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September 27, 1994

U.S. Nuclear Regulatory Commission
Mail Station P1-37
Washington, D.C. 20555

Attention: Document Control Desk

Subject: Grand Gulf Nuclear Station
Unit 1
Docket No. 50-416
License No. NPF-29
Request for a Reduced-Scope Service Water System
Operational Performance Inspection

GNRO-94/00122

Gentlemen:

This submittal is Grand Gulf Nuclear Station's (GGNS) request for NRC consideration of a reduced-scope Service Water System Operational Performance Inspection (SWSOPI) based upon GGNS performing a self-assessment on the Service Water System. This request is consistent with the guidance provided in Administrative Letter 94-03. The assessment plan is described in Attachment 1, and the technical review plans are provided in Attachment 2. The resumes for the self-assessment team members are included in Attachment 3.

NRC Inspection Procedure 40501, "Licensee Self-Assessments Related to Area-of-Emphasis Inspections," permits the NRC to recognize a licensee's good performance and quality self-assessment program by reducing the scope of an NRC inspection in an area-of-emphasis. GGNS's current SALP rating and the plans for a self-assessment of the service water system are both consistent with the intent of IP 40501 to reduce the resource burden on the NRC and licensees for detailed NRC inspections. GGNS has contracted with Cygna Energy Services to perform a detailed self-assessment of the service water system beginning in October 1994.

A065 1/1

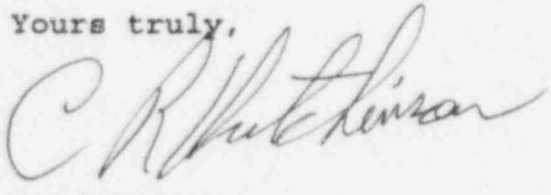
The plan addresses the scope, schedule, approach, and team qualifications. GGNS's assessment will fully meet the objectives of TI 2515/118, Revision 1, which is used by the NRC to conduct performance-based Service Water System inspections. The objectives of the SWSOPI are to assess planned or completed actions in response to Generic Letter 89-13; verify the Service Water System is capable of fulfilling its thermal and hydraulic performance requirements and is operated consistent with its design basis; ensure the Service Water System is operated and maintained so as to perform its safety-related functions; and assess the adequacy of human factors considerations relating to the system.

GGNS's contractor, Cygna Energy Services, has assembled a strong project organization to accomplish this scope of work. The assessment team consists of a team leader and four reviewers which is consistent with the guidance provided in the NRC TI 2515/118. Resumes of the self-assessment team members are provided in Attachment 3.

The SWSOPI self-assessment is scheduled to begin on October 24, 1994. The final report describing the results will be provided to the NRC by February 15, 1995.

GGNS agrees that a licensee self-assessment combined with a NRC reduced scope inspection will lessen the regulatory impact/burden on a licensee while ensuring that the area of emphasis is thoroughly and appropriately evaluated. Should you have questions or require additional information regarding this matter, please contact Rita Jackson at 601-437-2149.

Yours truly,



CRH/RRJ/amb
attachment: Request for a Reduced-Scope Service Water System Operational Performance Inspection

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Attachment 1

to

GNRO-94/00122

Request for a Reduced-Scope Service Water System Operational Performance Inspection

Assessment Plan

ASSESSMENT PLAN
SERVICE WATER SYSTEM OPERATIONAL PERFORMANCE INSPECTION (SWSOPI)

OBJECTIVE: To perform a self-assessment of the GGNS Service Water System to verify that the system design, operation, and performance meets the design basis and regulatory requirements. The objectives of the SWSOPI are as follows:

1. Assess planned or completed actions in response to Generic Letter 89-13, "Service Water System Problems Affecting Safety-Related Equipment."

2. Verify the Service Water System is capable of fulfilling its thermal and hydraulic performance requirements and is operated consistent with its design basis.

3. Assess the operational controls, maintenance, surveillance, and other testing and personnel training to ensure the Service Water System is operated and maintained so as to perform its safety-related functions.

4. Assess the adequacy of human factors considerations relating to the system (e.g., accessibility and labeling of valves) and supporting systems for ensuring proper system operation under normal and accident conditions.

SCOPE: Cygna Energy will provide experienced personnel to participate in the performance of a SWSOPI at GGNS. The SWSOPI will be conducted using USNRC Temporary Instruction 2515/118, Revision 1, "Service Water System Operational Performance Inspections (SWSOPI)" as a guideline. The scope of inspection will be based on the following guidelines considering the referenced sources of information.

SWSOPI Guidelines: Perform a comprehensive review of the Service Water System components and system performance including:

1. Mechanical systems engineering design review and configuration control;

2. Operations;

3. Maintenance;

4. Surveillance and testing;

5. Quality assurance and corrective actions.

Sources of Information: The scope shall encompass consideration of all applicable sources of information, activities or conditions, including, but not limited to:

Probabilistic Risk Assessments
Inspection & Enforcement Bulletins
Inspection & Enforcement Notices
Nuclear Regulatory Commission Reports
Incident Reports
Licensee Event Reports
Safety Evaluation Reports
Significant Operating Event Reports
Significant Event Evaluation and Information Network
Nuclear Network
Nuclear Plant Reliability Data System
Supplier Bulletins
Service Manuals
Final Safety Analysis Report
System Descriptions
Technical Specifications
Controlled Drawings
Calculations
License Conditions
Specifications/Standards
Codes (ASME,NFPA) Procedures
Change Requests
Change Notices
Design Change Packages
Implementation Packages
10CFR50.59 Evaluations
Approval Cycles
Post-Mod Test Bases
Original Equipment Purchase Specs.
Logic Diagrams
Elementary Wiring Diagrams
Licensing Letters
Operation and System Procedures
Surveillance and Test Procedures/Reports
Corrective and Preventive Maintenance Procedures
Calibration Procedures and Reports
Maintenance Work Orders (MWOs)
SALP AND INPO Evaluations
Drawing Mark-ups
Preventive Maintenance Program
Maintenance Frequency
Material Control/Spare Parts
Maintenance History System
Corrective Maintenance Program
Work Authorization
Prioritization
Maintenance Testing
Surveillance
Off-Normal Event Procedures
Integrated Operations Instructions
Emergency Procedures
Rounds, Logs, Night Orders
Equipment Tagging
Temporary Alterations
10CFR50.72 and 73 Reports
Operational Tests
Design Change Input
Operating Instruction
Post-Mod Input
System Descriptions
Human Factors
System Condition
Mode
System Configuration
Measurements
Environmental and Seismic Records
Design Basis Document
P&IDs
Loop Diagrams
Original Pre-Operational Test Procedures & Reports
Abnormal, Emergency, and Alarm Response Procedures
Training Lesson Plans
Instrument and Control Setpoint Calculations
Non-Conformance Reports

Organization: Cygna Energy Services, contractor for GGNS, has a strong project organization and will provide experienced personnel to participate in the performance of a SWSOPI, Cygna Energy Services will utilize a Team Leader and four Reviewers. The Team Leader will additionally review Mechanical Design activities. The Reviewer for each of the areas is:

- Mechanical Design - Mr. Robert Stanley (Team Leader)
- Electrical and I&C Design - Mr. Donald Kosack
- Maintenance and Corrective Actions - Mr. Jeffrey Haverly
- Surveillance and Testing - Mr. James Olson
- Operations and Training - Mr. Roger Persons

Attachment 3 provides the resumes of the team leader and reviewers. Cygna has staffed this SWSOPI team with senior Cygna personnel, ideally suited for each assignment due to their individual combination of SSFI experience and technical expertise. In the Operations area, Cygna will utilize personnel from their General Physics parent company. These personnel are local to the plants and provide operations and training personnel experienced with BWR's in general, and with BWR-6 specifically.

Additional technical expertise can and will be provided to address particular issues as they are identified during the SWSOPI. Cygna's employees have expertise in various areas that may be required during this SWSOPI.

Level of Effort: The level of effort for this assessment is provided as Attachment 2, Technical Review Plans: Maintenance, Design, and Operations.

