirs have caused multiple fish kills. Water quality parameters of primary concern in the basin include natural salinity, atrizine, perchlorate, phophorus, dairy wastes, and dissolved oxygen...

The Brazos River flows through the East Texas Gulf freshwater ecoregion. Unfettered by dams downstream of Waco, the rich biodiversity in the lower drainage is contained in habitats maintained by natural fluvial processes...Apart from Lake Brazos (formed by a low-head dam at Waco), the main stem of the Brazos in the lower basin flows freely for over 640 km to the Gulf of Mexico, due in part to the shallow gradient of the Coastal Plain. Wide meanders have formed many oxbow lakes at various distances from the present main stem of the river, which reflects their various histories of inundation, and reconnection to the river. The Brazos River, deprived of much of its sediments by many dams, has cut deeper into its channel, and less frequently reconnects with the oxbow lakes...

RECREATIONAL USES

Recreational Uses: The following information comes from *An Analysis of Texas Waterways* (TPWD, 1979):

The Brazos River has sufficient water for year-round recreational purposes downstream of its confluence with the Clear Fork in Young County. Few major hazards are found on the entire river. There are plenty of gravel bars and islands for stopping and camping in the upper portions of the river below Possum Kingdom Dam. Sand bars become more common downstream. The suitability of this section of the Brazos for recreational use depends upon water being generated from Possum Kingdom Dam. The water coming from the dam is cold and clear. A common occurrence for the river is the rising of 2 or 3 feet in a matter of minutes when the dam is generating. If the dam is not generating, the river is relatively shallow which results in the river being difficult to float. The 35-mile section of the Brazos River in Palo Pinto County is very similar to the preceding section. Cedar-covered hills and mountains, scenic vistas, and precipitous shorelines are still very much in existence. Vegetation along the river bank remains thick and water quality is relatively high. The river banks are clean and unpolluted. Many small islands lend themselves to camping and day use, and the number of sand bars increases as the river progresses downstream. Continuing downstream, the next 41-mile section in Palo Pinto and Hood Counties leaves the rough terrain of the Palo Pinto

Mountains and flows through decreasingly rugged country enroute to Lake Granbury. The river becomes a slow, meandering stream with many bends and twists. However, the Brazos remains scenic, flowing through rolling hills and wooded bottomlands of the Cross Timbers Area of North Central Texas. The river is very wide and in places is shallow, but recreational usage is possible during normal and above normal water levels almost year round. Sand bars are plentiful.

Flowing through Hood and Somerville Counties, this next 39-mile section of the Brazos River depends upon water being generated from De Cordova Bend Dam before recreational use is possible. During periods when the dam is not generating, water levels are shallow until the backwaters of Lake Whitney are reached. Water below the dam is clean and clear. The river along this section is very scenic, flowing through heavily vegetated rolling hills covered with cedar, live oak, and post oak. The river does not run swiftly, but meanders leisurely over sand and rocks. The Paluxy is a tributary of the Brazos and is a small but picturesque river which has potential for recreational use. Lake Whitney Recreational Area extends up the Brazos River from Lake Whitney for approximately 36 miles. Recreational use of the river for this 36-mile distance is feasible, giving a total length of approximately 66 miles of potential recreational waterway from De Cordova Bend Dam to Lake Whitney.

The 39-mile section of the Brazos River in Bosque, Hill, and McLennan Counties is scenic, with tree-lined banks periodically giving way to bluffs of sheer limestone. Springs located on this section create excellent water quality. The water temperature is very cold in the upper portion since it comes from the bottom of Lake Whitney. The river is wide with many deep holes of water. Unless Whitney Dam is generating, several shallow areas will be encountered on this section. The next 38.7-mile section in McLennan and Falls Counties begins its slow meandering trek to the Gulf, flowing through rolling hills and flat coastal terrain. An occasional high bluff is found although limestone outcroppings such as those present on the upper reaches are not present. The water is no longer clear, but is often a murky color; however, its quality is sufficient for water contact sports. The Brazos River is scenic and contains heavily vegetated banks. There is sufficient water for recreational use at all times although during periods of dry weather shallow areas are found. One dam, forming Lake Brazos in Waco, exists. Water releases are automatic, and when the lake goes above conservation pool, the spillway is opened to release water. Located in Falls, Milam, and Robertson Counties, this penultimate 28-mile section of the Brazos River is a scenic section suitable for recreational use at any time. The river is very wide and low water levels often create shallow areas. The scenery is similar to the previous section, containing high earthen banks and much vegetation. The river is sluggish and slow-moving with no existing rapids. However, Falls-on-the-Brazos is a small waterfall stretching across the river. A concrete low water crossing is also found at this site. If the water level is fairly high, the falls are navigable. The Brazos River throughout the lower sections is a very scenic coastal river. Here, the stream slowly meanders to the Gulf between wide, steep banks. The banks are lined with hardwood trees and many scenic bluffs and sand bars exist. Water levels for recreational use are sufficient year round.

FLOW REGIMES FOR RIVER ECOSYSTEMS

Over the past 20 years, scientific research on streamflows to support river ecosystems indicates that establishing streamflows only on the basis of fish needs may not be sufficient to fully protect ecosystem functions. Such a limited focus may result in insufficient flows to support the maintenance of the stream channel, geomorphological processes, and riparian vegetation (Hill et al. 1991). Four flows are now widely recognized as important to river ecosystems: subsistence flows, base flows, high pulse flows, and overbank flows (National Research Council 2005). A body of scientific literature recognizes that this "environmental dynamism is central to sustaining and conserving native species diversity and ecological integrity in rivers and other ecosystems" (Poff et al. 1997) and that species have evolved life history strategies compatible with the flow regime in which they live and reproduce (Schlosser 1985, Meffe and Minckley 1987, Bunn and Arthington 2002). The nascent Texas Instream Flow Program is being built upon these tenets of hydrologic variability and dynamism (TCEQ et al. 2008).

Magnitude, frequency, and duration of flow are critical factors for species recruitment, abundance, and survival. Base flows support diverse aquatic communities, maintain groundwater levels for riparian vegetation, provide connectivity for fish movement, maintain suitable temperature and water quality characteristics, and provide drinking water for terrestrial animals (Tennant 1976, Richter et al. 2003. While the emphasis has long been on providing critical or low flows, high flows transport sediment through the channel (Leopold et al. 1964). This sediment movement is integral to redistributing the organic resources on which many species depend (Fisher 1983). High-flow events, like low-flow events, may serve as ecological "bottlenecks" that present critical stresses and opportunities for riverine species (Poff and Ward 1989). In many systems, the relative composition and abundance of species often reflect the frequency and intensity of high flows (e.g., Bernardo et al. 2003, Agostinho et al. 2004). Finally, by connecting the channel to the floodplain, high flows also help maintain the productivity and diversity of adjacent riparian areas and wetlands and the terrestrial species that depend upon them (references in Poff et al. 1997). Removal or reduction of peak flows will impair floodplain functions, which can alter riparian and channel conditions that provide habitat for fish (Bayley 1995).

A goal of the recommendations presented herein is to reflect historical patterns of hydrological variability in the portions of the Brazos River Basin that may be affected by the proposed permit action. As such, USGS streamflow data from six gauges in the basin were reviewed and those data were used in subsequent analyses to determine instream or environmental flow recommendations. It is understood that the current Texas Instream Flow Program study of the middle and lower reaches of the Brazos River will provide data that may more thoroughly address the question of how to determine instream flow needs than streamflow data can alone, but those results are not available presently. The approach taken in this permit review is consistent with the framework for implementing environmental flow components described in the technical guidance of the Texas Instream Flow Program (TCEQ et al. 2008). The TIFP recognizes the range of climatic conditions that occur and influence hydrologic behavior. As such, instream flow recommendations contained herein are designed to also reflect that natural hydrologic and climatic variability by specifying flows that would occur under dry, average, or wet conditions (see below for further explanation).

The six USGS gauges selected and the period of record corresponding to relatively unaltered flow in the Brazos River Basin are:

Brazos River near Glen Rose (1924 to 1940), USGS #08091000
Yegua Creek near Somerville (1925 to 1966), USGS #08110000
Navasota River near Easterly (1925 to 1969), USGS #08110500
Little River near Cameron (1917 to 1953), USGS #08106500
Brazos River at Richmond (1923 to 1959), USGS #08114000
Brazos River at Waco (1899 to 1940), USGS #08096500 used for Brazos River at Highbank, USGS #08098290. The Waco gauge values are being multiplied by 1.043, which represents the increase in the drainage area at the Highbank gauge over the Waco gauge.

Flow records from each of the gauges were analyzed using Indicators of Hydrologic Alteration (IHA, The Nature Conservancy) software. The IHA software uses a hydrologic time series to identify environmental flow components (e.g., low flows, high flow pulses, overbank flows) based on parameters such as rate of change of peak flows and flow recurrence interval that can be used in default mode or specified by the user. In the current application, IHA was used to identify low or "normal" flows. Seven-day, two-year low flows (7Q2 flows) were substituted for IHA's extreme low flows. Additional calculations were made outside of IHA using Excel to determine high flow pulses (HFP). Overbank flows were not considered for recommendation.

In this application, a HFP is defined as any contiguous series of daily flows that meet specific criteria such as the flow must be greater than the 10% percentile flow of the entire period of record, peak flow of the HFP must be less than the 1.5-yr recurrence interval, and if the flow exceeds the 75th percentile of the entire period of record it triggers a HFP, regardless of the rate of change from the previous day. A HFP ends if the flow drops below the 10th percentile of the entire period of record. Other conditions may also apply.

For a wet hydrologic condition, a qualifying HFP exceeds the 75^{th} percentile of peak flow, 75^{th} percentile of storm event volume, and 75^{th} percentile of duration. For an average hydrologic condition, a qualifying HFP exceeds the 50^{th} percentile of peak flow, 50^{th} percentile of storm event volume, and 50^{th} percentile of duration. For a dry hydrologic condition, a qualifying HFP exceeds the 25^{th} percentile of peak flow, 25^{th} percentile of storm event volume, and 25^{th} percentile of duration. This approach is used to determine in near, real time HFPs provided by nature. IHA output was imported into Excel to further refine the computation of HFPs. The results were used to create tables of the 25^{th}, 50^{th}, and 75^{th} percentiles of HFP event peak flows as well as the volume per event, the duration in days, and the frequency or number of events per season.

Total storage in System Reservoirs is proposed as a trigger for determining which of the instream flow requirements (i.e., dry, average or wet) are to be implemented at any given time and is subject to revision in future Water Management Plans. The approach is a statistical one in which percentiles of historical system storage are used as a proxy for climatic conditions. 7Q2 flows are intended to be implemented when total storage in System Reservoirs is below 60% of total capacity. The standard is intended to reflect the driest 2.5% of the historic record (on a monthly basis). "Dry"

means times when the total storage in System Reservoirs is below 74%, but more than 60% of total capacity. This standard is intended to reflect the dry portion of the historic record from the 2.5th to the 25th percentile (on a monthly basis). "Average" means times when the total storage in System Reservoirs is at least 74%, but less than 96% of total capacity. This standard is intended to reflect that 50% of the time when conditions are neither "Wet" nor "Dry." "Wet" means times when the total storage in System Reservoirs is at least 96% of total capacity. The standard is intended to reflect the wettest 25% of the historic record (on a monthly basis). Instantaneous instream flow requirements are applicable at all times, with the exception of extremely dry conditions at which time 7Q2 flows are in place.

WATER QUALITY

The Brazos River comprises many surface water quality segments with designated uses of aquatic life, contact recreation, fish consumption, and public drinking water supply. The segments are not specifically named in this memo, but can be found in the *Atlas of Texas Surface Waters* (TCEQ 2004). Similarly, the designated uses of each of the surface water quality segments can be found in *2000 Texas Surface Water Quality Standards* (TCEQ 2000).

Water quality in the Brazos River basin is regularly monitored through the Clean Rivers Program, for which the Brazos River Authority serves as the main point of contact. In-depth water quality investigations have been or are being carried out to resolve particular water quality problems in the basin. However, none of the extant water quality problems should be exacerbated by this requested water right.

For determining minimum flows that would sustain water quality, the seven day, two-year low flow (7Q2) is used. The 7Q2 is often considered the lowest allowable flow which provides adequate assimilation of pollutants, and it is the low flow value used in water quality modeling for Texas Pollutant Discharge Elimination System (TPDES) permitting. The 7Q2 is statistically derived from historical daily gaged flow data. The most recent 7Q2 values calculated by the Water Quality Assessment Team of the TCEQ for key gauges in the Brazos River basin are:

Gauge Name	Gauge #	7Q2 Value (cfs)	Period of Record
Brazos R near Palo Pinto	08089000	30.29	1977-2005
Brazos R near Glen Rose	08091000	15.29	1977-2005
Aquilla Creek above Aquilla	08093360	0.12	2001-2005
Brazos R near Aquilla	08093100	30.71	1977-2005
Leon R at Gatesville	08100500	4.67	1977-2005
Leon R near Belton	08102500	4.7	1977-2005
Lampasas R near Belton	08104100	4.75	1969-2005
N Fork San Gabriel R nr Georgetown	08104700	1.53	1981-2005
Brazos R near Highbank	08098290	167.14	1977-2005
Navasota R near Easterly	08110500	7.56	1980-2005

Gauge Name	Gauge #	7Q2 Value (cfs)	Period of Record
Little R at Cameron	08106500	67.86	1977-2005
San Gabriel R at Laneport	08105700	3.6	1981-2005
Yegua Creek near Somerville	08110000	0.06	1969-1991
Brazos R at Richmond	08114000	742.57	1977-2005

BAYS AND ESTUARIES

Diversions could affect the receiving waters at the Gulf of Mexico. However, the Brazos River discharges directly into the Gulf of Mexico rather than a receiving bay and estuary system, reducing the likelihood of adverse effects. The study of the Brazos River Estuary to determine freshwater inflow needs being executed by the Texas Water Development Board is still in progress.

COASTAL MANAGEMENT PROGRAM (CMP) CONSISTENCY

Applications for water appropriations of 5,000 acre-feet/year or more within the costal boundary zone require a determination that the proposed action is consistent with the State's Coastal Zone Management Program. Instream Uses staff have determined the proposed application is subject to the Texas CMP, in accordance to Coastal Coordination Act Implementation Rules 31 TAC §505.11(a)(6)(H). The proposed project is located within the coastal management zone and is subject to the goals and policies of the CMP in accordance with the regulations of the Coastal Coordination Council (CCC).

The checklist of applicable coastal policies provides for the actual determination of consistency of the proposed application. The coastal policies specifically addressed in this environmental analysis are: 31 TAC §501.14 (r)(1)(C), (D), (E), (G), & (H). Based on a review of these policies, the proposed application should not have significant adverse impacts upon coastal natural resource areas.

SUMMARY AND RECOMMENDATIONS

1. Permittee shall conduct Instream Flow Studies (Studies) on the Brazos River and on segments of major tributaries upstream of their confluence with the Brazos River consistent with and in cooperation with the Texas Instream Flow Program. The results of these Studies, specifically accounting for flows required to maintain a sound ecological environment, shall be incorporated into the Water Management Plan (WMP). The Water Management Plan shall provide an adaptive management strategy for instream flow requirements that may be modified from time to time as additional data and knowledge are developed.

2. Upon completion of the Studies new flow requirements may be developed to replace the

following interim values and may be incorporated into the Water Management Plan.

3. Seasons are defined as Spring (March–May), Summer (June-August), Fall (September-November), and Winter (December-February). The number of seasons and the months representing each season are subject to revision in the WMP.

4. Total storage in System Reservoirs is a trigger for determining instream flow requirements and is subject to revision in future Water Management Plans. 7Q2 flows are to be implemented when total storage in System Reservoirs is below 60% of total capacity. "Dry" means times when the total storage in System Reservoirs is below 74%, but more than 60% of total capacity. "Average" means times when the total storage in System Reservoirs is at least 74%, but less than 96% of total capacity. "Wet" means times when the total storage in System Reservoirs is at least 96% of total capacity.

5. Storage triggers are to be recalculated every five years to ensure implementation of Susbsistence, Dry, Average, and Wet provisions at frequencies of 2.5%, 25%, 50%, and 75%, respectively.

6. Until such time as the Studies are completed, the interim instream flows in the following tables apply at the following USGS gauging stations. Measurement points for instream flows are subject to change in the WMP with approval of the Executive Director. The instream flow criteria in the following tables are applicable at all times. Depending upon the hydrologic condition (Subsistence, Dry, Average, or Wet), storage of water authorized by this Permit in system reservoirs upstream from the following flow gauging stations and the diversion and use of water pursuant to this Permit at locations upstream from the flow gauging locations shall be authorized when streamflows exceed the instantaneous flow values established in the following tables:

Instream Flow (cfs)	BRAZOS RIVER NEAR GLEN ROSE - USGS #08091000			
	Winter	Spring	Summer	Fall
Subsistence (7Q2)	15.3	15.3	15.3	15.3
Dry	39.0	45.0	33.3	62.0
Average	92.0	138.0	101.5	150.0
Wet	234.0	292.8	249.5	332.0

Instream Flow (cfs)	YEGUA CREEK NEAR SOMERVILLE – USGS #08110000			
	Winter	Spring	Summer	Fall
Subsistence (7Q2)	0.1	0.1	0.1	0.1
Dry	5.6	3.9	0.4	0.3
Average	14.0	12.0	2.5	1.8
Wet	34.0	31.0	8.9	9.6

Instream Flow (cfs)	NAVASOTA RIVER NR EASTERLY – USGS #08110500			
	Winter	Spring	Summer	Fall
Subsistence (7Q2)	7.6	7.6	7.6	7.6
Dry	7.6	10.0	7.6	7.6
Average	15.0	24.0	7.6	7.6
Wet	36.0	43.0	7.6	7.6

Instream Flow (cfs)	LITTLE RIVER NEAR CAMERON – USGS #08106500			
	Winter	Spring	Summer	Fall
Subsistence (7Q2)	67.9	67.9	67.9	67.9
Dry	100.0	135.0	133.0	82.0
Average	200.0	365.0	260.5	152.0
Wet	475.0	730.0	500.0	342.0

Instream Flow (cfs)	BRAZOS RIVER NEAR HIGHBANK – USGS #08098290			
	Winter	Spring	Summer	Fall
Subsistence (7Q2)	167.1	167.1	167.1	167.1
Dry	167.1	167.1	167.1	167.1
Average	220.59	344.19	323.85	225.29
Wet	672.74	759.30	780.69	508.98

These flows are based on historic records from Brazos River at Waco (USGS #08096500) and prorated to the Brazos River near Highbank gage by increasing Waco flows by the 4.3% increase in drainage area of Highbank over Waco.

