

U. S. NUCLEAR REGULATORY COMMISSION

REGION III

Docket No: 50-346  
License No: NPF-3

Report No: 50-346/98004(DRP)

Licensee: Toledo Edison Company

Facility: Davis-Besse Nuclear Power Station

Location: 5501 N. State Route 2  
Oak Harbor, OH 43449

Dates: February 18 - March 31, 1998

Inspectors: S. Campbell, Senior Resident Inspector  
K. Zellers, Resident Inspector

Approved by: Thomas J. Kozak, Chief  
Reactor Projects Branch 4

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## EXECUTIVE SUMMARY

### Davis-Besse Nuclear Power Station NRC Inspection Report No. 50-346/98004(DRP)

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

#### Operations

- Overall, the conduct of operations was well executed and managed (Section O1.1).
- Implementation of the new work support center has significantly reduced distractions in the control room. Further, the administrative workload of the control room senior reactor operator has been reduced, allowing him to devote more of his attention towards supervising control room and shift personnel and towards observing the performance of plant equipment (Section O1.2).
- Overall, observed simulator training was pertinent and effective towards providing assurance that operators were proficient to shut down the plant in an orderly manner (Section O5.1).
- The inspectors reviewed a Quality Assessment Audit Report that evaluated the effectiveness of control room activities. The inspectors concluded that the findings were generally consistent with observations made by the inspectors and that it had good scope and depth (Section O7.1).

#### Engineering

- Weak engineering support to maintenance activities led to the inadvertent breach of the emergency ventilation system negative pressure boundary when workers drilled through a drain pipe imbedded in the decay heat removal heat exchanger room. Although no spread of contamination occurred, breaching the boundary exposed the workers to a potentially contaminated system. Clear guidance on the necessary drawings for the engineers to review before approving the drilling location was not readily available to the evaluating engineer due to this being an infrequently performed evolution. The plant response to the event was timely and adequate. The proposed corrective actions were acceptable (Section E4.1).
- The inspectors observed activities of the licensee's offsite review committee. The inspectors concluded that the offsite review committee members effectively communicated concerns and suggestions with plant management (Section E7.1).
- The inspectors concluded that engineering personnel performed a thorough and detailed review of the concerns raised by Information Notice 97-90, "Use of Non-conservative Acceptance Criteria In Safety-Related Pump Surveillance Tests" (Section E7.2).
- The licensee was adequately addressing NRC and self-identified Updated Safety Analysis Report discrepancies (Section E8.1).



### Plant Support

- The licensee continued maintaining proper control of radiological areas and proper control of personnel entering and exiting these areas (Section R1).
- Security management issued a memorandum to heighten security officer awareness following recent lapses in security guard attentiveness to their duties. These expectations were discussed during shift security turnovers. Security guard attentiveness improved subsequent to this action (Section S1.1).
- The central and secondary alarm stations were staffed with attentive and knowledgeable personnel. The licensee appropriately identified and replaced degraded equipment with temporary equipment before the end of the inspection period (Section S2.1)



## Report Details

### Summary of Plant Status

The plant was operated at approximately 100 percent until about March 8, 1998, when a coastdown in plant power was started due to depleted fuel. At the end of the inspection period, the plant was at approximately 79 percent power.

## I. Operations

### **O1    Conduct of Operations**

#### **C1.1    General (71707)**

Operators conducted thorough shift briefs, and communicated an appropriate amount of detail relating to operational conditions and considerations. When questioned, operators were cognizant of the status of alarmed plant annunciators and were aware of equipment taken out of service for maintenance or testing activities. The inspectors observed that turnover of control room watch standing responsibilities was performed with emphasis placed on changed plant conditions. The inspectors noted that the operations manager and the plant manager conducted frequent control room observations. Overall, the conduct of operations was well executed and managed.

#### **O1.2    Operations Work Support Center (71707)**

##### **a.    Inspection Scope (71707)**

The inspectors observed the results of the implementation of a new operations work support center.

