PMComanchePeakPEm Resource

From: Willingham, Michael
Sent: Friday, October 09, 2009 2:53 PM
To: Brennan Smith (smithbt@ornl.gov); Lance McCold (mccoldln@ornl.gov); 'Zimmerman, Gregory P.'; Smith, Ellen D.; Tiruneh, Nebiyu; Barnhurst, Daniel
Cc: ComanchePeakCOL Resource
Subject: FW: Supplemental Information for the ER RAI
Attachments: TXNB-09052 ER RAI #1 final supp.pdf

Luminant submitted responses to hydrology issues and the Blowdown Treatment Facility. See attached PDF document.

MICHAEL H. WILLINGHAM, ENV PROJECT MANAGER
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Subject: Supplemental Information for the ER RAI

Luminant has submitted to the NRC the attached supplemental information resulting from the ER RAI. Only the letter with the supplemental information (Attachment 1) is attached to this e-mail. Attachments 2 and 3 total almost 300 Mb and were sent on CD to Stephen Monarque and to the Document Control Desk. If there are any questions regarding the submittal, please contact me or contact Don Woodlan (254-897-6887, Donald.Woodlan@luminant.com).

Thanks,

John Conly
COLA Project Manager NuBuild
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Hearing Identifier: ComanchePeak_COL_Public
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October 8, 2009

U. S. Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555
ATTN: David B. Matthews, Director
Division of New Reactor Licensing

SUBJECT: COMANCHE PEAK NUCLEAR POWER PLANT, UNITS 3 AND 4
DOCKET NUMBERS 52-034 AND 52-035
SUPPLEMENTAL INFORMATION FOR THE ENVIRONMENTAL REVIEW RAI

Dear Sir:

Luminant Generation Company LLC (Luminant) herein submits supplemental information for the responses to Environmental Review Request for Additional Information Questions HYD-11, -18, -19 (combined), HYD-23, and a general discussion regarding potable water to be supplied for Units 3 and 4. Luminant is providing this supplemental information after having several teleconferences with the NRC. Should you have any questions regarding the information, please contact Don Woodlan (254-897-6887, Donald.Woodlan@luminant.com) or me.

There are no commitments in this letter.

I state under penalty of perjury that the foregoing is true and correct.

Executed on October 8, 2009.

Sincerely,

Luminant Generation Company LLC

Donald R. Woodlan for

Rafael Flores

Attachments:
1. Supplemental Responses to Request for Additional Information
2. Potential Impacts of Comanche Peak Cooling Tower Operation on Total Dissolved Solids in the Lower Reach of Lake Granbury (on CD)
3. Somervell County Water Supply Project, Amendment to 2006 Brazos G Regional Water Plan (on CD)

cc: Stephen Monarque w/all attachments (on CD)

Electronic Distribution w/o Attachments 2 and 3

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SUPPLEMENTAL RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

Comanche Peak, Units 3 and 4

Luminant Generation Company LLC

Docket Nos. 52-034 and 52-035

RAI REGARDING THE ENVIRONMENTAL REVIEW

DATE OF RAI ISSUE: 6/26/2009

QUESTION NO.: HYD-11 (3.4.2-1), HYD 18 (5.3-1), and HYD 19 (5.3-2)

SUPPLEMENTAL INFORMAITON

This supplemental information is provided in two parts: Background and Answer.

BACKGROUND:

Combined License Applications for New Reactors were searched on the NRC website to obtain information regarding recirculation issues at new reactor sites. Most of the river sites researched were noted to have adequate flow to prevent recirculation. The Bellefonte Nuclear Station, Units 3 and 4 site was found to be similar to CPNPP Units 3 and 4, in that it is situated on the Guntersville Reservoir, a run-of-the-river reservoir. The Bellefonte site can have reverse flow based on upstream dam operation, but those events are predictable, short-term, and can be mitigated by administrative controls. Additionally, there is abundant flow through Guntersville Reservoir. The William States Lee II, Units 1 and 2 site was found to discharge at the dam so there is no potential for recirculation. No other run-of-the-river reservoir sites were found that have similar characteristics to CPNPP Units 3 and 4 at Lake Granbury, where extended periods of minimal dam discharges combined with the operation of the plant and proximity to the dam may cause recirculation. There are reservoir sites with existing once-through units such as North Anna and CPNPP Units 1 and 2 that have obvious recirculation, but these sites have large intake/discharge volumes that dominate the flow regime of the reservoir. While recirculation may occur at these sites, they are not comparable to CPNPP Units 3 and 4. The Standard Review Plan provides guidance for plants located on rivers and guidance for plants located on large cooling ponds or lakes. The use of Lake Granbury for CPNPP Units 3 and 4 is somewhat of a hybrid between these two options as flows in Lake Granbury can vary from no flow to 72,585 cfs (recorded on October 15, 1981).