Instream Flow (cfs)	BRAZOS RIVER NEAR RICHMOND – USGS #08114000			
	Winter	Spring	Summer	Fall
Subsistence (7Q2)	743	743	743	743
Dry	885	1170	930	760
Average	1630	2030	1450	1150
Wet	2955	3670	2635	2038

7. A HFP is initiated when flows are greater than the 10^{th} percentile and increase by more than 50% from the previous day, or when flows exceed the 75^{th} percentile, regardless of the rate of change. A HFP is terminated when the flow drops below the 10^{th} percentile or when the flow decreases from one day to the next by less than 5%, or when a succeeding pulse occurs. An entire HPF is reclassified as a small flood if the maximum rate exceeds the small flood threshold at the 1.5-yr recurrence interval.

8. Permittee shall meet a seasonal schedule of individual high flow pulses as follows:

Pulse Flows (ac-ft)	BRAZOS RIVER NEAR GLEN ROSE - USGS #08091000			
Hydrologic Condition	Winter	Spring	Summer	Fall
Dry	2329.6	3208.3	2617.2	2211.6
Average	7325.0	14915.7	7265.5	7565.0
Wet	31220.8	36144.8	33064.5	28682.0

Peak Flows (cfs)	BRAZOS RIVER NEAR GLEN ROSE - USGS #08091000			
Hydrologic Condition	Winter	Spring	Summer	Fall
Dry	403	466	394	347
Average	1,120	2,070	1,320	1,040
Wet	4,945	5,265	4,370	3,525

Pulse Flow Schedule (days/# of events)	BRAZOS RIVER NEAR GLEN ROSE - USGS #08091000							
	Winter		Spring		Summer		Fall	
Hydrologic Condition	Dura*	Freq**	Dura	Freq	Dura	Freq	Dura	Freq
Dry	6	2	4	3	4	3	4	2
Average	7	3	6	5	6	5	7	3
Wet	13	4	10	7	11	6	11	7

*Duration **Frequency

Pulse Flows (ac-ft)	YEGUA CREEK NEAR SOMERVILLE – USGS #08110000			
Hydrologic Condition	Winter	Spring	Summer	Fall
Dry	416.6	275.7	52.4	59.2
Average	1904.1	1225.8	239.2	372.9
Wet	8510.1	4331.3	845.2	3367.3

Peak Flows (cfs)	YEGUA CREEK NEAR SOMERVILLE – USGS #08110000			
Hydrologic Condition	Winter	Spring	Summer	Fall
Dry	69	51	13	10
Average	294	176	53	64
Wet	978	620	140	490

Pulse Flow Schedule (days/# of events)	YEGUA CREEK NEAR SOMERVILLE – USGS #08110000							
	Winter		Spring		Summer		Fall	
Hydrologic Condition	Dura*	Freq*	Dura	Freq	Dura	Freq	Dura	Freq
Dry	5	3	5	2	4	2	5	2
Average	10	4	8	3	7	3	7	3
Wet	15	6	13	6	11	5	11	6

*Duration **Frequency

Pulse Flows (ac-ft)	NAVASOTA RIVER NR EASTERLY – USGS #08110500			
Hydrologic Condition	Winter	Spring	Summer	Fall
Dry	439.3	748.3	195.9	77.1
Average	2142.1	2220.5	746.9	275.0
Wet	7927.9	8537.9	3399.7	2456.3

Peak Flows (cfs)	BRAZOS RIVER NR EASTERLY – USGS #08110500			
Hydrologic Condition	Winter	Spring	Summer	Fall
Dry	76	124	33	11
Average	298	344	142	43
Wet	1,060	1,160	592	371

Pulse Flow Schedule (days/# of events)	NAVASOTA RIVER NR EASTERLY – USGS #08110500							
	Winter		Spring		Summer		Fall	
Hydrologic Condition	Dura	Freq	Dura	Freq	Dura	Freq	Dura	Freq
Dry	5	3	5	2	5	2	4	3
Average	8	4	9	5	8	3	7	4
Wet	12	5	12	7	13	5	11	6

*Duration **Frequency

Pulse Flows (ac-ft)	LITTLE RIVER NEAR CAMERON – USGS #08106500			
Hydrologic Condition	Winter	Spring	Summer	Fall
Dry	4194.4	5641.5	3563.3	3511.2
Average	9633.7	16251.6	9088.3	9183.5
Wet	29414.9	42034.7	25811.4	20494.2

Peak Flows (cfs)	LITTLE RIVER NEAR CAMERON – USGS #08106500			
Hydrologic Condition	Winter	Spring	Summer	Fall
Dry	604	958	577	568
Average	1,600	2,545	1,875	1,630
Wet	5,190	6,405	3,665	3,723

Pulse Flow Schedule (days/# of events)	LITTLE RIVER NEAR CAMERON – USGS #08106500							
	Winter		Spring		Summer		Fall	
Hydrologic Condition	Dura*	Freq**	Dura	Freq	Dura	Freq	Dura	Freq
Dry	5	1	4	2	4	2	4	2
Average	6	3	6	3	6	3	6	4
Wet	10	5	9	7	9	5	9	5

*Duration **Frequency

Pulse Flows (ac-ft)	BRAZOS RIVER AT HIGHBANK – USGS #08098290			
Hydrologic Condition	Winter	Spring	Summer	Fall
Dry	5113.9	6040.7	4784.0	3652.4
Average	11647.1	14346.9	15135.1	11398.8
Wet	38514.1	38127.3	49810.6	39416.6

Peak Flows (cfs)	BRAZOS RIVER AT HIGHBANK – USGS #08098290			
Hydrologic Condition	Winter	Spring	Summer	Fall
Dry	1471	1429	1116	714
Average	2576	2952	2566	2274
Wet	5225	6748	7703	5366

Pulse Flow Schedule (days/# of events)	BRAZOS RIVER AT HIGHBANK – USGS #08098290							
	Winter		Spring		Summer		Fall	
Hydrologic Condition	Dura*	Freq**	Dura	Freq	Dura	Freq	Dura	Freq
Dry	3	2	3	3	3	5	3	3
Average	4	4	4	7	5	6	5	5
Wet	7	6	7	9	8	8	9	7

*Duration **Frequency

Pulse Flows (ac-ft)	BRAZOS RIVER NEAR RICHMOND – USGS #08114000			
Hydrologic Condition	Winter	Spring	Summer	Fall
Dry	36265.8	44667.8	38181.1	22457.9
Average	90287.6	101405.0	77176.9	56162.0
Wet	297550.4	270153.7	166115.7	146866.1

Peak Flows (cfs)	BRAZOS RIVER NEAR RICHMOND – USGS #08114000			
Hydrologic Condition	Winter	Spring	Summer	Fall
Dry	3,748	5,640	4,880	2,500
Average	9,670	10,200	8,830	7,730
Wet	19,500	19,150	15,300	13,175

Pulse Flow Schedule (days/# of events)	BRAZOS RIVER NEAR RICHMOND – USGS #08114000							
	Winter		Spring		Summer		Fall	
Hydrologic Condition	Dura	Freq	Dura	Freq	Dura	Freq	Dura	Freq
Dry	5	2	5	1	4	1	4	1
Average	6	3	7	3	7	2	7	2
Wet	16	4	13	4	12	4	11	4

*Duration **Frequency

8. Diversion or storage of water under the authority of this permit shall be authorized during a pulse when the volume, duration, and peak flow of the individual pulse exceeds the individual pulse criteria, or when the number of pulse events in that season exceeds the pulse frequency criteria. When a Qualifying HFP is passed or provided for at one of the six defined measurement points it may be used as credit for meeting one seasonal HFP frequency requirement.

9. For streamflow events that meet the requirements of Special Condition #7, Permittee may temporarily impound all flows in excess of the instream flow requirement. If the streamflow event provided a Qualifying HFP, flow may need to be passed downstream for environmental needs, subject to seasonal requirements in Special Condition #8 above. If it did not, then Permittee may retain the impounded water for water supply purposes. Once the required number of HFPs is met, Permittee may impound all subsequent HFPs for use as water supply as long as instream flow requirements specified in Special Condition #6 are met.

10. For pulses that generate a volume in excess of 250% of the Qualifying HFP volume criterion, BRA must provide two Qualifying HFPs with at least one week of instream flow, as required by Special Condition #6 above, between them. Similarly, for pulses in excess of 350% of the Qualifiying HFP volume criterion, BRA must provide three Qualifying HFPs with at least one week of instream flow between each pair. A similarly scaled requirement holds for larger pulses.

11. For streamflow events that meet the requirements of Special Condition #7, but do not meet the minimum requirements of a Qualifying HFP, Permittee may impound flows in excess of instream flow requirements and shall record the impounded volume in their accounting plan. At such time as the cumulative volume of streamflow events exceeds the volume of a Qualifying HFP, Permittee must release such a pulse to the environment.

12. If the streamflow event is designated a HFP but ultimately does not meet the minimum requirements of a Qualifying HFP, the volume passed shall be recorded in the accounting plan. At such time as the cumulative volume of such pulses exceeds the volume of a Qualifying HFP, Permittee will be credited with one Qualifying HFP (even if the duration, peak flow, etc. characteristics were not met).

13. For purposes of determining applicable HFP volumes that must be passed to the environment, each season is accounted for independently. There is no carry-over from season to season, either in regard to exceeding or not meeting HFP requirements. In the event there are seasons where the requisite number or volume of HFPs do not occur naturally, the Permittee is not obligated to meet the seasonal HFP requirements.

14. All seasonal HFP requirements are to be met using streamflow events with peak flows less than the 1.5-year return interval. Streamflow events with peak flows that exceed the 1.5-year return interval are classified as overbanking flows and the water volume associated with these events shall not be used to meet HFP requirements.

15. To the extent that overbanking flows can be safely managed by Permittee to maintain a sound ecological environment, Permittee shall develop operational guidelines to manage such flows in the Water Management Plan.

16. In addition to the measurement points and requirements specified in Special Conditions 7 and 8 above, Permittee is prohibited from diverting and storing water authorized by this permit unless streamflow at the following gauges meets or exceeds the 7Q2 value as follows:

Gauge Name	Gauge #	7Q2 Value (cfs)
Brazos R near Palo Pinto	08089000	30.3
Aquilla Creek above Aquilla	08093360	0.1
Brazos R near Aquilla	08093100	30.7
Leon R at Gatesville	08100500	4.7
Leon R near Belton	08102500	4.7
Lampasas R near Belton	08104100	4.8
N Fork San Gabriel R near Georgetown	08104700	1.5
San Gabriel R at Laneport	08105700	3.6

17. Permittee shall install and maintain a streamflow gage at Yegua Creek at Somerville.

18. The requirements of these Special Conditions apply only to diversion and storage under the authority of this Permit and do not address or limit diversion and storage of water authorized by other water rights held by Permittee.

19. These special conditions are subject to adjustment by the commission if the commission determines, through an expedited public review process, that such adjustment is appropriate to achieve compliance with applicable environmental flow standards adopted pursuant to Texas Water Code § 11.1471. Any adjustment shall be made in accordance with the provisions of Texas Water Code § 11.147(e-1).

This instream use assessment was conducted using current TCEQ operation procedures and policies and available data and information. The recommendations in this environmental analysis are intended for the protection of instream uses and do not necessarily provide protection to downstream water rights; that analysis is addressed in the hydrology memo and further restrictions may be applicable as necessary. Authorizations granted to the permittee by the water rights permit shall comply with all rules of the Texas Commission on Environmental Quality, and other applicable State and Federal authorizations.

LITERATURE CITED

Agostinho, A.A., L.C. Gomes, S. Verissimo, and E.K. Okada. 2004. Flood regime, dam regulation and fish in the Upper Paramá River: effects on assemblage attributes, reproduction and recruitment. Reviews in Fish Biology and Fisheries 14: 11-19.

Bayley, P.B. 1995. Understanding large river-floodplain ecosystems. BioScience 45: 153-158.

Benke, A. C. and C. E. Cushing (eds.). 2005. Rivers of North America. Amsterdam: Elsevier. 1144pp.

Bernardo, J.M., M. Ilhéu, P. Matono, and A.M. Costa. 2003. Interannual variation of fish assemblage structure in a Mediterranean river: implications of streamflow on the dominance of native or exotic species. River Research and Applications 19: 521-532.

Bunn, S.E. and A.H. Arthington. 2002. Basic principles and ecological consequences of altered flow regimes for aquatic biodiversity. Environmental Management 30: 492-507.

Dahm, C.N., R.J. Edwards and F.P. Gelwick. 2005. Gulf coast rivers of the southwestern United States. Pages 181-228 in Benke, A.C. and C.E. Cushing, eds. Rivers of North America. Amsterdam: Elsevier.

Fisher, S.G. 1983. Succession in streams. Pages 7-27 in Barnes, J.R. and G.W. Minshall, eds. Stream ecology: application and testing of general ecological theory. New York: Plenum Press.

Hill, M.T, W.S. Platts and R.L. Beschta. 1991. Ecological and geomorphological concepts for instream and out-of-channel flow requirements. Rivers 2: 198-210.

Leopold, L.B., M.G. Wolman, and J. P. Miller. 1964. Fluvial Processes in Geomorphology. W. H. Freeman and Company. San Francisco, CA. 533pp.

Meffe, G.K. and W.L. Minckley. 1987. Persistence and stability of fish and invertebrate assemblages in a repeatedly disturbed Sonoran Desert stream. American Midland Naturalisst 117: 177-191.

National Research Council. 2005. The Science of Instream Flows: A Review of the Texas Instream Flow Program. The National Academies Press. Washington, D.C.

Poff, N.L, J.D. Allan, M.B. Bain, J.R. Karr, K.L. Prestegaard, B.D. Richter, R.E. Sparks, and J.C. Stromberg. 1997. The natural flow regime. Bioscience 47: 769-784.

Poff, N.L.and J.V. Ward. 1989. Implication of streamflow variability and predictability for lotic community structure: a regional analysis of streamflow patterns. Canadian Journal of Fisheries and Aquatic Sciences 46: 1805-1818.

Richter, B.D., R. Mathews, D.L. Harrison, and R. Wigington. 2003. Ecologically sustainable water management: managing river flows for ecological integrity. Ecological Applications 13: 206-224.

Schlosser, I.J. 1985. Flow regime, juvenile abundance, and the assemblage structure of stream fishes. Ecology 66: 1484-1490.

Tennant, D.L. 1976. Instream flow regimens for fish, wildlife, recreation and related environmental resources. Fisheries 1: 6-10.

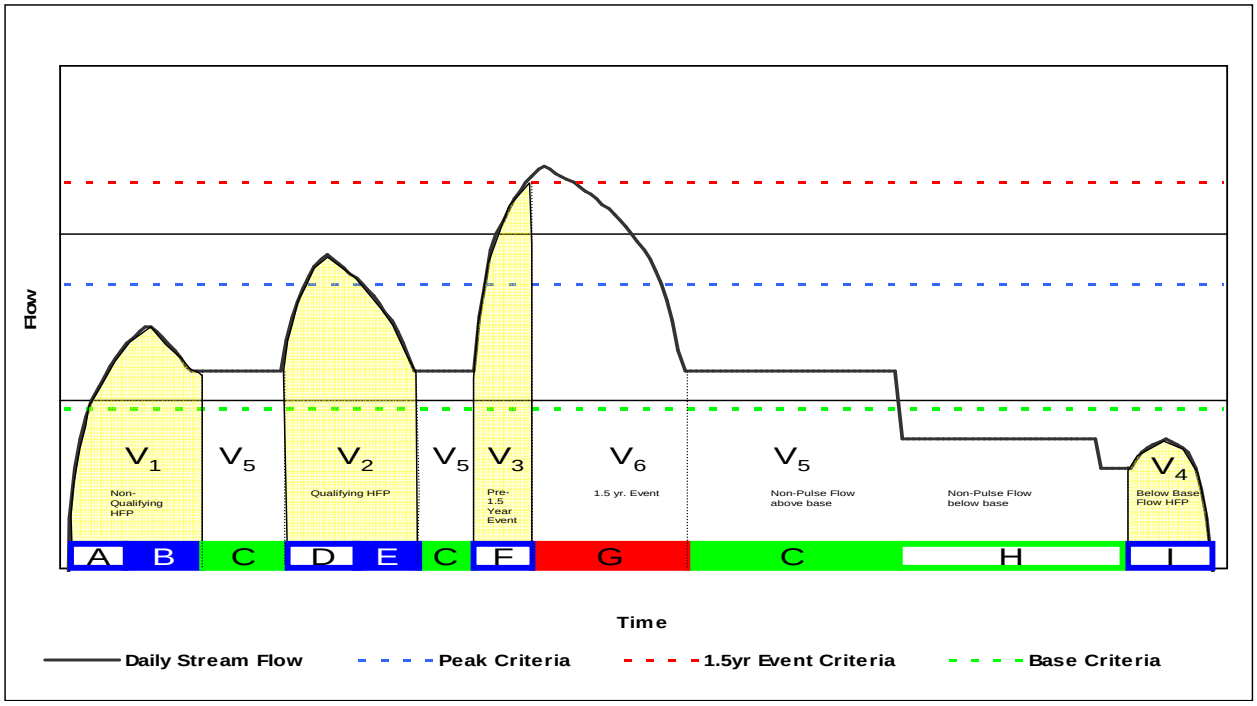
TCEQ. 2004. Atlas of Texas Surface Waters: Maps of the Classified Segments of Texas Rivers and Coastal Basins. Publication No. GI-316. Texas Commission on Environmental Quality. Austin, TX.

TCEQ. 2000. 2000 Texas Surface Water Quality Standards. Texas Commission on Environmental Quality. Austin, TX.

TCEQ, TPWD, and TWDB (Texas Commission on Environmental Quality, Texas Parks and Wildlife Department, Texas Water Development Board). 2008. Texas Instream Flow Studies: Technical Overview. TWDB Technical Report No. XX. Austin, TX. Available online at: http://www.twdb.state.tx.us/instreamflows/pdfs/TechnicalOverview-XXXX08.pdf.