##### **b.    Observations and Findings**

The licensee implemented a new operations work support center in an effort to reduce administrative burden from the control room senior reactor operator and to minimize the amount of control room traffic. This policy was implemented by conducting a work support center outside of the control room. Many administrative tasks that were previously performed in the control room by senior reactor operators were reassigned to the outside assistant senior reactor operator and the shift manager who were also relocated from the control room to the work support center. Consequently, the inspectors observed that the control room senior reactor operator had more time to devote his attention towards the supervision of control room and shift personnel and equipment.

The inspectors observed that this shift in responsibilities will require increased attentiveness on the part of operations personnel and management to ensure that effective communication is maintained such that control room operators remain aware of plant work activities. Additionally, the shift supervisor now has to decide, based upon activity level and workload, as to whether he should be located in the control room or the



work support center. The inspectors will continue to monitor plant operations and the work control process for continued effective communication and adjustments in staffing responsibilities.

c. Conclusions

The initial implementation of the new work support center concept significantly reduced distractions in the control room. Further, the administrative workload of the control room senior reactor operator has been reduced, allowing him to devote more of his attention towards supervising control room and shift personnel and towards observing the performance of plant equipment.

O1.1 Frequently Used Procedures (71707)

While observing an equipment operator add hydrogen to the makeup tank on February 26, 1998, the inspectors noted that no procedure was at the work site because the evolution was characterized as a frequent use procedure. Many of the procedural steps were required to be performed sequentially and, since a hard copy procedure was not used, the inspectors questioned the operations manager as to the assurance that the procedure would be performed in the correct sequence. The operations manager indicated that a more robust method of performing procedures of this type was desired, and that this issue would be addressed with all of the shift supervisors. The inspectors concluded that no operator errors occurred during this evolution.

**O2 Operational Status of Facilities and Equipment**

O2.1 System Walkdowns (71707)

The inspectors walked down the accessible portions of the following engineered safety features and important-to-safety systems during the inspection period:

- Motor Driven Feed Pump
- Containment Spray Trains 1 and 2
- Containment Air Cooler Trains 1 and 2
- Emergency Ventilation Trains 1 and 2
- Emergency Diesel Generator Trains 1 and 2

No concerns were identified as a result of the walkdowns. System valves, dampers, and attendant instrumentation lineups were verified to be consistent with plant procedures/drawings and the Updated Safety Analysis Report. Pump/motor fluid levels were within their normal bands. Generally, equipment material condition was good.

**O5 Operator Training and Qualification**

O5.1 Simulator Observations (71707)

The inspectors attended two sessions of operator requalification sessions on the control room simulator. The training evolution was for shutting down the plant to the point where decay heat removal could be placed online. The inspectors concluded that the simulator instructors provided good input to the training, that they generally emphasized clear



communications, and that they provided insights on operational experiences from other utilities. The operators were well focused, and were receptive to criticism. Overall, the training observed was pertinent and effective towards assuring that these operators were prepared to shut down the plant.

## **O7 Quality Assurance in Operations**

### **O7.1 Review of Operations Quality Assessment Report (71707)**

The inspectors reviewed Quality Assessment Audit Report AR-97-OPSNF-01. The audit evaluated the effectiveness of control room activities including procedure use, turnover practices, work control activities, technical specification operability tracking and operations self assessment efforts. The inspectors determined that the findings of the audit were generally consistent with observations made by the inspectors and the audit had good scope and depth. The inspectors reviewed the response of the operations department to the audit report and concluded that the audit findings were adequately corrected to prevent recurrence.

## **O8 Miscellaneous Operations Issues (92901)**

### **O8.1 (Closed) Violation 50-346/96003-02 (DRP)**

Inadvertent Transfer of Reactor Coolant System Inventory. This violation concerned an event where over 200 gallons of reactor coolant was inadvertently drained to the reactor coolant drain tank due to an operator not shutting a minimum flow valve prior to opening DH-830 as required by the procedure. The licensee's subsequent corrective actions included counseling the operators involved in the incident on the need to be attentive to plant conditions and to be observant of operating procedure requirements. The event was reviewed with all operators and licensed personnel during operator requalification training completed on July 6, 1996. A new site-wide procedure was developed to consolidate and make consistent management's expectations for procedure adherence. The inspectors also observed that plant personnel displayed greater awareness of the importance of reviewing procedure requirements prior to usage.

