UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
612 EAST LAMAR BLVD, SUITE 400
ARLINGTON, TEXAS 76011-4125

February 15, 2011

Mr. Edward D. Halpin
President and Chief Executive Officer
STP Nuclear Operating Company
P.O. Box 289
Wadsworth, TX 77483

SUBJECT: SOUTH TEXAS PROJECT ELECTRIC GENERATING STATION - NRC COMPONENT DESIGN BASES INSPECTION REPORT 05000498/2010007 AND 05000499/2010007

Dear Mr. Halpin:

On January 11, 2011, the U.S. Nuclear Regulatory Commission (NRC) completed a component design bases inspection at your South Texas Project facility. The enclosed report documents our inspection findings. The preliminary findings were discussed on August 19, 2010, with you and other members of your staff. After additional in-office inspection, a final telephonic exit meeting was conducted on January 11, 2011, with Mr. Tim Powell, Vice President of Technical Support and Oversight, and others of your staff.

The inspection examined activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your license. The team reviewed selected procedures and records, observed activities, and interviewed cognizant plant personnel.

Based on the results of this inspection, the NRC has identified four findings that were evaluated under the risk significance determination process. Violations were associated with all of the findings. All four of the findings were found to have very low safety significance (Green) and the violations associated with these findings are being treated as noncited violations, consistent with the NRC Enforcement Policy. If you contest any of the noncited violations, or the significance of the violations you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001, with copies to the Regional Administrator, U.S. Nuclear Regulatory Commission, Region IV, 612 East Lamar Blvd., Suite 400, Arlington, Texas 76011; the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Resident Inspector at the South Texas Project. In addition, if you disagree with the characterization of the crosscutting aspect assigned to any finding in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your disagreement, to the Regional Administrator, Region IV, and the NRC

Resident Inspector at South Texas Project. The information you provide will be considered in accordance with Inspection Manual Chapter 0305.

In accordance with Code of Federal Regulations, Title 10, Part 2.390 of the NRC's Rules of Practice, a copy of this letter and its enclosure will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Sincerely,

/RA/

Thomas Farnholtz, Chief
Engineering Branch 1
Division of Reactor Safety

Dockets: 50-498
50-499

Licenses: NPF-76
NPF-80

Enclosure:
NRC Inspection Report 05000498/2010007; 05000499/2010007
w/Attachment: Supplemental Information

Kevin Richards, Senior Vice President and
Assistant to CEO
STP Nuclear Operating Company
South Texas Project
P.O. Box 289
Wadsworth, TX 77483

David W. Rencurrel
Senior Vice President Units 1 and 2
STP Nuclear Operating Company
South Texas Project
P.O. Box 289
Wadsworth, TX 77483

Louis Peter, Plant General Manager
STP Nuclear Operating Company
South Texas Project
P.O. Box 289
Wadsworth, TX 77483

Tim Powell, Vice President, Engineering
STP Nuclear Operating Company
South Texas Project
P.O. Box 289
Wadsworth, TX 77483

A. W. Harrison, Manager, Licensing
STP Nuclear Operating Company
South Texas Project
P.O. Box 289
Wadsworth, TX 77483

Charles T. Bowman, General Manager, Oversight
STP Nuclear Operating Company
South Texas Project
P.O. Box 289
Wadsworth, TX 77483

Marilyn Kistler
Senior Staff Specialist, Licensing
STP Nuclear Operating Company
South Texas Project
P.O. Box 289
Wadsworth, TX 77483

Cheryl Mele
City of Austin
Electric Utility Department
721 Barton Springs Road
Austin, TX 78704

J. J. Nesrsta/R. K. Temple
Ed Alercon/Kevin Pollo
City Public Service
P.O. Box 1771
San Antonio, TX 78296

A. H. Gutterman, Esq..
Morgan, Lewis & Bockius LLP
1111 Pennsylvania Avenue, NW
Washington, DC 20004

Richard A. Ratliff, P.E., L.M.P.
Radiation Safety Licensing Branch Manager
Division for Regulatory Services
Texas Department of State Health
Mail Code 2385
P.O. Box 149347
Austin, TX 78714-9347

Brian Almon
Public Utility Commission of Texas
P.O. Box 13326
Austin, TX 78711-3326

Environmental and Natural Resources
Policy Director, Office of the Governor
P.O. Box 12428
Austin, TX 78711-3189

Mr. Nate McDonald
Judge, Matagorda County
Matagorda County Courthouse
1700 Seventh Street
Bay City, TX 77414

Anthony P. Jones, Chief Boiler Inspector
Texas Department of Licensing and Regulation
Boiler Division
E.O. Thompson State Office Building
P.O. Box 12157
Austin, TX 78711

Susan M. Jablonski
Office of Permitting, Remediation and Registration
Texas Commission on Environmental Quality
MC-122
P.O. Box 13087
Austin, TX 78711-3087

Ted Enos
4200 South Hulen, Suite 422
Fort Worth, TX 76109

Kevin Howell/Catherine Callaway/Jim von Suskil
NRG Energy, Inc.
1301 McKinney, Suite 2300
Houston, TX 77010

Peter G. Nemeth
Crain, Caton, & James, P.C.
P.O. Box 289
Mail Code: N5005
Wadsworth, TX 77483

Chief, Technological Hazards
Branch
FEMA Region VI
800 North Loop 288
Federal Regional Center
Denton, TX 76201-3698

Chairperson
Radiological Assistance Committee
FEMA Region VI
800 North Loop 288
Federal Regional Center
Denton, TX 76201-3698

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

Electronic distribution by RIV:
Regional Administrator (Elmo.Collins@nrc.gov)
Deputy Regional Administrator (Art.Howell@nrc.gov)
DRP Director (Kriss.Kennedy@nrc.gov)
DRP Deputy Director (Troy.Pruett@nrc.gov)
DRS Director (Anton.Vegel@nrc.gov)
DRS Deputy Director (Vacant)
Senior Resident Inspector (John.Dixon@nrc.gov)
Resident Inspector (Binesh.Tharakan@nrc.gov)
Branch Chief, DRP/A (Wayne.Walker@nrc.gov)
Senior Project Engineer, DRP/A (David.Proulx@nrc.gov)
STP Administrative Assistant (Lynn.Wright@nrc.gov)
Project Engineer, DRP/A (Laura.Micewski@nrc.gov)
Public Affairs Officer (Victor.Dricks@nrc.gov)
Public Affairs Officer (Lara.Uselding@nrc.gov)
Project Manager (Mohan.Thadani@nrc.gov)
Branch Chief, DRS/TSB (Michael.Hay@nrc.gov)
RITS Coordinator (Marisa.Herrera@nrc.gov)
Regional Counsel (Karla.Fuller@nrc.gov)
Congressional Affairs Officer (Jenny.Weil@nrc.gov)
OEMail Resource
ROPreports
OEDO RIV Coordinator (James.Trapp@nrc.gov)
DRS/TSB STA (Dale.Powers@nrc.gov)

R:\STP CDBI 2010007-RPT-RAK.docx ADAMS ML

ADAMS: ☐ No ☑ Yes	☑ SUNSI Review Complete	Reviewer Initials: RML
	☑ Publicly Available	☑ Non-Sensitive
	☐ Non-publicly Available	☐ Sensitive

RIV\DRS\EB1\SRI	EB1\RI	EB1\RI	EB1\RI	OB\OI	EB1\C
RKopriva	JAdams	AFairbanks	SMakor	CSteely	TFarnholtz
/RA/	***/RA/***	***/RA/***	***/RA/***	***/RA/***	***/RA/***
2/14/2011	2/11/2011	2/14/2011	2/11/2011	2/14/2011	2/11/2011

OFFICIAL RECORD COPY T=Telephone E=E-mail F=Fax

U.S. NUCLEAR REGULATORY COMMISSION

REGION IV

Docket:	05000498, 05000499
License:	NPF-76, NPF-80
Report Nos.:	05000498/2010007 and 05000499/2010007
Licensee:	STP Nuclear Operating Company
Facility:	South Texas Project Electric Generating Station, Units 1 and 2
Location:	Wadsworth, Texas
Dates:	July 26, 2010, through January 11, 2011
Team Leader:	R. Kopriva, Senior Reactor Inspector, Engineering Branch 1
Inspectors:	J. Adams, Ph.D., Reactor Inspector, Engineering Branch 1 A. Fairbanks, Reactor Inspector, Engineering Branch 1 S. Makor, Reactor Inspector, Engineering Branch 1 C. Steely, Operations Inspector, Operations Branch
Accompanying Personnel:	C. Baron, Mechanical Contractor, Beckman and Associates G. Skinner, Electrical Contractor, Beckman and Associates
Others:	M. Runyan, Senior Reactor Analyst, Division of Reactor Safety
Approved By:	Thomas Farnholtz, Chief Engineering Branch 1 Division of Reactor Safety

SUMMARY OF FINDINGS

IR 05000498/2010007;05000499/2010007; July 26, 2010, through January 11, 2011; South Texas Project Electric Generating Station, Units 1 and 2; baseline inspection, NRC Inspection Procedure 71111.21, "Component Design Basis Inspection."

The report covers an announced inspection by a team of five regional inspectors and two contractors. Four findings and one unresolved item were identified. All of the findings were of very low safety significance. The final significance of most findings is indicated by their color (Green, White, Yellow, Red) using Inspection Manual Chapter 0609, "Significance Determination Process," and the crosscutting aspect was determined using Inspection Manual Chapter 0310, "Components Within the Cross Cutting Areas." Findings for which the significance determination process does not apply may be Green or be assigned a severity level after NRC management review. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 4, dated December 2006.

A. NRC-Identified Findings

Cornerstone: Mitigating Systems

- Green. The team identified a Green noncited violation of 10 CFR Part 50, Appendix B, Criterion III, Design Control, which states, in part, "measures shall be established to assure that applicable regulatory requirements and the design basis are correctly translated into specifications, drawings, procedures, and instructions." Specifically, as of August 8, 2010, Calculation EC-5000 did not properly analyze the performance of the load tap changer controller for the new engineered safety feature transformer E1B for avoiding spurious separation of the offsite power supply. This finding was entered into the licensee's corrective action program as Condition Report 10-17147.

  The team determined that the failure to properly analyze the performance of the load tap changer controller for the new engineered safety feature transformer E1B was a performance deficiency. The finding is more than minor because it is associated with the design control attribute of the Mitigating Systems Cornerstone and affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Using Inspection Manual Chapter 0609.04, "Phase 1 - Initial Screening and Characterization of Findings," the team determined that the finding was of very low safety significance (Green) because it was a design or qualification deficiency confirmed not to result in loss of operability or functionality. Specifically, the licensee performed subsequent analyses, which demonstrated that the load tap changer controller would function as required to mitigate an accident. This finding had a crosscutting aspect in the area of human performance, resources, because the licensee failed to impart knowledge/training to personnel. Specifically, the licensee had not provided technical oversight of design changes prepared by the on-site contractor [H.2(b)](Section1R21.2.1).