Schedule: The schedule for the self-assessment is as follows:

• October 24	SWSOPI team arrives on site
• October 25 - November 4	The SWSOPI continues on site
• November 7-11	SWSOPI team will be at their home offices
• November 14-18	The team continues onsite activities
• February 15	Final Report provided to NRC

Attachment 2

to

GNRO-94/00122

Request for a Reduced-Scope Service Water System
Operational Performance Inspection

Technical Review Plans:
Maintenance
Design
Operations

SERVICE WATER SYSTEM

OPERATIONAL PERFORMANCE INSPECTION

(SWSOPI)

TECHNICAL REVIEW PLAN

MAINTENANCE

PROJECT - GRAND GULF NUCLEAR STATION

TRP COMPLETE _____ _____

PROJECT LEAD DATE

TRP ACCEPTED _____ _____

PROJECT MANAGER DATE

MAINTENANCE TECHNICAL REVIEW PLAN

1.0 INTRODUCTION

The purpose of this Technical Review Plan (TRP) is to provide review guidelines for the maintenance area. The capabilities of both the maintenance program and the system and component maintenance activities on the overall operational readiness and abilities of the system to accomplish the original design bases functions, will be assessed. Focus will be on system/component specific activities. The TRP will in no way restrict the reviewer from pursuing other maintenance-related areas which may not be identified herein.

Through the implementation of this TRP, particular emphasis will be placed on maintenance-specific activities as well as programmatic maintenance issues. Particular emphasis will be placed on the resolution of previously identified maintenance issues in addition to the overall maintenance assessment.

Section 2.0 identifies the major areas of review and, in several cases, specific items which should be addressed in the review.

2.0 KEY REVIEW AREA

The portion of the review focuses on the overall maintenance program and how it is applied to the Service Water System components. It also addresses set point and calibration procedures, as well as a review of the surveillance program. The primary review areas are as follows:

2.1 Corrective and Preventive Maintenance Programs and Procedures

2.2 Planning, Scheduling, and Coordination of Maintenance

2.3 Maintenance Training and Qualifications

2.4 Problem Tracking and Corrective Actions, Root Cause Evaluations

2.5 Equipment/Instrumentation Calibration and Setpoints

2.6 Post Maintenance Testing

2.7 Procurement and Material Controls

2.8 Overall Maintenance Program/Performance Based Implementation (including material condition and management)

Information and data used in this review are to be obtained from the following primary sources:

- A walkdown of the system and its essential supporting systems
- Review and evaluation of the logic drawings
- Interviews with maintenance personnel
- Review of the applicable maintenance history documentation and appropriate procedures and design bases documentation.
- A physical inspection of maintenance performed or being performed

All document reviews, personnel interviews, and plant walkdowns shall be documented on Form 89-001-Service Water System Operational Performance Inspection Document Critique Form; 89-002-Service Water System Operational Performance Inspection Interview Record; or 89-003-Service Water System Operational Performance Inspection Walkdown Record. The use of these forms will help in ensuring all aspects of the inspection are completed and will be available to reference should questions arise at a later date.

2.1 Corrective and Preventive Maintenance Programs and Procedures

The reviewer will ensure that adequate maintenance procedures are in place to maintain system equipment in accordance with the systems and components design basis. Particular focus will be placed on the maintenance process (the system in place to maintain equipment) as well as on the specific procedures. The following questions will be addressed:

2.1.1 Conduct an in-depth system walkdown to review the as-configured system for material condition. (Generic Letter 89-13 Action IV) The review should include the following attributes:

1. Good lubrication practices are evident. Sight glasses are full of oil, spherical bearings on snubbers and adjustable rod supports are free to move.

2. Material deficiencies are included in the work control system. Note age of maintenance request tags.

3. Equipment is protected from adverse environmental conditions, e.g. rust, dust, dirt, falling objects, humidity/water leaks.

4. Pump motor filters are clean and unobstructed.

5. Motor operated valve operators have all fasteners installed and are tight.

6. Excessive oil leaks, puddles not cleaned up, excessive use absorbent of material.

7. Fluid leakage from packing/gaskets.

8. Plant equipment and instruments are properly labeled.

9. Fasteners and supports are properly installed and maintained. For example, snubber pins should have keepers installed and bolts on bolted connections should have full engagement.

2.1.2 Do plant maintenance procedures reflect vendors' and plant specific maintenance requirements?

2.1.3 Are vendor manuals available and maintained current?

2.1.4 Are maintenance procedures sufficiently detailed to allow adequate maintenance of their components? In many cases, maintenance procedures are found to be non-specific and outdated, particularly with older equipment.

2.1.5 Are procedures verified and validated?

2.1.6 Does the maintenance program provide for adequate preventive maintenance of system components? Are maintenance intervals and procedures in concert with the plant maintenance program and vendor recommendations?

2.1.7 Do procedures provide for EQ maintainability?

2.1.8 Is a post-maintenance test program identified?

2.1.9 Are spare parts adequately specified and available?

2.1.10 Is there a program in place to update procedures, vendor manuals, and drawings when updated information is provided by the vendor when plant specific changes are made.

2.1.11 Is a predicative maintenance program in place and effective on system specific components?

2.1.12 Are periods between maintenance actions appropriate?

2.1.13 Is work performed on schedule?

2.1.14 Are there procedures in place allowing deferral of preventive maintenance? How are deferrals prioritized for working at a later date?

2.1.15 Is there a feedback system from the shop personnel? Does it work?

2.1.16 The reviewer will determine the adequacy of the maintenance program from an overview perspective. Of importance here is a determination that maintenance work order system ensures that the plant, system and component design bases are adequately maintained.

2.1.17 Review the periodic inspection program used to detect corrosion, erosion, protective coating failure, silting, and biofouling. (Generic Letter 89-13, Action III)

2.2 Planning, Scheduling, and Coordination of Maintenance

The reviewer will ensure that system-related maintenance is adequately planned, scheduled, and coordinated to support its design requirements.

2.2.1 Review the maintenance program for removal and repair of SWS piping and interface system components due to silting, biofouling, corrosion, erosion, and failure of protective coatings. (Generic Letter 89-13, Action III)

2.2.2 Does work appear planned and scheduled consistent with plant/system unavailability?

2.2.3 Are schedules met?

2.2.4 Are layouts planned and implemented in advance?

2.2.5 Are the work control procedures clear, concise, and well implemented?

2.2.6 Do dedicated personnel coordinate and implement those functions?

2.2.7 Do machinery history records exist and are they maintained and utilized?

2.2.8 Does a work prioritization system exist; is it sound, and well implemented on system components?

2.3 Maintenance Training and Qualifications

The reviewer will determine if adequate maintenance training has been conducted. Some specific areas of review are as follows:

2.3.1 Are maintenance personnel periodically trained on the equipment that they are maintaining? Determine if maintenance personnel receive adequate training pertaining to the SWS and if the degree of training provided is consistent with the amount of technical detail in the procedures. (Generic Letter 89-13, Action V)

2.3.2 Are training programs defined and well established?

2.3.3 Is OJT utilized effectively?

2.3.4 Are lessons learned incorporated into maintenance procedures?

2.3.5 Are qualification records for maintenance personnel maintained?

2.3.6 Conduct detailed interviews with the maintenance personnel to determine their technical knowledge of how components are maintained, such as the setting of limit switches, the alignment of pump couplings, cleaning and replacing filters, and the maintenance of circuit breakers.

2.4 Maintenance Problem Tracking, Corrective Action, and Cause Determinations

Maintenance problems on certain equipment may have a history of malfunction. These malfunctions, if tracked adequately and corrected, can prevent recurrent problems. The reviewer will ensure that a system exists to track problem equipment, that root cause analysis has been carried out, and that an effective corrective action program is in place.

2.4.1 Review the maintenance history for the selected components of the SWS for the past two operating cycles (minimum of 2 years) or longer if necessary. Look for recurring equipment problems and determine if any trends exist. Review several completed maintenance activities for technical adequacy, performance of appropriate post-maintenance testing and satisfactory demonstration of equipment operability.

2.4.2 Is a root cause determination program in place?

2.4.3 Have any specific instances of system components failures been evaluated within the program?

2.4.4 If so, assess adequacy of that determination.

2.4.5 Assess degree of assessment of industry - component/system specific failure and/or maintenance issues.

2.4.6 Assess adequacy of post-maintenance listing relative to cause determination follow-up.

2.5 Equipment/Instrumentation Calibration and Setpoints

In this section of the review, the reviewer will focus on maintenance activities which result in equipment and instrumentation-related setpoints and calibration. The Maintenance Department is typically responsible for ensuring that setpoints are maintained within their calibrated range.

2.5.1 Particular attention should be focused on procedures and training associated with the following:

-Instrument setpoints and calibration
-Control valves and accessories
-Timers associated with dryers

2.5.2 The reviewer will determine if the program setup for this function is adequate, especially where systems have had revisions and replacements, thus altering component or system performance.

2.5.3 The reviewer will ensure that adequate records are kept.

2.5.4 The reviewer must assess the degree that the setpoint and calibration programs support the system and component design bases and actual functional requirements.

2.6 Post-Maintenance Testing

The aspects of post-maintenance testing required to ensure design basis compliance are to be assessed.

