May 30, 2003

Mr. Lew W. Myers
Chief Operating Officer
FirstEnergy Nuclear Operating Company
Davis-Besse Nuclear Power Station
5501 North State Route 2
Oak Harbor, OH 43449-9760

SUBJECT: DAVIS-BESSE NUCLEAR POWER STATION
NRC SUPPLEMENTAL INSPECTION AND RADIATION PROTECTION
PROGRAM EFFECTIVENESS REVIEW REPORT NO. 50-346/03-08(DRS)

Dear Mr. Myers:

On April 15, 2003, the U. S. Nuclear Regulatory Commission (NRC) completed a supplemental inspection and radiation protection program effectiveness review at the Davis-Besse Nuclear Power Station. The results of this inspection were discussed with you and other members of your staff during a public exit meeting on April 15, 2003. The enclosed report presents the result of this inspection.

On February 20, 2002, several contract workers were both internally and externally radioactively contaminated while installing steam generator nozzle dams at the Davis-Besse plant. In August 2002, the NRC staff became aware that removable contamination surveys (smears) and air samples collected previously from various areas of the plant, including an air sample taken inside one of the steam generators, exhibited trace amounts of transuranic (TRU) isotopes. Subsequently, your staff collected fecal and urine samples from the individuals that were contaminated in February 2002, and analyses indicated that alpha emitting TRU materials contributed to these intakes. On September 30, 2002, the NRC dispatched a special inspection team to the Davis-Besse site to evaluate the radiological work planning and controls for the steam generator nozzle dam work, to review your follow-up actions for the incident and to assess the dose consequences from the internal contaminations. The results of that inspection are documented in NRC Inspection Report No. 50-346/02-16(DRS), issued January 7, 2003. On February 19, 2003, the NRC completed its final significance determination for the problems identified during the September/October 2002 special inspection and issued two White findings and a Notice of Violation.

Your staff performed evaluations to identify the root causes and those factors that contributed to your staff's failure to adequately: (1) evaluate the radiological hazards to characterize the steam generator work conditions prior to nozzle dam installations in February 2002; and

(2) perform timely and suitable measurements to monitor the occupational intake of radioactive material by workers during and following work in the steam generators. Additionally, comprehensive reviews were completed by your contractors in December 2002, which assessed the overall adequacy of your radiation protection program.

An NRC inspection team completed this supplemental inspection in accordance with Inspection Procedure 95002, "Inspection For One Degraded Cornerstone or Any Three White Inputs In a Strategic Performance Area," to assess your staff's root cause evaluations and corrective actions for the two White findings in the occupational radiation safety cornerstone. In addition, relevant sections of Inspection Procedure 95003, "Inspection for Repetitive Degraded Cornerstones, Multiple Degraded Cornerstones, Multiple Yellow Inputs, or One Red Input" were used as guidance during this inspection. The purpose of the supplemental inspection was to: (1) provide assurance that the root and contributing causes for the individual White findings in the occupational radiation safety area and the collective performance which resulted in the degraded cornerstone are understood; (2) independently assess the extent of condition and generic implications of these performance issues; and (3) provide assurance that the corrective actions are sufficient to prevent recurrence. Additionally, this inspection reviewed your actions to address NRC 0350 Panel Restart Checklist item no. 3.h., associated with the effectiveness of your programs in both the occupational and public radiation safety areas.

The inspection effort was an examination of activities conducted under your license as they relate to safety and to compliance with the Commission's rules and regulations and with the conditions of your license. Within these areas, the inspection consisted of a selective review of procedures and representative records, observation of radiological work activities and practices, and interviews of personnel.

The team concluded that your root cause evaluations for the White performance issues were completed using systematic techniques, were conducted at the appropriate depth, and adequately identified the primary and contributory causes of the issues. We also concluded that your corrective action plans were adequate to address the root and contributing causes that were identified in your evaluation so as to prevent recurrence. Additionally, we determined that significant progress has been made to improve your radiation protection program. Your analyses of the White performance issues determined that inadequate work direction and management systems, including problems with radiation protection management oversight, were the root causes of the performance problems, and recent changes have been made in radiation protection management. Recognizing the need for lasting improvement in the effectiveness of the radiation protection program, Restart Checklist Item No. 3.h will remain open pending the results of an upcoming baseline inspection of the radiation protection program. That inspection will take place the week of July 14, 2003, and will focus on the effectiveness of your ALARA and radioactive material control programs.

Based on the results of this inspection, the NRC identified one issue of very low safety significance (Green). The issue was determined to involve a violation of NRC requirements. However, because of its very low safety significance and because it has been entered into your corrective action program, the NRC is treating this issue as a Non-Cited Violation, in accordance with Section VI.A.1 of the NRC's Enforcement Policy. If you deny this Non-Cited

Violation, you should provide a response with the basis for your denial, within 30 days of the date of this inspection report, to the Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington DC 20555-0001; with copies to the Regional Administrator, Region III; the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Resident Inspector at the Davis-Besse facility. Otherwise, no response to this inspection report is required.

This also acknowledges receipt of your letter dated March 21, 2003, in reply to our February 19, 2003 letter which transmitted the NRC's final significance determination and Notice of Violation for the two White findings. We have no further questions regarding your reply.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records System (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Sincerely,

/RA/

John A. Grobe, Chairman
Davis-Besse Oversight Panel

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

Enclosure: NRC Inspection Report No. 50-346/03-08(DRS)

cc w/encl: The Honorable Dennis Kucinich
B. Saunders, President - FENOC
Plant Manager
Manager - Regulatory Affairs
M. O'Reilly, FirstEnergy
Ohio State Liaison Officer
R. Owen, Ohio Department of Health
Public Utilities Commission of Ohio
President, Board of County Commissioners
Of Lucas County
Steve Arndt, President, Ottawa County Board of Commissioners
D. Lochbaum, Union Of Concerned Scientists

Violation, you should provide a response with the basis for your denial, within 30 days of the date of this inspection report, to the Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington DC 20555-0001; with copies to the Regional Administrator, Region III; the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Resident Inspector at the Davis-Besse facility. Otherwise, no response to this inspection report is required.

This also acknowledges receipt of your letter dated March 21, 2003, in reply to our February 19, 2003 letter which transmitted the NRC's final significance determination and Notice of Violation for the two White findings. We have no further questions regarding your reply.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records System (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Sincerely,
/RA/

John A. Grobe, Chairman
Davis-Besse Oversight Panel

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

Enclosure: NRC Inspection Report No. 50-346/03-08(DRS)

cc w/encl: The Honorable Dennis Kucinich
B. Saunders, President - FENOC
Plant Manager
Manager - Regulatory Affairs
M. O'Reilly, FirstEnergy
Ohio State Liaison Officer
R. Owen, Ohio Department of Health
Public Utilities Commission of Ohio
President, Board of County Commissioners
Of Lucas County
Steve Arndt, President, Ottawa County Board of Commissioners
D. Lochbaum, Union Of Concerned Scientists

DOCUMENT NAME: G:DRS\ML031500693.wpd

To receive a copy of this document, indicate in the box: "C" = Copy without attachment/enclosure "E" = Copy with attachment/enclosure "N" = No copy

OFFICE	RIII		RIII		RIII		RIII		RIII	
NAME	WSlawinski:sd		KRiemer		DPasehl for CLipa		CPederson		JGrobe	
DATE	05/09/03		05/09/03		05/15/03		05/30/03		05/30/03	

OFFICIAL RECORD COPY

ADAMS Distribution:
AJM
DFT
SPS1
RidsNrrDipmIipb
GEG
HBC
CST1
C. Ariano (hard copy)
DRPIII
DRSIII
PLB1
JRK1

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Docket No:	50-346
License No:	NPF-3
Report No:	50-346/03-08
Licensee:	FirstEnergy Nuclear Operating Company
Facility:	Davis-Besse Nuclear Power Station
Location:	5501 North State Route 2 Oak Harbor, OH 43449
Dates:	February 24 through April 15, 2003
Inspectors:	W. Slawinski, Lead Inspector J. House, Senior Radiation Specialist J. Wigginton, Senior Health Physicist R. Alexander, Radiation Specialist
Reviewed By:	Kenneth Riemer, Chief Plant Support Branch Division of Reactor Safety
Approved By:	John Grobe, Chairman Davis-Besse Oversight Panel

SUMMARY OF FINDINGS

IR 05000346-03-08(DRS), on 02/24-04/15/2003; FirstEnergy Nuclear Operating Company; Davis-Besse Nuclear Power Station. Radiation Protection Program Effectiveness Review and Supplemental Inspection of Degraded Radiation Safety Cornerstone.

Cornerstones: Occupational and Public Radiation Safety

The U.S. Nuclear Regulatory Commission (NRC) performed a review to assess the effectiveness of radiation protection planning and accomplishing radiological work, and a supplemental inspection resulting from prior radiation safety performance issues. The supplemental inspection assessed the licensee's root cause evaluations and corrective actions associated with a degraded occupational radiation safety cornerstone which resulted from two White performance problems related to: (1) an inadequate evaluation of the radiological hazards to characterize steam generator work conditions; and (2) inadequate measurements to monitor the occupational intake of radioactive material by workers during and following work in the steam generators. Special Inspection Report No. 50-346/02-16(DRS) provided the details of the two radiation safety performance problems associated with the steam generator work, which were each characterized as White findings in the NRC's final significance determination letter dated February 19, 2003.

During this supplemental inspection, performed in accordance with Inspection Procedures 95002 and aspects of Inspection Procedure 95003, the team determined that the licensee performed comprehensive evaluations of the two performance problems both individually and collectively, and that adequate corrective actions were completed or were in-progress to address the identified performance issues. The licensee's evaluations identified primary root causes and contributing factors for both performance issues. The licensee attributed the primary root causes for the degraded cornerstone to be less than adequate work direction and management systems within the radiation protection organization. In particular, radiological preparations for the steam generator nozzle dam job did not ensure workers had the necessary information for successful execution of the work. Also, standards, policies and procedures that governed radiological activities were ineffective, and guidance provided by radiation protection management and the resources assigned to support radiological work and to investigate intakes were not sufficient.

The licensee completed several corrective actions to address the root causes and contributing causes identified in its evaluation including new or revised procedures, additional training, improvements to the self-assessment process, and restructuring of the radiation protection organization and staff. The inspection team determined that the corrective actions appeared appropriate and that planning for radiologically significant work had improved.

The team did not identify any significant concerns associated with the current radiation protection program's effectiveness, or significant problems related to the licensee's root cause evaluations for the radiation protection performance problems.

Given the licensee's progress in evaluating and correcting the radiation protection program deficiencies that resulted in the degraded radiation safety cornerstone, the two White performance issues will only be considered in assessing plant performance for a total of four

quarters, starting with the fourth quarter 2002, in accordance with the guidance in Inspection Manual Chapter 0305, "Operating Reactor Assessment Program."

A. Inspector Identified Findings

Cornerstone: Occupational Radiation Safety

Green. The inspectors identified a finding of very low safety significance and an associated Non-Cited Violation (NCV) regarding the licensee's access controls for some locked high radiation areas (LHRAs) that existed during movement of spent fuel. The licensee used thin plastic netting as a barricade to obstruct entry through openings that could permit access into certain LHRAs (around cable trays and adjacent to locked gates) as the only physical means to prevent access, contrary to Technical Specifications.