- <u>Green</u>. The team identified a Green noncited violation of 10 CFR Part 50, Appendix B, Criterion III, Design Control, which states, in part, "measures shall be established to assure that applicable regulatory requirements and the design basis are correctly translated into specifications, drawings, procedures, and instructions." Specifically, as of August 8, 2010, the team identified three examples of the violation where 1) the licensee's calculations for starting motors during accident load sequencing were based on the minimum expected voltage assured by administrative controls, rather than the lowest voltage afforded by the degraded voltage relays; 2) the licensee did not have calculations to demonstrate that individual motors, other than motor-operated valve motors, could be started during steady state conditions, based on the worst case voltage afforded by the relays; and 3) the licensee used nonconservative acceptance criteria in calculations for motor control center contactor pick-up voltage. This finding was entered into the licensee's corrective action program as Condition Reports 10-7244 and 10-19950.

  The team determined that the failure to properly verify the adequacy of calculations for the voltage setpoint for the degraded voltage relays was a performance deficiency. The finding is more than minor because it was associated with the design control attribute of the Mitigating Systems Cornerstone and affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Using Inspection Manual Chapter 0609.04, "Phase 1 - Initial Screening and Characterization of Findings," the team determined that the finding was of very low safety significance (Green) because it was a design or qualification deficiency confirmed not to result in loss of operability or functionality. Specifically, the licensee performed subsequent analyses, which demonstrated that the degraded voltage relays would function as required to mitigate an accident. This finding did not have a crosscutting aspect because the most significant contributor did not reflect current licensee performance (Section 1R21.2.2).

- <u>Green</u>. The team identified a Green noncited violation of 10 CFR Part 50, Appendix B, Criterion III, Design Control, which states in part, "measures shall be established to assure that applicable regulatory requirements and the design basis are correctly translated into specifications, drawings, procedures, and instructions." Specifically, prior to August 20, 2010, the licensee did not adequately analyze the transfer of the emergency core cooling systems and containment spray pump suctions from the refueling water storage tank to the containment sump under postaccident conditions. The team determined that the current design calculations did not include the time required for the operators to close the refueling water storage tank isolation valves from the control room or account for the potential of water draining directly from the refueling water storage tank to the containment sump. This finding was entered into the licensee's corrective action program as Condition Report 10-17868.

The team determined that the failure to adequately analyze the transfer of the emergency core cooling systems and containment spray pump suctions from the refueling water storage tank to the containment sump under postaccident conditions was a performance deficiency. The finding is more than minor because it was associated with the design control attribute of the Mitigating Systems Cornerstone and affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Using Inspection Manual Chapter 0609.04, "Phase 1 - Initial Screening and Characterization of Findings," the team determined that the finding was of very low safety significance (Green) because it was a design or qualification deficiency confirmed not to result in loss of operability or functionality. Specifically, the licensee performed subsequent analyses, which demonstrated that the suction supplies would function as required to mitigate the accident. This finding did not have a crosscutting aspect because the most significant contributor did not reflect current licensee performance (Section 1R21.2.9).

- Green. The team identified a Green noncited violation of 10 CFR Part 50, Appendix B, Criterion III, Design Control, which states, in part, "measures shall be established to assure that applicable regulatory requirements and the design basis are correctly translated into specifications, drawings, procedures, and instructions." Specifically, as of August 20, 2010, the team identified two examples of the violation where 1) the licensee did not verify the adequacy of the design for avoiding spurious separation of the offsite power supply in that Calculation EC-5000 did not analyze all alternate alignments of the electrical distribution system allowed by technical specifications; and 2) the licensee failed to properly translate the design into procedures, in that Procedure 0POP02-AE-0002 did not provide adequate controls for maintaining the availability of offsite power required by the design. This finding was entered into the licensee's corrective action program as Condition Reports 10-17146, 10-17219, and 10-17618.

  The team determined that the failure to analyze all alternate alignments of the electrical distribution system allowed by technical specifications and provide adequate controls for maintaining the availability of offsite power required by the design, was a performance deficiency. The finding is more than minor because it is associated with the design control attribute of the Mitigating Systems Cornerstone and affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Using Inspection Manual Chapter 0609.04, "Phase 1 - Initial Screening and Characterization of Findings," the team determined that the finding was of very low safety significance (Green) because it was a design or qualification deficiency confirmed not to result in loss of operability or functionality. Specifically, the licensee performed subsequent analyses, which demonstrated that the offsite electrical distribution system would function as required to mitigate an accident. This finding had a crosscutting aspect in the area of human performance, resources, because the licensee failed to provide complete, accurate and up-to-date design documentation, including calculations and procedures, to assure nuclear safety [H.2(c)](Section 1R21.3.5).

B. Licensee-Identified Violations.

None.

REPORT DETAILS

1 REACTOR SAFETY

Inspection of component design bases verifies the initial design and subsequent modifications and provides monitoring of the capability of the selected components and operator actions to perform their design bases functions. As plants age, their design bases may be difficult to determine and important design features may be altered or disabled during modifications. The plant risk assessment model assumes the capability of safety systems and components to perform their intended safety function successfully. This inspectable area verifies aspects of the Initiating Events, Mitigating Systems and Barrier Integrity Cornerstones for which there are no indicators to measure performance.

1R21 Component Design Bases Inspection (71111.21)

The team selected risk-significant components and operator actions for review using information contained in the licensee's probabilistic risk assessment. In general, this included components and operator actions that had a risk achievement worth factor greater than two or a Birnbaum value greater than 1E-6.

.1 Inspection Scope

To verify that the selected components would function as required, the team reviewed design basis assumptions, calculations, and procedures. In some instances, the team performed calculations to independently verify the licensee's conclusions. The team also verified that the condition of the components was consistent with the design bases and that the tested capabilities met the required criteria.

The team reviewed maintenance work records, corrective action documents, and industry operating experience records to verify that licensee personnel considered degraded conditions and their impact on the components. For the review of operator actions, the team observed operators during simulator scenarios, as well as during simulated actions in the plant.

The team performed a margin assessment and detailed review of the selected risk-significant components to verify that the design bases have been correctly implemented and maintained. This design margin assessment considered original design issues, margin reductions because of modifications, and margin reductions identified as a result of material condition issues. Equipment reliability issues were also considered in the selection of components for detailed review. These included items such as failed performance test results; significant corrective actions; repeated maintenance; 10 CFR 50.65(a)1 status; operable, but degraded, conditions; NRC resident inspector input of problem equipment; system health reports; industry operating experience; and licensee problem equipment lists. Consideration was also given to the uniqueness and complexity of the design, operating experience, and the available defense in-depth margins.

The inspection procedure requires a review of 20 to 30 total samples, including 10 to 20 risk-significant and low design margin components, 3 to 5 relatively high-risk operator actions, and 4 to 6 operating experience issues. The sample selection for this inspection was 12 components, 5 operator actions, and 5 operating experience items.

.2 Results of Detailed Reviews for Components

.2.1 13.80 kV/4.16 kV Auxiliary Engineered Safety Feature Transformer E1B

a. Inspection Scope

The team reviewed calculations, design change documents, operating procedures, drawings, maintenance schedules, maintenance procedures, and completed work records for the unit auxiliary transformer. The team performed a walkdown of engineered safety feature transformer E1B to assess material condition and the presence of hazards. Specifically, the team reviewed:

- Load flow calculations to determine whether the capacity of the transformer was adequate to supply worst case accident loads
- Design change documentation for the installation of new engineered safety feature transformer E1B to determine whether the installation met the design requirements and whether the transformer had been adequately tested before being placed into service
- Calculations for system voltage, load tap changer design, and degraded voltage relay setpoints, and; operating procedures for controlling offsite power voltage, to determine whether bus voltages maintained by the automatic load tap changer were adequate to assure the availability of offsite power during low grid voltage conditions
- System voltage calculations, one line diagrams, and control wiring diagrams for the load tap changer to determine whether the automatic load tap changer would operate properly during low system voltage conditions
- Maintenance schedules, procedures, and completed work orders to determine whether the transformer was being properly maintained
- Corrective action histories to determine whether there had been any adverse operating trends

b. Findings

Introduction. The team identified a Green noncited violation of 10 CFR Part 50, Appendix B, Criterion III, Design Control, for nonconservative modeling of the engineered safety feature transformer load tap changer controller deadband in grid availability calculations. Specifically, computer models in Calculation EC-5000 performed to support modification Design Change Package 04-11502-20 used an initial bus voltage near the top of the load tap changer adjustment deadband instead of conservatively at the bottom of the band, causing a nonconservative bus voltage recovery result.

Description. In order to ensure the operability of the offsite power supply, measures must be implemented to control postcontingency switchyard voltage (i.e., voltage following trip of the unit), so that it does not drop and stay below the setpoint of the degraded voltage relays. This is accomplished at the South Texas Project site by using a real time contingency analyzer operated by the transmission system operator to calculate postcontingency voltage. Interface agreements between the station and the transmission system operator require the transmission system operator to notify the South Texas Project control room if post-contingency voltage is expected to drop below a specified value, provided by South Texas Project, depending on the onsite electrical distribution system alignment, so that plant operators may take appropriate actions. The allowable switchyard voltage values required to maintain operability of the offsite power supply for various onsite power system alignments are determined in Calculation EC-5000.

The purpose of Design Change Package 04-11502-20 was to replace the existing engineered safety feature transformer E1B with one equipped with a load tap changer in order to ensure adequate voltage at bus E1B following implementation of more restrictive limits for grid voltage. This modification was necessary because the new limit could result in conditions where the offsite power system would be considered inoperable even with the most favorable alignment of the premodified onsite power system. Attachment A of the South Texas Project Nuclear Plant Interface Coordination Agreement dated April 1, 2010, lists the South Texas Project voltage limits as 362.25 kV to 340.00 kV for the normal lineup until August 31, 2013, and 362.25 kV to 331.00 kV for all lineups after August 31, 2013.

Calculation EC-5000 evaluated the performance of the transformer E1B load tap changer by determining whether it could provide sufficient safety bus voltage improvement to accommodate the maximum expected voltage drop, based on the new grid voltage limits, concurrent with accident loading. Calculation EC-5000, Case AAM determined that if switchyard voltage dropped from 362.20 kV to approximately 327.80 kV concurrent with loss of coolant accident loading, the transformer E1B load tap changer could adjust voltage above the reset setpoint of the degraded voltage relays, and prevent spurious separation of bus E1B from the offsite power supply. However, the team noted that this case was nonconservative because the computer model failed to take into account the lowest bus voltage that could be afforded by the load tap changer controller just prior to an accident. Calculation EC-6068 documents that transformer E1B was provided with a load tap changer controller adjusted to maintain safety bus voltage between 101.1-103.9 percent of the nominal 4.16 kV bus rating. However, Case AAM was modeled such that the initial voltage on the 4.16 kV bus was 103.7 percent, which is near the top of the load tap changer controller deadband, rather than conservatively at the lower end of the deadband.