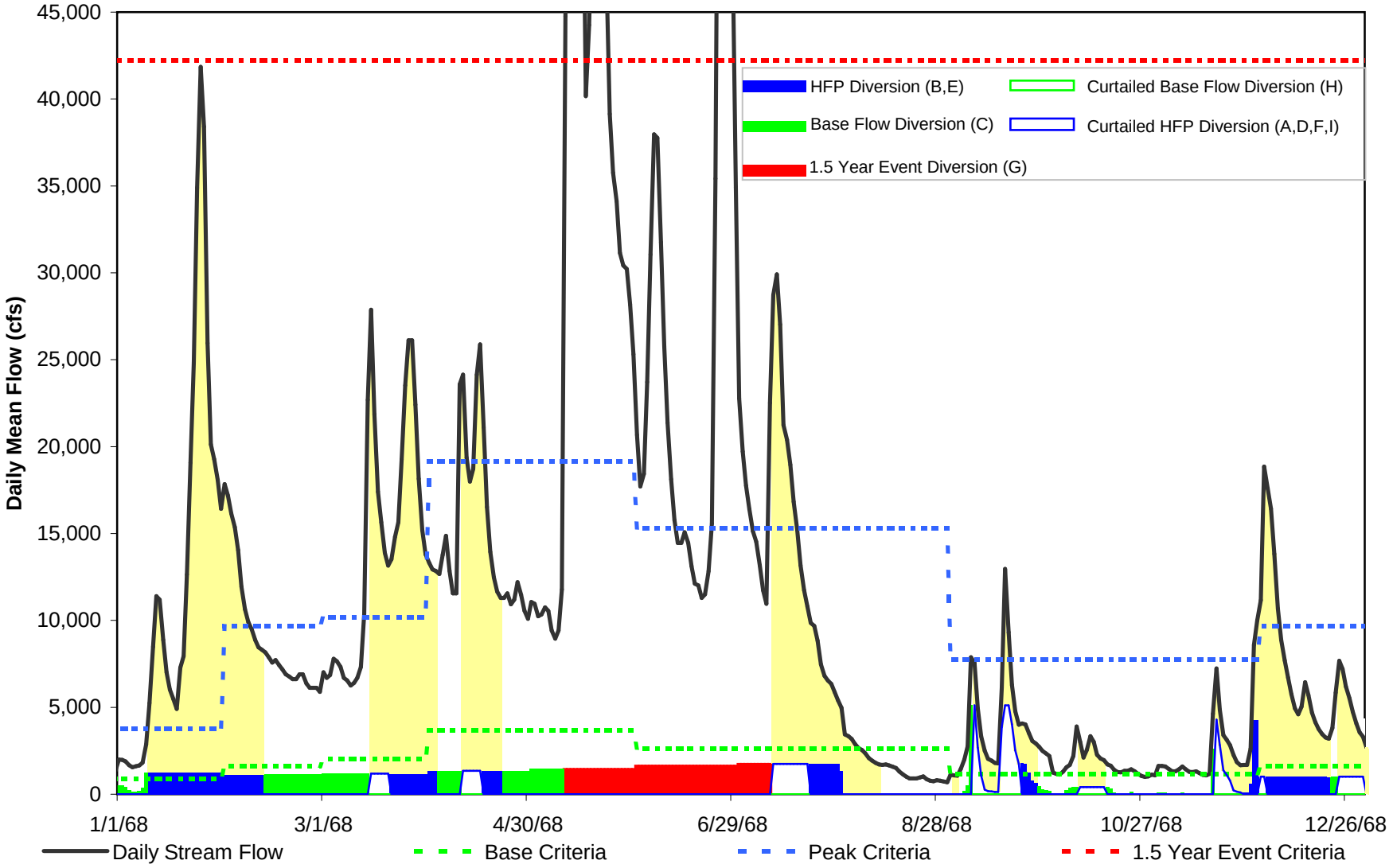
Texas Parks and Wildlife Department. 1979. An Analysis of Texas Waterways: A report on the physical characteristics of rivers, streams, and bayous in Texas. Texas Parks and Wildlife Department, 240pp.

Figure 2
Conceptual Accounting of Diversions under Instream Flow Criteria



Variable & Color key	Flow Regime	Description
V_1	Non-Qualifying HFP	Volume of a non-qualifying HFP
V_2	Qualifying HFP	Volume of a qualifying HFP meeting all three criteria simultaneously
V_3	Pre-1.5 Year Event	Volume of a HFP prior to being reclassified as a 1.5 year flood event
V_4	Below Base Flow HFP	Volume of a HFP whose peak never exceeds base flow
A	Non-Qualifying HFP	Diversions not allowed during a non-qualifying HFP until frequency criteria is met
B	Non-Qualifying HFP	Diversions allowed during non-qualifying HFP conditions when frequency criteria met
C	Above Base Flow	Diversions allowed when flow above base criteria
D	Qualifying HFP	Diversions not allowed during a qualifying HFP until peak, volume and duration criteria are met, or frequency criteria has been met
E	Qualifying HFP	Diversions allowed during a qualifying HFP when peak, volume and duration criteria are met or frequency criteria has been met
F	Pre - 1.5 year event	Diversions not allowed prior to HFP being reclassified as a 1.5 year flood event
G	1.5 year event	Diversions allowed during 1.5 year flood event.
H	Below Base Flow	Diversions not allowed when flow does not exceed base flow.
I	Non-Qualifying HFP	Diversions not allowed during a non-qualifying HFP when HFP does not exceed base flow.

Figure 3
Modeled Accounting of Diversions - First Draft Instream Flow Criteria
Daily Streamflow Richmond Gage



SOAH DOCKET NO. 582-10-4184
TCEQ DOCKET NO. 2005-1490-WR

APPLICATION BY THE BRAZOS	§	BEFORE THE STATE OFFICE
	§	
RIVER AUTHORITY FOR WATER	§	OF
	§	
USE PERMIT NO. 5851	§	ADMINISTRATIVE HEARINGS

BRAZOS RIVER AUTHORITY'S
PREFILED TESTIMONY OF DAVID K. HARKINS, PH.D., P.E.

Exhibits Sponsored by David K. Harkins

BRA Exhibit No. 29	Prefiled Testimony of David K. Harkins, Ph.D., P.E.
BRA Exhibit No. 30	Resume of David K. Harkins
BRA Exhibit No. 31	TCEQ's November 19, 2007 Memorandum
BRA Exhibit No. 32	Graphs Illustrating Environmental Flow Requirements

SOAH DOCKET NO. 582-10-4184
TCEQ DOCKET NO. 2005-1490-WR

APPLICATION BY THE BRAZOS	§	BEFORE THE STATE OFFICE
	§	
RIVER AUTHORITY FOR WATER	§	OF
	§	
USE PERMIT NO. 5851	§	ADMINISTRATIVE HEARINGS

BRAZOS RIVER AUTHORITY
PREFILED TESTIMONY OF DAVID K. HARKINS, PH.D., P.E.

INTRODUCTION AND QUALIFICATIONS

Q: Please state your name and occupation.

A: David K. Harkins, Ph.D., P.E., D.WRE, Vice President, Espey Consultants, Inc.

Q: On whose behalf are you presenting testimony in this proceeding?

A: Brazos River Authority (BRA).

Q: What is your educational background?

A: I received a Bachelor of Science degree in Petroleum Engineering from Texas Tech University in 1992, a Master of Science degree in Civil Engineering from Texas Tech University in 1995, and a Ph.D. in Civil Engineering (water resources emphasis) from Texas Tech University in 1998.

Q: How are you currently employed?

A: I am employed at Espey Consultants, Inc. (EC). I have worked at EC for over eleven years and I have been a Vice President for approximately eight years.

Q: What is the nature of your employment?

A: I am currently a Vice President at EC and the manager of the Environmental and Water Resources group. I also manage the Houston and Amarillo offices. The primary focus of my work for EC has been in the water resources discipline.

Q: What is your prior work experience?

A: Prior to working at EC, I was in graduate school at Texas Tech University. Prior to graduate school I worked in the petroleum industry for approximately three years.

Q: Please identify the document marked <u>BRA Exhibit No. 30</u>.

A: BRA Exhibit No. 30 is a copy of my resume.

Q: Did you prepare this resume?

A: Yes.

Q: Does BRA Exhibit No. 30 accurately reflect the information contained therein?

A: Yes.

Q: What are your areas of expertise or specialization?

A: I have primarily specialized in water resources engineering, specifically in water availability modeling, water quality, and environmental flows evaluations.

Q: Please describe a few projects that are indicative of your work in this field.

A: EC was retained by the Lower Neches Valley Authority (LNVA) to provide expert testimony on a water rights issue in the Neches River Basin. I was the project manager and was responsible for evaluating subordination of the LNVA water right, creating water availability modeling scenarios to determine the impacts of removing the subordination of the LNVA rights on upstream water rights, and preparing prefiled testimony for a contested case hearing.

EC was retained by the City of Kerrville to evaluate several water rights in the Guadalupe River Basin for potential purchase. I was the project manager and was responsible for reviewing the existing water rights, determining the estimated reliability of the water rights, evaluating the impact to the reliability of moving the diversion point upstream, determining the potential impact to other water rights in the river basin of moving the diversion location upstream, and estimating a value for the water right.

The City of Houston retained EC to prepare a water right application for indirect reuse of approximately 600,000 acre-feet of water per year. I am the project manager and am responsible for the development of the water right application, development of the water rights and wastewater return flow accounting plan, evaluation of environmental flows (both instream flows and bay and estuary restrictions) for the permit in accordance with the 2006 Region H Water Plan, and assistance in negotiations with protesting parties.

I have performed water quality projects for many clients, including water quality modeling (WASP and hydrodynamic modeling), water quality sampling plan preparation, water quality sampling, mass balance calculations, Texas Commission on Environmental Quality (TCEQ) water quality evaluations for wastewater discharge permits, and nutrient impacts and removal recommendations.

Q: Do you have experience with water availability modeling?

A: Yes.

Q: Please describe that experience.

A: I have been involved in many water rights projects during my tenure at EC. I began working for EC in 1998, and one of my first projects was for the Texas Natural Resources Conservation Commission, now TCEQ. EC was hired to assist the agency in the selection of a model to analyze water rights in Texas as required by Senate Bill 1 (SB 1). I helped evaluate the modeling alternatives and EC eventually recommended the Water Rights Analysis Package (WRAP). EC was later hired by TCEQ as the primary consultant to develop the water availability models (WAMs) for the Trinity, San Jacinto, Neches-Trinity and Trinity-San Jacinto river basins. I was the project manager for these efforts and was responsible for development of the Trinity River WAM. I was also the project manager for a TCEQ project to develop the WAMs for the Red and Canadian river basins. I was the EC project manager assisting TCEQ (as a subcontractor) in developing different parts of other WAMs, for the Neches, Cypress, San Antonio-Nueces and Nueces-Rio Grande river basins.

I also have extensive experience in water rights permitting and utilizing the WAMs for clients across Texas. I was the project manager for a joint project for the Trinity River Authority, Tarrant Regional Water District, City of Dallas, North Texas Municipal Water District, and City of Houston to determine the impact of a Tarrant Regional Water District reuse application on river flow, Lake Livingston yield, and bay and estuary flows using the Trinity WAM. Ultimately, TCEQ approved the reuse permit. I also was the project manager for a water rights project for the City of Houston and the San Jacinto River Authority (SJRA) on Lake Houston. I was responsible for preparing water rights applications for the remaining yield in Lake Houston as well as a run-of-river application for additional water supply for

both entities. Both of these water rights have been granted by TCEQ. I worked for SJRA to develop an indirect reuse application for wastewater return flows from their Woodlands operations, which was also granted by TCEQ. I am also currently working with SJRA on water rights and water supply planning. I worked for the Chambers Liberty Counties Navigation District in evaluation of water right issues and planning. I was the project manager for a water rights analysis for New Braunfels Utilities for a water supply evaluation. I am also working on an indirect reuse application for New Braunfels Utilities.

In addition to my work on BRA's System Operation Permit application, described below, I have had other experience with water availability modeling in the Brazos River Basin. I assisted in developing the modified Brazos WAM utilized in the evaluation of this water right application. I also was the project manager for a conjunctive use project for Lake Granger for BRA. I was responsible for utilizing the Brazos WAM to evaluate different conjunctive use scenarios on the yield of Lake Granger.

Q: Do you have experience with the TCEQ water rights application and permitting process?

A: Yes.

Q: Please describe that experience.

A: In addition to those projects listed above, other examples of my experience include the following:

I was the project manager for a project for SJRA dealing with water rights in the Trinity River Basin. I was responsible for amending a water right that SJRA purchased from Chambers Liberty Counties Navigation District. Activities performed for this project include

water right amendment application preparation, evaluation of the reliability of the proposed application in the Trinity WAM, evaluation of environmental flow restrictions that may be applied, development of an accounting plan, and submittal of the application to TCEQ.

I assisted a water right holder in a coastal river basin in Texas to evaluate the marketing potential of a water right. I evaluated how the water right was modeled in the applicable WAM and its reliability. I met with TCEQ staff to discuss amending the permit to add additional uses and to move the location of the water right.

I assisted High Point Lake Estates Property Owners Association with its water right permitting application. I gathered the necessary documents and data for filing a permit application with TCEQ, updated descriptions of the amenity lakes to be permitted based on final construction plats, and assisted in the WAM modeling to determine water right reliability.

EC, as part of a subcontract with LBG-Guyton Associates, assisted the Edwards Aquifer Authority with an evaluation of the impact of bifurcated (junior-senior) permitting rules on downstream surface water interests in the Guadalupe River Basin. EC assessed the flow of surface water and the management of surface water rights in the Guadalupe-San Antonio River Basin as it relates to the evaluation of different groundwater management scenarios for the Edwards Aquifer. Different pumping scenarios were developed to represent historical pumpage, pumpage from junior and senior rights, and pumpage from senior rights only in the Edwards Aquifer. I assisted in incorporating the resulting springflow estimates into the

Guadalupe-San Antonio WAM, and then assisted with the determination of the impact to downstream surface water rights under the different pumping scenarios.

EC participated in several projects designed to investigate the potential environmental impacts of a proposed water project related to the transfer of Lower Colorado River Authority (LCRA) water from the Colorado River Basin to the San Antonio Water System (SAWS) in the San Antonio River Basin. I oversaw EC's participation in a detailed instream flow study on the Colorado River, identifying those flows necessary to maintain the instream environment of the system. I also participated as EC's project manager on the Matagorda Bay Health Study. I participated in the analysis of freshwater inflows and their potential relation to the ecological health of the Matagorda Bay system. This included overseeing statistical analyses investigating the relation between representations of freshwater inflow from the Colorado River and surrogates of ecosystem health, *e.g.*, organism abundance.

Q: Do you have experience with water availability modeling and the TCEQ water rights application and permitting process as these relate to terms, conditions, and provisions regarding environmental flows?

A: Yes.

Q: Please describe that experience.

A: As mentioned above, I have assisted several clients in preparing and obtaining water rights permits with environmental flow restrictions (City of Houston, SJRA, LCRA, and SAWS). In addition to those projects, EC also assisted SJRA in submitting a water right amendment for a water right purchased in the Trinity River Basin. The amendment was to move the diversion point upstream on the Trinity River. An environmental flow (instream flow)

restriction was placed on the water right because of the amended diversion location. I was responsible for the evaluation and negotiation of the instream flow restriction, and for the water right accounting plan (including the instream flow requirement).

Additionally, as part of the Senate Bill 2 (SB 2) process, EC was retained by BRA for an instream flow evaluation project sponsored by BRA, the Texas Water Development Board (TWDB), the Texas Parks and Wildlife Department (TPWD), and TCEQ. For a joint effort sponsored by BRA and TWDB (through TPWD), I was the project manager for a project to identify and catalogue completed studies and reports relevant to the State's SB 2 study efforts. I am also currently working on a project sponsored by BRA and TCEQ. I am participating in a study of water quality related to the SB 2 instream flow study; this project was initiated in September 2010 and is ongoing.

Finally, EC is involved in the Senate Bill 3 (SB 3) process in the Trinity and San Jacinto and Guadalupe and San Antonio basins. We evaluated the best available science for identifying those flows necessary to maintain sound ecological environments in the Trinity and San Jacinto watersheds, as well as the Galveston Bay system, and our analysis included a detailed literature review related to hydrology, biology, geomorphology, and water quality, the application of the Hydrology-Based Environmental Flows Regime (HEFR) methodology to these basins, and the proposal and acceptance of a salinity-zonation approach to evaluating freshwater inflows to the bay. We provided technical support regarding the utilization of WAM models to evaluate the potential effects of the various environmental flow recommendations that resulted from the Trinity-San Jacinto basin and bay expert science

team effort. With the Science Advisory Committee (SAC), EC was involved in the refinement of the HEFR methodology, yielding significant changes to the analytic methods employed within HEFR.

OVERVIEW OF TESTIMONY

Q: Please explain the purpose and scope of your testimony in this contested case hearing.

A: The purpose of my testimony is to summarize the aspects of the proposed permit relating to maintenance of environmental flows in the Brazos River Basin. This testimony will also cover the characteristics of the Brazos watershed, environmental flow restrictions, and water quality considerations included as part of BRA's System Operation Permit application.

Q: Please explain the role of you and Espey Consultants in developing BRA's System Operation Permit application pending in this proceeding.

A: Initially, EC was retained to assist BRA in the development of the water availability model utilized in the preparation and evaluation of the permit application. I assisted BRA staff and Freese and Nichols in developing the methodology for the WAM. EC was a subcontractor to Freese and Nichols for this part of the project. EC has also been retained by BRA to participate in development of a Work Plan to complete environmental studies related to the Water Management Plan to be developed in relation to the System Operation Permit. EC also attended meetings and provided input on instream flow restrictions, water availability model issues, accounting plan discussions, and water management plan discussions.

Q: Please describe generally the data or other materials you reviewed and evaluated in developing and considering the provisions in the draft permit relating to environmental flows, and in preparing your testimony.

A: I reviewed portions of the Texas Water Code relevant to the development and implementation of environmental flows, guidance documents prepared under the SB 2 Texas Instream Flow Program (TIFP) including the Programmatic Overview, Technical Overview, and Draft Study Design for the Brazos River Instream Flow Program, and guidance documents prepared by the SB 3 Science Advisory Committee related to instream flows and their evaluation. I also reviewed the recommendations on environmental flow regimes from the Trinity and San Jacinto Rivers and Galveston Bay Basin and Bay Expert Science Team (BBEST), and TCEQ's proposed rules package related to the SB 3 process. I also reviewed and analyzed historical streamflow records, and naturalized and unappropriated flows in the water availability models. I participated in one meeting among BRA, TCEQ staff and TPWD staff regarding the environmental flow statistical analysis.