The issue represented a performance deficiency with a potential impact on radiological safety and was associated with the occupational radiation safety cornerstone attribute for programs and processes related to exposure control, and that affected the cornerstone objective to ensure the adequate protection of workers from exposure to radioactive material. While access controls for certain LHRAs did not satisfy requirements during movement of spent fuel through the fuel transfer chute, no unauthorized entry into the affected areas occurred. Also, radiological conditions present in these areas were not sufficient to produce a substantial potential for an overexposure had an individual gained unauthorized entry. Therefore, the finding was of very low safety significance (i.e., not an ALARA planning or work control finding, not an overexposure or substantial potential for an overexposure, and the ability to assess dose was not compromised). An NCV of Technical Specification 6.12.2 was identified for the failure to properly control access into LHRAs that were not otherwise controlled by locked gates or doors (Section 2OS1).

B. Licensee Identified Violations

A violation of very low safety significance which was identified by the licensee has been reviewed by the inspectors. Corrective actions taken or planned by the licensee have been entered into the licensee's corrective action program.

- 10 CFR 20.1501 requires that surveys be made to comply with the regulations in 10 CFR Part 20, including Subpart I, "Storage and Control of Licensed Materials." On October 2, 2002, the licencee identified a contaminated piece of equipment outside the radiologically restricted area (but within the protected area) with low levels of contamination. The equipment was not adequately surveyed as required by 10 CFR Part 20 when it was removed from the restricted area sometime between July 2002 and its discovery on October 2, 2002. This event is documented in the licensee's corrective action program as Condition Report No. 02-07229.

REPORT DETAILS - RADIATION PROTECTION PROGRAM EFFECTIVENESS REVIEW

Background Information and Event Overview

On February 20, 2002, several contract workers were both internally and externally radioactively contaminated while installing steam generator nozzle dams at the Davis-Besse plant. In April 2002, the NRC staff became aware that clothing worn by four of these individuals was determined to be radioactively contaminated upon their arrival at other nuclear power plants and that the source of the contamination was potentially from their work at Davis-Besse. On April 17, the NRC dispatched a Special Inspection Team (SIT) to the Davis-Besse site and surrounding areas to review the circumstances surrounding the release of radioactive material from the Davis-Besse facility. The results of that inspection are documented in NRC Inspection Report No. 50-346/02-06(DRS).

In August 2002, the NRC staff became aware that removable contamination surveys (smears) and air samples previously collected from various areas of the plant, including an air sample taken inside one of the steam generators, exhibited trace amounts of transuranic (TRU) isotopes. Subsequently, the licensee collected fecal and urine samples from the individuals that were contaminated in February, and analyses indicated that alpha emitting TRU materials contributed to these intakes. On September 30, 2002, the NRC dispatched another SIT to the Davis-Besse site to evaluate the radiological work planning and controls for the steam generator nozzle dam work, to review the licensee's follow-up of the incident and to assess the dose consequences from the internal contaminations. The results of that inspection are documented in NRC Inspection Report No. 50-346/02-16(DRS). On February 19, 2003, the NRC completed its final significance determination for the problems identified during the September/October 2002 Special Inspection and issued two White findings and an associated Notice of Violation. Following the final significance determination, a supplemental inspection was performed to review the licensee's root cause and extent of condition evaluations for the two White performance issues and to assess overall radiation protection program effectiveness.

2. RADIATION SAFETY

Cornerstone: Occupational Radiation Safety

2OS1 Access Control to Radiologically Significant Areas (71121.01)

.1 Plant Walkdowns

a. Inspection Scope

The inspectors reviewed the radiological conditions of work areas within the radiologically restricted area to verify the adequacy of radiological boundaries and postings. This included walkdowns of high and locked high radiation area (LHRA) boundaries in the Containment Building. The inspectors evaluated the licensee's radiological controls to determine if the controls (i.e., surveys, postings, and barricades) were adequate to meet the requirements of 10 CFR Part 20 and the licensee's Technical Specifications.

b. Findings

Introduction

An NRC identified Green finding and an associated Non-Cited Violation (NCV) were identified for the failure to properly control access to certain LHRAs, as required by Technical Specification 6.12.2.

Description

On February 25, 2003, the inspectors toured the Containment Building and observed openings/gaps accessible to workers that allowed alternate access into posted LHRAs which were barricaded with orange colored netting commonly used as snow fencing along roadways. The licensee used the netting material during outages as a barricade to prevent personnel from entering LHRAs through pathways that were not intended for access. The netting was secured with tie-wraps and/or tape to cover openings and gaps under and adjacent to LHRA gates, or to barricade openings around cable trays that led into LHRAs. The gaps/openings were accessible to workers and physically large enough to permit entry into the areas.

The inspectors observed areas on the 565 foot and 585 foot elevations of the Containment Building that used the netting to barricade openings that led into posted LHRAs near the shielded spent fuel transfer chute. Licensee surveys showed that during movement of spent fuel, these LHRAs exhibited short-term dose rates in accessible areas up to approximately 22 Rem/hour. Based on the number of spent fuel bundles that could be transferred through the chute during any one hour, radiation levels existed that could result in an individual receiving a dose equivalent in excess of one rem in one hour.

Regulatory Guide 8.38, "Control of Access to High and Very High Radiation Areas in Nuclear Plants," provides acceptable methods of excluding personnel from such areas by constructing a substantial (robust) physical barrier that completely encloses the area and has no openings or portals. This type of control is commonly called cocooning. When properly cocooned, an area would not be accessible and the access control and posting requirements in 10 CFR Part 20 and licensee Technical Specifications would not apply. The licensee erroneously believed that the netting was sufficiently "robust" and made access into the LHRAs via the openings/gaps "inaccessible."

The issue of cocooning and the adequacy of the physical barrier was addressed in the 10 CFR Part 20 Questions and Answers (NUREG/CR-6204, "Questions and Answers Based on Revised 10 CFR Part 20") developed by the NRC staff in the early to mid-1990s. Question no. 373 which references Regulatory Guide 8.38 details control measures that should be implemented for LHRAs, and question no. 489 defines the adequacy of plastic sheeting or netting material for cocooning purposes. While some "snow fence" material provides an adequate barrier and is acceptable for cocooning purposes, the orange netting used by the licensee was determined to be inadequate because it did not require specialized tools (e.g., wire cutters) to breach. Specifically, the inspectors determined that the material in question could be easily breached with a pocket knife and thus did not meet NRC guidelines as a "substantial barrier." Therefore,

the netting did not render the area inaccessible. Consequently, the Technical Specification access control and posting requirements applied to these openings/gaps.

Analysis

This issue represented a performance deficiency because the licensee failed to adequately control access to Technical Specification locked high radiation areas. The issue had a potential impact on radiological safety (external dose) and if not corrected would become a more significant concern given the elevated dose rates that occur during fuel moves. Also, the issue was associated with the occupational radiation safety cornerstone attribute for exposure control and affected the cornerstone objective to ensure the adequate protection of worker health and safety from exposure to radioactive material. Therefore, the issue was more than minor and represented a finding which was evaluated using the significance determination process (SDP) for the Occupational Radiation Safety Cornerstone.

The inspectors determined that the netting material did not constitute a sufficient cocoon and when used alone without flashing lights positioned near the openings/gaps as a warning device, failed to satisfy Technical Specification LHRA access controls. The inspectors determined that the finding did not involve ALARA planning or work controls (as described in Manual Chapter 0609, Appendix C, "Occupational Radiation Safety Significance Determination Process"). There was no overexposure or a substantial potential for an overexposure, and the ability to assess dose was not compromised. The inspectors determined that there was no substantial potential for an overexposure had unauthorized entry into the areas occurred given the maximum dose rates during fuel moves in areas accessible to workers coupled with the finite number of fuel bundles that can be transferred in any one hour through the chute. Consequently, the inspectors concluded that the SDP assessment for this finding was of very low safety significance (Green).

Enforcement

Technical Specification 6.12 provides the high and LHRA controls required in place of the controls specified by 20.1601 (a) and (b) of 10 CFR Part 20. Technical Specification 6.12.2 requires, in part, that LHRAs with dose rates greater then 1.0 rem/hour at 30 centimeters from the radiation source or from any surface penetrated by the radiation shall be provided with a locked door, gate, or other barrier that prevents unauthorized entry. The Technical Specification also provides that individual areas where no enclosure exists for the purpose of locking and where no enclosure can reasonably be constructed around the individual areas, need not be controlled by a locked door or gate, but shall be barricaded, posted and a clearly visible flashing light shall be activated at the area as a warning device.

As of February 25, 2003, the licensee failed to adequately control access through three openings/gaps that led into LHRAs because flashing lights were not used in the area as a warning device to supplement the netting barricades, as required by Technical Specifications. However, since the licensee replaced the netting material with metal, sufficiently robust barricades once the problem was identified, documented this issue in its corrective action program (Condition Report 03-01586), and because the violation is

of very low safety significance, the violation is being treated as a Non-Cited Violation (NCV 50-346/03-08-01).

Cornerstone: Public Radiation Safety

2PS3 Radioactive Material Control Program (83502)

.1 Radiological Control and Unrestricted Release of Material, Equipment, and Vehicles from Radiologically Restricted Areas

a. Inspection Scope

The inspectors evaluated the licensee's methods and procedures to control, survey, and release material, equipment, and vehicles from the Radiologically Restricted Areas (RRAs) of the station. Specifically, the inspectors reviewed the licensee's procedures that govern the unconditional release of material, equipment, and vehicles from the RRA (i.e., no detectable radioactivity above background). The inspectors' review of these procedures also included an assessment of the licensee's survey and release criteria for potentially contaminated volumetric material and material/equipment with potentially contaminated inaccessible surfaces. The inspectors assessed personnel adherence to these procedures by observing radiation workers and radiation protection technicians (RPTs) performing surveys of material, equipment, and vehicles utilizing the instrumentation in place at the two RRA exit points (i.e., the 2nd Floor of the Personnel Shop Facility and the Low Level Radwaste Storage Facility Truck Bay). The inspectors also observed radiation worker and RP technician response to instrument alarms indicating the potential presence of contamination when conducting these surveys at the RRA exit points.

The inspectors independently walked-down areas outside of the RRA and reviewed the licensee's survey data to determine if the licensee conducts periodic surveys of these areas and to verify the effectiveness of its unconditional release program.

b. Observations and Findings

No findings of significance were identified. The inspectors confirmed that licensee procedures were adequate to control the release of potentially contaminated material, equipment, and vehicles. Additionally, inspector observations of radiation workers and RPTs surveying material, equipment and vehicles for unconditional release at the RRA exit points revealed that the workers were cognizant of the requirements to survey these items, and that they appropriately conducted the surveys and responded to any indications of detectable radioactivity above background.

The inspectors' review of the procedures governing unconditional release of potentially contaminated volumetric material confirmed that the licensee appropriately implemented gamma spectroscopic analyses of these items with lower limits of detection as required for environmental samples in accordance with the licensee's Radiological Environmental Technical Specifications.

