

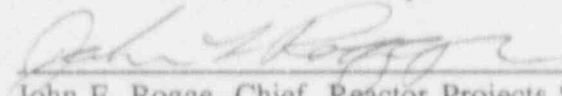

U.S. NUCLEAR REGULATORY COMMISSION  
REGION I

Report No. 92-01  
Docket No. 50-271  
Licensee No. DPR-28  
Licensee: Vermont Yankee Nuclear Power Corporation  
RD 5, Box 169  
Ferry Road  
Brattleboro, VT 05301

Facility: Vermont Yankee Nuclear Power Station  
Vernon, Vermont

Inspection Period: January 1 - February 10, 1992

Inspectors: Harold Eichenholz, Senior Resident Inspector  
Paul W. Harris, Resident Inspector

Approved by:    
John F. Rogge, Chief, Reactor Projects Section 3A Date

Inspection Summary: This inspection report documents resident safety inspections conducted between January 1 and February 10, 1992. Station activities inspected during this period included: plant operations; radiological controls; maintenance and surveillance; emergency preparedness; security; engineering and technical support; and safety assessment and quality verification.

Results: Inspection results and conclusions are summarized in the attached Executive Summary.

**EXECUTIVE SUMMARY**  
Vermont Yankee Nuclear Power Station  
Report No. 50-271/92-01

**Plant Operations**

The conduct of control room operations was observed to be professional and in accordance with plant operating procedures during two planned reactor power changes and an inadvertent isolation of the advanced off-gas system (AOG). Vermont Yankee continues their investigation into the cause of higher than normal chromate levels within the reactor water cleanup system piping. Inspection findings within the reactor building involved inadequately maintained lighting, scaffolding, and transient material control issues. While prior corrective action is ongoing to determine why these conditions have existed for long periods, additional attention by Vermont Yankee is warranted.

**Radiological Controls**

A review of Vermont Yankee's response to assess the radiological consequences of the release resulting from the inadvertent AOG isolation, concluded that their actions were appropriate and timely. A tour of the reactor building with a radiation protection assistant identified a variety of minor radiological deficiencies that were immediately corrected and observations of good housekeeping and radiological practices.

**Maintenance and Surveillance**

The actions taken by Vermont Yankee to improve the administration of the visual examination process and to prevent recurrence of previously identified weaknesses were appropriate. The maintenance activities associated with the replacement of the AOG rupture disk were properly controlled and planned. Vermont Yankee has taken appropriate steps to resolve the issue of reduced brush life on the direct current motor portion of the rotating uninterruptable power supply. Vermont Yankee's efforts to identify and resolve the issue of three missed technical specification surveillances was commendable (NCV 92-01-02). Strong performance by an Auxiliary Operator was noted in the identification of broken bolting on the "A" emergency diesel generator. A proper safety perspective was exhibited by Vermont Yankee in resolving this issue and identifying corrective actions.

**Emergency Preparedness**

The conduct of an annual communication call-in test was reviewed. Notably good performance occurred that continues to be characteristic of a strong commitment by Vermont Yankee in this functional area.

## Executive Summary

### **Security**

A vulnerability in a safeguards system was identified by Vermont Yankee, however, initial corrective actions did not sufficiently compensate for the identified deficiency. Vermont Yankee actions involving an isolated breakdown in their access control program and a confirmed positive on a random drug screening test were reviewed.

### **Engineering and Technical Support**

Vermont Yankee actions to resolve the failure of a motor operated valve anti-rotation device were appropriate. Vermont Yankee determined that the Gould relays which are subject to aging related failures are not used at Vermont Yankee in safety-related applications. Vermont Yankee actions to resolve the repeated isolations of the shutdown cooling system during startup were reviewed. Vermont Yankee's investigation was systematically aggressive, involved good technical support and communications between departments, and obtained an appropriate level of management attention and review.

### **Safety Assessment and Quality Verification**

Discussions between Vermont Yankee and the NRC satisfactorily resolved the issue that an inadvertent high pressure coolant injection system suction transfer constituted an engineered safety feature actuation and required the submittal of a Licensee Event Report.

## TABLE OF CONTENTS

EXECUTIVE SUMMARY		ii
TABLE OF CONTENTS		iv
1.0	SUMMARY OF FACILITY ACTIVITIES	1
2.0	PLANT OPERATIONS (71707, 93702)	1
2.1	Inspection Activities	1
2.1.1	Control Room Operations	1
2.2	Significant Plant Events	1
2.2.1	Inadvertent Isolation of Advanced Off-Gas System (AOG)	1
2.3	Reactor Building Inspection Findings	2
2.3.1	Inadequately Maintained Lighting	2
2.3.2	Deficient Scaffolding and Combustible Material Control	2
2.3.3	(Closed) NCV 92-01-01: Transient Material Control	3
2.3.4	Piping Hanger Not Properly Identified	3
2.4	Off-Gas Calculation Change	4
2.5	Higher Than Normal Conductivity in the Reactor Water Cleanup (RWCU) System	4
3.0	RADIOLOGICAL CONTROLS (71707)	4
3.1	Inspection Activities	4
3.2	Inspection Findings and Review of Events	4
3.2.1	Radiological Practices	4
3.2.2	Radiological Consequences Resulting From the Inadvertent Isolation of the AOG System	5
4.0	MAINTENANCE AND SURVEILLANCE (62703, 61726, 92701)	5
4.1	(Closed) UNR 91-12-03: Adequacy of Corrective Actions Associated with Recurring Deficiencies in the Visual Examination Process	5
4.2	Maintenance Inspection Activity	6
4.3	Maintenance Observations	6
4.3.1	Replacement of Advanced Off-Gas Rupture Disk	6
4.3.2	Rotating Uninterruptable Power Supply (RUPS) Maintenance	7
4.3.3	"A" Emergency Diesel Generator Air Inlet System-Broken Bolting	8
4.4	Surveillance Inspection Activity	9
4.4.1	(Closed) UNR 91-29-01: Review the Root Cause and Analysis for Missed Technical Specification Surveillances (NCV 92-01-02) (LER 91-16)	9
5.0	EMERGENCY PREPAREDNESS (71707)	10

