

1982 Evaluation

**Surry**  
**Power Station**  
Virginia Electric and  
Power Company

*Inspection - December 1982*

**INPO**

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EVALUATION  
of  
SURRY POWER STATION

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Virginia Electric and Power Company

March 1983

## SUMMARY

### INTRODUCTION

The Institute of Nuclear Power Operations (INPO) conducted an evaluation of Virginia Electric and Power Company's (VEPCO) Surry Power Station during the weeks of November 29 and December 6, 1982. The station is located on the south bank of the James River on a point of land called Gravel Neck in Surry County, Virginia, and has two 775-Mwe (net) Westinghouse pressurized water reactors. Unit 1 began commercial operation in 1972 and Unit 2 in 1973.

### PURPOSE AND SCOPE

INPO conducted an evaluation of site activities to make an overall determination of plant safety, to evaluate management systems and controls, and to identify areas needing improvement. Information was assembled from discussions, interviews, observations, and reviews of documentation.

The INPO evaluation team examined station organization and administration, operations, maintenance, technical support, training and qualification, radiological protection, and chemistry. The team also observed the actual performance of selected evolutions and surveillance testing. As a basis for the evaluation, INPO used performance objectives and criteria relevant to each of the areas examined; these were applied and evaluated in light of the experience of team members, INPO's observations, and good practices within the industry.

INPO's goal is to assist member utilities in achieving the highest standards of excellence in nuclear plant operation. The recommendations in each area are based on best practices, rather than minimum acceptable standards or requirements. Accordingly, areas where improvements are recommended are not necessarily indicative of unsatisfactory performance.

### DETERMINATION

- In each of the areas evaluated, INPO has established PERFORMANCE OBJECTIVES and supporting criteria. All PERFORMANCE OBJECTIVES reviewed during the course of this evaluation are listed in APPENDIX II.

Findings and recommendations are listed under the PERFORMANCE OBJECTIVES to which they pertain. Particularly noteworthy conditions that contribute to meeting PERFORMANCE OBJECTIVES are identified as Good Practices. Other findings describe conditions that detract from meeting the PERFORMANCE OBJECTIVES. It would not be productive to list as Good Practices those things that are commonly done properly in the industry since this would be of no benefit to VEPCO or to INPO's other member utilities. As a result, most of the findings highlight conditions that need improvement.

The recommendations following each finding are intended to assist the utility in ongoing efforts to improve all aspects of its nuclear programs. In addressing these findings and recommendations, the utility should, in addition to correcting or improving specific conditions, pursue underlying causes and issues.

The evaluation staff appreciates the cooperation received from all levels of Virginia Electric and Power Company.

**VIRGINIA ELECTRIC & POWER COMPANY**

**Response Summary**

The INPO evaluation of Surry Power Station is one of several industrywide appraisals designed to improve the operation of commercial nuclear power stations beyond established regulatory requirements.

VEPCO fully supports this industry effort and the progressive criteria used to make the evaluation.

While the results of this evaluation showed that some areas at the station need improvement, INPO determined that Surry "is being operated in a safe manner by well qualified and experienced personnel."

The INPO findings and improvement recommendations provided insights that will aid VEPCO in improving overall operations of Surry and North Anna.

INPO stated that improvements were recommended in a number of areas. VEPCO plans to make appropriate improvements in these areas and other areas discussed throughout the report.

VEPCO looks forward to the INPO evaluation of both of its nuclear stations in 1983.



ORGANIZATION & ADMINISTRATION

MANAGEMENT ASSESSMENT AND QUALITY PROGRAMS

PERFORMANCE OBJECTIVE: Management should assess station activities to ensure and enhance quality performance of all aspects of nuclear plant operation.

Finding  
(OA.3-1)

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INDUSTRIAL SAFETY

PERFORMANCE OBJECTIVE: Station industrial safety programs should achieve a high degree of personnel safety.

Finding  
(OA.5-1)

Recommendation

Response

Finding  
(OA.5-2)

Recommendation

Response

Finding  
(OA.5-3)

Recommendation

Response



DOCUMENT CONTROL

PERFORMANCE OBJECTIVE: Document control systems should provide correct, readily accessible information to support station requirements.

Finding  
(OA.6-1)

Recommendation

Response

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OPERATIONS

CONDUCT OF OPERATIONS

PERFORMANCE OBJECTIVE: Operational activities should be conducted in a manner that achieves safe and reliable plant operation.

Finding  
(OP.2-1)

Recommendation

Response

Finding  
(OP.2-2)

Recommendation

Response

### PLANT STATUS CONTROLS

**PERFORMANCE OBJECTIVE:** Operational personnel should be cognizant of the status of plant systems and equipment under their control, and should ensure that systems and equipment are controlled in a manner that supports safe and reliable operation.