2.6.1 The reviewer shall assess instances of post-maintenance testing against the components' ability to fulfill design functions.

2.6.2 Are responsibilities clearly assigned for determining post-maintenance testing requirements?

2.6.3 Does a program exist to track the longer term post-maintenance testing? Assess its performance.

2.7 Procurement and Material Controls

The reviewer will assess the parts procurement and material controls activities and assess impact on the systems design bases through review of past activities.

2.7.1 The reviewer shall assess safety and non-safety system interfaces and related component/part procurement examples. Assess process capability to maintain system design basis and availability.

2.8 Implementation

2.8.1 Are station and maintenance organization goals and objectives clear in regard to the subject system?

2.8.2 Are administrative procedures adequate to ensure implementation of goals and objectives?

2.8.3 Are adequate resources available to implement the maintenance policies?

2.8.4 Do goals address items such as

- forced outages
- unplanned challenges to safety-related systems
- lost-time accidents
- action statements (entry into)
- personnel errors
- radiological exposure
- rework
- backlog work order
- control overtime

SERVICE WATER SYSTEM

OPERATIONAL PERFORMANCE INSPECTION

(SWSOPI)

TECHNICAL REVIEW PLAN

DESIGN

PROJECT - GRAND GULF NUCLEAR STATION

TRP COMPLETE _____ _____

PROJECT LEAD DATE

TRP ACCEPTED _____ _____

PROJECT MANAGER DATE

DESIGN TECHNICAL REVIEW PLAN

1.0 INTRODUCTION

The purpose of this Technical Review Plan (TRP) is to provide review guidelines for the Design area. The Design area includes the design basis of the system and design change process, including field installation. This TRP in no way restricts the reviewer from pursuing other related areas which may not be identified herein.

Section 2.0 identifies the major areas of review and, in several cases, specific items which should be addressed in the review.

2.0 KEY REVIEW AREAS

This portion of the review will focus on the following areas:

2.1 System Design Basis

2.2 Design Process

- Design
- Modification Installation
- Testing and Operability
- Installation Verification
- QA Coverage
- Training

The review will be based upon the following sources of data:

- Review of Plant Documentation
- interviews with Personnel
- Plant Walkdowns

Specifically, interviews will be conducted with System Engineers, Design Engineers, and managers in the engineering and quality assurance areas. Interviews will also be conducted with various individuals knowledgeable of the system design, operation, surveillance, testing, procedures, and modifications.

All document reviews, personnel interviews, and plant walkdowns shall be documented on Form 89-001-Service Water System Operational Performance Inspection Document Critique Form; 89-002-Service Water System Operational Performance Inspection Interview Record; or 89-003-Service Water System Operational Performance Inspection Walkdown Record. The use of these forms will help in ensuring all aspects of the inspection are completed and will be available to reference should questions arise at a later date.

2.1 System Design Basis

2.1.1 Review the design-basis, and other design documents such as calculations and analyses for the SWS, and determine the functional requirements for the SWS and each active component during accident or abnormal conditions. This review should include the appropriateness of the design assumptions, boundary conditions, and models. This may include independent calculations . During the review the team may determine if (a) the system design is in accordance with the facility's licensing commitments and regulatory requirements. (b) the system will meet the thermal and hydraulic performance requirements, and (c) associated design output documents such as facility drawings and procurement specifications are consistent with the design bases and engineering analyses.

2.1.2 Review the SWS configuration drawings for consistency with applicable design documents, NRC requirements, and licensing commitments.

2.1.3 Review the SWS operation as compared to design documents. Advise the other team inspectors of any discrepancies for further review and operations evaluation.

2.1.4 Evaluate single active failure vulnerabilities of the system and the resulting impact on interfacing system components such as emergency diesel generators. Evaluate the effect on SWS operability of failures to interfacing systems, such as instrument air. Examine potential common mode failures from fouling of common intakes or traveling screens.

2.1.5 Review the effectiveness of design features installed to minimize silting and biofouling of the piping and components. Verify if features are provided for the timely detection of flow degradation and if flow balancing has been conducted during various system operating modes. Flow balance verification should be done for worst case combinations of pump operation. Verify that pump runout conditions are not present with minimum number of pumps operating with worst case alignment of non-safety related loads. Evaluate minimum and maximum limits of valve positions and ensure these limits are properly translated into operational controls. Verify that system flow balance data is consistent with key design assumptions, where available, for flow coefficients, rated pressure drops across components and piping, rated heat removal, heat exchanger fouling, and total system flow for operating modes.

2.1.6 Check whether design features are provided to mitigate the effects of flooding caused by SWS leaks. Review NUREG 1275, Volume 3, Section 3.3 for information on SWS events involving actual or potential flooding.

2.1.7 Review the safety-related portion of the system for seismic qualification and verify that non-safety related portions can be isolated in accordance with the provisions specified in the system design basis.

2.1.8 Review the Licensee's program for monitoring system degradation. Evaluate licensee's performance trending, and adequacy of engineering evaluation and operability determination.

2.1.9 Review the setpoints and actuations to ensure they are consistent with the design basis and assumptions.

2.1.10 The system design basis will be reviewed to ensure that the functions required are met. This review will be completed by the review of the documents in Attachment 1.

The following is a list of the design criteria topics which will be evaluated during the review:

Layout Requirements
Hydraulic Requirements
Chemistry Requirements
Material Requirements
Suitability of Materials, Processes, Parts, and Equipment
Redundancy and Diversity Requirements
Electrical Separation Requirements

Seismic Requirements (Including II/I)
Environmental Qualification Requirements
Protection Against Dynamic Effects of Pipe Rupture, Jet Impingement, and Missiles
Access Control
Fire Protection Requirements (Detection and suppression)
Safe Shutdown Requirements (Appendix R)
Handling, Storage, and Shipping Requirements
Containment Isolation Requirements
Personnel Requirements
Testing (Surveillance, Appendix J and IST)
Mechanical, Electrical, and Instrument and Control Safety-Related Functional Requirements
Pipe Stress and Supports
Accessibility and Inservice Inspection
Monitoring Instrumentation and Control Requirements

2.1.11 Using the design basis and functions determined above, evaluate the adequacy and consistency of the existing system/component with respect to the design bases:

Review procedures, Tech Specs, FSAR and drawings for agreement with design basis.

Determine if as-built systems and components meet their applicable design documents and design basis.

Evaluate the traceability of setpoints and setpoint bases.

Review selected design calculations and assumptions supporting the design bases.

2.1.12 Assure availability of power circuits under all operating and design basis conditions.

Review load studies for power supplies.

Review AC systems for proper sizing.

Review power circuit separation requirements and assure they are met.

2.1.13 Review instrumentation for range and accessibility.

2.1.14 Verify adequacy of system/component control and protection logic.

2.2 Design Process

This portion of the review focuses on the process by which modifications are made at the plant. The review encompasses all aspects of the design process from the initial conception of the design, to the implementation in the field, and the final closeout of the paper work. All elements of the design control process will be assessed.

The review of the modification and design process utilizes the questionnaire developed for EPRI Report NC 1G-06 - Modification and Design Control.

To ensure the system meets its design requirements, a detailed review of several design packages will be performed to ensure that calculations and other modification documentation was traceable; that adequate post-installation testing was conducted; and that plant documentation such as operating procedures, training materials, design drawings, the FSAR, and etc., were updated to reflect modification; and interviews with design engineering and modification installation personnel will be conducted.

For the design process portion of the review, approximately three (3) modification packages will be reviewed in-depth. The packages selected will provide a representative cross section of engineering discipline (e.g., electrical, I&C, or mechanical), modification type and complexity.

Each modification will be physically inspected to ensure consistency with design documentation. The design package will then be reviewed to ensure that design base impacts are properly evaluated; that all necessary reviews and post-installation testing was carried out; and finally, that all documentation affected by the modification was updated. An assessment of the completeness of the modification packages will be made and interviews will be conducted with a number of personnel involved with implementation of modifications.

The following discuss the specific areas to be reviewed:

2.2.1 Design

The review will focus on all aspects of the Design Engineering Function including:

2.2.1.1 Conceptual Design

The reviewer shall ensure that sufficient justification is presented for new modifications and that the correct level of review and approval is obtained.

2.2.1.2 Design Bases

The review will determine if the design changes have impacted the design bases and if adequate documentation exists to demonstrate that the appropriate design analysis and reviews have been conducted. The review shall ensure that the requirements identified in Section 2.1 have been evaluated.

2.2.1.3 Design Change Process

The reviewer shall review the process of completing a design package to the point of issuance to the field. The reviewer shall review the design preparation procedures, the method for prioritizing modifications, and the approval process. The reviewer shall review the design packages for completeness by checking that it contains all required documentation, the requirements of ANSI N45.2.11 Section 6.3 have been met, and all information is complete. In addition, the methods for ensuring that the process identifies all required changes to affected drawings, procedures, and other design basis documents, shall be identified and assessed.