## Table of Contents

6.0	SECURITY (71707, 90712, 92700) . . . . .	10
6.1	Observations of Physical Security . . . . .	10
6.2	Uncompensated Vulnerability in a Safeguards System . . . . .	10
6.3	(Closed) NCV 92-01-03: Granting of Unauthorized Access . . . . .	11
6.4	Positive Test Result on Random Drug Screening . . . . .	12
7.0	ENGINEERING AND TECHNICAL SUPPORT (71707, 92701) . . . . .	12
7.1	(Closed) UNR 91-28-03: Adequacy of Design Control Regarding the Failure of Motor Operated Valve Anti-Rotation Device . . . . .	12
7.2	Aging Related Failure of Gould Relays . . . . .	13
7.3	Shutdown Cooling System Isolation . . . . .	13
8.0	SAFETY ASSESSMENT AND QUALITY VERIFICATION (90712, 92700, 90713, 40500) . . . . .	14
8.1	Licensee Event Reports (LER) . . . . .	14
8.2	Periodic and Special Reports . . . . .	15
9.0	MANAGEMENT MEETINGS (30702) . . . . .	16
9.1	Preliminary Inspection Findings . . . . .	16
9.2	Region Based Inspection Findings . . . . .	16
9.3	Significant Meetings . . . . .	16

## DETAILS

### 1.0 SUMMARY OF FACILITY ACTIVITIES

Vermont Yankee Nuclear Power Station (VY) operated at or near full power throughout most of this inspection period. On January 13, reactor power began to coastdown at approximately 0.0025 percent of rated power per day due to end of cycle fuel depletion. Coastdown will continue until the planned plant shutdown on March 7 to begin the 1992 refueling outage. On January 8, reactor power was reduced to approximately 79 percent of rated power for 12 hours for planned electrical grid maintenance. On January 13, the AOG system rupture disk ruptured, during an AOG system isolation transient caused by maintenance activities. Subsequently, on January 15-16, reactor power was reduced to approximately 2-5 percent of rated power to support AOG rupture disk repair activities. During this inspection period, both the "A" and "B" emergency diesel generators (EDG) were declared inoperable at different times to conduct maintenance.

### 2.0 PLANT OPERATIONS (71707, 93702)

#### 2.1 Inspection Activities

The inspector verified that the facility was operated safely and in conformance with regulatory requirements. Management control was evaluated by direct observation of activities, tours of the facility, interviews and discussions with personnel, and independent verification. The inspector performed backshift, deep backshift, and weekend inspections.

##### 2.1.1 Control Room Operations

The conduct of control room operations was observed to be professional and in accordance with plant operating procedures. During two significant reactor power changes to support maintenance activities, control room operators were observed to follow procedures, succinctly yet accurately communicate, and respond effectively to changing plant conditions. Shift turnovers adequately described on-going and planned maintenance activities, and the status of annunciators and plant systems.

#### 2.2 Significant Plant Events

##### 2.2.1 Inadvertent Isolation of Advanced Off-Gas System (AOG)

On January 13 at approximately 1:30 p.m. with the plant at 100 percent of rated power, the "B" AOG train isolated during a maintenance activity to replace the "A" AOG train instrument air filters. This preventive maintenance required that the air supply to the filters be secured. However, when the air was isolated, the air operated cooling water inlet isolation valve for the "A" recombiner failed shut as designed. This, unknowingly to the maintenance personnel and control room operators, also secured cooling water flow to the on-line "B" AOG train because both trains are cooled in series. Subsequently, the "B" train automatically isolated on low condensate cooling flow (< 800 gpm).

With both AOG trains isolated and steam jet air ejectors (SJAE) steam supply still in service, the piping between the SJAEs and the inlet to the AOG trains rapidly increased in pressure causing the AOG rupture disk to rupture. The disk, located in the common AOG supply pipe within the SJAE room, is designed to rupture between 14-15 psig to protect the integrity of the AOG system in the event of a hydrogen explosion within the system. The pressure increase also caused the SJAE auxiliary steam supply and the main condenser to SJAE supply line to automatically isolate (4 psig and 7.5 psig, respectively). After the rupture of the disk, AOG system pressure began to decrease. At 2.5 psig decreasing, the SJAE steam supply isolation automatically reset to readmit auxiliary steam to the air ejectors. This provided a second motive force to propel radioactive gases and particulates out the rupture. VY determined that these events took approximately one minute. Approximately four minutes after the event, control room operators restored the "B" AOG train to service. The personnel in the AOG room performing the filter maintenance were evacuated and efforts began to assess the radiological release. The radiological activities taken by VY are described in Section 3.2.2. Repair activities are described in Section 4.3.1.

Control room operator actions were in accordance with operating procedures. Notifications to plant management, radiological controls, and chemistry personnel were prompt. No reactor plant transient resulted from this event.

