## PMSTPCOL PEmails

**From:** Muniz, Adrian
**Sent:** Tuesday, May 19, 2009 7:46 AM
**To:** Bhatia, Bhupendra; Pal, Amar
**Cc:** STPCOL
**Subject:** FW: Response to NRC RAIs on Section 8.1 and Section 8.2
**Attachments:** U7-C-STP-NRC-0900039_signed.pdf

Please see attached the response to the RAIs for Sections 8.1 and 8.2.

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**From:** Bense, Richard [mailto:rhbense@STPEGS.COM]
**Sent:** Monday, May 18, 2009 7:07 PM
**To:** Adrian Muniz; Belkys Sosa; George Wunder; Loren Plisco; Raj Anand; Rocky Foster; Tekia Govan; Tom Tai
**Subject:** Response to NRC RAIs on Section 8.1 and Section 8.2

Attached is a courtesy copy of the letter answering NRC Requests for Additional Information related to COLA Part 2, Tier 2, Section 8.1 and Section 8.2. The official paper copies were sent via UPS according to the letter addressee lists.

If you have any questions, please contact me at (215) 353-8857 or Bill Mookhoek at (361) 972-7274.

**Dick Bense**
Licensing Engineer, STP 3 & 4
RHBense@STPEGS.Com
RHBense@MSN.Com

(361) 972 4802 (Bay City Office)
(215) 353-8857 (mobile)
(215) 362-2552 (home office)

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**From:** Muniz, Adrian

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**Recipients:**
"STPCOL" <STP.COL@nrc.gov>
Tracking Status: None
"Bhatia, Bhupendra" <Bhupendra.Bhatia@nrc.gov>
Tracking Status: None
"Pal, Amar" <Amar.Pal@nrc.gov>
Tracking Status: None

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Nuclear Operating Company
South Texas Project Electric Generating Station P.O. Box 289 Wadsworth, Texas 77483

May 18, 2009
U7-C-STP-NRC-090039

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
One White Flint North
11555 Rockville Pike
Rockville, MD 20852-2738

South Texas Project
Units 3 and 4
Docket Nos. 52-012 and 52-013
Responses to Requests for Additional Information

Attached are responses to NRC staff questions included in Request for Additional Information (RAI) letter numbers 96 and 95, related to Combined License Application (COLA) Part 2, Tier 2, Sections 8.1, "Introduction" (Offsite Transmission Network) and 8.2, "Offsite Power Systems." This submittal forms a complete response to RAI letter numbers 96 and 95. Attachments 1 through 18 provide responses to the following RAI questions:

| | | | | |
|---|---|---|---|---|
| 08.01-1 | 08.02-1 | 08.02-6 | 08.02-10 | 08.02-14 |
| | 08.02-2 | 08.02-7 | 08.02-11 | 08.02-15 |
| | 08.02-3 | 08.02-8 | 08.02-12 | 08.02-16 |
| | 08.02-4 | 08.02-9 | 08.02-13 | 08.02-17 |
| | 08.02-5 | | | |

There are no commitments in this letter.

If you have any questions regarding these responses, please contact me at (361) 972-7136, or Bill Mookhoek at (361) 972-7274.

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

Executed on 5/18/09

Scott Head
Manager, Regulatory Affairs
South Texas Project Units 3 & 4

rhb

Attachments:

1. Question 08.01-1
2. Question 08.02-1
3. Question 08.02-2
4. Question 08.02-3
5. Question 08.02-4
6. Question 08.02-5
7. Question 08.02-6
8. Question 08.02-7
9. Question 08.02-8
10. Question 08.02-9
11. Question 08.02-10
12. Question 08.02-11
13. Question 08.02-12
14. Question 08.02-13
15. Question 08.02-14
16. Question 08.02-15
17. Question 08.02-16
18. Question 08.02-17

cc: w/o attachments and enclosure except*
(paper copy)

Director, Office of New Reactors
U. S. Nuclear Regulatory Commission
One White Flint North
11555 Rockville Pike
Rockville, MD 20852-2738

Regional Administrator, Region IV
U. S. Nuclear Regulatory Commission
611 Ryan Plaza Drive, Suite 400
Arlington, Texas 76011-8064

Kathy C. Perkins, RN, MBA
Assistant Commissioner
Texas Department of Health Services
Division for Regulatory Services
P. O. Box 149347
Austin, Texas 78714-9347