## **II. Maintenance**

## **M1 Conduct of Maintenance**

### **M1.1 Maintenance and Surveillance Activities (61726)(62707)**

The following maintenance and surveillance testing activities were observed/reviewed during the inspection period:

DB-SS-04040	Low Voltage Switchgear Room 429 (Bus E) Ventilation System
DB-MI-03729	Channel Calibration of Channel 1 Containment Vessel Atmosphere Hydrogen Analyzer
DB-NE-06102	New Fuel Receipt, Inspection, and Storage
DB-SC-03077	Emergency Diesel Generator 2 184 Day Test



Problems encountered during testing activities were investigated and corrected in an orderly manner. No significant concerns relating to procedural compliance were noted. See Sections M3.1 and E3.1 for further discussion relating to the hydrogen analyzer calibration. All equipment operated in accordance with descriptions in the Updated Safety Analysis Report (USAR).

### **M3 Maintenance Procedures and Documentation**

#### **M3.1 As-Found and As-Left Calibration Readings for Containment Hydrogen Analyzer Not Recorded Properly**

##### **a. Inspection Scope (61726)**

The inspectors observed the performance of DB-MI-03729, "Channel Calibration of Channel 1 Containment Vessel Atmosphere Hydrogen Analyzer," on February 25, 1998.

##### **b. Observations and Findings**

While maintenance personnel calibrated the containment hydrogen analyzer, the inspector noted that the as-found zero reading was recorded after adjusting the analyzer and the as-left zero reading was recorded before the final adjustment was made. Normally, the accepted industry practice was to record as-found reading before adjusting equipment and to record as-left reading after all adjustments have been completed. This practice allows trending of instrument drift between calibrations.

Although the inspectors determined that this analyzer was not in the trending program for zero set-point drift and that properly recording this data was currently insignificant, the licensee could have potentially gathered inaccurate data if trending was subsequently instituted. The licensee agreed with the inspectors' assessment and made preliminary plans to enhance the procedure by submitting a procedure change request to record the readings consistent with industry practice.

The inspectors determined that the calibration procedure was adequate to perform a valid calibration of the hydrogen analyzer and that it properly recorded the as-found and as-left span readings.

##### **c. Conclusions**

The containment hydrogen analyzer calibration procedure described a method of recording the as-found and as-left hydrogen analyzer zero set points different than the normal industry practice. Consequently, the inspectors concluded that inaccurate trending data could be gathered if this method was used for trending zero set-point drift. The licensee planned to enhance the procedure to address this issue.



### III. Engineering

#### **E3 Engineering Procedures and Documentation**

##### **E3.1 Updated Safety Analysis Report (USAR) Review (61726)**

###### **a. Inspection Scope (61726)**

The inspectors reviewed the USAR following observation of a containment hydrogen analyzer surveillance test.

###### **b. Observations and Findings**

The inspectors reviewed the USAR description of the containment isolation valves for the hydrogen analyzer system and found that information regarding the list of containment isolation valves was confusing. System Tables 6.2-25, 6.2-26, and 6.2-27 did not include all containment isolation valves. Although the tables appeared to be incomplete, a complete list of the containment isolation valves was available in USAR Table 6.2-2. When this observation was discussed with the system engineer, he also concluded that the USAR descriptions were unclear and submitted Request for Assistance 98-0070 to provide resolution. Discussions with licensing personnel revealed that an effort to clarify the USAR entry would be made before the next USAR update scheduled six months after the upcoming refueling outage.

###### **c. Conclusions**

The inspectors identified that a USAR description was misleading because all of the containment isolation valves were not listed in the referenced tables. However, a complete list of the containment isolation valves was available in a separate table. The Request for Assistance that was generated adequately addressed the issue.

#### **E4 Engineering Staff Knowledge and Performance**

##### **E4.1 Imbedded Auxiliary Building Drain Pipe Inadvertently Drilled Through**

###### **a. Inspection Scope (62707)**

The inspectors reviewed an event where maintenance personnel inadvertently drilled through a potentially contaminated drain pipe that was imbedded inside a concrete wall in the decay heat removal heat exchanger room.

