

U.S. NUCLEAR REGULATORY COMMISSION

REGION 3

Docket No: 50-341
License No: NPF-43

Report No: 50-341/97010(DRP)

Licensee: Detroit Edison Company (DECo)

Facility: Enrico Fermi, Unit 2

Location: 6400 N. Dixie Highway
Newport, MI 48166

Dates: June 30 through August 12, 1997

Inspectors: G. Harris, Senior Resident Inspector
C. O'Keefe, Resident Inspector

Approved by: Michael J. Jordan, Chief
Reactor Projects Branch 5

EXECUTIVE SUMMARY

Enrico Fermi Unit 2
NRC Inspection Report No. 50-341/97010(DRP)

This inspection included aspects of licensee operations, engineering, maintenance, and plant support. The report covers a 6-week period of resident inspection.

Operations

- Control room operators exhibited an excellent questioning attitude by identifying several surveillance tests with incomplete Technical Specification impact statements. (O1.1)
- The licensee responded appropriately to NRC concerns regarding the completion of operability determinations in a timely manner. The licensee implemented guidance to ensure that the removal of safety equipment from service, while operability determinations are being conducted, will be evaluated. (O1.3)
- Equipment operability was maintained and the material condition of plant equipment continued to be good during this period. (O2.1)
- Corrective actions taken in response to NRC identified material condition deficiencies with the combustion turbine generator were effective. (O8.1)

Maintenance

- The inspectors identified a concern with the surveillance test procedure for the jet pumps. The licensee decided to modify their existing surveillance test to require evaluation of the jet pump diffuser to the low or plenum differential pressure deviation on a daily basis. This should improve the licensee's ability to monitor and trend jet pump performance and thus enable the licensee to better predict degradation. (M1.2)
- The high pressure coolant injection system outage was adequately planned and executed. (M1.3)

Engineering

- The licensee identified that fuel failures from the previous three operating cycles were caused by foreign material in the core. (E2.1)

Plant Support

- The licensee was well prepared for changes in plant conditions caused by initiating the hydrogen water chemistry system. (R1.1)

Report Details

Summary of Plant Status

Unit 2 operated at 96 percent power during the entire inspection period. The unit operated well with few equipment problems. Hydrogen water chemistry was implemented, which changed radiological conditions in the plant considerably. The Station Blackout generator was removed from service for an extended period of time in order to identify and correct the causes of degraded reliability.

I. Operations

O1 Conduct of Operations

O1.1 General Comments (71707)

Using Inspection Procedure 71707, the inspectors conducted frequent reviews of plant operations. Specific events and noteworthy observations are detailed in the sections below.

The inspectors observed activities associated with resetting the reactor recirculation motor-generator high speed stops to a higher value. The inspectors noted the higher value was below the normal settings. The inspectors observed that the preparations for the evolution were detailed, the pre-evolution briefing was thorough, and the coordination of activities was very good. Operations personnel control of the work and manual reactivity control were excellent throughout the evolution.

Operations personnel exhibited an excellent questioning attitude in identifying problems with impact statements listed in surveillance procedures. These statements describe the impact of performing surveillance tests on plant equipment. Operators wrote several deviation event reports (DERs) concerning inadequate or unclear impact statements. Specifically, the impact statements did not fully describe the necessary Technical Specification (TS) actions to be entered nor the impact to system operability (DERs 97-1227, 97-1215, 97-1207, 97-1204, and 97-1149). The affected surveillance procedures were not performed until the specific issues were addressed to the Nuclear Shift Supervisor's (NSS) satisfaction. However, the inspectors were concerned about past operability for these items. This will be tracked as an Inspection Followup Item pending the inspectors review of the licensee's determination of past operability impact for the DERs listed above. (IFI)(50-341/97010-01)

Operations personnel implemented a new shift foreman position, assigning a licensed operator to provide direction to all non-licensed operators on each shift. The inspectors noted that non-licensed operators considered the new arrangement to be an improvement in the areas of supervision and pre-evolution briefings. Operations management also assigned a senior licensed operator to each shift to approve all scheduled, non-Technical Specification work, relieving the NSS and

Nuclear Assistant Shift Supervisor of much of the responsibility for routine work control activities.