The methods should ensure the following are reviewed for required changes:

• Plant baseline drawings, including as-builts

• Plant lists such as line lists, cable listings, instrument lists, setpoint index, drawing index, etc.

• Maintenance procedures and vendor manual obtained

• Test procedures

• Training

• Plant licensing documents, including Technical Specifications

• Related AC and DC load studies

• QA/QC requirements records

Review selected modification packages with potential electrical impact on safety and design basis by checking the following attributes:

1) Adherence to design basis
2) Documentation for sizing,cabling, electrical switching, and changes to electrical loading
3) Safety review, including common mode failure and single failure impact
4) Identification and adherence to design basis criteria
5) Revision and control of supporting documentation -calculation assumptions and input
6) Appropriate application of quality standards
   - Reviews
   - Records control and traceability
   - Control of design input
7) Appropriate procurement requirements
8) Appropriate consideration of contributing factors, e.g.,
   - Appendix R
   - HELB
   - Seismic requirements, II/I-EQ
9) Post-modification acceptance testing
   - Specification of proper test conditions
   - Test requirements satisfy functional requirements
   - Accounts for impact of interfacing plant systems
   - Plant operating manual procedure and calibration changes

2.2.1.4 Safety Evaluation

The reviewer shall review the design packages to evaluate whether the safety evaluation adequately evaluates all aspects of 10CFR50.59 including equipment qualification and fire hazards considerations.

2.2.1.5 Procurement

The reviewer shall review any bills of material associated with the change for completeness of requirements.

2.2.2 Modification Installation

The reviewer shall review the installation process to determine the adequacy of the installation procedures, feedback to engineering, and adequacy of installation. The review shall determine if installation problems are a result of poor procedures or poor design packages. The reviewer shall also determine if field changes made to packages have been adequately addressed by engineering and incorporated into all related documents and drawings.

This review shall also ensure that a human factors review was performed on this change. The reviewer will determine if plant changes will adversely impact the operator's ability to operate or maintain the system. The reviewer will determine if the changes affect the plant simulator. If so, was the simulator modified? Is there adequate input from operations, plant engineering and maintenance during the conception of a design change? The reviewer will determine if a design change package required changes to appropriate plant procedures, if the procedural changes were made, if revised procedures are included in the training program, and if operators have been trained to the revised procedures.

2.2.3 Testing and Operability

The reviewer will determine if appropriate post-modification testing requirements have been specified, carried out, and if results meet the design bases for the change and do not impact the original design bases. Additionally, periodic and surveillance tests shall be reviewed to ensure any changes required have been incorporated appropriately. The reviewer will determine if adequate documentation exists to confirm the above. The reviewer will determine if adequate an adequate test program exists in accordance with 10CFR50, Appendix B, Criterion XI.

2.2.4 Installation Verification

The reviewer will determine if an adequate method has been established to verify the installation of the modification. A review of the method used will be conducted to determine if it is complete.

2.2.5 Configuration Control

The reviewer will determine if configuration control principles have been applied. Upon completion of the modification in the plant, the following should occur in a timely manner:

- Plant baseline drawings have been updated, including as-builts
- Plant lists such as line lists, cable listings, instrument lists, setpoint index, drawing index, etc., have been updated
- Plant operation and emergency procedures are updated

- Maintenance procedures and vendor manuals are updated and in place
- Test procedures are updated and in place
- Training is conducted
- Plant licensing documents are amended, including Technical Specifications
- Related AC and DC load studies are updated
- QA/QC requirements records are updated and in place
- Complete design package documentation is transmitted to document control

Update and control of the following Plant Data Bases and Effected Documents has occurred:

a. Maintenance data base
b. Plant procedures
c. Tech Specs
d. UFSAR
e. Setpoint tabulations
f. Original design basis calculations for effected equipment
g. Q List
h. Relay data sheets

2.2.6 Training

The reviewer will determine if appropriate training associated with the design change has been carried out and that a system is in place which assures expeditious training of operators and other key personnel.

2.2.7 Quality Assurance Coverage

The reviewer shall determine the extent of QA involvement in the design process. The review should determine if problems from this involvement have developed and what is the resolution. The reviewer should also check if the QA duties are specified within the procedures.

2.2.8 Quality Assurance and Corrective Actions

2.2.8.1 Review the meeting minutes of the plant onsite safety review committee and the offsite safety review committee for the past six months for items pertaining to the SWS. Inform the operations and design inspectors of any discrepancies and unusual operability determinations.

2.2.8.2 Review the operational history of the SWS, including licensee event reports, nuclear plant reliability data system reports (NPRDS), 10CFR 50.72 reports, enforcement actions, nonconformance reports, technical specifications operability determinations, maintenance work requests, and adverse test results of recurrent test failures. Emphasize the adequacy of root-cause evaluations.

2.2.8.3 Compare the results of the team's assessment of the areas inspected for the SWS with the results of applicable licensee quality verification activities in the same are (i.e. operations, maintenance, surveillance and testing, engineering design, and design control). Determine why the licensee's quality verification activities did not uncover significant issues identified by the team.

2.2.8.4 Review the timeliness and technical adequacy of licensee resolution of findings from its self-assessments. Review the open item tracking system items pertaining to the SWS for adequate tracking and closure of identified deficiencies.

2.2.8.5 Evaluate the interface between engineering and technical support (E&TS) and plant operations, regarding corrective actions to resolve operational problems.

ATTACHMENT 1

DESIGN BASIS DOCUMENT SOURCES

1. Design criteria documentation

2. SARs (including question responses)

3. Topical reports (including utility and NRC reports)

4. Other licensing reports; e.g.,

   a. Fire protection report
   b. High Energy Line Break Analysis (HELBA) report
   c. NRC Bulletins, Notices, Orders, and Generic Letter Responses

5. Architect Engineer system documents

6. Plant technical specifications

7. Plant drawings; e.g.,

   a. P&IDs (including notes)
   b. Single-line diagrams
   c. Logic diagrams
   d. Elementary diagrams

8. Major calculations; e.g.,

   a. Piping pressure drop
   b. Pipe stress
   c. Pump flow/head
   d. Heat Exchanger Heat Transfer
   e. Electrical load sequencing
   f. Breaker coordination

9. Major equipment specifications

10. Plant/system operating procedures (including EOPs)

11. Major equipment vendor drawings

12. Applicable industry standards

13. Correspondence files; e.g.,

   a. NRC
   b. NSSS supplier
   c. Other major equipment suppliers
   d. Internal interdiscipline
   e. Architect Engineer

14. 10CF50.59 - Safety Evaluations

15. JCOs - Justification for Continued Operation for Pumps and Valves

16. Service Water System Design Basis Document

SERVICE WATER SYSTEM

OPERATIONAL PERFORMANCE INSPECTION

(SWSOPI)

TECHNICAL REVIEW PLAN

OPERATIONS

PROJECT - GRAND GULF NUCLEAR STATION

TRP COMPLETE _____ _____
PROJECT LEAD DATE

TRP ACCEPTED _____ _____
PROJECT MANAGER DATE

OPERATIONS TECHNICAL REVIEW PLAN

1.0 INTRODUCTION

The purpose of this Technical Review Plan (TRP) is to provide review guidelines for the Operations area. This review will assess the operational readiness of the system as well as its ability to accomplish its design functions. The TRP in no way restricts the reviewer from pursuing other related areas which may not be identified herein.

Through the implementation of the TRP, particular emphasis will be placed on operations-specific activities versus programmatic operations issues. Particular emphasis will be placed upon the review of any outstanding generic issues or problems which have been recently identified.

Section 2.0 identifies the major areas of review and, in several cases, specific items which will be addressed in the review.

2.0 KEY REVIEW AREAS

This portion of the review will focus on the following primary review areas:

2.1 System Operation

2.2 Instrumentation and Controls

2.3 Human Factors

2.4 Operator Training

2.5 Normal, Abnormal, and Emergency Operating Procedures

2.6 System Testing

The review will be based on three (3) primary sources of input:

- Plant walkdowns
- Interviews with personnel
- Review of plant documentation

Specifically, interviews will be conducted with equipment operators; shift supervisors; other engineers on the operations staff; and managers in the operations, engineering, maintenance, quality assurance, and training areas. Interviews will also be conducted with various individuals knowledgeable of the system design, operation, surveillance, testing, procedures, and modifications.