Alice Hamilton Rogers, P.E.
Inspections Unit Manager
Texas Department of Health Services
P. O. Box 149347
Austin, Texas 78714-9347

C. M. Canady
City of Austin
Electric Utility Department
721 Barton Springs Road
Austin, TX 78704

*Steven P. Frantz, Esquire
A. H. Gutterman, Esquire
Morgan, Lewis & Bockius LLP
1111 Pennsylvania Ave. NW
Washington D.C. 20004

*George F. Wunder
*Tekia Govan
Two White Flint North
11545 Rockville Pike
Rockville, MD 20852

(electronic copy)

*George Wunder
*Tekia Govan
Loren R. Plisco
U. S. Nuclear Regulatory Commission

Steve Winn
Eddy Daniels
Joseph Kiwak
Nuclear Innovation North America

Jon C. Wood, Esquire
Cox Smith Matthews

J. J. Nesrsta
R. K. Temple
Kevin Pollo
L. D. Blaylock
CPS Energy

**RAI 08.01-1**

**QUESTION:**

FSAR Section 8.1, Table 8.1-1 does not include the following Regulatory Guides (RG): RG 1.160, "Monitoring the Effectiveness of Maintenance at Nuclear Power Plants;" RG 1.180, "Guidelines for Evaluating Electromagnetic and Radio-Frequency Interference in Safety-Related Instrumentation and Control Systems," RG 1.182, "Assessing and Managing Risk before Maintenance Activities at Nuclear Power Plants;" and RG 1.204, "Guideline for Lightning Protection at Nuclear Power Plants." Discuss their applicability to STP.

**RESPONSE:**

Applicability of Codes and Standards is addressed in ABWR DCD, Tier 2, Section 1.8.2. The Regulatory Guides (RG) which are applicable to the ABWR design are provided in ABWR DCD, Tier 2, Table 1.8-20. RG 1.160 Revision 0 (6/93) is listed in that table as part of the Certified Design. However, the Certified Design did not include RG 1.160 in ABWR DCD, Tier 2, Table 8.1-1, there was no departure to this portion of the certified design and as such no change is required.

RG 1.160 Revision 2 (3/97) and RG 1.182 Revision 0 (5/00) are part of the site-specific RGs adopted in support of FSAR Section 17.6S 'Maintenance Rule Program.' Since these were not added to Section 8A.1.2, they will not be provided in FSAR Table 8.1-1.

RG 1.180 Revision 0 (2000) & Revision 1 (2003) relate to Instrument and Controls (I&C) platform departures (reference Enclosure 2b to letter U7-C-STP-NRC-090009 dated February 9, 2009, 'Additional I&C Information'). This Regulatory Guide is not applicable to the Electrical Power System and therefore no additional COLA markup to FSAR Table 8.1-1 is required for this item.

RG 1.204 Revision 0 (11/05) will be added to FSAR Table 8.1-1 since it was also added to FSAR Section 8A.1.2 in COLA Revision 2.

In FSAR Table 8.1-1, the following line corresponding to RG 1.204 will be added.

| Applicable Criteria | Ref. IEEE Std | Offsite Power System | AC Power Systems (Onsite) | DC Power Systems (Onsite) |
|---|---|---|---|---|
| **RG 1.204** | **IEEE-665**<br>**IEEE-666**<br>**IEEE-1050**<br>**IEEE-C62.23** | | **X** | **X** |

**RAI 08.02-1**

**QUESTION:**

FSAR Subsection 8.2.1.2 specifies the symmetrical and asymmetrical interrupting ratings of the main generator circuit breaker. These values were reduced from those specified in the DCD. Identify the maximum fault available from the main generator and main step-up transformers and confirm that the breaker interrupting ratings are consistent with the available fault from the system. Also, provide supporting information pertaining to these issues.

**RESPONSE:**

Based on IEEE C37.013 methodology and the site specific impedance values, the maximum fault available from the main generator or from the main step up transformers is less than the generator circuit breaker capability values provided in COLA Part 2, Tier 2, Section 8.2.1.2.

The application of a generator circuit breaker is a special application which will require vendor specific considerations. As a result, the procurement of the actual generator circuit breakers to be installed at STP 3 & 4 will require further vendor specific analysis and detailed design for the application. This will be controlled as part of project specific implementation.

No COLA revision is required as a result of this response.