### **2.3 Reactor Building Inspection Findings**

The inspector conducted frequent tours of the reactor building and observed increased activities associated with refueling outage preparation. Staging of equipment, the building of scaffolding, and pre-outage maintenance activities highlight the effort within the plant to meet the published outage start date of March 7. Overall, the control of activities within the reactor building appeared to be well planned and orchestrated to prevent access difficulties and to preclude personnel safety concerns. Even in areas of high work activity, the temporary storage and staging of equipment appears to be commensurate with the work activities necessary for outage preparation.

#### **2.3.1 Inadequately Maintained Lighting**

The inspector observed an unusually high number of areas and work spaces having inadequately maintained lighting that may challenge personnel safety or job performance. The Maintenance Department was informed of the inspector's observations and which had these deficiencies promptly corrected. Additionally, the inspector was informed of VY's efforts to maintain adequate lighting. The inspector had no further concern regarding this issue.

#### **2.3.2 Deficient Scaffolding and Combustible Material Control**

On February 2, the inspector identified two sets of scaffolding in the torus room that did not meet VY controls for removal and tagging of such equipment. Specifically, one scaffolding erected in a combustible free zone with combustible materials was properly authorized; however,

the combustible material was left installed approximately 3 months after the maintenance activity was completed. This did not meet VY's expectation that the time of increased fire loading in a combustible free zone be minimized. The second instance involved scaffolding placed over safety-related equipment in the torus room which was not tagged to indicate the acceptability of installation. VY took actions to promptly correct these deficiencies.

The above observations were similar to a scaffolding (work platform) deficiency identified by VY on December 3, 1991, which involved the installation of the platform on safety-class piping in the torus room. For this issue, VY determined that a load analysis had not been performed prior to installation. The December event was reviewed in Inspection Report 91-29 and the inspector concluded that VY's actions were appropriate to resolve over the long term. Based on the identification of further examples of work platform related deficiencies and increased activities to install scaffolding in the plant for outage preparation, additional VY attention to identify and prevent these types of deficiencies is warranted.

### **2.3.3 (Closed) NCV 92-01-01: Transient Material Control**

A tool box on rollers, belonging to the Instrument and Controls (I&C) Department, was found in the drywell ante room not properly secured. Uncontrolled temporary material can represent many hazards such as blocking access to equipment, personnel hazards, and seismic hazards. The proximity of this box to safety-related motor operated valves warranted immediate corrective action. The I&C Department promptly secured the box. This condition was an isolated event.

The inspector was concerned not only about the transient material being a potential plant and personnel hazard, but of the apparent lack of knowledge of transient material controls displayed by the I&C Department representative when the inspector informed him of this condition. This concern was communicated to the I&C Department representative. Subsequent I&C Department actions were to implement supervisory tours of the reactor building and to conduct department training on VY procedure AP 0019, "Control of Temporary Materials." Involvement by the VY Training Department, as part of the corrective actions, was noteworthy. These efforts focused the appropriate safety perspective on this subject. This violation is not being cited because the criteria specified in Section V.A. of the Enforcement Policy were satisfied (NCV 92-01-01).

### **2.3.4 Piping Hanger Not Properly Identified**

The inspector identified to the control room Shift Supervisor (SS) that a pipe hanger for the standby liquid control (SLC) pump discharge piping did not appear to be properly fastened due to a missing U-bolt. The SS recognized the potential safety significance of this issue and initiated prompt actions that involved site engineering and escalation of this issue to management through the use of VY's potential occurrence report process. VY engineering inspected the hanger and determined, based on a review of the system's seismic analysis, that this particular pipe hanger was only required for vertical seismic loading; the horizontal component was not necessary for system operability. Therefore the U-bolt was not necessary and was previously



removed. The Operations Department submitted a work request to install labels identifying the current configuration of SLC hangers. The inspector considered this corrective action appropriate.

#### **2.4 Off-Gas Calculation Change**

VY intends to implement a more precise delay time constant used to determine off-gas activity release rate. The new constant, three minutes versus six minutes, was recommended by General Electric following their review of VY's off-gas data and is expected to provide a more accurate representation of off-gas activity. An approximate 14 percent decrease in off-gas values would occur when the delay time is reduced to three minutes. This is attributed to the change in Xe-138 (14 minute half-life) contribution to the overall off-gas activity. VY will implement this new constant following the 1992 refueling outage.

#### **2.5 Higher Than Normal Conductivity in the Reactor Water Cleanup (RWCU) System**

Since January 1991, periods of higher than normal conductivity have been measured in the RWCU system. The increased conductivity lasting up to 35 days, appears to be a function of power level, and localized to the area between the RWCU pump and the outlet of the non-regenerative heat exchangers. The conductivity levels in the RWCU demineralizer outlet and reactor vessel are normal. VY determined that the high conductivity was caused by elevated chromate levels (10-23 ppb) and calculated that approximately 1 pound of metal loss has occurred over the last year. Efforts to determine the source of chromate are continuing. VY has requested the involvement of a Yankee Nuclear Services Division (YNSD) metallurgist. This issue has received appropriate management attention, since it involves the possibility of an elevated corrosion rate. The inspector will continue to assess VY actions.

### **3.0 RADIOLOGICAL CONTROLS (71707)**

#### **3.1 Inspection Activities**

Compliance with the radiological protection program was verified on a periodic basis.

#### **3.2 Inspection Findings and Review of Events**

##### **3.2.1 Radiological Practices**

The inspector toured the reactor building with the on-shift radiation protection (RP) assistant and found that plant and personnel radiological practices were generally very good. The radiological work areas associated with the fuel pool modification, a filter replacement in the reactor water clean-up system, and facility work in the control rod drive room were observed to be clean and uncluttered. Minor discrepancies with radiological postings, radiological housekeeping, and personnel contamination monitoring equipment were observed and corrected by the RP Department. The inspector observed workers adhering to good radiological work practices;

however, one maintenance worker lapsed from good practices when he did not observe that he passed through a deficient radiological boundary. The RP assistant took immediate action to inform the individual and correct the boundary. The Maintenance Supervisor stated that department training would be conducted to address this issue.