Detailed ambient current pattern data was not found for Lake Granbury during development of the ER. The Brazos River Authority (BRA) stated that no studies or modeling have been performed and that during times of low flow through Lake Granbury, current patterns may be dictated by wind speed and direction. Based on discussions with the NRC reviewer, ambient flow patterns and how the CPNPP Units 3 and 4 intake and discharge will affect them during prolonged low-flow conditions are needed to determine potential impacts. It is Luminant’s understanding that previous NRC inquiries regarding thermal loading on the lower portion of Lake Granbury were answered in the white paper addressing the HYD-43 information need and the related heat balance analysis. Thermal modeling was performed and Luminant believes it addressed the potential thermal impacts.

The NRC has stated that without ambient hydrodynamic data, it cannot be assumed that the lower portion of Lake Granbury is fully mixed; however, Luminant has provided data that indicate Lake Granbury is predominately a fully-mixed water body [(Ward 2008), attached]. Based on discussions with the NRC, Luminant understands that even if a chemical mass balance (apart from that performed for chlorides and TDS) is performed to complement the heat balance analysis already performed, it may not fully address the NRC's needs.

ANSWER:

It is Luminant's position that hydrologic alterations to Lake Granbury resulting from CPNPP Units 3 and 4 operations will be similar to those identified through Lake Granbury's historical use as both a cooling water source and discharge location for local power plants. Two flow scenarios are expected during CPNPP Units 3 and 4 operations.

> High-flow - flows or releases through DeCordova Bend Dam, located approximately 800 feet downstream of the Units 3 and 4 discharge, exceed intake diversions from CPNPP Units 1 through 4 and Wolf Hollow, located 6,020 feet upstream of the Units 3 and 4 discharge.
>
> Low-flow - intake diversions from CPNPP Units 1 through 4 and Wolf Hollow, located 6,020 feet upstream of the Units 3 and 4 discharge, exceed releases through DeCordova Bend Dam, located approximately 800 feet downstream of the Units 3 and 4 discharge.

As evident in lake release data, protracted low-flow conditions through the DeCordova Bend Dam will be unusual, since Possum Kingdom releases must flow through Lake Granbury to meet downstream water user demands. This is especially true during dry summer months when downstream water demands typically increase. With regard to mixing in Lake Granbury, available historical temperature data for Lake Granbury indicate a predominately fully-mixed water body during any flow condition with substantial stratification occurring only about 12% of the time (some of which is attributable to near-surface solar heating rather than seasonal stratification). [(Ward 2008), attached]

Based on the operating history of the existing Squaw Creek Reservoir (SCR) make-up water intakes, during times of high- or low-flow through Lake Granbury, intake-induced current pattern alterations have not destabilized Lake Granbury with respect to its designated uses. Similarly, the addition of Units 3 and 4 intakes adjacent to SCR make-up water intakes, along with the increased releases from Possum Kingdom to meet water needs of Units 3 and 4, are not expected to destabilize Lake Granbury during any flow condition.

There is currently no operational discharge in Lake Granbury similar to that proposed for Units 3 and 4; therefore, a direct comparison to existing facilities with regard to discharge-induced current pattern alterations is not possible. However, based upon Luminant's operating experience with the upstream DeCordova Steam Electric Station (SES), where once-through cooling water is discharged to the lower portion of Lake Granbury, impacts from discharge-induced current pattern alterations have not been identified as destabilizing to Lake Granbury.