O1.2 Timeliness of Operability Determinations

a. Inspection Scope (71707)

The inspectors reviewed the licensee's operability procedure MOP05 "Operability Evaluations." The inspectors interviewed licensing personnel and reviewed Limiting Condition for Operation (LCO) status sheets.

b. Observations and Findings

The inspectors identified concerns with the controls over operability determinations including timeliness and adequacy. The inspectors were also concerned with the potential for removal of additional equipment from service before resolving an outstanding operability question. As a result, the licensee established a tracking mechanism to ensure the timely completion of operability determinations. The licensee implemented a requirement that a tracking LCO and a DER be written requiring that an operability determination be performed within a specified time. The inspectors noted that the time for the determination is 24 hours unless there are unusual circumstances. The licensee stated that the NSS should notify the on-call system engineer of the need for an "Operability Determination" and inform the system engineer of the required time stipulation. Additional changes to ensure proper tracking included listing the DER number on the LCO sheet. The licensee stated that the applicable procedures would be updated to reflect the new requirements.

c. Conclusions

The licensee responded appropriately to NRC concerns regarding the completion of operability determinations in a timely manner. The licensee implemented guidance to ensure that the removal of safety related equipment from service while operability determinations are being conducted will be evaluated.

O2 Operational Status of Facilities and Equipment

O2.1 Engineered Safety Feature (ESF) System Walkdowns (71707)

The inspectors used Inspection Procedure 71707 to walk down accessible portions of the following ESF and safety related systems:

- Emergency Diesel Generators (EDGs) 11, 12, 13 and 14
- Division 2 Residual Heat Removal Service Water
- Divisions 1 and 2 Hydrogen Recombiners
- High Pressure Coolant Injection System (HPCI)
- Alternate Station Blackout Generator (CTG 11-4)
- Division 1 24/48V Direct Current System

- Division 1 Residual Heat Removal Service Water
- Condensate Storage Tank (CST) System
- Emergency Equipment Cooling Water System

The material condition of most safety-related equipment in the plant continued to be good during this inspection period. Several minor discrepancies were brought to the licensee's attention by the inspectors and were corrected by the licensee. The inspectors noted that numerous emergency diesel generator oil leaks identified during previous inspection periods were repaired.

As discussed in Section 08.1 below, the inspectors identified several concerns with the material condition of combustion turbine generator 11-4, the designated alternate stations blackout (SBO) generator. Operations and system engineering personnel adequately addressed all of the inspectors concerns. However, the inspectors concluded that the material condition should have been assessed before designating combustion turbine generator 11-4 as the alternate SBO generator.

08 Miscellaneous Operations Issues (92700)

08.1 Combustion Turbine Generator Material Condition Walkdown

a. Inspection Scope (92700)

The inspectors conducted walkdowns of combustion turbine generators and interviewed operations and engineering personnel.

b. Observations and Findings

The inspectors noted during reviews of DERs and interviews with station personnel that Combustion Turbine Generator (CTG) 11-1 reliability was not improved after refurbishment. The licensee removed CTG 11-1 from service for evaluation. The inspectors observed the installation of Temporary Modification 97-005 on July 17. This modification was intended to provide an SBO capability for the remaining CTGs by installing a temporary diesel which provides alternating current power for starting. In addition, the inspectors assessed the material condition of the designated alternate SBO generator, CTG 11-4. The inspection was necessary to determine if CTG 11-4 was capable of performing its intended function. The inspectors identified several material condition concerns. The concerns include water in an air receiver, a malfunction of an air receiver automatic blowdown valve, and oil leaks.

The concerns were discussed with system engineering and operations personnel to determine the potential impact to CTG 11-4 operability. System engineering and operations personnel evaluated the auto blowdown valve and wrote a work request to repair or replace the valve. Operator rounds were changed to manually blow the receiver down twice per shift and wipe up the oil from the leaks.

Following licensee corrective actions, the inspectors had no operability concerns with CTG 11-4. However, the inspectors concluded that the material condition should have been assessed before designating CTG 11-4 as the alternate SBO generator.

c. Conclusions

The inspectors concluded that the licensee's corrective actions were adequate to correct the identified deficiencies with CTG 11-4. However, the licensee should have identified and corrected the deficiencies before designating CTG 11-4 as an SBO generator.