### **3.2.2 Radiological Consequences Resulting From the Inadvertent Isolation of the AOG System**

On January 13 at approximately 1:30 p.m. as documented in Section 2.2.1, a pressure transient within the AOG system resulted in the release of radioactive gases and particulates into the steam jet air eject (SJAE) room of the turbine building (TB). The radioactive gases then apparently migrated to various levels of the reactor building (RB) and TB, and finally, via the plant ventilation system, to the plant stack. Access to areas of the plant was restricted and the workers performing the AOG maintenance were evacuated and whole body counted. No internal contamination was detected.

The majority of the release lasted for approximately six minutes during which activities at the stack increased from the pre-event level of 250 cpm to approximately 130,000 cpm. Stack counts then slowly decreased over the next several hours as the AOG system was placed back in service. Particulate air samples from the RB and the TB were as high as 0.19 and 0.16 MPC (maximum permissible concentration), respectively. Slight increases in particulate activity were observed on the RB ventilation exhaust radiation monitors. A portable air monitor alarmed on the refuel floor and personnel radiation monitoring instruments (RM-14s) in the hallway to the radioactive waste processing area alarmed. The airborne particulate activity within the SJAE room where the rupture disk is located was 0.38 MPC.

At 3:10 p.m. that day, VY determined that no state or federal radioactive release limits were exceeded and that this event was not reportable under 10 CFR 50.72. Over the next few days, VY re-evaluated their release calculations and confirmed that no release limits were exceeded.

The inspector reviewed control point logs, interviewed RP technicians and the RP Supervisor, and concluded that the actions taken by the RP Department to assess the radiological conditions within the plant were appropriate and timely. The surveys taken appeared to be properly documented and of adequate detail to assess conditions within the plant. The inspector had no further question on this issue.

## **4.0 MAINTENANCE AND SURVEILLANCE (62703, 61726, 92701)**

### **4.1 (Closed) UNR 91-12-03: Adequacy of Corrective Actions Associated with Recurring Deficiencies in the Visual Examination Process**

During a review of maintenance packages, VY identified two events associated with recurring deficiencies in the visual examination (VT) process. The first involved a bent motor mounting bolt for a standby liquid control (SLC) pump, and the second involved a hair-line crack in the

valve disk seating surface for a reactor cooling isolation valve (V13-15). Both non-conforming items were identified by VY; however, were installed into their respective systems without proper disposition of the deficiencies. This item was left open pending a review of VY's corrective actions regarding recurring deficiencies in the VT process.

VY determined that these two events had a common root cause that centered on a lack of understanding regarding the review, approval, and disposition process for visual examinations. VY also concluded that neither of these items caused their respective systems to be inoperable.

The inspector reviewed the corrective actions taken by VY regarding these issues as documented in VY Audit Report No. 90-17, Non-Conformance Report No. 91-003, and Corrective Action Report No. 91-11. All corrective actions have been completed with the exception of a revision to Yankee Nuclear Services Division (YNSD) procedure YA-VT-11. This commitment is scheduled for completion by July 1. A discussion with the cognizant maintenance engineer provided the basis for the inspector to conclude that the procedure, as written, satisfied the administrative requirements involving disposition of VT deficiencies. However, the engineer advised that the procedure revision will be initiated to improve the clarity of VT actions. VY has completed training of all personnel associated with the VT process, completed a review of randomly selected maintenance, and concluded that the process has been performed per the procedure.

Based on the inspector's review of this matter and non-recurrence of VT deficiencies, the corrective actions were adequate. This item is closed.

## **4.2 Maintenance Inspection Activity**

The inspector observed selected maintenance activities on safety-related equipment to ascertain that these activities were conducted in accordance with approved procedures, TS, and appropriate industry codes and standards.

## **4.3 Maintenance Observations**

### **4.3.1 Replacement of Advanced Off-Gas Rupture Disk**

The maintenance activities to replace the AOG rupture disk consisted of a series of meetings that focused on various repair methods and the risks associated with each. Consideration was given to conducting either an on-line or off-line repair. Representation by cognizant organizations contributed to the discussion and evaluation to determine the best repair method.

The AOG rupture disk is located in the SJAE room in a moderate environment subject to radiation levels ranging from 350 mr/hr on contact to 150 mr/hr general area. The temperature of the rupture disk flange was approximately 175 degrees Fahrenheit. The 10-inch diameter 316 stainless steel rupture disk is mounted within a flange assembly. AOG system pressure in the pipe at this point is normally 1-2 pounds vacuum, but operationally, pressure can go to 5

psig. The steam flow rate is approximately 7000 lbm/hr, which dilutes the hydrogen concentration to <3 percent. Staging was necessary to provide a stable work platform and to improve access to the work area. A video camera was oriented to allow control room operators a view of the work area. The AOG system had experienced many failures of the rupture disk in the past, and no record existed of an on-line replacement being performed.

After considerable discussions and meetings, VY management decided on January 15 that the AOG rupture disk would be replaced with the plant at less than 5 percent rated power with the mechanical vacuum pump maintaining main condenser vacuum. That night, the plant began to reduce power to support the maintenance. During the replacement on the morning on January 16, control room operators maintained the AOG piping at a vacuum to minimize the radiological airborne and potential hydrogen hazards. Maintenance personnel were well prepared for this off-line repair as evidenced by the timely replacement of the rupture disk.