**RAI 08.02-2**

**QUESTION:**

In FSAR Subsection 8.2.1.2 it is stated that the 4.16 KV winding of the reserve auxiliary transformer (RAT) A can be aligned to support any of the three plant investment protection (PIP) buses and any of the Class 1E buses and has the capacity to support all three Class 1E buses. This is also true for RAT B. Indicate the interlocks provided to prevent closure of all six breakers and, thus, potentially overload the transformer.

**RESPONSE:**

Administrative controls will be utilized to limit reserve auxiliary transformer(s) loading.

Please refer to COLA Part 2, Tier 2, Section 8.2.4.5 Capacity of Auxiliary Transformers:

> "Procedure(s) that provide limits to assure that the ONAF ratings of the unit auxiliary or reserve auxiliary transformers are not exceeded under any operating mode will be developed before fuel load consistent with the plant operating procedure development plan in Section 13.5. (COM 8.2-2)"

Please refer to COLA Part 2, Tier 2, Figure 8.3-1 Sheet 1 of 4, Note 9:

> "During normal plant operation all of the Non-Class 1E buses and two of the Class 1E buses are supplied with power from the main turbine generator through the unit auxiliary transformers. The remaining Class 1E bus is supplied from RAT B. The division is immediately available without a bus transfer if the NPP is lost to the other two divisions."

No COLA revision is required as a result of this response.

**RAI 08.02-3**

**QUESTION:**

In FSAR Subsection 8.2.1.2 it is stated that the 13.8 winding of RAT B is designed to be capable of supporting power generation (PG) Buses B1 and D1 via an intermediate 13.8 KV bus designated as CTG1. Based on Figure 8.3-1, a tie breaker connects bus CTG1 to bus CTG2 that receives power from RAT A. Discuss the interlocks provided between the transformer supply breakers and the tie breaker and between the supply and tie breakers and the bus feeders such that the RATs are not overloaded.

**RESPONSE:**

Administrative controls will be utilized to limit reserve auxiliary transformer(s) loading.

Please refer to COLA Part 2, Tier 2, Section 8.2.4.5 Capacity of Auxiliary Transformers:

> "Procedure(s) that provide limits to assure that the ONAF ratings of the unit auxiliary or reserve auxiliary transformers are not exceeded under any operating mode will be developed before fuel load consistent with the plant operating procedure development plan in Section 13.5. (COM 8.2-2)"

Please refer to COLA Part 2, Tier 2, Figure 8.3-1 Sheet 1 of 4, Note 9:

> "During normal plant operation all of the Non-Class 1E buses and two of the Class 1E buses are supplied with power from the main turbine generator through the unit auxiliary transformers. The remaining Class 1E bus is supplied from RAT B. The division is immediately available without a bus transfer if the NPP is lost to the other two divisions."

No COLA revision is required as a result of this response.

**RAI 08.02-4**

**QUESTION:**

FSAR Subsection 8.2.1.3 states that the RATs are separated from the main power and unit auxiliary transformers by distance or barriers. Additionally, it is stated that separation between the two RATs is not sufficient to allow each to be considered an independent offsite power supply. A review of Figure 8.2-1 shows that a barrier is provided between the RATs, but not between these and the unit auxiliary transformers (UATs). Clarify the statement in subsection 8.2.1.3 and provide additional details regarding the separation provided by the design, including the type and size of barriers that would be used, and how these barriers meet the separation criteria.

**RESPONSE:**

The COLA states that separation between RATs and UATs will be maintained either by distance or by barriers. Figure 8.2-1 indicates that there is no barrier between the RATs and the UATs, however the space between the RATs and UATs will be at least 15.24 meters. This figure is not in conflict with the requirement of 15.24 meters minimum separation between the RATs and UATs.

For STP 3 & 4, barriers will not be used to separate RATs and UATs. Detailed design has not been completed at the time this is written, however it has been decided that separation between UATs and RATs will be maintained with a distance of at least 15.24 meters.

The end of the second sentence in COLA Tier 2 Section 8.2.1.3 will be changed to remove the statement ", or by barriers" as shown below:

> *The location of the main power transformer, unit auxiliary transformers, and reserve auxiliary transformer***s** *are shown on Figure 8.2-1. The reserve auxiliary transformer***s** ~~*is*~~**are** *separated from the main power and unit auxiliary transformers by minimum distance of 15.24 m*~~**, or by barriers**~~*.*

**RAI 08.02-5**

**QUESTION:**

FSAR Subsection 8.2.1.2.1 discusses the design and susceptibility of transmission lines to lightning. Identify the basic insulation level (BIL) specified for the 345 kV transmission lines, the switchyards, and substations listed in this section, and provide a comparison with the BILs that are utilized by other transmission lines in the general area for existing and proposed 345 kV transmission lines. Describe design features such as surge protection devices, grounding, and lightning protection provided for the switchyard and transmission lines and indicate how these systems will be periodically maintained and tested to assure their functionality.