.2 Unrestricted Release of Personnel from Radiologically Restricted Areas

a. Inspection Scope

The inspectors reviewed the licensee's methods to control and survey radioactive contamination on radiation workers as they exit the RRAs of the station. Specifically, the inspectors reviewed recently revised licensee procedures and standing orders implemented for the whole body frisking of radiation workers at the two RRA exits. The inspectors assessed personnel adherence to these procedures by observing radiation workers processing out of the RRA using alpha/beta-sensitive personnel contamination monitors (PCMs) and gamma-sensitive portal monitors. The inspectors observed the workers' and RP technician responses to PCM and portal monitor alarms to assess if appropriate follow-up frisking and decontamination efforts, if necessary, were employed to preclude the inadvertent release of workers with detectable radioactive material.

b. Observations and Findings

No findings of significance were identified. The inspectors confirmed that licensee procedures were adequate to preclude the inadvertent release of workers with detectable radioactive material. Minor issues with respect to the continuity and "user friendliness" of these procedures were noted by the inspectors. Specifically, the inspectors noted that the guidance for conducting the surveys/frisks and releasing of personnel from the RRA were contained in several licensee documents (procedures, forms, and technical basis papers) rather than in one consolidated procedure. The inspectors noted that the procedural discontinuity presented a possible vulnerability in the licensee's program. However, inspector observations of workers processing through the recently improved configuration of the PCMs and portal monitors at the RRA exit points revealed that the workers were appropriately cognizant of the requirements to perform the whole body frisks, the workers adequately conducted the frisks, and the workers and RP technicians appropriately responded to any alarms. Therefore, the inspectors concluded that despite the procedural issues noted, the licensee's performance indicates that appropriate controls are in place sufficient to prevent the inadvertent release of detectable radioactive material on workers. The inspectors' observations were discussed with the licensee's RP staff and were being addressed by the licensee's corrective action program.

.3 Radiation Monitoring Instrumentation Used for the Unrestricted Release of Material, Equipment, Vehicles, and Personnel from Radiologically Restricted Areas

a. Inspection Scope

The inspectors discussed surveillance practices and reviewed the most recent calibration records and procedures for all radiation instrumentation used to survey personnel and equipment for radiological contamination prior to egress or release from controlled areas of the station. The instrumentation included:

- Thermo/Eberline Model PCM-2 Whole Body Friskers (at RRA Exits);
- Thermo Models SPM-904C and SPM-906 Portal Monitors (at RRA and Restricted Area Exits);

- NE Technologies Model SAM-11 Small Articles Monitors (at RRA Exits); and
- Thermo Model Frisk-Tech Count Rate Meters with Alpha Probes (at RRA Exits).

The inspectors reviewed the instrument calibration procedures and capabilities of the instrumentation to verify that they were appropriate for the radiation types present (alpha, beta, and gamma) and were calibrated with appropriate radiation sources. Additionally, the inspectors reviewed the radiation detection sensitivities of the instrumentation to verify that they were consistent with NRC guidance contained in Inspection and Enforcement (IE) Circular 81-07, IE Information Notice 85-92, and Health Physics Positions in NUREG/CR-5569, "Health Physics Position Data Base," for both surface contaminated and volumetrically contaminated materials. The inspectors reviewed the calibration and alarm set points to verify that the licensee had not established a "release limit" by altering instrumentation sensitivity through such methods as raising the discriminator level or locating the instrument in a high radiation background area. Finally, the inspectors reviewed the licensee's analyses which addressed the issue of difficult-to-measure radionuclides (i.e., those which decay by electron capture) in the station's waste stream and discussed with the RP staff how these radionuclides are taken into account when surveying material and personnel for release from the RRA.

b. Observations and Findings

No findings of significance were identified. The inspectors confirmed that the instrumentation used to survey material and personnel for release from the RRA: (1) were adequately calibrated and operated; (2) had detection sensitivities and alarm set points consistent with NRC guidance; and (3) were appropriately configured/operated to account for difficult-to-measure radionuclides.

.4 Identification and Resolution of Problems

a. Inspection Scope

The inspectors independently reviewed licensee corrective action program documents generated since April 2002 to evaluate the licensee's assessment and corrective actions for licensee identified incidents that involved the unconditional release of contaminated materials from the RRA. Additionally, the inspectors reviewed the licensee's Radiation Protection Program Phase 2 Review (see Section 2OS5/2PS5) and Restart Implementation Action Plan (with respect to the radioactive material control program) to assess the licensee's efforts to identify and correct potential deficiencies in the program that could result in the release of detectable amounts of radioactive material outside of the RRA.

b. Observations and Findings

No findings of significance were identified. Subsequent to the February 2002 events whereby workers were released from the station with measurable amounts of external contamination, the licensee instituted a corrective action to begin extensive surveys of areas outside of the RRA, including "high traffic areas" directly adjacent to the primary RRA exit. The inspectors' review of the corrective action program identified several

condition reports which documented low levels of fixed contamination found in squares of carpet identified by surveys of these "high traffic areas." Upon discovery, the licensee took control of these carpet squares and disposed of them as radioactive waste. The licensee's evaluation of these discoveries determined that given the location of radioactive material found outside the RRA exit, the low level of contamination was most likely due to the accumulation of undetectable levels of contamination on the bottoms of workers' shoes (well below the lower limit of detection of the personnel contamination monitors), rather than a recent performance deficiency related to the survey and release of materials and personnel from the RRA. The inspectors determined that the licensee's evaluation of these issues was reasonable and conclusions plausible, that the circumstances did not appear to involve a recent performance deficiency, and that the problems constituted issues of minor safety significance that were adequately addressed by the licensee's corrective action program. Although this issue should be corrected, it constitutes a violation of minor significance that is not subject to enforcement action in accordance with Section VI of the NRC's Enforcement Policy.

Additionally, the inspectors concluded that the RP Program Phase 2 Review and Restart Implementation Action Plan, with respect to the radioactive material control program, was thorough and adequate corrective actions were developed as described in Section 2OS5/2PS5 of this report.

Cornerstones: Occupational and Public Radiation Safety

2OS4/ General Employee and Radiation Protection Staff Qualifications/Training (83723)
2PS4

Introduction and Background

The NRC training and qualification requirements for nuclear power plant personnel are contained in 10 CFR Part 50. Section 50.120 requires a systems approach to training for various categories of plant workers, including RPTs. Additional qualification requirements for plant personnel are included in the plant's Technical Specifications (administrative section), which adopts an industry consensus standard requiring minimum experience and education criteria for all categories of plant staff. Nuclear power plant licensees maintain accredited training programs under the auspices and review of the Institute of Nuclear Power Operations (INPO). The Davis Besse Nuclear Plant continues to maintain its INPO accreditation.

.1 General Employee Training Program

a. Inspection Scope

The inspectors reviewed the following documents: Lesson Plan for Radiation Worker Training (LP-FEN-RWT) and the Plant Access Training (LP-FEN-PAT) and toured the simulated contaminated area mockup located in the training building where special hands-on, practical factors training is conducted on an as-needed basis. The inspectors also discussed general employee training (GET) with the lead RP instructor and reviewed GET records for selected workers to assess compliance with 10 CFR Part 19.

b. Observations and Findings

No findings of significance were identified. Training materials were generally of high quality and up-to-date instructional tools were maintained. The level of technical information presented was determined to be appropriate, and the use of illustrations effective. However, the inspectors noted that LP-FEN-RWT (or any other documented lesson plans) did not provide instruction regarding HRA access controls currently used at the plant. In particular, while the practice of cocooning was used routinely in the Containment Building to make certain HRAs inaccessible, this practice was not described in General Employee Training. NRC staff guidance for cocooning is given in NUREG/CR-5569, Revision 1, "Health Physics Positions Data Base," (HPPOS) 242. Among other things, this guidance specifies that workers need to be trained on the cocooning practice, as required by 10 CFR 19.12, "Instructions to Workers." Specifically, radiation workers are to be instructed in the precautions and procedures to minimize exposure and in the applicable provisions of the NRC regulations (and license requirements) for the protection of personnel from exposure to radiation. The failure to provide general radiation worker training related to the cocooning practice used for control of access into HRAs is a violation of 10 CFR 19.12. The problem is being addressed by the licensee's corrective action program and is determined to be of minor safety significance because it did not affect the objective of the occupational radiation safety cornerstone. Although this issue should be corrected, it constitutes a violation of minor significance that is not subject to enforcement action in accordance with Section VI of the NRC's Enforcement Policy.

The inspectors found that the hands-on contaminated mockup training facility provided an effective learning environment, especially for high contamination work. The facility used "black-light" fluorescence setups which allowed trainees to "see" simulated contamination, and how it is easily spread. The inspectors concluded that the general employee training material and mockup capability were acceptable aside from the HRA training deficiency, and that the licensee's GET program was adequate and satisfied the training requirements of 10 CFR Part 19.

.2 Learning Lessons From Industry Events Via Generic Communications Reviews

a. Inspection Scope

The inspectors reviewed a selected set of plant technical reviews of NRC and industry generic communications (e.g., NRC Information Notices) related to radiation protection issues. The notices reviewed by the inspectors involved significant worker dose control issues. The NRC staff expects all licensees to review the applicability of lessons learned from events to their facility, and to consider appropriate actions to avoid similar problems. The inspectors discussed generic communications (GCs) with RPTs, Radiation Protection Supervisors (RPSs) and Radiation Protection Technical Staff, to assess their knowledge of the problems discussed in the communications and the plant's review and response to them.

b. Observations and Findings

No findings of significance were identified. The inspectors determined that the quality and validity of the licensee's reviews varied. For example, the licensee completed an adequate review and revised its RP program accordingly for GC related to lessons learned from underwater diving events (described in both Industry and NRC GCs). As a result, the plant's recent spent fuel pool re-rack RPT training and ALARA work controls/procedures benefitted significantly from the lessons learned incorporated from previous industry mishaps and diver overexposure problems described in GCs. Alternatively, another GC review missed important opportunities for improvement related to the plant's steam generator work control problems, and resulting unexpected worker TRU intakes. Specifically, NRC IN 97-36, "Unplanned Intakes By Worker of Transuranic Airborne Radioactive Materials and External Exposure Due To Inadequate Control of Worker," discussed unexpected airborne transuranic intakes in the workplace and provided pertinent lessons learned which the licensee failed to incorporate into its program. While continuing RP training on IN 97-36 for RPTs and their first-line supervisors was held on a one-time basis, no permanent changes to RP implementing procedures or the RP training program were deemed necessary by the licensee. Additionally, during the licensee's review of IN 97-36, their search for previous related industry events failed to identify an industry GC (SER 3-93, "Contamination Events Involving Alpha-Emitting Transuranic Elements") which discussed pertinent lessons learned from unplanned intakes of transuranic airborne radioactivity. When questioned by the inspectors, the licensee provided a copy of their review of SER 3-93, and while the SER was discussed with plant RPTs and their first line supervisors, no formal changes where made to the training lesson plans or plant procedures. Additionally, the plant's documented review appeared to focus on the surface contamination aspects of alpha contamination and not on the potential for airborne problems. Had key lessons learned from these two GCs been adopted and effectively incorporated in the radiation protection program procedures and training program, barriers could have been established that might have prevented or mitigated the February 2002 steam generator intake incident. However, as discussed in sub-section 3b below, the licensee has taken positive actions to improve radiation protection training as a result of the steam generator event.