II. Maintenance

M1 Conduct of Maintenance

M1.1 General Comments

a. Inspection Scope (62703)

The inspectors observed all or portions of the following work and surveillance activities. Work practices and procedure adherence were assessed. Tagout isolations and administration were observed and reviewed. Radiological work practices and support of work from the radiation protection staff were observed. Work packages were reviewed for completeness and adequacy, as well as plant impact and implementation of required TS actions. Surveillance procedures were reviewed and compared to TS, Updated Final Safety Analysis Report and system design basis documentation to ensure regulatory requirements were properly tested.

- Division 1 Emergency Equipment Cooling Water Pump and Valve Operability Surveillance, and Heat Exchanger Performance Test
- Division 1 Core Spray System Minimum Flow Valve Flow Switch Calibration
- HPCI Drain Pot Level Switch Replacement
- HPCI Pump/Shaft Lubricant Replacement
- HPCI Barometric Condenser Pressure Switch Calibration
- HPCI Auxiliary Oil Pump and Barometric Condenser Vacuum Pump Motor Inspections
- Circulating Water Pump No. 5 Motor Removal and Troubleshooting
- Battery Charger 21A-2 Calibration
- Installation of CTG Blackstart Temporary Diesel
- CTG Response Surveillance
- Resetting of Reactor Recirculation Motor-Generator High Speed Stops
- Main Steam Isolation Valve Channel Functional Test
- Jet Pump Operability Test
- Residual Heat Removal Room Cooler Corrective Maintenance
- Control Rod Operability Test
- Main Steam Isolation Valve Leakage Control Test

b. Observations

The inspectors noted increased participation of radiation protection personnel in routine maintenance activities during this period. This increased participation was primarily due to the implementation of hydrogen additives for water chemistry, which resulted in the increase in dose rates in the plant. The inspectors observed that work groups were knowledgeable of the changes in radiological plant conditions. Station personnel sought assistance from the radiation protection personnel in determining radiological conditions for work planning and preparations. In one instance, the inspectors observed instrumentation and controls personnel and radiological protection technicians walking down a job in a low dose idle offgas room in preparation for a work activity to be performed in a high dose area.

The inspectors also observed self-assessments of safety system outage planning. As an example, during the Division 2 Primary Containment Monitoring System outage, a new calibration gas cylinder was requested from the warehouse, but an empty cylinder arrived. The Instrumentation and Control Supervisor and the System Outage Manager obtained a replacement and checked all the remaining cylinders. A DER was written to determine the cause. The remaining work was also reviewed to determine if other problems existed. For additional comments on the HPCI outage, see Section M1.2 below.

As discussed in Section O1.1, resetting of the reactor recirculation motor-generator high speed stops was well-coordinated. The instrumentation and control technicians, who had never performed this task before, were properly briefed and prepared and performed this sensitive work without any problem.

M1.2 Jet Pump Surveillance Implementation

a. Inspection Scope (61726)

The inspectors reviewed Technical Specification surveillance test requirements, interviewed operations and engineering personnel, and reviewed related technical documentation.

b. Observations and Findings

The inspectors evaluated the licensee's practices during the performance of surveillance test procedure 24.138.06, "Jet Pump Operability Test." The surveillance test is performed every 24 hours and is used to prove operability of all 20 jet pumps. Inoperability of any single jet pump requires the plant to be placed in a hot shutdown condition within 12 hours. To prove operability, Technical Specification surveillance test 4.4.1.2 requires daily collection of data on recirculation loop flow, total core flow, and diffuser to lower plenum differential pressure. This data is then used in performing three calculations to evaluate operability of the jet pumps. The TS require, for operability determination, that two of the three calculation results meet test acceptance criteria. The inspectors reviewed the licensee's test procedure and noted it had been previously modified to

allow the performance and evaluation of only two of three calculations. The third calculation was performed on a weekly basis. In addition to an operability determination, the calculations provide trending information that can be used for early detection of jet pump failure. The inspectors questioned whether the licensee's current implementation of the surveillance test complied with Technical Specification requirements.

The inspectors evaluated the licensee's closeout of Bulletin 80-07: "BWR Jet Pump Assembly Failure." The inspectors determined that performing only the two calculations to determine recirculation and total core flow deviation met Technical Specification requirements. The inspectors reviewed an earlier evaluation that the licensee used to justify not performing the third calculation. The inspectors determined that this evaluation did not provide a good technical basis for not performing the diffuser to lower plenum differential pressure calculation. The inspectors surveyed other licensees with similar jet pump configurations and TS surveillance requirements and noted that all three calculations had been performed.