**RESPONSE:**

For transmission lines, 345kV line insulators are designed for a minimum critical flashover (CFO), which represents the electrical strength of the insulator at 50% probability of flashover. The table below shows CFO for the transmission lines listed in COLA Section 8.2.1.2.1

| Transmission Line | CFO |
|---|---|
| Elm Creek 27 | 1995 kV |
| Hillje 44 | 1995 kV |
| White Point 39 | 1745 kV |
| Velasco 27 | 1700 kV |
| Blessing 44 | 2065 kV |

There are four other 345 kV transmission lines in the general area of the transmission lines servicing the Units 3 & 4 switchyard. These other lines have CFO ratings between 1700 kV and 1995 kV. Any rebuilt transmission line (Hillje lines) is designed with a minimum CFO of 1585 kV.

The BIL for 345 kV substations and equipment, including circuit breakers, is 1300 kV.

For lightning protection, all of the 345 kV transmission lines for Units 3 & 4 use two overhead shield wires grounded at each tower structure.

To provide protection for circuit breakers and other substation equipment, Metal Oxide Varistor surge arresters are installed at each transmission line's entrance to a substation or switchyard. The standard design for these 345 kV surge arresters is 209 kV maximum continuous operating voltage (MCOV). Circuit breakers are also tested to withstand a 1680 kV chopped wave.

The switchyard will be designed with a buried ground grid sized according to the maximum available fault current and the soil resistivity. The switchyard will also be designed with an overhead shield wire to dissipate lightning strikes without damaging substation equipment.

Transmission Service Providers have periodic inspection programs for their transmission lines

and right of ways to identify any issues that may impact functionality. All transmission lines undergo aerial inspection at least once per year, and a comprehensive inspection is conducted on non-wood structures in coastal areas at least once every five years.

345 kV substations and switchyards undergo a monthly site inspection and walk through, as well as an annual predictive maintenance inspection which includes thermographic inspection.

No COLA revision is required as a result of this RAI response.

**RAI 08.02-6**

**QUESTION:**

FSAR Figure 8.2-2 indicates that the existing DOW 27 line runs underground between the switchyards for Units 1 and 2 and Units 3 and 4. Since underground cables are susceptible to moisture, identify the cable design features and/or in-situ programs that will be implemented to avoid or arrest the degradation of the cable insulation from the effects of the moisture (testing and inspection frequency of water accumulation and adequate corrective action if water accumulation is found).

**RESPONSE:**

The underground cables for the DOW 27 line will be parallel (two per phase) 3500 kcmil cross-linked polyethylene (XLPE) cables with metallic (either lead or copper) sheaths, installed in duct banks. Because metallic sheathed cables are designed for continuous submergence, cable degradation from the effects of moisture will be avoided and in-situ testing of the cable installation is not necessary.

No COLA revision is required as a result of this RAI response.

**RAI 08.02-7**

**QUESTION:**

FSAR Table 8.2-3 identifies the transmission line historical failure associated with STP Units 1 and 2. This table shows that a large majority of failure incidents were either unknown (166) or weather-related (147). Discuss how these incidents are being used in the design of the new switchyard and transmission lines.

**RESPONSE:**

A portion of the 166 unknown and 147 weather-related transmission line incidents are instantaneous circuit breaker trips where the fault was cleared and the line brought back into service instantaneously. The remaining cases are those where the circuit breaker cleared the fault and was locked out, requiring the Transmission Service Provider to bring the line back to service. Table 8.2-3 is misleading in that the title indicates that these incidents are all failures, while some are actually the instantaneous type where the line is instantaneously returned to service.

These historical failures are the result of transmission line incidents and will not affect the new switchyard's design. The existing transmission lines are being used for STP 3 & 4.

The title of COLA Tier 2 Table 8.2-3 will be changed to replace the word "Failures" with "Circuit Breaker Actuations".

The content of COLA Tier 2 Table 8.2-3 will be changed to show the number of incidents in two categories, instantaneous and lock-outs, as shown on the next page.