Another example of potential improvement in the licensee's industry lessons learned review process involved the need to re-examine previously reviewed GCs when plant conditions or work controls changed. For example, the licensee's review of IN 88-79, "Misuse of Flashing Lights for High Radiation Areas Controls," appropriately concluded in 1988 that since their plant Technical Specifications for HRA controls did not allow the use of flashing lights as a control option, no plant actions were necessary. If permitted by plant specific Technical Specifications, flashing lights can be used to alert workers of LHRAs that could not reasonably be locked due to physical constraints. Several years following issuance of this IN, the licensee requested and was granted a Technical Specification change that allowed the use of warning lights as a LHRA control method yet the IN was not re-evaluated or plant procedures revised to reflect this option. Based on these inspector observations, the licensee documented this problem in its corrective action program and planned to reevaluate this IN. The inspectors could not identify any

process currently in place for prompting a “look-back” review of historic GCs when the situation may warrant.

Based on the review of six GCs, the inspectors determined that the licensee generally had an adequate process in place to review, identify and incorporate applicable lessons learned into the radiation protection program (including RPT training).

.3 Radiation Protection Staff Training Program

a. Inspection Scope

The inspectors reviewed the training and qualifications for selected RP staff including licensee and contractor RPTs, RP supervisors, and RP Technical Staff (including an instructor). Interviews were conducted with representatives from each of these groups, selected at random by the inspectors, and included questions that related to RP processes, policies and technical issues. The governing training and qualification procedures/manual and selected lesson plans were reviewed by the inspectors in preparation for the interviews. Also, the initial and continuing qualification programs were examined and the quizzes administered by the licensee to those individuals interviewed by the inspectors were reviewed for adequacy.

b. Observations and Findings

No findings of significance were identified. The inspectors found, however, that the initial RPT classroom lesson plans currently in effect were generally outdated. For example, major rule changes were made to 10 CFR Parts 20 (Radiation Protection) and 71 (Shipping of Radioactive Materials) in the 1990's that were not incorporated in the lesson plans. Discussions with the Training Manager and lead RP Instructor confirmed that this was also a licensee identified deficiency that was being corrected through program updates and procedure revisions.

Notwithstanding this problem, due to the licensee’s experienced, stable RPT workforce, the out-dated lesson plans had not been used since no entry level RPT candidates completed the entire qualification process in the last several years. Additional house RPTs have been added to the staff over the past several years, but these individuals were senior-level, highly experienced contract technicians that were processed through an alternate training and qualification pathway which used competency written and oral examinations in lieu of lesson plan driven didactic training. The inspector noted that, aside from needed updating, the general quality (technical depth, scope, etc.) of the lesson plans and training material ranged from good to excellent. Although still in draft form, the training lesson plan, “Dealing with Transuranic Contamination RCC-DOS-1302,” provided the RPTs with important insights and technical information to provide proper job coverage. The inspectors determined that RP staff Qualification Cards (Training Manual RCI-070, etc.,) were comprehensive, and consistent with the systems approach to training (e.g., product of identified job skills).

The inspectors noted that contractor RPT training in preparation for the spent fuel pool re-rack was innovative and effective. A large, deep pool was used to train RPTs in the techniques of performing underwater radiation surveys. The training mockup provided

valuable hands-on experience that facilitated the radiological surveys needed later during job coverage in support of the in-pool work with divers.

To maintain proficiency and keep up with changes in technology, the licensee established a continuing training program for both RPTs and their first line supervisors (RP Supervisors). An advisory group comprised of RPTs, their supervisors and other licensee stakeholders provided input and suggestions for the continuing training topics. The inspectors viewed the advisory group concept and its actions as a strength because it steered the program in a direction that most benefitted the staff. The inspectors reviewed selected examples of continuing training (new implementing procedures), and interviewed one of the instructors. A focus of recent training was on the lessons learned from the transuranic uptakes during the steam generator event, which the inspectors found acceptable.

Lastly, the inspectors reviewed the contractor RPT training/qualification program and criteria, including a selection of written examinations and resumes of contractors recently hired. That review disclosed no problems.

The inspectors concluded that the overall RP staff training program was acceptable, meeting the applicable regulatory requirements.

.4 Qualification of Radiation Protection Staff

.4(1) Radiation Protection Technicians

a. Inspection Scope

The licensee used both staff RPTs and contract RPTs to supplement its staff during outages and for other increased workload situations. The inspectors conducted one-on-one interviews with both contractor and licensee technicians (randomly selected) to assess their health physics knowledge and cognizance of station processes. The technical subjects were varied, and the questions ranged from narrow (short answer) issues up to scenario-driven work situations (including emergency responses) to test the technicians' general radiological knowledge, awareness of system radiation hazards, and ability to provide effective job coverage including when to stop work. Each interview lasted about 50 minutes.

b. Observations and Findings

No findings of significance were identified. The inspectors found that all four technicians interviewed displayed adequate health physics knowledge and each understood station processes and RP procedures. Based on information provided verbally by those interviewed, each technician met all applicable regulatory qualification requirements (Technical Specification requirement to meet ANSI-N18.1-1971) based on their number of years of applied radiation protection experience in the nuclear industry.

During the steam generator nozzle dam removal performed during this inspection, the RPT direct coverage in support of the worker entries was adequate. Effective mockup training, thorough pre-work briefings, and active first-line supervisor and management

involvement contributed to the successful completion of this radiologically challenging task.

.4(2) Supervisory, Technical Staff and Managerial

a. Inspection Scope

The inspectors interviewed a randomly selected radiation protection supervisor (first-line supervisor). The interview focused on discussions and questions to assess work experience, radiation protection knowledge, and cognizance of radiological processes, procedures and extent of supervisory involvement. Interviews were also conducted of technical (health physics) support staff, some of whom served supervisory roles during the licensee's current extended outage. Interviews focused on educational background, work experience, and process knowledge and project oversight responsibilities. Resumes of selected RP supervisors and RP management were also reviewed by the inspectors to assess compliance with Technical Specifications, including the resume of the designated radiation protection manager (RPM) and two supervisors responsible for RP operations and technical support, respectively.

b. Observations and Findings

No findings of significance were identified. The first line supervisor had a well balanced technical background and several years of applied experience in both chemistry and radiation protection which fully met the industry guidelines in ANSI N18.1-1971, "Selection and Training of Nuclear Power Plant Personnel," for the supervisory position.

Those interviewed all had excellent professional credentials, extensive radiation protection work experience and each maintained a good awareness of current industry practices in their areas of responsibility. The inspectors noted that these individuals maintained appropriate levels of involvement with day-to-day radiation protection activities, as all clearly understood the status of ongoing and upcoming planned work, and its radiological impediments. All individuals evaluated by the inspectors were found to exceed the ANSI standard requirements for their supervisory or technical health physics positions. The inspectors determined that the number and qualifications of RP supervisory and health physics staff was acceptable for providing technical and policy support and oversight of plant radiological operations.

The resumes of the designated RPM and RP Operations Supervisor each demonstrated educational and professional radiation protection experience that exceeded the requirements for Manager of Radiological Controls, as specified in Technical Specification 6.3, which references Regulatory Guide 1.8, "Personnel Selection and Training," Revision 1-R, September 1975.

2OS5/ 2PS5 Radiation Protection Program Phase 2 Review (71152)

Introduction and Background

As a result of a series of radiological events detailed in NRC Inspection Reports Nos. 50-346/02-06; 02-16(DRS), licensee management determined that the

Davis-Besse RP program should undergo a detailed evaluation termed a Phase 2 Review. This review was conducted over a two month time period late in 2002 by an independent, experienced, multi-person Program Compliance Review Team (the review team) which the licensee contracted. The review team identified and documented numerous deficiencies in the RP program. The licensee then developed an Implementing (corrective measures) Action Plan to address the deficiencies. The events leading up to this review included the release of contaminated workers who transported discrete radioactive particles to offsite locations, the uptake of transuranic isotopes by workers, and the failure of the licensee to adequately identify and quantify these uptakes and determine the resultant dose to the workers.

The inspectors evaluated the Phase 2 Review to determine if it was of sufficient scope, breadth and rigor, and to determine if corrective actions were being adequately implemented to address problems identified by the review.

.1 Program Elements

a. Inspection Scope

The inspectors evaluated the licensee's Phase 2 Review of the RP program elements to determine if the review process was adequate to assess program development and to identify weaknesses. The NRC evaluation consisted of extensive document reviews, discussions with licensee and contractor personnel, attending program meetings and observing ongoing work activities in the RP organization.

b. Observations and Findings

No findings of significance were identified. The licensee's review team evaluated the regulatory requirements and guidance that applied to the RP program. These included 10 CFR Parts 19, 20, and 50; NRC Regulatory Guides, Information Notices, Bulletins and Circulars; and the licensee's Updated Safety Analysis Report and Technical Specifications. The review team compared the regulatory elements to the bases documents and procedures that supported the radiation protection program. The comparisons were made to determine if the radiation protection program was sufficiently developed and provided the necessary guidance to the staff to ensure its proper implementation. These comparisons disclosed that the licensee had not developed procedures and/or governing documents for the radiation protection program to effectively address all regulatory elements. As a result, program performance was impacted, which contributed to the degraded cornerstone condition described later in this report in the Supplemental Inspection Section.

The inspectors assessed the review team's findings and concluded that the team had performed a thorough review of the regulatory elements, and assessed the adequacy of the licensee's program bases and supporting documents and procedures.

.2 Program Implementation

a. Inspection Scope

The inspectors evaluated the licensee's Phase 2 Review of the implementation of the RP program to determine if: (1) the review was adequate to identify program weaknesses; and (2) the RP program was implemented in compliance with the spirit and letter of the governing and implementing documents. The NRC evaluation consisted of extensive document reviews, discussions with licensee and contractor personnel, attending program meetings and the observation of ongoing activities in the RP organization.

b. Observations and Findings

No findings of significance were identified. The review team assessed RP program implementation through an examination of RP self-assessments, quality assurance audits, peer reviews, NRC inspection reports, condition reports and related corrective action documents.

The review team divided its review of program implementation into specific areas. The specific areas included:

- Program Management and Administration
- External Dosimetry Program
- Internal Dosimetry Program
- Work Planning, Control, and ALARA Programs
- Radioactive Material/Contamination Control Program
- Radiological Surveillance/Hazard Warning Program
- Respiratory Protection Program
- High Radiation Area Controls
- RP Self-Assessment and Audit Effectiveness

The team identified weaknesses in RP procedures and instances in which program implementation was deficient. The team identified the most significant weaknesses in RP program implementation within work planning, radioactive material control, and hazard identification. The team did not identify any instances of regulatory non-compliance associated with these issues.

The inspectors assessed the review team's findings and concluded that the team had performed a thorough and rigorous evaluation of the licensee's RP program implementation.

.3 Roles and Responsibilities

a. Inspection Scope

The inspectors evaluated the review team's assessment of management roles and responsibilities for the RP program to determine if management oversight, involvement, and interface with other organizations were clearly defined and appropriately executed.

The NRC evaluation consisted of document reviews, discussions with various levels of licensee management and contractor personnel, attending program meetings and the observation of ongoing activities in the RP organization.

b. Observations and Findings

No findings of significance were identified. The review team evaluated the level of management involvement in the RP organization, effectiveness of program ownership, and the extent of reliance on "tribal knowledge" in the implementation of the RP program. The review team covered all levels of management in the RP organization including RP first line supervisors. The review team evaluated line management involvement and oversight, the effectiveness of management actions to correct deficiencies, and assessed the adequacy of the RP staff in terms of the number, qualifications and the impact of collateral duties.