###### **b. Observations and Findings**

During performance of a maintenance work order (MWO 2-97-0068-01) to install seismic supports for the decay heat removal heat exchanger, maintenance personnel encountered obstructions while drilling holes in a concrete wall. They thought rebar caused the obstructions and contacted an engineer for guidance before continuing the work. After obtaining approval from the engineer, they continued drilling but stopped when the workers realized they had drilled through a drain pipe instead of rebar. The drain pipe was used to drain water from drains in the radiologically restricted area (e.g.



inside the makeup pump room). No spread of contamination occurred during the event but drilling the hole did breach the emergency ventilation pressure boundary. The licensee initiated Potential Condition Adverse to Quality Report (PCAQR) 98-0361 to document the event. Operations personnel then calculated the total emergency ventilation system boundary leakage and determined that the emergency ventilation system remained operable. Further, the licensee established administrative controls to prohibit the use of this drain pipe until the pipe was repaired.

Upon review, the licensee determined that the design engineer had reviewed three other drawings that depicted imbedded piping but was unaware of a fourth drawing that showed this detail. According to the design engineer, evaluating for imbedded piping was an infrequently conducted activity and clear guidance was unavailable on what drawings to review. The licensee's proposed corrective action was to train engineers on the correct drawings to review and to provide more written guidance to engineering personnel on what drawings to reference.

The inspectors determined that the licensee responded appropriately to the event after it had occurred. The inspectors determined that existing programs and procedures as well as the planned corrective actions were adequate to ensure that the event would not recur.

c. Conclusions

Maintenance personnel inadvertently drilled through an imbedded pipe, which breached a negative pressure boundary for the emergency ventilation system. Although no contamination occurred, breaching the boundary exposed the workers to a potentially contaminated system. Because the imbedded pipe evaluation was an infrequently conducted activity, clear guidance on the necessary drawings to review before approving the drilling location was not available to the evaluating engineer. The plant response to the event was timely and adequate. The proposed corrective actions were acceptable.

**E7 Quality Assurance in Engineering Activities**

**E7.1 Offsite Review Committee (71707)**

The inspectors observed activities of the licensee's offsite review committee on February 26, 1998. Members gathered information for their discussions from station audits, external reviews and personnel interviews. In general, good conclusions relating to the performance of the plant were discussed with plant management by the subcommittee chairmen. These conclusions were generally consistent with observations of plant performance made by the inspectors. Plant management accepted an action to provide more training and emphasis in the area of self-assessment. Also discussed was the importance of constant vigilance in the area of human performance. The inspectors concluded that the offsite review committee effectively communicated concerns and suggestions with plant management.

**E7.2 Review of Information Notice 97-90 (37551)**

The inspectors followed up on engineering personnel's initial response to Information Notice 97-90, "Use of Non-conservative Acceptance Criteria In Safety-Related Pump



Surveillance Tests." The licensee documented the issue in a PCAQR to ensure the potential issue was addressed. The inspectors interviewed the person who was assigned the action for the PCAQR and determined that he was properly qualified for the activity. Further, the inspectors determined that the assigned individual had conducted a thorough review of the pump curve design basis document book in order to address the Information Notice concerns. The engineer properly addressed some inconsistent documentation regarding acceptance criteria for determining the acceptability of pump performance characteristics. The inspectors concluded that engineering personnel conducted a thorough and detailed review of the concerns raised by Information Notice 97-90.

## **E8 Miscellaneous Engineering Issues (92903)**

### **E8.1 (Closed) Inspection Follow-up Item 50-346/95009-03 (DRP)**

Updated Safety Analysis Report Discrepancies Noted. A fuel manipulation in the spent fuel pool resulted in approximately a 23 mr/hr dose rate which was greater than the maximum dose rate expected per USAR Figure 12.1-4. The condition that caused the event, manipulating spent fuel close to the cask pit gate while the cask pit level was drained, has been procedurally prohibited from recurring. Subsequent discussions with RP management indicated that Figure 12.1-4 dose rate descriptions were misleading. In response, the licensee issued USAR Change Notice 98-019 to clarify Figures 12.1-1 through -6 to reflect more accurately the basis for the reported radiation levels.