**Table 8.2-3 Transmission Line Historical Data on Outages Due to ~~Failures~~ Circuit Breaker Actuations**
**STP Unit 1 & 2**

| **Failure Description** | **No. of Incidents (1980 – 2006)** | |
|---|---|---|
| | **Instantaneous** | **Lock-out** |
| Airplane/Foreign Object into Circuit | 1 | 6 |
| Breaker Failure | 1 | 8 |
| Broken Insulator | 8 | 7 |
| Broken Conductor | 0 | 5 |
| Electrocution (Bird/Human) | 0 | 2 |
| Insulator Flashover Contamination | 19 | 36 |
| Lightning | 56 | 13 |
| Personnel Error | 2 | 14 |
| Relay Mis-operation | 9 | 11 |
| Trees/Vines into Circuits | 4 | 10 |
| Unknown | 103 | 63 |
| Weather Related | 53 | 94 |

**RAI 08.02-8**

**QUESTION:**

FSAR Subsections 8.2.1.2.2 describes the criteria used in specifying the continuous current rating, interrupting duties, momentary rating and voltage rating for the switchyard circuit breakers, but no values are provided for each of these ratings. Provide details regarding the circuit breaker ratings specified and indicate why those ratings are adequate for the application. Additionally, indicate applicable ratings for disconnect switches.

**RESPONSE:**

The circuit breaker and disconnect switches are rated based on the interconnection study (Reference 8.2-3, COLA Part 2, Tier 2, FSAR Section 8.2) performed for the addition of Units 3 & 4 at STP. The study performed both continuous and short circuit studies for various configurations and contingencies which determined the required ratings of the switchyard's main power equipment. As stated in COLA Part 2 Tier 2, FSAR Section 8.2.1.2.2, the interrupting rating of the circuit breakers is 63,000 amps. The voltage rating and momentary rating of the breakers is 362 kV and approximately 82,000 amps respectively. The continuous ratings of the circuit breakers and disconnect switches are 4000 amps.

No COLA revision is required as a result of this RAI response.

**RAI 08.02-9**

**QUESTION:**

FSAR Section 8.2.1.2.2 describes the protection provided for the switchyard and its components and indicates that the switchyard uses a primary and secondary relay scheme, and that for the main power transformers and RATs the protection scheme includes primary and backup protection. Provide specific details regarding the protection devices and schemes used for the switchyard and its components, including the UATs. Additionally, indicate whether protection schemes have addressed lessons learned from the event described in Information Notice 2005-15, "Three-Unit Trip and Loss of Offsite Power at Palo Verde Nuclear Generating Station."

**RESPONSE:**

As the detailed design for switchyard protective relaying has not been completed at this time, specific details regarding protective devices are not yet available. The Unit Auxiliary Transformers (UATs) are not part of the switchyard, and are not included in the protective relaying scheme for the switchyard.

ABWR DCD Tier 2 Section 8.2.5 describes the design requirements of the offsite power circuit and switchyard relay schemes as using primary and backup protection features. Each circuit breaker is equipped with dual trip coils, each protection circuit supplying a trip signal is connected to a separate trip coil, and there is physical separation between the cabling for primary and backup protection circuits.

COLA Part 2 Tier 2 Sections 8.2.2.2.2.3 and 8.2.2.2.2.4 describes how the switchyard protection scheme meets the ABWR DCD requirements. Current input for the primary and secondary relaying systems is provided from separate circuit breaker bushing current transformers. The potential input for the primary and secondary systems is supplied from fused branch circuits from a set of coupling capacitor potential devices. The control power for the primary and secondary relaying systems is provided by separate 125 VDC systems. The primary relay is of a different type or manufacture from the backup relay. The breaker-and-a-half switchyard arrangement allows the isolation of any faulted transmission line into the switchyard without affecting any other line. The breaker-and-a-half arrangement also allows any circuit breaker fault or failure to trip to be cleared while only resulting in the loss of a tie breaker's two adjacent circuits or a bus side breaker's adjacent circuit and bus.

The primary and backup protection schemes that are being used will increase the reliability of the switchyard as suggested by Information Notice 2005-15.

No COLA revision is required as a result of this RAI response.

**RAI 08.02-10**

**QUESTION:**

FSAR Section 8.2.1.2.2 describes the protection provided for the switchyard and its components. Discuss who is responsible for the coordination, setting, monitoring, maintenance, and testing of all protective relays. Also, discuss associated review and approval requirements by STP and/or grid reliability organization.

**RESPONSE:**

Because Texas is a deregulated electricity market, an Interconnection Agreements is required between a Generation Owner, Generation Operator, and Transmission Service Providers (TSP).