During high-flow conditions, effluent from Units 3 and 4 is expected to mix quickly and exit Lake Granbury through DeCordova Bend Dam. This expectation is based upon the dominating flow pattern toward the dam during high-flow conditions and the close proximity of the diffusers to the dam. During low-flow conditions, recirculation current patterns may develop between Units 3 and 4 discharge and intake lines; however, the volume of water contained in this reach of Lake Granbury has been shown to be sufficient to dissipate the thermal plume of Units 3 and 4. Additionally, chemical impacts from Units 3 and 4 effluents are mitigated during low flow by water treatment and mixing with freshwater from upstream releases. As a conservative design measure, effluent limits were assumed to be below Lake Granbury water quality standards at the end-of-pipe with no credit for a mixing zone.

Ambient current patterns are altered when cooling water for Units 3 and 4 is diverted from Lake Granbury and returned from the cooling towers during low-flow conditions. The ambient flow field of the lower portion of Lake Granbury is currently altered by SCR make-up diversions, Wolf Hollow diversions, and DeCordova SES once-through cooling operations. Increased withdrawals from this area for Units 3 and 4 operations are not expected to alter current patterns during high-flow conditions.

Units 3 and 4 blowdown is discharged near the dam as shown in the attached Figure 1. The path of the discharge plume will depend upon the amount of water being released through the dam and the rate at which water is being diverted for plant operations upstream. Based on the diffuser design and location, the distance between the discharge and intake (1.14 miles), the width of the lake (0.375 miles), the volume of water contained within this area (9668 acre-feet), and mixing of freshwater make-up from upstream reservoir releases, there is no reason to assume that local channeling of concentrated effluent will occur between the discharge and intake.

Broad recirculation current patterns may occur under certain conditions, for example when the Units 3 and 4 intake and/or discharge flow rates exceed the flow through the dam; however, no adverse impacts are expected because the effluent has been treated and is near the ambient temperature of Lake Granbury. Based on the nature of the Units 3 and 4 effluent from the cooling tower basins to Lake Granbury, through a treatment system and approximately a 7-mile pipeline, there is no technical reason to expect adverse temperature or chemical impacts in the lake as a whole or in any isolated locations within the lake. This is further supported by historical operation of the DeCordova SES and the absence of any significant impacts to Lake Granbury. This plant employs a once-through cooling system with much higher thermal characteristics than a cooling tower configuration.

In summary, the diversions and returns needed to support CPNPP 3 and 4 do not significantly alter the currents in Lake Granbury beyond the range of flows and potential flow paths seen normally. Because the heated circulating water passes through cooling towers (considered Best Available Technology for thermal treatment) and the return water is treated to regulatory requirements, there is no reason to project temperature or chemical concentrations either generally or locally in Lake Granbury. An understanding of the flows, temperatures and chemical concentrations can be obtained by examining the attached Figure 1 and the explanations above. This assessment does not require detailed calculations to understand that the flows, temperatures and chemical content of the lake will not be disturbed by CPNPP Units 3 and 4 operations in a manner that would have more than a very minimal impact on the environment, including water and shoreline biotics or recreational use of the lake.

Impact on R-COLA

None.

Impact on S-COLA

None.

Impact on DCD

None.

Attachments

Figure 1 - Cooling Water Diversion and Discharge Locations on Lower Lake Granbury

(Ward 2008) Potential Impacts of Comanche Peak Cooling Tower Operation on Total Dissolved Solids in the Lower Reach of Lake Granbury, Dr. George H. Ward, January 31, 2008

