Luminant

Rafael Flores
Senior Vice President &
Chief Nuclear Officer
rafael.flores@luminant.com

Luminant Power
P O Box 1002
6322 North FM 56
Glen Rose, TX 76043

T 254.897.5590
F 254.897.6652
C 817.559.0403

CP-201100944
Log # TXNB-11046

Ref. # 10 CFR 52

July 14, 2011

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 RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION
NO. 4314 (SECTION 2.4.12)

Dear Sir:

Luminant Generation Company LLC (Luminant) submits herein supplemental information for the response to Request for Additional Information (RAI) No. 4314 (CP RAI #147) for the Combined License Application for Comanche Peak Nuclear Power Plant Units 3 and 4. The supplemental information addresses potential seismic effects on post-construction groundwater elevations.

Should you have any questions regarding this supplemental 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 July 14, 2011.

Sincerely,

Luminant Generation Company LLC

Donald R. Woodlan for

Rafael Flores

Attachment: Supplemental Response to Request for Additional Information No. 4314 (CP RAI #147)

D090
NRO

Electronic distribution w/attachment:

Rafael.Flores@luminant.com
mlucas3@luminant.com
jeff.simmons@energyfutureholdings.com
Bill.Moore@luminant.com
Brock.Degeyter@energyfutureholdings.com
rbird1@luminant.com
Allan.Koenig@luminant.com
Timothy.Clouser@luminant.com
Ronald.Carver@luminant.com
David.Volkening@luminant.com
Bruce.Turner@luminant.com
Eric.Evans@luminant.com
Robert.Reible@luminant.com
donald.woodlan@luminant.com
John.Conly@luminant.com
JCaldwell@luminant.com
David.Beshear@txu.com
Ashley.Monts@luminant.com
Fred.Madden@luminant.com
Dennis.Buschbaum@luminant.com
Carolyn.Cosentino@luminant.com
NuBuild Licensing files
sfrantz@morganlewis.com
jrund@morganlewis.com
tmatthews@morganlewis.com
regina.borsh@dom.com
diane.aitken@dom.com
askolhek@bechtel.com
yoshinori_fujiwara@mhi.co.jp
kano_saito@mhi.co.jp
shigemitsu_suzuki@mhi.co.jp
Luminant Records Management (.pdf files only)

shinji_kawanago@mnes-us.com
masanori_onozuka@mnes-us.com
ck_paulson@mnes-us.com
joseph_tapia@mnes-us.com
russell_bywater@mnes-us.com
william_mcconaghy@mnes-us.com
mutsumi_ishida@mnes-us.com
yukako_hill@mnes-us.com
nicholas_kellenberger@mnes-us.com
ryan_sprengel@mnes-us.com
al_freitag@mnes-us.com
masaya_hoshi@mnes-us.com
rjb@nei.org
kak@nei.org
michael.takacs@nrc.gov
cp34update@certrec.com
michael.johnson@nrc.gov
David.Matthews@nrc.gov
Balwant.Singal@nrc.gov
Hossein.Hamzehee@nrc.gov
Stephen.Monarque@nrc.gov
jeff.ciocco@nrc.gov
michael.willingham@nrc.gov
john.kramer@nrc.gov
Brian.Tindell@nrc.gov
Alicia.Williamson@nrc.gov
Elmo.Collins@nrc.gov
Loren.Plisco@nrc.com
Susan.Vrahoretis@nrc.gov
Frank.Akstulewicz@nrc.gov
ComanchePeakCOL.Resource@nrc.gov

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 NO.: 4314 (CP RAI #147)

SRP SECTION: 02.04.12 - Groundwater

QUESTIONS for Hydrologic Engineering Branch (RHEB)

DATE OF RAI ISSUE: 2/26/2010

QUESTION NO.: 02.04.12-9 S01

NUREG-0800, Standard Review Plan (SRP), Chapter 2.4.12, 'Groundwater,' establishes criteria that the NRC staff intends to use to evaluate whether an applicant meets the NRC's regulations.