An Interconnection Agreement between STP and its TSPs for STP 3 & 4 will include terms that the TSP will be responsible for the coordination, setting, monitoring, maintenance, and testing of the protective relays for the switchyard and its components. The Interconnection Agreement will require TSPs to notify STP of all maintenance and testing activities in the switchyard, however STP approval will not be required for these activities. Under this agreement TSPs will be required to obtain STP approval for any design changes to the switchyard.

Refer to COLA Tier 2 Section 8.2.2.3.1 for a description of the interconnection agreement that provides requirements for TSP's operation of the grid and interconnection.

No COLA revision is required as a result of this RAI response.

**RAI 08.02-11**

**QUESTION:**

In FSAR Section 8.2.1.2.2, it is stated that the control cables for the switchyard breakers are routed through three parallel independent cable trenches. Describe the cables design features and the monitoring program that will be implemented to avoid or arrest the degradation of cable insulation from the effects of moisture.

**RESPONSE:**

The control cables at STP that are routed in the switchyard will be in concrete modular trench with drain holes in the bottom which will be mounted with the trench covers at grade to facilitate cable installation. At South Texas the water table is about six feet below grade and the switchyard elevation will be increased by at least a foot above grade. Since the switchyard elevation will be about a foot higher than the surrounding areas, during heavy rainfalls there will be some runoff away from the switchyard which will minimize seepage into the soil due to standing water in the switchyard. Also, it is anticipated that the trench internals will be approximately 24 inches wide and no greater than 16 inches deep to accommodate the cables. The trench will be mounted on 6-8 inches of crushed stone with a top layer of 2-3 inches of sand to facilitate leveling of the trench. Based on the above, water ingression from heavy rainfall will be reduced due to the natural runoff since the switchyard elevation is higher than the surrounding areas and there will be a natural drainage path for any water that gets into the trench through the drain holes in the bottom, the sand and the crushed stone thus precluding standing water in the trench. Therefore the cables may get wet but will not be continuously submerged. Cables that will be used are designed for wet/dry environments and should not be challenged since they will not be continuously submerged. A similar trench system has been used in the Unit 1 & 2 switchyard and inspection inside of the trenches has confirmed that there has been no standing water in them.

There is no plan to have any cable monitoring program for switchyard cables. Also based on the installation methods described above and the fact that STP has not experienced any cable failures that have been in service for over thirty years in the Unit 1 & 2 switchyard, there is no reason to monitor the low voltage control cables.

No COLA revision is required as a result of this RAI response.

**RAI 08.02-12**

**QUESTION:**

FSAR Subsection 8.2.1.2.4 is titled "Unit Auxiliary Transformers." However, these transformers are not discussed in this subsection. This subsection appears to be a continuation of subsection 8.2.1.2.3. Verify the content of the two subsections and make appropriate changes.

**RESPONSE:**

COLA Section 8.2.1.2.4 is a continuation of Section 8.2.1.2.3. The inclusion of "8.2.1.2.4 Unit Auxiliary Transformers" is an error.

COLA Section 8.2.1.2.3 will be revised to delete the heading for Section 8.2.1.2.4 as follows:

> The impedances of the unit auxiliary and reserve auxiliary transformers are compatible with the interrupting capability of the plant's circuit interrupting devices.

~~**8.2.1.2.4 Unit Auxiliary Transformers**~~

> The main step-up power and reserve auxiliary transformers are provided with separate oil collection pits and drains to safe disposal area, and are provided with fire protection deluge systems as specified in Section 9A.4.6.

RAI 08.02-13

**QUESTION:**

FSAR Section 8.2.2.3 addresses grid analysis and indicates that the evaluation performed under various line outages showed that stable operation existed for all STP units under all second level transmission line contingency conditions. This evaluation does not appear to have addressed the simultaneous loss of multiple units. Address the impact of such events on the ability of the offsite power system to supply power to the safety loads for Units 3 and 4.

**RESPONSE:**

As part of the interconnection study performed for the addition of Units 3 & 4 at STP (Reference 8.2-3, COLA Part 2, Tier 2, FSAR Section 8.2), a simultaneous loss of both Units 3 & 4 were analyzed. The loss of both units and the stability of the ERCOT grid were addressed in section 8.2.2.3. STP Units 3 & 4 will have 5 transmission lines with an additional 345 kV transmission line between Units 3 & 4 switchyard and Units 1 & 2 switchyard. Each remote transmission line terminates at a switchyard with multiple transmission lines which allows for alternate power flow paths should a STP transmission line(s) trip.