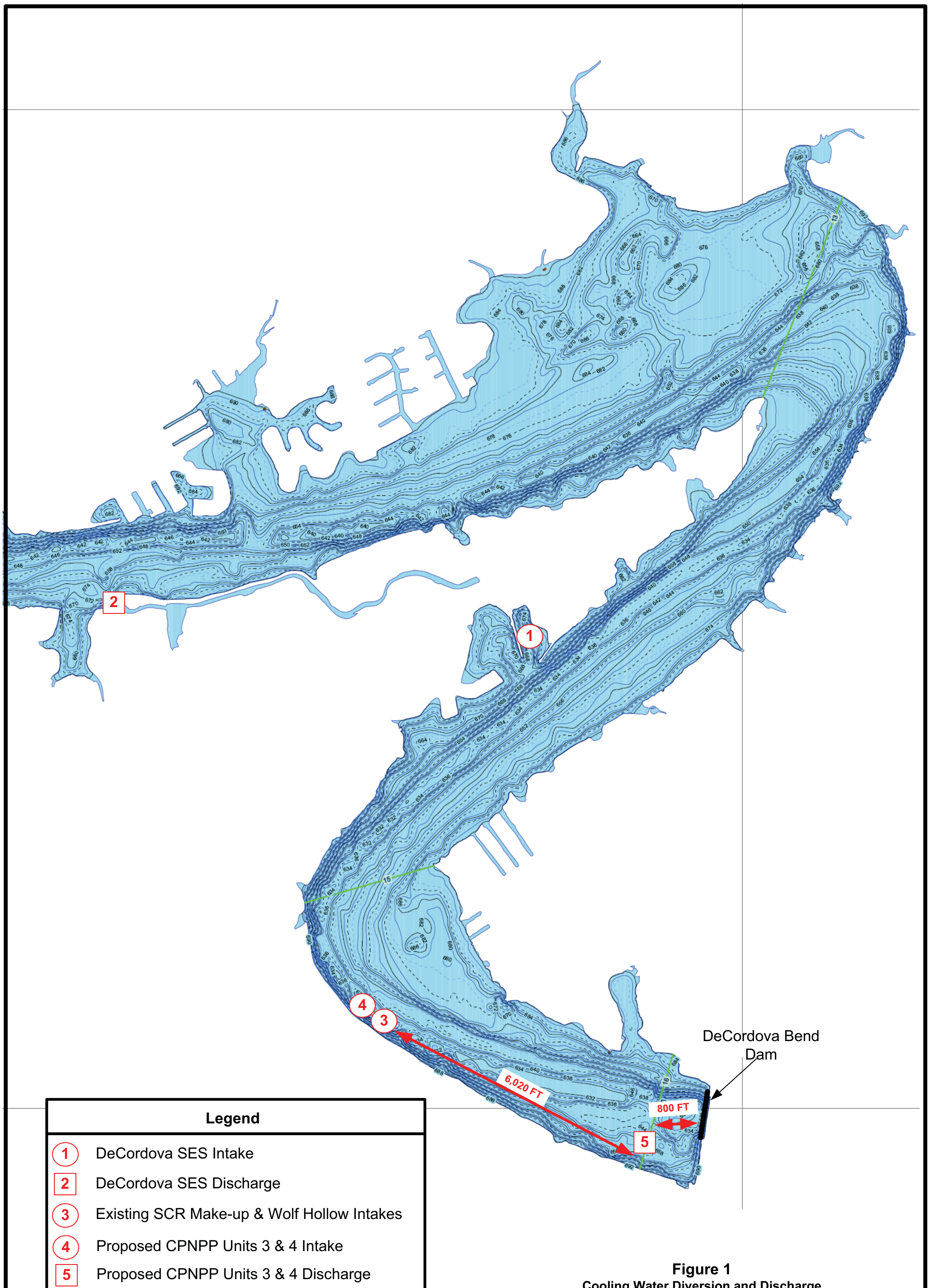

Figure 1
Cooling Water Diversion and Discharge Locations on Lower Lake Granbury

QUESTION NO.: HYD-23 (9.4.2.2.5-1)

Provide a discussion on the viability of routing the mixed effluent from the treated (BDTF) and untreated (BDTF bypass) blowdown water at ambient or below ambient chloride and TDS concentrations and temperature to the cooling tower basins for reuse. This alternative would avoid the construction of a return pipeline to Lake Granbury, as well as eliminate the need for constructing a discharge structure at Lake Granbury. The rationale for excluding the detailed evaluation this alternative should be clearly presented and discussed.

SUPPLEMENTAL INFORMATION:

With respect to alternate designs for the Blowdown Treatment Facility (BDTF), one alternative of interest is processing and returning all the water to the cooling tower basins for reuse and not returning any water to Lake Granbury (closed-cycle cooling system). Although a documented study was not developed, Luminant has considered this alternative. This alternative has both advantages and disadvantages as described below.

The primary advantage is that the discharge permit is greatly reduced and the potential impacts to Lake Granbury are easily analyzed. The current proposed route of the return piping will share the right-of-way for the supply piping thereby reducing environmental impacts. Therefore, from this perspective there is little advantage to choosing the closed-cycle cooling system to eliminate a return piping system.