BRAZOS RIVER BASIN – ENVIRONMENTAL FLOWS ISSUES

Q: Please provide an overview description of the Brazos River Basin.

A: The Brazos River is the longest river in Texas, extending approximately 860 river miles, with a drainage basin comprising approximately 15 percent of Texas' land area, extending northward into the state of New Mexico. The total basin drainage area is approximately 45,600 square miles, with 42,800 square miles in Texas. It is formed at the confluence of the upper forks of the river, the South Fork and Double Mountain Fork, with the Clear Fork joining the river just above Possum Kingdom Reservoir. Several other significant tributaries to the Brazos River include Yegua Creek, Bosque River, Little River (formed by the confluence of the Leon, Lampasas, and San Gabriel rivers), and the Navasota River. The Brazos River is the third-largest contributor of suspended sediments to the Gulf of Mexico,

having no obstructing barrier islands as the river enters the Gulf of Mexico two miles south of Freeport in Brazoria County.

Located within the Brazos River Basin are the cities of Lubbock, Abilene, Waco, Bryan, College Station, and Sugar Land. The predominant land uses in the basin include agriculture, industry, and urban. Many of Texas' physiographic regions are located within the basin: the High Plains, West Texas Rolling Plains, West Cross Timbers, Grand Prairie, and Gulf Coastal Plains.

Q: Please identify the document marked <u>BRA Exhibit No. 31</u>.

A: BRA Exhibit No. 31 is a true and correct copy of the TCEQ Interoffice Memorandum to David Koinm from Wendy Gordon dated November 19, 2007 regarding the BRA System Operation Permit application. I have reviewed the memorandum and evaluated its findings.

Q: Do you concur with the background discussion on the Brazos River Basin included on pages 4-6 of BRA Exhibit No. 31?

A: Yes.

Q: Please describe any bays and estuaries that are associated with the Brazos River Basin.

A: The San Bernard-Brazos River estuaries, Brazoria County, Texas, are comprised of four freshwater sources: the San Bernard River, Brazos River, Jones Creek, and Oyster Creek, along with two isolated lakes (Cedar Lake and Jones Lake). The Gulf Intra-Coastal Waterway (GIWW) transects and links these freshwater sources and lakes, providing mixing with marine waters along the GIWW from river mouths and neighboring bay systems. Within Texas, a majority of the natural estuaries are transitional systems, intermediate between freshwater and marine. As transitional systems, their hydrography and chemical

qualities are governed by both terrestrial and marine controls, as well as factors that are unique to the estuary environment. In contrast to most natural Texas estuaries that have large bays supporting commercial fisheries, the lower portion of the Brazos River is river-dominated, without any associated bay and limited commercial fishing. The mouth of the Brazos River discharges directly at the shore of the Gulf of Mexico. The current location of the mouth of the Brazos River is not the natural mouth. The lower portion of the river is channelized to divert waters away from the original channel, which is now Freeport Harbor and Brazos Harbor in Freeport, Texas.

Q: Does the bay or estuary at the mouth of the Brazos River require particular protection in water rights permitting, including TCEQ's consideration of BRA's System Operation Permit application?

A: No. Because the Brazos River lacks a bay and its estuary is river-dominated, no bay or estuary requirement should be applied to the System Operation Permit. Because of the distinct differences between riverine and estuarine ecosystems, requirements for environmental flow needs might also be distinctively different.

Q: Please describe what is meant by "instream flows" or "instream uses" of water, as those terms are used in water rights permitting in Texas.

A: "Instream flows" are the flows in the state's rivers and streams, typically described as the flow regime that is necessary to adequately maintain an ecologically sound environment in streams and rivers, including riparian and floodplain features. The flow regimes consider hydrology, biology, water quality, geomorphology (the study of land forms and the processes that shape them), and connectivity (the degree to which waterways and waterbodies are linked across a landscape). A flow regime is generally specified as a schedule of flow

quantities that reflects seasonal and yearly fluctuations. These flow regimes typically vary depending on the location in a watershed. These flow regimes are necessary for maintenance of the diversity and productivity of ecologically characteristic fish and wildlife, including the living resources on which they depend.

"Instream uses," defined in 30 TEX. ADMIN. CODE § 297.1, refers to a broad range of topics and is considered a beneficial use of state water. Water may be reserved by TCEQ to protect beneficial instream uses. Depending on the context, in some cases "instream uses" refers to the ecological functions of instream flows. Other "instream uses" of water include navigation, recreation, water quality protection, hydropower, and aquatic and riparian wildlife habitat.

Q: Please describe what is meant by "beneficial inflows," as that term is used in water rights permitting in Texas.

A: 30 Tex. Admin. Code § 297.1 defines "beneficial inflows" as "freshwater inflows providing for a salinity, nutrient, and sediment loading regime adequate to maintain an ecologically sound environment in the receiving bay and estuary that is necessary for the maintenance of productivity of economically important and ecologically characteristic sport or commercial fish and shellfish species and estuarine life upon which such fish and shellfish are dependent." As noted previously, based on the lack of a bay and significant estuary system in the Brazos River Basin, bay or estuary permit requirements are not necessary in this case.

Q: How are issues relating to fish and wildlife habitat considered in water rights permitting in Texas?

A: Presently there are several mechanisms in place to consider fish and wildlife habitat. TCEQ has the authority to include, "to the extent practicable when considering all public interests," special conditions necessary to maintain fish and wildlife habitats in any application or amendment of a water right in Texas. To prepare special conditions for the Brazos River Basin, which are developed in conjunction with input from TPWD, TCEQ utilizes either default methodologies (usually the Lyons' Method) or site-specific studies to address identified environmental concerns. The Lyons' Method is a rather simplified approach to developing environmental flow criteria, wherein statistics are applied to a period of record of historical gaged flow data. The method provides for 40 percent of median monthly flows from October-February and 60 percent of median monthly flows from March-September.

Q: How are issues relating to water quality considered in water rights permitting in Texas?

A: TCEQ is statutorily directed to consider water quality impacts in the water right permitting process (Texas Water Code § 11.150). Generally, this means that a new permit should not cause impairment of surface water quality standards, but it also allows consideration of water quality impacts on instream flows and downstream water use (30 TEX. ADMIN. CODE § 297.54).

Q: Are there any particular conditions or circumstances in the Brazos River Basin that affect water quality, as a consideration of environmental issues in water rights permitting?

A: Some lakes in the basin have exhibited blooms of Golden Algae affecting aquatic species. Also, the upper portion of the Brazos River Basin has natural salt sources that contribute to salt concentrations in the river that are comparatively higher than salt concentrations in other

Texas rivers. Salinities have historically varied based on the hydrologic conditions within the watershed. As these higher salinity waters are part of the natural conditions, existing instream uses deal with such conditions on a regular basis, regardless of system Operations or TCEQ's action on BRA's System Operation Permit application.

Q: Please explain why beneficial inflows, instream flows, and protection of fish and wildlife habitat are important for the Brazos River Basin, and what is needed, in the water permitting context, in order to protect them.

A: Environmental flows, which include beneficial inflows, instream flows, and the protection of fish and wildlife habitat, have not been addressed uniformly in water development project planning and permitting in Texas. The study of environmental flows has developed over time as science has advanced. Such studies have varied spatially as well, as efforts related to projects specific to particular river basins have provided opportunities for further research. The State, through its agencies such as TWDB and TPWD, has also endeavored to further the knowledge on environmental flows, through its studies of freshwater inflows to Texas estuaries from the 1960's through the 1990's, and by more recent efforts such as the Texas Instream Flow Program.

Environmental flows are needed for the maintenance of a sound ecological environment in the Brazos River Basin and the maintenance of the productivity, extent, and persistence of key aquatic habitats. Variation in stream flow affects the ecology and biology of the stream through changes in habitat availability. Consequently, the life histories of stream fishes and other aquatic organisms have adapted to the seasonal and interannual variability of components of flow. Thus, the hydrologic pattern and variability are one of the key

determinants of aquatic community structure and stability. Alterations to this flow regime may result in decreased diversity and abundance of aquatic species inhabiting riverine ecosystems. TCEQ estimates environmental flow restrictions based on present data (many times only with historic flow records) until other data is developed through other studies in the basin (*i.e.*, biologic studies, geomorphology, habitat studies, etc.).

Q: Please describe the nature of the studies required by Texas Water Code § 16.059, and the status of those studies for the Brazos River Basin.

A: The studies required by Texas Water Code § 16.059 relate to what is commonly known as the Texas Instream Flow Program (TIFP), created in 2001 following the passage of SB 2. That legislation directed TPWD, TCEQ, and TWDB to "jointly establish and continuously maintain an instream flow data collection and evaluation program . . .." Additionally, these agencies were further directed to "conduct studies and analyses to determine appropriate methodologies for determining flow conditions in the state rivers and stream necessary to support a sound ecological environment."

These agencies have developed a programmatic work plan, identifying priority studies throughout Texas' river basins as well as a schedule for the prosecution of these efforts. Priority studies of the lower Sabine, middle Trinity, middle and lower Brazos, lower Guadalupe, and lower San Antonio rivers are to be completed by December 31, 2016.

The nature of these studies is an interdisciplinary effort to summarize the state of knowledge in various fields (broadly defined into primary disciplines of hydrology and hydraulics, physical processes, biology, water quality, and connectivity), develop conceptual models and

tie this knowledge to components of flow, identify and prioritize the knowledge and information gaps, and develop a prioritized research agenda. Specific sub-basin goals and study objectives are to be developed, as well as ecological indicators that are responsive to flow and can be monitored so that adaptive management might be employed towards achievement of a sound ecological environment.

A comprehensive instream flow study on the Lower Brazos River Basin is now underway as part of the TIFP. The approach and underlying principles of the TIFP include a focus on the entire ecosystem, recognizing the scientific realities regarding the assessment of instream flows. This approach recognizes that (1) instream flows have an important but not exclusive role in supporting ecosystems, (2) the study results will ultimately need to incorporate uncertainty, and (3) the procedures and methods for addressing instream uses will need to be adaptable as the state of science is developed. The statewide goal is the support of a sound ecological environment, which is a resilient, functioning ecosystem characterized by intact, natural processes, and a balanced, integrated, and adaptive community of organisms comparable to that of the natural habitat of a region.

Q: Please describe the requirements established under Texas Water Code § 11.1471 for the development of environmental flow standards and the inclusion of set-asides for environmental flows in water rights permitting.

A: TEX. WATER CODE § 11.1471 requires TCEQ by rule to "adopt appropriate environmental flow standards for each river basin and bay system in Texas that are adequate to support a sound ecological environment, to the maximum extent reasonable, considering other public interests and other relevant factors." If available, an amount of unappropriated water is to be

set aside to satisfy the environmental flow standards when human water needs are considered. TCEQ is required to establish procedures to adjust the conditions included in a permit or amended water right based on environmental flows. In adopting the environmental flow standards, TCEQ must consider the geographical extent of the basin and bay systems, the schedule established by the Environmental Flows Advisory Group, the environmental flow analyses and flow regimes developed by the applicable basin and bay expert science teams, the recommendations from the applicable basin and bay stakeholders committees, comments from the Environmental Flows Advisory Group, the specific characteristics of the basin and bay systems, economic factors, human and other competing water needs, and all other reasonably available scientific information, including any scientific information provided by the Science Advisory Committee, and any other appropriate information. These environmental flow standards must include a schedule of flow quantities, reflecting seasonal and yearly fluctuations that may vary geographically by specific location in a river basin and bay system. TCEQ may not issue a permit for a new appropriation or an amendment to an existing water right that increases the amount of water authorized to be stored, taken, or diverted if the issuance of the permit or amendment would impair an established environmental flow set-aside. A permit for a new appropriation or an amendment to an existing water right that increases the amount of water authorized to be stored, taken, or diverted that is issued after the adoption of an applicable environmental flow set-aside must contain appropriate conditions to ensure protection of the environmental flow set-aside.

Q: What is the process for establishing the environmental flow standards?

A: In order to develop such environmental flow analyses and environmental flow regimes, Texas Water Code § 11.02362 establishes a multi-tiered process, as follows: The

Environmental Flows Advisory Group appoints a basin and bay area stakeholder committee for a particular basin and bay system. The basin and bay area stakeholder committee then establishes a basin and bay expert science team. The basin and bay expert science team has approximately one year to finalize environmental flow regime recommendations and submit them to the basin and bay area stakeholder committee, the Environmental Flows Advisory Group, and TCEQ. In developing its recommendations, the basin and bay expert science team is to consider all reasonably available science without regard to the need of water for other uses. The basin and bay area stakeholder committee is then given six months to submit to TCEQ its comments on and recommendations regarding the basin and bay expert science team's recommended environmental flow regime. TCEQ then has approximately 12 months to adopt environmental flow standards for the basin through rulemaking, as described in Texas Water Code § 11.1471.

Q: As the SB 3 environmental flows process has progressed, have there been any key issues identified?

A: Presently, it is not clear that the best currently available science can provide a predictive response of the environment to flow as mandated, or that any given flow regime can be shown to support a sound ecological environment and maintain the productivity of key aquatic habitats of the basin and bay system. Analyses have been based largely on the application of the Hydrology-based Environmental Flow Regime (HEFR) software, defaulting to a solely hydrological characterization. The HEFR model uses data over a sufficient period of time to reflect the variation in the hydroclimatology. Typically, this data is available from USGS gage locations, principally gages with 20 or more years of data available and that still exist (so that continued monitoring is feasible). HEFR itself is merely

a statistical tool, having no mechanism for identifying low- or high-flow conditions, nor including any biologic, ecologic, geomorphologic, or water quality functions in the software itself. HEFR has no predictive capability, as one cannot derive what changes in the environment would occur due to changes in inflow. I will discuss later in my testimony how the draft System Operation Permit addresses this limitation of relying only on the HEFR model.

Q: Has this SB 3 process been completed for any river basin in Texas?

A: The process is nearly completed for the Sabine-Neches and Trinity-San Jacinto bay and basin systems. The basin and bay expert science teams for the Sabine-Neches and Trinity-San Jacinto bay and basin systems submitted their recommendations on December 1, 2009. The Sabine-Neches basin and bay area stakeholder committee submitted a consensus recommendation to TCEQ, while the Trinity-San Jacinto expert science team submitted two opposing recommendations. The Sabine-Neches basin and bay area stakeholder committee submitted a recommendation that, in general, states the science is not presently available to meet the mandates of SB 3. The basin and bay area stakeholder committee for the Trinity-San Jacinto, reflecting the results of the expert science team, submitted two opposing recommendations. TCEQ is presently in the rulemaking process, having recently published draft rules and standards for these two basins, and TCEQ is taking public comments on the proposed rules.

Q: What is the status of implementation of these new Texas Water Code § 11.1471 requirements, for the Brazos River Basin?

A: Environmental flow recommendations under Texas Water Code § 11.1471 have not yet been developed for the Brazos River Basin. The basin and bay area stakeholder committee has only recently been selected for this basin.

SYSTEM OPERATION PERMIT REQUIREMENTS

Q: Please describe generally how TCEQ's Brazos River Basin water availability model (Brazos WAM) addresses environmental flows, and the WAM modeling results based on BRA's System Operation Permit application.

A: The TCEQ Brazos WAM addresses environmental flows on a water right-by-water right basis. As with other WAMs in other river basins, TCEQ requires instream flow restrictions as part of the water right permitting process. As new or amended water rights are requested, the TCEQ staff will evaluate the location, amount, and rate of diversion and determine if an environmental flow restriction is needed. Specifically, in the Brazos WAM, as utilized regarding the BRA System Operation Permit application, TCEQ has identified six locations with target flow numbers for the different flow conditions. TCEQ has also identified eight other locations that require a minimum flow of 7Q2 before BRA is allowed to divert under the System Operation Permit. These requirements are discussed in more detail below.

Q: Please describe generally how BRA has worked with TCEQ staff and TPWD staff to address issues relating to environmental flows terms and conditions for the System Operation Permit.

A: Following the initial application, BRA worked with TPWD and TCEQ to define and develop appropriate environmental flows terms and conditions. Use of water authorized under this permit is contingent upon implementation of the environmental flows terms and conditions. BRA staff and its consultants, TPWD staff, and TCEQ staff participated in many technical

meetings to discuss and negotiate various technical aspects regarding how the environmental flows would be assessed and how to include those results in a permit. After extensive negotiations, TPWD and BRA reached an agreement and submitted jointly recommended revisions to an early draft of the System Operation Permit in August 2009 (*see* BRA Exhibit No. 7-J).

Q: What was the scientific process used to develop the instream flow requirements proposed jointly by BRA and TPWD for the System Operation Permit?

A: The scientific process employed to develop the instream flow requirements proposed within the System Operation Permit is based principally upon statistical analyses of hydrology and general ecologic theory performed by TPWD, BRA, and TCEQ.

Q: How does this approach relate to the SB 3 environmental flows planning process?

A: The approach taken by BRA in cooperation with TCEQ and TPWD was the initial step in the development and use of the HEFR software. The environmental flows approach established during the process of preparing the draft permit for BRA's System Operation Permit set a precedent for the SB 3 environmental flows planning process. These analyses served as the initial prototype for development of the HEFR model. HEFR analyses have been performed in both the Trinity-San Jacinto and Sabine-Neches bay and basin systems, and are currently being evaluated in the Colorado-Lavaca and Guadalupe-San Antonio bay and basin systems by the respective expert science teams.

Q: Turning to the ED's February 11, 2010 Draft Permit (BRA Exhibit No. 18), can you provide an overview of how the draft permit's provisions address environmental flows requirements?

A: As mentioned previously, Special Condition 6.E.1 addresses the interim and preliminary nature of the conditions included in the draft permit, identifying the necessity for further studies on Brazos River Basin instream flows to provide greater certainty that flow will maintain a sound ecological environment. Each of the other provisions of Special Condition 6.E is described below.

- Special Condition 6.E.2 identifies four seasons, providing a mechanism to acknowledge the variability of flows within a given year, and the accordant effects of such variations on the ecology of the system.
- Special Condition 6.E.3 establishes hydrological (or climatological) conditions to recognize the inter-annual variability of flows. These conditions are established based on total storage in the permittee's System reservoirs, whereupon certain trigger amounts, represented as a percentage of total storage capacity, are utilized.
- Special Condition 6.E.4 is included to assure that the frequencies established in Special Condition 6.E.3 are being achieved and yielding the correct frequency of each hydrologic condition.
- Special Condition 6.E.5 establishes what are considered to be two of the four fundamental components of a flow regime: subsistence and base flows. These components have been identified through the TIFP process as significant to the characterization of the hydrology and its ecological functions. The draft permit provisions utilize statistics on the historical hydrology related to these components during wet, average, dry, and subsistence conditions to depict the lower portions of a flow regime which has historically yielded a sound ecological environment. The criteria are applicable at all times. Storage and diversion of water authorized by the

draft permit is allowed only when such criteria are achieved in a particular hydrologic condition.