The review team determined that the RP program had been allowed to deteriorate over time, and this gradual programmatic degradation resulted in procedures, staffing and inter-departmental interfaces not being adequate to cope with the significant challenges presented by simultaneous fuel failures, reactor vessel head degradation, ineffective shutdown chemistry control and an aggressive outage schedule.

The review team concluded that an ongoing lack of effective management oversight and lack of safety focus contributed to the gradual degradation of the RP program and that these two conditions together contributed to the radiological control events in February 2002. The review team also found that management had not adequately verified the effectiveness of corrective actions. Program ownership appeared adequate at senior management levels; however, this was not apparent at lower levels of line management. The team also noted that reviews of program content, condition reports and operating experiences indicated that previous management oversight had not been effective in maintaining the program at a level consistent with current industry standards.

The inspectors assessed the review team's findings and concluded that the team had performed an in-depth evaluation of the licensee's RP program management structure and its effectiveness. The inspectors concluded that the proposed and completed actions in this area should address the identified concerns.

.4 Implementing Action Plan

a. Inspection Scope

The inspectors evaluated the licensee's Radiation Protection Program Restart Implementation Action Plan developed to address the deficiencies identified in the Phase 2 Review of the RP program. The inspectors determined if the plan was adequate to administer the changes necessary to address the weaknesses in the program and to ensure that the RP program would be in full compliance with the spirit and letter of the governing and implementing documents. The plan was also evaluated to determine if corrective actions, both implemented and being developed, would provide a lasting solution for those weaknesses identified by the Phase 2 Review of the RP program. The NRC evaluation consisted of document reviews including an

independent verification of selected corrective actions provided in the Implementing Action Plan, discussions with licensee and contractor personnel, attending planning meetings and observing ongoing activities in the RP organization.

b. Observations and Findings

No findings of significance were identified. The RP program was being upgraded through six implementing actions described below.

Management Oversight: Improvements within this area addressed deficiencies in performance measures, organizational structure, expectations, conduct of operations, human resources, staff roles and responsibilities, and management oversight. Deficiencies with the supervisory field observation program and more effective corrective action management were also addressed.

Radiological Area Access, Work Control, and ALARA: Improvements within this area addressed deficiencies in radiation area entry, work planning and work control. The depth and content of ALARA pre-job planning and radiation work permit development were also addressed.

Radioactive Material Control: Improvements to this area better defined the control of radioactive material within the plant and, specifically, at the radiologically restricted area boundary. Upgrades to detect, discriminate, and manage discrete radioactive particle contamination, internal contamination, and personnel/material release authorization were also addressed.

Personnel Dose Assessment: Improvements to this area focused on the scope and rigor of internal uptake/dose assessments, development of methodologies to periodically assess the impact of the plant's source term, and an expanded and better defined bioassay program.

Field Surveillance and Characterization: Improvements to this area better defined the frequency and methods to characterize radiological conditions (air sampling, smears, field readings) prior to work initiation. Upgrades regarding quantifying source term changes and transuranic presence (alpha/beta ratios), improved documentation of data and preservation of records integrity were also addressed.

Training: Training to clarify RP expectations, work practices, standing orders, and special evolution were defined within this implementing action.

The inspectors determined that the Implementing Action Plan included the actions necessary to adequately address the deficiencies identified by the Phase 2 Review Team. As of the end of the inspection, the licensee had completed approximately 85 percent of the actions assigned to address these deficiencies.

4. OTHER ACTIVITIES

40A7 Licensee Identified Violations: The following violation of very low safety significance (Green) was identified by the licensee and is a violation of NRC requirements which meet the criteria of Section VI of the NRC Enforcement Policy, NUREG-1600 for being dispositioned as a Non-Cited Violation (NCV):

- 10 CFR 20.1501 requires that reasonable surveys be made, as necessary, to comply with the requirements of 10 CFR 20. Contrary to this requirement, reasonable and necessary surveys were not adequate to ensure control of radioactive materials in conformance with 10 CFR 20, Subpart I, "Storage and Control of Licensed Materials." On October 2, 2002, during a pre-shipment survey of equipment in the Measurement and Test Equipment (M&TE) lab, the RP staff identified low levels of non-fixed radioactive contamination on a digital thermometer. The M&TE lab is located outside the RRA but within the protected area of the station. In July 2002, the digital thermometer was determined to have measurable amount of fixed contamination when it was surveyed at the RRA exit point using a small article monitor (SAM-11). As such, RP instructed the station's quality control staff to take the digital thermometer to the RRA Tool Crib and place it in the decontamination area. However, no licensee records could be found to: (1) indicate if and when the digital thermometer had been decontaminated and surveyed for release from the RRA; or (2) how the thermometer may have been further contaminated with loose radioactive material prior to its discovery on October 2. Applying the applicable Significance Determination Process (NRC Manual Chapter 0609, Appendix D), this issue is associated with the conduct of radiological surveys to identify and control radioactive material, is considered to be of very low safety significance (green) because: (1) the finding was not associated with transportation; (2) no member of the public received or was likely to receive a dose in excess of 5 millirem; and (3) this matter was not considered to represent more than five radioactive material control occurrences. This matter was addressed by various corrective actions, including complete follow-up surveys of other equipment in the M&TE lab, and was entered into licensee's corrective action program (CR 02-07229).

REPORT DETAILS - SUPPLEMENTAL INSPECTION

01 INSPECTION SCOPE

This supplemental inspection was performed by the NRC in accordance with Inspection Procedure 95002 to assess the licensee's evaluation of the root causes, contributing causes, and the corrective actions associated with a degraded occupational radiation safety cornerstone which resulted from two White performance issues. The two White radiation safety program performance issues were characterized in the NRC's final significance determination latter dated February 19, 2003. This inspection also assessed the licensee's extent of condition evaluation for the two performance issues including their relevance to other plant programs/processes beyond the radiation protection program.

Since this supplemental inspection was conducted using Inspection Procedure 95002, the following details are organized by the specific inspection criteria of that procedure which are noted by italics in the following sections.

02 EVALUATION OF INSPECTION REQUIREMENTS

2.01 Problem Identification

.1 Inadequate Evaluation of the Hazards to Characterize the Radiological Work Conditions

a. *Determination of who (i.e., licensee, self-revealing or NRC) identified the issue and under what conditions*

The inadequate evaluations associated with the installation of steam generator (SG) nozzle dams in February 2002 were identified by NRC inspectors during a Special Inspection that initiated in late September 2002, as documented in Inspection Report No. 50-346/02-16(DRS). The special inspection team found that the controls established for the nozzle dam installations were based primarily on the radiological conditions from prior outages rather than an assessment of actual current conditions. The team determined that the licensee's radiological controls did not take into consideration the possible presence of transuranic (TRU) isotopes which may have warranted the use of respiratory protection equipment or the application of other engineering controls, despite several indicators that TRUs could be present. The licensee initiated condition report (CR) 2002-07811 to perform the root cause analysis for these problems.

b. *Determination of how long the issue existed, and prior opportunities for identification*

The licensee had prior opportunities to recognize that greater than previously encountered radiological hazards may be present in the SG bowls dating back to at least May 2001, when a self-assessment identified an increasing trend in alpha emitting radionuclides in the plant's contamination mix. Additionally, several indicators of potentially degraded radiological conditions were present leading up to the nozzle dam work that included fuel leaks of varying magnitude for several of the plant's thirteen

operating cycles, higher than previously experienced reactor coolant system (RCS) radioactive iodine concentrations during the most recent operating cycle, knowledge that a CRUD burst occurred in the RCS just prior to SG entry, radiation surveys that showed higher than previously encountered contamination levels in the SG bowls and a SG platform air sample collected just as entry into the bowls was to occur that indicated elevated levels of alpha activity. Moreover, industry operating experiences including NRC Information Notice 97-36 were issued that documented problems of unplanned intakes of TRUs by workers due to inadequate recognition of the radiological hazards in the work environment, but that information was not integrated into the licensee's radiological work planning processes.

c. *Determination of plant-specific risk consequences (as applicable) and compliance concerns associated with the issue*

The licensee failed to conduct an adequate evaluation of the radiological conditions and potential hazards inside the SG bowls. This resulted in the failure to identify the presence of alpha emitting isotopes in the steam generators in concentrations sufficient to cause a substantial potential for an exposure in excess of regulatory requirements to workers without adequate protection against internal contamination. The NRC's risk assessment concluded that the failure was of low to moderate safety significance, and represented a White finding. The licensee's risk assessment agreed with the NRC's assessment. The NRC concluded that the failures were in violation of 10 CFR 20.1501 to assure compliance with 10 CFR 20.1201, which limits radiation exposure to occupational workers. In letter dated February 19, 2003, the NRC summarized the results of the risk evaluation and transmitted the Notice of Violation. On March 21, 2003, the licensee submitted its response to the Notice of Violation, including the identified root causes and associated corrective actions.

.2 <u>Inadequate Measurements to Monitor the Occupational Intake of Radioactive Materials by Workers During and Following Steam Generator Nozzle Dam Installations</u>

a. *Determination of who (i.e., licensee, self-revealing or NRC) identified the issue and under what conditions*

Contamination of the nozzle dam workers was self-revealed to the licensee when personnel contamination monitors alarmed as the workers attempted to exit the radiologically restricted area upon completion of the job. The failure to conduct timely and suitable measurements to adequately monitor the occupational intake of radioactive material by workers during and following nozzle dam installations in February 2002 were identified by NRC inspectors during a Special Inspection that initiated in late September 2002, as documented in Inspection Report No. 50-346/02-16(DRS). The special inspection team found that the licensee did not perform appropriate air sampling during the nozzle dam work and thus was unable to provide data that represented the actual radiological environment the workers were exposed to during the nozzle dam installations. The lack of airborne isotopic data impacted the licensee's intake dose assessments.