The disadvantages of the closed-cycle cooling system, apart from that performed for chlorides and TDS, are outlined below:

- In order to maintain the TDS concentration of the cooling tower basins, the dimension of closed-cycle cooling system would need to be 1.4 times larger (approximately 550 acres of land impacts) than the current design for the BDTF. The closed-cycle cooling system would probably need to consider redundancy as well to deal with potential failures. The current BDTF system provides more flexibility for such failures.

- The current BDTF system is projected to be operational for three-months during seasonally low-flow periods for Lake Granbury when the TDS concentrations are naturally high. For the remainder of the year when the TDS concentrations are low, the BDTF will be bypassed. In comparison, the closed-cycle cooling system would need to be continuously operated to maintain the TDS concentration of the cooling tower basins.

- For both systems, solid waste (mostly salt) will be generated when the systems are operational. As discussed above, the closed-cycle cooling system will be continuously operational resulting in the generation of more solid waste that will need to be managed and disposed of.

In summary, Luminant looked at the options (including the financial impacts) and chose the current design. Both options offer environmental impacts of a different nature, but both small and acceptable. However, the current design is considered the most flexible and robust, and the operation of the system can be altered to meet potential future requirements.

<u>Impact on R-COLA</u>

ER Revision 0 pages 9.4-22 and 9.4-23 have been revised to reflect this additional information.

<u>Impact on S-COLA</u>

None.

<u>Impact on DCD</u>

None.

proposed water supply for the heat dispersion system at CPNPP Units 3 and 4 is Lake Granbury reservoir. No alternate sources of water are available for this purpose; alternate sources would require the development of a new lake and sufficient water supply from the Brazos River System to fill the new lake. The time required obtaining land and mineral rights, ROWs, and permission to build a new lake does not support the scheduled activities of the project. Land and water are not available to provide any viable alternate water sources. The Lake Granbury proposed water supply system is designed so that the intake would be at sufficient depth to insure flow during all anticipated lake low water levels. No shortages are anticipated. Based on the maximum intake flow with both units in operation, Lake Granbury reservoir would supply sufficient water to meet the operational requirements of the cooling water systems.

Withdrawal volumes are regulated by the Brazos River Authority (BRA). The withdrawal would be controlled by allocation agreement with the BRA. The environmental impact of the use of this water supply would be SMALL. No alternative source is identified that would be environmentally equivalent or superior. No adverse impact is identified, and no mitigation is warranted.

9.4.2.2.5 Alternatives to the Proposed Water Treatment System

Water treatment of the influent water is applied to the CWS water for the proposed project (Subsection 3.3.2.1). Treatment typically consists of adjustments to water chemistry using several chemicals: biocide, algaecide, pH adjuster, corrosion inhibitor, scale inhibitor, and silt dispersant. Water quality effects could occur from the concentration and discharge of chemicals added to the re-circulating cooling water. These additives are present in the blowdown.

Concentration of dissolved salts in the makeup water resulting from evaporative water losses would require the discharge of a certain percentage of the mineral-rich stream (blowdown) and its replacement with fresh water (makeup). The concentration of total dissolved solids in the cooling tower blowdown would be monitored to meet the values on the TPDES permit. Dilution of the low-volume blowdown by the receiving water would also reduce water quality effects of contaminants discharged from closed-loop cooling systems. The number of cycles that water is used before the blowdown is removed is changed to meet the limitations of the TPDES contaminant concentrations in the system. The treatment of the blowdown water may be required to remove chemicals, salts and TDS to meet TDPES discharge limits and not adversely impact the water quality in the lower part of Lake Granbury. Any water treatment depends on the TPDES permit requirements that is expected to be modified prior to construction of CPNPP Units 3 and 4.