The inspector concluded that the maintenance activities associated with the off-line replacement of the rupture disk were properly coordinated and planned. The meetings held by the Maintenance Department to discuss this issue involved appropriate representation and identified many safety-related questions that affected plant and personnel safety. Senior Vermont Yankee management was very effective in ensuring that the organizations decision to conduct an off-line repair reflected well-focused objectives and a commendable safety ethic.

#### **4.3.2 Rotating Uninterruptable Power Supply (RUPS) Maintenance**

Shortly after the new RUPS units were installed during the 1989 outage, VY confirmed that the direct current (DC) motor brushes were experiencing accelerated wear. VY anticipated this operational limitation, as documented in Inspection Report 90-18, when the new RUPS units were initially evaluated for use and increased the periodicity of corrective maintenance on the machines. This condition increased the frequency of entering into an LCO for the approximate 8-hour maintenance to replace the brushes.

The DC brushes were originally estimated to have a service life of six months, however, actual life has been approximately 2.5 months. Since January 1991, communications between VY, YNSD, General Electric, and the motor generator (MG) set manufacturer have resulted in identifying two alternative DC brushes to improve MG set brush performance. One alternative, planned for installation in the 1992 refueling outage, is made of synthetic electrographite and has been analyzed to exhibit improved wear characteristics. The second alternative, made of natural carbon, may be evaluated in the plant depending on the performance of the synthetic brushes. The natural brushes are considered the lesser choice, because they may increase commutator wear.

VY has taken appropriate steps to resolve the issue of reduced DC brush life and has, in the interim, installed longer length brushes to reduce the frequency of brush replacement. The inspector will continue to assess VY actions to improve RUPS availability.

#### 4.3.3 "A" Emergency Diesel Generator Air Inlet System-Broken Bolting

During the routine performance of monthly surveillance testing of the "A" EDG on January 22 at approximately 4:00 a.m., an Auxiliary Operator discovered, during his review of equipment performance, two broken bolts on the "Y" shaped air inlet housing to the engine's turbochargers. The EDG was secured from service and the Maintenance Department was requested to assess the as-found conditions. Subsequently the "A" EDG was declared inoperable at 12:40 p.m. with the operating crew acknowledging the entry into the LCO associated with TS 3.10.B.1. However, the EDG was being maintained in an available status, should the need arise for emergency power. The EDGs at VY are Fairbanks Morse 38TD-1/8 engines.

The "Y" shaped air inlet to the turbo housing has a baffle plate that divides the air inlet flow equally to the turbo-parallel scavenging air systems. The baffle plate is retained in place by six 1/2 inch diameter hex head capscrews, SAE Grade 5 material, at the "Y" portion of the housing. Shortly after the "A" EDG was secured, the "B" EDG was started for its monthly surveillance. The Maintenance Department assessed the condition of this EDG's bolting and identified no concerns, however, they did locate in the vendor technical manual a December 16, 1985, Service Information Letter (SIL) concerning this issue. The SIL documented a product improvement redesign that provides a cast baffle as an integral part of the air inlet housing casting, that eliminates the need for the retaining bolts. Further, the SIL documents instances when these bolts have worked loose or broken off during engine operation which could have caused the baffle to move within the inlet cavity and possibly restrict the combustion air flow.

At a meeting of the Plant Operations Review Committee (PORC) on January 22, the broken bolting issue was reviewed. Immediate and long-term corrective actions were discussed, including a determination that no immediate safety concerns were identified for the "B" EDG's operability. Because exact replacement bolting was unavailable for the "A" EDG, non-safety grade bolting was installed as a temporary measure to assist the "available", but not operable, status of the diesel. Subsequently, replacement bolting was located and the "A" EDG was tagged out-of-service on January 23 at 8:52 p.m. for replacement of all six bolts. By 12:14 p.m. this date, repairs, operability testing, and monthly surveillance testing were satisfactorily completed. By 5:41 p.m., VY maintenance and operations personnel accomplished a complete replacement of bolting on the "B" EDG as a precautionary measure. An inspection of the removed bolting identified no deficiencies. The inspector reviewed VY's One-For-One Evaluation No. 92-06, developed by the Maintenance Department and reviewed by the Mechanical Engineering and Construction Group. This evaluation, provided the technical justification for using higher tensile and yield strength Grade-B7 bolting as a one-for-one replacement. No concerns were identified.

On January 24, at the request of VY, YNSD dispatched a materials specialist to assess the condition of the failed and removed bolting from the "A" EDG. The specialist's preliminary analysis indicated one bolt exhibited characteristics of a cyclical fatigue failure and the other failed bolt was characterized as being initially damaged due to over torquing at the time of installation. No defects were identified with the remaining four bolts that were intact, but

removed from service as a precaution. The PORC reviewed this event and available information on the subject and concluded that maintenance plans for the "B" EDG bolting replacement were appropriate. Additionally, a PORC Follow Item was generated to develop a corrective action report (CAR) to assess the technical information process as it related to the availability of the SIL at VY. It appears that although the SIL was contained in an updated manual, no specific review for applicability occurred, or even that VY was aware of the existence of the SIL in 1986 or thereafter. The PORC was also informed by the Maintenance Department that the equipment vendor was not aware of any events involving degraded equipment performance resulting from loose or broken bolting on any of its supplied equipment that have caused air flow problems. The improved design air inlet housing has been procured by VY, with installation planned for each of the EDGs during their next scheduled overhaul. The overhauls are scheduled to be completed by September 1992 and April 1993, for the "A" and "B" EDGs, respectively. A preliminary review by VY indicated that this event was not reportable.