The team estimated that this error could produce a final voltage result of up to 3.6 percent higher than would have been produced if the initial voltage had been conservatively modeled, and was concerned that the existing minimum grid voltage limit of 340.00 kV may not be adequate for the new power system alignment implemented as part of Design Change Package 04-11502-20. In response to the team's concerns, the licensee performed a preliminary calculation using an appropriate initial bus voltage at the lower end of the controller deadband. The results of the preliminary calculation showed that with the normal alignment, the 4.16 kV bus could tolerate a voltage drop to 340.00 kV, which is the minimum switchyard voltage in effect until August 2013. Based on these results, the team concluded, that although the calculation did not support the design objective of Design Change Package 04-11502-20, the modified design was still acceptable under the minimum switchyard voltage limit currently in place (340.00 kV), so there was no concern relative to the current operability of the offsite power supply. The licensee issued Condition Report 10-17147 to address this issue.

Analysis. The team determined that the failure to properly analyze the performance of the load tap changer controller for the new engineered safety feature transformer E1B was a performance deficiency. The finding is more than minor because it is associated with the design control attribute of the Mitigating Systems Cornerstone and affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Using Inspection Manual Chapter 0609.04, "Phase 1 - Initial Screening and Characterization of Findings," the team determined that the finding was of very low safety significance (Green) because it was a design or qualification deficiency confirmed not to result in loss of operability or functionality. Specifically, the licensee performed subsequent analyses, which demonstrated that the load tap changer controller would function as required to mitigate an accident. This finding had a crosscutting aspect in the area of human performance, resources, because the licensee failed to impart knowledge/training to personnel. Specifically, the licensee had not provided technical oversight of design changes prepared by the on-site contractor [H.2(b)].

Enforcement. The team identified a Green noncited violation of 10 CFR Part 50, Appendix B, Criterion III, Design Control, which states, in part, “measures shall be established to assure that applicable regulatory requirements and the design basis are correctly translated into specifications, drawings, procedures, and instructions." Contrary to the above, the licensee failed to establish measures to assure that applicable regulatory requirements and the design basis were correctly translated into specifications, drawings, procedures, and instructions. Specifically, as of August 8, 2010, Calculation EC-5000 did not properly analyze the performance of the load tap changer controller for the new engineered safety feature transformer E1B for avoiding spurious separation of the offsite power supply. Because this violation is of very low safety significance and has been entered into the licensee's corrective action program as Condition Report 10-17147, it is being treated as a noncited violation consistent with the NRC Enforcement Policy: NCV 05000498;05000499/2010007-01, "Nonconservative Modeling of Engineered Safety Feature Transformer Load Tap Changer Controller Dead Band."

.2.2 <u>4.16 kV Engineered Safety Feature Bus E1B</u>

a. Inspection Scope

The team reviewed calculations, operating procedures, drawings, maintenance schedules, maintenance procedures, and completed work records for 4.16 kV engineered safety feature bus E1B. The team performed a walkdown of the bus to assess material condition and the presence of hazards. Specifically, the team reviewed:

- Load flow calculations to determine whether the 4.16 kV system had sufficient capacity to support its required loads under worst case accident loading and grid voltage conditions
- The design of the 4.16 kV bus degraded voltage protection scheme, including elementary wiring diagrams, setpoint calculations, and system voltage drop calculations including motor starting and running voltage calculations, and motor control center control circuit voltage drop calculations, to determine whether it afforded adequate voltage to safety related devices at all voltage distribution levels
- Procedures and completed surveillances for calibration of the degraded voltage relays to determine whether the acceptance criteria was consistent with design calculations, and to determine whether relays were performing satisfactorily
- Operating procedures and interface agreements with the transmission system operators to determine whether the limits and protocols for maintaining offsite voltage were consistent with design calculations
- The South Texas Project response to NRC Generic Letter 2006-02 to determine whether current procedures for maintaining the availability of offsite power were consistent with licensee responses
- Maintenance schedules, procedures, and completed work orders to determine whether the bus was being properly maintained
- Corrective action histories to determine whether there had been any adverse operating trends

b. Findings

Introduction. The team identified a Green noncited violation of 10 CFR Part 50, Appendix B, Criterion III, Design Control, with three examples, where the licensee did not verify the adequacy of the design for the degraded voltage relay voltage setpoint by performing adequate calculations for motor starting voltage, and for motor control center control circuit voltage. In the first example, the licensee's calculations for starting motors during accident load sequencing were based on the minimum expected voltage assured by administrative controls, rather than the lowest voltage afforded by the degraded voltage relays. In the second example, the licensee did not have calculations to demonstrate that individual motors, other than motor operated valves, could be started during steady state conditions based on the worst case voltage afforded by the relays. In the third example, the licensee used nonconservative acceptance criteria in calculations for motor control center contactor pick-up voltages.

Description. Branch Technical Position PSB-1, Position B.1.a, requires that the degraded voltage relay voltage setpoint be determined from an analysis of the voltage requirements of Class 1E loads at all onsite system distribution levels. The team determined that the licensee failed to adequately establish the basis for the degraded voltage relay voltage setpoint for two aspects of motor starting voltage requirements, and also for motor control center control circuit voltages.

Motor Starting Issues

Class 1E induction motors, such as those used to power safety-related loads at South Texas Project, have minimum voltage requirements for both starting and running. Industry standards generally specify a minimum voltage of 90 percent of rated for starting and running but a lower starting voltage may be specified by the manufacturer. Updated Final Safety Analysis Report 8.2.1.3 states that all engineered safety feature motors at South Texas Project are specified to start and accelerate satisfactorily with 80 percent of the motor's rated voltage applied at their terminals, except motors for the reactor containment fan coolers which are capable of accelerating their associated loads with only 75 percent of motor nameplate voltage available at motor terminals. The team noted that the licensee did not have calculations to demonstrate that the voltage requirements stated in the Updated Final Safety Analysis Report were available, based on voltage available from the degraded voltage relays.

Two types of motor starting studies are generally required at nuclear power plants, one for simultaneously starting blocks of multiple motors such as occurs during load sequencing and another for starting individual motors during steady state voltage conditions on the bus. Calculation EC-5052, “Degraded and Undervoltage Protection,” determined the settings of the degraded voltage relays. However, the calculation only addressed steady state motor running voltage instead of both running and starting voltage. Calculation EC-5000 evaluated the South Texas Project electrical auxiliary system, including motor starting voltage during load sequencing, but only considered system voltages based on the expected normal range of offsite power voltage afforded by administrative controls, rather than the lower voltage that could be afforded by the degraded voltage relays without disconnecting from offsite power. No calculations were available for starting individual nonmotor-operated valve motors (i.e., fans, pumps, etc.) when bus voltage was just above the minimum steady state voltage afforded by the relays.

In response to the team’s concerns, the licensee performed preliminary calculations that modeled motor starting during load sequencing with a grid voltage just high enough to enable resetting the degraded voltage relays at their minimum reset setpoint of 92.02 percent. In addition, the licensee performed calculations modeling the starting of individual motors when 4.16 kV buses were at the lowest steady state voltage afforded by the degraded voltage relay dropout setpoint of 91.10 percent. These preliminary calculations showed that all motors had at least 80.00 percent at their terminals during starting except the reactor containment fan coolers, which had greater than 75.00 percent. These results met the acceptance criteria stated in Updated Final Safety Analysis Report 8.2.1.3. The licensee addressed the motor starting issues in Condition Report 10-17244.

Motor Control Center Control Circuit Voltage

Calculation EC-05014 determined maximum control circuit cable length to ensure adequate voltage for safety-related control circuits. The contactor pick-up voltage criteria used in the calculation was based on tests performed on the Gould contactors originally installed at the station, and was established as 76 percent of rated voltage. In 2001 all of the safety-related contactors were replaced with GE contactors supplied by Nuclear Logistics, Inc. The replacements were specified to be individually tested, and to pick up at 70 percent rated voltage. The test results showed a maximum pick-up voltage of 76 percent instead of the specified 70 percent. Since the 76 percent value was bounded by existing calculations, no changes were made to the analysis. The team noted that the tests performed by Nuclear Logistics, Inc were essentially production tests. Specifically, the tests consisted of a screening of new units ready to be shipped, rather than tests on a statistically significant number of suitably aged specimens. NEMA Standard ICS-2 specifies a minimum pick-up voltage of 85 percent for contactors. New contactors typically exceed this criteria, because manufacturers provide design margin to account for performance degradation due to wear and aging over the life of the contactor. The team noted that the licensee had not done any subsequent voltage testing on the replacement contactors in the approximately 10 years since they were installed and none was scheduled to be performed. Since the acceptance criteria in the calculation was the same value as the worst case test result, and no margin had been provided for wear and aging, the team was concerned that the contactors may not be capable of picking up during actual degraded voltage conditions after several years of service. In response to the team's concerns, the licensee initiated Condition Report 10-19950. Condition Report Engineering Evaluation 10-19950-1 concluded that, because of conservative modeling methodologies and available margins, there was currently reasonable assurance of operability of the control circuits.

Analysis. The team determined that the failure to properly verify the adequacy of the voltage setpoint for the degraded voltage relays was a performance deficiency. The finding was more than minor because it was associated with the design control attribute of the Mitigating Systems Cornerstone and affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Using Inspection Manual Chapter 0609.04, "Phase 1 - Initial Screening and Characterization of Findings," the team determined that the finding was of very low safety significance (Green) because it was a design or qualification deficiency confirmed not to result in loss of operability or functionality. Specifically, the licensee performed subsequent analyses, which demonstrated that the degraded voltage relays would function as required to mitigate an accident. This finding did not have a crosscutting aspect because the most significant contributor did not reflect current licensee performance.

Enforcement. The team identified a Green noncited violation of 10 CFR Part 50, Appendix B, Criterion III, Design Control, which states in part, “measures shall be established to assure that applicable regulatory requirements and the design basis are correctly translated into specifications, drawings, procedures, and instructions.” Contrary to the above, the licensee failed to establish measures to assure that applicable regulatory requirements and the design basis are correctly translated into specifications, drawings, procedures, and instructions. Specifically, as of August 8, 2010, the team identified three examples of the violation where 1) the licensee’s calculations for starting motors during accident load sequencing were based on the minimum expected voltage assured by administrative controls, rather than the lowest voltage afforded by the degraded voltage relays; 2) the licensee did not have calculations to demonstrate that individual motors, other than motor-operated valve motors, could be started during steady state conditions, based on the worst case voltage afforded by the relays; and 3) the licensee used nonconservative acceptance criteria in calculations for motor control center contactor pick-up voltage. Because this violation is of very low safety significance and has been entered into the licensee’s corrective action program as Condition Reports 10-17244 and 10-19950, it is being treated as a noncited violation consistent with the NRC Enforcement Policy:
NCV 05000498;05000499/2010007-02, "Inadequate Calculations for Degraded Voltage Relay Voltage Setpoint."

