## PMComanchePeakPEm Resource

**From:** Conly, John [John.Conly@luminant.com]
**Sent:** Friday, March 18, 2011 2:52 PM
**To:** Aitken, Diane; Barrie, Ashley; Bell, Russ; Bird, Bobby; Borsh, Gina; Buschbaum, Denny; Bywater, Russell; Caldwell, Jan; Carver, Ronald; Certrec; Ciocco, Jeff; Clouser, Tim; Collins, Elmo; Conly, John; Cosentino, Carolyn; Degeyter, Brock; Evans, Todd; Flores, Rafael; Frantz, Steve; Freitag, Al; Hamzehee, Hossein; Hoshi, Masaya; Ishida, Mutsumi; Johnson, Michael; Kawanago, Shinji; Keithline, Kimberley; Kellenberger, Nick; Koenig, Allan; Kramer, John; Lucas, Mitch; Madden, Fred; Matthews, David; Matthews, Tim; McConaghy, Bill; Monarque, Stephen; Moore, Bill; ComanchePeakCOL Resource; Onozuka, Masanori; Paulson, Keith; Plisco, Loren; Reible, Robert; Rund, Jon; Simmons, Jeff; Singal, Balwant; Sirirat, Nan; Sprengel, Ryan; Takacs, Michael; Tapia, Joe; Tindell, Brian; Turner, Bruce; Volkening, David; Vrahoretis, Susan; Williamson, Alicia; Willingham, Michael; Woodlan, Don
**Cc:** Hill, Craig
**Subject:** Three Submittals to the NRC
**Attachments:** TXNB-11015 RAI 133, 136 Supp.pdf; TXNB-11016 RAI 146, 167 Supp.pdf; TXNB-11018 RAI 020, 204, 205.pdf

Luminant has submitted the three attached letters to the NRC:

TXNB-11015 supplemental response for RAIs 133 and 136 about maintaining the dose to construction workers < 100 mrem/year

TXNB-11016 supplemental response to RAIs 146 and 167 about installing free-field seismic instrumentation

TXNB-11018 response to RAIs 202, 204, and 205 about seismic response spectra, compliance with ASHRAE Std 15, and the 100-yr return period non-coincident site wet-bulb temperature.

If there are any questions regarding these submittals, please contact me or contact Don Woodlan (254-897-6887, Donald.Woodlan@luminant).

Thanks,

*John T. Conly*

**COLA Project Manager**
**(254) 897-5256**

**Hearing Identifier:** ComanchePeak_COL_Public
**Email Number:** 1288

**Mail Envelope Properties** (D7A32D47A61872409CE74F57B83C8B011C9A2AA167)

**Subject:** Three Submittals to the NRC
**Sent Date:** 3/18/2011 2:52:14 PM
**Received Date:** 3/18/2011 2:52:34 PM
**From:** Conly, John

**Created By:** John.Conly@luminant.com

**Recipients:**
"Hill, Craig" <James.Hill@luminant.com>
Tracking Status: None
"Aitken, Diane" <diane.aitken@dom.com>
Tracking Status: None
"Barrie, Ashley" <Ashley.Barrie@luminant.com>
Tracking Status: None
"Bell, Russ" <rjb@nei.org>
Tracking Status: None
"Bird, Bobby" <Robert.Bird@luminant.com>
Tracking Status: None
"Borsh, Gina" <regina.borsh@dom.com>
Tracking Status: None
"Buschbaum, Denny" <Dennis.Buschbaum@luminant.com>
Tracking Status: None
"Bywater, Russell" <russell_bywater@mnes-us.com>
Tracking Status: None
"Caldwell, Jan" <Janice.Caldwell@luminant.com>
Tracking Status: None
"Carver, Ronald" <Ronald.Carver@luminant.com>
Tracking Status: None
"Certrec" <cp34update@certrec.com>
Tracking Status: None
"Ciocco, Jeff" <Jeff.Ciocco@nrc.gov>
Tracking Status: None
"Clouser, Tim" <Timothy.Clouser@luminant.com>
Tracking Status: None
"Collins, Elmo" <Elmo.Collins@nrc.gov>
Tracking Status: None
"Conly, John" <John.Conly@luminant.com>
Tracking Status: None
"Cosentino, Carolyn" <Carolyn.Cosentino@luminant.com>
Tracking Status: None
"Degeyter, Brock" <Brock.Degeyter@energyfutureholdings.com>
Tracking Status: None
"Evans, Todd" <Eric.Evans@luminant.com>
Tracking Status: None
"Flores, Rafael" <Rafael.Flores@luminant.com>
Tracking Status: None
"Frantz, Steve" <sfrantz@morganlewis.com>
Tracking Status: None
"Freitag, Al" <al_freitag@mnes-us.com>

Tracking Status: None
"Hamzehee, Hossein" <Hossein.Hamzehee@nrc.gov>
Tracking Status: None
"Hoshi, Masaya" <masaya_hoshi@mnes-us.com>
Tracking Status: None
"Ishida, Mutsumi" <mutsumi_ishida@mnes-us.com>
Tracking Status: None
"Johnson, Michael" <Michael.Johnson@nrc.gov>
Tracking Status: None
"Kawanago, Shinji" <shinji_kawanago@mnes-us.com>
Tracking Status: None
"Keithline, Kimberley" <kak@nei.org>
Tracking Status: None
"Kellenberger, Nick" <nicholas_kellenberger@mnes-us.com>
Tracking Status: None
"Koenig, Allan" <Allan.Koenig@luminant.com>
Tracking Status: None
"Kramer, John" <John.Kramer@nrc.gov>
Tracking Status: None
"Lucas, Mitch" <Mitchell.Lucas@luminant.com>
Tracking Status: None
"Madden, Fred" <Fred.Madden@luminant.com>
Tracking Status: None
"Matthews, David" <David.Matthews@nrc.gov>
Tracking Status: None
"Matthews, Tim" <tmatthews@morganlewis.com>
Tracking Status: None
"McConaghy, Bill" <william_mcconaghy@mnes-us.com>
Tracking Status: None
"Monarque, Stephen" <Stephen.Monarque@nrc.gov>
Tracking Status: None
"Moore, Bill" <Bill.Moore@luminant.com>
Tracking Status: None
"ComanchePeakCOL Resource" <ComanchePeakCOL.Resource@nrc.gov>
Tracking Status: None
"Onozuka, Masanori" <masanori_onozuka@mnes-us.com>
Tracking Status: None
"Paulson, Keith" <ck_paulson@mnes-us.com>
Tracking Status: None
"Plisco, Loren" <Loren.Plisco@nrc.gov>
Tracking Status: None
"Reible, Robert" <Robert.Reible@luminant.com>
Tracking Status: None
"Rund, Jon" <jrund@morganlewis.com>
Tracking Status: None
"Simmons, Jeff" <Jeffry.Simmons@luminant.com>
Tracking Status: None
"Singal, Balwant" <Balwant.Singal@nrc.gov>
Tracking Status: None
"Sirirat, Nan" <nan_sirirat@mnes-us.com>
Tracking Status: None
"Sprengel, Ryan" <ryan_sprengel@mnes-us.com>
Tracking Status: None
"Takacs, Michael" <Michael.Takacs@nrc.gov>
Tracking Status: None
"Tapia, Joe" <joseph_tapia@mnes-us.com>

Tracking Status: None
"Tindell, Brian" <Brian.Tindell@nrc.gov>
Tracking Status: None
"Turner, Bruce" <Bruce.Turner@luminant.com>
Tracking Status: None
"Volkening, David" <David.Volkening@luminant.com>
Tracking Status: None
"Vrahoretis, Susan" <Susan.Vrahoretis@nrc.gov>
Tracking Status: None
"Williamson, Alicia" <Alicia.Williamson@nrc.gov>
Tracking Status: None
"Willingham, Michael" <Michael.Willingham@nrc.gov>
Tracking Status: None
"Woodlan, Don" <Donald.Woodlan@luminant.com>
Tracking Status: None

**Post Office:** MDCEXMB01.tceh.net

| **Files** | **Size** | **Date & Time** |
|---|---|---|
| MESSAGE | 1325 | 3/18/2011 2:52:34 PM |
| TXNB-11015 RAI 133, 136 Supp.pdf | 225759 | |
| TXNB-11016 RAI 146, 167 Supp.pdf | 237080 | |
| TXNB-11018 RAI 020, 204, 205.pdf | 391819 | |

**Options**
**Priority:** Standard
**Return Notification:** No
**Reply Requested:** No
**Sensitivity:** Normal
**Expiration Date:**
**Recipients Received:**

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-201100377
Log # TXNB-11015

Ref. # 10 CFR 52

March 18, 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 RESPONSES TO REQUEST FOR ADDITIONAL INFORMATION NO. 4207 (SECTION 12.3-12.4) AND NO. 4208 (SECTION 12.5)

Dear Sir:

Luminant Generation Company LLC (Luminant) submits herein supplemental responses to Request for Additional Information No. 4207 (CP RAI #133) and No. 4208 (CP RAI #136) for the Combined License Application for Comanche Peak Nuclear Power Plant Units 3 and 4. The supplemental responses address maintaining the dose to each construction worker at less than 100 mrem per year and reducing unnecessary contributions to the plant source term from components.