VY's resolution of this event was good. Operational and safety oversight perspectives were properly oriented toward nuclear safety. Maintenance activities were well controlled and proper use of engineering expertise by plant and off-site organizations was evident. Good use of root cause evaluation and corrective action processes was noted. The assessment of important safety-related equipment performance by the Auxiliary Operator reflected good attention-to-detail performance, and continues to reflect a VY strength in this area. The inspector had no further questions on this matter at this time.

#### **4.4 Surveillance Inspection Activity**

Routine observations of daily surveillances were conducted. No unacceptable conditions were identified.

##### **4.4.1 (Closed) UNR 91-29-01: Review the Root Cause and Analysis for Missed Technical Specification Surveillances (NCV 92-01-02) (LER 91-16)**

Inspection Report 91-29 documents the sequence of events leading to VY's identification of their failure to perform TS required daily instrument checks on three post-accident monitoring instruments. The report concludes that VY's immediate actions were timely and appropriate; however, the event was left unresolved pending review of VY's root cause analysis, as documented in LER 91-16.

The inspector reviewed LER 91-16 and the functions served by these particular instruments as described in the Final Safety Analysis Report, assessed the ability of control room operators to determine the operability of post-accident parameter displays to meet TS daily instrument check requirements, and concluded that VY's failure to perform the correct daily instrument checks represents a violation of TS requirements with low safety significance. The inspector notes that for each parameter (torus pressure, containment hydrogen/oxygen, and containment high range radiation monitor) the signal originated from the required TS sensor instrumentation, and provided a qualified indication of parameter availability. In addition, the control room logs

indicated, and operators understood that these parameters were required to be instrument checked. VY's efforts to identify and resolve this issue and implement appropriate immediate and long-term corrective actions was commendable.

This violation will not be subject to enforcement action because the licensee's efforts in identifying and correcting the violation meet the criteria specified in Section V.G. of the Enforcement Policy (NCV 92-01-02).

## **5.0 EMERGENCY PREPAREDNESS (71707)**

As part of VY maintaining an acceptable level of emergency preparedness, which includes ensuring the reliability of the call-in procedure, an annual communication test is conducted. This test utilizes both the beeper system and commercial telephones to estimate emergency personnel response times. This test is conducted in accordance with station procedure OP 3531, Rev. 4, "Emergency Call-In Methods."

On January 13, VY conducted an unannounced, off-hours communication test. A written evaluation of the test was performed by the Emergency Plan Coordinator. The test results indicated that required positions to be staffed in the Emergency Response Facilities, as specified in NUREG 0654, Table B.1, were able to be staffed within the appropriate time frame by personnel qualified and/or trained for those positions. An increase in the number of responders for the required positions was noted from the 1990 communication test.

The conduct of this communication test and the response by VY personnel continues to demonstrate the strong commitment shown in the area of emergency preparedness.

## **6.0 SECURITY (71707, 90712, 92700)**

### **6.1 Observations of Physical Security**

Compliance with the security program was verified on a periodic basis, including the adequacy of staffing, entry control, alarm stations, and physical boundaries.

### **6.2 Uncompensated Vulnerability in a Safeguards System**

On January 22 at 2:25 p.m., VY discovered a vulnerability in a safeguards system that could have allowed unauthorized or undetected access to the Protected Area for which compensatory measures had not been employed. This event was reported to the NRC at 3:25 p.m. or the Emergency Notification System in accordance with 10 CFR 73.71(b)(1). The vulnerability was a design deficiency which could allow the intrusion detection system (IDS) equipment to be defeated by a single station operator without knowledge of the other station.

At 2:30 p.m. that day, a compensatory measure was employed by VY security that prevented the IDS from being defeated by the discovered vulnerability. Post orders describing the compensatory measure were generated and implemented. Modification of the IDS equipment to remove the design deficiency occurred on January 23, and at 7:30 p.m. this date, system testing for determining the adequacy of the modification was performed.

Subsequently on February 1, VY discovered that the implemented modification of the IDS equipment did not fully correct the design deficiency. A series of compensatory measures, involving personnel and procedural changes, were implemented until permanent changes to the IDS equipment could be performed to completely eliminate the vulnerability. Discussions were held on February 3 between the inspector, VY, and NRC Region I (NRC:RI) security specialists to facilitate our understanding of this event and the planned VY corrective actions.

A number of issues involving this event were identified by VY and are the subject of an intensive investigation. According to VY security management personnel, a corrective action plan to address these issues is being developed and will be reported to the NRC as part of their 30 day written Security Event Report (SER). VY informed the inspector that starting on February 7 a YNSD engineer was assigned the responsibility to conduct a complete evaluation of their security system to determine if any vulnerability exists which could allow a single station operator to defeat the system without the knowledge of the other station operator. The NRC's review and disposition of this security event awaits the receipt and evaluation of the SER.

### 6.3 (Closed) NCV 92-01-03: Granting of Unauthorized Access

On January 3, VY informed the inspector that the VY access control program failed to prevent a contractor employee, who tested positive on a pre-employment drug screening test, from being badged and granted unescorted access to the plant. The individual was badged on December 5, 1991, and had access until December 11, 1991, when his access was terminated. The access authorization occurred prior to the Medical Review Officer's (MRO) evaluation as to whether the drug test was a confirmed positive. This was contrary to VY's access control program and the requirements in 10 CFR 26. Subsequently, on December 16, 1991, the MRO determined that there were no indications of drug abuse and that the results of the test were negative.