**Finding**  
(OP.3-1)

**Recommendation**

Response

Finding  
(OP.3-2)

Recommendation

Response

Finding  
(OP.3-3)

Recommendation

Response

Finding  
(OP.3-4)

Recommendation

Response

Finding  
(OP.3-5)

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### OPERATOR KNOWLEDGE AND PERFORMANCE

PERFORMANCE OBJECTIVE: Operator knowledge and performance should support safe and reliable plant operation.

Finding  
(OP.4-1)

Recommendation

Response

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### OPERATIONS PROCEDURES AND DOCUMENTATION

**PERFORMANCE OBJECTIVE:** Operational procedures and documents should provide appropriate direction and should be effectively used to support safe operation of the plant.

**Finding**  
(OP.5-1)

**Recommendation**

**Response**

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### OPERATIONS FACILITIES AND EQUIPMENT

**PERFORMANCE OBJECTIVE:** Operational facilities and equipment should effectively support plant operation.

**Finding**  
(OP.6-1)

**Recommendation**

**Response**

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Finding  
(OP.6-2)

Recommendation

Response

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MAINTENANCE

PLANT MATERIAL CONDITION

PERFORMANCE OBJECTIVE: The material condition of the plant should be maintained to support safe and reliable plant operation.

Finding  
(MA.2-1)

Recommendation

Response

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WORK CONTROL SYSTEM

PERFORMANCE OBJECTIVE: The control of work should ensure that identified maintenance actions are properly completed in a safe, timely, and efficient manner.

Finding  
(MA.3-1)

Recommendation

Response

Finding  
(MA.3-2)

Recommendation

Response

Good Practice  
(MA.3-3)

CONDUCT OF MAINTENANCE

PERFORMANCE OBJECTIVE: Maintenance should be conducted in a manner that ensures efficient and effective plant operation.

Finding  
(MA.4-1)

Recommendation

Response

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TECHNICAL SUPPORT

OPERATING EXPERIENCE REVIEW PROGRAM

PERFORMANCE OBJECTIVE: Industrywide and in-house operating experiences should be evaluated and appropriate actions undertaken to improve plant safety and reliability.



Finding  
(TS.3-1)

Finding  
(TS.3-2)

Recommendation

Response

Finding  
(TS.3-3)

Recommendation

Response

#### PLANT MODIFICATIONS

PERFORMANCE OBJECTIVE: Plant modification programs should ensure proper review, control, implementation, and completion of plant design changes in a safe and timely manner.

Finding  
(TS.4-1)

Recommendation

Response

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#### TECHNICAL SUPPORT PROCEDURES AND DOCUMENTATION

PERFORMANCE OBJECTIVE: Technical support procedures and documents should provide appropriate direction and should be effectively used to support safe operation of the plant.

Finding  
(TS.7-1)

Recommendation

Response

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TRAINING AND QUALIFICATION

TRAINING ORGANIZATION AND ADMINISTRATION

PERFORMANCE OBJECTIVE: The training organization and administrative systems should ensure effective control and implementation of training activities.

Finding  
(TQ.1-1)

Recommendation

Response

NON-LICENSED OPERATOR TRAINING AND QUALIFICATION

PERFORMANCE OBJECTIVE: The non-licensed operator training and qualification program should develop and improve the knowledge and skills necessary to perform assigned job functions.

Finding  
(TQ.2-1)

Recommendation

Response

Finding  
(TQ.2-2)

Recommendation

Response

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#### LICENSED OPERATOR TRAINING AND QUALIFICATION

PERFORMANCE OBJECTIVE: The licensed operator training and qualification program should develop and improve the knowledge and skills necessary to perform assigned job functions.

Finding  
(TQ.3-1)

Recommendation

Response

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MAINTENANCE PERSONNEL TRAINING AND QUALIFICATION

PERFORMANCE OBJECTIVE: The maintenance personnel training and qualification program should develop and improve the knowledge and skills necessary to perform assigned job functions.

Finding  
(TQ.5-1)

Finding  
(TQ.5-2)



Recommendation

Response

Finding  
(TQ.5-3)

Recommendation

Response

TRAINING FACILITIES AND EQUIPMENT

PERFORMANCE OBJECTIVE: The training facilities, equipment, and materials should effectively support training activities.

Finding  
(TQ.8-1)

Recommendation

Response

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RADIOLOGICAL PROTECTION

RADIOLOGICAL PROTECTION ORGANIZATION AND ADMINISTRATION

PERFORMANCE OBJECTIVE: The organization and administrative systems should ensure effective control and implementation of the radiological protection program.