In order to make its safety determination based on information that adequately demonstrates conservatism and in consideration of the post-construction conditions at the site, the staff requests that a discussion of any potential seismic effects on post construction groundwater elevations surrounding the subgrade, safety related structures, be provided.

SUPPLEMENTAL INFORMATION:

This supplemental response is provided to address NRC Hydrology Audit Open Item (OI) 2.4.12-6 submitted for the Hydrology Audit conducted June 7-9, 2011. The response to RAI 147 Question 02.04.12-9 discussed the post-construction groundwater system at the CPNPP to address the expected maximum groundwater elevation. This supplemental response is provided to extend that discussion to address potential groundwater level changes resulting from seismic activity as discussed during the audit.

Due to slow seepage from the surrounding Glen Rose Formation limestone and limited surface infiltration, post-construction groundwater that may be present surrounding the CPNPP Units 3 and 4 reactor building (R/B) and auxiliary building (A/B) will be the result of slow accumulation in the engineered fill. Well-compacted engineered fill during construction will completely surround the Unit 3 and 4 R/B and A/B, hence future consolidation of the backfill would be insignificant. Therefore, groundwater seepage from the surrounding Glen Rose Formation and limited surface infiltration will accumulate within this compacted engineered fill matrix.

Seismically-induced groundwater elevation changes are not fully understood, but are generally considered to be the result of sediment consolidation effects, pressure-induced opening of sediment-filled fractures and pore spaces, redistribution of pore pressure, and changes in the formation volumetric strain relationships caused by the passage of the Rayleigh-, S-, and Love-waves generated by the event. According to Wang and Manga (2010), the specific causal mechanism leading to a change in groundwater elevation tends to be related to the strength of the seismic event, distance from the rupture, and the specific media evaluated.

Consolidation effects resulting in a spike increase in groundwater elevations are normally associated with earthquakes in the near-field (within 1 rupture length distance) (Wang and Manga, 2010). Based on the locations and magnitudes of nearby earthquakes reported in FSAR Subsection 2.5.2, there are no earthquakes of sufficient magnitude to cause near-field consolidation effects in the engineered fill surrounding the A/B and R/B. Therefore, it is unlikely there would be a nearby seismic event capable of producing a spike increase in groundwater levels at the CPNPP.

Intermediate-field (up to 10 rupture length distance) elevation changes are generally considered to be the result of enhanced permeability due to flushing and opening of groundwater pathways (pores, fractures, mineralized sediments) allowing better communication with the local groundwater source or sink. The direction of change at a particular well is dependent on the location of the well relative to the groundwater source or the sink. Those wells located in an area dominated by the source area (recharge) will show a rise in groundwater elevation. Conversely, those wells located near the groundwater sink (spring, lake, river) will show a decrease in groundwater elevation (Wang and Manga, 2010).

The CPNPP is located approximately 180 miles from the Meers Fault as described in FSAR Subsection 2.5.2.2.2.5. This is considered the nearest capable fault to the site and is described as having a projected magnitude of 7.0 with a fault rupture length of approximately 23 miles. Based on the estimated rupture length and magnitude, a seismic event on the Meers Fault would place the CPNPP in the intermediate-field of the earthquake. Based on the location of the CPNPP near the shore of Squaw Creek Reservoir (SCR), it is expected that any intermediate-field seismic enhancement of site permeability (either in the Glen Rose formation, engineered, or existing fills) would result in a better hydraulic connection to the SCR (groundwater sink) and would result in a lowering of groundwater elevations surrounding the A/B and R/B.

Far-field (greater than 10 rupture length distance) elevation changes are normally due to pressure wave-induced changes in porosity from flushing of fractures and pores, commonly resulting in short-term groundwater oscillations as the pressure waves pass the well location (Wang and Manga, 2010). These may or may not produce a permanent change in groundwater elevations. Usually, these far-field effects are small in nature (observed millimeter to centimeter changes) and short in duration; however, foot-scale oscillations for several hours have been reported in high transmissivity aquifers (Schindel, 2011). Although the engineered and existing fills are highly transmissive, any groundwater would be of very limited volume and large-scale oscillations would be considered highly unlikely. Similar to the intermediate-field analysis, any far-field seismic enhancement of site permeability (either in the Glen Rose formation, engineered, or existing fills) would result in a better hydraulic connection to the SCR (groundwater sink) and would result in a lowering of groundwater elevations surrounding the A/B and R/B.