.2.3 125 V DC Battery Train 1B

a. Inspection Scope

The team reviewed the Updated Final Safety Analysis Report, system design criteria, current system health report, selected drawings, operating procedures, past corrective action documents, licensee’s design basis documentation, procedures, test results, and operability determinations. Specifically, the team reviewed:

- Design calculations including, battery sizing calculations, voltage drop calculations, and load flow studies to evaluate whether the battery capacity was adequate for equipment load and duration required by design and licensing requirements

- Battery maintenance and surveillance tests, including modified performance tests, to assess whether the testing and maintenance was sufficient and that the activities were performed in accordance with established procedures, vendor recommendations, industry standards, and design and licensing requirements

The inspection team also performed walkdowns where the material condition of the battery cells and associated electrical equipment was independently inspected for signs of degradation such as excessive terminal corrosion and electrolyte leaks. In addition, the team interviewed design and system engineering personnel regarding the design, operation, testing, and maintenance of the battery.

b. Findings

The team identified that Surveillance Test 32345357, "125 Volt Class 1E Battery Modified Performance Surveillance Test," discharge time was terminated at 03:25:59 for the 125 V DC batteries and that the licensee had never tested their batteries to the established station blackout design requirements (battery duty cycle) in the current licensing basis that specified a 4-hour duty cycle. The licensee argued that no testing requirements were violated, because they were licensed as an alternate alternating current plant, and as a result, did not have to perform a coping analysis as defined by Regulatory Guide 1.155, "Station Blackout," and NUMARC 87-00, "Guidelines and Technical Bases for NUMARC Initiatives Addressing Station Blackout at Light Water Reactors."

The team reviewed all of the provided licensing and design basis documents that addressed station blackout battery capacity, but did not see any indication that the licensee was an approved alternate alternating current plant. Additionally, the licensee was unable to provide any documentation that showed that they were an alternate alternating current plant capable of starting in 10 minutes and did not require a coping analysis. After discussions, the licensee acknowledged that their Final Safety Analysis Report was not completely accurate on the subject of station blackout battery testing and was unclear on whether they were an alternate alternating current plant.

To resolve this matter, the NRC is waiting on the licensee's submittal to NRR clarifying their current licensing basis. Upon completion, the NRC can complete the inspection and review of this unresolved item: URI 05000498;05000499/2010007-03, "Transfer of Station Blackout Requirements from Current Licensing Basis into Final Safety Analysis Report."

.2.4 Pressure Switch PSL 7507 (Auxiliary Feedwater Discharge Pressure)

a. Inspection Scope

The team reviewed the Updated Final Safety Analysis Report, system design criteria, current system health report, selected drawings, operating procedures, past corrective action documents, licensee's design basis documentation, procedures, test results, and operability determinations. Specifically, the team reviewed:

- The licensee's instrument loop diagram, elementary diagrams, setpoint/accuracy calculation, scaling calculation, calibration/surveillance procedure, and work orders for calibrations

The inspection team also performed walkdowns where the material condition of the pressure switch was independently inspected for signs of degradation. In addition, the team interviewed design and system engineering personnel regarding the design, operation, testing, and maintenance of the pressure switch.

b. Findings

No findings were identified.

.2.5 Unit 1 Main Generator Breaker

a. Inspection Scope

The team reviewed the Updated Final Safety Analysis Report, system design criteria, current system health report, selected drawings, operating procedures, past corrective action documents, licensee's design basis documentation, procedures, test results, and operability determinations. Specifically, the team reviewed:

- Elementary diagrams, protective relaying maintenance calculations, protection coordination calculations, and relay settings

- The adequacy of design assumptions for calculations that evaluated the protection and relay coordination scheme

- The acceptance criteria of maintenance and test procedures to determine if the breaker testing was adequate and in accordance with industry and vendor recommendations

The inspection team also performed walkdowns of the breaker and associated electrical equipment to assess the material condition and inspect for signs of degradation. In addition, the team interviewed design and system engineering personnel regarding the design, operation, testing, and maintenance of the breaker to determine whether the system alignment and operating environment were consistent with the design basis assumptions.

b. Findings

No findings were identified.

.2.6 Unit Auxiliary Transformer UT001A

a. Inspection Scope

The team reviewed calculations, operating procedures, drawings, maintenance schedules, maintenance procedures, completed work records for the unit auxiliary transformer. The team performed a walkdown of the unit auxiliary transformer to assess material condition and the presence of hazards. Specifically, the team reviewed:

- Load flow calculations to determine whether the capacity of the transformer was adequate to supply worst case accident loads.

- Calculations for system voltage, load tap changer design, and degraded voltage relay setpoints, and; operating procedures for controlling offsite power voltage, to determine whether bus voltages maintained by the automatic load tap changer were adequate to assure the availability of offsite power during low grid voltage conditions.

- System voltage calculations, one line diagrams, and control wiring diagrams for the load tap changer to determine whether the automatic load tap changer would operate properly during low system voltage conditions.

- Maintenance schedules, procedures, and completed work orders to determine whether the transformer was being properly maintained.

- Corrective action histories to determine whether there had been any adverse operating trends.

b. Findings

No findings were identified.

.2.7 Electrical Auxiliary Building Main Air Handling Unit Supply Fan (3V111VFN015)

a. Inspection Scope

The team reviewed the Updated Final Safety Analysis Report, system design criteria, current system health report, selected drawings, operating procedures, and past corrective action documents. Specifically, the team reviewed:

- The licensee’s design basis documentation as well as various calculations and test results to verify that the final air balance report coincided with pressure drop calculations.

- Surveillance requirements for tornado dampers to verify they support design requirements to protect against pressure decreases up to 3 psi in the event of a tornado.

The inspection team also performed interviews with design and system engineering personnel to ensure the capability of this component to perform its required function.

b. Findings

No findings were identified.

.2.8 Essential Refrigeration Chiller 12B (3V111VCH005)

a. Inspection Scope

The team reviewed the Updated Final Safety Analysis Report, current system health report, selected drawings, operating procedures, and past corrective action documents. This review included the licensee’s design basis documentation as well as various calculations, condition reports, procedures, and test results. Specifically, the team reviewed:

- The capacity of the component to perform its required function with a postulated single failure
- The inspection and testing of the chiller, including inspection of the condenser heat exchanger to verify the capability of the component to perform its required function

The inspection team also performed interviews with design and system engineering personnel and component walkdowns to ensure the capability of this component to perform its required function.

b. Findings

No findings were identified.

.2.9 Unit 1, Containment Sump Isolation Valve (MOV-016B)

a. Inspection Scope:

The team reviewed the Updated Final Safety Analysis Report, operating procedures, current system health report, selected drawings, operating procedures, and corrective action documents. This review included the licensee's design basis documentation as well as various calculations, condition reports, procedures, and test results. Specifically, the team reviewed:

- Valve thrust calculations and stroke test results to verify the capability of the valve to perform its function under the most limiting conditions
- The capability of the valve to transfer the emergency core cooling systems and containment spray pump suction supply from the reactor water storage tank to the containment sump
- The system was appropriately restored after valve stroke testing

The inspection team also performed interviews with design and system engineering personnel and component walkdowns to ensure the capability of this component to perform its required function.

b. Findings

Introduction. The inspectors identified a Green noncited violation of 10 CFR Part 50, Appendix B, Criterion III, Design Control, in that, the licensee did not adequately analyze the transfer of the emergency core cooling systems and containment spray pump suctions from the reactor water storage tank to the containment sump under postaccident conditions. Specifically, the inspectors determined that the current design calculations were not bounding because they did not include the time required for the operators to close the reactor water storage tank isolation valves from the control room or account for the potential of water draining directly from the reactor water storage tank to the containment sump. As a result, the calculations that established the minimum reactor water storage tank LO-LO level setpoint would not be adequate to prevent air from entering the emergency core cooling systems and containment spray pump suction piping under limiting conditions causing adverse impact on pump function.

Description. The inspectors identified a performance deficiency related to the transfer of the emergency core cooling systems and containment spray pump suctions from the reactor water storage tank to the containment sump. The system design included a “semi-automatic” transfer that would be automatically initiated upon LO-LO reactor water storage tank level. Under postaccident conditions, the three containment sump isolation valves would automatically open when the reactor water storage tank level reached the LO-LO setpoint. Subsequently, the operators would verify adequate pump flow and close the three associated reactor water storage tank isolation valves as directed by Emergency Operating Procedure 0POP05-EO-ES13, "Transfer to Cold Leg Recirculation," Revision 10. This transfer sequence and the resulting reactor water storage tank levels were addressed by Calculation MC-5037, "Reactor Water Storage Tank Volumes & Limits," Revision 9 and Calculation MC-5037A, "Evaluation of Reactor Water Storage Tank Vortex Breaker," Revision 0. These calculations were performed to determine the minimum LO-LO reactor water storage tank level setpoint that would ensure the tank level remained above the vortex breaker during the transfer sequence; and to ensure the vortex breaker would effectively prevent air from entering the emergency core cooling systems and containment spray pump suction piping.

The inspectors noted that these calculations only addressed the automatic portion of the transfer sequence, the first 38 seconds after reaching the level setpoint; they did not evaluate the additional time required for the operators to close the reactor water storage tank isolation valves from the control room. In addition, these calculations did not address the potential of water draining directly from the reactor water storage tank to the containment sump due to their elevation difference. Both of these issues would be applicable if the postaccident containment pressure was less than approximately 10 psig at the time of the transfer. The inspectors determined that the existing analyses did not bound the most limiting postaccident conditions and did not ensure that the vortex breaker would effectively prevent air from entering the piping.

In response to these concerns, Condition Report 10-17868 was initiated on August 18, 2010. Subsequently, Condition Report Action 10-17868-2 was completed on August 26, 2010, to ensure that the actual LO-LO reactor water storage tank level setpoints were adequate to prevent air from entering the emergency core cooling systems and containment spray pump suction piping. The condition report action included an evaluation of the minimum reactor water storage tank level during an accident scenario with the high head safety injection and containment spray pumps operating. The evaluation was based on the actual LO-LO reactor water storage tank level setpoint, adjusted for instrument uncertainty, of approximately 4 feet as opposed to the 2.725 feet minimum level established in Calculation MC-5037. It conservatively assumed that the containment pressure was 0 psig to minimize the final reactor water storage tank level. The evaluation also used operator response times based on a simulator exercise performed during the inspection; it assumed that the reactor water storage tank isolation valve would be fully closed 146 seconds after the LO-LO reactor water storage tank level setpoint was reached. This evaluation determined that the final reactor water storage tank water level would be below the level of the vortex breaker for the most limiting conditions. Additional evaluations were performed to verify that the final water level would be adequate to prevent air from entering the emergency core cooling systems and containment spray pump suction piping. Based on the results of this evaluation, the licensee determined that the reactor water storage tank, the emergency core cooling system pumps, and the containment spray pumps were operable.

Analysis. The team determined that the failure to adequately analyze the transfer of the emergency core cooling systems and containment spray pump suctions from the refueling water storage tank to the containment sump under postaccident conditions was a performance deficiency. The finding was more than minor because it was associated with the design control attribute of the Mitigating Systems Cornerstone and affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Using Inspection Manual Chapter 0609.04, "Phase 1 - Initial Screening and Characterization of Findings," the team determined that the finding was of very low safety significance (Green) because it was a design or qualification deficiency confirmed not to result in loss of operability or functionality. Specifically, the licensee performed subsequent analyses, which demonstrated that the suction supplies would function as required to mitigate the accident. This finding did not have a crosscutting aspect because the most significant contributor did not reflect current licensee performance.