The primary objectives of subsistence flows are the maintenance of water quality criteria. Subsistence flows are considered to be low flows necessary to maintain populations during periods of extreme and prolonged drought. Subsistence flows represent the extreme, non-typical low flow condition, and are based on a selected statistic representing the lowest tier of flows. For the System Operation Permit, subsistence flows are identified as the 7-day low flow that occurs on the average once every two years, generally called the "7Q2." Such a statistic has been historically used to identify subsistence flows in Texas. Other such statistics include the lowest 10 percent of dry flows, which coincides with the flow that is exceeded 97.5% of the time.

Base flows (in units of cubic feet per second (cfs)) are those flows present in the river absent the effects of rainfall events, and are disaggregated utilizing selected percentiles (*e.g.*, 25^{th}, 50^{th}, and 75^{th}) in order to represent intra-annual variation. In the System Operation Permit, dry base flows are associated with the 25^{th} percentile, average base flows with the 50^{th} percentile, and wet base flows with the 75^{th} percentile. The ecological functions of base flows include providing habitat, supporting aquatic organism growth and survival, and maintaining the diversity of the habitat.

- Special Condition 6.E.6 establishes how a high flow pulse (HFP) is characterized and determined, both in its onset and termination. This is necessary to establish when an HFP is occurring. HFPs are in-channel, rainfall-derived events that provide spawning and migratory cues and sediment transport, shape the physical habitat of the river channel, and provide water quality functions. HFPs also provide lateral connectivity, including connections to oxbow lakes, which benefit certain species. HFPs can be similarly disaggregated. Thus, the draft permit identified three conditions: dry, average, and wet.
- Special Condition 6.E.7 establishes a seasonal schedule for six sites, with specific criteria for identifying "Qualifying HFPs (per hydrologic condition). The criteria utilized to describe the HFPs are peak flow, volume, duration, and frequency; hence, the inclusion of three tables per criterion per site (duration and frequency are combined).
- Special Condition 6.E.8 clarifies the pulse frequency criterion, describing how once the peak, volume, and duration are passed or provided at one of the six defined measurement points, that qualifying pulse counts as credit towards meeting one seasonal HFP frequency requirement.
- Special Condition 6.E.9 describes the interplay between the HFP and base flow criteria. If flows are above the base flow criteria but are not a Qualifying HFP, those flows may be retained for water supply purposes. If a streamflow event provides a Qualifying HFP, those flows may need to be passed downstream for environmental needs, unless the required number of HFPs (the frequency criterion) has already been

met, in which case all subsequent HFPs may be diverted or impounded for water supply as long as the base flow criteria are met.

- Special Condition 6.E.10 clarifies how a significantly large HFP (in excess of 250% of the volume criterion) is to be utilized to provide two Qualifying HFPs with at least one week of base flow between them. For pulses 350% greater than the volume criterion, three Qualifying HFPs are to be similarly provided. A similarly scaled requirement holds for larger pulses. TCEQ has subsequently agreed to remove this condition.
- Special Condition 6.E.11 provides a method for providing an HFP if one does not naturally occur. When flows are above the base flow criteria yet not meeting the criteria of a Qualifying HFP, a record shall be kept recording the impoundment of such flows in an accounting/delivery plan. When the cumulative volume of such streamflow events exceeds the volume of a Qualifying HFP, such a pulse could be released by the permittee and count as credit for provision of a Qualifying HFP.
- Special Condition 6.E.12 recognizes the uncertainty in the identification of an HFP. If a designated HFP is passed but ultimately does not meet all of the criteria to be a Qualifying HFP, the accounting plan shall record the volume passed. When the cumulative volume of such pulses exceeds the volume criterion for a Qualifying HFP, credit will be given for providing a Qualifying HFP even if the other criteria (duration, peak flow, etc.) were not met.
- Special Condition 6.E.13 clarifies how achievement of the frequency criterion is calculated, stating that each season is accounted for independently, with no carry-over from season to season. Thus, if ten pulses are provided in spring, that number

does not carry over to either the following summer or the next subsequent spring season. Similarly, if the number of Qualifying HFPs provided did not meet the frequency requirement, that deficiency does not carry over to the next season either. At the onset of a new season, the count of qualifying pulses for the new season is set to zero. Also important is the note that if the requisite number or volume of HFPs do not occur naturally, there is no obligation for BRA to meet the seasonal HFP requirements. Recall that HFPs are rainfall-derived events. Such a note recognizes the inherent uncertainty associated with criteria based on such events. Lastly, should a pulse start in one season but end in the next season, for accounting purposes such a pulse will be accounted in the season in which it ends.

- Special Condition 6.E.14 clarifies the difference between HFPs and overbank flows. Overbank flows are not incorporated as environmental flow requirements for the System Operation Permit, but the draft permit characterizes overbank flows as streamflow events with peak flows greater than a 1.5-year return interval, a statistical measurement denoting the average recurrence interval over an extended period of time. Thus, Special Condition 6.E.14 states that seasonal HFP requirements are to be met using streamflow events with peak flows less than the 1.5-year return interval. However, it further clarifies that if the peak flows exceed this 1.5-year return interval and satisfy the remaining criteria for a Qualifying HFP then credit will be given for providing an HFP.
- Special Condition 6.E.15 subjects all of the aforementioned conditions regarding HFPs to consideration of the issues detailed in Special Condition 6.D.4, relating to

the contents of BRA's initial application for approval of the Water Management Plan (WMP).

- Special Condition 6.E.16 deals with water quality, ensuring that the 7-day low flow that occurs on the average once every two years (*i.e.*, 7Q2) values at eight gages be utilized as additional instream flow criteria to be met or exceeded prior to any diversion or storage of water upstream of the nearest gages under the draft permit. The 7Q2 value is typically utilized as a flow criterion to identify those minimum flows necessary to maintain water quality.
- Special Condition 6.E.17 again relates to the adaptive management of the interim flow criteria provided within the draft permit. Monitoring studies will be necessary to establish baseline data related to the ecological health of a riverine system, including data regarding biology, habitat, water quality, hydrology, ecosystem health, and other environmental factors. The objectives of such monitoring studies are broadly defined, with the overall objective to potentially refine the environmental criteria utilized as special conditions in this draft permit. A Little River watershed study is to be completed prior to application for approval of the initial WMP. If such a study is not completed at that time, no diversions or impoundments of water authorized by the draft permit from the Little River watershed will be allowed until that study is completed and the results incorporated into an application to amend the WMP.
- Special Condition 6.E.18 relates again to overbanking flows. As has been seen in the SB 3 process, overbanking flows are recognized for providing certain ecological benefits. The draft permit does not require overbanking flows due to potential

liability for flood damage. Thus, the draft permit requires BRA to consult with the U.S. Army Corps of Engineers to determine if overbanking flows can be safely managed.

- Special Condition 6.E.19 specifies that the aforementioned special conditions apply only to the diversion and storage of waters under the System Operation Permit, and does not address or limit such activities under BRA's other existing water rights.
- Special Condition 6.E.20 essentially allows for the special conditions enumerated in the System Operation Permit to be modified, if appropriate, to reflect results or output from the SB 3 process in the Brazos River Basin.

Q: Earlier in your testimony you described limitations of using the HEFR Model to develop environmental flow regimes. How have those limitations been addressed in the draft permit?

A: The draft permit recognizes the limitations of HEFR by categorizing environmental flow requirements as "interim" and noting (Special Condition 6.E.1 of the ED's February 11, 2010 Draft Permit, BRA Exhibit No. 18) that the conditions are "preliminary and are based upon historic flow analyses, without direct relationships to the biological and environmental benefits intended to be protected." The draft permit also requires that more detailed instream flow studies be conducted on the Brazos River and on segments of major tributaries upstream of their confluence with the Brazos River, consistent with and in cooperation with the Texas Instream Flow Program. The results of such analyses may lead to replacement of the interim conditions in the draft permit. This recognition addresses the limitations of the methods used in development of the special conditions enumerated in the draft permit.

Q: How are the seasons defined in the System Operation Permit, and what is the purpose of these seasonal distinctions?

A: Seasons are defined as Spring (March-May), Summer (June-August), Fall (September-November), and Winter (December-February). These seasonal components have been developed to capture the intra-annual variability of the hydrology at the identified locations. As different ecological functions are provided through this variation (such as organism spawning cues), the disaggregation of statistics into seasons attempts to recognize this critical feature of the flow regime.

Q: How are the triggers related to these defined "subsistence," "wet," "average," and "dry" hydrologic conditions, and what is the purpose of those distinctions?

A: Triggers for the hydrologic conditions are defined by the total storage in all of the BRA System reservoirs. Reservoir storage was selected in the BRA/TPWD/TCEQ negotiations because reservoir storage is a good indicator of long-term, consistent hydrologic conditions. Such hydrologic conditions have been defined in the permit as percentiles of this total storage frequency (*i.e.*, 75% wet, 50% average, 22.5% dry). Thus, the dry period is the bottom 25^{th} percentile (or that amount which is exceeded 75% of the time), which includes the 2.5^{th} percentile utilized for identifying subsistence flow.

The total storage in the System reservoirs is a trigger for determining instream flow requirements, because the total storage reflects the hydroclimatological properties of the system. That is to say, if the storage is high, the system is considered to be in a "wet" condition. When the storage is low, the system is "dry." It is expected that the hydrologic

condition of the basin will be Subsistence 2.5% of the time, Dry 22.5% of the time, Average 50% of the time, and Wet 25% of the time.

The purpose of the distinction of these conditions is to acknowledge the inter-annual variability of the watershed. Namely, flows (such as a pulse) during "dry" conditions may provide different ecological functions than flows of the same magnitude during "wet" conditions. For example, during a multi-year drought even a minimal pulse might be critical for the health of a stream segment, yet during "wet" times such a pulse might not provide even a noticeable effect. As noted in SAC guidance (Report # SAC-2009-05: *Essential Steps for Biological Overlays in Developing Senate Bill 3 Instream Flow Recommendations*) on the subject, "species that make up a stream/river community of organisms will encompass a great range of habitat preferences, and thus, a mosaic of habitats with variable depths and flow velocities is desirable for maintenance of species diversity. In most fluvial systems, spatially-uniform velocities and depths constitute poor fish habitat."

Q: How do the interim seasonal flow criteria for each of these conditions operate?

A: 7Q2 flows are to be implemented when total storage in the System reservoirs is below 60% of total capacity. "Dry" means times when the total storage in System reservoirs is below 74%, but more than 60% of total capacity. "Average" means times when the total storage in System reservoirs is at least 74%, but less than 96% of total capacity. "Wet" means times when the total storage in System reservoirs is at least 96% of total capacity. These conditions were based on modeling done at full demands. The WMP will provide a method for adjusting these criteria to reflect other demand conditions.

The interim instream flows criteria enumerated in the draft permit apply at six USGS gage locations (although measurement points are subject to change in the WMP with approval of the Executive Director). The instream flow criteria are applicable at all times. Depending upon the hydrologic condition, storage of water authorized by the draft permit in the System reservoirs upstream from the gaging stations and the diversion and use of water pursuant to the proposed permit at locations upstream from the gaging stations shall be authorized only when stream flows exceed the flow values established in the permit.

Q: How do these requirements affect BRA's exercise of its storage, diversion, and use rights under the System Operation Permit?

A: BRA is not permitted to exercise storage or diversion water rights authorized under the System Operation Permit if instantaneous river flows are lower than instream flow criteria for the applicable condition.

Q: Why were these particular control points chosen?

A: These control points are located where river flows may be affected by exercise of the authorized System Operation Permit rights. The control point locations are associated with stream gaging stations that are useful for future flow monitoring and that also have a suitable available period of historical hydrology records. Three locations (Glen Rose, High Bank, and Richmond) are at BRA's diversion locations (geographic on main stem). Others are on the major tributaries. The 7Q2 water quality measurement points are found at eight other locations on the main stem or other tributaries or gages just downstream of reservoirs.

Q: What is a "Qualifying High Flow Pulse," as that term is used in the ED's February 11, 2010 Draft Permit (BRA Exhibit No. 18)?

A: A "Qualifying High Flow Pulse" is an individual rainfall-derived flow event that meets the peak flow, volume, and duration criteria enumerated within the draft permit for the current season and climatic condition.

Q: What is the purpose of the "high flow pulse" requirements in the ED's February 11, 2010 Draft Permit, and when and how are these requirements operative?

A: Theoretically the high flow pulses (HFPs) are needed to provide for certain biological activities and needs (*e.g.*, to cue reproductive and spawning behaviors, to transport sediment and bed material to maintain the river channel, and to affect water quality through transport of terrestrial vegetation into the river, contributing increased concentrations of particulate organic carbon to the food chain). These HFPs may also provide lateral connectivities for oxbow lakes, allowing movement of organisms between the main channel and off-channel aquatic habitats.

An HFP is initiated when flows are greater than the 10^{th} percentile and increase by more than 50 percent from the previous day, or when flows exceed the 75^{th} percentile, regardless of the rate of change. An HFP is terminated when the flow drops below the 10^{th} percentile or when the flow decreases from one day to the next by less than 5 percent, or when a succeeding pulse occurs. An entire HFP is also classified as a small flood if the maximum rate exceeds the small flood threshold at the 1.5-year recurrence interval. When an individual Qualifying HFP occurs and is passed at one of the six measurement points it may be used as credit for meeting one seasonal HFP frequency requirement.

Q: How do the HFP requirements affect BRA's operations under the System Operation Permit?

A: Generally, BRA cannot store or divert water appropriated by the System Operation Permit when that storage or diversion would prevent meeting the HFP schedule. Attached to my testimony as **BRA Exhibit No. 32** are two graphs from a February 18, 2009 BRA Memorandum prepared by Phil Price, P.E. and Chris Higgins, both with BRA, regarding the impact of water supply diversions on HFP events at Richmond. I have reviewed the Memorandum and the charts and discussed the information and results with Mr. Price. BRA Exhibit No. 32 illustrates how the instream flow criteria in the ED's February 11, 2010 Draft Permit (BRA Exhibit No. 18) would impact diversion under the System Operation Permit. The first figure (labeled "Figure 2") in BRA Exhibit No. 32 conceptually describes how diversions can or cannot be made based on instream flow criteria. The figure provides a graphical representation of non-qualifying and Qualifying HFPs, 1.5-year events and pre-1.5-year events, and below base flow HFP. The figure also identifies the instream flow criteria and daily stream flow.

The second figure (labeled "Figure 3") in BRA Exhibit No. 32 provides an example of the diversions based on modeled stream flows at the Richmond gage for the year 1968. This year was selected because it illustrates many of the diversion and curtailment scenarios. The figure provides the same coloring scheme as the conceptual accounting figure and identifies the same flow regimes. Again, this example illustrates when diversions can and cannot be made based on the instream flow criteria. For example, in the beginning of 1968 a base flow diversion can be made for the first two weeks, represented by the solid green shading at the bottom of the figure. The diversion can be made because the modeled stream flow is greater than the base line instream flow criteria (*i.e.*, the black line is higher than the dashed green

line). From the second or third week in January the stream flow increases significantly and creates a non-qualifying and Qualifying HFP. As indicated by the solid blue shading at the bottom of the figure, the HFP diversion can be made until the HFP ends sometime in mid-February. From that point, a diversion can be made based on the stream flow being greater than the base criteria (again, the black line is higher than the dashed green line). This diversion can continue (illustrated by the shaded green at the bottom of the figure) until two or three weeks into March.

Diversions can be made from the second or third week in May and last through the beginning of July based on the 1.5-year event diversion (represented by the solid red shading). The diversions represent the diversion during a flood event. Diversions are curtailed beginning in mid-August and last until the beginning of November based on low stream flow (*i.e.*, below or equal to the base flow instream criteria.

Q: Under the System Operation Permit provisions, what happens if a streamflow event does not meet the requirements for a Qualifying HFP?

A: For streamflow events that do not meet the minimum requirements of a Qualifying HFP, flows in excess of the base flow requirements may be impounded. The permittee shall record the impounded volume in its accounting/delivery plan. At such time as the cumulative volume of streamflow events exceeds the volume of a Qualifying HFP, the permittee may release the pulse to the environment if it chooses to do so. Such a release will result in a credit for a Qualifying HFP. If a streamflow event is designated an HFP but ultimately does not meet the minimum requirements of a Qualifying HFP, the volume passed shall be recorded in the accounting/delivery plan. At such time as the cumulative volume of such

pulses exceeds the volume of a Qualifying HFP, the permittee will be credited with one Qualifying HFP (even if the duration, peak flow, etc. characteristics were not met).

Q: How does the System Operation Permit address seasonal occurrence of Qualifying HFPs?

A: The specific peak flow, volume, duration, and frequency criteria specified in the draft permit are based on historic flows and vary from season to season. For purposes of determining the satisfaction of Qualifying HFP criteria, each season is accounted for independently. There is no carry-over from season to season, either in regard to exceeding or not meeting HFP requirements. In the event there are seasons where the requisite number of Qualifying HFPs do not occur naturally, the permittee is not obligated to meet the seasonal HFP requirements. In the event that a pulse extends across seasonal boundaries, it will be accounted in the season in which it ends. Seasonal HFP requirements are to be met using streamflow events with peak flows less than the 1.5-year return interval; however, streamflow events with both peak flows that exceed the 1.5-year return interval and satisfy the requirements of a Qualifying HFP may be classified as both overbanking flows and an HFP.

Q: Are there other issues relating to environmental flows which the System Operation Permit provides to be addressed in the Water Management Plan to be developed following issuance of the System Operation Permit?

A: Yes, several. These include:

- Special Condition 6.D.4.b: Consideration of adding, deleting, or modifying measurement points and flow levels.
- Special Condition 6.D.4.c: Consideration of establishing diversion rate trigger levels for HFP requirements.