The licensee initially determined the dose to the workers through in-vivo whole body counting which did not account for alpha emitting materials. In-vitro or other appropriate bioassay sampling was not completed in a timely manner because the licensee did not initially recognize the need to assess worker dose from alpha emitting radioisotopes. The NRC inspection team determined that the failure to obtain suitable and timely air sample measurements compromised the licensee's ability to assess worker dose initially. The licensee's subsequent failure to determine the quantity of radionuclides in the body through in-vitro sampling until over 200 days after the intake event further impacted the dose assessment. The licensee initiated condition report (CR) 2002-07819 to perform the root cause analysis of the worker monitoring problems.

b. *Determination of how long the issue existed, and prior opportunities for identification*

Air sampling to evaluate the radiological environment in the SG bowls had not historically been performed by the licensee because dose significant intakes had not occurred previously during nozzle dam work. When worker intakes were identified by the licensee immediately following the nozzle dam installations on February 20, 2002, the licensee failed to recognize the presence of alpha emitting material because the radiation protection staff were not sensitive to the potential for TRU materials. Consequently, the licensee did not recognize the need to assess the dose from alpha emitting radioisotopes and did not obtain timely in-vitro bioassay samples. Once the results of area contamination smear and RCS waste characterization samples were received from the licensee's contract analytical laboratory on August 8, 2002 (which were collected for reasons unrelated to the intakes), the licensee then recognized the need to collect in-vitro samples from the workers that had intakes to aide in its dose assessment. These samples, however, were not obtained until approximately seven months after the workers' intakes. Industry operating experiences were also available as summarized in item 2.01.1(b) above that addressed the impact of TRU material on internal dose, but this information had not been adequately reviewed and integrated into the licensee's dose assessment processes.

c. *Determination of plant-specific risk consequences (as applicable) and compliance concerns associated with the issue*

The licensee failed to take suitable and timely measurements of concentrations of radioactive material in air in work areas prior to and during the steam generator nozzle dam work. In addition, following worker internal contaminations that were identified the day of the nozzle dam work, the licensee failed to take suitable and timely measurements of the quantities of radionuclides in the body, quantities of radionuclides excreted from the body or combinations of these measurements for two nozzle dam installers. The workers were likely to receive an intake greater than 10 percent of the applicable annual limits of intake since the licensee knew that increased concentrations of alpha emitting isotopes existed in the plant contamination mix, that high contamination levels existed in the SGs, and that two workers potentially received a relatively large amount of internal contamination. The NRC's risk assessment concluded that the failures were of low to moderate safety significance, and represented a White finding. The licensee's risk assessment agreed with the NRC's assessment. The NRC concluded that the failures were in violation of 10 CFR 20.1204 as required

under 10 CFR 20.1502, to monitor the occupational intake of radioactive material and assess worker dose from internal contamination. In letter dated February 19, 2003, the NRC summarized the results of the risk evaluation and transmitted the Notice of Violation. On March 21, 2003, the licensee submitted its response to the Notice of Violation, including the identified root causes and associated corrective actions.

2.02 Root Cause and Extent of Condition Evaluation

.1 Inadequate Evaluation of the Hazards to Characterize the Radiological Work Conditions

a. *Evaluation of method(s) used to identify root causes and contributing causes*

The licensee formed a root cause evaluation team consisting of a contractor and appropriately trained members of the licensee's radiation protection (RP) staff. The team conducted the root cause evaluation using the licensee's "Root Cause Analysis Reference Guide" and the "Tap Root" methodology, supplemented by document review and interviews. The inspectors reviewed the Root Cause Analysis Report ("NRC White Finding of 10 CFR 20.1501 Violation," CR 2002-07811), Revision 01, dated January 21, 2003, and discussed the analysis with root cause team members to verify proper application of the methodology. The inspectors concluded that the licensee's root cause analysis was performed in a systematic manner to determine the root and contributing causes.

b. *Level of detail of the root cause evaluation*

The licensee's root cause analysis identified two root causes and one contributing cause that led to the inadequate evaluation of the radiological hazards for the nozzle dam installations. The inspectors independently evaluated the root cause analysis and reviewed the root cause report and determined that the level of detail of the licensee's evaluation was adequate, and that sufficient information was provided by the licensee to support the conclusions reached. The inspectors concluded overall that the licensee's analysis was performed to a level of detail commensurate with the significance of the performance problem.

Root Cause No. 1: Less Than Adequate Work Direction

The licensee's root cause analysis found that work direction was inadequate as the preparations for the job did not ensure that the workers performing the task had all the necessary information to be successful. The licensee determined that the radiological preparations for the nozzle dam work failed to consider changing plant conditions created by fuel degradation and by a revised shutdown chemistry process that caused an unexpected CRUD burst in the SGs during RCS cleanup. The radiation work permit (RWP) and ALARA work package developed by the RP staff failed to consider radiological conditions in the SG bowls that differed from those historically encountered, and the staff presumed that conditions would be unchanged from past refueling outages. When the ALARA briefing was conducted for the job, the radiological information presented was based on the historical data documented in the RWP and not current data which represented the actual conditions. Also, the briefing was not well organized and the RP staff assigned to the task were not all present at the brief. The

licensee determined that job schedule time pressure placed on the work crew contributed to the work preparation deficiencies. The licensee also determined that the selection of support personnel was less than adequate in that the RP supervisor that provided oversight of the work and two of the RP technicians assigned job coverage were unfamiliar with nozzle dam installations.

Root Cause No. 2: Less Than Adequate Management Systems

The licensee determined that standards, policies and controls in the RP organization were inadequate to ensure those assigned to provide task oversight and radiological coverage were from within the licensee's RP organization. Although plant RP staff had been involved in the work planning, they were not present in the work execution. While an increasing trend of TRU material in the plant mix had been documented in a self-assessment, assessment recommendations were not applied during preparation of the RWP/ALARA work package because staff were largely unaware of this trend. Similarly, industry and operating experiences relevant to the presence of TRUs were available but not adequately addressed and integrated into the RP program or the work planning process.

Contributing Cause: Less Than Adequate Procedures

The licensee determined that procedures relevant to RWP/ALARA package development and for entry into radiologically risk significant environments were either inadequate or no longer used. The RWP package was developed hastily without the necessary rigor in its development or its review, as a latent error concerning the expected SG bowl contamination levels was not detected. The inspectors determined that the lack of an ALARA staff within the RP organization that was unburdened with collateral duties contributed to the work planning problems.

c. *Consideration of prior occurrences of the problem and knowledge of prior operating experience*

The licensee's root cause analysis team performed an industry operating experiences and plant specific corrective action program review and determined that similar problems occurred both at Davis-Besse and at other industry sites. In general, the failure to properly plan work, perform adequate surveys and provide appropriate RP oversight were the causes of several events. The root cause analysis determined that the licensee's review of industry experiences lacked the attention necessary to provide continued program improvement.

d. *Consideration of potential common cause(s) and extent of condition of the problem*

The root cause analysis team conducted a common cause and extent of condition review of all RWP/ALARA packages developed by the RP staff for the current extended outage. The review was performed to evaluate the adequacy of these work packages overall and to determine if they contained erroneous radiological data similar to the February 2002 nozzle dam work package. The licensee did not identify additional erroneous data; however, other RWP packages were found less than adequate in their development and were subsequently enhanced and information was clarified before

work was allowed to recommence. During the licensee's extended shutdown, the adequacy of the overall RP program was evaluated by licensee consultants (Phase Two Program Review) and compared to industry standards and best practices. The inspectors determined that the Phase Two Review was detailed and rigorous and that it identified problems within the RP program similar to the work planning and work execution performance issue which was the subject of the root cause analysis. Specifically, weaknesses were identified in management systems, work direction and procedures in a variety of RP program areas.

The inspectors identified that although the root cause analysis team adequately performed an extent of condition review to assess RP program areas and processes beyond the specific performance issue, the analysis did not determine the extent to which the root causes of the RP performance issue may impact or exist in other plant programs and processes. According to the licensee, its root cause analysis program limits the scope of extent of condition reviews only to the affected program. However, because the licensee had performance problems beyond the RP program, other root cause analyses, and management and human performance assessments were completed by the licensee that adequately captured the extent of condition of the RP performance issues in other plant programs.

.2 Inadequate Measurements to Monitor the Occupational Intake of Radioactive Material by Workers During and Following Steam Generator Nozzle Dam Installations

a. *Evaluation of method(s) used to identify root causes and contributing causes*

The licensee formed a root cause evaluation team consisting of a contractor and appropriately trained members of the licensee's RP staff. The team conducted the root cause evaluation using the licensee's "Root Cause Analysis Reference Guide" and "Tap Root" and "Barrier Analysis" methodologies, supplemented by document review and interviews. The inspectors reviewed the Root Cause Analysis Report ("NRC White Finding of 10 CFR 20.1204 Violation," CR 2002-07819), Revision 02, dated February 11, 2003, and discussed the analysis with root cause team members to verify that the methodologies were employed adequately. The inspectors concluded that the licensee's root cause analysis was performed in a systematic manner to determine the root and contributing causes.

b. *Level of detail of the root cause evaluation*

The licensee's root cause analysis identified two root causes and three contributing causes that led to inadequate measurements to monitor the occupational intake of radioactive materials for those workers that installed the nozzle dams. The inspectors independently assessed the root cause analysis and reviewed the root cause report and determined that the level of detail of the licensee's evaluation was adequate, and that sufficient information was provided by the licensee to support the conclusions reached. The inspectors concluded overall that the licensee's analysis was performed to a level of detail commensurate with the significance of the performance problem.

Root Cause No. 1: Less Than Adequate Work Direction

The licensee determined that the work planning process was not used for identifying required air sampling. Rather, the decision for air sampling was made at the discretion of the assigned RP technician or by RP supervisor direction at the time of the job. According to the licensee's root cause analysis, there was a lack of direction and management involvement in the gathering and correlating of the data necessary to perform the intake assessments. Also, the RP organization failed to recognize the potential significance of the intake disclosed by the initial whole body counts, which was exacerbated because management did not assign sufficient resources to further evaluate the situation.

Root Cause No. 2: Less Than Adequate Management Systems

A perception existed in the RP organization that TRU contamination was not a site issue. As a result, the program did not provide guidance for work controls or internal dose assessment for this type of contamination. Responsibilities and expectations for conducting dose assessments or for communicating preliminary results were not provided in standards or procedures. Instead, the RP organization relied on the judgement of technical staff and did not necessarily include supervisory involvement. Although relevant industry operating experiences were available, they were not formally integrated into the RP program.

Contributing Cause No. 1: Less Than Adequate Procedures

The process for performing a timely dose assessment was not driven by procedure and was left to the knowledge of the RP staff. No procedural guidance existed for differentiating between external versus internal contamination or what conditions required follow-up analysis. Also, procedure guidance did not provide for in-vitro bioassay sample collection, handling or analysis. Similarly, procedures did not address dose assessments when TRU materials or other difficult to detect nuclides were involved. Moreover, procedures did not address air sampling for jobs where airborne activity was possible and particularly when it may be required as part of the ALARA evaluation to determine the need for respiratory protection.

Contributing Cause No. 2: Less Than Adequate Communications

Communications to ensure understanding of the analyses needed when submitting bioassay samples to independent laboratories was less than adequate. There was no clear definition of the requirements necessary for the bioassay analysis between the RP organization and the licensee's contracted laboratory, and no communication to the laboratory regarding the minimum detectable activities required and the length of time that elapsed since the intakes.

Contributing Cause No. 3: Less Than Adequate Training

Content and frequency of training in regards to dose assessment, TRU contributions to dose and performance of initial dose assessments after decontamination were not adequate. Training of RP staff did not cover methods for personnel decontamination,

distinguishing between internal and external contamination, the significance of TRUs on dose calculations or the need for in-vitro sampling.

c. *Consideration of prior occurrences of the problem and knowledge of prior operating experience*

The licensee's root cause analysis team performed an operating experiences and plant specific corrective action program review and determined that this type of event was not a common occurrence in the industry. In general, the licensee's analysis found that failure to maintain adequate procedures and ensure the RP staff maintained an adequate knowledge of internal dose concepts contributed to the issue. The licensee found that an industry event documented in an 1997 NRC Information Notice included similar issues that the licensee failed to address in its RP program. The root cause analysis concluded that the licensee's review of industry experiences lacked the necessary attention to provide continued improvement.

d. *Consideration of potential common cause(s) and extent of condition of the problem*

The root cause analysis team conducted a common cause and extent of condition review of all positive bioassay results for which internal dose was assigned to any worker during its last three operating cycles. The licensee then conservatively applied conversion factors to account for additional TRU dose that was not previously assessed. The increased dose assignments were determined to be small percentages of regulatory limits as no significant intakes had occurred previously.