Should you have any questions regarding these supplemental responses, 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 March 18, 2011.

Sincerely,

Luminant Generation Company LLC

Donald R. Woodlan for

Rafael Flores

Attachments: 1. Supplemental Responses to Request for Additional Information No. 4207 (CP RAI #133)
2. Supplemental Responses to Request for Additional Information No. 4208 (CP RAI #136)

Electronic distribution w/attachments:

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

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
nan_sirirat@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
ComanchePeakCOL.Resource@nrc.gov
sfrantz@morganlewis.com
jrund@morganlewis.com
tmatthews@morganlewis.com
regina.borsh@dom.com
diane.aitken@dom.com

# 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.: 4207 (CP RAI #133)**

**SRP SECTION: 12.03-12.04 - Radiation Protection Design Features**

**QUESTIONS for Health Physics Branch (CHPB)**

**DATE OF RAI ISSUE: 1/21/2010**

---

**QUESTION NO.: 12.03-12.04-9**

10 CFR 20.1101, 1301, 1302, NUREG-0800, 'Standard Review Plan,' Section 12.03-12.04

In RAI No. 3318 (RAI # 119), Question 12.03-12.04-8 (13150), the NRC staff asked the Applicant to change the combined license (COL) final safety analysis report (FSAR) to better define the as low as reasonably achievable (ALARA) program for construction workers.

The requirement of 10 CFR 20.1301(a)(1) is "The total effective dose equivalent to individual members of the public from the licensed operation does not exceed 0.1 rem (1 mSv) in a year," and 10 CFR 20.1101(b) requires exposure to members of the public be as low as reasonably achievable (ALARA). In response to the NRC staff's RAI, the Applicant noted that they would continually monitor construction worker dose during construction, they would take the actions appropriate to maintain exposure ALARA, and they would ensure protection of construction workers to radiation exposure from radiography sources and radioactive materials. However, since the Radiation Protection milestones described in COL FSAR Table 13.4-201 do not require any Radiation Protection program elements until the receipt of radioactive sources under the COL License, the NRC staff is unable to determine who has responsibility for monitoring and controlling cumulative construction worker dose resulting from activities of diverse licensees.

The Applicant is requested to update and revise COL FSAR Section 12.4 to describe how the Applicant will meet the requirements of § 20.1101, 1301 and 1302 to control, limit and monitor exposure to members of the public involved in the construction of CPNPP, Units 3 and 4.

---

**SUPPLEMENTAL INFORMATION:**

As a result of a discussion with the NRC Staff on February 14, 2011, FSAR Subsections 12.2.1.1.10 and 12.4.1.9 have been revised to include a statement that Luminant maintains procedures to control, limit, and monitor cumulative dose for construction workers and security employees such that total exposure for each construction worker and security employee is maintained less than 100 mrem per year in accordance with 10 CFR Part 20.1301.

Luminant's procedures will include precautions to keep construction workers and security personnel clear of areas of potential exposure due to various sources that may be on site. Once elements of the Radiation Protection Program are implemented per FSAR 12.5 and Table 13.4-201, this program and its supporting procedures will be used to control and monitor exposure. Prior to the implementation of the CPNPP Units 3 and 4 Radiation Protection Program, the controls in the Offsite Calculation Manual (ODCM) for CPNPP Units 1 and 2 limit the dose in Unrestricted Areas (which includes the construction sites for Units 3 and 4).

Impact on R-COLA

See attached marked-up FSAR Rev 1 pages 12.2-2 and 12.4-1.

Impact on S-COLA

None.

Impact on DCD

None.

The estimated fission and corrosion product activity in the evaporation pond water are shown in the Table 12.2-201. This estimated source term is initial activity into the evaporation pond, based on the realistic source term of the Waste Monitor Tank and the decontamination factors from NUREG-0017. RCOL2_12.02-2

~~Any additional solid, liquid and gaseous radiation sources that are not identified in Subsection 12.2.1, including radiation sources used for instruments calibration or radiography, will be provided when such site-specific information would become available in the procurement phase. These sources will be incorporated in the updated FSAR.~~ RCOL2_12.02-1

Additionally, the site maintains contained sources of known isotope and activity containing byproduct, source, or special nuclear materials for use as calibration, check, or radiography sources. Example uses for these types of sources include systems security checks; equipment standardization and calibration; process control; gauging and quality assurance testing; teaching; and nuclear reactor operations.

Licensed sources containing byproduct, source, and special nuclear materials that warrant shielding design consideration meet the applicable requirements of 10 CFR Parts 20, 30, 31, 32, 33, 34, 40, 50, and 70. A supplementary warning symbol is used in the presence of large sources of ionizing radiation consistent with the guidance in Regulatory Issue Summary (RIS) 2007-03. Sources maintained on site are shielded to keep personnel exposure ALARA. Sources brought on-site by contractors for activities such as the servicing or calibration of plant instrumentation or the performance of radiography are maintained and used in accordance with the provisions of the licensed utility group or contractor. If these sources must be maintained on site, designated plant personnel approve the storage location and identify appropriate measures for maintaining security and personnel protection. Luminant maintains procedures to control, limit and monitor cumulative dose for construction workers and security employees such that total exposure for each construction worker and security employee is maintained less than 100 mrem per year in accordance with 10 CFR Part 20.1301. RCOL2_12.03-12.04-9 RCOL2_12.02-1 RCOL2_12.03-12.04-9 S01 RCOL2_12.03-12.04-10 S01

Specific details regarding the isotope, quantity, form and use of these sources are maintained onsite following their procurement. The following minimum information is maintained: RCOL2_12.02-1

- Isotopic concentration
- Location on site
- Source strength, form, and geometry (as applicable)
- Description of the use

Written procedures based upon the Radiation Protection Program govern the procurement, receipt, inventory, labeling, leak testing, surveillance, control, transfer, disposal, storage, issuance, and use of these sources. Additionally, these

## 12.4 DOSE ASSESSMENT

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

---

### 12.4.1.9 Dose to Construction Workers

CP COL 12.4(1) Replace the paragraph in DCD Subsection 12.4.1.9 with the following.

RG 1.206 requires that an annual dose to construction workers be estimated in a new unit construction area for multi-unit plants. This subsection evaluates the potential radiological dose impacts to construction workers at the CPNPP Units 3 and 4 resulting from the operation of CPNPP Units 1 and 2. Because the CPNPP Units 3 and 4 construction period occurs while CPNPP Units 1 and 2 are operating, construction workers at CPNPP Units 3 and 4 would be exposed to direct radiation and gaseous radioactive effluents from CPNPP Units 1 and 2. Doses to CPNPP Unit 4 construction workers from operation of CPNPP Unit 3 are not evaluated because the CPNPP Unit 4 construction will be substantially complete and many of the construction workers gone before CPNPP Unit 3 begins commercial operation. Gaseous effluent releases from CPNPP Unit 3 during fuel loading and low power testing, less than 5 percent power, are not expected to be significant, and are bounded by the conservatisms in the following dose estimate. During CPNPP Unit 3 testing, the overall work force, as well as outdoor construction activities on CPNPP Unit 4, would be reduced.

Additionally, the site maintains contained sources of known isotope and activity containing byproduct, source, or special nuclear materials for use in equipment standardization and calibration, security checks, process control, gauging, quality assurance, teaching, or radiography sources. Luminant maintains procedures to control, limit and monitor cumulative dose for construction workers and security employees such that total exposure for each construction worker and security employee is maintained less than 100 mrem in a year in accordance with 10 CFR Part 20.1301 and the Radiation Protection Program. Once CPNPP Unit 3 completes 5% power ascension testing and proceeds to commercial operation, the remaining construction workers doses will be maintained ALARA in accordance with 10 CFR 20.1301 as described in Section 12.5, Operational Radiation Protection Program. Subsection 13.4 provides an implementation milestones for the Operational Radiation Protection Program that meets the regulations provided in 10 CFR Parts 20.1101 (a) and (b), 1301 and 1302. Once CPNPP Units 3 and 4 become operational, the estimated dose for remaining construction workers will be maintained ALARA at less than 2 mrem/hr.