Enforcement. The team identified a Green noncited violation of 10 CFR Part 50, Appendix B, Criterion III, Design Control, which states, in part, “measures shall be established to assure that applicable regulatory requirements and the design basis are correctly translated into specifications, drawings, procedures, and instructions.” Contrary to the above, the licensee failed to establish measures to assure that applicable regulatory requirements and the design basis are correctly translated into specifications, drawings, procedures, and instructions. Specifically, prior to August 20, 2010, the licensee did not adequately analyze the transfer of the emergency core cooling systems and containment spray pump suctions from the refueling water storage tank to the containment sump under postaccident conditions. The team determined that the current design calculations did not include the time required for the operators to close the refueling water storage tank isolation valves from the control room or account for the potential of water draining directly from the refueling water storage tank to the containment sump. Because this violation was of very low safety significance (Green) and has been entered into the licensee’s corrective action program as Condition Report 10-17868, this violation is being treated as a noncited violation, consistent with the NRC Enforcement Policy: NCV 05000498;05000499/2010007-04, "Inadequate Analysis of Emergency Core Cooling Systems Transfer to Containment Sump."

.2.10 Unit 1, Auxiliary Feedwater Storage Tank (3S191MTF03)

a. Inspection Scope

The team reviewed the Updated Final Safety Analysis Report, system design criteria, current system health report, selected drawings, operating procedures, inservice testing, past corrective action documents, various calculations, condition reports, procedures, test results, permanent modifications (none within the past five years) and operability determinations. Specifically, the team reviewed:

- Design basis documentation to verify that the tank is capable of performing its safety function

- Sizing and level uncertainty calculations and engineering analyses to verify that the tank is adequately sized and that instrumentation is correctly designed to meet its safety function under worst case accident conditions

The inspection team also performed walkdowns and conducted interviews with system engineering personnel to assess material condition and verify that pipes connected to the tank would not interfere with the safety function

b. Findings

No findings were identified.

.2.11 High Head Safety Injection Pump Minimal Flow First Isolation Valve (B1SIMOV0011B)

a. Inspection Scope

The team reviewed the Final Safety Analysis Report, design basis documents, selected drawings, calculations, maintenance records, and operating procedures to verify the capability of the motor operated valve to perform its intended function during design basis events. Specifically, the team reviewed:

- Generic Letter 89-10, "Safety-Related Motor-Operated Valve Testing and Surveillance," calculations and requests for resolution to evaluate the capability of the valve to change position as required under the most limiting accident conditions

- The calculations to verify that the most limiting system operating conditions were considered in the calculations

- The design and testing of the control interlocks and setpoints associated with the valve

- Operating procedures related to the valve to ensure they were consistent with the design basis calculations and the licensing basis

b. Findings

No findings were identified.

.2.12 Unit 1, Steam Generator 1B Outside Reactor Containment Auxiliary Feedwater Isolation Motor-Operated Valve (2S141TAF0065)

a. Inspection Scope

The team reviewed the Updated Final Safety Analysis Report, system design criteria, current system health report, selected drawings, operating procedures, inservice testing and past corrective action documents. Specifically, the team:

- Opening and closing Inservice Testing data and thrust calculations, as well as the governing procedures, to ensure the valve was being appropriately maintained and would meet its safety function under worst case accident conditions

- Design basis documentation to verify that the valve was appropriately designed to be capable of performing its safety function

- Condition reports and operability determinations associated with this valve to ensure that corrective actions had been taken to ensure the valve is maintained in an appropriate manner

The inspection team also performed walkdowns and performed interviews with design and system engineering personnel to assess material conditions and ensure the capability of this component to perform its required safety function.

b. Findings

No findings were identified.

.3 Results of Reviews for Operating Experience

.3.1 Inspection of NRC Information Notice 2005-30, "Safe Shutdown Potentially Challenged by Unanalyzed Internal Flooding Events and Inadequate Design"

a. Inspection Scope

The team reviewed NRC Information Notice 2005-30, "Safe Shutdown Potentially Challenged by Unanalyzed Internal Flooding Events and Inadequate Design," which addressed the importance of establishing and maintaining the plant flooding analysis and design, consistent with NRC requirements and principles of effective risk management, to ensure that internal flooding risk is effectively managed. In response to Information Notice 2005-30, the licensee evaluated potential sources of internal flooding, as well as the design basis external flooding event. The team reviewed this evaluation to verify that the plant was adequately protected against postulated flooding events.

b. Findings

No findings were identified.

.3.2 Inspection of NRC Information Notice 2006-29, “Potential Common Cause Failure of Motor-operated Valves as a Result of Stem Nut Wear”

a. Inspection Scope

The team reviewed Information Notice 2006-29, “Potential Common Cause Failure of Motor-operated Valves as a Result of Stem Nut Wear,” which documented multiple instances where excessive stem nut wear resulted in motor-operated valves becoming inoperable. The licensee reviewed the information notice and performed a comprehensive review of all of their motor-operated valves to determine which could be susceptible to this phenomenon. They concluded that they were less susceptible to this wear because of their use of a very pure lubrication (no grit) grease plus protection against dirt intrusion. Inspections of their stem nuts, to date, support this conclusion. They have also instituted additional inspection requirements, including zero-transition time measurements and direct physical measurements of stem nut thread wear, to further minimize their susceptibility to this phenomenon.

b. Findings

No findings were identified.

.3.3 Inspection of NRC Information Notice 2009-02, “Biodiesel in Fuel Oil Could Adversely Impact Diesel Engine Performance”

a. Inspection Scope

The team reviewed NRC Information Notice 2009-02, “Biodiesel in Fuel Oil Could Adversely Impact Diesel Engine Performance,” which documented the potential for diesel fuel oil to contain up to 5 percent biodiesel. In response to Information Notice 2009-02, the licensee confirmed with their fuel oil vendor that biodiesel is not manufactured at their plant; hence, the risk of biodiesel contamination to the fuel oil is significantly lower than the risk from plants that also produce biodiesel for other customers. Additionally, the licensee’s diesel purchase specification and fuel purchase contract were revised to stipulate that the vendor is prohibited from supplying Number 2 diesel fuel that is contaminated with biodiesel. The team concluded that the licensee’s actions to ensure that diesel engine performance was not impacted by biodiesel blends were adequate.

b. Findings

No findings were identified.

.3.4 Inspection of NRC Information Notice 2009-03, "Solid State Protection System Card Failure Results in Spurious Safety Injection Actuation and Reactor Trip"

a. Inspection Scope

The team reviewed NRC Information Notice 2009-03, "Solid State Protection System Card Failure Results in Spurious Safety Injection Actuation and Reactor Trip," which documented an event at North Anna Power Station, Unit 2, involving a solid state protection system card failure that resulted in a spurious actuation of safety injection train B and a reactor trip. The team reviewed the licensee's analysis to ensure that the appropriate review was performed to identify if this event was applicable to South Texas Project facilities. The licensee performed an adequate review of the operating experience with respect to solid state protection system card failures and the team concluded that this operating experience was properly addressed.

b. Findings

No findings were identified.

.3.5 Inspection of NRC Regulatory Issue Summary 2004-05, "Grid Reliability and the Impact on Plant Risk and the Operability of Offsite Power"

a. Inspection Scope

The team reviewed the licensee's response to NRC Regulatory Issue Summary 2004-05 to determine whether the licensee had adequately addressed the issues presented. Specifically, the team reviewed operating procedures to determine whether adequate measures were in place to effectively assess the operability of the offsite power supply and whether grid conditions were considered when planning maintenance or other plant activities that could increase the chance of a plant trip or reduce the availability of alternate or standby power supplies. Also, calculations and procedures for the availability of offsite power were reviewed to determine whether the design had been properly translated into procedures. In particular, the team reviewed whether calculations and procedures for offsite power availability were based on expected posttrip voltage and worst case accident loading. The inspectors reviewed procedures for responding to a loss of alternating current power to determine whether the required actions were consistent with the design.

b. Findings

Introduction. The team identified a Green noncited violation of 10 CFR Part 50, Appendix B, Criterion III, Design Control, with two examples, in that the licensee had not verified the adequacy of the design for avoiding spurious separation of the offsite power supply and also failed to properly translate the design into procedures. Specifically, Calculation EC-5000 did not analyze all alternate alignments of the electrical distribution system allowed by technical specifications, and Procedure 0POP02-AE-0002 did not provide adequate controls for maintaining the availability of offsite power required by the design.

Description. Each of the two South Texas Project units feature three 4.16 kV safety buses which may be connected to the offsite power supply through different alignments to the two unit auxiliary transformers and two standby transformers available at the station. Several alignments are possible that comply with the Technical Specification 3.8.1.1.a requirement for two physically independent circuits between the offsite transmission network and the onsite Class 1E distribution system. In addition, Procedure 0POP02-AE-0002 provides for alternate alignments that may be entered under a technical specification limiting condition for operation, whose duration depends on whether one or zero offsite power sources remain operable.

In order to maintain the operability of the offsite power supply, the licensee should implement measures to ensure that postcontingency switchyard voltage (i.e., voltage following trip of the unit), does not drop and stay below the setpoint of the degraded voltage relays. This is accomplished at South Texas Project by calculating postcontingency voltage using a real time contingency analyzer maintained by the transmission system operator. Interface agreements between the station and the transmission system operator require the transmission system operator to notify the South Texas Project control room if postcontingency voltage is expected to dip below one of the various specified values, that depends on the onsite electrical distribution system alignment. These values are determined in Calculation EC-5000.

The team noted that the calculation did not adequately address all alignments allowed by technical specifications without restriction and some alignments allowed by procedures with limiting conditions for operation restrictions. For example, Bus E1A may be aligned to a standby transformer instead of its normal alignment to the unit auxiliary transformer associated with the unit. Calculation EC-5000 did not analyze this alignment. Also, Procedure 0POP02-AE-0002, Section 4.16, allows alignment of all three safety buses to a single supply transformer provided a 72 hour limiting condition for operation is entered for one offsite power supply inoperable. Calculation EC-5000 does not analyze the case where three safety buses are aligned to a single standby transformer to demonstrate operability of the single offsite source remaining in service, which is required for the 72 hour limiting condition for operation.

In addition, Procedure 0POP02-AE-0002 did not provide adequate controls necessitated by the design to prevent spurious separation of the offsite power supply. Calculation EC-5000 determined that a minimum grid voltage of 355.00 kV was necessary to prevent grid separation for certain alternate alignments of the electrical distribution system allowed by technical specifications. Step 4.13 of the procedure stated that if the switchyard voltage fell below 355.00 kV while in an alternate alignment, then Technical Specifications Limiting Condition for Operation 3.8.1.1.e for loss of the two required offsite sources should be entered, and that the limiting condition for operation could be exited if voltage returned above 355.00 kV. However, the 355.00 kV limit determined in Calculation EC-5000 for alternate alignments was a postcontingency voltage rather than a real time measured voltage as described in the procedure. Postcontingency voltage should have been used in the procedure since switchyard voltage may drop suddenly following the trip of the unit, as occurs during an accident.