All document reviews, personnel interviews, and plant walkdowns shall be documented on Form 89-001-Service Water System Operational Performance Inspection Document Critique Form; 89-002-Service Water System Operational Performance Inspection Interview Record; or 89-003-Service Water System Operational Performance Inspection Walkdown Record. The use of these forms will help in ensuring all aspects of the inspection are completed and will be available to reference should questions arise at a later date.

2.1 System Operation

The system operation will be reviewed by observing and evaluating the system operating characteristics, routine evolutions, and component operability for potential adverse impact on safety functionality. The systems Incident Reports, LERs, and Deficiency Reports will be reviewed for insight into past performance and any potential common problem areas. Interviews with equipment operators and shift supervisors shall also provide insight into recurring problems, as well as, problems which have existed for extended periods.

2.1.1 Perform an in-depth system walkdown. Review the SWS configuration for consistency with design drawings. (Generic Letter 89-13, Action IV) Detailed system walkdowns will be performed to observe the system lineup, to assess equipment functionality, and to determine overall material conditions. The

objectives of these walkdowns are listed below:

· Verify P&ID and applicable System isometric accuracy.

• Verify component accessibility and maintainability.

• Identify potential problems associated with System operability under postulated abnormal conditions.

• Identify the material condition of system components.

2.1.2 The System Operating Procedures shall be reviewed for useability, clarity, and determination if sufficient guidance is given for operating the system. The evaluation should ensure that satisfactory system operation isn't a result of experienced operators.

2.1.3 Review the proper implementation of procedures for verifying periodic and post-maintenance alignments of valves in the SWS especially those valves that isolate flow to safety-related components. Verify that required accident condition flow is not degraded during normal system operation valve alignments. Review the method used to verify proper SWS throttle valve position. Review control of SWS heat exchanger flow variations due to changing climate (temperature) conditions.

2.1.4 Walkthrough the system operating procedures and the system piping and instrument diagrams with engineering and operations staff, as appropriate. Consider using the plant simulator for this walk through. Verify the procedures can be performed and that components and equipment are accessible for normal and emergency operation. If any special equipment is required to perform these procedures, determine if the equipment is available and in good working order. Verify that the operators' knowledge of equipment location and operation is adequate. (Generic Letter 89-13, Action V)

2.1.5 Interview the operators to determine the adequacy of their technical knowledge of such items as the operation of the system, its role in accident mitigation, technical specification surveillance requirements, and determination of operability. (Generic Letter 89-13, Action V)

2.1.6 Review the local operation of equipment. Determine if the indication available to operate the equipment is in accordance with applicable operating procedures and instructions. Verify that the environmental conditions, such as expected room temperature, emergency lighting, and steam, assumed under accident conditions are adequate for remote operation of equipment.

2.1.7 Assess operational controls for traveling screens and circulating water pumps to preclude excessive drawdown of the intake bay, with associated loss of SWS pump suction head, as a result of clogging the traveling screens.

2.2 Instrumentation and Controls

The reviewer will evaluate the systems Instrumentation and Control (I&C) from an operational perspective. Specific review areas are as follows:

• Adequacy of I&C to support the control room operators during normal, abnormal, and emergency conditions

• Potential adverse interaction of protective instrumentation with system operation

• Instrument setpoint selection

• Excessive system challenges or actuation due to system interlocks of setpoints

• Ability to override protective instrumentation permissives and interlocks

This review will determine if setpoints are adequately selected (e.g., far enough from operating points to avoid spurious actions). Additionally, the reviewer will determine if the system has been challenged an inordinate number of times from spurious signals.

Again, the reviewer will gain insight into potential I&C problems via review of Trouble, Incident, and Licensee Event Reports and interview with operators.

2.3 Human Factors

The reviewer will perform an evaluation of the ease of operation of the systems. The review will include the following:

• Control room layout relative to the ease of system operation as well as the potential for an operator error.

• Equipment layout in terms of correcting off normal conditions; start-up and shut-down of system, both local and remote, and gaining access to critical valves which may be locked or failed

• Control room instrumentation necessary to assess an off normal condition accurately and expeditiously

• Equipment layout, control room instrumentation availability, and procedural direction given should critical components become unavailable

2.4 Operator Training

Lesson plans and other training materials associated with the system will be reviewed to assess the following:

• The manner of presenting the material (e.g., is it clear and concise?)

• The accuracy of the lesson plans and materials compared to the as-built configuration. Focus on the technical completeness and accuracy of the training material and lesson plans.

• The manner in which design changes are factored into training materials and the manner in which the materials are updated (e.g., is updating done in a timely fashion?)

• Do plant operators understand the potential consequences of a degraded system?

• Do plant operators know how to respond to the loss of portions or the complete system? Are the emergency operating procedures for such events adequate?

• Are plant operators aware of the potential for simultaneous or common mode failure of redundant safety-related equipment within the system?

2.5 Normal, Abnormal, and Emergency Operating Procedures

The reviewer will perform an evaluation of the systems Normal, Abnormal, and Emergency Operating Procedures. Also, a review of the Alarm Response Procedures associated with the system will be conducted. The reviewer will walkdown the procedures to ensure overall correctness and clarity of direction. He will also conduct operator interviews. The review will include the following:

• Technical correctness of the operating procedures including consistency of setpoint and instrumentation information, consistency with other plant documentation, and consistency with the installed plant equipment

• Control of procedural revisions

• Equipment and system layout for potential human factors related interfaces

• Technical correctness and clarity of Alarm Response Procedures

1. Accessibility/labelling
2. Use of operator aids, posting, tools, help, etc.
3. Effective tagging process
4. HP/security interface
5. Ease of manipulations
6. Local displays

• Ability of plant communication systems to support systems operations

The reviewer will gain insight into potential problems via review of Licensee Event Reports and discussions with plant operational personnel.

2.6 System Testing

The reviewer will examine surveillance tests and/or reports to determine if the system has been operated without malfunction (adequate system response times, pressure, and stored air reserves). Additionally, surveillance tests will be reviewed to ensure that the tests accurately and completely satisfy the technical specifications requirements.

2.6.1 Review and evaluate the technical adequacy and accuracy of the technical specification surveillance procedures and inservice test procedures performed in the past two operating cycles (minimum of 2 years) for the SWS. Coordinate the review with the mechanical systems design inspector to ensure design assumptions on system performance are satisfactorily demonstrated by the test methodology.

2.6.2 Review the SWS design and licensing basis. Verify that test acceptance criteria are consistent with the design basis to ensure the SWS testing adequately demonstrates that the SWS will operate as designed. Review indicators of SWS system performance (such as overall system unavailability or recurring problems) to identify if testing frequency is appropriate. Determine if surveillance test procedures comprehensively address required SWS responses.

2.6.3 Review results from preoperational testing to determine whether the SWS capabilities and limitations were appropriately demonstrated. Determine whether appropriate controls were estanlished to avoid unacceptable system or component operating regimes such as limiting valve travel to avoid pump runout conditions.

2.6.4 Evaluate the support systems and plant modifications selected for review by the engineering team to ensure that surveillance and testing has been properly performed.

2.6.5 Review the inservice test records for pump and valves in the SWS with emphasis on the technical adequacy of the procedures, trending of the test results and recurrent failures. Review the IST program for completeness.

2.6.6 Review how specific SWS instruments are calibrated and tested, how valve stroke time testing is performed, and how and where temporary test equipment is installed to verify compliance with technical specification operability requirements. Verify the tolerance used for instruments accuracy is acceptable.

2.6.7 If possible, witness post-maintenance, surveillance, and inservice tests performed on the SWS.

2.6.8 Review procedures for periodic testing of safety-related heat exchanger heat transfer capability and the trending of such results. Inform the mechanical systems inspector of unusual data trends or apparent procedural inadequacies (Generic Letter 89-13, Action II).

2.6.9 For the two previous operating cycles (2 year minimum) preceding the inspection, ascertain the system train, pumps, or significant component unavailability during power and shutdown conditions. Compare the actual unavailability data to that assumed by the Individual Plant Examination (IPE). Assess the degree to which the licensee has input accurate unavailability data into the IPE.

2.6.10 Verify that the installed SWS components are tested to ensure the components will perform in accordance with their design bases. Coordinate the review with the mechanical design inspector (Generic Letter 89-13, Action IV).

2.6.11 Review the periodic inspection implementation program to detect flow blockage from biofouling in other systems. This includes the fire protection system that uses the same source of water as the SWS (Generic Letter 89-13, Action I).

2.6.12 Review testing on one air-to-water heat exchanger served by the SWS to ensure proper heat transfer. Examine the air side for fouling.

2.7 Quality Assurance and Corrective Actions

The reviewer will examine various previous reports, Plant Review Meeting notes, etc to assure identification of problems and adequate response by management to critical issues.