RCOL2_12.03-12.04-9 S01
RCOL2_12.03-12.04-10 S01
RCOL2_12.03-12.04-6

## 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.: 4207 (CP RAI #133)**

**SRP SECTION: 12.03-12.04 - Radiation Protection Design Features**

**QUESTIONS for Health Physics Branch (CHPB)**

**DATE OF RAI ISSUE: 1/21/2010**

---

**QUESTION NO.: 12.03-12.04-10**

10 CFR 20.1101, 1301, 1302, NUREG-0800, SRP Section 12.03-12.04

In RAI No. 3318 (RAI# 119), Question 12.03-12.04-5 (13147), the NRC staff asked the Applicant to change the combined license (COL) final safety analysis report (FSAR) to better define the sources of radiation exposure to the construction workers, and to clarify the placement of area monitoring dosimetry used to monitor construction worker exposure.

In response to the NRC staff's RAI, the Applicant noted that they would keep construction worker exposures less than 2 mrem/hr in accordance with the current Radiation Protection Program, STA 650 “General Health Physics Plan” and that monitoring construction worker exposure is unnecessary because limiting construction worker exposure to 2 mrem/hr is as low as reasonably achievable (ALARA). However, controlling construction worker to exposure to dose rates less than 2 mrem/hr does not address § 20.1301(a)(1), which limits doses to members of the public to 100 mrem (1 milli Sv) in a year, nor does it address the requirements of § 20.1101(b), which requires exposure to members of the public be ALARA. The Applicant further noted that construction worker dose will be maintained ALARA in accordance with the Radiation Protection Milestones noted in COL FSAR Table 13.4-201. However, prior to fuel receipt, Table 13.4-201 only requires those Radiation Protection program elements necessary to support COL Licensee receipt of sources. Since the location of the exposure monitoring TLDs are not adequately described in the COL FSAR, the NRC staff is unable to determine that the Applicant is meeting the requirements of § 20.1302(a) to perform surveys sufficient to demonstrate that exposure to members of the public meet the public dose limits of §20.1301(a)(1). Additionally, based on the available information, the NRC staff is unable to determine that the provisions of STA 650 adequately address the requirements of § 20.1101(b) to maintain construction worker radiation exposure ALARA, and § 20.1301(a)(1), which limits doses to members of the public to 100 mrem.

The Applicant is requested to update and revise COL FSAR Section 12.4 to describe how the Applicant will meet the requirements of § 20.1101, 1301 and 1302 to control, limit and monitor exposure to members of the public involved in the construction of CPNPP Units 3 and 4.

---

**SUPPLEMENTAL INFORMATION:**

As a result of a discussion with the NRC Staff on February 14, 2011, FSAR Subsections 12.2.1.1.10 and 12.4.1.9 have been revised to include a statement that Luminant maintains procedures to control, limit and monitor cumulative dose for construction workers and security employees such that the total exposure for each construction worker and security employee is maintained less than 100 mrem per year in accordance with 10 CFR Part 20.1301.

Impact on R-COLA

See marked-up FSAR Rev 1 pages 12.2-2 and 12.4-1 attached above.

Impact on S-COLA

None.

Impact on DCD

None.

# 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.: 4208 (CP RAI #136)**

**SRP SECTION: 12.05 - Operational Radiation Protection Program**

**QUESTIONS for Health Physics Branch (CHPB)**

**DATE OF RAI ISSUE: 2/2/2010**

---

**QUESTION NO.: 12.05-6**

In its response, dated November 11, 2009, to the NRC staff's RAI 3319 (RAI 100), Question 12.05-2, the applicant referenced the Design Certification (DC) applicant response to US-APWR Tier 2 DCD RAI 147-1850, dated February 6, 2009, and RAI 428-2910, Question 12.03-12.04-3, dated September 30, 2009. The DC applicant revised section 12.3 to include some design specifications for selection of materials employed for the purpose of implementing the as low as reasonably achievable (ALARA) concept during construction. However, the DC applicant's response did not describe the program elements, that when implemented, will provide an on going understanding of the plant source term, including knowledge of input mechanisms and the process to reduce unnecessary contributions to the plant source term from components.

Since the on going effort to reduce the radiation source term in the plant is an essential element of meeting the requirements of 10 CFR 20.1101(b), the COL applicant is requested to revise and update the combined license (COL) application final safety analysis report (CPNPP FSAR) section 12.5 to describe those program elements related to establishing an understanding of input mechanisms to the plant source term and the program elements that will be used to reduce unnecessary contributions to the plant source term from components. Alternately, the applicant may describe the use of a different approach.

---

**SUPPLEMENTAL INFORMATION:**

As a result of a discussion with the NRC Staff on February 14, 2011, FSAR Section 12.5 has been revised to include a commitment to identify sources of cobalt and other activated materials prior to initial plant startup and utilize latest industry practice guidelines similar to those in Electric Power Research Institute (EPRI) report TR-103296 in establishing a source reduction program for maintenance, plant modifications and procurement of replacement components once CPNPP Unit 3 becomes operational.

Impact on R-COLA

See attached marked-up FSAR Revision 2 page 12.5-3.

Impact on S-COLA

None.

Impact on DCD

None.

In order to ensure that the B.A. evaporator room does not become a VHRA during the end of cycle, routine surveillance for the B.A. evaporator room during the end of cycle is stipulated in the Radiation Protection Program. In the event that the routine surveillance shows an increase in dose level, an appropriate strategy to sufficiently reduce the dose rate below the criteria for a VHRA is to be provided. DCD_12.02-29 DCD_12.02-30

---

Add the following information after the last paragraph in the discussion on Calibration in Subsection 12.5.4.2 of NEI 07-03A. RCOL2_12.05-6

Source Term Reduction Strategy

The plant source term is described by the level of radiation, or radioactive material, given off or contained in plant systems, structures, or components that results in occupational radiation exposure from routine operation of the plant, including anticipated operational occurrences. The source term includes, but is not limited to, activated components in the primary coolant, corrosion and wear products activated in the reactor and distributed in plant systems, or sealed sources maintained to support plant operations. The reduction and control of the plant radiation source term is an essential element of meeting the requirements of 10 CFR 20.1101(b). RCOL2_12.05-6

FSAR Subsection 12.1.1.3.2 commits the administrative programs and procedures to comply with RG 8.8, which provides several strategies for reducing personnel exposure, including some options that would limit the overall source term, such as crud control and equipment isolation and decontamination. Additionally, the following DCD Subsections, which describe design considerations for the reduction of the overall source term, are already incorporated into the FSAR by reference:

- Subsection 12.1.2.1
- Subsection 12.1.2.2.3
- Subsection 12.3.1.1.1.1 Item (E)
- Table 12.3-7

Luminant will identify cobalt and other activated material sources during the detailed design phase of the project. During plant operation, Luminant will utilize industry practice guidance similar to EPRI report TR-103296 to ensure that procurement of components or piping, conducting maintenance, or modifications considers the identified sources of cobalt and other activated materials. RCOL2_12.05-6 S01

---

**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-201100378
Log # TXNB-11016

Ref. # 10 CFR 52

March 18, 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 RESPONSES TO REQUEST FOR ADDITIONAL INFORMATION NO. 4294 (SECTION 3.7) AND NO. 4542 (SECTION 3.8)

Dear Sir:

Luminant Generation Company LLC (Luminant) submits herein supplemental responses to Request for Additional Information No. 4294 (CP RAI #146) and No. 4542 (CP RAI #167) for the Combined License Application for Comanche Peak Nuclear Power Plant Units 3 and 4. The supplemental responses address free-field seismic instrumentation.

Should you have any questions regarding these supplemental responses, 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 March 18, 2011.