Also, Procedure 0POP02-AE-0002 did not require station operators to notify the transmission system operator when alternate alignments were implemented. This notification is required so that the transmission system operator can adjust the alarm setpoint of the real time contingency analyzer to the required value determined in Calculation EC-5000.

Interviews with South Texas Project licensed operators indicated that alternate alignments are entered during plant startup and shutdown which involves connecting the three safety buses to two standby transformers. Since records of postcontingency voltages calculated by the real time contingency analyzer are not maintained, it was not possible to ascertained whether an actual vulnerability of spurious grid separation has occurred during these alignments. However, since these alignments are typically brief in duration, it is unlikely that they exceeded the Technical Specification Limiting Condition for Operation Action 3.8.1.1.e allowed outage times for one offsite source of 72 hours. Operators were not aware of any alignments of three safety buses to a single standby transformer and this was not an alignment that would typically be entered. Based on this, the team determined that it was unlikely that the offsite power had been inoperable for durations exceeding those allowed by Technical Specification Limiting Condition for Operation Actions 3.8.1.1.a for two offsite sources inoperable and 3.8.1.1.e for one offsite source inoperable.

In response to the team's concerns, the licensee initiated Condition Reports 10-17146, 10-17219, and 10-17618. The licensee provided preliminary calculations to determine the switchyard voltage required for the alternate alignment involving Bus E1A aligned to a standby transformer. In addition, the licensee initiated Condition Report 10-17618-1 to correct the deficiencies in Procedure 0POP02-AE-0002.

Analysis. The team determined that the failure to analyze all alternate alignments of the electrical distribution system allowed by technical specifications; and provide adequate controls for maintaining the availability of offsite power required by the design, was a performance deficiency. The finding is more than minor because it is associated with the design control attribute of the Mitigating Systems Cornerstone and affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Using Inspection Manual Chapter 0609.04, "Phase 1 - Initial Screening and Characterization of Findings," the team determined that the finding was of very low safety significance (Green) because it was a design or qualification deficiency confirmed not to result in loss of operability or functionality. Specifically, the licensee performed a subsequent analysis, which demonstrated that the offsite electrical distribution system would function as required to mitigate an accident. This finding had a crosscutting aspect in the area of Human Performance, Resources, because the licensee failed to provide complete, accurate and up-to-date design documentation, including calculations and procedures, to assure nuclear safety [H.2(c)].

Enforcement. The team identified a Green noncited violation of 10 CFR Part 50, Appendix B, Criterion III, Design Control, which states, in part, "measures shall be established to assure that applicable regulatory requirements and the design basis are correctly translated into specifications, drawings, procedures, and instructions." Contrary to the above, the licensee failed to establish measures to assure that applicable regulatory requirements and the design basis were correctly translated into specifications, drawings, procedures, and instructions. Specifically, as of August 20, 2010, the team identified two examples of the violation where 1) the licensee did not verify the adequacy of the design for avoiding spurious separation of the offsite power supply in that Calculation EC-5000 did not analyze all alternate alignments of the electrical distribution system allowed by technical specifications; and 2) the licensee failed to properly translate the design into procedures, in that Procedure 0POP02-AE-0002 did not provide adequate controls for maintaining the availability of offsite power required by the design. Because this violation is of very low safety significance and has been entered into the licensee's corrective action program as Condition Reports 10-17146, 10-17219, and 10-17618, it is being treated as a noncited violation consistent with the NRC Enforcement Policy: NCV 05000498;05000499/2010007-05, "Inadequate Analysis and Procedures for Offsite Power Availability."

.4 <u>Results of Reviews for Operator Actions</u>

The team selected risk-significant components and operator actions for review using information contained in the licensee's probabilistic risk assessment. This included components and operator actions that had a risk achievement worth factor greater than two or Birnbaum value greater than 1E-6.

a. <u>Inspection Scope</u>

For the review of operator actions, the team observed operators during simulator scenarios associated with the selected components as well as observing simulated actions in the plant using job performance measure techniques.

The selected operator actions were:

- Auxiliary operators must be able to manually trip the reactor trip breakers during an anticipated transient without scram event (in-plant job performance measure)

- Control room staff must be able to place residual heat removal in service for a steam generator tube rupture event (scenario)

- Control room staff must be able to perform feed and bleed within 13 minutes of a loss of heat sink transient event (scenario)

- Control room staff must be able to start the positive displacement pump within 13 minutes of loss of reactor coolant pump seal cooling event (scenario)

- Control room staff must be able to identify and isolate a ruptured steam generator within 10 minutes of the beginning of the event (scenario)

b. Findings

No findings were identified.

4 OTHER ACTIVITIES

4OA6 Meetings, Including Exit

On August 19, 2010, the team leader presented the preliminary inspection results to Mr. Edward D. Halpin, President and Chief Executive Officer, and other members of the licensee's staff. On January 11, 2011, the Chief, Engineering Branch 1, conducted a telephonic final exit meeting with Mr. Tim Powell, Vice President of Technical Support and Oversight, and other members of the licensee's staff. The licensee acknowledged the findings during each meeting. While some proprietary information was reviewed during this inspection, no proprietary information was included in this report.

ATTACHMENT: SUPPLEMENTAL INFORMATION

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee Personnel

M. Berg, Manager, Design Engineering
M. Billings, Staff Engineer, Probabilistic Risk Assessment
C. Bowman, General Manager, Oversight
T. Bowman, Manger, General Nuclear Safety Assurance
J. Calvert, Manager, Training
F. Comeaux, I&C Engineer, Design Engineering Department
J. Cook, Supervisor, Project Engineering Department
N. Corrick, Operations
R. Dunn, Jr., Manager, Nuclear Fuels and Anaylsis
R. Engen, Director, Site Engineering
S. Exum, Mechanical Engineer, Design Engineering Department
T. Frahm, Manager, Operations Support
T. Frawley, Manger, Operations
C. Gann, Manger, Communications/Public Affairs
E. Halpin, President and CEO
A. Harrison, Manager, Licensing
W. Humble, Supervision Engineer, Performance Improvement
B. Jenewein, Director, Systems Engineering
D. Klockentager, Engineer, Systems Engineering Department
G. Jones, Instrument and Controls Engineer, Design Engineering Department
H. Leon, Electrical Engineer, Design Engineering Department
R. Lovell, Manager, Interface U1/2 and U3/4
J. Loya, Engineer, Licensing Staff, Oversight
W. McGlover, Projects
R. McNiel, Manager, Maintenance Engineering
B. Migl, Supervisor, Mechanical Engineering Department
J. Milliff, Manager, Operations Division –Unit 2
D. Montgomery, Manager, NPMM
J. Morris, Engineer, Licensing Staff
C. Murry, Manager Projects
M. Oswald, Supervising Engineer, Design Engineering Department
C. Pham, Supervisor, Mechanical Engineering Department
J. Pierce, Manager, Operations Training
J. Pineda, Electrical Engineer, Design Engineering Department
G. Powell, Vice President, Engineering
T. Powell, Vice President, Technical Support and Oversight
K. Richards, Senior Vice President, Alliances, Projects, and Outages
D. Rohan, Engineer, Operation Procedures
S. Rosales, Electrical Engineer, Design Engineering Department
R. Savage, Engineer Licensing Staff Specialist, Oversight
W. Schulz, Mechanical Engineer, Design Engineering Department
B. Scott, Engineer, Testing/Programs

W. Sotos, Engineer Supervising, Design Engineering
K. Taplett, Senior Engineer Licensing Staff, Oversight
D. Towler, Manager, Quality
R. Wiegand, Electrical Engineer, Design Engineering Department

NRC Personnel

B. Tharakan, Resident Inspector

LIST OF ITEMS OPENED AND CLOSED

Opened and Closed

05000498;05000499/2010007-01	NCV	Nonconservative Modeling of Engineered Safety Feature Transformer Load Tap Changer Controller Dead Band (Section 1R21.2.1)
05000498;05000499/2010007-02	NCV	Inadequate Calculations for Degraded Voltage Relay Voltage Setpoint (Section 1R21.2.2)
05000498;05000499/2010007-04	NCV	Inadequate Analysis of Emergency Core Cooling System Transfer to Containment Sump (Section 1R21.2.9)
05000498;05000499/2010007-05	NCV	Inadequate Analysis and Procedures for Offsite Power Availability (Section 1R21.3.5)

Opened

05000498;05000499/2010007-03	URI	Transfer of Station Blackout Requirements from Current Licensing Basis into Final Safety Analysis Report (Section 1R21.2.3)

LIST OF DOCUMENTS REVIEWED

ACTION REQUESTS

94-02023	07-00340	09-01401-1	10-17147
95-00333	07-03421	09-02976	10-17148
97-00587	07-08920	09-03503	10-17219
97-11626-1	07-11333	09-03902	10-17244
97-06188	07-11491	09-10502	10-17277
98-00529-8	07-12755	09-11909	10-17338
99-13593	07-12991	09-12704	10-17348
01-11964	07-14903	10-00040	10-17470
01-19669	07-14959	10-05355	10-17529

ACTION REQUESTS

03-01341-140	07-15592	10-08929	10-17618
03-16294	07-15817	10-14028	10-17661
04-5840	07-16082	10-15469	10-17817
04-01959-30	08-15384-70	10-16100	10-17865
04-15721	08-12064	10-16323	10-17866
05-11740	08-13702	10-16614	10-17868
05-15009	08-4554	10-17126	
	08-4693	10-17146	

CALCULATIONS

NUMBER	TITLE	REVISION/DATE
5V110MC5144	EAB Main Area HVAC System Pressure Drop	5
EC-05014	Maximum Length of Control Cables / Class 1E and Non-Class 1E	4
EC05036	DC Cable Sizing	4
EC-06068	Load Tap Changer (LTC) Control Relay Setting Calculations	3
EC-5000	Voltage Regulation Study	12
EC-5008	Class 1E Battery, Battery Charger and Inverter Sizing	13
EC-5018	Short Circuit Current Analysis-Class 1E 125VDC and Non-Class 1E 25, 125 and 48 VDC Systems	7
EC5027	Generator, Main, and Auxiliary Transformer Protection	10
EC-5029	4.16 kV Switchgear Relay Setting	5
EC-5037	Maximum Allowable Length of AC Power Cables	4
EC-5038	Power Cable Sizing Verification	9
EC-5039	Control Cable Voltage Drop	4
EC-5052	Degraded and Undervoltage Protection	6
EC5054	Generator Out-of-Step Protection	18
EC-5098	Degraded Undervoltage Protection Instrument Uncertainties	2
EC-6066	Class 1E 125 VDC Battery Float & Equalize Voltage Evaluation	1
MC-06482A	Essential Chilled Water Minimum Flow Requirements for EAB, CRE, FHB, and MAB Coolers	June 13, 2002