No COLA revision is required as a result of this RAI response.

**RAI 08.02-14**

**QUESTION:**

FSAR Section 8.2.2.2.3 addresses grid availability study. Discuss whether the study addressed load increases over the next 5-10 years, whether maximum winter and/or summer loads were appropriately accounted for and what is the frequency for updating the study.

**RESPONSE:**

The grid availability study (Ref. 8.2-3) discussed in Section 8.2.2.3 addresses the 2012 (five year) generation dispatches provided by the Electric Reliability Council of Texas (ERCOT). This study used ERCOT's 2012 Summer loading cases.

An Interconnection Agreement between STP and its Transmission Service Providers (TSPs) will require TSPs to provide STP annually a voltage study for the STP 3 & 4 substation. This study will analyze the grid stability and voltage for every year up to five years out from when the study is completed. The study will use the summer peak load conditions in order to determine the expected lowest grid voltage.

Also, refer to COLA Tier 2 Section 8.2.2.3.1, which discusses grid availability and ERCOT's analysis to ensure the adequacy of the bulk power system.

No COLA revision is required as a result of this RAI response.

**RAI 08.02-15**

**QUESTION:**

As indicated in FSAR Section 8.1.1, ERCOT is the Independent System Operator (ISO) which oversees all generation and transmission functions. Discuss the responsibilities of the ISO and the STP organizations to assure the switchyard and transmission system operation and maintenance. Address communication protocols between plant Operations and the ISO regarding switchyard and plant-related events and the extent to which maintenance and modifications to the switchyard and substation will be reviewed, controlled, and approved through the STP process (i.e., 10 CFR 50.65).
Additionally, discuss the communication that will be established between the plant and grid operators regarding grid reliability evaluations before performing "grid- risk-sensitive" maintenance activities which could increase risk under existing or imminent degraded grid reliability conditions. Also, discuss the controls and alarm/indication for switchyard components that are available in the STP 3 and STP 4 control rooms.

**RESPONSE:**

Agreements will be put in place (Reference COLA Part 2, Tier 2, FSAR section 8.2.2.3.1) to establish the interfaces between the grid operators and STP operations. ERCOT uses protocols, operating guides and procedures for operation of the ERCOT grid which will support the offsite power requirements for STP. STP will have a formal interconnection agreement with the Transmission Service Providers (TSP) which will require notification to STP prior to and during maintenance activities. The TSP will be required to notify STP prior to removing transmission lines from service. The interconnection agreement will also require that STP review and concur with proposed changes to the switchyard.

With respect to evaluations of potential grid problems that may be anticipated in advance of performing maintenance activities, the agreement will require communications between STP operations and grid operations to:

- discuss the status of STP and the transmission system,
- review upcoming work activities, and
- discuss the operating conditions scheduled or anticipated for the next day and the next seven days.

With respect to evaluations of potential grid problems which may occur with little or no advance warning, the grid operator is in a unique position to anticipate and assess grid problems via information obtained from:

- the grid Supervisory Control And Data Acquisition (SCADA) System,
- communications with field personnel,
- communications with neighboring utilities, and
- timely reports from various weather services.

ERCOT procedures presently require nuclear plants to be notified whenever an impaired or potentially degraded grid condition of the following type is recognized by ERCOT or TSPs. Specific examples of known potentially degrading conditions fall into two basic categories:

1. Normal day-to-day operational communications associated with topics such as:
   • work coordination
   • switching
   • generation dispatch
   • planning

2. Infrequent or off-normal communications associated with topics such as:
   • emergent line outages
   • severe weather
   • equipment malfunctions that affect STP
   • very low system load
   • very high system load,
   • North American Electric Reliability Council (NERC) Energy Emergency Alerts
   • voltage support problems

The detailed design of the switchyard has not been completed at this time; however, the Unit 3 & 4 control rooms will have control function for the main generator breakers and the reserve auxiliary transformer breakers in the switchyard. There will be breaker trouble alarms in the control room for the same breakers that STP has control over. Indication will include voltage on both 345 kV busses and breaker position status.

No COLA revision is required as a result of this RAI response.