Finding  
(RP.1-1)

Recommendation

Response

Finding  
(RP.1-2)

Recommendation

Response

Finding  
(RP.1-3)

Recommendation

Response

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#### EXTERNAL RADIATION EXPOSURE

PERFORMANCE OBJECTIVE: External radiation exposure controls should minimize personnel radiation exposure.

Finding  
(RP.4-1)

Recommendaiton

Response

Finding  
(RP.4-2)

Recommendation

Response

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### INTERNAL RADIATION EXPOSURE

PERFORMANCE OBJECTIVE: Internal radiation exposure controls should minimize internal exposures.

Finding  
(RP.5-1)

Recommendation

Response

Finding  
(RP.5-2)

Recommendation

Response

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SOLID RADIOACTIVE WASTE

PERFORMANCE OBJECTIVE: Solid radioactive waste controls should minimize the volume of radioactive waste and ensure safe transportation of radioactive material.

Finding  
(RP.7-1)

Recommendation

Response

CHEMISTRY

CHEMISTRY ORGANIZATION AND ADMINISTRATION

PERFORMANCE OBJECTIVE: The organization and administrative systems should ensure effective implementation and control of the chemistry program.

Finding  
(CY.1-1)

Recommendation

Response

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CHEMISTRY PERSONNEL QUALIFICATION

PERFORMANCE OBJECTIVE: The chemistry qualification program should ensure that chemistry personnel have the knowledge and practical abilities necessary to implement chemistry practices effectively.

Finding  
(CY.2-1)

Recommendation

Response

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CHEMISTRY CONTROL

PERFORMANCE OBJECTIVE: Chemistry controls should ensure optimum chemistry conditions during all phases of plant operation.

Finding  
(CY.3-1)

Recommendation

Response

#### LABORATORY ACTIVITIES

PERFORMANCE OBJECTIVE: Laboratory and counting room activities should ensure accurate measuring and reporting of chemistry parameters.

Finding  
(CY.4-1)

Recommendation

Response

Finding  
(CY.4-2)

Recommendation

Response

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CHEMICAL AND LABORATORY SAFETY

PERFORMANCE OBJECTIVE: Work practices associated with chemistry activities should ensure the safety of personnel.

Finding  
(CY.5-1)

Recommendation

Response

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Finding  
(CY.5-2)

Recommendation

Response

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APPENDIX I

Summary of Outstanding Response Action from Previous Evaluation (1981)

OPERATIONS FACILITIES AND EQUIPMENT

Finding  
(OP.2-2)

Recommendation

Response

Status

Finding  
(TS.4-2)

Recommendation

Response



Status

Finding  
(TS.4-3)

Recommendation

Response

Status

## APPENDIX II

### Performance Objectives Reviewed

#### ORGANIZATION AND ADMINISTRATION

##### OA.1 Station Organization and Administration

Station organization and administrative systems should ensure effective implementation and control of station activities.

##### OA.2 Mission, Goals, and Objectives

Station mission, goals, and objectives should be established and progress monitored through a formal program.

##### OA.3.1 Management Assessment

Management should assess and monitor station activities to ensure effective performance of all aspects of nuclear plant operation.

##### OA.3.2 Quality Programs

Quality programs should ensure the effective performance of activities important to nuclear safety.

##### OA.4 Personnel Planning and Qualification

Personnel programs should ensure that station positions are filled by individuals with proper job qualifications.

##### OA.5 Industrial Safety

Station industrial safety programs should achieve a high degree of personnel safety.

##### OA.6 Document Control

Document control systems should provide correct, readily accessible information to support station requirements.

##### OA.7 On-site Nuclear Safety Review Committee

Review of station nuclear activities by a knowledgeable interdisciplinary group should ensure achievement of a high degree of nuclear safety.

## OPERATIONS

### OP.1 Operations Organization and Administration

The operations organization and administrative systems should ensure effective control and implementation of department activities.

### OP.2 Conduct of Operations

Operational activities should be conducted in a manner that achieves safe and reliable plant operation.

### OP.3 Plant Status Controls

Operational personnel should be cognizant of the status of plant systems and equipment under their control, and should ensure that systems and equipment are controlled in a manner that supports safe and reliable operation.

### OP.4 Operations Knowledge and Performance

Operator knowledge and performance should support safe and reliable plant operation.

### OP.5 Operations Procedures and Documentation

Operational procedures and documents should provide appropriate direction and should be effectively used to support safe operation of the plant.

### OP.6 Operations Facilities and Equipment

Operational facilities and equipment should effectively support plant operation.

## MAINTENANCE

### MA.1 Maintenance Organization and Administration

The maintenance organization and administrative systems should ensure effective control and implementation of department activities.

### MA.2 Plant Material Condition

The material condition of the plant should be maintained to support safe and reliable plant operation.

### MA.3 Work Control System

The control of work should ensure that identified maintenance actions are properly completed in a safe, timely, and efficient manner.