VY attributed the cause of this event to human error associated with communications between the MRO's office and the plant Medical Services Coordinator. To prevent recurrence, VY has implemented improvements in its process of receiving and transmitting drug test results. In addition, the MRO reinstructed his staff on all elements of the laboratory test result printouts.

This event, identified by VY, was considered to be an isolated instance of a breakdown in the implementation of their access control program and not indicative of a programmatic weakness. Prompt and appropriate corrective actions were taken by VY to address the root cause of the event and to improve communications that would result in the transmittal of accurate test results.



The actions taken by VY appear appropriate to preclude recurrence. This violation will not be subject to enforcement action because VY's efforts in identifying and correcting the violation meet the criteria specified in Section V.G. of the Enforcement Policy (NCV 92-01-03).

#### **6.4 Positive Test Result on Random Drug Screening**

On January 13, the MRO informed VY of a confirmed positive on a random drug screening test performed on a contractor employee. The individual's site access was immediately terminated. VY determined that the employee was non-supervisory whose duties and responsibilities did not directly impact safety-related activities. The inspector had no further questions on this event.

### **7.0 ENGINEERING AND TECHNICAL SUPPORT (71707, 92701)**

#### **7.1 (Closed) UNR 91-28-03: Adequacy of Design Control Regarding the Failure of Motor Operated Valve Anti-Rotation Device**

During VY's actions to respond to the failure of the anti-rotation device, hereafter referred to as the key, on safety-related valve RHRSW-89A, the inspector questioned whether inadequate design control during the design and fabrication of the key in 1989 may have led to the 1991 failure. This concern was brought to the attention of VY and specifically to the maintenance supervisor, who acknowledged that if the root cause(s) were not adequately understood, conditions adverse to quality may exist and not be corrected. VY implemented their corrective action process (AP 0007) to resolve this issue.

The inspector reviewed the completed CAR, interviewed the cognizant engineer, and concluded that recent improvements in the maintenance department procedures would prevent recurrence. VY had aggressively pursued the failure mechanism of the key by initiating a series of failure mechanism tests on the bar stock used to fabricate the key. The actual key was also sent to an independent laboratory for failure testing and macroscopic and microscopic examination. Material testing by YNSD is continuing. In addition, communications between VY, YNSD, and the valve manufacturer (Crane Alloyco) has possibly resulted in enhanced material and design characteristics of the key to improve performance.

VY identified that the apparent root cause was higher than normal cyclic loading on the key as a result of the valve RHRSW-89A being installed backwards since plant construction. This condition was identified in May 1989 and subsequently corrected. Contributing root causes were the lack of a radius at the tang/body interface, possible undercutting of the "tang" portion of the key causing a potential fatigue failure initiation point, and the milling of 0.025" from one side of the tang possibly resulting in higher than normal impact loading.

The documents reviewed by the inspector confirmed that VY understands that there were weaknesses during the fabrication and design control of the key in 1989. These weaknesses involved the milling of the 0.025" was performed without an engineering evaluation; the different dimensional attributes between the 89A and 89B anti-rotation devices; and, inadequate documentation of the heat treatment process used on the keys.

The corrective action initiated by VY was to replace the anti-rotation devices in both the 89A and 89B valves. VY considered this necessary to ensure that the installed keys were of the highest quality and of the most recent design improvements. The inspector considers this a conservative maintenance action. Despite this, VY has not identified any areas of improvement in the fabrication or design control processes, because, as they contend, recent changes in the maintenance department organization intended to provide improved maintenance engineering and supervisory involvement, and their current procedures for one-for-one replacements will preclude the installation of on-site manufactured parts that are not subject to adequate reviews. The inspector acknowledges that procedures for heat treatment and one-for-one replacements have improved since 1989. The inspector will continue to assess the effect of the maintenance department reorganization on maintenance department programs and processes.

## **7.2 Aging Related Failure of Gould Relays**

Recently, the NRC became aware of another facility that was experiencing accelerated aging related failures of 120 VAC Gould relays using J20M coils. The inspector contacted the VY Electrical Engineering and Construction (EE&C) supervisor to ascertain if similar relays were in use at the plant in safety-related applications and, if in use, what was their performance.

On January 6, the EE&C supervisor informed the inspector that the subject relays were not in use in safety-related applications. The plant engineering staff's effort was timely and the inspector had no further questions on this matter.

## **7.3 Shutdown Cooling System Isolation**

Loss of the "B" shutdown cooling loop occurred on a number of occasions in 1991. Initial NRC review was documented in Inspection Report 91-07, Section 2.2.4, which indicated that VY was postulating as a possible root cause that a pressure surge/water hammer was resulting from the initial startup of the residual heat removal (RHR) pumps. Licensee Event Report (LER) 91-06 and associated supplements were issued by VY to document their investigation and corrective actions. Temporary instrumentation was installed to monitor pressure at various points in the "B" loop during the plant shutdowns that occurred on April 23, June 15, and September 8. Testing conducted on these dates provided data to evaluate the performance of permanently installed instrumentation and the system's response to the startup of loop "B" RHR pumps.

A shift engineer (SE) was assigned the task of reviewing and evaluating available operational and special instrumentation data; including cool-down/depressurization periods, reactor pressure, reactor level, status of recirculation pumps, PCIS Group IV isolation occurrences, and

relationship of pressure data at various points in the system to flushing operations. This investigation and evaluation resulted in a conclusion that a section of RHR piping between the inboard check valve and the outboard injection valve remains in a depressurized state after the "B" loop has been flushed prior to pump startup. VY has postulated that the depressurized state of this line is responsible for the abnormally high pressure surge (approximately 120 psig) which occurs the first time a RHR pump in the "B" loop is started.