Following discussion with licensee personnel, a determination was made by plant management to perform the third calculation. Engineering personnel concluded that some additional jet pump performance information could be gathered by performing the third calculation.

c. Conclusion

The inspectors determined that the licensee decision to modify the existing surveillance test to evaluate diffuser to lower plenum differential pressure deviation would improve the ability to monitor and trend jet pump performance. In addition, it would enable the licensee to detect jet pump degradation or failure. The licensee was in compliance with the Technical Specification surveillance test requirement. Once two calculations met the acceptance criteria, the third calculation was not required.

M1.3 High Pressure Coolant Injection (HPCI) System Outage

a. Inspection Scope (62703)

The inspectors observed work activities associated with the HPCI system outage. Work requests were reviewed to determine the scope of the work, TS actions taken, and post-maintenance testing required. A concern about welding in a steam environment was discussed with the site welding engineer, maintenance and operations supervision, and an NRC specialist inspector.

b. Observations and Findings

The inspectors observed work activities performed by maintenance and engineering personnel during various portions of the HPCI system outage. The inspectors also reviewed preparation activities and observed the pre-evolution briefings. The inspectors determined that the preparations for the system outage were thorough.

For example, the safety significance of the scheduled work and a number of contingency plans were discussed during the pre-evolution briefings.

An example of a good questioning attitude to assure high quality work was observed when mechanical maintenance and quality assurance personnel questioned the methodology used to determine gear backlash (free play) for the HPCI turbine governor angle drive gears. The vendor was contacted and based on the vendor's recommendations, the work instructions were revised. Subsequently, workers determined that backlash was outside acceptance criteria. The work package was revised to include replacement of the gears. The associated work was promptly accomplished without impact on out-of-service time.

The inspectors noted that the system outage schedule incorrectly listed the leak check on valve E41-F067, HPCI Steam Supply Hydraulic Stop Valve, under Work Request 000Z965245 as being done with the system in standby. However, the work request required the valve to be tested at normal operating temperature and pressure. The inspectors noted that the valve would not have been tested under normal pressure in a standby lineup. This issue was discussed with the system outage manager who resolved the schedule discrepancy.

The inspectors observed that a steam plume was present in the work area while maintenance workers removed and rewelded a new drain pot level switch. The inspectors were concerned with the personnel hazard this presented and the potential impact on the new welds. Weld concerns were discussed with the site welding engineer and a Region III welding inspector. Both agreed that porosity was a potential problem but that any flaws would be apparent during non-destructive examination. The inspectors reviewed the non-destructive examination results for the welds and no porosity was indicated.

Operations management conducted a critique to determine the causes for why it took the licensee almost three shifts to return the HPCI system to service upon completion of the work. The results of the critique were not finalized at the conclusion of the inspection. However, the inspectors learned that emergent issues had impacted the manpower assigned to the job. The inspectors reviewed the priorities assigned to other work items during the period and had no additional concerns.

The inspectors observed the HPCI post-maintenance testing and preparatory briefings. Preparations were detailed with good organizational involvement. For example, flow rates in the hydrogen water chemistry system were reduced in order to reduce dose received during testing.

c. Conclusions

The inspectors concluded that HPCI system outage work was adequately planned and executed. Delays in returning the system to service were evaluated and determined to be caused by a lack of manpower. The lack of manpower was caused by emergent issues. The licensee is currently evaluating the scheduling of activities to prevent such manpower shortages during future outages.

M8 Miscellaneous Maintenance Issues (92902)

- M8.1 (Open) Licensee Event Report 50-341/96010: High Pressure Coolant Injection Suction Swap Due to Radio Use Near Level Transmitter. The inspectors identified that previous licensee corrective actions for radio use impacting plant instrumentation had failed to address condensate storage tank (CST) instrumentation. In response to this event, the licensee hung signs to prohibit radio use within 20 feet of the CST instrument cabinet. In addition, training was conducted on the event with all groups that use radios. The inspectors considered the lack of a working phone line to be a primary cause for this event and noted that the telephone line in the instrument cabinet had not been repaired at the time of the inspection. A recent instrumentation and control surveillance test was conducted successfully with the use of a temporary phone line. The licensee closed DER 96-0804 and transferred the phone problem to DER 96-0831. This DER addressed the lack of spare underground conductors. This item will remain open pending phone line repairs.