Based upon expected TPDES permit requirements, design alternatives for the BDTF water treatment included a number of possible designs and variations on the designs. The proposed system consists of a 46% diversion and treatment of the blowdown and then returning 80% of the diverted water to the blowdown returning to Lake Granbury with a blended effluent TDS concentration of 2500 mg/l. The proposed system satisfies the expected effluent TDS concentration limit of 2500 mg/l discharge into Lake Granbury. Alternatives of this same design were evaluated using 31% and 18% diversion values and returning blended effluent TDS concentrations of 3000 mg/l and 3500 mg/l respectively. (URS 2008a)

An alternative BDTF design considered was routing both treated and untreated blowdown water to the cooling tower basins for reuse (closed-cycle cooling), thus eliminating the need for RAI HYD-23 constructing a discharge structure to Lake Granbury. This alternative was eliminated from consideration for several reasons. RAI HYD-23

In order to maintain the TDS concentration of the cooling tower basins, the dimension of this system would need to be 1.4 times larger in size than the proposed system. The proposed system is projected to be operational during the seasonally low-flow period of Lake Granbury (approximately three-months) when the TDS concentrations are naturally high. In comparison, this system would need to be continuously operated to maintain the TDS concentrations of the cooling tower. Both systems will generate solid waste (mostly salts) when operational. This system, due the need of continuous operation, will generate more solid waste than the proposed system. The options were considered and the proposed system was selected as it is considered the most robust and the operation of the system can be altered to meet the projected future requirements.

An alternative to increase makeup supply to the system and divert the excess makeup into a water treatment facility was evaluated also. This option treated the excess makeup water and then blended it with the blowdown from the CWS to provide a blended effluent TDS concentration of 2500 mg/l returning to the discharge outfall. This alternative requires an additional 8626 gpm makeup water flow, more blowdown returning to the discharge outfall, additional water treatment facilities, and a new 3 million gallon evaporation pond for effluent waste concentrates. (URS 2008a)

Alternative system designs for increasing the cycles of concentration from 2.4 to 5.0 were evaluated utilizing increased chemical feed and treatment bringing blowdown effluent TDS concentration to 2500 mg/l but producing a high waste concentrate effluent of 8400 mg/l that would require special handling methods such as a new 25 million gallon evaporation pond, deep well injection, or acquire permission to pump the waste concentrates to be released into Possum Kingdom Lake. These alternatives reduce the amount of water required for makeup and the amount of blowdown returning to the discharge outfall, but they require twice the chemical usage, additional equipment and storage, and they produce a waste concentrate of approximately 8400 mg/l that exceeds all the current local waterway permit release limits. (URS 2008a)

Hybrid cooling tower design was also evaluated for the ability to recover (approximately 15% with Air2Air CT design) water from the cooling tower plume and use that water to blend along with treated blowdown to provide a blended effluent TDS concentration of 2500 mg/l at the discharge outfall. The resultant effluent TDS concentration is the same as other alternatives, but the cost of the hybrid type design is much higher and therefore, this option was not considered as viable. (URS 2008a)

All nuclear power plants in Texas are required to obtain a TPDES permit to discharge effluents. This permit is periodically renewed to ensure the continued operation of the units is within the bounds of the controls specified and that no unanticipated impacts go unaddressed. The TPDES permit renewals provide the opportunity to require modification of power plant discharges or to alter discharge monitoring in response to water quality concerns.

Effects of cooling tower discharges would have small significance assuming compliance with water quality criteria (e.g., TPDES permits). In considering the effects of closed-cycle cooling systems on water quality, the NRC evaluated the same issues that were evaluated for once-

QUESTION: GENERAL DISCUSSION REGARDING POTABLE WATER

Are the supply pipes for the potable water source from Glen Rose already available to supply CPNPP? If Glen Rose obtains its water from Wheeler Branch, what impacts do CPNPP Units 3 and 4 have on the Glen Rose and on Wheeler Branch water systems? If CPNPP obtains water from Wheeler Branch, how will the water be treated to make it acceptable as potable water?

SUPPLEMENTAL INFORMATION:

The Comanche Peak Nuclear Power Plant (CPNPP) site currently obtains potable water from the Trinity Aquifer (Twin Mountains Formation) by way of onsite water wells. The 2006 Brazos G Regional Water Plan included the Wheeler Branch Off-Channel Reservoir as a water management strategy to address water supply needs in Somervell County. The Somervell County Water Supply Project (see attached amendment to the 2006 Brazos G Regional Water Plan) will treat raw water from Wheeler Branch Off-Channel Reservoir and transmit the treated water to customers of the Somervell County Water District (SCWD). The SCWD has now constructed the reservoir and the associated raw water supply facilities, and is currently in the design phase for a water treatment plant and a transmission system to deliver water to wholesale and retail customers. Luminant currently exercises substantial conservation with regard to groundwater use at CPNPP and in order to further curtail and ultimately eliminate this use, intends to purchase water from the SCWD to provide potable water for the plant and high quality process water.