- Special Condition 6.D.4.d: Establishment of a Brazos River Basin environmental flow study program identifying environmental flow studies to be conducted on specified reaches and the estimated time for completion of the studies.
- Special Condition 6.D.4.e: Development of operating guidelines to manage the frequency and magnitude of reservoir level fluctuations to avoid or minimize impacts on fisheries.
- Special Condition 6.D.4.g: Development of operational and accounting criteria to address uncertainty in forecasting and accounting for HFPs in a manner that balances the risks and benefits between water supply and environmental flow protection.
- Special Condition 6.D.4.h: Consideration of revised storage triggers and the process for recalculating those triggers.
- Special Condition 6.D.4.k: Development and implementation of a specific adaptive management strategy for meeting instream flow requirements consistent with providing water supplies. The adaptive management strategy shall include a monitoring program for assessing impacts on instream uses and address short- and long-term impacts to economically and ecologically important stream fisheries, unique aquatic communities and species, and water quality.

Q: What are the "7Q2" values, and how are those applied under the provisions of the draft permit?

A: 7Q2 refers to the seven-day low flow with a two-year recurrence interval. TCEQ has historically used the 7Q2 and the harmonic mean flow to calculate water-quality based effluent limits and to establish whole effluent toxicity testing parameters in wastewater discharge permits. Under the provisions of the draft permit, 7Q2 flows have been applied as

a minimum criterion which must be met or exceeded. Otherwise, the diversion and storage of water authorized in the draft permit upstream of the eight gage locations has been prohibited.

Q: What additional monitoring studies does the System Operation Permit require, to assess instream flow protection and water quality protection?

A: Monitoring studies are required in the draft permit to collect baseline data on the biology, habitat, water quality, hydrology, ecosystem health and other environmental factors of the stream segment between each of the eight water quality protection points and the immediate downstream measurement point. As part of the study and analysis required in the permit, the permittee must perform and complete a Little River watershed study prior to filing its application for approval of the initial WMP.

Q: How might the results of those monitoring studies be addressed in the Water Management Plan?

A: If baseline data are sufficient to determine instream flow protection needs, and such criteria are determined to be necessary, the data is to be used to develop criteria to replace those within the draft permit. If the monitoring studies indicate that additional study is needed, instream flow studies are be conducted to determine appropriate instream flow protection criteria for the water quality protection points; the results of such instream flow studies will be used to develop criteria to replace the values in the draft permit.

Q: How might the "interim" instream flow values developed by BRA and TPWD and reflected in the System Operation Permit change, based on the SB 3 "reopener" provision applicable to water rights permits issued after the effective date of that statute?

A: SB 3, as reflected in Texas Water Code § 11.147, states that environmental flows special conditions placed on a permit after the effective date of SB 3 recommendations may not be increased by greater than 12.5%. It further states that "appropriate consideration" shall be given in making such changes to voluntary contributions to the Texas Water Trust, such as the one planned by BRA. If BRA performs an instream flow study and determines that the flow values or structure of the seasons or criteria are different than the "interim" numbers, these provisions will need to be adjusted.

Q: Based on the provisions of the System Operation Permit, what is your opinion of how BRA's System Operation Permit will affect bays and estuaries associated with the Brazos River Basin?

A: As I have previously stated, freshwater inflow needs of the bay and estuary at the mouth of the Brazos River are minimal due to the absence of any bay or significant estuary system. Based on the environmental flow restrictions found in the draft System Operation Permit, sufficient flows should be present to provide enough water to satisfy any freshwater inflow needs.

Q: Based on the provisions of the System Operation Permit, will BRA's System Operation Permit affect the ability to maintain instream uses of water in the Brazos River Basin?

A: The special conditions provisions of the permit are intended to ensure that exercise of authorized rights does not negatively impact instream uses. Provisions include allowance for revision of the approved initial WMP in the event that additional future study identifies changes to the approved WMP that are needed to maintain instream uses.

Q: Based on the provisions of the draft permit, what is your opinion of how BRA's System Operation Permit will affect fish and wildlife habitat in the Brazos River Basin?

A: I do not anticipate significant adverse impacts on fish and wildlife. If the fundamental components of the natural flow regime are provided then the ecology of the system should be sound. The adaptive management aspects of the draft permit acknowledge the weakness in a hydrology-based approach, and offer a means to further develop the science of what flows are necessary to maintain a sound ecological environment.

Q: Based on the provisions of the draft permit, what is your opinion of how BRA's System Operation Permit will affect water quality in the Brazos River Basin?

A: Maintenance of 7Q2 flows has been utilized historically to protect water quality. It is my opinion that the employment of these flows in the draft permit will help maintain the water quality in the Brazos River Basin. In addition, the permit anticipates the release of water from BRA System reservoirs to meet main stem demands. These releases should also help to maintain water quality.

Q: Is there any basis to conclude that applicable water quality standards cannot be maintained in the Brazos River Basin, as a result of approval of BRA's System Operation Permit?

A: No. In my opinion, the approval of BRA's System Operation Permit will not affect attainment of water quality standards.

Q: Would you anticipate any effect on water quality in the Brazos River Basin, as a result of the bed and banks authorization included in the draft permit?

A: No. Changes to timing or magnitude of existing flows resulting from authorized management (*e.g.*, diversions, releases, and return flows) could change some of the water quality by changing river velocities and/or depths and concentration of constituents within the water (*e.g.*, suspended and dissolved materials). The precise degree of impact to the

water body resulting from exercise of water rights authorized by the draft permit is not known relative to the degree that existing processes impact the water body. However, the draft permit places restrictions on exercise of water rights so that river conditions are maintained within the range of historically occurring conditions.

Q: Based on the provisions of the draft permit, do you believe that BRA's System Operation Permit provides environmental benefits to the Brazos River Basin?

A: Yes. Where only specific environmental criteria have been in place historically, the draft permit establishes a suite of flow criteria implementing the latest knowledge on hydrologic flow regimes and their contribution to a sound ecologic environment. These criteria are further subject to adjustment based upon better scientific information in the future. Such an implementation is a benefit to the environment of the Brazos River Basin. Also, permits issued by TCEQ in the Brazos River Basin in the future will be required to honor these environmental flow provisions, because the provisions will be part of a senior water right. The permit will also reduce the need for other, more potentially damaging, water supply projects to meet future needs.

Q: Based on the provisions of the draft permit, what is your opinion of how BRA's System Operation Permit will affect or benefit the public welfare, particularly throughout the Brazos River Basin?

A: The permit will increase the available supply of water to meet current and future water needs, reducing and delaying the need for constructing new reservoirs. The permit also considers and incorporates the protection of instream uses including the ecological needs of the aquatic river environment. Providing an additional needed and economical water supply, while protecting environmental flow needs, will greatly benefit the public welfare in my opinion.

Q: Are there any provisions in the ED's February 11, 2010 Draft Permit (BRA Exhibit No. 18) that are of concern to BRA?

A: There are several issues in the ED's February 11, 2010 Draft Permit that are of concern to BRA. In some locations (particularly at Richmond and probably Highbank), diversions even during a Qualifying HFP are almost certain to be minimal compared to the HFP volume (although this may not be the case at Glen Rose). These diversions would not impact the significance of the HFP if diverted. To address this concern, the draft permit requires the WMP to address whether trigger levels for total rates of diversion in particular river segments should be established to relieve BRA of HFP requirements until diversion levels are large enough to actually have an impact on HFPs. BRA does not have a problem with this approach and is not asking for a change to the draft permit.

Another issue of concern is that the draft permit requires HFPs to meet all three criteria (peak, duration, and volume). In TCEQ's proposed environmental flow rules for the Trinity and Sabine basins, criteria are met by satisfaction of the volume requirement, or peak and duration, but not both. The BRA Draft Permit (BRA Exhibit No. 8) addresses this concern in Special Condition 5.E.7.

Similarly, the ED's February 11, 2010 Draft Permit requires that environmental flow requirements be met at all downstream gages prior to storage and diversion of water appropriated under the System Operation Permit. This is both impractical and unnecessary in my opinion. For example, travel time from Possum Kingdom to the Richmond gage is approximately 14 days. This is the amount of time before operational changes at Possum

Kingdom will be felt at Richmond, and then only if not overshadowed by events on downstream tributaries and over 600 intervening miles of the Brazos River. Such a requirement makes no sense. Limiting environmental flow requirements to the next downstream gage is sufficient. The BRA Draft Permit addresses this concern in Special Condition 5.E.5.

Q: Does BRA agree with the proposal in TCEQ's proposed Trinity and Sabine environmental flow rules regarding the satisfaction of the duration requirement of HFPs?

A: Not completely, because BRA has commented on the proposed rules that the duration for the pulse should start when the pulse actually starts, not when it hits the peak, and BRA believes that would be better.

Q: What is the significance of BRA's approach on return flows, both existing and future, as that approach relates to environmental flows permitting provisions?

A: In the modeling context, in the WAM return flows are input so that all senior water right holders downstream of the return flow discharge have access to the flow prior to the BRA System Operation Permit priority date (2004). Therefore, existing water rights are satisfied, as well as environmental flow requirements, prior to any storage, diversion or use of existing and future return flows appropriated by the System Operation Permit. These restrictions will protect the environment in the future as well as today.

Q: How would you characterize BRA's efforts and approach to environmental flows in permitting for its System Operation Permit application, in relation to the ongoing work statewide pursuant to SB 3?

A: This permit comes closer to satisfying SB 2 and SB 3 goals for identifying and evaluating environmental flow needs than any water right permit previously issued by TCEQ. BRA, in its efforts to consider environmental flows in its System Operation Permit application, has had a substantial role in setting the precedent for consideration of the hydrologic flow regime and its effects on a sound ecological environment, both in its characterization and analysis. Development of the environmental flows conditions in the draft permit was the predecessor of the HEFR modeling now utilized statewide as part of the SB 3 effort. In the Trinity-San Jacinto and Sabine-Neches basins, great controversy exists at both the expert and stakeholder levels over the sole reliance on hydrology-based analyses. BRA has gone further in this regard, acknowledging the uncertainties in such analyses through incorporation of monitoring studies and instream flow studies, such that further science will be developed to reflect the priority of maintaining flows necessary for the protection of a sound ecological environment in the Brazos River Basin.

Q: Does this conclude your testimony?

A: Yes. However, I reserve the right to supplement and amend my testimony at the time of hearing.

TEXAS WATER COMMISSION

PERMIT TO
DIVERT STATE WATER

APPLICATION NO. 5388 *PERMIT NO. 5388* *TYPE: §11.121*

Permittee:	*City of Lewisville*	*Address:*	*PO BX 299002* *LEWISVILLE TX 75029-9002*
Filed:	*October 18, 1991*	*Granted:*	*January 29, 1992*
Purpose:	*Flood Protection*	*County:*	*Denton*
Watercourse:	*Unnamed tributary (known locally as Old Town Creek) of Prairie Creek, tributary of the Elm Fork Trinity River, tributary of the Trinity River*	*Watershed:*	*Trinity River Basin*

WHEREAS, applicant seeks authorization to divert and redirect the floodflows of an unnamed tributary of Prairie Creek for flood protection purposes within the city limits of Lewisville, approximately 14.5 miles southeast of Denton, Texas; and

WHEREAS, the Texas Water Commission finds that jurisdiction over the application is established; and

WHEREAS, no person protested the granting of this application; and

WHEREAS, the Commission has complied with the requirements of the Texas Water Code and Rules of the Texas Water Commission in issuing this permit.

NOW, THEREFORE, this permit to divert state water is issued to the City of Lewisville subject to the following terms and conditions:

1. DIVERSION

Permittee is authorized to construct a diversion berm across an unnamed tributary of Prairie Creek and to divert the floodflows, i.e., only flows above 35 cfs, of the creek for non-consumptive flood-control purposes only at a point on the north, or left, bank of the tributary at Latitude 33.045° N, Longitude 96.992° W (also being S 11° E, 1450 feet from the northwest corner of the A. King Survey, Abstract No. 698) at a maximum rate of 1402 cfs through a box culvert beneath a Lewisville city street to an open channel and thence to a point on the west, or left, bank of the tributary that is N 49° E, 1250 feet from the southwest corner of the E. Sutton Survey, Abstract No. 1250.

2. SPECIAL CONDITION

Permittee is required to maintain a low flow pipe through the berm that shall continously allow all normal flows (all flows equal to or less than 35 cfs) to pass into the existing channel of the creek.

3. TIME LIMITATIONS

a. *Construction of the berm herein authorized shall be commenced within two years and completed within three years from date of issuance of this permit.*

b. *Failure to commence and/or complete construction of the berm within the period stated above shall cause this permit to expire and become null and void, unless permittee applies for an extension of time to commence and/or complete construction prior to the respective deadlines for commencement and completion, and the application is subsequently granted.*

This permit is issued subject to all superior and senior water rights in the Trinity River Basin.

Permittee agrees to be bound by the terms, conditions and provisions contained herein and such agreement is a condition precedent to the granting of this permit.

All other matters requested in the application which are not specifically granted by this permit are denied.

This permit is issued subject to the Rules of the Texas Water Commission and to the right of continuing supervision of State water resources exercised by the Commission.

TEXAS WATER COMMISSION

John Hall, Chairman

DATE ISSUED: FEB 1 8 1992

ATTEST:

Gloria A. Vasquez, Chief Clerk

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

February 22, 2010

Mr. Ron Freeman
Freeman & Corbett LLP
8500 Bluffstone Cove, Suite B-104
Austin, TX 78759

RE: City of Lewisville
ADJ 2350
CN600535140, RN103981106, RN103981650, RN103982328, RN103982955, RN103983755, RN105566871, RN105566913, RN105566939
Application No. 08-2350A to Sever a Portion of Certificate of Adjudication No. 08-2349 and Combine with Certificate of Adjudication No. 08-2350
TWC§11.122, Requiring Mailed and Published Notice
Elm Fork Trinity River, Trinity River Basin
Denton County

Dear Mr. Freeman:

Enclosed are a draft, subject to revision, of the proposed amendment to Certificate of Adjudication No. 08-2350 and the related order and technical memoranda.

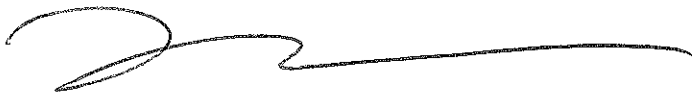
We are recommending that the application be granted in accordance with the enclosed draft. Please review the proposed amendment and contact me no later than March 9, 2010 with any comments or questions.

The persons on the attached mailing list have requested a contested case hearing concerning this matter and will also receive a copy of these documents. If, after reviewing the draft with its special conditions, all parties agree to withdraw their objections to granting the application by March 9, 2010 the amendment will be issued as drafted.

If all requests for a contested case hearing are not withdrawn, the matter will be placed on the Commission Agenda for consideration and all parties will be notified of the date.

If you have any questions concerning this matter, please contact me at (512) 239-0083 or by e-mail at tdonnell@tceq.state.tx.us.

Sincerely,



Tracie Donnelly, Project Manager,
Mail Code-160
Water Rights Permitting Team

Enclosures

cc: attached mailing list

AMENDMENT TO A
CERTIFICATE OF ADJUDICATION

CERTIFICATE NO. 08-2350A TYPE: 11.122

Permittee:	City of Lewisville	Address:	151 Church Street Lewisville, Texas 75057
Filed:	April 20, 2009	Granted:	
Purpose:	Agricultural, Industrial, Mining, Recreation	County:	Denton
Watercourse:	Elm Fork Trinity River, Tributary of the Trinity River	Watershed:	Trinity River Basin

WHEREAS, the City of Lewisville owns Certificate of Adjudication No. 08-2350 which authorizes the diversion and use of not to exceed 385 acre-feet of water per year from five diversion points on the Elm Fork Trinity River, tributary of the Trinity River, Trinity River Basin, at a maximum diversion rate in combination with Certificate of Adjudication No. 08-2351 of 14.44 cfs (6500 gpm) for agricultural purposes to irrigate 58.49 acres in Denton County with a priority date of 1952; and

WHEREAS, the City of Lewisville also owns Certificate of Adjudication No. 08-2349 which authorizes the diversion and use of not to exceed 68 acre-feet of water per year from two diversion points on the Elm Fork Trinity River, at a maximum diversion rate of 1.40 cfs (630 gpm) for agricultural purposes to irrigate 60 acres in Denton County with a priority date of March 1967; and

WHEREAS, an application was received from the City of Lewisville to sever its rights under Certificate of Adjudication No. 08-2349 and combine them with the its rights under Certificate of Adjudication No. 08-2350, resulting in an authorization for diversion of 453 acre-feet of water per year from seven diversion points; and

WHEREAS, by Commission order approved on _____, the 68 acre-foot portion of the water rights owned by the City of Lewisville authorized by Certificate of Adjudication No. 08-2349 was severed from Certificate of Adjudication No. 08-2349 and combined with Certificate of Adjudication No. 08-2350; and

WHEREAS, the applicant also seeks to amend Certificate of Adjudication No. 08-2350 to add recreation purposes to its entire authorized amount of 453 acre-feet, and to add industrial and mining purposes to a 22 acre-foot portion in Denton County, Texas; and

WHEREAS, the applicant also seeks to store water in two off-channel reservoirs, known as Lake 2 and Lake 3, for recreation and subsequent diversion for agricultural (irrigation) purposes; and

WHEREAS, Lake 2 has a surface area of 16.9 acres and a maximum capacity of 182.2 acre-feet of water and is located at bearing S5.37917°W, 1,485.02 feet from the NE corner of the L.N. Sparks Original Survey No. 479, also being at Latitude 33.037811°N and Longitude 96.967567°W, and Lake 3 has a surface area of 8.0 acres and a maximum capacity of 88.0 acre-feet of water and is located at bearing S45.38139°W, 1,782.04 feet from the NW corner of the Philemon Higgins Original Survey No. 1,415, also being at Latitude 33.038381°N and Longitude 96.962964°W; and

WHEREAS, the applicant also seeks to add an additional downstream diversion point (known as Diversion Point No. 8) on the Elm Fork Trinity River, located approximately 3.9 miles southeast of the City of Lewisville, at Latitude 33.013072°N, Longitude 96.949444°W, also bearing N26.5833°E, 5,630 feet from the southeast corner of the Philemon Higgins Survey, Abstract 526, in Denton County, Texas; and

WHEREAS, the applicant further seeks to move the existing most upstream diversion point to a point 400 feet upstream on the Elm Fork Trinity River, River, located approximately 2.0 miles southeast of the City of Lewisville, at Latitude 33.038381°N, Longitude 96.962972°W, also bearing N32.2166°W, 1,480 feet from the northwest corner of the Philemon Higgins Survey, Abstract No. 526, in Denton County, Texas; and

WHEREAS, the applicant also seeks authorization to divert the 453 acre-feet of water from any of the eight diversion points; and

WHEREAS, the applicant also seeks to change the place of use for agricultural (irrigation) purposes to its service area within the city boundaries of the City of Lewisville, Texas; and

WHEREAS, the Texas Commission on Environmental Quality finds that jurisdiction over the application is established; and

WHEREAS, the Executive Director recommends special conditions be included in the permit; and

WHEREAS, the Commission has complied with the requirements of the Texas Water Code and Rules of the Texas Commission on Environmental Quality in issuing this amendment;

NOW, THEREFORE, this amendment to Certificate of Adjudication No. 08-2350, designated Certificate of Adjudication No. 08-2350A, is issued to the City of Lewisville, subject to the following terms and conditions:

1. IMPOUNDMENT

In addition to the previous authorization Owner is also authorized to maintain two off-channel reservoirs described below.