III. Engineering

E2 Engineering Support of Facilities and Equipment

E2.1 Licensee Fuel Inspections Identified Damage Caused by Debris

a. Inspection Scope (92903, 37551)

The inspectors observed fuel inspection activities and reviewed the licensee's fuel inspection results. The inspectors also discussed fuel performance history, including five recent failures. The Maintenance Rule Fuel Reliability Improvement Plan was also reviewed.

b. Observations and Findings

During the week of June 20, the licensee conducted inspections on one of the two failed fuel bundles from the previous operating cycle (Cycle 5). The fuel vendor, General Electric, was onsite to perform the inspections and assist in analyzing the results. The licensee performed sipping operations, removed the channels, and inspected a total of 12 bundles for evidence of foreign material or debris related damage.

The inspectors reviewed the results from the fuel inspections which identified that three fuel bundles contained some foreign material. The source of the foreign material could not be specifically identified. The failed General Electric 11 fuel bundle was inspected by the licensee and the vendor and each determined that the failure was caused by foreign material. The inspectors noted that the licensee did not inspect the other fuel bundle which was known to have failed during Cycle 5 because it was manufactured by a different vendor, Asea Brown Braveria. The licensee presumed that the Asea Brown Braveria fuel failure in Cycle 5 was also caused by foreign material, as documented in the Fuel Reliability Improvement Plan.

The inspectors noted that one failure in General Electric fuel occurred during each of Cycle 3 and 4, two failures in Cycle 5, and one failure in the current cycle. The failure in Cycle 4 and the failures in Cycle 5 were caused by foreign material. As documented in Inspection Report 50-341/97007, the fuel failure during the current operating cycle was believed by the licensee to have started during Cycle 5. However, the failure was so small that it was masked by the other two failures. This failure was not detected during core sipping because of the limited scope of the sipping.

Based on the five total fuel failures during Cycles 3-6, the licensee made fuel a Maintenance Rule a.1 system, and developed a system improvement plan per 10 CFR Part 50.65. This plan included additional inspections of fuel and feedwater strainers. The inspectors noted during a review of the improvement plan that actions were focussed on preventing the introduction of foreign material into the core. Foreign material exclusion was identified as an issue by the resident staff in Inspection Report 50-341/97-0004. Both the station maintenance department and the Integrated Safety Engineering Group (ISEG) are conducting evaluations of the station's foreign material exclusion program. This issue will be tracked as an Inspection Followup item pending inspector review and assessment of the licensee's actions to correct foreign material exclusion problems. (IFI)(50-341/97010-02)

c. Conclusions

The inspectors concluded that the inspections were adequate to confirm that a foreign material problem in the core existed. The Fuel Reliability Improvement Plan appeared to adequately address this issue.

IV. Plant Support

R1 Radiological Protection and Chemistry Controls

R1.1 Implementation of Hydrogen Water Chemistry (HWC) Successful

a. Inspection Scope (71750, 71707, 37551, 40500)

The inspectors reviewed Safety Evaluation 95-0024, Revision 1. The inspectors discussed implementation of Hydrogen Water Chemistry (HWC) with the Chemistry Manager, Superintendent of Radiation Protection (RP) and Chemistry/Radwaste Supervisor. The inspectors observed operator refresher training on HWC system operation.

b. Observations and Findings

The licensee initiated HWC system operation on July 13. The injection rate was about 80 standard cubic feet per minute. This injection rate was selected to obtain about 2 parts per million of hydrogen in the feedwater system, which was consistent with industry practices.

Site wide training was conducted in early 1996 prior to system initial testing. Refresher training was given in June 1997 on the affects of HWC on plant dose rates. Operator refresher training on system operations was also given before system startup. The inspectors attended the 1997 training sessions and concluded that they appropriately addressed changes expected in plant conditions and the consequent impact on the activities of operations and other plant personnel.

Dose rates in the plant increased as predicted. Radiation protection (RP) personnel initiated conservative radiological postings for plant areas affected by the HWC system. Surveys were performed to determine actual plant conditions and reposting was performed as appropriate. The inspectors observed that RP personnel made advantageous use of a robot to conduct surveys in areas expected to be high radiation areas in order to limit dose.