CALCULATIONS

NUMBER	TITLE	REVISION/DATE
MC-5037	RWST Volumes and Limits	9
MC-5037A	Evaluation of RWST Vortex Breaker	0
MC-5144	EAB Main Area HVAC System	6
MC-5680	EAB Main Area HVAC Failure Modes and Effects Analysis	4
MC-6219	Generic Letter 89-013	2
MC-6336	GNL 89-10 Calc for MOV-B1SIMOV0011B	1
MC-6442	Phase II GL 89-10 Justifications	1
MC-6472	DVAC Calculation AC Motor MOVs	2
MC-6479	Essential Chilled Water, EAB HVAC, and CRE HVAC Design Basis Loads	0
MC-6482A	Essential Chilled Water Minimum Flow Requirements for EAB, CRE, FHB, and MAB Coolers	0
V-EC-1274	Motor Operated Valve Evaluation	September 11,1992

DESIGN BASIS DOCUMENTS

NUMBER	TITLE	REVISION/DATE
4E519EB1108	4.16 kV AC Power (PK) System	4
5N049EB01118	Station Blackout	1

DRAWINGS

NUMBER	TITLE	REVISION/DATE
00000E0AAAA	Main One Line Diagram Unit No. 1 & 2	22
00009E0AF01#1 Sh.1	Elementary Diagram Auxiliary Feedwater Pumps No 11, 12, & 13	9
00009E0CH11#1 Sh.1	Elementary Diagram E.A.B. HVAC Essential Chilled Water Chiller Units CH004, 005 & 006	9
00009E0DG01#1 Sh.3	Elementary Diagram Standby Diesel Generator DG12 4.16kV Feeder Breaker	3
00009E0DJAC#1	Single Line Diagram 125V DC Class 1E Distribution SWBD E1B11	20
00009E0EW01#1 Sh.1	Elementary Diagram Essential Cooling Water Pumps 1A, 1B, & 1C	14
00009E0PCAB#1	Single Line Diagram 13.8 kV Switchgear 1G	14

DRAWINGS

NUMBER	TITLE	REVISION/DATE
00009E0PCAC#1	Single Line Diagram 13.8 kV Switchgear 1H	14
00009E0PK01#1 Sh.1	Elementary Diagram 4.16kV Bus E1A, E1B, & E1C Supply Breaker Control	9
00009E0PK02#1 Sh.1	Elementary Diagram 4.16kV Feeder to 480V Load Center Transformers E1A1, E1B1 & E1C1	11
00009E0PK04#1	Elementary Diagram ESF Transformer & 4.16kV Bus E1A, E1B & E1C Protection and Metering	12
00009E0PLAA#1	Single Line Diagram 480V Class-1E Load Center E1A	16
00009E0PLAB#1	Single Line Diagram 480V Class-1E Load Center E1B	15
00009E0PLAC#1	Single Line Diagram 480V Class-1E Load Center E1C	17
00009E0PMAA#1 Sh.1	Single Line Diagram 480V Class-1E Motor Control Center E1A1	25
00009E0PMAA#1 Sh.2	Single Line Diagram 480V Class-1E Motor Control Center E1A1	20
00009E0PMAB#1	Single Line Diagram 480V Class-1E Motor Control Center E1A2	23
00009E0PMAC#1	Single Line Diagram 480V Class-1E Motor Control Center E1A3 ECW Bldg	13
00009E0PMAD#1 Sh.1	Single Line Diagram 480V Class-1E Motor Control Center E1B1	21
00009E0PMAD#1 Sh.2	Single Line Diagram 480V Class-1E Motor Control Center E1B1	17
00009E0PMAE#1	Single Line Diagram 480V Class-1E Motor Control Center E1B2	16
00009E0PMAF#1	Single Line Diagram 480V Class-1E Motor Control Center E1B3	17
00009E0PMAG#1 Sh.1	Single Line Diagram 480V Class-1E Motor Control Center E1C1	19
00009E0PMAG#1 Sh.2	Single Line Diagram 480V Class-1E Motor Control Center E1C1	17
00009E0PMAH#1	Single Line Diagram 480V Class-1E Motor Control Center E1C3	13

DRAWINGS

NUMBER	TITLE	REVISION/DATE
00009E0PMAJ#1	Single Line Diagram 480V Class-1E Motor Control Center E1C2	23
00009E0PMAK#1	Single Line Diagram 480V Class-1E Motor Control Center E1A4	23
00009E0PMAL#1	Single Line Diagram 480V Class-1E Motor Control Center E1B4	18
00009E0PMAM#1	Single Line Diagram 480V Class-1E Motor Control Center E1C4	17
00009E0SI05#1	Elementary Diagram High Head Safety Injection Pumps PA101A, PA101B, & PA101C	8
00009E0SI06#1	Elementary Diagram Low Head Safety Injection Pumps PA102A, PA102B, & PA102C	9
00009E0SI07#1	Elementary Diagram HHSI Pump 1A, 1B & 1C Recirc. MOV's 0011A, 0011B & 0011C	12
0000E0AAAA	Single Line Diagram Main One Line Diagram Unit No. 1 & 2	22
2F369PSI0572	Safety Injection	10
3V111V01052	Piping & Instrumentation Diagram – Refrigeration Chiller	10
3V111V01053	Piping & Instrumentation Diagram – Refrigeration Chiller	10
3V111V01054	Piping & Instrumentation Diagram – Refrigeration Chiller	12
3V119V10002#1	Piping & Instrumentation Diagram – HVAC Essential Chilled Water System	13
3V119V10003#1	Piping & Instrumentation Diagram – HVAC Essential Chilled Water System	18
3V119V10004#1	Piping & Instrumentation Diagram – HVAC Essential Chilled Water System	9
3V119V25001#1	Piping & Instrumentation Diagram – HVAC Electrical Auxiliary Building	11
4099-01006AN	EAB HVAC Supply Fan Drawing	November 2, 1987
4109-01001GZ	Layout for 59 Cells NCX-1200 Batt. ON-1-507-074520-826 & 1-507-074520-836 Racks	H
4120-01057JA	EAB HVAC Return Fan Drawing	March 19, 1980

DRAWINGS

NUMBER	TITLE	REVISION/DATE
5N109F05037#1	Piping & Instrumentation Diagram – Containment Spray System	19
5N129F05013#1	Piping & Instrumentation Diagram – Safety Injection System	28
5N129F05014#1	Piping & Instrumentation Diagram – Safety Injection System	17
5N129F05015#1	Piping & Instrumentation Diagram – Safety Injection System	21
5N129F05016#1	Piping & Instrumentation Diagram – Safety Injection System	15
5N129Z42001	Containment Sump Isolation Valves Logic Diagram – System: SI	7
5N-12-9-Z-42002#1	Normally Open SI Pump Recirculation Valves Logic Diagram System:SI	7
5Q069F05030#1	Piping & Instrumentation Diagram – Radioactive Vent & Drain System – Sump Pumps	18
5Q159F22543#1	Piping & Instrumentation Diagram – Standby Diesel Air Intake & Exhaust	3
5Q159F22544#1	Piping & Instrumentation Diagram – Standby Diesel Stating Systems & Alarms	2
5Q159F22545#1	Piping & Instrumentation Diagram – Standby Diesel Shutdown System	7
5Q159F22546#1	Piping & Instrumentation Diagram – Standby Diesel Starting Air	23
5R169F20000 #1	Piping & Instrumentation Residual Heat Removal System	25
5V119V10001#1	Piping & Instrumentation Diagram – HVAC Essential Chilled Water System	32
5V119V25000#1	Piping & Instrumentation Diagram – HVAC Electrical Auxiliary Building Main Area System	15
5V119V25002#1	Piping & Instrumentation Diagram-HVAC E.A.B. Main Area Elev. 35’-0”, 60’-0”, 76’-0”, & 86’-0” Air Distribution	22
5V119V25002#1	Piping & Instrumentation Diagram – HVAC Electrical Auxiliary Building Main Area	22

DRAWINGS

NUMBER	TITLE	REVISION/DATE
5V119V25003#1	Piping & Instrumentation Diagram – HVAC Electrical Auxiliary Building Main & Control Room Outside Air Makeup System	21
5V119V25005#1	Piping & Instrumentation Diagram HVAC Control Room Envelope Air Distribution	11
5V139V00015#1	Piping & Instrumentation Diagram – HVAC Diesel Generator Building	14
5V139V00080	HVAC Diesel Generator Building	10
6M-18-9-N-5029	General Arrangement Mechanical Electrical Auxiliary Building Plan @ El. 60'-0" Area K	7
6M-18-9-N-5043	General Arrangement Mechanical & Electrical Auxiliary Building Section F-F Area K & L	4
9-E-PB02 02#1	Elementary Diagram Unit Auxiliary transformer Protection & Alarms	11
9-E-PCAA-01#1	Single Line Diagram 13.8 kV Switchgear 1F	13
9-E-PK04-02#1	Elementary Diagram ESF Transformer & 4.16kV Bus E1A, E1B & E1C Protection and Metering	9
9-E-PKAA-01#1	Single Line Diagram 4.16KV Class-IE Switchgear	12
9-E-PKAB-01#1	Single Line Diagram 4.16Kv Class 1E Switchgear E1B	14
9-E-PKAC-01#1	Single Line Diagram 4.16Kv Class 1E Switchgear E1C	13
PW-N10069-717	SSPS Interposing Isol. Relay Cab. 4Z101ZRR057	February 21,1992
SL31337-04 Sh.1	ONAN/ONAF XFMR W/ABB UZERT 200/600 LTS Schematic Diagram	A
SL31337-04 Sh.2	ONAN/ONAF XFMR W/ABB UZERT 200/600 LTS Schematic Diagram	A
SL31337-04 Sh.3	ONAN/ONAF XFMR W/ABB UZERT 200/600 LTS Schematic Diagram	A

ENGINEERING EVALUATIONS/REPORTS

NUMBER	TITLE	REVISION/DATE
CREE 10-17470-2	Operability Review	August 23, 2010
CREE 10-17868-1	Sensitivity Runs – RWST Switchover Margin	August 19, 2010

ENGINEERING EVALUATIONS/REPORTS

NUMBER	TITLE	REVISION/DATE
CREE 10-17868-2	Operability Evaluation – RWST Level	August 26, 2010
CREE 10-5355-1	OE Review	
CREE 99-447-1	MOV EPRI Performance Prediction Methodology Calculations	February 9. 2000
DCP 00-10937-7	Revise Main Feedwater Control Valve Isolation Signal to Energize to Actuate	2

LICENSING DOCUMENTS AND CORRESPONDENCE

NUMBER	TITLE	DATE
NOC-AE-06001979	60 Day Response to NRC Generic Letter 2006-02, Grid Reliability and the Impact on Plant Risk And the Operability of Offsite Power	March 30, 2006
ST-AE-HL-94257	Revised Station Blackout (SBO) Position, South Texas Project, Units 1 and 2 (STP) (TAC NOS. M90061 and M90062)	July 24, 1995
ST-HL-AE-5010	Loss of All Alternating Current Power	March 1, 1995
ST-HL-AE-5103	Loss of All Alternating Current Power	June 14, 1995

