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

July 15, 2010
U7-C-STP-NRC-100167

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
One White Flint North
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South Texas Project
Units 3 and 4
Docket Nos. 52-012 and 52-013
Response to Request for Additional Information

Attached are the STP Nuclear Operating Company (STPNOC) revised response to RAI 08.02-24, which was originally submitted in STPNOC Letter U7-C-STP-NRC-100123 (ML101590397) dated June 3, 2010, and a supplemental response to RAI 08.04-4, which was originally submitted in STPNOC Letter U7-C-STP-NRC-100116 (ML101530166) dated May 27, 2010. Attachments 1 and 2 provide the responses to the RAI questions listed below:

08.02-24, Revision 1 · 08.04-4, Supplement 1

When a change to the COLA is required, it will be incorporated into the next routine revision of the COLA following NRC acceptance of the RAI response.

There are no commitments in this letter.

If you have any questions, 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 7/15/10

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

rhb

Attachments: 1. RAI 08.02-24, Revision 1
2. RAI 08.04-4, Supplement 1

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NRO

cc: w/o attachments and enclosure except*
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08.02-24, Revision 1

QUESTION:

In response to RAI 8.2-23, Supplement 1, regarding implementing a program for inaccessible or underground power, control, and instrumentation cables, the applicant stated that low-voltage power (120 volt AC and 125 volt and 250 volt DC), control and instrument cables are not included in monitoring and testing programs consistent with STP Units 1 and 2. This is inconsistent with the requirements of 10 CFR 50.65(a)(1) which states that, "Each holder of a license to operate a nuclear plant ... shall monitor the performance or condition of structures, systems, or components... in a manner sufficient to provide reasonable assurance that such structures, systems, and components... are capable of fulfilling their intended functions." Additionally, Standard Review Plan Section 8.2III.L, states, "Operating experience has shown that undetected degradation of underground ...could result in multiple equipment failures. Underground or inaccessible power and control cable runs that are susceptible to protracted exposure to wetted environments or submergence... should be reviewed. Guidance on the selection of electric cable condition monitoring can be found in Sections 3 and 4.5 of NUREG/CR-7000.

Additionally, the applicant stated that the testing of medium voltage and 480 volt cables will be performed using a DC megger or other acceptable method based on the cable type/construction. The testing will be performed as part of routine preventive and corrective maintenance activities associated with the end device. The staff finds the applicant's response to be inadequate because DC megger test alone is not sufficient to identify incipient cable degradation that can lead to a cable failure during plant operations, thereby causing challenges to safety systems and systems important to safety. The megger test is not as sensitive to insulation degradation as other tests. EPRI studies for cable testing and condition monitoring support other tests in addition to megger test to detect incipient degradation in cables. Therefore, the staff believes that a combination of megger and other state-of-the-art tests are needed for cable condition monitoring program. In addition, the staff does not consider the megger testing including the end device as an acceptable method for cable condition monitoring program because the test results would be masked by the conditions of the end device insulation rather than revealing the condition of the cable insulation itself. Therefore, the staff requests that the applicant revise its response to provide an appropriate condition monitoring program for detecting incipient degradation in cables based on the industry (EPRI, IEEE and nuclear entities including regulatory bodies) recommended practices or provide justification for supporting its position.

Revised Response:

This revision to the response to RAI 08.02-24 (STPNOC Letter U7-C-STP-NRC-100123, dated June 3, 2010 (ML101590397) supersedes the original response its entirety. Differences from the June 3, 2010 response to RAI 08.02-24 are indicated by revision bars in the right margin.

Description of raceway design associated with offsite power system feeds and safety related cabling between the Reactor Building and exterior structures:

As described below, most STP 3 & 4 cable raceways are above grade and the cables are not subject to submergence. In cases where the cables are below grade, the manholes are subjected to periodic inspections and provided with sump pumps and high water level alarms.

The normal preferred feeds from the unit auxiliary transformers are routed around the Turbine Building in an electrical tunnel from the unit auxiliary transformers to the Turbine Building switchgear rooms as shown on FSAR Figure 8.2-1. (An underground duct bank is an acceptable alternate.) The tunnel or duct bank manholes are subjected to periodic inspections and are provided with high water level alarms. Where necessary, sump pumps are provided. The feeds to the Reactor Building exit the Turbine Building and cross the roof on the Division I and III side of the Control Building (FSAR Figure 8.2-1, Sheet 3). The feeds then drop down the side of the Control Building in the space between the Control and Reactor Buildings, enter the Reactor Building, and continue through the Division I and III side of the Reactor Building to the associated Class 1E switchgear rooms in the Reactor Building.