A. Lake 2 has a surface area of 16.9 acres and a maximum capacity of 182.2 acre-feet of water, and is located at bearing S5.37917°W, 1,485.02 feet from the NE corner of the L.N. Sparks Original Survey No. 479, also being at Latitude 33.037811°N and Longitude 96.967567°W.

B. Lake 3 has a surface area of 8.0 acres and a maximum capacity of 88.0 acre-feet of water and is located at bearing S45.38139°W, 1,782.04 feet from the NW corner of the Philemon Higgins Original Survey No. 1,415, also being at Latitude 33.038381°N and Longitude 96.962964°W.

2. USE

A. In lieu of the previous authorization, Owner is now authorized to divert and use not to exceed 453 acre-feet of water per year for agricultural purposes within its service area in Denton County.

B. Owner is also authorized to store the authorized water in off-channel Lakes 2 and 3 for recreation purposes and subsequent agricultural purposes.

C. Owner is further authorized to divert 22 acre-feet out of the authorized 453 acre-feet of water for direct industrial and mining purposes in Denton County, Texas.

2. DIVERSION

A. Diversion Points:

In lieu the previous authorization, Owner is now authorized to divert 453 acre-feet of water from any of the following diversion points in Denton County:

1. Diversion Point No. 1 is on the Elm Fork Trinity River, located approximately 2 miles southeast of the City of Lewisville, at Latitude 33.038381°N, Longitude 96.962964°W, also bearing N32.216667°W, 1,480 feet from the northwest corner of the Philemon Higgins Survey, Abstract 526.

2. Diversion Point No. 2 is on the Elm Fork Trinity River, located approximately 2.2 miles southeast of the City of Lewisville, at Latitude 33.032667°N, Longitude 96.963044°W, also bearing N20.433333°W, 2,150 feet from the southwest corner of the Philemon Higgins Survey, Abstract 526.

3. Diversion Point No. 3 is on the Elm Fork Trinity River, located approximately 2.6 miles southeast of the City of Lewisville, at Latitude 33.025792°N, Longitude 96.958539°W, also bearing N81.200000°W, 3,090 feet from the northwest corner of the Philemon Higgins Survey, Abstract 526.

4. Diversion Point No. 4 is on the Elm Fork Trinity River, located approximately 2.8 miles southeast of the City of Lewisville, at Latitude 33.025936°N, Longitude 96.957292°W, also bearing N83.116667°W, 3,460 feet from the northwest corner of the Hugh Harper Survey, Abstract 605.

5. Diversion Point No. 5 is on the Elm Fork Trinity River, located approximately 3.4 miles southeast of the City of Lewisville, at Latitude 33.023067°N, Longitude 96.945111°W, also bearing N71.750000°W, 3,460 feet from the southeast of the Philemon Higgins Survey, Abstract 526.

6. Diversion Point No. 6 is on the Elm Fork Trinity River, located approximately 3.4 miles southeast of the City of Lewisville, at Latitude 33.018078°N, Longitude 96.950192°W, also bearing N39.300000°W, 4,150 feet from the southeast of the Philemon Higgins Survey, Abstract 526.

7. Diversion Point No. 7 is on the Elm Fork Trinity River, located approximately 3.4 miles southeast of the City of Lewisville, at Latitude 33.017086°N, Longitude 96.950183°W, also bearing N36.416667°W, 4,440 feet from the southeast corner of the Philemon Higgins Survey, Abstract No. 526.

8. Diversion Point No. 8 is on the Elm Fork Trinity River, located approximately 3.9 miles southeast of the City of Lewisville, at Latitude 33.013072°N, Longitude 96.949444°W, also bearing N26.58333°E, 5,630 feet from the southeast corner of the Philemon Higgins Survey, Abstract 526.

B. Diversion Rates:

a. Owner is authorized to divert 385 acre-feet of water per year at a maximum diversion rate in combination with Certificate of Adjudication No. 08-2351 of 14.44 cfs (6,500 gpm).

b. Owner is authorized to divert 68 acre-feet of water at a maximum diversion rate of 1.40 cfs (630 gpm).

4. PRIORITY

Diversion and use of the 68 acre-feet of water has a priority date of March, 1967, and the 385 acre-feet of water has a priority date of 1952.

5. CONSERVATION

Owner shall implement water conservation plans that provide for the utilization of those practices, techniques, and technologies that reduce or maintain the consumption of water, prevent or reduce the loss or waste of water, maintain or improve the efficiency in the use of water, increase the recycling and reuse of water, or prevent the pollution of water, so that a water supply is made available for future of alternative uses.

6. SPECIAL CONDITIONS

A. Owner shall not operate Lake 3 such that state water is diverted through the weir and impounded. After any flood event that engages the weir, Owner shall ensure that the elevation of the lake is returned to that measured before the flood event.

B. Owner shall install and maintain a flood elevation gage in Lake 3, maintain daily records of the lake elevation, and make these records available to the Executive Director upon request.

C. All state water entering Lake 3 through the weir must be returned to the Elm Fork Trinity River through the outlet of Lake 3.

D. In order to minimize entrainment and impingement of aquatic organisms, the owner shall install a screen with a mesh size of 0.25 inches or smaller on the diversion structures at Diversion Point No. 8.

E. Owner shall install and maintain a measuring device which accounts for, within 5% accuracy, the quantity of water diverted from the points authorized above in Diversion Paragraphs A. 1 and A. 8 and maintain measurement records.

F. Owner shall allow representatives of the TCEQ reasonable access to the property to inspect the measuring device and records.

This amendment is issued subject to all terms, conditions, and provisions contained in Certificate of Adjudication No. 08-2350 except as specifically amended herein.

This amendment is issued subject to all superior and senior water rights in the Trinity River Basin.

Owner agrees to be bound by the terms, conditions, and provisions contained herein and such agreement is a condition precedent to the granting of this amendment.

All other matters requested in the application which are not specifically granted by this amendment are denied.

This amendment is issued subject to the Rules of the Texas Commission on Environmental Quality and to the right of continuing supervision of State water resources exercised by the Commission.

For the Commission

Date issued:

AN ORDER severing the water rights authorized by Certificate of Adjudication No. 08-2349, owned by the City of Lewisville, from that Certificate and combining those rights with the water rights owned by the City of Lewisville authorized by Certificate of Adjudication No. 08-2350, designating such combination as Certificate of Adjudication No. 08-2350A.

An application was received from the City of Lewisville seeking to sever the 68 acre-feet of water from the Elm Fork Trinity River, Trinity River Basin, for agricultural (irrigation) purposes in Denton County, authorized by Certificate of Adjudication No. 08-2349, owned by the City of Lewisville, from that Certificate and combine those water rights with the City of Lewisville's water rights authorized by Certificate of Adjudication No. 08-2350.

The Commission has jurisdiction to consider this matter and after hearing all of the evidence pertaining to the matter, the Commission is of the opinion and so finds that the 68 acre-feet of water from the Elm Fork Trinity River for agricultural (irrigation) purposes, owned the City of Lewisville, authorized by Certificate of Adjudication No. 08-2349, should be severed from that Certificate and combined with the rights owned by the City of Lewisville, authorized by Certificate of Adjudication No. 08-2350, designating said combination as Certificate of Adjudication No. 08-2350A.

NOW THEREFORE, BE IT ORDERED BY THE TEXAS COMMISSION ON ENVIRONMENTAL QUALITY that the 68 acre-feet of water from the Elm Fork Trinity River for agricultural purposes authorized by Certificate of Adjudication No. 08-2349, owned by the City of Lewisville, is hereby severed from Certificate of Adjudication No. 08-2349 and combined with the water rights owned by the City of Lewisville, authorized by Certificate of Adjudication No. 08-2350, to be so designated by an amendment to Certificate of Adjudication No. 08-2350 as Certificate of Adjudication No. 08-2350A.

All other terms and conditions contained in Certificate of Adjudication No. 08-2350 which are not specifically contrary to the terms of Certificate of Adjudication No. 08-2350, as amended, shall remain in full force and effect.

If any provision, sentence, clause, or phrase of this Order is for any reason held to be invalid, the invalidity of any portion shall not affect the validity of the remaining portions of the Order.

_____

For the Commission

DATE ISSUED:

Texas Commission on Environmental Quality

INTEROFFICE MEMORANDUM

To: Tracie Donnelly, Application Manager
Water Rights Team
Water Rights Permitting & Availability Section

Date: October 22, 2009

Through: CL 10/22/09 Chris Loft, Team Leader
Resource Protection Team
Water Rights Permitting & Availability Section

GE 10/22/09 Gregg Easley, Aquatic Scientist
Resource Protection Team
Water Rights Permitting & Availability Section

From: Kaci Myrick, Aquatic Scientist
KM 10/22/09 Resource Protection Team
Water Rights Permitting & Availability Section

Subject: City of Lewisville
ADJ 08-2350
CN600535140
Elm Fork Trinity River, Trinity River Basin
Denton County

Environmental reviews of water right applications are conducted in accordance with §11.042, §11.147, §11.1491, §11.150, and §11.152 of the Texas Water Code and with TCEQ administrative rules which include 30 TAC §297.53 through §297.56. These statutes and rules require the TCEQ to consider the possible impacts of the granting of a water right on fish and wildlife habitat, water quality, and instream uses associated with the affected body of water. Possible impacts to bays and estuaries are also addressed.

ENVIRONMENTAL ANALYSIS

Application Summary: Certificate of Adjudication (COA) No. 08-2349 authorizes the diversion and use of not to exceed 68 acre-feet of water per year from two diversion points on the Elm Fork Trinity River, tributary of the Trinity River, Trinity River Basin, at a maximum diversion rate of 1.40 cfs (630 gpm) for agricultural purposes to irrigate 60 acres in Denton County with a time priority of March 1967.

COA No. 08-2350 authorizes the diversion and use of not to exceed 385 acre-feet of water per year from five diversion points on the Elm Fork Trinity River, tributary of the Trinity River, Trinity River Basin, at a maximum diversion rate in combination with COA No. 08-2351 of 14.44 cfs (6500 gpm) for agricultural purposes to irrigate 58.49 acres in Denton County with a priority date of 1952.

The City of Lewisville has applied for an amendment to COA No. 08-2350 to sever rights under COA No. 08-2349 and combine them with their water rights for COA No. 08-2350 resulting in a total of 453

acre-feet of water per year with a maximum combined diversion rate of 15.84 cfs (7130 gpm). The owner also seeks to add industrial and mining use to a 22-acre-foot portion, to add recreational use to their entire authorized amount, and to change the place of use to their service area. The applicant also seeks to store diverted water in two off-channel reservoirs, known as Lake 2 and Lake 3, for recreation and subsequent diversion. Lake 2 has a surface area of 16.9 acres and a maximum capacity of 182.2 acre-feet of water and Lake 3 has a surface area of 8.0 acres and a maximum capacity of 88.0 acre-feet. The Applicant further seeks to add an additional diversion point 0.16 miles down stream of the most downstream diversion point authorized in COA No. 08-2350 and to move the most up stream point, currently authorized in COA No. 08-2349, upstream by 400 feet.

INSTREAM USES

Recreational Uses: According to *southwestpaddler.com* this section of the Elm Fork Trinity below Lake Lewisville is described as flowing clear and cool as it leaves Lewisville dam and for approximately 6-8 miles. The current then slows and the water becomes muddy. There is an annual paddling event held by the Dallas Down River Club and paddle trips can start at the Lewisville spillway and continue for up to 34 miles. This section of the Elm Fork River contains Largemouth bass, Spotted bass, White and Hybrid bass, and bluegill below the dam (Hodge 2007). In order to protect aquatic organisms Instream Uses Staff recommend the use of screens on any diversion structure to be used at the most downstream proposed diversion point to prevent entrainment or impingement.

Aquatic and Riparian Habitats: According to the *Handbook of Texas Online* the Elm Fork of the Trinity traverses generally flat to rolling terrain surfaced by shallow, stony loams that support junipers, oaks, and grasses. Much of the river is in highly urban areas aside from the Lewisville Lake Environmental Learning and Wildlife Management Area just below the dam. Dominant land use along the elm Fork is portioned out as 30% residential, 25% improved pasture, 15% industrial, and 9% forest (Millican and Hauck 2008) This project is in a section of the Elm Fork that has abundant wildlife, including the American White Pelican (*Pelecanus erythrorhynchos*), Belted kingfishers (*Megaceryle alcyon*), and Red-eared sliders (*Trachemys scripta*), yet due to the urban nature of the Elm Fork, the riparian area has also been described as having huge landfills alongside giant cottonwood trees (Hodge 2007). The proposed amendment is not expected to have any additional adverse impacts to the aquatic and riparian habitat of the Elm Fork.

Water Quality: The project is located on the Elm Fork Trinity River below Lewisville Lake which is designated as segment 0822 in the state water quality standards (30 TAC §307.10(1) and (3)). Segment 0822 is located upstream of the confluence with the West Fork Trinity River in Dallas County to the Lewisville Dam in Denton County. The stream segment is 30 miles long and the watershed is approximately 200 square miles. Three significant tributaries discharge into the segment: Denton Creek, Grapevine Creek and Cottonwood Branch. The watershed is located in Dallas, Tarrant, Denton, and Collin Counties in a densely populated urban area (TCEQ 2009). The designated uses for this segment as listed in 30 TAC §307.10(1) are contact recreation, high aquatic life use, and public water supply. A Total Maximum Daily Load (TMDL) was initiated for the segment in October of 2004 for the failure to support contact recreation use due to elevated bacteria levels. The contact recreation impairment applies to the 12-mile reach of the segment near the Dallas Water Utilities' Elm Fork Water Treatment Facility which is downstream of the City's project location. The addition of a diversion point, the addition of industrial, mining, and recreation use, and

the storage of diverted water in two off channel impoundments is not expected to adversely affect the water quality in segment 0822.

Bay and Estuary Freshwater Inflows: Freshwater inflows are critical for maintaining the historical productivity of bays and estuaries along the Gulf Coast. The proposed project is located more than 200 river miles from the Gulf of Mexico. There is no request for an increase in the amount of water to be diverted under the COA therefore the amendment should have minimal impact on the Trinity Bay. However, the cumulative effects of all diversions and impoundments in the Trinity River Basin upon the receiving estuary are unknown at this time.

SUMMARY

The City of Lewisville has applied for an amendment to COA No. 08-2350 to sever rights under COA No. 08-2349 and combine them with the Owner's water rights for COA No. 08-2350 resulting in a total of 453 acre-feet of water per year with a maximum combined diversion rate of 15.84 cfs (7130 gpm). The owner also seeks to add industrial and mining use to a 22-acre-foot portion, to add recreational use to their entire authorized amount, and to change the place of use to their service area. The applicant also seeks to store diverted water in two off-channel reservoirs, known as Lake 2 and Lake 3, for recreation and subsequent diversion. Lake 2 has a surface area of 16.9 acres and a maximum capacity of 182.2 acre-feet of water and Lake 3 has a surface area of 8.0 acres and a maximum capacity of 88.0 acre-feet. The Applicant further seeks to add an additional diversion point 0.16 miles down stream of the most downstream diversion point authorized in COA 08-2350 and to move the most upstream point, currently authorized in COA No. 08-2349, upstream by 400 feet.

Instream Uses staff recommend issuance of the amendment if the following special condition is adopted in the certificate, if granted:

In order to minimize entrainment and impingement of aquatic organisms, the owner shall install a screen with a mesh size of 0.25 inches or smaller on the diversion structure at the most downstream proposed diversion point.

LITERATURE CITED

Ellis, L.T., W. Pohl, R. Tyler. 1997-2001. Handbook of Texas Online. The Texas State Historical Association.

Millican, J. and L.M. Hauck. 2008. Technical Support Document: Segments 0806, 0841, 0822, and 0805 of the Trinity River Bacteria TMDL. Prepared for Texas Commission on Environmental Quality, Texas Institute for Applied Environmental Research, Tarleton State University, Stephenville, Texas.

Hodge, L.D. "Tripping the Trinity" Texas Parks and Wildlife Magazine March 2007.

TCEQ 2009 Total Maximum Daily Load Program *Improving Water Quality for the Trinity River. Four TMDLs for Bacteria.* July 2009.

TPWD. 1979 An Analysis of Texas Waterways. Texas Parks and Wildlife Department.

Texas Commission on Environmental Quality

INTEROFFICE MEMORANDUM

To: Tracie Donnelly, Project Manager
Water Rights Permitting Team
Water Supply Division

Date: April 20, 2009

Thru: Christopher Loft, Team Leader 4/20/09
Resource Protection Team
Water Supply Division

E. Scott Swanson, Senior Water Conservation Specialist
Resource Protection Team
Water Supply Division
ESS 4/20/09

From: Trent Jennings, Water Conservation Specialist
Resource Protection Team
Water Supply Division
4/20/09

Subject: City of Lewisville
ADJ 2350A
Review of Water Conservation Plans for Administrative Completeness

Certificate of Adjudication (COA) No. 08-2349 authorizes the diversion and use of not to exceed 68 acre-feet of water per year from two diversion points on the Elm Fork Trinity River, tributary of the Trinity River, Trinity River Basin, at a maximum diversion rate of 1.40 cfs (630 gpm) for agricultural purposes to irrigate 60 acres in Denton County with a time priority of March 1967.

COA No. 08-2350 authorizes the diversion and use of not to exceed 385 acre-feet of water per year from five diversion points on the Elm Fork Trinity River, tributary of the Trinity River, Trinity River Basin, at a maximum diversion rate in combination with COA 08-2351 of 14.44 cfs (6500 gpm) for agricultural purposes to irrigate 58.49 acres in Denton County with a priority date of 1952.