Original USAR system descriptions were maintained in Chapter 15 of the document. This could be misleading at times. For instance, the USAR originally stated that following a 100 percent load rejection, the reactor would not trip. Due to a plant modification, the plant may trip under this circumstance. This plant response was stated in an addendum to the original USAR section. The inspectors informed the licensee that should an individual only read the original USAR section, actions could be initiated on outdated information. The licensee acknowledged the inspectors observation and, in response, Procedure Change Request 98-0742 for NG-NS-00806, "Preparation of USAR Changes," was issued. This change let future reviewers know that both the original and addendum analyses must be reviewed to gain a complete understanding of the individual accident analysis.

The licensee had completed a Phase 1 multi-disciplinary staff review and an Nuclear Energy Institute initiative review of the USAR and had discovered many discrepancies. Based on these evaluations, the licensee planned to do a Phase 2 review scheduled to be completed by November of 1998. The majority of the discrepancies were of minor significance and were being addressed through the USAR Change Notice process. The more significant discrepancies were being identified, analyzed, and resolved through the PCAQR process.

The inspectors concluded that the licensee was applying adequate resources to address the inspectors concern with misleading and inaccurate USAR descriptions. Also, the licensee was applying adequate resources towards identifying, analyzing, and resolving USAR discrepancies.



E8.2 (Closed) Violation 50-346/96005-08 (DRP)

Untimely Safety Evaluation Relating to Draining and Abandonment of the Primary Water Storage Tank. Although the inspectors determined that an adequate 10 CFR 50.59 safety evaluation for abandoning the Primary Water Storage Tank had been conducted, the records showed that the tank was drained of water in preparation for abandonment prior to the safety evaluation being completed.

The inspectors reviewed PCAQR 96-1104 that was generated because of the discrepancy. The licensee determined that the cause of this violation was poor judgement in implementing site processes by the individuals involved. As corrective actions, the licensee conducted training for operations personnel highlighting expectations for addressing safety evaluations much earlier. Plant engineers also received training to address requirements for abandoning equipment. Further, guidance for doing safety reviews and subsequent safety evaluations was included into a revision of Procedure DB-OP-00016, "Removal and Restoration of Station Equipment." The inspectors concluded that all corrective actions that had been proposed and completed were sufficient to prevent recurrence.

E8.3 (Open) Unresolved Item 50-346/97003-04(DRP)

Service Water Strainer Blowdown Valve Failures. A failure of the service water strainer blowdown valve was attributed to, in part, relay racing in the control circuit. To correct the situation, new auxiliary relays were installed and modifications to the control circuits were made. The modification provided seal-in contacts to the auxiliary relays to ensure they would latch and trip upon actuation. Without a seal-in contact, the auxiliary relay was susceptible to not being energized long enough to latch or trip. Consequently, the main relay contact would open to interrupt power to the auxiliary relay before the auxiliary relay could latch or trip.

The licensee identified 30 other safety related control circuits that had an identical control circuit arrangement. Most of the systems were for ventilation and support equipment. Consequences of having a relay race phenomenon in these circuits ranged from improper valve and damper positioning in safety related ventilation and service water systems, to improper indication of equipment operating status. The licensee had finished their recommendations for corrective actions for the other systems and was proposing various degrees of action, ranging from modification of control circuitry to addressing problems on an as-fail basis. The inspectors had not completed their review of the remaining systems to conclude if the proposed corrective actions were appropriate. The inspectors were waiting for the licensee's response to questions relating to the consistency of corrective actions, the validity of the basis for the decision to do nothing to some systems and to address problems on an as-fail basis.

E8.4 (Open) Unresolved Item 50-346/97011-01 (DRP)

Component Cooling Water Ventilation System Determined Inoperable on Two Occasions. On two occasions, the inspectors contributed to the discovery of inoperable and degraded component cooling water ventilation systems. Upon review of the PCAQRs that were generated as a result of the inspectors initial findings, the inspectors had additional questions that warranted additional inspection effort. The questions related to:



- the thoroughness of corrective action documentation
- PCAQR categorization
- missing documentation of experience reviews,
- adequacy of current corrective action,
- extent of the condition on components of similar design and,
- not generating a PCAQR to address possible ineffective implementation of the minor modification process.