The alternate preferred feeds from the reserve auxiliary transformers are routed inside the Turbine Building. The Turbine Building switchgear feeds from the reserve auxiliary transformer are routed directly to the Turbine Building switchgear rooms. The feeds to the Control Building are routed in corridors outside of the Turbine Building switchgear rooms. The feed exits the Turbine Building and crosses the Control Building roof on the side opposite the route for the normal preferred power feeds. The alternate preferred power feed turns down between the Control and Reactor Building and enters the Reactor Building on the Division I side. From there, the alternate preferred feeds continue to the respective switchgear rooms in the Reactor Building.

Safety-related cables routed from the Reactor Building to the Reactor Service Water (RSW) Pump house are routed via three underground tunnels with a separate tunnel for each safety division. The cables are routed in cable trays in the tunnel above the RSW pipes and are accessible. This design is illustrated in FSAR Figure 1.2-36.

The safety-related cables from the Reactor Building to the Diesel Generator Fuel Vaults are routed via underground ducts with manholes at each end of the duct. The ducts share a common concrete wall with the tunnels carrying fuel from the Diesel Generator Fuel Vaults to the Reactor Building. The manholes include sump pumps and level monitoring.

Testing and Monitoring

STPNOC will test all onsite safety and non-safety related medium and low voltage power, control and instrumentation cables covered by the Maintenance Rule (chapter 8.3) by monitoring and/or testing cables, which are installed below grade and potentially subjected to submergence.

The offsite power system cables that fall within the scope of the maintenance rule, and their associated manholes, will be included in a monitoring and/or inspection program.

a. Monitoring

Monitoring includes inspection of the manholes for water level above the lowest layer of cable, confirmation of sump pump functionality, confirmation that manhole covers are properly seated, and, if required, sealed to prevent/minimize water ingression.

b. Testing

Medium voltage power cables, 480 Vac, 120 Vac and 125/250 Vdc power cables, control cables, and instrumentation cables which are underground and which support equipment covered by the Maintenance Rule are monitored and the results trended using techniques and at a frequency determined appropriate for the application based on a review of industry best practices. Testing for inaccessible underground cables will be conducted as follows:

1. STP Units 3 & 4 utilize shielded cables for the 4.16 kV safety related and non-safety related systems and 13.8 kV non-safety related medium voltage AC distribution systems covered by the Maintenance Rule. Testing of medium voltage power cables will be performed at a frequency anticipated to be every five years as part of routine preventative and corrective maintenance activities associated with the end device including load centers and transformers. This will provide early indication of any problems with cable insulation. In addition, testing will be performed to trend cable health using other industry methods such as Tan Delta (Dielectric Loss) for medium voltage cables at a frequency anticipated to be every ten years.

2. Testing of 480 Vac, 120 Vac and 125/250 Vdc volt power cables in systems covered by the Maintenance Rule will be performed at a frequency anticipated to be every five years using an insulation resistance test (DC megger) as part of routine preventative and corrective maintenance activities associated with the end device including loads and motor control centers. These cables do not have a shield, which limits the kind of testing that can be performed effectively. At present, there is no other effective method for detecting insulation system degradation in unshielded cables. The meggering will be performed at the source end and will capture both the cable and the end device. If a low megger reading is obtained, the end device (load) is separated from the cable and they are then individually tested to determine which item has degraded (i.e., the cable or the end device). In addition to the above, the DC systems are equipped with permanently installed continuous ground detection systems that provide local and control room alarms in the event of a system ground. Additionally, surveillance tests, which periodically demonstrate functional capability of the equipment supported by these cables, demonstrate that the cables are functional.

3. For control and instrumentation cables in systems covered by the Maintenance Rule, STPNOC will perform testing at a frequency anticipated to be every five years in

accordance with EPRI test methods that are presently under development (Reference INPO Topical Report TR10-69 dated May 2010).

STPNOC will continue to evaluate using the latest testing technology for performance of the tests described above.

COLA Part 2, Tier 2, Section 8.3.3 will be revised as follows:

8.3.3.2.1S Testing of Power, Control, and Instrumentation Cables

Medium voltage power cables, 480 Vac, 120 Vac and 125/250 Vdc power cables, control cables, and instrumentation cables which are underground and which support equipment covered by the Maintenance Rule are monitored and the results trended using techniques and at a frequency determined appropriate for the application based on a review of industry best practices.

8.3.3.9S Monitoring of Manholes

Manholes are provided with high water level alarms. Where appropriate, sump pumps are provided. Additionally, manholes are inspected every year to ensure water levels are below the lowest layer of cables, to confirm sump pump and alarm functionality, and to ensure proper seating of manhole covers. If warranted, manhole covers will be sealed to minimize water ingression.