2.7.1 Review meeting minutes of the Plant Review Committee for items relating to the Service Water System. Inform design inspectors of any unusual operability determinations.

2.7.2 Review operational history of the Service Water System, including LERs, NPRDS reports, 10 CFR 50.72 reports, enforcement actions, nonconformance reports technical specification operability determinations, adverse test results or recurrent failures. Place special emphasis on Root Cause Evaluations.

2.7.3 Compare results of the teams findings with any from the plants verification activities. Determine why the licensee's QA program did not identify or uncover any significant issues identified by the team.

2.7.4 Review the timeliness and technical adequacy of the plants resolution of items from its self-assessments. Review the open item tracking system items pertaining to the Service Water system for adequate tracking and closure of identified deficiencies.

2.7.5 Evaluate the interface between engineering and technical support and plant operations, regarding corrective actions to resolve operational problems.

Attachment 3

to

GNRO-94/00122

Request for a Reduced-Scope Service Water System
Operational Performance Inspection

Resumes

ROBERT T. STANLEY

CYGNA ENERGY SERVICES

A Division of General Physics Corporation

EDUCATION:

1968 B.S., Mechanical Engineering, Pratt Institute

PROFESSIONAL REGISTRATION:

Professional Engineer, New Jersey

EXPERIENCE:

Mr. Stanley is the Mechanical Engineering Group Director in Cygna's Design Department. In this capacity he is responsible for all technical aspects, procedures, schedule, budget and client interface on all projects under his direction. He has over 25 years of experience in mechanical and systems engineering and design. He has worked on both fossil and nuclear fueled plants.

He performed a review of the testing aspects of the Service Water System at the Palisades Nuclear Plant. Tests reviewed included the IST pump and valve testing as well as the surveillance flow balance testing. A major portion of this review concerned the Post LOCA heat transfer Design Basis calculation and its confirmation by the surveillance test. Other tests which were reviewed were for the Containment Coolers, Control Room Chillers, etc. This review assisted Consumers Power prepare for the Service Water System Operational Performance Inspection (SWOPI), subsequently conducted by the NRC.

He completed an SSFI at AEP's D. C. Cook plant on the Component Cooling Water System, where he was the lead Mechanical reviewer. The Service Water System support functions were also reviewed as they related to the ultimate heat sink requirements. The review included examination of the Generic Letter 89-13 commitments made by AEP. The heat transfer Design Basis calculation of the heat loads transferred from Component Cooling to Service Water for post LOCA recirculation requirements was reviewed. Recommendations were made to improve the margin for the ultimate heat sink analysis.

He completed a review of the Chilled Water, Essential Cooling Water and Ventilation Systems for Houston Light and Power's South Texas Project. This was an SSFI type vertical slice review to determine whether there were any design deficiencies, operations or maintenance concerns, or training inadequacies relating to the three systems especially during cold weather periods.

Prior to this he was part of the Program to Assure Completion and Assure Quality (PAC/AQ) at TVA's Watts Bar Nuclear Plant. He was the Lead Mechanical Review Engineer for the project which included SSFI reviews of the Component Cooling System, Emergency Raw Water Cooling System, 6.9 kV Shutdown Board Room Ventilation System, and the Instrument Air System.

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He previously was the lead Mechanical Project Engineer for the Salt Service Water Pipe Replacement Project at Boston Edison's Pilgrim Plant. The 22" SSW headers between the Intake Structure and the Reactor Building were rubber lined carbon steel headers and were replaced with Titanium pipe. He developed the material specifications and the Commercial Grade Item dedication plans for both the piping and the rubber expansion joints used for the project. He also developed the installation instructions used in the modification package.

Mr. Stanley was a team member on eleven Safety System Functional Inspections. Seven were on the Service Water System, Safety Injection System, Auxiliary Feedwater, Chemical Volume Control System, Primary Coolant System, Control Rod Drive Mechanisms and the Diesel Engine Mechanical System at the Palisades Plant, one was for an overall assessment of the Design Process at the D.C. Cook Plant, and the three were at Watts Bar for the ERCW system (a service water system), Instrument Air and the 6.9 kV Shutdown Board Room Ventilation System.

He was a reviewer for CP&L at the Harris Plant for an Appendix R Fire Protection audit. He was responsible for review of the Safe Shutdown Analysis and its implementation at the plant as well as general Fire Protection items.

Mr. Stanley conducted an EPRI Study "Assessment of the Effectiveness of ASME Section XI Pump and Valve Surveillance Test Methods in Detecting Component Degradation." This study involved the pump and valve testing within the scope of ASME Section XI Inservice Testing Programs. It assessed the valve stroke testing, check valve forward and reverse flow testing, leak testing, check valve exercise testing and the various valve diagnostic test equipment available for evaluating motor operated valves.

Prior to that he was assigned to a special Motor Operated Valve Task Group at CP&L's Brunswick Steam Electric Plant There he performed a valve suitability/ application study of various problem valves and also performed analysis for thrust and torque for numerous Motor Operated Valves.

He was a writer and reviewer on the San Onofre 1 FSAR Project. He had primary writing responsibilities for the Chapter 9 systems sections and was a reviewer for the Chapter 4 NSSS systems.

Prior to joining Cygna, Mr. Stanley was employed by the Public Service Electric and Gas Company, where he was Manager Systems Engineering. He was responsible for the engineering for modification packages and the engineering for responses to Nuclear Regulatory issues, such as Appendix R, EQ, Generic Letters, IE Bulletins, plant identified safety concerns, etc. He was the PSE&G representative at the Westinghouse Owners Group.

He was on site at Salem for the Construction and startup of the two units. He was the Chairman of the Pre-Operational Review Committee for the Unit 2 Startup Program.

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DONALD E. KOSACK

EDUCATION:

1972 B.E., Chemical Engineering, Stevens Institute of Technology

PROFESSIONAL REGISTRATIONS:

Licensed Professional Engineer, CA

EXPERIENCE:

Mr. Kosack is the Group Director of the Corporate I&C/Electrical Design Engineering Department. He has over 22 years of engineering, design, licensing, operations, and project management experience. He is currently managing CYGNA's project to prepare instrument setpoint evaluations to ensure optimum plant performance for Rochester Gas and Electric's Ginna Station, and previously managed our efforts on Instrument Setpoint Programs for Boston Edison's Pilgrim Station and New York Power Authority's FitzPatrick Plant. Additionally, he is currently managing the Motor Control Center Component Upgrade project being performed for Boston Edison and the Electrical Penetration Replacement Project for Carolina Power & Light Company.

Mr. Kosack has served as Project Engineer responsible for the overall direction of engineering for modifications performed to improve plant performance. He has been involved with projects which included station pneumatic systems, process fluid systems, electrical distribution systems, design basis reconstruction, evaluation of system performance, and has provided consulting services to confirm the adequacy of pre-operational test procedures.

He was a member of the Electrical Distribution System Inspection team at the Salem Generating Station, Units 1 & 2. He reviewed the plant design adequacy and audited the operation and maintenance programs, as well as the design modification process. The Electrical System review included the 500 kV switchyard, the 4 kV distribution system, the 480 volt distribution system, and the diesel generators.

Mr. Kosack has also been a reviewer for the last four years on the Palisades Nuclear Power Plant Design Confirmation team for Consumers Power. The project consists of a third party review of the Design Basis Documents (DBDs) against the design and physical plant configuration. Design, operations, maintenance, and training programs associated with the Electrical Distribution System, Diesel Generators and supporting Auxiliary Systems, Safety Injection System, Reactor Protection System, Feedwater System, and Main Coolant System were reviewed to assure the design basis information was carried through to all facets of plant operation.

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For the Pacific Bell Northern California Data Center, Mr. Kosack was the lead I&C/Electrical assessor performing an independent third party review to ensure the facility was engineered and designed in accordance with the owner's project specifications. In a similar task for an independent power producing plant in Rhode Island, he performed various assessments of the electrical distribution system, as well as the fire detection and protection systems.

In addition to performing these tasks, he has provided support services to Boston Edison. In this capacity, he has developed and reviewed plant design change packages, resolved field construction problems, and provided various consulting services. Prior to joining Cygna, Mr. Kosack was employed by Stone & Webster Engineering Corporation, with work assignments performed in the following areas:

NORTHEAST UTILITIES SERVICE COMPANY

As Principal Instrument Application Engineer, Mr. Kosack was responsible for the direction and overall coordination of the Instrument Application Group activities with the project. These activities included the design and engineering effort of the headquarters group, as well as the on-site activities of the I&C field engineering group. He was also responsible for the interface between I&C construction and the I&C engineering group.