MAINTENANCE WORK ORDERS

09000311	MM-1-93000518	MV-1-93001955	362240
93000495	31668258	31268732	362908
WAN 325843	32005963	513276	363919
WAN 326505	32317828	32671897	366450
32576180	WAN 342793	03001174	315923
99000296	32578003	05000022	347311
99001067	31092710	93002426	349345
03000403	05000020	86013296	353592
05000018	93001308	353877	368376
347306	93002212	322843	370678
306031	86013295	291895	381936
291895	322755	356174	353759
322844	291896	339945	362145
339956	322843	366657	285410
339946	348342	366882	291629
367388	344468		

PROCEDURES

NUMBER	TITLE	REVISION
0PAP01-ZA-0101	Plant Procedure Writer’s Guide	4
0PEP06-ZA-0002	Infrared Thermography Program Description	6
0PEP06-ZE-0001	MOV Diagnostic Testing Error Analysis and Acceptance Criteria	11
0PEP06-ZG-0013	Infrared Thermography Data Collection	9
0PGP02-ZA-0003	Comprehensive Risk Management Program	13
0PGP02-ZA-0062	Integrated Working Group Process	1
0PGP03-ZA-0069	Control of Heavy Loads	22
0PGP03-ZM-0021	Control of Configuration Changes	18
0PGP03-ZM-0028	Erection and Use of Temporary Scaffolding	15
0PGP04-ZA-0108	Vendor Document Control Program	8
0PGP04-ZA-0328	Engineering Document Processing	11
0PM05-PM-0001	MCC Starter Inspection	2
0PMP05-DJ-0010	1E Battery Equalizing Charge	20
0PMP05-GM-0003	Inspection of Main Generator Breaker and Control Cabinets	6
0PMP05-PM-4800	Motor Control Center Maintenance ITE Gould	14
0PMP05-ZE-0046	Calibration of Agastat Timers	9
0PMP05-ZE-0110	Inspection and Maintenance of G.E. Type HGA Relays	2
0PMP05-ZE-0111	Inspection and Maintenance of Dayton 24 Hour Timer	1
0PMP05-ZE-0202	Insulation Resistance Testing – Low Voltage Motors	18
0PMP07-SP-0004R	SSPS Logic Train R Block Functions Test	2
0POP01ZO0010	Partial System Fill and Vent (General)	3
0POP02-AE-0001	AC Electrical Distribution Breaker Lineup	24
0POP02-AE-0002	Transformer Normal Breaker and Switch Lineup	31
0POP02DG0001	Emergency Diesel Generator 11(21)	47
0POP02DG0002	Emergency Diesel Generator 12(22)	52
0POP02DG0003	Emergency Diesel Generator 13(23)	49
0POP02-HE-0001	Electrical Auxiliary Building HVAC System	31
0POP02-RH-0001	Residual Heat Removal System Operation	51

PROCEDURES

NUMBER	TITLE	REVISION
0POP02-SI-0002	Safety Injection System Initial Lineup	24
0POP04-AE-0001	First Response to Loss of Any or All 13.8 KV or 4.16 KV Bus	37
0POP04-AE-0004	Loss of Power to One or More 4.16 KV ESF Bus	12
0POP04-AE-0005	Offsite Power System Degraded Voltage	5
0POP04-CC-0001	Component Cooling Water System Leak	14
0POP04-HE-0001	Loss of EAB or Control Room HVAC	10
0POP04-RC-0002	Reactor Coolant Pump Off Normal	29
0POP04-ZO-0002	Natural or Destructive Phenomena Guidelines	42
0POP05-EO-E000	Reactor Trip or Safety Injection	21
0POP05-EO-EO30	Steam Generator Tube Rupture	22
0POP05-EO-ES01	Reactor Trip Response	24
0POP05EOES13	Transfer to Cold Leg Recirculation	10
0POP05-EO-ES33	Post SGTR Using Steam Dump	14
0POP05-EO-FRH1	Response to Loss of Secondary Heat Sink	19
0POP05-EO-FRS1	Response to Nuclear Generation ATWS	16
0POP09-AN-02M3	CCW Pump 1A (2A) Trip, Annunciator Response	23
0POP09-AN-04M8	Annunciator Lampbox 4M08 Response Instructions	34
0PSP03-DG-0013	Standby Diesel 11(21) LOOP – ESF Actuation Test	28
0PSP03-DG-0014	Standby Diesel 12(22) LOOP – ESF Actuation Test	25
0PSP03-DG-0015	Standby Diesel 13(23) LOOP – ESF Actuation Test	27
0PSP03-SI-0001	Low Head Safety Injection Pump 1A(2A) Inservice Test	17
0PSP03-SI-0002	Low Head Safety Injection Pump 1B(2B) Inservice Test	16
0PSP03-SI-0020	Safety Injection and Miscellaneous and Train 1A(2A) Valve Operability Test	16
0PSP03-SI-0024	Safety Injection System 1B(2B) Valve Operability Test	18
0PSP03-SI-0024	Safety Injection System 1B(2B) Valve Operability Test	17
0PSP03SI0025	Safety Injection System 1C(2C) Valve Operability Test	19
0PSP03-SP-0008B	SSPS Train B Quarterly Slave Relay Test	19
0PSP03-SP-0014	Safety Injection Automatic Recirculation Actuation and	5

PROCEDURES

NUMBER	TITLE	REVISION
	Response Time Test	
0PSP06-DJ-0001	125 Volt Class 1E Battery Monthly Surveillance Test	30
0PSP06-DJ-0003	125 Volt Class 1E Battery Surveillance Test	15
0PSP07-ZC-0002	Diesel Fuel Oil Receipt Testing	19
0PSP11SI0001	LLRT: M-22 Emergency Sump 1A/2A	7
0PSP11SI0002	LLRT: M-21 Emergency Sump 1B/2B	7
0PSP11SI0003	LLRT: M-20 Emergency Sump 1C/2C	7
0PSP11SP0001	Response Time Verification Test	2
LOR-GL-0003	LOR Exam Bank Guidelines	2
RM04-003	Plant Generation risk Process Administrative Guideline	1

VENDOR MANUALS

NUMBER	TITLE	REVISION/DATE
31785771	Instruction Manual for Membrane Air Dryer	2
QR-088004-1	Qualification Report-NLI Motor Control Center Cubicles	B
VTD-B455-0008	Instructions Single Phase Voltage Relays	E
VTD-G185-0001	Instruction Manual for Power Application	0
VTD-G185-0005	General Purpose Batteries Type Nax-Lead Antimony, Type NCX-Lead Calcium	0
VTD-G185-0010	Instruction Manual for 59 Cells NCX-1200 on S07-074520-826 Rack and S08-074520-836 Rack	0
VTD-G185-0015	Flooded Battery Interconnection Kits for: M, N, H and PDQ Cell Types	0
VTD-G185-0018	Installation & Operating Instructions Lead-Antimony Types Lead-Calcium Types	2
VTD-J127-0002 R/0	Series 800/1000/2000/3000 Axivane Fans Adjustable Pitch Direct Connected Single and Two Stage Axial Flow Fans	January 1, 1991
VTD-P025-0004	High Head Safety Injection Pump Operation and Maintenance Manual Size and Type 17 Stage 6 X 10 WYRF	4

MISCELLANEOUS DOCUMENTS

NUMBER	TITLE	REVISION/DATE
	South Texas Project Nuclear Operating Company Approved Vendors List.	September 28, 2005
	Specification for Safety Class Dampers, 3V289VS0008.	September 16, 1986
	EAB HVAC Final Air Balance Report HE 01, 02, 03.	October 9, 1987
	South Texas Project Risk Card (Level 1 Summary)	July, 2009
	Time Critical Operator Actions Assumed in Accident Analyses	15
10000026	ESF Transformer PM Plan	July 27, 2010
4041-00130CE	Cooper Energy Services – Report of Witness Tests	September 26, 1984
5N109MB01024	Design Basis Document – Containment Spray System	3
5N109MB01045	Design Basis Document – Safety Injection System	7
5N209MB01035	Design Basis Document – External Environment	2
5Q159MB01023	Design Basis Document – Standby Diesel Generator System	3
5R179MB1017	Chemical and Volume Control System, Pages 4A-10 to 4A-13, Positive Displacement Pump	5
5V119VB01022	Design Basis Document – Electrical Auxiliary Building HVAC System	4
5V139VB00115	Design Basis Document – Diesel Generator HVAC System	3
5V369VB00120	Design Basis Document – Chilled Water System	8
6.6.2 ZHESI1	HHSI Train A Misaligned Following 0PSP11-SI-0013, Human Reliability Analysis	May 6, 2006
7.4.18 HEOS01	Open Doors, 2 of 3 EAB HVAC Fan Trains Fail STP Rev. 4, Human Reliability Analysis	April 26, 2006
7.4.20 HEOT01	Manually Trip Reactor, No MFW, ATWS, Human Reliability Analysis	May 4, 2006
7.4.26 HERC6	Start PDP and Manually Trip RCP, Human Reliability Analysis	May 4, 2006

MISCELLANEOUS DOCUMENTS

NUMBER	TITLE	REVISION/DATE
7.4.6 HEOB02	Case A, Bleed and Feed, No AFW (GT Tree) STP Rev. 4, Human Reliability Analysis	April 26, 2006
7.4.8 HEOC01	Initiate Closed Loop RHR Cooling (SGTR) STP Rev. 4, Human Reliability Analysis	April 26, 2006
E-EPS-1645	NSSS Emerg Elec Loading Requirements	5
IEN 02-29 Screening	Recent Design Problems in Safety Functions of Pneumatic Systems	N/A
JPM 012.01A	Terminate ECCS Flow	0
JPM 015.02	Locally Open Reactor Trip and Bypass Breakers	9
JPM 023.02	Restore Power to Stripped 480V MCCs and Restore RCB HVAC	7
JPM 032.01	Establish Excess Letdown Flow with Elevated RCDT Level	2
JPM 072.01a	Place RHR System in Operation	0
JPM 25.01	Respond to a Loss of 250VDC	00
JPM 4.01a	Re-establish Letdown (ES-11)	4
JPM Audit S7	Transfer to Hot Leg Recirculation	1
JPM NRC S2	Lower Safety Injection Accumulator Level	2
JPM NRC S5	Perform Containment Spray Pump Test	2
JPM S1	Respond to CCW Leak	3
JPM S1	Respond to ECW Low Discharge Pressure	1
N/A	South Texas Project Fault Duty and Steady State Voltage Study	December 10, 2009
N/A	South Texas Project Nuclear Plant Interface Coordination Agreement	April 1, 2010
NRC Branch Technical Position PSB-1	Adequacy of Station Electric Distribution System Voltages	July, 1981
Plant Impact Summary 00-500	SOER 99-1, Loss of Grid	May 24, 2004