MA.4 Conduct of Maintenance

Maintenance should be conducted in a manner that ensures efficient and effective plant operation.

MA.5 Preventive Maintenance

The preventive maintenance programs should contribute to optimum performance and reliability of plant equipment.

MA.6 Maintenance Procedures and Documentation

Maintenance procedures should provide appropriate directions for work and should be used to ensure that maintenance is performed safely and efficiently.

MA.7 Maintenance History

The maintenance history should be used to support maintenance activities and optimize equipment performance.

MA.8 Maintenance Facilities and Equipment

Facilities and equipment should effectively support the performance of maintenance activities.

TECHNICAL SUPPORT

TS.1 Technical Support Organization and Administration

The technical support organization and administrative systems should ensure effective control and implementation of department activities.

TS.2 Surveillance Testing Program

Surveillance inspection and testing activities should provide assurance that equipment important to safe and reliable plant operation will perform within required limits.

TS.3 Operations Experience Review Program

Industrywide and in-house operating experiences should be evaluated and appropriate actions undertaken to improve plant safety and reliability.

TS.4 Plant Modifications

Plant modification programs should ensure proper review, control, implementation, and completion of plant design changes in a safe and timely manner.

TS.5 Reactor Engineering

On-site reactor engineering activities should ensure optimum nuclear reactor operation without compromising design or safety limits.

TS.6 Plant Efficiency and Reliability Monitoring

Performance monitoring activities should optimize plant thermal performance and reliability.

TS.7 Technical Support Procedures and Documentation

Technical support procedures and documents should provide appropriate direction and should be effectively used to support safe operation of the plant.

TRAINING AND QUALIFICATION

TQ.1 Training Organization and Administration

The training organization and administrative systems should ensure effective control and implementation of training activities.

TQ.2 Non-Licensed Operator Training and Qualification

The non-licensed operator training and qualification program should develop and improve the knowledge and skills necessary to perform assigned job functions.

TQ.3 Licensed Operator Training and Qualification

The licensed operator training and qualification program should develop and improve the knowledge and skills necessary to perform assigned job functions.

TQ.4 Shift Technical Advisor Training and Qualification

The shift technical advisor training program should develop and improve the knowledge and skills to perform assigned job functions.

TQ.5 Maintenance Personnel Training and Qualification

The maintenance personnel training and qualification program should develop and improve the knowledge and skills necessary to perform assigned job functions.

TQ.6 Technical Training for Managers and Engineers

The technical training program for engineers and managers should broaden overall knowledge of plant processes and equipment as a supplement to position-specific education and training.

TQ.7 General Employee Training

The general employee training program should develop a broad understanding of employee responsibilities and safe work practices.

TQ.8 Training Facilities and Equipment

The training facilities, equipment, and materials should effectively support training activities.

RADIOLOGICAL PROTECTION

RP.1 Radiological Protection Organization and Administration

The organization and administrative systems should ensure effective control and implementation of the radiological protection program.

RP.2 Radiological Protection Personnel Qualification

The radiological protection qualification program should ensure that radiological protection personnel have the knowledge and practical abilities necessary to effectively implement radiological protection practices.

RP.3 General Employee Training In Radiological Protection

General employee training should ensure that plant personnel, contractors, and visitors have the knowledge and practical abilities necessary to effectively implement radiological protection practices associated with their work.

RP.4 External Radiation Exposure

External radiation exposure controls should minimize personnel radiation exposure.

RP.5 Internal Radiation Exposure

Internal radiation exposure controls should minimize internal exposures.

RP.6 Radioactive Effluents

Radioactive effluent controls should minimize radioactive materials released to the environment.

RP.7 Solid Radioactive Waste

Solid radioactive waste controls should minimize the volume of radioactive waste and ensure safe transportation of radioactive material.



RP.8 Personnel Dosimetry

The personnel dosimetry program should ensure that radiation exposures are accurately determined and recorded.

RP.9 Radioactive Contamination Control

Radioactive contamination controls should minimize the contamination of areas, equipment, and personnel.

CHEMISTRY

CY.1 Chemistry Organization and Administration

The organization and administrative systems should ensure effective implementation and control of the chemistry program.

CY.2 Chemistry Personnel Qualification

The chemistry qualification program should ensure that chemistry personnel have the knowledge and practical abilities necessary to implement chemistry practices effectively.

CY.3 Chemistry Control

Chemistry controls should ensure optimum chemistry conditions during all phases of plant operation.

CY.4 Laboratory Activities

Laboratory and counting room activities should ensure accurate measuring and reporting of chemistry parameters.

CY.5 Chemical and Laboratory Safety

Work practices associated with chemistry activities should ensure the safety of personnel.