There are currently seven water user groups in Somervell County: the City of Gen Rose; County Other; Manufacturing; Steam Electric; Mining; Irrigation; and Livestock.

- The City of Glen Rose obtains groundwater from the Trinity Aquifer. No shortage is projected for the City of Glen Rose; however, Glen Rose may obtain supplemental surface water supplies from the Somervell County Water Supply Project.

- Somervell County-Other obtains its water supply from the Trinity Aquifer. Based on the available groundwater supply, Somervell County-Other is projected to have a shortage of 231 ac-ft/yr in the year 2030 and 260 ac-ft/yr in the year 2060. The Wheeler Branch Off-Channel Reservoir and the Somervell County Water Supply Project have been recommended to meet the projected shortage of the County-Other water user group

- Somervell County Manufacturing obtains its water supply from the Trinity Aquifer. Based on the available groundwater supply, Somervell County Manufacturing is projected to have a shortage of 4 ac-ft/yr in the year 2030 and 7 ac-ft/yr in the year 2060. Water conservation and the purchase of water from the City of Glen Rose have been recommended to meet the projected shortage of the Somervell County Manufacturing water user group.

- Somervell County Steam-Electric is projected to have a surplus of water through 2060. Potable water at the CPNPP site is currently provided from local groundwater. When the Somervell County Water Supply Project is developed, potable water and some process water for Units 3 and 4 will be obtained from the project.

- Somervell County Mining obtains its water supply from the Trinity Aquifer. Based on the available groundwater supply, Somervell County Mining is projected to have a shortage of 94 ac-ft/yr in the year 2030 and 85 ac-ft/yr in the year 2060. Water conservation and voluntary redistribution from the Steam-Electric water user group have been recommended to meet the projected shortage of the Somervell County Mining water user group.

- Somervell County Irrigation is projected to have a surplus of water through 2060 and no changes in water supply are recommended.
- No shortages are projected for Somervell County Livestock and no changes in water supply are recommended.

SCWD is currently designing a 1.5-million gallons per day (mgd) treatment plant at the Wheeler Branch Reservoir, which will utilize 840 ac-ft per year of the permitted 2,000 ac-ft of water from the reservoir. The treatment plant, planned to operate in the first quarter of 2011, will eventually be expanded to 5 mgd for a total annual water use from Wheeler Branch Reservoir of 2,000 ac-ft. CPNPP is expected to use up to 484 ac-ft per year (300 gpm) or 24 percent of the total amount available from the Wheeler Branch Reservoir through the year 2060; however, only around 50 gpm (81 ac-ft per year) will be initially used for potable purposes. The balance of the available water will be for Units 3 and 4 process needs. The SCWD will construct a pipeline to the southwest corner of the CPNPP property, near the plant entrance at FM 56. From there, CPNPP will provide piping to tie points. The water will be supplied as potable water meeting all regulatory potable water standards and no additional treatment at the CPNPP site will be needed.

The City of Glen Rose and Luminant are the only significant wholesale customers in the county; however, it is possible that other wholesale customers will develop before the system is actually built. When compared to established water plan development criteria, the Somervell County Water Supply Project reliably provides a sufficient quantity of water for local needs while having a low impact on environmental water needs, habitat, cultural resources, threatened and endangered species, and wetlands. No apparent negative impacts on other state water resources were identified in connection with the Somervell County Water Supply Project. The source change from groundwater to surface water by CPNPP will lessen the impact on declining groundwater levels in the area.

Impact on R-COLA

None.

Impact on S-COLA

None.

Impact on DCD

None.

Attachment

Somervell County Water Supply Project, Amendment to 2006 Brazos G Regional Water Plan. June 2008; HDR-00044257-08, Somervell County Plan Amendment; Prepared by Freese and Nichols, Inc. for Somervell County Water District