To correct this postulated condition, VY has proposed a RHR system operation procedure change that will enable pressurization of the subject piping subsequent to flushing the RHR piping prior to the startup of an RHR pump. The SE's evaluation and proposed corrective actions were reviewed and endorsed by the cognizant on-site engineering group and Operations Department management. Department Instruction No. 92-02 to procedure OP 2124, Rev. 27, "Residual Heat Removal System," was developed on January 21 to incorporate the pressurizing process, and was submitted to the Plant Operations Review Committee for its review. Prior to the next startup of the "B" RHR loop in the shutdown cooling mode of operation, supplemental instrumentation will be installed to monitor system pressures and verify the adequacy of the corrective actions implemented. Should additional corrective actions be warranted, VY has identified follow-on procedural changes and testing that should then be considered. VY plans on documenting all their evaluations and corrective actions in Corrective Action Report 91-26, once the ultimate root cause of these events is conclusively identified and corrected.

VY's investigation of this issue was systematic and aggressive. A good level of engineering and technical support was also used to resolve this issue. Communications between the various departments to facilitate an organizational level resolution was notable. Activities involved in the investigation used established administrative controls and had appropriate levels of management review. The inspector had no further question on this issue at this time.

## **8.0 SAFETY ASSESSMENT AND QUALITY VERIFICATION (90712, 92700, 90713, 40500)**

### **8.1 Licensee Event Reports (LER)**

The inspector reviewed the LERs listed below and determined that, with respect to the general aspects of the events; (1) the report was submitted in a timely manner, (2) the description of the event was accurate, (3) a root cause analysis was performed, (4) safety implications were considered, and (5) corrective actions implemented or planned were sufficient to preclude recurrence of a similar event.

LER 91-06, Supplement 2, "Loss of 'B' Loop Shutdown Cooling Due to Pressure Switch Actuation." VY's investigation and corrective actions in response to this event is further reviewed in Section 7.3 of this report. This LER supplement updated the LER to document continuing testing and evaluations being conducted to identify the root cause of unintended shutdown cooling system isolations. The additional testing and corrective actions described in this supplement exceeded the previous commitment made by VY, as last documented in Section

7.1 of Inspection Report 91-19. Verification of the adequacy of implemented corrective actions will occur during the 1992 refueling outage. Should further corrective actions be required, a supplemental LER will be submitted. This LER remains open pending additional NRC review on this issue.

LER 91-16, "Failure to Perform Correct Daily Instrument Checks Due to Technical Specification Human Factors Weakness." This LER is reviewed in Section 4.4.1 and is closed.

LER 92-01, "Inadvertent High Pressure Coolant Injection (HPCI) System Suction Transfer." On January 13, VY retracted a 10 CFR 50.72 Emergency Notification System report that described a spurious transfer of the HPCI suction from the condensate storage tank (CST) to the torus that occurred on December 19, 1991. Normally, HPCI suction will shift to the torus on low CST level. A suction transfer does not cause HPCI to initiate core injection; injection initiates on signals from reactor vessel low-low (82.5") water level or high drywell pressure (+2.5 psig). However, control room operators verified HPCI system parameters, manually shifted HPCI suction back to the CST, and appropriately made a 4-hour notification. The event did not repeat and a system functional test did not identify any problems.

The original VY assessment on the reportability of this event was completed January 13 and concluded that this event did not constitute an ESF actuation and was not reportable. On January 13, VY called the NRC Operations Center to officially retract its December 19, 1991, 4-hour notification, and indicated no LER would be submitted on this event. However, on January 17, during a meeting between the inspector and the Technical Services Superintendent (TSS) on this issue, VY was informed that based on NRC expectations on reportability and the definition of an ESF actuation, that an LER for this event should be submitted.

Discussions on the reportability aspects of this event were held with the NRC staff and NRC:RI cognizant management representative. The NRC's view that this event was reportable was communicated to the TSS on January 21. The TSS acknowledged the inspector's comments and indicated that within 30 days from January 21 an LER would be issued. This resolved the reportability issue in a satisfactory manner.

## 8.2 Periodic and Special Reports

The plant submitted the following periodic and special reports which were reviewed for accuracy and the adequacy of the evaluation:

- Monthly Statistical Report for December 1991
- Biweekly Status of Fuel Failure Parameter Trends dated January 7, 1992
- Monthly Feedwater Nozzle Temperature Monitoring for December 1991
- Quarterly Housekeeping Inspections for October - December 1991

## 9.0 MANAGEMENT MEETINGS (30702)

### 9.1 Preliminary Inspection Findings

At periodic intervals during this inspection, meetings were held with senior plant management to discuss preliminary inspection findings. A summary of findings for the report period was also discussed at the conclusion of the inspection and prior to report issuance. No proprietary information was identified as being included in the report.

An unresolved item is a matter about which more information is required to ascertain whether it is an acceptable item, a deviation or a violation. An unresolved item is discussed in Section 6.2 of this report.

### 9.2 Region Based Inspection Findings

Two Region based inspections were conducted during this inspection period. Inspection findings were discussed with senior plant management at the conclusion of the inspections.

<u>Date</u>	<u>Subject</u>	<u>Rpt. No.</u>	<u>Inspector</u>
01/13-17/92	Design Modification Review	92-02	S. Chaudhary
01/27-31/92	Preparations for Licensed Operator Requalification	92-03	S. Hansell

### 9.3 Significant Meetings

On January 22 the Senior Resident Inspector attended a meeting held at the NRC Region I office with VY representatives to discuss a pending inspection in the area of Emergency Operating Procedures.