Sincerely,

Luminant Generation Company LLC

Donald R. Woodlan for

Rafael Flores

Attachment: Supplemental Response to Request for Additional Information No. 4294 (CP RAI #146) and No.4542 (CP RAI #167)

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

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
nan_sirirat@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
ComanchePeakCOL.Resource@nrc.gov
sfrantz@morganlewis.com
jrund@morganlewis.com
tmatthews@morganlewis.com
regina.borsh@dom.com
diane.aitken@dom.com

## 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.: 4294 (CP RAI #146)**

**SRP SECTION: 03.07.04 – Seismic Instrumentation**

**QUESTIONS for Geosciences and Geotechnical Engineering Branch 1 (RGS1)**

**DATE OF RAI ISSUE: 2/26/2010**

---

**QUESTION NO.: 03.07.04-2**

Paragraph IV(a)4 of Appendix S of 10 CFR 50 requires that, "Suitable instrumentation must be provided so that the seismic response of nuclear power plant features important to safety can be evaluated promptly after an earthquake." Regulatory Guide (RG) 1.166 provides the guidance regarding the instrumentation and procedures to make the required evaluation.

In FSAR subsection 3.7.4.1, “Comparison with Regulatory Guide 1.12” you proposed to use foundation-level instrumentation for operating basis earthquake (OBE) determinations. The FSAR states that “it is acceptable to perform a CAV check of seismic responses measured at the R/B and PS/B foundation locations”. RG 1.166 explicitly states that “The evaluation to determine whether the OBE was exceeded should be performed using data obtained from the three components of the free-field ground motion (i.e., two horizontal and one vertical)”. Also, Appendix A to RG 1.166, which provides interim OBE exceedance guidelines in the case that the installed seismic instrumentation or data processing equipment is inoperable, states that “For plants at which instrumentally determined data are available only from an instrument installed on a foundation, the cumulative absolute velocity (CAV) check (see Regulatory Position 4.2 of this guide) is not applicable.” Considering that the CAV value of 0.16g-sec was defined using free-field instruments, the staff is not clear based on the justification provided in the FSAR and is concerned that the plant may not be shutdown in all instances when RG 1.166 anticipated a shutdown would be performed. Please provide further clarification why foundation instrument records are appropriate for CAV checks for CPNPP’s OBE determinations.

---

**SUPPLEMENTAL INFORMATION:**

In the previous response to this RAI (ML100950107), Luminant provided clarification that foundation instrument records are appropriate for CAV checks for OBE determinations. In response to a teleconference on January 27, 2011, Luminant has decided to provide free-field instrumentation at grade in the plant yard in addition to the in-plant seismic instrumentation. The FSAR has been revised accordingly.

Impact on R-COLA

See attached marked-up FSAR Revision 1 pages 3.7-12, 3.7-13, and 3.7-14.

Impact on S-COLA

None; this response is site-specific.

Impact on DCD

None.

The seismic category I fuel oil storage tanks are metal tanks which are enclosed by tornado missile protecting concrete vaults (that is, the seismic category I PSFSVs). Since the PSFSVs are below-grade structures, the fuel oil storage tanks are not above-ground tanks. However, the tanks and their mountings are seismically analyzed consistent with the discussion of hydrodynamic loads for above-ground tanks given further below. The tanks' seismic analysis is based on the ISRS which are derived from site-specific SSI analysis of the PSFSVs as documented in Appendix 3MM, using the corresponding site-specific FIRS. Flexibility of the tank shell and tank shell damping effects are considered in estimating the fundamental frequency and spectral accelerations of the tank including its impulsive fluid weight.

---

### 3.7.4.1 Comparison with Regulatory Guide 1.12

---

CP COL 3.7(16) Replace the second paragraph in DCD Subsection 3.7.4.1 with the following. RCOL2_03.07.04-2 S01

The criteria that define the vibratory motion that requires the shutdown of the plant are based on the site-specific OBE. The 5% damping FIRS associated with the site-specific OBE are enveloped by 1/3 of the 5% damping CSDRS. OBE motion is measured at plant grade with seismic instrumentation located in the free field. Spectra scaled from the 5% damping site-specific SSE response spectra are used directly for OBE exceedance checks. An OBE exceedance check is performed in accordance with Section 4 of RG 1.166 (Reference 3.7-41) using both a response spectrum check and a cumulative absolute velocity (CAV) check. The comparison evaluation is to be performed within 4 hours of the earthquake using data obtained from the three components of the earthquake motion as defined by the three orthogonal axes of the standard plant (two horizontal and one vertical) on the uncorrected earthquake records. The evaluation is also to include a check on the operability of the seismic instrumentation as mandated by Section 4.3 of RG 1.166 (Reference 3.7-41).

---

CP COL 3.7(16) Replace the third paragraph, except the first sentence, in DCD Subsection 3.7.4.1 with the following.

For the free-field instrumentation located in the plant yard, the OBE acceleration and velocity spectra for 5% critical damping are scaled directly from the corresponding SSE spectra. Using site-specific values of OBE input motion, acceleration and velocity spectra for 5% critical damping are also developed for the seismic instrumentation located at the two foundation basemat locations in the R/B and east PS/B. Following the guidance of RG 1.12 and RG 1.166, the basemat instrumentation locations are used for shutdown consideration only in the event that the free-field instrumentation is inoperable. The other three RCOL2_03.07.04-2 S01

instrument locations in the plant superstructure described in Section 3.7.4.2 serve as data sources for long-term evaluation for start-up and as back-up data sources in the unlikely event that both the free-field and the foundation instruments are inoperable during an earthquake, as these instrument locations are not required by RG 1.12 to be used for shutdown determination. RCOL2_03.07.04-2 S01

~~Using these site-specific values of OBE ground input motion, in-structure acceleration and velocity response spectra are developed for the two Unit 3 seismic instrumentation foundation basemat locations in the R/B and east PS/B for 5 percent critical damping. The other three instrument locations described in Subsection 3.7.4.2 serve as back-up data sources in the unlikely event that the foundation instruments are inoperable during an earthquake, and the upper level instrument locations are also not required by RG 1.12 (Reference 3.7-40) to be used for shutdown determination.~~

~~For CPNPP Units 3 and 4, it is considered acceptable to utilize the foundation level seismic instrumentation to perform the cumulative absolute velocity (CAV) exceedance check for the following reasons:~~

- ~~The minimum required site specific ground motion input response spectra (which are the CSDRS anchored at 0.1 g) are greater than the calculated site specific free field ground motion, and are also greater than the nominal site specific ground motion input response spectra calculated for the R/B and PS/B foundations. This is shown in Figure 3.7-201, where FIRS3 represents the free field ground motion, and FIRS1 represents the nominal site specific ground motion input spectra for the R/B and PS/B foundations. In this case, it is acceptable to perform a CAV check of seismic responses measured at the R/B and PS/B foundation locations.~~
- ~~Structure to structure interactions, which could potentially influence the measured seismic response levels, will not occur because the R/B and PS/B are both founded on the same very stiff limestone layer and are separated by expansion joints which prevent seismic interaction.~~

---

CP COL 3.7(16) Replace the sixth paragraph in DCD Subsection 3.7.4.1 with the following.

In the event that the free-field instrumentation is inoperable, or both the free-field and the foundation-level instrumentation are inoperable, then the guidance of RG 1.166 Appendix A is applicable.

---

## 3.7.4.2 Location and Description of Instrumentation

---

CP COL 3.7(16) Replace the sixth bullet of the bulleted list in the second paragraph of DCD Subsection 3.7.4.2 with the following.

- In the vicinity of the power block area at surface grade, on top of backfill material, and sufficiently far away from structures in order to appropriately measure free-field ground motion. RCOL2_03.07.04-2 S01

---

### 3.7.4.3 Control Room Operator Notification

---

CP COL 3.7(14) Replace the third sentence of the paragraph in DCD Subsection 3.7.4.3 with the following.

For CPNPP Units 3 and 4, the anticipated seismic response is essentially the same since both units are founded at the same elevation and on the same subgrade with the same stratigraphies, and have the same backfill conditions (including fill concrete) as previously described in Subsection 3.7.1.3 and ~~Chapter 2~~Subsection 2.5.4. Only Unit 3 will be equipped with seismic monitoring instrumentation; however, the main control room (MCR) for both units will be provided with annunciation upon triggering of the instrumentation. CTS-00922

---

### 3.7.4.4 Comparison with Regulatory Guide 1.166 RCOL2_03.07.04-2 S01

---

CP COL 3.7(16) Replace the second sentence of the first paragraph in DCD Subsection 3.7.4.4 with the following.