Due to the documented low permeability and limited secondary porosities in the surrounding Glen Rose Formation limestone, any pressure-induced clearing of fractures and pore spaces would be minimal and any seismically-induced enhancement of permeability would be expected to produce a decline in groundwater elevations due to enhancement of the hydraulic connection to the SCR. Consolidation potential of the engineered fill surrounding the CPNPP Units 3 and 4 R/B and A/B would be minimized by the compaction performed during the placement of the engineered fill material during construction.

Based on the above assessment, it is unlikely that a seismic event would cause a seismically-induced rise in groundwater elevations exceeding the maximum allowed groundwater elevation of 821 ft bgs as defined by the DCD.

References

Wang, C. Y. and Manga, M., Earthquakes and Water, Lecture Notes in Earth Sciences 114, Springer Verlag Berlin Heidelberg, 2010.

Schindel, G. M., Honshu, Japan Earthquake of March 11, 2011 9.0 Magnitude recorded in the Edwards Aquifer, San Antonio, Texas, Speleogenesis and Evolution of Karst Aquifers, Issue 10, 2011.

Impact on R-COLA

See attached marked-up FSAR Revision 2 pages 2.4-81 and 2.4-112.

Impact on S-COLA

None; this response is site-specific.

Impact on DCD

None.

flow beneath the site, or vice versa, based on the geographic positions of these wells (i.e., the distance of the domestic wells from the power block area and their completion in the Twin Mountain Formation).

2.4.12.4 Monitoring or Safeguard Requirements

Accident effects are discussed in Subsection 2.4.13 and the radiation protection program is discussed in Section 12.5. Additionally, analysis of the relationship of the CPNPP groundwater to seismicity and the potential for related soil liquefaction and the potential for undermining of safety-related structures is discussed in Section 2.5. A groundwater monitoring program will be developed before fuel load that will include radiological sampling based upon post-construction configuration.

2.4.12.5 Site Characteristics for Subsurface Hydrostatic Loading

According to the Design Control Document (DCD) for the US-APWR, the design maximum groundwater elevation is 1 ft below plant grade. The CPNPP plant grade elevation is 822 ft msl; therefore, the design maximum groundwater elevation is 821 ft msl relative to the current elevation of the Glen Rose Formation. The Glen Rose Formation is an impermeable limestone that confines the groundwater in the underlying Twin Mountains Formation aquifer. Not all of the wells completed in the Glen Rose Formation were sampled; however, the wells that were sampled and purged, purged dry and water did not return for several days to weeks. All deep Glen Rose wells have been reported as "dry" or reported with less than 1-foot of water. The Twin Mountains Formation is at least 230 ft below the Glen Rose Formation; therefore, the installation and operation of a permanent dewatering system is not planned. A dewatering system will not be required during construction. Normal construction practices will be employed to remove water from seepage and rainfall. Based on the documented low primary and secondary permeability of the Glen Rose Formation limestone at the site, and the fact that the engineered fill placed around the CPNPP Units 3 & 4 reactor and auxiliary buildings will be well compacted, it is unlikely that a seismic event would cause a seismically-induced rise in groundwater elevations (Reference 2.4-298). RCOL2_2.4.12-09 S01

Based on the removal of the soil overlying the bedrock surrounding the site foundations, and the maximum groundwater elevation within the engineered fill constrained by the southern and western trench drain to less than 820 ft. msl, the design maximum groundwater elevation is expected to be satisfied.

2.4-298 C.-Y.Wang, M. Manga, Earthquakes and Water, Lecture Notes in Earth Sciences 114, 218p, Springer Verlag Berlin Heidelberg, 2010. RCOL2_2.4.12-09 S01