08.04-4, Supplement 1

QUESTION:

In response to RAI 08.04-1 regarding the time required to declare the existence of an SBO, the applicant stated that the Station Blackout (SBO) clock (10 minutes) starts after the operators perform the immediate steps in the emergency operating procedures (EOPs) to verify the SCRAM, primary parameters, etc., and the attempt to restore offsite power and start the diesel generators from the control room per the EOPs as discussed in Appendix I to NUMARC 87-00, Rev. 1. The NRC staff notes that during an SBO inspection at one of the operating plants, it took as long as 15 minutes to declare the onset of an SBO after going through the EOPs and bringing the Alternate AC (AAC) power source to the safety-related bus in the next 10 minutes. As a result, this plant was in an unanalyzed condition for almost 25 minutes. This is inconsistent with the requirements of 10 CFR 50.63 which requires that the 10-minute criterion shall start as soon as the plant loses both onsite and offsite power to the emergency buses. Therefore, the staff has determined that no additional time is allowed to restore the offsite power source or restart the emergency diesel generator from the control room in order to determine the onset of an SBO. The staff requests that the applicant revises its response to either demonstrate that the total time to identify the existence of an SBO and bringing the AAC power source to the safety-related bus can be accomplished within the 10-minute criterion or provide AC-independent coping analysis for one hour.

RESPONSE:

The response below supersedes in its entirety the response provided in RAI 08.04-4, (STPNOC letter U7-C-STP-NRC-100116, dated May 27, 2010 (ML 101480124)).

During the first 10 minutes of an SBO, the reactor will have automatically tripped, the Main Steam Isolation Valves (MSIVs) closed, and the Reactor Core Isolation Cooling (RCIC) actuated. The RCIC system will automatically control reactor coolant level. Any necessary relief valve operation will also be automatic. Within the 10 minute SBO interval, none of the above actions will require AC power or manual operator actions.

In response to a Loss of Preferred Power, the Combustion Turbine Generator (CTG) will automatically progress through its starting sequence in parallel with the operator performing the immediate steps in the EOPs. The remaining steps to connect the CTG power to a Class 1E bus would be the operation of circuit breakers to align the pre-selected Class 1E bus to the CTG. All circuit breakers required to perform this task are operable from the Main Control Room and connection of the CTG power to a Class 1E bus can be completed within 10 minutes of a Loss of Preferred Power.

These actions will be confirmed as capable of being performed within the 10 minute time requirement as indicated by FSAR 14.2.12.1.45.4, (3)-(m), which describes the pre-operational testing of the combustion turbine generator (CTG) as shown below:

> Capability of the combustion turbine generator (CTG) to automatically start, accelerate to rated speed, reach nominal voltage, and begin accepting load within the time limit specified in Subsection 9.5.11. This test shall also demonstrate the capability of

connecting the CTG to any one of the emergency buses using manually controlled breakers.

The time requirement is detailed in FSAR 9.5.11.1. Note that during development of this RAI, a minor editorial change was required to bring FSAR 9.5.11.1 into agreement with the single-line diagram presented in FSAR Figure 8.3-1. This change is shown below:

(2) The CTG shall be capable of being manually connected to SBO shutdown loads (via any one of the Class 1E diesel generator buses) from the main control room within ten minutes from the beginning of the event. The CTG shall also be capable of being manually connected to the Class 1E buses. However, the CTG shall not be normally connected to plant safety buses nor require any external AC power to operate. There shall be two circuit breakers (one Class 1E and one non-class 1E) in series between the bus automatically connected to the CTG and each Class 1E bus.

Therefore, in accordance with 10 CFR 50.63(c)(2), a station blackout coping analysis is not required because the alternate ac source (i.e., the CTG) will "be demonstrated by test to be available to power the shutdown buses within 10 minutes of the onset of station blackout."

The need for additional minor editorial changes was identified during the development of this response. FSAR 9.5.13.19 will be modified as shown below:

One Class 1E circuit breaker and four non-Class 1E circuit breakers exist and are functional between each of the Class 1E diesel generator buses and the CTG. (Note that ~~both~~ the Class 1E and non-Class 1E breakers, which provide the connection from the CTG bus to the diesel generator buses, are normally open and ~~they~~ have no automatic function. The operator must manually align ~~the CTG to the diesel generator buses~~ this connection.)

FSAR Tier 2, Table 1C-3 will be modified as shown below:

Requirements	Compliance
Appendix A – Definitions	
ALTERNATE AC POWER SOURCE. An alternating current (AC) power source that is available to and located at or nearby a nuclear power plant and meets the following requirements: (i) Is connectable to but not normally connected to the preferred or onsite emergency AC power systems.	(i) The design is connectable to (but not normally connected to) the preferred or onsite emergency AC power sources. At least ~~T~~two normally open breakers separate the AAC CTG from the safety-related onsite emergency power buses. Non-Class 1E normally open breakers separate the AAC CTG from the non-safety related PIP buses (preferred power) (See Figure 8.3-1).

The above FSAR changes are additional text changes to bring the FSAR into conformance with the changes previously described in Departure STD DEP 8.3-1.