As previously discussed in Subsection 3.7.4.1, the seismic instrumentation and OBE exceedance checks meet the requirements of RG 1.166 (Reference 3.7-41). The OBE exceedance checks can be performed using only uncorrected earthquake data for the three orthogonal plant directions (two horizontal and one vertical) obtained from seismic instrumentation installed in the free fields as described in Subsection 3.7.4.2.

### 3.7.4.6 Program Implementation

CP COL 3.7(19) Replace the paragraph in DCD Subsection 3.7.4.6 with the following.

The seismic instrumentation program for CPNPP Units 3 and 4 will be established at least 12 months prior to first fuel load.

### 3.7.5 Combined License Information

Replace the content of DCD Subsection 3.7.5 with the following.

## 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.: 4542 (CP RAI #167)**

**SRP SECTION: 03.08.04 - Other Seismic Category I Structures**

**QUESTIONS for Structural Engineering Branch 1 (AP1000/EPR Projects) (SEB1)**

**DATE OF RAI ISSUE: 5/21/2010**

---

**QUESTION NO.: 03.08.04-64**

This Request for Additional Information (RAI) is necessary for the staff to determine if the application meets the requirements of 10 CFR 50.55a, and General Design Criteria (GDC) 1, 2, 4, and 5.

In its response to RAI 2994 (#108), Question 03.08.04-6, Luminant provides answers in the same format as the question. In Part (a) of the response, the Applicant indicates that the Safe Shutdown Earthquake (SSE) is described in the Final Safety Analysis Report (FSAR), Subsection 3.7.1.1. The staff reviewed FSAR Subsection 3.7.1.1 and was unable to find this description of the SSE. The staff, however, did find the SSE response spectra in Figure 3.7.202 of FSAR which is the minimum Certified Seismic Design Response Spectra (CSDRS) anchored at 0.1g. Please clarify whether the SSE is defined at elevation 782 feet, which is the same elevation where the Ground Motion Response Spectra (GMRS) is defined, and describe the manner in which the required seismic monitoring instrumentation will be installed at elevation 782 feet, which elevation is 40 feet below the ground surface.

For Part (b) the Applicant provides the values for the wind speed, the snow load and roof load used in the design. However, for the SSE, the Applicant, again, refers to FSAR Subsection 3.7.1.1, the subsection where the staff was unable to find the description for the SSE. Address this inconsistency and provide a description of the type and location of the seismic monitoring instrumentation that needs to be installed at elevation 782 feet.

Reference: Luminant's response to request for additional information no. 2994; Log # TXNB-09078; dated December 10, 2009; ML093480149.

---

**SUPPLEMENTAL INFORMATION:**

The response to Part (b) of the question (ML102240246) stated that the foundation-level in-plant instrumentation used to measure earthquake motion is considered to be measuring free-field motion as explained in a previous response to RAI 146 (ML100950107). Luminant has decided to install free-field instrumentation in the plant yard at grade in addition to the in-plant seismic instrumentation. The FSAR has been revised accordingly.

Impact on R-COLA

See marked-up FSAR Revision 1 pages 3.7-12, 3.7-13, and 3.7-14 attached above.

Impact on DCD

None.

**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-201100380
Log # TXNB-11018

Ref. # 10 CFR 52

March 18, 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
RESPONSES TO REQUEST FOR ADDITIONAL INFORMATION NO. 5317 (SECTION 3.7.1), NO. 5411 (SECTION 6.4), AND NO. 5465 (SECTION 2.3.1)

Dear Sir:

Luminant Generation Company LLC (Luminant) submits herein responses to Request for Additional Information No. 5317 (CP RAI #205), No. 5411 (CP RAI #202), and No. 5465 (CP RAI #204) for the Combined License Application for Comanche Peak Nuclear Power Plant Units 3 and 4. The responses address seismic response spectra, compliance with ASHRAE Standard 15-207, and the 100-year return period non-coincident site wet bulb temperature, respectively.

Should you have any questions regarding these supplemental responses, 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 March 18, 2011.

Sincerely,

Luminant Generation Company LLC

Donald R. Woodlan for

Rafael Flores

Attachments: 1. Response to Request for Additional Information No. 5317 (CP RAI #205)
2. Response to Request for Additional Information No. 5411 (CP RAI #202)
3. Response to Request for Additional Information No. 5465 (CP RAI #204)

Electronic distribution w/attachments:

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

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
nan_sirirat@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
ComanchePeakCOL.Resource@nrc.gov
sfrantz@morganlewis.com
jrund@morganlewis.com
tmatthews@morganlewis.com
regina.borsh@dom.com
diane.aitken@dom.com

# 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.: 5317 (CP RAI #205)**

**SRP SECTION: 03.07.01 - Seismic Design Parameters**

**QUESTIONS for Structural Engineering Branch 1 (AP1000/EPR Projects) (SEB1)**

**DATE OF RAI ISSUE: 2/15/2011**

---

**QUESTION NO.: 03.07.01-7**

This is a follow-up to RAI 3.7.1-3.

In response to RAI 3.7.1-3 Luminant has stated that the development of foundation input response spectra (FIRS) 1, FIRS 2, and FIRS 3 is consistent with the recommendations of NEI (2009) *Consistent Site-Response/Soil-Structure Interaction Analysis and Evaluation* for embedded structures that are analyzed as surface structures. To date, the soil-structure interaction (SSI) analysis performed in support of the US-APWR Standard Plant has treated embedded structures as surface structures. In contrast, in the SSI analysis of the CPNPP structures, embedded structures are analyzed as embedded structures, not surface structures.

Consequently, FIRS 1, FIRS 2, and FIRS 3 that were developed for treating embedded structures as surface structures will not generally be the same FIRS for analyzing embedded structures as embedded structures. Section 3.2.3 of NEI gives a multi-step process for developing FIRS to be used when analyzing embedded structures as embedded structures. Provide justification for using FIRS 1, FIRS 2, and FIRS 3 as the basis of comparison for determining the proper seismic input to the CPNPP structures and describe how the current approach does or does not meet the guidelines of DC/COL Interim Staff Guidance-017 (which adopts the methodology of NEI [2009]).

---

**ANSWER:**

The minimum design spectra, tied to the shapes of the certified seismic design response spectra (CSDRS) and anchored at 0.1g, define the safe-shutdown earthquake (SSE) design motion for the site-specific seismic design and analysis of category I structures. GMRS/FIRS1 and FIRS 2 and 3 motions developed in FSAR Subsection 2.5.2 were not used as SSI input for the structural and seismic design and evaluations for CPNPP Units 3 and 4 because they are all below the federally mandated 0.1 g SSE (10 CFR 50 Appendix S). FSAR Figure 3.7-201 shows why the 0.1 g SSE from the CSDRS is used as SSI input motion for the design and analysis in lieu of the spectra developed in FSAR Subsection 2.5.2. FSAR Section 3.7.1.1 defines the SSE and contains summary descriptions of FIRS1, FIRS2, FIRS3 and

FIRS4 shown in Figure 3.7-201. The response to related CP RAI 167 Question 03.08.04-64 (ML102240246) discusses how the site-specific SSE is defined.

The SSI analyses of the seismic category I structures documented in FSAR Chapter 3 and its related appendices consider both surface and embedded conditions, with limited exceptions. One such exception is the analysis of the segments 1 and 3 of the ESWPT, which considers only embedded conditions in the SSI analyses since those tunnel segments are buried.

The development of the SSE ground motion used as the basis for the site-specific SSI analyses of the standard plant is described in FSAR Subsection 3.7.1.1 and Section 3NN.2 of Appendix 3NN. FSAR Appendices 3KK, 3LL, and 3MM for the seismic analyses of site-specific structures utilize the same approach for the development of the SSI ground input motion and cross-reference to the explanations in FSAR Subsection 3.7.1.1 and Section 3NN.2. Please note that the discussion in Section 3NN.2 has been revised to correct a cross-reference to Subsection 2.5.2.

Two statistically independent time histories H1 and H2 are developed compatible to the horizontal 0.1 g CSDRS design basis input spectrum, and a vertical acceleration time history V is developed compatible to the vertical 0.1 g CSDRS design spectrum. These time histories are referred to herein as 0.1 g CSDRS motions.

Analyses of structures as surface structures were performed using 0.1 g CSDRS motions directly as input at the surface level, which is equal to the foundation level for the SASSI analyses.