The licensee had a goal to maintain high reliability and availability of the system to maximize the advantages of HWC. To that end, considerable vendor and industry experience was obtained from plants which had successfully implemented HWC.

The Chemistry Manager stated that reactor plant chemistry was responding as predicted. The inspectors determined that no problems were encountered in the chemistry program or in radwaste operations. Radiation protection was assisting operations and maintenance personnel in developing a policy statement on the conduct of HWC system operations.

The inspectors noted that RP personnel were active in evaluating planned work in the weeks surrounding the HWC system implementation date. For example, higher-dose jobs were re-scheduled to be completed prior to increases in dose rates.

The inspectors reviewed Safety Evaluation 95-0024 on HWC system implementation and did not identify any concerns.

c. Conclusions

The licensee was proactive in identifying and planning for the changes in plant conditions caused by implementing the hydrogen water chemistry system. Radiation protection and chemistry personnel closely monitored changing plant conditions. All plant personnel were conscious of the increased dose rates in the plant. Plant changes were closely compared to industry experience and predicted values.

V. Management Meetings

X1 Exit Meeting Summary

The inspectors presented the inspection results to members of licensee management at the conclusion of the inspection on August 12, 1997. The licensee acknowledged the findings presented. The inspectors asked the licensee whether any materials examined during the inspection should be considered proprietary. No proprietary information was identified.

X2 Predecisional Enforcement Conference Summary

A Predecisional Enforcement Conference was held on August 6, at the Region III office in Lisle, Illinois, to discuss three apparent violations in the area of corrective actions. One apparent violation concerned a non-conservative calibration error in primary containment oxygen monitors, documented in inspection report 50-341/97003. The remaining two issues, documented in 50-341/97007, dealt with a failure in a motor-operated valve and inadequate lubrication of fused disconnect switches.

PARTIAL LIST OF PERSONS CONTACTED

Licensee

S. Booker, Superintendent, Electrical Maintenance
D. Cobb, Superintendent, Operations
W. Colonnello, Work Week Manager
R. DeLong, Superintendent, System Engineering
T. Dong, NSSS Supervisor, Technical Engineering
P. Fessler, Plant Manager, Operations
E. Kokosky, Superintendent, RP and Chemistry
J. Korte, Director, Nuclear Security
R. Matthews, Superintendent, I&C Maintenance
J. Moyers, Director, Nuclear Quality Assurance
N. Peterson, Supervisor, Compliance
J. Plona, Technical Director
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NRC

A. Kugler, Fermi 2 Project Manager, NRR
M. Holmberg, Reactor Inspector, Region III
T. Tjader, Technical Specification Branch, NRR
C. Paterson, Senior Resident Inspector, Brunswick Nuclear Plant

CHECK PROCEDURES

INSPECTION PROCEDURES USED

IP 37551:	Onsite Engineering
IP 40500:	Effectiveness of Licensee Controls in Identifying, Resolving, and Preventing Problems
IP 61726:	Surveillance Observations.
IP 62703:	Maintenance Observation
IP 71707:	Plant Operations
IP 71750:	Plant Support Activities
IP 92902:	Followup - Engineering
IP 92903:	Followup - Maintenance
IP 92700:	Onsite Followup of Written Reports of Nonroutine Events at Power Reactor Facilities

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

50-341/97010-01	IFI	Determination of Past Operability Impact on Inadequate Impact Statements in DERs
50-341/97010-02	IFI	Actions to Correct Debris Problems in Reactor

Discussed

50-341/96012-07	IFI	CTG 11-1 Reliability Not Met
50-341/96010-00	LER	HPCI Suction Swam Due to Radio Use Near Level Transmitter

LIST OF ACRONYMS USED

CST	Condensate Storage Tank
CTG	Combustion Turbine Generator
CFR	Code of Federal Regulations
DECo	Detroit Edison Company
DER	Deviation Event Report
HPCI	High Pressure Coolant Injection
LCO	Limiting Condition for Operation
LER	Licensee Event Report
NRC	Nuclear Regulatory Commission
NSS	Nuclear Shift Supervisor
RP	Radiation Protection
SBO	Station Blackout
TS	Technical Specification