The City of Lewisville has applied for an amendment to COA No. 08-2350 to sever rights under COA No. 08-2349 and combine them with Owner's water rights for COA No. 08-2350 resulting in a total of 453 acre-feet of water per year. Owner also seeks to amend 08-2350 to add industrial and mining use to a 22 acre-foot portion, to add recreational use to their entire authorized amount, to add an eighth diversion point, and to change the place of use to irrigate land anywhere in the City's service area which consists of its city limits.

Applicant also seeks to store diverted water in off-channel reservoirs for in-place recreation and subsequent diversion.

The water conservation plan was reviewed by TCEQ staff and found to be administratively complete per 30 TAC Chapter 288.3 and 288.4. The application is consistent with the approved January 2006 Region C Water Plan and the 2007 State Water Plan, because the state plan does not address this amendment, and because there is nothing in the state water plan that conflicts with issuing this amendment."

In addition the following standard water conservation language should be included in the permit: "Owners shall implement water conservation plans that provide for the utilization of those practices, techniques, and technologies that reduce or maintain the consumption of water, prevent or reduce the loss or waste of water, maintain or improve the efficiency in the use of water, increase the recycling and reuse of water, or prevent the pollution of water, so that a water supply is made available for future or alternative uses."

A further technical review is not required by the Water Conservation Staff of the Resource Protection Team because no new appropriation of state water or inter-basin transfer was requested.

Texas Commission on Environmental Quality

INTEROFFICE MEMORANDUM

To: Tracie Donnelly, Application Manager
Water Rights Permitting Team

October 13, 2009

Through: Lann Bookout, Team Leader
Surface Water Availability & Interstate Compacts Team

From: Leonard Oliver, Hydrologist
Surface Water Availability & Interstate Compacts Team

Subject: City of Lewisville
CN600535140
ADJ 08-2350
Elm Fork, Trinity River, Trinity River Basin,
Denton County

WATER AVAILABILITY REVIEW

Application Summary

Certificate of Adjudication No. 08-2349 authorizes the diversion and use of not exceed 68 acre-feet of water per year from two diversion points on the Elm Fork Trinity River, tributary of the Trinity River, Trinity River Basin at a Maximum diversion rate of 1.40 cfs for agricultural purposes to irrigate 60 acres in Denton County with a time priority of March 1967.

Certificate of Adjudication No 08-2350 authorizes the diversion and use of not to exceed 385 acre-feet of water per year from five diversion points on the Elm Fork Trinity River, at a maximum diversion rate in combination with Certificate of Adjudication No. 08-2351 of 14.44 cfs (6500 gpm) for agricultural purposes to irrigate 58.49 acres in Denton County with a time priority date of 1952.

Applicant seeks to sever rights under Certificate of Adjudication N0. 08-2349 and combine them with the Owner's right for Certificate of Adjudication No. 08-2350 resulting in a total of 453 acre-feet of water per year with a maximum combined diversion rate of 15.84 cfs (7,130 gpm) consisting of 1.40 cfs (630 gpm) with a priority date of March, 1967, and 14.44 cfs (6,500 gpm) with a priority date of 1952. The applicant also seeks to add recreational use,

and to add industrial and mining use. Further, the applicant seeks to add an additional downstream diversion point, and to change the place of use. The proposed diversion point is located on the Elm Fork Trinity River, also being at 33.0130°N Latitude, 96.9494°W at a point bearing N26.5833°E, 5,603 feet from the southeast corner of the Philemon Higgins Survey, Abstract No. 526, approximately 3.9 mile from the City of Lewisville in Denton County, Texas.

Applicant also seeks authorization to store diverted water in two off-channel reservoirs, known as Lake 2 and Lake 3, for recreation and subsequent diversion. Further the applicant seeks to operate a weir on Lake 3 that could allow water from the Elm Fork Trinity River to enter the reservoir in the very rare instance when the flood stage in the area causes such to happen. The application indicates that the weir is designed to allow water to enter Lake 3 during flood stage to raise the Lake 3 water surface elevation prior to the river overtopping its bank at this location to minimize erosion. Once the river subsides below the normal operating level of Lake 3, any water, above the Lake 3 normal water surface elevation, returns to the river through the weir's flap gate. The applicant indicates that the weir will not be operated to divert state water.

No Injury Analysis

Resource Protection staff did not recommend an instream flow requirement. The application does not request a new appropriation of water, therefore a water availability analysis is not necessary. However, the application must be reviewed to ensure that no water rights are affected by the request to add a downstream diversion point.

Staff modeled the application using the Full Authorization simulation of the Trintiy WAM in which all water rights use their full authorized amounts and return flows are not included. The Trinity WAM has a period of record from 1940 to 1998. Staff compared the pre- and post- application reliabilities of basin water rights and found that there were no impacts on other water rights as a result of the request to add a downstream diversion point.

Conclusion

Staff can recommend that the application be granted provided the amendment includes the following special condition.

1. Owner shall not operate Lake 3 such that state water is diverted through the weir and impounded. After any flood event that engages the weir, owner shall ensure that the elevation of the lake is returned to that measured before the flood event.

2. Owner shall install and maintain a flood elevation gage in Lake 3, maintain daily records of the lake elevation, and make these records available to the Executive Director upon request.

3. All state water entering Lake 3 through the weir must be returned to the Elm Fork Trinity River through the outlet of Lake 3.

Leonard Oliver, Hydrologist

HYDROLOGY UNIT ANALYSIS FACT SHEET

Applicant: City of Lewisville
Water Right: ADJ 08-2350
Stream: Elm Fork of Trinity River
Period of Record: 1940-1998

Basin: Trinity River Basin
County: Denton
Drainage Area: 1681.11 sq. mi

Input Files:

Changes to *.DAT file:

```
**WRB2349A    68  UTIRR19670301                60802349002
**WRB2350A   385  UTIRR19520101                60802350001
WRB2350C     68  UTIRR19670301                60802350002
WRB2350C    385  UTIRR19520101                60802350001

**CPB2350A B2351B          7      ZERO
CPB2350A B2350C            7      ZERO
CPB2350C B2351B            7      ZERO
```

Changes *.DIS file:

```
FDB2350C 8TRDA    1 8ELLE 8DNGR 8MCGP 8WTGP
WPB2350C 1681.11
```

Remarks: Resource Protection Staff did not recommend streamflow restrictions for this application.

Leonard Oliver

Gwendolyn Hill Webb
Webb & Webb, Attorneys
P.O. Box 1239
Austin, Texas 78767

Excerpts from Texas Water Code, Ch. 11 re: Environmental Flows

Definitions in Sec. 11.002

……

(15) "Environmental flow analysis" means the application of a scientifically derived process for predicting the response of an ecosystem to changes in instream flows or freshwater inflows.

(16) "Environmental flow regime" means a schedule of flow quantities that reflects seasonal and yearly fluctuations that typically would vary geographically, by specific location in a watershed, and that are shown to be adequate to support a sound ecological environment and to maintain the productivity, extent, and persistence of key aquatic habitats in and along the affected water bodies.

(17) "Environmental flow standards" means those requirements adopted by the commission under Section 11.1471.

(18) "Advisory group" means the environmental flows advisory group.

(19) "Science advisory committee" means the Texas environmental flows science advisory committee.

Sec. 11.023. PURPOSES FOR WHICH WATER MAY BE APPROPRIATED. (a) To the extent that state water has not been set aside by the commission under Section 11.1471(a)(2) to meet downstream instream flow needs or freshwater inflow needs, state water may be appropriated, stored, or diverted for:

(1) domestic and municipal uses, including water for sustaining human life and the life of domestic animals;

(2) agricultural uses and industrial uses, meaning processes designed to convert materials of a lower order of value into forms having greater usability and commercial value, including the development of power by means other than hydroelectric;

(3) mining and recovery of minerals;

(4) hydroelectric power;

(5) navigation;

(6) recreation and pleasure;

(7) public parks; and

(8) game preserves.

(b) State water also may be appropriated, stored, or diverted for any other beneficial use.

Sec. 11.086. OVERFLOW CAUSED BY DIVERSION OF WATER. (a) No person may divert or impound the natural flow of surface waters in this state, or permit a diversion or impounding by him to continue, in a manner that damages the property of another by the overflow of the water diverted or impounded.

(b) A person whose property is injured by an overflow of water caused by an unlawful diversion or impounding has remedies at law and in equity and may recover damages occasioned by the overflow.

(c) The prohibition of Subsection (a) of this section does not in any way affect the construction and maintenance of levees and other improvements to control floods, overflows, and freshets in rivers, creeks, and streams or the construction of canals for conveying water for irrigation or other purposes authorized by this code. However, this subsection does not authorize any person to construct a canal, lateral canal, or ditch that obstructs a river, creek, bayou, gully, slough, ditch, or other well-defined natural drainage.

(d) Where gullies or sloughs have cut away or intersected the banks of a river or creek to allow floodwaters from the river or creek to overflow the land nearby, the owner of the flooded land may fill the mouth of the gullies or sloughs up to the height of the adjoining banks of the river or creek without liability to other property owners.

Amended by Acts 1977, 65th Leg., p. 2207, ch. 870, Sec. 1, eff. Sept. 1, 1977.

Sec. 11.147. EFFECTS OF PERMIT ON BAYS AND ESTUARIES AND INSTREAM USES. (a) In this section, "beneficial inflows" means a salinity, nutrient, and sediment loading regime adequate to maintain an ecologically sound environment in the receiving bay and estuary system that is necessary for the maintenance of productivity of economically important and ecologically characteristic sport or commercial fish and shellfish species and estuarine life upon which such fish and shellfish are dependent.

(b) In its consideration of an application for a permit to store, take, or divert water, the commission shall assess the effects, if any, of the issuance of the permit on the bays and estuaries of Texas. For permits issued within an area that is 200 river miles of the coast, to commence from the mouth of the river thence inland, the commission shall include in the permit any conditions considered necessary to maintain beneficial inflows to any affected bay and estuary system, to the extent practicable when considering all public interests and the studies mandated by Section 16.058 as evaluated under Section 11.1491.

(c) For the purposes of making a determination under Subsection (b) of this section, the commission shall consider among other factors:

(1) the need for periodic freshwater inflows to supply nutrients and modify salinity to preserve the sound environment of the bay or estuary, using any available information, including studies and plans specified in Section 11.1491 of this code and other studies considered by the commission to be reliable; together with existing circumstances, natural or otherwise, that might prevent the conditions imposed from producing benefits;

(2) the ecology and productivity of the affected bay and estuary system;

(3) the expected effects on the public welfare of not including in the permit some or all of the conditions considered necessary to maintain the beneficial inflows to the affected bay or estuary system;

(4) the quantity of water requested and the proposed use of water by the applicant, as well as the needs of those who would be served by the applicant;

(5) the expected effects on the public welfare of the failure to issue all or part of the permit being considered; and

(6) for purposes of this section, the declarations as to preferences for competing uses of water as found in Sections 11.024 and 11.033, Water Code, as well as the public policy statement in Section 1.003, Water Code.

(d) In its consideration of an application to store, take, or divert water, the commission shall include in the permit, to the extent practicable when considering all public interests, those conditions considered by the commission necessary to maintain existing instream uses and water quality of the stream or river to which the application applies. In determining what conditions to include in the permit under this subsection, the commission shall consider among other factors:

(1) the studies mandated by Section 16.059; and

(2) any water quality assessment performed under Section 11.150.

(e) The commission shall include in the permit, to the extent practicable when considering all public interests, those conditions considered by the commission necessary to maintain fish and wildlife habitats. In determining what conditions to include in the permit under this subsection, the commission shall consider any assessment performed under Section 11.152.

(e-1) Any permit for a new appropriation of water or an amendment to an existing water right that increases the amount of water authorized to be stored, taken, or diverted must include a provision allowing the commission to adjust the conditions included in the permit or amended water right to provide for protection of instream flows or freshwater

inflows. With respect to an amended water right, the provision may not allow the commission to adjust a condition of the amendment other than a condition that applies only to the increase in the amount of water to be stored, taken, or diverted authorized by the amendment. This subsection does not affect an appropriation of or an authorization to store, take, or divert water under a permit or amendment to a water right issued before September 1, 2007. The commission shall adjust the conditions if the commission determines, through an expedited public comment process, that such an adjustment is appropriate to achieve compliance with applicable environmental flow standards adopted under Section 11.1471. The adjustment:

(1) in combination with any previous adjustments made under this subsection may not increase the amount of the pass-through or release requirement for the protection of instream flows or freshwater inflows by more than 12.5 percent of the annualized total of that requirement contained in the permit as issued or of that requirement contained in the amended water right and applicable only to the increase in the amount of water authorized to be stored, taken, or diverted under the amended water right;

(2) must be based on appropriate consideration of the priority dates and diversion locations of any other water rights granted in the same river basin that are subject to adjustment under this subsection; and

(3) must be based on appropriate consideration of any voluntary contributions to the Texas Water Trust, and of any voluntary amendments to existing water rights to change the use of a specified quantity of water to or add a use of a specified quantity of water for instream flows dedicated to environmental needs or bay and estuary inflows as authorized by Section 11.0237(a), that actually contribute toward meeting the applicable environmental flow standards.

(e-2) Any water right holder who makes a contribution or amends a water right as described by Subsection (e-1)(3) is entitled to appropriate credit for the benefits of the

contribution or amendment against the adjustment of the holder's water right under Subsection (e-1).

(e-3) Notwithstanding Subsections (b)-(e), for the purpose of determining the environmental flow conditions necessary to maintain freshwater inflows to an affected bay and estuary system, existing instream uses and water quality of a stream or river, or fish and aquatic wildlife habitats, the commission shall apply any applicable environmental flow standard, including any environmental flow set-aside, adopted under Section 11.1471 instead of considering the factors specified by those subsections.

(f) On receipt of an application for a permit to store, take, or divert water, the commission shall send a copy of the permit application and any subsequent amendments to the Parks and Wildlife Department. At its option, the Parks and Wildlife Department may be a party in hearings on applications for permits to store, take, or divert water. In making a final decision on any application for a permit, the commission, in addition to other information, evidence, and testimony presented, shall consider all information, evidence, and testimony presented by the Parks and Wildlife Department and the board.

(g) The failure of the Parks and Wildlife Department to appear as a party does not relieve the commission of the requirements of this section.

Sec. 11.142. PERMIT EXEMPTIONS. (a) Without obtaining a permit, a person may construct on the person's own property a dam or reservoir with normal storage of not more than 200 acre-feet of water for domestic and livestock purposes. A person who temporarily stores more than 200 acre-feet of water in a dam or reservoir described by this subsection is not required to obtain a permit for the dam or reservoir if the person can demonstrate that the person has not stored in the dam or reservoir more than 200 acre-feet of water on average in any 12-month period. This exemption does not apply to a commercial operation.

Text of subsec. (b) as inserted by Acts 2001, 77th Leg., ch. 966, Sec. 2.09

(b) Without obtaining a permit, a person may construct on the person's property a dam or reservoir with normal storage of not more than 200 acre-feet of water for fish and wildlife purposes if the property on which the dam or reservoir will be constructed is qualified open-space land, as defined by Section 23.51, Tax Code. This exemption does not apply to a commercial operation.

Text of subsec. (b) as inserted by Acts 2001, 77th Leg., ch. 1427, Sec. 1

(b) Without obtaining a permit, a person may construct on the person's property in an unincorporated area a dam or reservoir with normal storage of not more than 200 acre-feet of water for commercial or noncommercial wildlife management, including fishing, but not including fish farming.

Sec. 11.143. USE OF WATER FROM EXEMPT DAM OR RESERVOIR FOR NONEXEMPT PURPOSES. (a) The owner of a dam or reservoir exempted under Section 11.142(a) or (b) who desires to use water from the dam or reservoir for a purpose not described by that subsection shall obtain a permit to do so. The owner may obtain a regular permit, a seasonal permit, or a permit for a term of years. The owner may elect to obtain the permit by proceeding under this section or under the other provisions of this chapter governing issuance of permits.

TEXAS ENVIRONMENTAL FLOWS ADVISORY GROUP

DECEMBER 2010

A REPORT TO THE GOVERNOR,

LIEUTENANT GOVERNOR,

AND SPEAKER OF THE HOUSE

TROY FRASER

CO-CHAIRMAN

ALLAN B. RITTER

CO-CHAIRMAN

TEXAS ENVIRONMENTAL FLOWS ADVISORY GROUP
COMMITTEE COMPOSITION

The Texas Environmental Flows Advisory Group is comprised of nine members: three members appointed by the governor including one member of the Texas Commission on Environmental Quality, one member of the Texas Water Development Board, and one member of the Texas Parks and Wildlife Department; three members of the Senate appointed by the Lieutenant Governor; and three members of the House of Representatives appointed by the Speaker of the House of Representatives. The Texas Environmental Flows Advisory Group members include:

Co-Chairman Troy Fraser, Texas Senate
Co-Chairman Allan Ritter, Texas House of Representatives
Glenn Hegar, Jr., Texas Senate
Joan Huffman, Texas Senate
Jodie Laubenberg, Texas House of representatives
Doug Miller, Texas House of Representatives
Carlos Rubinstein, Texas Commission on Environmental Quality
Joe M. Crutcher, Texas Water Development Board
Karen Hixon, Texas Parks and Wildlife Department

The Brazos River and Its Associated Bay and Estuary System

Agricultural Irrigation - Willie Gavranovic
Curt Mowery
Free-range Livestock - Brian Hays
Lloyd Huggins
Concentrated Animal Feeding Operation - Ned Meister
Recreational Water Users- Bruce Berg
Buddy Rochelle
Municipalities - David Blackburn
Tom Conry
Tommy O'Brien
SuEllen Staggs
Soil and Water Conservation Districts - Joe Langdon
Industry: Refining - Eddie Saucedo
Industry: Chemical - Gena Leathers
Industry: Electric Generation - Bruce Turner
Industry: Paper/Timber - None
Commercial Fishermen - Patrick Riley
Public Interest - Mary Ruth Rhodenbaugh
Sue Campbell William
Regional Water Planning Groups - Dale Spurgin
Tom Michael
Groundwater Conservation Districts - Horace Grace
River Authorities - Phil Ford
Environmental Interests- Ed Lowe
Matt Phillips
Keith Pate

Brazos River and its associated bay and estuary system - The Texas Environmental Flows Advisory Group appointed the stakeholder committee on October 29, 2010. Organizational meetings are being scheduled.