Analyses of structures as embedded structures were also performed using 0.1 g CSDRS time histories as outcrop motion input at the bottom of foundation level at the top of limestone. The SASSI SSI analysis requires the object motion to be defined as in-layer motion. Therefore, the analyses of embedded foundations use horizontal in-layer motion input time histories that are numerically equivalent to the outcrop motions. These in-layer motions are obtained from a set of site response analyses, separate from those documented in FSAR Subsection 2.5.2, that are performed on a soil column consisting of the rock subgrade and backfill strain-compatible profiles identical to those used in the SSI analyses with no iteration on soil properties. The 0.1 g CSDRS motions are applied to the soil column as outcrop motion at the top of limestone/foundation interface elevation in order to calculate the in-layer motion at the same location. This procedure is the same as used in NEI White Paper Section 3.2.3 Step 3. These site response analyses provide two horizontal acceleration time histories (East-West and North-South) within the top limestone rock layer that are used as input in the SASSI analyses of embedded foundations. A different set of time history motions is developed for each considered soil profile. The 0.1 g CSDRS motions are applied directly to SASSI as in-layer motions for embedded foundations.

Figure 1 shows the horizontal ground motion acceleration response spectra (ARS) calculated in the site response analyses. The figure shows the 0.1 g CSDRS and surface ARS calculated for each of the four soil cases: lower bound (LB), best-estimate (BE), upper bound (UB) and high bound (HB) as indicated. The 0.1 g CDSRS motion was input as outcrop motion at the foundation level at top of limestone. The resulting ground surface ARS are significantly higher than the outcrop motions input at rock level.

ISG-017 and the associated NEI document require the motions applied to exceed the performance-based spectra developed at foundation level (FIRS) and at surface level (PBSRS). The performance based surface response spectra (PBSRS) corresponds to FIRS3 or FIRS4 identified in FSAR Figure 3.7-201. The input motion applied exceeds the FIRS3 and FIRS4 values by a significant margin at all frequencies. None of the spectra in FSAR Figure 3.7-201 directly represent outcrop FIRS response for embedded structures, however based on Figure 1, surface spectra are higher than the foundation level outcrop motion for this soil column. Therefore, the performance-based FIRS will be lower than FIRS3 and FIRS4

motions in FSAR Figure 3.7-201 which are lower than the 0.1 CSDRS used as input motion. Therefore, the motions applied exceed the ISG-017 required FIRS and PBSRS input requirements.

Because the design was developed prior to issuance of ISG-017, the exact procedures used for the SSI analysis may not match verbatim what is described in ISG-017. However, the motions used are conservative relative to the procedure advocated in ISG-017 as follows:

For vertical motions, the 0.1 g CSDRS motions were applied in SASSI as in-layer motion even though these motions represent outcrop motions. This approach is conservative since in-layer motions are lower than outcrop motions for this profile across the range of key frequencies as seen in Figure 2. The vertical motions envelope those required by ISG-017 because vertical motions are developed from the horizontal using a site-specific V/H ratio, which is the same for all motions.

The consequence of SSI analysis approach used is that the design based on the SSI input motion is conservative because the SSI input motion envelopes surface and embedded conditions of the ISG-017 guidelines. Because the design was developed prior to issuance of ISG-017, the exact procedures used for the SSI analysis may not match verbatim what is described in ISG-017. However, despite the differences, the resulting structural and seismic design is as conservative, or more so, than what would be achieved with ISG-017 procedures.

Reference:

NEI White Paper, “Consistent Site-Response/Soil Structure Interaction and Evaluation,” NEI, June 12, 2009.

Attachments:

Figure 1 – Site Response Soil Column Analysis Results Showing Ground Surface Acceleration Response Spectra for Four Soil Profiles due to Rock Outcrop Motion Applied at Foundation Level

Figure 2 - Site Response Soil Column Analysis Results Showing Foundation Level in-Layer Acceleration Response Spectra for Four Soil Profiles due to Rock Outcrop Motion Applied at Foundation Level

Impact on R-COLA

See attached marked-up FSAR Revision 1 page 3NN-4.

Impact on S-COLA

None; this response is site-specific.

Impact on DCD

None.

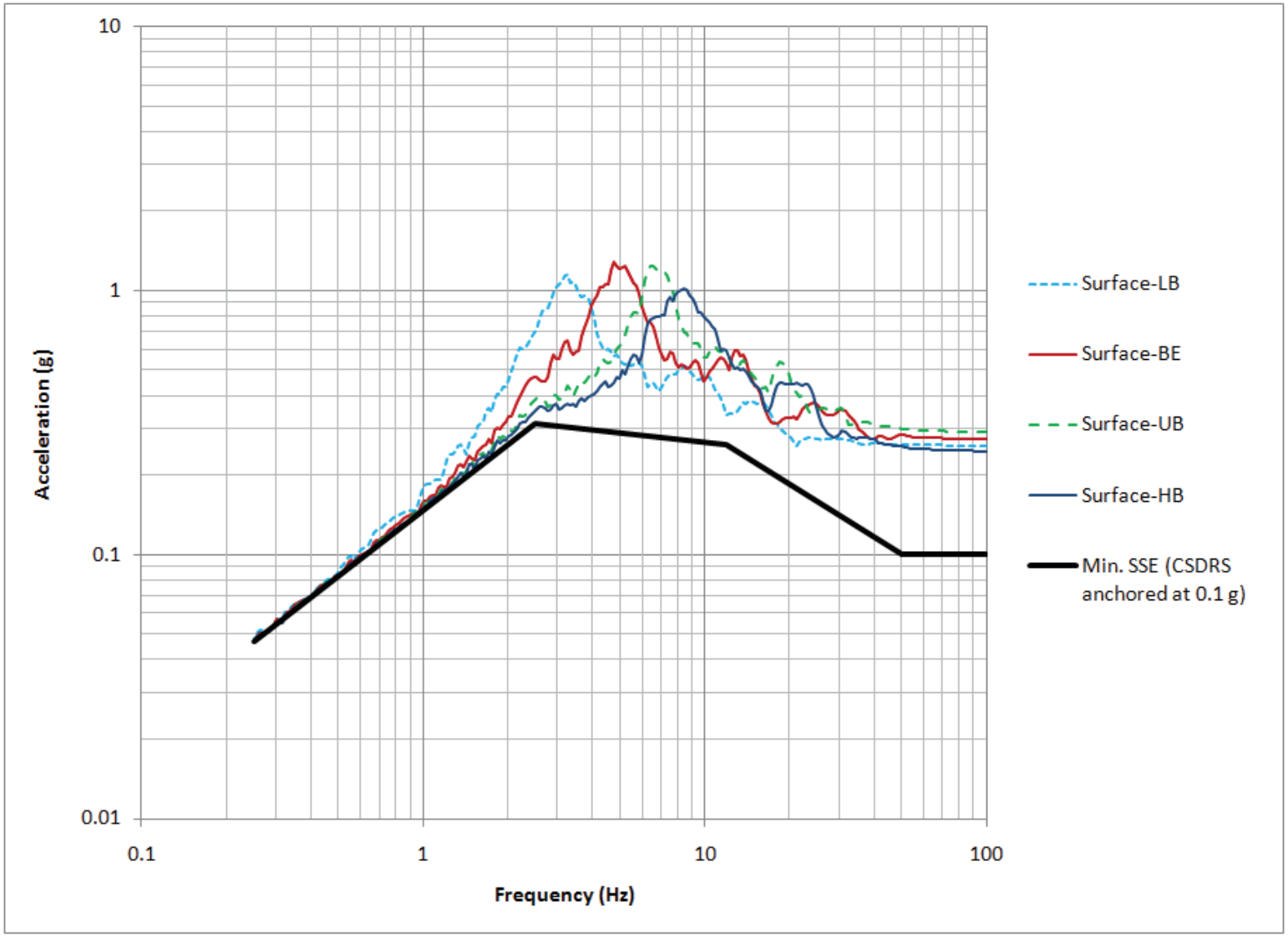


**Figure 1 – Site Response Soil Column Analysis Results Showing Ground Surface Acceleration Response Spectra for Four Soil Profiles due to Rock Outcrop Motion Applied at Foundation Level**