As discussed in item 2.02.1(d) above, Phase Two Program Reviews coupled with other root cause analyses and management/human performance assessments completed by the licensee adequately captured the extent of condition of the RP performance issues in plant programs other than radiation protection.

2.03 Corrective Actions

.1 Inadequate Evaluation of the Hazards to Characterize the Radiological Work Conditions

a. *Appropriateness of corrective actions*

The inspectors assessed the adequacy of the individual corrective actions that the licensee had taken or proposed for each root cause and contributing cause as identified by their analysis. The inspectors review determined that the corrective actions were appropriate in that they targeted those areas and aspects of the program necessary to prevent recurrence. The corrective actions for the root causes consisted of new procedures or revisions to existing ones, improvements to work planning guidance, enhanced work coverage expectations for radiologically significant work, additional training, and development of standards and expectations for the conduct of RP operations. Actions for the contributing cause included improvements to the total effective dose equivalent (TEDE) evaluation process to ensure TRUs are addressed, and development of procedures and methods to ensure improved work planning and oversight.

Although procedure improvements were made overall, the inspectors identified that some work planning procedures lacked clarity and/or were partially inconsistent with existing companion procedures. The inspectors learned that input from involved RP staff had either not been adequately sought and/or not effectively integrated into the procedure revision process. The inspectors noted that the procedural discontinuities presented a possible vulnerability in the licensee's program, which the licensee acknowledged and planned to address. However, based on inspector interviews of RP staff and observation of ongoing work, the inspectors concluded that work planning had improved despite the procedure deficiencies and that radiological support for work was adequate.

b. *Prioritization of corrective actions*

The licensee developed both immediate and longer-term corrective actions for each root and contributing cause. The inspectors reviewed each of these actions and concluded that they were properly prioritized based on risk significance and regulatory compliance.

c. *Establishment of schedule for implementing and completing the corrective actions*

The licensee developed a schedule for the implementation of each corrective action as part of the root cause analysis. Each corrective action was assigned an owner and due date. The inspectors found that corrective actions were completed timely or on track to be completed as scheduled.

d. *Establishment of quantitative or qualitative measures of success for determining the effectiveness of the corrective actions to prevent recurrence*

The licensee developed an effectiveness review to verify the adequacy of corrective actions consistent with its corrective action programmatic guidelines. The inspectors found the licensee's approach for completing the review to be adequate, timely and tracked through the corrective action process.

.2 Inadequate Measurements to Monitor the Occupational Intake of Radioactive Material by Workers During and Following Steam Generator Nozzle Dam Installations

a. *Appropriateness of corrective actions*

The inspectors assessed the adequacy of the individual corrective actions that the licensee had taken or proposed for each root cause and contributing cause as identified by their analysis. The inspectors review determined that the corrective actions were appropriate in that they targeted those areas and aspects of the program necessary to prevent recurrence. The corrective actions for the root causes consisted of new procedures or revisions to existing ones, improved delineation of responsibilities, mechanisms for management notification and improved involvement in the bioassay process, additional training, and development of guidance and expectations for technical staff involvement in dose assessments. Actions for contributing causes included the purchase of state-of-the-art equipment to better assess intakes, development of

procedures and processes for collecting and for laboratory analysis of in-vitro bioassays and enhanced staff training.

b. *Prioritization of corrective actions*

The inspectors identified no problems with the prioritization of corrective actions as described in item 2.03.1(b) above.

c. *Establishment of schedule for implementing and completing the corrective actions*

The inspectors identified no problems with the corrective action implementation schedule as described in item 2.03.1(c) above.

d. *Establishment of quantitative or qualitative measures of success for determining the effectiveness of the corrective actions to prevent recurrence*

The inspectors found that measures of success for determining the effectiveness of corrective actions was adequate as described in item 2.03.1(d) above.

2.04 Independent Assessment of Extent of Condition (EOC) and Generic Implications

Independent EOC Scope

The inspectors performed an EOC evaluation to independently sample the licensee's performance within the key attributes of the cornerstones that were related to the two White performance issues. Since the root and contributing causes for the degraded cornerstone condition related to programmatic aspects of the RP organization, the inspectors independent EOC review included aspects of both the occupational and public radiation safety cornerstones, as delineated below. The NRC evaluation was performed to determine if the licensee's EOC review and corrective actions for the RP program were sufficiently comprehensive.

.1 Radiological Environmental Monitoring Program (REMP)

The inspectors reviewed the most recent revision of the licensee's Offsite Dose Calculation Manual (ODCM) to determine that environmental sample locations, sample media, collection frequencies and analytical methods were adequate and satisfied Technical Specification requirements to demonstrate compliance with the dose criteria of 10 CFR 50, Appendix I. The inspectors reviewed the 2001 Annual Radiological Environmental Operating Report to verify that environmental sampling locations, sample media, monitoring frequencies, land use census and data analysis were completed consistent with the ODCM. The inspectors reviewed the REMP monitoring equipment maintenance program to ensure the equipment was acceptably maintained, repaired as necessary and that equipment problems were documented in the licensee's corrective action program. The inspectors interviewed REMP field technicians and supervisory personnel to determine their understanding of program and their oversight of ongoing program activities. The inspectors also reviewed the REMP air sample pump calibration program to verify that the licensee performed calibrations at required frequencies using

traceable National Institute of Standards instruments. Additionally, the inspectors reviewed the licensee's inter-laboratory comparison program results for 2001, to verify the adequacy of environmental sample analyses performed by the licensee.

The inspectors determined that the REMP was properly developed and acceptably implemented consistent with the ODCM. The inspectors concluded that the programmatic deficiencies that led to the degraded cornerstone condition did not extend into the REMP.

.2 Radiological Work Planning and Controls

The inspectors reviewed the licensee's new or recently revised procedures for RWP development and ALARA planning, and evaluated several work planning packages for selected jobs that took place during the inspection. The review was performed to assess the adequacy of the revised procedures and to assess improvements to the work planning process. Specifically, the inspectors selected the following radiologically significant work activities that took place during the inspection and evaluated the adequacy of the radiological work planning and the ALARA controls for the job.

- Install Steam Generator Diaphragm and Manway Covers (RWP # 2003-5305)
- Remove Nozzle Dams an FME Covers From the Steam Generators (RWP # 2003-5306)
- Replace Reactor Coolant Pump (RCP) Motors and Remove/Install RCP Seal Packages (RWP # 2003-5556)

The inspectors reviewed the RWP package and ALARA Plan developed for each job, discussed work planning with ALARA staff, assessed the radiological engineering controls and other dose mitigation techniques to be used for each job and verified that each plan was developed consistent with the licensee's revised procedures. The inspectors also verified that lessons learned and industry operating experiences were integrated into each work package. The inspectors determined that although work planning had improved, portions of the new procedures were inconsistent with other procedures and/or lacked clarity, which impacted work package quality.

The inspectors observed ongoing work for each of the activities listed above to verify the adequacy of ALARA controls and assess overall radiological performance. Also, TEDE ALARA evaluations completed for these activities were reviewed for technical adequacy. The inspectors reviewed radiation survey and air sampling data for these jobs to determine the extent of any alpha emitting nuclides and to verify the accuracy of the assumptions used in the TEDE ALARA evaluations. The inspectors also attended pre- and post-job meetings for the nozzle dam removal and manway/diaphragm installation work to verify that work activities were adequately planned and information for successful completion of the work was exchanged effectively.

The inspectors concluded that radiological work planning, work execution and management involvement in radiologically significant work had improved and that the corrective actions for the performance issues associated with work planning were generally adequate.

03 MANAGEMENT MEETINGS

Inspection Team Debrief

Members of the team presented the preliminary inspection results to Mr. Fast and other members of licensee management and staff at the conclusion of the onsite inspection on March 21, 2003. The licensee acknowledged the findings presented. No proprietary information was identified.

Exit Meeting Summary

On April 15, 2003, members of the inspection team and NRC management conducted a public exit meeting with Mr. Myers and other members of licensee management and staff. During the exit meeting, the NRC staff presented the inspection findings and discussed the performance and readiness of the licensee's radiation protection organization and programs to support restart.

KEY POINTS OF CONTACT

Licensee
R. Fast, Plant Manager
G. Gillespie, Acting Supervisor, Technical Support
L. Meyers, Chief Operating Officer
R. Pell, Manager, Chemistry and Radiation Protection

Contractor
G. Honma, Regulatory Affairs
R. Lewis, Lewis Group, LLC

ITEMS OPENED, CLOSED AND DISCUSSED

Opened and Closed

50-346/03-08-01	NCV	Failure to properly control access to LHRAs as required by Technical Specifications (Section 2OS1).

Discussed

None

LIST OF DOCUMENTS REVIEWED

2OS1 Access Controls For Radiologically Significant Areas

CR 03-1586; Potential Violation of LHRA Technical Specifications; dated February 25, 2003

10 CFR 20.1601; Control of Access to High Radiation Areas; dated 2002

10 CFR Part 20; Questions and Answers, Nos. 373 and 489

Surveillance, Initial Irradiated Fuel Assembly Move; dated February 19, 2003

Davis-Besse Technical Specifications

2PS3 Radioactive Material Control Program

Calibration Data Sheet - Frisk-Tech Alpha Count Rate Meter (L.I. # 2.7.286; S/N: A288N); dated November 30, 2002

CR 02-01438; Root Cause Analysis Report - Release of Discrete Radioactive Particles from the Davis-Besse Nuclear Station; dated May 7, 2002

CR 02-02699; Discrete Radioactive Particles (DRP) Found Outside the RRA; dated June 18, 2002

CR 02-05903; Low Level Fixed Contamination Found on Carpet Squares in PSF 2nd Floor; dated September 13, 2002

CR 02-07229; Item Released from RRA with Smearable Contamination; dated October 2, 2002

CR 02-07349; Discrete Radioactive Particles Found Outside RRA Entrance/Exit Area; dated October 2, 2002

CR 02-08863; Radioactive Material Found Outside Radiological Restricted Area; dated October 30, 2002

CR 02-08951; PR/RP: RP Internal Dosimetry/Personnel Monitoring Procedure Deficiencies; dated November 1, 2002

CR 02-10001; PR/RP: Radioactive Material Release Surveys; dated December 7, 2002

DB-0125-0; Calibration Data Sheet - Small Article Monitor (L.I. # 2.12.49; S/N: 133); dated November 29, 2002

DB-0125-0; Calibration Data Sheet - Small Article Monitor (L.I. # 2.12.50; S/N: 225); dated November 29, 2002

DB-0125-0; Calibration Data Sheet - Small Article Monitor (L.I. # 2.12.64; S/N: 326); dated May 7, 2002

DB-0125-0; Calibration Data Sheet - Small Article Monitor (L.I. # 2.12.54; S/N: 264); dated November 10, 2002

DB-0190-0; SPM-906 Calibration Record (L.I. # 2.12.66; S/N: 906066); dated March 3, 2003