Consequently, this item could not be dispositioned by the end of the inspection period.

#### IV. Plant Support

##### **R1 Radiological Protection and Chemistry (RP&C) Controls**

###### **R1.1 General (71750)**

During tours of radiologically restricted areas, the inspectors noted that signs and postings provided adequate notification of radiological conditions and that the postings accurately reflected the general dose rates. Station personnel were observed to be adhering to radiological protection procedures during in processing and out processing to and from the radiologically restricted area.

##### **S1 Conduct of Security and Safeguards Activities**

###### **S1.1 Distracted Security Guard at Personal Processing Facility (71750)**

During ingress into the plant, the inspectors noted that a guard was distracted from his duties because the guard had been conversing with another guard. The inspectors were concerned that security errors and inattentiveness may be increasing, given that similar recent events had happened at the plant. In response to the concern, the security manager issued a memorandum to the guards stressing the manager's expectations for heightened awareness of security duties, especially with increased activity during the upcoming outage. Since then, the inspectors have noted a decrease in distractions and that no other similar errors had occurred.

##### **S2 Status of Security Facilities and Equipment**

###### **S2.1 Tours of the Central and Secondary Alarm Stations (71750)**

The inspectors toured the central and secondary alarm stations and determined that the stations were manned with attentive security guards who were knowledgeable of their assigned duties. The inspectors noted that the equipment in the central alarm station was generally in good condition. However, two pieces of equipment were degraded. The licensee had previously recognized this condition and replaced the degraded equipment with temporary equipment before the end of the inspection period. The temporary equipment will remain until permanent replacements can be installed during a security upgrade scheduled for 1999.



## 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 March 31, 1998. 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.



## PARTIAL LIST OF PERSONS CONTACTED

### Licensee

J. K. Wood, Vice President, DB Nuclear  
L. W. Worley, Director, Nuclear Assurance  
J. L. Michaelis, Manager, Maintenance  
M. C. Beier, Manager, Quality Assessment  
J. W. Rogers, Manager, Plant Engineering  
F. L. Swanger, Manager, Davis-Besse Design  
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D. H. Lockwood, Supervisor, Compliance  
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D. R. Ricci, Supervisor, Operations  
S. A. Coakley, Supervisor, Outage  
J. E. Reddington, Superintendent, Mechanical Services  
R. B. Coad, Superintendent, Radiation Protection  
G. M. Wolt, Engineer, Licensing  
M. A. Koziel, Auditor  
T. Kozlowski, Licensing Student



## INSPECTION PROCEDURES USED

IP 37551:	Onsite Engineering
IP 61726:	Surveillance Observations
IP 62707:	Maintenance Observation
IP 71707:	Plant Operations
IP 71750:	Plant Support Activities
IP 92700:	Onsite Follow-up of Written Reports of Nonroutine Events at Power Reactor Facilities
IP 92901:	Followup - Plant Operations
IP 92903:	Followup - Engineering

## ITEMS CLOSED AND DISCUSSED

### Closed

50-346/96003-02 (DRP)	VIO	Inadvertent Transfer of Reactor Coolant System Inventory
50-346/95009-03 (DRP)	IFI	Updated Safety Analysis Report Discrepancies Noted
50-346/96005-08 (DRP)	VIO	Untimely Safety Evaluation for PWST

### Discussed

50-346/97003-04 (DRP)	URI	Service Water Strainer Blowdown Valve Failures
50-346/97011-01 (DRP)	URI	Inoperable Component Cooling Water Ventilation System



#### LIST OF ACRONYMS AND INITIALISMS USED

CFR	Code of Federal Regulations
DRP	Division of Reactor Projects, Region III
IFI	Inspection Followup Item
IR	Inspection Report
MWO	Maintenance Work Order
NEI	Nuclear Energy Institute
NRC	Nuclear Regulatory Commission
PCAQR	Potential Condition Adverse to Quality Report
PCR	Procedure Change Request
PDR	Public Document Room
PWST	Primary Water Storage Tank
RFA	Request For Assistance
RRA	Radiological Restricted Area
TS	Technical Specification
URI	Unresolved Item
USAR	Updated Safety Analysis Report
VIO	Violation