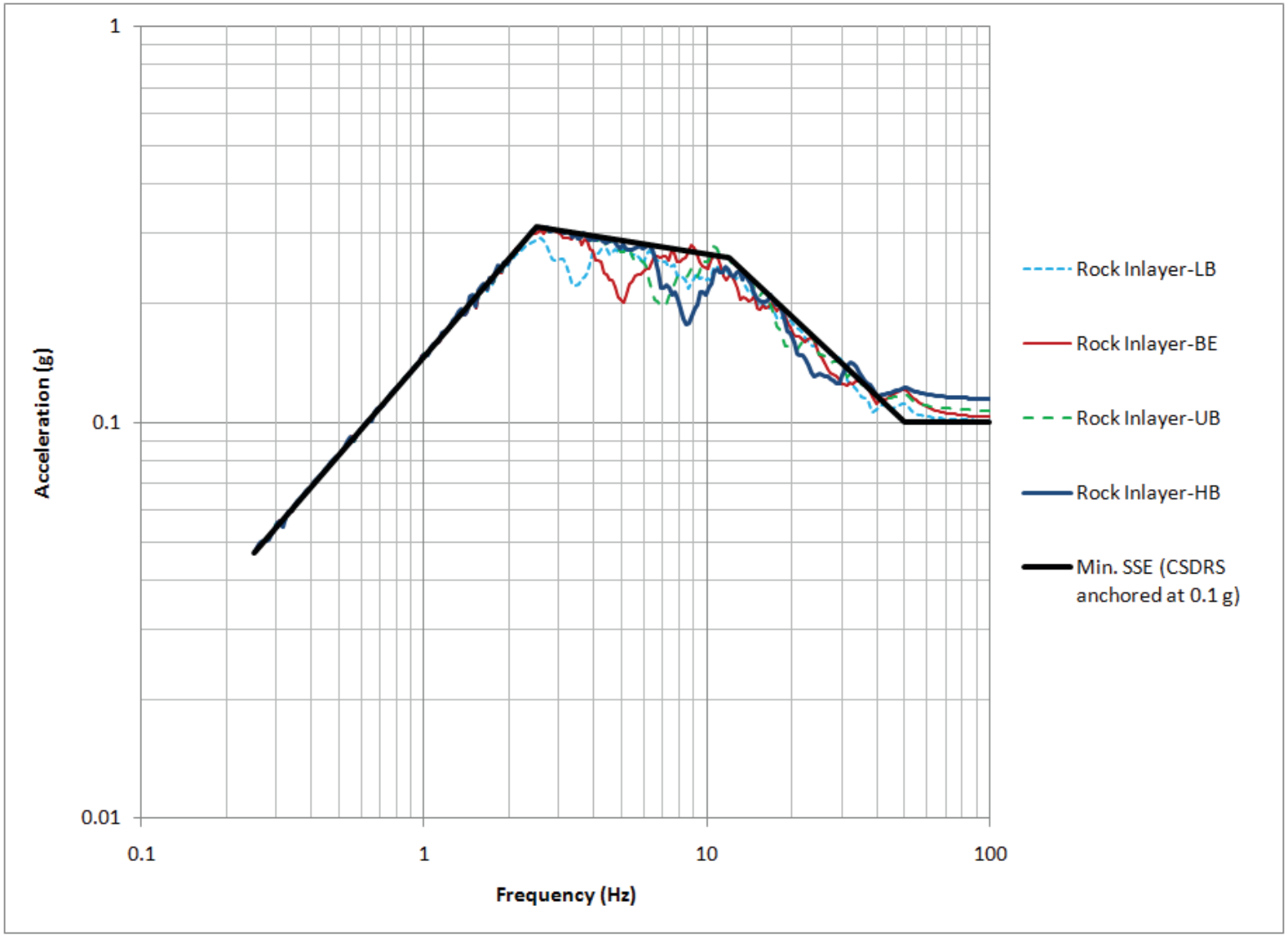


**Figure 2 – Site Response Soil Column Analysis Results Showing Foundation Level in-Layer Acceleration Response Spectra for Four Soil Profiles due to Rock Outcrop Motion Applied at Foundation Level**

~~that are used as input in the SASSI analyses of embedded foundation. The outcrop horizontal time histories are used as input for the SASSI analyses of surface foundations.~~The outcrop horizontal time histories are used directly as input for the SASSI analyses of surface foundations applied at the FIRS bottom of foundation elevation. The analyses of embedded foundation use "within" motion input time histories that are also applied at the FIRS input elevation. The "within" motions are obtained from a set of site response analyses, separate from these documented in Subsection 2.5.2, that are performed on a soil column consisting of the rock subgrade and the backfill, for purposes of embedded foundation SSI analysis. The design motion is applied to the soil column as layer outcrop motion at the FIRS elevation in order to calculate the within-layer motion. These site response analyses provides for each considered backfill profile, two horizontal acceleration time histories (East-West and North-South) of the design motion within the top limestone rock layer that are used as input in the SASSI analyses of embedded foundations. The time history of the vertical outcrop accelerations serves as input for both surface and embedded foundations. ~~The time step of the acceleration time histories used as input for the SASSI analysis is 0.005 sec.~~

RCOL2_03.08.04-54

RCOL2_03.07.01-7

## 3NN.3 SASSI Model Description and Analysis Approach

Figure 3NN-7 shows the three-dimensional SASSI FE model used for site-specific seismic analysis of the US-APWR R/B-PCCV-containment internal structure of Units 3 and 4. The SASSI structural model uses lumped-mass-stick models of the PCCV, containment internal structure, and R/B to represent the stiffness and mass inertia properties of the building above the ground elevation. A three-dimensional (3D) FE model, presented in Figure 3NN-8, represents the building basement and the floor slabs at ground elevation.

The model is established with reference to the Cartesian coordinate system with origin established 2 ft.-7 in. below the ground surface elevation at the center of the PCCV foundation. The origin location corresponds to the location of the coordinate system used as reference for the seismic analysis of the standard plant presented in Section 3.7. The orientation of the Z-axis is upward. The orientation of the standard plant model is modified such that the positive X-axis is oriented northward and the Y-axis is oriented westward.

The geometry and the properties of the lumped-mass-stick models representing the above ground portion of the building are identical to those of the lumped mass stick model used for the R/B-PCCV-containment internal structure seismic analysis, as addressed in Appendix 3H. SASSI 3D beam and spring elements with cross sectional properties identical to those of the standard plant models represent stiffness properties. All of the modeling characteristics present in the standard plant lumped mass stick models for the R/B-PCCV-containment internal structure are the same as for the SASSI model, with the exception of minor adjustments for compatibility with SASSI, described as follows. Because SASSI does not have rigid link capability, ~~T~~the rigid links in the lumped mass stick models that connect different nodal points at the same floor elevation are replaced with SASSI 3D beam elements with high stiffness properties. The 3D beam elements

RCOL2_03.08.04-57

RCOL2_03.08.04-57

# 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.: 5411 (CP RAI #202)**

**SRP SECTION: 06.04 - Control Room Habitability System**

**QUESTIONS for Containment and Ventilation Branch 1 (AP1000/EPR Projects) (SPCV)**

**DATE OF RAI ISSUE: 2/11/2011**

---

**QUESTION NO.: 06.04-12**

This is a follow-up RAI for USAPWR DCD RAI No. 49 Question No. 06.04-19 and RAI 338-2325, Question No. 06.04-6 (ADAMS Accession Number ML091700682); RAI No. 559-4387; Question No. 06.04-13 (ADAMS Accession Number ML101450224) (NRC ID 4387, Question number 16732), and for Comanche Peak R-COLA RAI No. 3968, Question No. 06.04-7 (ADAMS Accession Number ML100550345), and RAI No. 4678, Question No. 06.04-11 (ADAMS Accession Number ML102810224). Due to the expected plant design impact of the resolution of the issues associated with this RAI, it is being issued simultaneously to both the DCD applicant and the R-COL applicant.

In response to Question No. 06.04-13, **OPEN ITEM** - Follow-up RAI (NRC ID 4387, Question Number 16732), dated May 20, 2010, the COL FSAR was revised in a confusing and potentially ambiguous manner. Specifically, the FSAR commits to design the enclosure and chillers in accordance with ANSI/ASHRAE Standard 15-2007. The NRC staff can accept essential and non-essential chillers located in proximity of other important equipment if they are designed in accordance with a robust consensus standard like ANSI/ASHRAE Standard 15. Unfortunately, compliance with the standard was made ambiguous with the recent revision to the COL FSAR. The specific or detailed design of the chillers has not been finalized and it is not possible at this time to demonstrate compliance with STD 15. It is also not possible to conclude whether a dedicated ventilation for each machinery room is necessary to comply with STD 15. The recent COL FSAR revision has precluded the use of dedicated ventilation and instead indicated that the auxiliary building ventilation would be used. STD 15 clearly requires dedicated ventilation under certain conditions. Specifically, STD 15, Section 8.11.4 reads, "*Air and supply and exhaust ducts to the machinery room shall serve no other area.*"

Please justify why a dedicated ventilation and the other requirements of STD 15 Sections 8.11.and 8.12 are not necessary for compliance with STD 15 for all possible chiller configurations permitted by the FSAR. If additional design commitments for the chillers (size, refrigerant type, refrigerant volume, refrigerant amount ….) are necessary to justify this assertion please include these design commitments in the FSAR.