RAI 08.02-16

**QUESTION:**

FSAR Section 8.2.4.1 discusses periodic testing of offsite equipment and indicates that testing intervals will be established according to IEEE 338. Discuss the type and interval of routine inspection of the offsite system, such as, but not limited to structures, network lines, transformers, circuit breakers substation equipment, batteries, potential transformers, ground grid, and lightning arresters. Additionally, discuss the industry standards that will be followed for the switchyard protection system, monitoring, maintenance and testing.

**RESPONSE:**

The Unit 3 & 4 switchyard receives an on-site visit once a month by the Transmission Service Provider (TSP) which includes a walk through to verify the condition of the substation, the fence, the structures, the property, and the external appearance of the substation equipment. It also includes taking readings from the breaker counters and performing the monthly routine inspection of the station batteries. In addition to the monthly battery inspections, batteries also receive a detailed inspection approximately every 180 days.

The STP Unit 3 & 4 switchyard circuit breakers also have two different maintenance procedures: the first is an "external inspection"; the second is a "complete inspection". The frequency for these procedures varies depending on the interrupting medium and the measured interrupting duty. The Unit 3 & 4 345 kV circuit breakers are gas circuit breakers using sulfur hexafluoride gas. Gas circuit breakers have a nominal interval of 6 years for external inspections and the interval for complete inspections is based on a cumulative measured fault current and the number of operations since the last complete inspection.

In addition to the above, the station receives an annual Predictive Maintenance (PDM) inspection which includes a thermography inspection of all station equipment including the bus work, switches, PT's, CT's, breakers, transformers and arresters. The PDM inspection also includes taking oil samples from the transformers and regulators for Dissolved Gas Analysis (DGA) testing.

The switchyard maintenance practices are based on the Transmission Service Provider's Station Maintenance Guidelines which reference various guides and standards including:

IEEE C57.106, "Guide for Acceptance and Maintenance of Insulating Oil in Equipment;"

IEEE C37.61, "Standard Guide for the Application, Operation and Maintenance of Automatic Circuit Reclosers;"

IEEE C37.010, "Application Guide for AC High-Voltage Circuit Breakers Rated on a Symmetrical Current Basis;"

IEEE 637, "Guide for the Reclamation of Insulating Oil and Criteria for Its Use;"

NEMA C37.85, "Switchgear - Alternating-Current High-Voltage Power Vacuum Interrupters - Safety Requirements for X-Radiation Limits;"

ASTM D1816, "Standard Test Method for Dielectric Breakdown Voltage of Insulating Oils of Petroleum Origin Using VDE Electrodes;"

ASTM D877, "Standard Test Method for Dielectric Breakdown Voltage of Insulating liquids Using Disk Electrodes;"

Doble documents;

NERC standards; and,

Manufacturer's guidelines.

The TSP utilizes periodic transmission line inspections to observe and report the present physical condition of the transmission line and ROW. The TSP's applicable inspection programs, as shown in the table below, provides information on the general condition of the transmission system, in addition to indicating areas requiring immediate corrective action. Items found during routine inspection that require urgent attention are scheduled for quick repair. Inspections can also reveal certain trends, such as increasing structure or hardware deterioration that are taken into consideration for future planning, budgeting and scheduling of resources.

| Inspection Program | Facilities Included | Recommended Minimum Frequency (See Note 1) |
|---|---|---|
| Routine Aerial Inspection | All Lines | Once per year |
| Comprehensive Inspection | Non-Wood Structures (coastal areas) | Once every 5 years |

Note 1: Recommended frequencies are minimums. Many conditions may warrant more frequent inspections, including but not limited to regulatory requirements, historical performance, system conditions, abnormal system configuration, or other intrinsic characteristics.

No COLA revision is required as a result of this RAI response.

**RAI 08.02-17**

**QUESTION:**

FSAR Subsection 8.2.1.2 discusses the isolated phase bus duct and refers to FSAR Figure 8.3.1 for the bus duct rating. However, Figure 8.3.1 only identifies the rating of the bus duct sections that connect the output of the main generator to the step-up transformers. Revise Figure 8.3.1 to indicate the ratings of the bus duct sections that supply power to the UATs and provide the data required to confirm the capability of each section to carry maximum full load currents.

**RESPONSE:**

Detailed design of the plant is not complete and the rating of the bus duct sections supplying power to the Unit Auxiliary Transformers (UATs) is not yet known. Once detailed design is complete the ratings of all of the sections of the isolated phase bus duct will be added to Figure 8.3.1. Figure 8.3.1 is a general arrangement and does not represent the final configuration.

No COLA revision is required as a result of this RAI response.