His responsibilities included scheduling and manpower planning; coordination of the workscopes with other principal engineers; review and approval of loop diagrams, logic diagrams, flow diagrams, specifications, and field engineering coordination.

YANKEE ROWE POWER STATION - YANKEE ATOMIC ELECTRIC COMPANY

Assigned as a Consultant to Yankee Atomic Electric Company, working in the Instrument and Control and Electrical Engineering disciplines for the Yankee Rowe Plant.
His major activities in the I&C discipline included engineering reviews of Design Change Packages, preparation of Design Change Packages to modify the Main Control Room Panels to resolve Human Engineering Deficiencies, performed instrument loop error analysis calculations, prepared and reviewed plant performance packages, and prepared various equipment purchase specifications.

His major activities in the electrical discipline included performing electrical load studies, engineering review of design change packages, and preparation and review of various electrical specifications and calculations.

Field assistance for outage support and in troubleshooting operations, was also provided for both engineering disciplines.

JEFFREY S. HAVERLY

CYGNA ENERGY SERVICES
A Division of General Physics Corporation

EDUCATION:

B.S., Marine Engineering, SUNY Maritime College, FT Schuyler, Bronx NY, 1974,
Regimental Commander, Chief Engineer
Graduate Studies in Business Administration and Nuclear Engineering, Union College, 1976,1977

PROFESSIONAL REGISTRATION:

Engineer in Training, New York State
Second Assistant Engineer's License, USCG, Steam Engines, Unlimited Horsepower
Third Assistant Engineer's License, USCG, Diesel Engines, Unlimited Horsepower

Training Courses

Kepnor Tregoe Operations Management Training, 1977
Kepnor Tregoe Decision Making Training, 1977
USCG Fire Academy, 1974

PROFESSIONAL AFFILIATIONS:

Member, American Nuclear Society, Power and Operations Divisions

EXPERIENCE:

Mr. Haverly has over twenty (20) years of experience in the operations, maintenance, and engineering disciplines of DOE facility, commercial nuclear, fossil, and marine power plants. He has an extensive background as the Engineer in charge of operations at nuclear and shipboard marine power plants as well as being responsible for the day to day maintenance and long term shutdown, outage and shipyard overhaul programs for both nuclear and shipboard power plants. He has management assessment and compliance program management experience through the performance of safety analysis and management assessment projects for the DOE and the commercial nuclear and fossil power industry.

Mr. Haverly is Group Director within CES's Systems and Operations Services Group. In this role, he has the responsibilities for managing and performing on assigned Operations Services related projects. Currently, he is the Project Manager on the Reliability, Availability, Maintainability (RAM) Program Assessment Project for the DOE Strategic Petroleum Reserve. This project involves the assessment of all technical processes, inputs and outputs and technical reports related to the RAM Program. Prior to this project, he has completed an assignment as Project Engineer on two Management Assessment Projects for the Strategic

Petroleum Reserve. The projects' scopes include the assessment of compliance of particular SPR field operations to DOE Orders 5480.19, "Conduct of Operations" and 4330.4A, "Maintenance Management Program". Mr. Haverly developed and implemented detailed assessment plans and was a lead team member in the performance of the assessments. The scope of these assessments included the analysis and assessment of DOE Order compliance by the M&O contractor, and included the evaluation of Tiger Team, DOE Headquarter's, and internal assessment corrective action status.

Mr. Haverly was assigned to Cygna's Project Management Group. Within the Project Management Group, Mr. Haverly was responsible for the management of and participation in assigned projects, as well as responding to individual client project management needs.

From March 1987 through December 1991, Mr. Haverly was assigned as Vice President and Area Office Manager of Cygna's Midwest Office in Toledo, Ohio. In this capacity, he was responsible for office and project administration, project controls and technical adequacy, project and design quality assurance. Under Mr. Haverly's direction, the office was established and grew to a multi-disciplined engineering office with a staff of over 60 engineers and technicians. Office disciplines included all operations and systems engineering, design engineering, and power plant licensing and support services and personnel. The operations support and design engineering staff performed an extensive number of power plant and design modification projects as well as providing unique engineering solutions in areas such as; plant as-built validation projects, configuration management, fire protection and regulatory assessment projects.

In addition to his corporate and office management responsibilities, he has participated in various management assessment programs throughout the industry. The reviews have consisted of assessments including; Electric Power Research Institute sponsored design and modification control project, spare parts program assessments, fossil plant design validation and code compliance upgrade assessments, safety analyses and safety-related system design reviews, and performance based functional inspections throughout the utility industry.

The following is a sample of the Design Process Assessments and Safety System Functional Inspections in which he performed:

- Consumers Power Company, 1990 through 1991, performed as Lead Design and Maintenance Reviewer during Design Basis Document Validation Assessments at the Palisades Nuclear Power Plant on the Service Water and High Pressure Safety Injection and Auxiliary Feedwater System

- Public Service Electric & Gas Company, 1988 through 1990, Performed on the following:
  - Lead Maintenance Reviewer, Instrument Air System, Salem Nuclear Power Station

- Support Engineer, Design Reviewer, Site Service Water, Salem Nuclear Power Station
- Support Engineer, Design Reviewer, Air Systems, Hope Creek Nuclear Power Station

- Rochester Gas & Electric Company, 1987, performed as Project Engineer and Lead Maintenance reviewer during the full scope SSFI of the R.E. Ginna Westinghouse Plant's Main Auxiliary Feedwater System.

- Consolidated Edison Company, 1991, Performed as Support Engineer for Design aspects during the SSFI at the Indian Point Unit 2 Nuclear Power Station.

- Performed as support engineer on the EPRI Modification and Design Control Project. The objective of the review was to review the modification and design control process at a sampling of utilities across the commercial nuclear industry, and to identify generic issues and problems requiring attention, as well as to identify root causes of those problems with corrective actions identified.

Mr. Haverly participated in many technical projects as Project Manager, Project Engineer, as well as Technical Specialist. A sampling of these projects include:

- Facility Change Request Closeout Project
- Plant As-built Configuration Reconciliation Project
- Plant Security System Backfit Project
- Station Blackout Diesel Design Project
- Design Basis Document Development Projects (2)
- Steam Generator Blowdown System Design Validation Project
- HVAC Damper Controller Design Analysis
- Fire Suppression System Design Modifications
- Fire Damper Design Modifications
- Fire Barrier Penetration Seal Configuration Projects
- Fire Risk Assessments and Fire Hazards Analyses
- Safety System Functional Inspections
- Many additional design change notice (DCN) packages for Nuclear and Fossil Power Plants

Mr. Haverly, from September 1985 through July 1987, completed an assignment as Fire Protection Compliance Manager at Toledo Edison Company's Davis-Besse Nuclear Power Station. In this position, he was responsible for directing all fire protection day-to-day activities as well as the management of the plant restart and FP Design Reconstitution Program. This program was implemented and managed while ensuring continued technical specification

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compliance.

Prior to this Mr. Haverly was with Impell Corporation, as Senior Engineer and Supervising Engineer, completed assignments of increasing responsibility as project engineer and project manager in the Operations Services and Engineering Group. He performed as project engineer on a multi-year Electrical Environmental Qualification Project. He was support engineer on Fire Hazards Analysis Projects. He performed high energy line break analysis. He completed a two-year assignment as Supervising Licensing Engineer, responsible for major projects in Fire Protection, Appendix R, and Generic Letter 83-28. He was responsible for coordinating NRC interface activities and interfacing with all utility divisions to develop NRC positions and correspondence.

Before this he worked as a Third Assistant Engineer and following license upgrade, as the Second Assistant Engineer on a number of ships in the United States Merchant Marine. In this capacity, Mr. Haverly performed operations watch officer duties on shipboard power plants, including the operations of all power plant systems on power plants on ships up to 30,000 shaft horsepower and 165,000 dead-wight tons. Mr. Haverly performed extensively as maintenance engineer in support of daily power plant and ship equipment maintenance, plant outages and long term lay-up and shipyard periods. As Second Engineer, Mr. Haverly was responsible for the maintenance of all boiler and feedwater, and related systems.

Prior to this following a one (1) year training program in the Naval Nuclear Operations Training Program, resulting in the qualification as Engineering Officer of the Watch, Mr. Haverly progressed in positions of increasing responsibility through staff Operations Engineer, Nuclear Plant Engineer for Training, and Nuclear Plant Engineer for Operations at the D1G Nuclear Prototype Plant. As a qualified Engineering Officer of the Watch, Mr. Haverly was responsible for safe on-shift operation, maintenance and training at the prototype. He was also responsible for certain aspects of classroom training and off-hull equipment operations and maintenance. Mr. Haverly led his class during qualification as Engineering Officer of the Watch, and performed as lead civilian EOOW during critical plant operations.