---

**ANSWER:**

The design of the essential chilled water system (ECWS), non-ECWS chillers, and chiller equipment rooms is within the scope of the standard plant contained in the US-APWR Design Control Document (DCD). The applicable sections of the DCD related to ECWS, non-ECWS chillers, and chiller equipment rooms are incorporated by reference into the FSAR.

DCD RAI 691-5410, Question 06.04-14 requested additional information about the design of the ECWS, non-ECWS chillers, and chiller equipment rooms, and compliance with ANSI/ASHRAE Standard 15. MHI responded to RAI 691-5410 in letter UAP-HF-11061 on March 9, 2011. The letter is not yet available in ADAMS.

Impact on R-COLA

None.

Impact on S-COLA

None.

Impact on DCD

None.

# 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.: 5465 (CP RAI #204)**

**SRP SECTION: 02.03.01 - Regional Climatology**

**QUESTIONS for Siting and Accident Conseq Branch (RSAC)**

**DATE OF RAI ISSUE: 2/14/2011**

---

**QUESTION NO.: 02.03.01-12**

10 CFR 52.79(a)(1)(iii) states that the COL FSAR shall include "the seismic, meteorological, hydrologic, and geologic characteristics of the proposed site with appropriate consideration of the most severe of the natural phenomena that have been historically reported for the site and surrounding area and with sufficient margin for the limited accuracy, quantity, and time in which the historical data have been accumulated." The US-APWR DCD states that the 0% exceedance ambient design temperature site parameters are based on the EPRI Advanced Light Water Reactor Utility Requirements Document and conservative estimates of historical high and low values for potential US-APWR sites. The staff considers temperatures based on a 100-year return period to provide sufficient margin for the limited accuracy, quantity, and period of time in which the historical data have been accumulated as required by the regulation. This is why SRP 2.3.1 states that 100-year return period ambient temperature and humidity statistics should be identified as site characteristics. Thus, the staff believes the higher of either the maximum recorded dry-bulb value or the maximum 100-year dry-bulb value should be listed as the Comanche Peak Nuclear Power Plant (CPNPP) site characteristic value to be compared to the US-APWR 0% exceedance maximum dry-bulb site parameter value. Similarly, a comparison should be provided between the 100-year non-coincident wet-bulb value and the US-APWR DCD 0% exceedance maximum non-coincident wet-bulb value.

In response to RAI 02.03.01-11, CPNPP COL FSAR Table 2.0-1R was updated to include comparisons between the site characteristic 100-year return period temperatures for the maximum dry bulb temperature with coincident wet bulb temperature as well as the minimum dry bulb temperature. These values, as presented, are acceptable to the staff. However, the updated table did not include a comparison between the site parameter 0% exceedance non-coincident wet bulb temperature and the 100-year return period non-coincident wet bulb temperature.

Please update CPNPP COL FSAR Table 2.0-1R to include a comparison between the 100-year return period non-coincident wet bulb temperature site characteristic value and the US-APWR DCD 0% exceedance maximum non-coincident wet bulb temperature value or provide a statement as to why this information should be omitted.

---

**ANSWER:**

The 100-year return period maximum dry bulb temperature and the coincident wet bulb temperature are used to calculate the capacity of safety related HVAC system cooling coils. The safety related HVAC system cooling coil design is based on the enthalpy of the cooling coil inlet and outlet air flow. The cooling coil inlet air enthalpy is determined from the 100-year return period dry bulb temperature and the coincident wet bulb temperature.

The non-coincident wet bulb temperature is generally used in the cooling tower design as the inlet air temperature; however the non-coincident wet bulb temperature is not used in the US-APWR design and is therefore not relevant to safety analyses.

Table 2.0-1R summarizes the typical DCD design conditions and the site conditions and Regulatory Guide 1.206 section C.I.2 states that the purpose of meteorological information in the COLA is to "demonstrate that the applicant has accurately described the site characteristics and appropriately used them in the plant design and operating criteria". The 100-year return period maximum non-coincident wet bulb temperature was not used in the US-APWR design, however the FSAR has been revised to compare the 100-year return maximum non-coincident wet bulb values to the DCD 0% exceedance non-coincident wet bulb values.

The ASHRAE Fundamentals Handbook gives an accepted methodology for calculating 100-year return values for dry bulb temperature. The ASHRAE discussion of the methodology used to calculate an n-year return period Extreme Annual Design Conditions specifically uses dry bulb temperature as the example. The handbook bases the dry bulb temperature return period calculation on the assumption that the annual maxima and minima temperatures are distributed according to the Gumbel Type 1 extreme value distribution. Assuming that the wet bulb temperature follows the same Type 1 Gumbel distribution as the dry bulb temperature results in a site-specific 100-year return non-coincident wet bulb temperature of 86°F (30°C) using 30 years (1977-2006) of meteorological data from the Dallas/Fort Worth Airport. For comparison, the maximum wet bulb temperature was also calculated to be 86°F using a methodology from the Statistical Engineering Division of NIST. This value is equal to the 0% annual exceedance maximum (historical limit excluding peaks <2 hr) non-coincident wet bulb temperature of 86°F given in the US-APWR DCD.

Impact on R-COLA

See attached marked-up FSAR Revision 1 page 2.0-3

Impact on S-COLA

None; this response is site-specific

Impact on DCD

None.

**Table 2.0-1R (Sheet 2 of 15)**
**Key Site Parameters**

| | | | | |
|---|---|---|---|---|
| | Extreme wind speed (other than in tornado) | 155 mph for 3-second gusts at 33 ft aboveground level based on 100-year return period, with importance factor of 1.15 for seismic category I/II structures | ~~90~~96 mph for-3-second gust wind speed at 33-ft aboveground | RCOL2_02.03.01-9 |
| CP COL 2.1(1)<br>CP COL 2.2(1)<br>CP COL 2.3(1)<br>CP COL 2.3(2) | Ambient design air temperature<br>~~(1% exceedance maximum)~~<br><br>~~Ambient design air temperature (0% exceedance maximum)~~ | 1% exceedance maximum:<br>100°F dry bulb,<br>77°F coincident wet bulb,<br>81°F non-coincident wet bulb | 1% exceedance maximum:<br>99°F dry bulb,<br>75°F coincident wet bulb,<br>78°F non-coincident wet bulb | RCOL2_02.03.01-11 |
| | | 0% exceedance maximum:<br>115°F dry bulb,<br>80°F coincident wet bulb,<br>86°F non-coincident wet bulb,<br>historical limit excluding peaks <2 hr | 0% exceedance maximum:<br>112°F dry bulb,<br>78°F coincident wet bulb,<br>83°F non-coincident wet bulb,<br>historical limit excluding peaks <2 hr<br>100-year return period maximum:<br>115°F dry bulb,<br>78°F coincident wet bulb<br>86°F non-coincident wet bulb | RCOL2_02.03.01-11<br>RCOL2_02.03.01-6 S01<br>RCOL2_02.3.01-12<br>RCOL2_02.03.01-6 S02 |
| CP COL 2.3(3)<br>CP COL 2.4(1)<br><br>CP COL 2.5(1) | Ambient design air temperature<br>~~(1% exceedance minimum)~~<br><br>~~Ambient design air temperature (0% exceedance minimum)~~ | 1% exceedance minimum:<br>-10°F dry bulb | 1% exceedance minimum:<br>25°F dry bulb | RCOL2_02.03.01-11 |
| | | 0% exceedance minimum:<br>-40°F dry bulb,<br>historical limit excluding peaks <2 hr | 0% exceedance minimum:<br>-0.5°F dry bulb,<br>historical limit excluding peaks <2 hr<br>100-year return period minimum:<br>-5°F dry bulb | RCOL2_02.03.01-6 S01<br>RCOL2_02.03.01-6 S02 |
| | *Atmospheric dispersion factors ($\chi$/Q values) for on-site locations:* | | | |