DB-0190-0; SPM-906 Calibration Record (L.I. # 2.12.55; S/N: 906022); dated October 13, 2002

DB-0190-0; SPM-906 Calibration Record (L.I. # 2.12.67; S/N: 906065); dated October 18, 2002

DB-0190-0; SPM-906 Calibration Record (L.I. # 2.12.60; S/N: 906052); dated April 23, 2002

DB-0265-0; PCM-2 Calibration Record (L.I. # 2.12.65; S/N: 438); dated December 20, 2002

DB-0265-0; PCM-2 Calibration Record (L.I. # 2.12.69; S/N: 452); dated January 21, 2003

DB-0265-0; PCM-2 Calibration Record (L.I. # 2.12.68; S/N: 451); dated January 7, 2003

DB-0265-0; PCM-2 Calibration Record (L.I. # 2.12.58; S/N: 420); dated February 8, 2003

DB-HP-01108; Discrete Radioactive Particle Detection and Control; Revision 6

DB-HP-01342; Bioassay for Potential Intakes; Revision 0

DB-HP-01435; SPM-904C Calibration Record (L.I. # 2.12.47; S/N: 90447); dated July 16, 2002

DB-HP-01435; SPM-904C Calibration Record (L.I. # 2.12.48; S/N: 90448); dated July 18, 2002

DB-HP-01701; Personnel Contamination Evaluation and Decontamination; Revisions 4 and 5

DB-HP-01706; Release of Material from Radiologically Restricted Areas; Revision 5

DBP 6027F; Radiation Monitor Setpoint - Personal Contamination Monitor PCM-2; dated January 10, 2003

DBP 6027F; Radiation Monitor Setpoint - Portal Monitor (SPM-906, SPM-904); dated June 19, 2002

DBP 6027F; Radiation Monitor Setpoint - Small Article Monitor (SAM-11); dated April 26, 2001

NG-DB-00242; Contamination Control Program; Revision 0

PR-IAP-3H-01; Radiation Protection Program Improvement (selected sections); Revision 0

RP-TBD 2003-001; Technical Basis for Skin Dose Assessment Program at Davis-Besse Nuclear Plant; dated February 2003

RP-TBD 2003-002; Technical Basis for Air Sampling Program at Davis-Besse Nuclear Plant; dated February 2003

2OS4/2PS4 General Employee and Radiation Protection Staff Qualifications/Training

Technical Skills Training Plan; Appendix F; Radiation Protection; (Draft Revision 0, Undated)

Technical Skills Training Overall Training Plan; Appendix G; Contractor Training Program

Training Plan, Attachment 4, Radiation Protection Types; Revision 0

RCI-PHP-i001; Radiological Surveys; December 11, 1989

RCI-PHP-i002; Radiation Work Permits/ALARA; December 11, 1989

RCI-PHP-i004; Personnel External Monitoring; December 11, 1989

RCI-PHP-i005; Access Control; December 17, 1989

RCI-PHP-i010; Job Coverage; December 12, 1989

RCI-PHP-l001; Interpret Radiological Survey Data; December 9, 1989

RCI-PHP-i008; Personnel Contamination; December 11, 1989

RCI-PHP-i006; Contamination Controls; December 20, 1989

RCI-BIN-i008; Selection and Use of Radiation Survey Instruments; October 14, 1989

RCI-BIN-i010; Selection and Use of Air Sampling/monitoring Equip; October 14, 1989

RCI-BIN-i011; Use of Contamination Monitoring Equipment; October 18, 1989

RCI-DOS-1302; Dealing with Transuranic Contamination; Draft (Revision 0)

RCI-DOS-i003; Special Dosimetry; September 1, 1993

RCI-DOS-i004; Evaluation of Personnel External Exposures; September 1, 1993

RCI-DOS-i010; Abnormal/Emergency Procedures; November 1, 1986

RCI-DOS-i006; Internal Exposure Evaluation; September 1, 1993

RCI-BIN-i006; Control and Use of Radioactive Sources; October 21, 1989

RCI-DOS-i001; Thermoluminescent Dosimetry; September 1, 1993

RCI-PSH-i001; Station Design; February 2, 1994

RCI-PSH-i004; Reactor Vessel; February 3, 1994

RCI-PSH-i005; Reactor Coolant System; February 3, 1994

RCI-PSH-i006; Makeup and Purification System; February 3, 1994

RCI-PSH-io10; Clean Liquid Radwaste System; February 4, 1994

RCI-PSH-i012; Gaseous Radwaste System; February 7, 1994

RCI-PSH-i013; Spent Fuel Pool System; February 7, 1994

RCI-PSH-i016, Ventilation Systems; February 7, 1994

Rad. Control Training, Student Handout; Reactor Coolant Pump and Motor

Rad. Control Training, Student Handout; Gaseous Radwaste System

Rad. Control Training, Student Handout; Radwaste Ventilation System

Rad. Control Training, Student Handout; Once-through Steam Generator

Senior Radiation Protection Technician Qualification Record

Health Physics Technician Written Examination: Initial Training, HP Fundamentals, Number 18, Exam #940050

RCI-070; Davis- Besse Radiation Protection Section Qualification Card, Job Coverage; Revision 03

RCI-080; Radiological Control Section Qualification Record, Advanced Job Coverage; Revision 0

LP-FENB-RWT; Radiation Worker Training; (Revision 00)

LP-FEN-PAT; Plant Access Training; (Revision 00)

Davis-Besse 11 & 12 RFO Post Outage Reports

Davis-Besse NPS 1999 Mid-Cycle Outage Report

For Information Notice 88-63 (and it's supplements): October 20, 1988 Memorandum, NEO-88-01614; October 30, 1990, NEO-90-01069; August 26, 1991, NEO-91-00678

For Information Notice 88-79: November 10, 1998, NEO-88-01768

For Information Notice 90-33: February 6, 1992, NEO-92-00100 For Industry Generic Communication SER 3-093 (INPO): April 28, 1993 Memorandum, NEI-93-00259

For Information Notice 97-36: 12/15/97, Potential Condition Adverse to Quality Report and associated follow-up actions, #97-913.

For information Notice 97-68: October 16, 1997, PCAQR 1997-1228

For Industry Generic Communication SOER 01-1 (INPO): The Davis-Besse Evaluation

Notebook for SOER 01-1, Unplanned Radiation Exposures, December 1, 2001

2OS5/2PS5 Radiation Protection Program Phase 2 Review

PR-DAP-3-01; Restart Closure Package, Discovery Action Plan, Radiation Protection Program; Revision 1

PR-IAP-3H-01; Radiation Protection Program Restart Implementation Action Plan; Revision 0

02 Supplemental Inspection Of Degraded Cornerstone

NOP-LP-2001; Condition Report Process; Revision 3

Conduct of Operations for Radiation Protection; Revision 0

DB-HP-01154; Radiological Work ALARA Reviews; Revision 0

DB-HP-01340; Dose Assessment; Revision 5

DB-HP-01342; Bioassay for Potential Intakes; Revision 0

DB-HP-01901; Radiation Work Permits; Revision 8

NG-DB-00241; ALARA Program; Revision 0

DB-HP-01104; Radiological Surveillance; Revision 7

DB-HP-01454; Calibration and Use of Lapel Air Samplers; Revision 4

DB-HP-01115; OTSG Entries; Revision 2

Radiation Protection Outage and Non-Outage Organizations; February 2002 and September 2002

RWP # 2003-5556, Associated ALARA Plan and Radiation Surveys; Replace RCP 1-1-1 and 1-1-2 Motors and Associated Work to Include Removal of RCP Seal Packages; Revision 1

RWP # 2003-5305, Associated ALARA Plan and Radiation Surveys; Install Diaphragms and Manway Covers; Revision 0

RWP # 2003-5306, Associated ALARA Plan and Radiation Surveys; Remove Nozzle Dams and Nozzle Dam FME Covers and Equipment from Steam Generators; Revision 0

Root Cause Analysis Report; NRC White Finding of 10 CFR 20.1501 Violation; CR # 2002-07811; Revision 1 dated January 21, 2003

Root Cause Analysis Report; NRC White Finding of 10 CFR 20.1204(a) Violation; CR # 2002-07819; Revision 2 dated February 11, 2003

NOP-LP-2001-05; Corrective Action Records for CR # 2002-07811 and # 2002-07819

Program Compliance Plan Overall Results Assessment Report; dated January 28, 2003

Management & Human Performance Improvement Plan; Implementation Action Plan MHP-IAP-4a-01; Revision 1

Radiation Protection Program Review (Phase Two) Summary Report; Revision 0 dated December 2002

Program Compliance Review Team Qualification Matrix

CR # 2002-07323; QA Assessment Report Issue - Radiation Protection; October 3, 2002

CR # 2002-08951; RP Internal Dosimetry/Personnel Monitoring Procedure Deficiencies; November 1, 2002

CR # 2002-09589; Procedural Violation Not Assessed by Root Cause Study; November 22, 2002

CR # 2002-09618; Inconsistent ALARA Review Requirements; November 22, 2002

CR # 2002-09619; Inadequate Procedure for Steam Generator Entry; November 22, 2002

CR # 2002-09673; ALARA Procedure Deficiencies; November 25, 2002

CR # 2002-10193; Smear Surveys Not Consistently Analyzed for Alpha Activity; December 11, 2002

Root Cause Analysis Reference Guide; Revision 3

FENOC Integrated Training System Completion Report; February 25, 2003

Offsite Dose Calculation Manual; Revision 17

DB-HP-10101; REMP Enhancement Sampling; Revision 4

DB-HP-03004; Radiological Monitoring Quarterly, Semiannual and Annual Sampling; Revision 3

DB-HP-00015; Radiological Environmental Monitoring Program; Revision 2

DB-HP-00013; Review and Evaluation of REMP Sample Results; Revision 2

CR # 2001-1170; Possible Reliability Issue With REMP Air Samplers; April 30, 2001

CR # 2002-07712; REMP Air Samplers Missing Time; October 8, 2002

2001 Annual Radiological Environmental Operating Report; Revision 1, dated November 2002

Self-Assessment Report # 1999-0058; Assessment of REMP Implementation; dated February 2, 2000

Self-Assessment Report # SA 200-0149; Effluents, ODCM and REMP; dated January 25, 2001

Nuclear Quality Assessment Audit Report # AR-01-RPPCP-01; REMP, Effluents, Meteorological Program, ODCM and Process Control Program; dated January 24,2002

LIST OF ACRONYMS USED

ALARA	As-Low-As-Is-Reasonably-Achievable
EOC	Extent of Condition
GC	Generic Communication
HRA	High Radiation Area
IN	Information Notice
INPO	Institute for Nuclear Power Operations
LHRA	Locked High Radiation Area
NCV	Non-Cited Violation
ODCM	Offsite Dose Calculation Manual
PCM	Personnel Contamination Monitor
REMP	Radiological Environmental Monitoring Program
RCS	Reactor Coolant System
RP	Radiation Protection
RPM	Radiation Protection Manager
RPT	Radiation Protection Technician
RRA	Radiologically Restricted Area
RPS	Radiation Protection Supervisor
TEDE	Total Effective Dose Equivalent
SDP	Significance Determination Process
SG	Steam Generator
TRU	Transuranic
WBC	Whole Body Count
RWP	Radiation Work Permit