JAMES M. OLSON

CYGNA ENERGY SERVICES
A Division of General Physics Corporation

EDUCATION:

1977 B.S., Marine Engineering, Massachusetts Maritime Academy

SPECIALTIES:

Controls Systems
Nuclear Steam Supply Systems
Systems Application & Design
Engineering/Construction/Operation
Independent Audit Activities

PROFESSIONAL AFFILIATIONS:

Member: Instrument Society of America

EXPERIENCE

Mr. Olson is a Principal Engineer in the I&C Group at Cygna Energy Services' Boston office. In this field, he offers more than 17 years of broad based experience in the design, application, and operation of Instrumentation and Control systems in the Power Generation Industry. He has diverse experience in both office and field locations. This experience includes both conceptual and site engineering, SSFI and station licensing activities, construction, outage and operation support. While working in the power industry, Mr. Olson has been assigned to various nuclear and fossil projects, including Beaver Valley Units 1 & 2, River Bend, Pilgrim, Watts Bar, Rocky Flats (DOE Facility), H.B. Robinson, Brunswick, R.E. Ginna, Dresdon, Quad Cities, D.C. Cook, and Oswego Unit 5.

He is experienced in the design, repair and modification of power plant instrumentation systems and associated equipment including the preparation of specifications, scopes of work, cost and material estimates, and equipment installation procedures. He has directly supervised activities of contractor engineering and construction personnel during the modification and installation of plant equipment.

Additionally he has been involved in various programs such as performing Safety System Functional Inspections as the Lead I&C reviewer (Electrical Distribution, Auxiliary Feedwater, Emergency Diesel Generator, Service Water, Component Cooling Water, Quench Spray, Residual Heat Removal, Recirculating Spray), performing fire protection safe shutdown reviews, and performing failure mode and effects analysis reviews on numerous modifications impacting Instrumentation and Controls.

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Presently, Mr. Olson is the senior lead engineer on the instrument loop evaluation program for the on-going Rochester Gas & Electric setpoint project. At Boston Edison he participated in the NRC Setpoint Program Audit by assisting in the preparation of selected instrument error analysis calculations. Also at Boston Edison he has developed and reviewed plant design change packages, resolved field construction problems including troubleshooting of circuits, and provided various consulting services. Prior to joining Cygna, Mr. Olson was employed by Stone & Webster Engineering Corporation.

He also has worked in various control logic and instrument applications groups, where he developed process instrumentation equipment sizing calculations for systems application and integration, in addition to preparing engineering and design modifications of control circuit logic, wiring modifications of various vendor supplied equipment packages, and technical support to start-up and construction personnel. Prior to this he spent two years at sea as an Engineering Officer.

Recent Experience Highlights:

- **Robert Emmet Ginna Nuclear Power Station**
  Currently, he is the senior lead engineer on the instrument loop evaluation program for the on-going Rochester Gas & Electric setpoint project. This consists of both the preparation and review of instrument error analysis calculations on RG&E selected instrument loops. Additionally, as part of this effort he assisted in the development of both the methodology and procedure for the preparation of instrument error analysis calculations utilizing the guidelines provided in both ISA Standard S67.04 and NRC Regulatory Guide 1.105.

- **Brunswick Nuclear Power Station, CP&L**
  Provided both electrical and I&C support for the development of modification packages associated with the station corrosion betterment project. This project consisted of replacing/relocating selected instrumentation and the replacement of various conduits to protect the associated systems from the effects of corrosion.

- **Pilgrim Nuclear Power Station**
  Acted as project engineer and also provided engineering support for long term plans associated with selected system betterment projects, abandoned equipment, G.L. 89-10 MOV MCC cubicle replacements and instrument air system upgrades. Also, he has provided onsite engineering support during the last three station outages. In one of his assignments, Mr. Olson prepared instrument setpoint and loop uncertainty calculations in preparation of the NRC audit on the Pilgrim setpoint program.

- **Watts Bar Nuclear Power Station**
  I&C and Electrical review team leader for a prototype program to assess completion and assess quality for TVA. This program was developed to provide assurance to the NRC that the recovery programs instituted by TVA at Watts Bar have been satisfactorily incorporated into the applicable procedures, design documents and that all related field deficiencies have been properly addressed and resolved.

- **Beaver Valley Power Station - Unit 1**
  Team member of an EDSSFI, performing an in-depth review of the plants Electrical Distribution System to verify both compliance and operability to Regulatory and Industry standards.

- **H.B. Robinson Nuclear Power Plant**
  Prepared specifications for the purchase of both electrical penetrations and cable associated with the electrical penetration replacement project. He also assisted in the development of a data base which was utilized to identify all affected penetrations, cables and components.

- **Beaver Valley Power Station - Units 1 and 2**
  As the Site Lead Controls Engineer, he was responsible for the overall coordination of the on-site I&C effort for the project. His responsibilities included scheduling and manpower planning, coordination of effort with both other disciplines and the client, and for the incorporation, review and approval of all engineering drawings and documents associated with the I&C Group. Additionally, he was involved with various programs such as performing Safety System Functional Inspections, setpoint calculations, performing fire protection safe shutdown reviews for all changes impacting I&C, performing failure modes and effects analyses reviews on all I&C related modifications, and assisted in resolving problems associated with I&C to support the construction, startup, and testing groups.

  Previous to the above assignment he was a Site Engineer and was the responsible I&C Engineer for the nuclear steam supply and interfacing systems (NSSS). He also directly supervised contractor engineering and construction personnel regarding the repair, modification and installation of plant equipment. He also developed process instrumentation equipment sizing calculations for systems application and integration, in addition to preparing engineering and design modifications of control circuit logic, wiring modifications of various vendor supplied equipment packages, and provided technical support to start-up and construction personnel,in addition to specifying various components to be procured.

ROGER L. PERSONS
Principal Specialist

EDUCATION

B.S. Candidate, Nuclear Engineering, University of Idaho
U.S. Navy Nuclear Power Training Program

LICENSES AND CERTIFICATIONS

Certified NRC Senior Reactor Operator Instructor: River Bend Station

EXPERIENCE
1984 - Present

General Physics Corporation

Mr. Persons is responsible for providing nuclear utility clients: instructor support to develop and present initial and continuing training programs for Shift Technical Advisors, Licensed and Nonlicensed Operators, Management and Engineering Staff; technical support for plant audits and operating procedure maintenance projects. Representative projects include:

- 10CFR50.59 Training, River Bend Station, Gulf States Utilities
  Conducted a three-day 10CFR50.59 Reviewer Course five times in 1994 for plant engineers and procedure writers.

- Prelicensing Audit Exams
  Administered pre-NRC license audit exams for Entergy Operations, Inc., Waterford 3; Boston Edison Company, Pilgrim Unit 1; Philadelphia Electric Company, Limerick Generating Station, Unit 1; and Iowa Electric Light and Power Company, Duane Arnold Energy Center.

- Operator Training, River Bend Station, Gulf States Utilities
  Participated in conducting all aspects of River Bend Station licensed operator initial and requalification training; served as Lead Instructor for all simulator training; supervised and assisted in the development of the NRC requal exam open-reference questions, simulator scenarios and JPMs.

- Operator and STA Training, Perry Nuclear Station, Cleveland Electric Illuminating Company
  Developed and delivered a one-week Transient and Accident Analysis Course to hot license candidates and STAs.
  Developed and delivered a one-week Reactor Engineering Course for Licensed Operator Requal.

ROGER L. PERSONS

- Operator and Tech Staff Training, Waterford 3 Generating Station, Entergy Operations, Inc.
  Revised Reactor Theory and Plant System lesson plans; taught a Management SRO Certification Course; directed a task analysis and job performance measure development project for all INPO accredited programs; managed a System Description Upgrade project.

1974 - 1984 — EG and G Idaho, Inc.
As an Operations Specialist, Mr. Persons was contracted to the U.S. Nuclear Regulatory Commission (NRC) as an Auditor and Operator Examiner. He prepared, administered, and evaluated operator licensing examinations for the NRC at 15 BWRs. Mr. Persons spent a year as a Reactor Safety Engineer. He was responsible for inspecting and auditing all areas of facility operation at three DOE reactor sites. He developed annual Safety Evaluation reports. Mr. Persons also spent three years as a Shift Supervisor at the Power Burst Facility, a DOE owned research reactor at the INEL.

1968 - 1974 — United States Navy
As an Electrician Mate on the USS TRUXTUN, DLGN35, Mr. Persons qualified Engineering Watch Supervisor. He served as a classroom instructor at the A1W Prototype Plant.

References:

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