August 2, 2006

Mr. David A. Christian
Senior Vice President and
Chief Nuclear Officer
Innsbrook Technical Center
5000 Dominion Boulevard
Glen Allen, VA 23060-6711

SUBJECT: KEWAUNEE POWER STATION
NRC SPECIAL INSPECTION REPORT 05000305/2006011

Dear Mr. Christian:

On June 23, 2006, the U.S. Nuclear Regulatory Commission (NRC) completed a special inspection at your Kewaunee Nuclear Power Plant. The enclosed inspection report documents the inspection findings, which were discussed at the exit meeting on June 23 with Ms. L. Hartz and other members of your staff.

On May 17, 2006, operators demonstrated weaknesses in procedural use and adherence when they failed to follow operating procedures and failed to address inadequacies in a procedure they were using to start up the Kewaunee Power Station. Two Senior Reactor Operators (SROs) directed control room Reactor Operators (ROs) to perform procedural steps out of sequence during a plant startup. The SROs directed the ROs to dilute the reactor coolant system boron concentration to the Estimated Critical Position boron concentration vice the procedurally directed Hot Shutdown boron concentration, and to withdraw shutdown bank rods after reaching Estimated Critical Position boron concentration. Due to the potential significance of operational errors, the NRC decided to conduct a special inspection of the Kewaunee Power Station control room activities during this reactor startup.

Following the criterion (criterion h) specified in Management Directive 8.3, and Inspection Procedure 71153, a Special Inspection was initiated in accordance with Inspection Procedure 93812 and Regional Procedure RP-1219. The special inspection team officially commenced on May 18, 2006.

The inspection examined activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your license. The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel.

The attached report documents two NRC-identified findings of very low safety significance (Green). These findings were determined to involve violations of NRC requirements. However, because of the very low safety significance and because they are entered into your corrective action program, the NRC is treating these two findings as non-cited violations (NCVs), in accordance with Section VI.A.1 of the NRC Enforcement Policy. If you contest any NCV, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington DC 20555-0001; with copies to the Regional Administrator - Region III, 2443 Warrenville Road, Suite 210, Lisle, IL 60532-4352; the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Resident Inspector at the Kewaunee Power Station.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response (if any) 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), accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Sincerely,

/RA/

Cynthia D. Pederson, Director
Division of Reactor Safety

Docket No. 50-305
License No. DPR-43

Enclosure: Inspection Report 05000305/2006011
w/Attachments: 1. Supplemental Information
2. Special Inspection Team Charter
3. Timeline

cc w/encl: L. Hartz, Site Vice President
C. Funderburk, Director, Nuclear Licensing
and Operations Support
T. Breene, Manager, Nuclear Licensing
L. Cuoco, Esq., Senior Counsel
D. Zellner, Chairman, Town of Carlton
J. Kitsembel, Public Service Commission of Wisconsin
State Liaison Officer, State of Wisconsin

The attached report documents two NRC-identified findings of very low safety significance (Green). These findings were determined to involve violations of NRC requirements. However, because of the very low safety significance and because they are entered into your corrective action program, the NRC is treating these two findings as non-cited violations (NCVs), in accordance with Section VI.A.1 of the NRC Enforcement Policy. If you contest any NCV, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington DC 20555-0001; with copies to the Regional Administrator - Region III, 2443 Warrenville Road, Suite 210, Lisle, IL 60532-4352; the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Resident Inspector at the Kewaunee Power Station.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response (if any) 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), accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Sincerely,

/RA/

Cynthia D. Pederson, Director
Division of Reactor Safety

Docket No. 50-305
License No. DPR-43

Enclosure: Inspection Report 05000305/2006011
w/Attachments: 1. Supplemental Information
2. Special Inspection Team Charter
3. Timeline

cc w/encl: L. Hartz, Site Vice President
C. Funderburk, Director, Nuclear Licensing and Operations Support
T. Breene, Manager, Nuclear Licensing
L. Cuoco, Esq., Senior Counsel
D. Zellner, Chairman, Town of Carlton
J. Kitsembel, Public Service Commission of Wisconsin
State Liaison Officer, State of Wisconsin

DOCUMENT NAME: E:\Filenet\ML062190469.wpd
☐ Publicly Available ☐ Non-Publicly Available ☐ Sensitive ☐ Non-Sensitive
To receive a copy of this document, indicate in the concurrence box "C" = Copy without attach/encl "E" = Copy with attach/encl "N" = No copy

OFFICE	RIII		RIII		RIII		RIII	
NAME	MBielby:jb		MKunowski for PLouden		HPeterson		CPederson	
DATE	8/2/06		8/2/06		8/2/06		8/2/06	

OFFICIAL RECORD COPY

ADAMS Distribution:
JLD
JFS2
RidsNrrDirsIrib
GEG
KGO
SXB3
CAA1
LSL (electronic IR's only)
C. Pederson, DRS (hard copy - IR's only)
DRPIII
DRSIII
PLB1
TXN
ROPreports@nrc.gov

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Docket No:	50-305
License No:	DPR-43
Report No:	05000305/2006011
Licensee:	Dominion Energy Kewaunee, Inc.
Facility:	Kewaunee Power Station
Location:	Kewaunee, WI 54216
Dates:	May 18 through June 23, 2006
Inspectors:	Michael Bielby, Senior Operations Engineer - Team Leader Charles Phillips, Senior Resident Inspector, Dresden Keith Walton, Operations Engineer
Approved By:	Hironori Peterson, Chief Operations Branch Division of Reactor Safety

SUMMARY OF FINDINGS

IR 05000305/2006011; 05/18/06 - 06/23/06; Kewaunee Power Station; Special Inspection for Use of an Inadequate Procedure and Failure of Operators to Follow an Operations Procedure During a Plant Heatup.

This report covers an on-site and in-office Special Inspection conducted by three Region III inspectors. The inspection identified two Green findings. The significance of most findings is indicated by their color (Green, White, Yellow, Red) using Inspection Manual Chapter 0609, "Significance Determination Process." Findings for which the Significance Determination Process does not apply may be "Green" or be assigned a severity level after NRC management review. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 3, dated July 2000.

A. Inspector-Identified and Self-Revealed Findings

Cornerstone: Mitigating Systems

- Green. The inspectors identified a finding associated with a non-cited violation of Technical Specification 6.8.a (written procedures and administrative policies). The finding was for the licensee's failure to follow approved procedures during a plant startup. The finding was of very low safety significance and there were three examples of the finding. The first example of a failure to follow approved procedures occurred when operators incorrectly marked a procedure step as not applicable and failed to execute the step. The second example of the failure to follow approved procedures occurred when operators executed procedure steps out of sequence. The third example occurred during the previous reactor startup conducted in November 2005 when operators performed procedure steps out of sequence in the same manner as executed during this plant startup. Corrective actions included placing Procedure N-0-01 on administrative hold until appropriate procedure changes could be made and training operating crews on procedure adherence.

  This finding was of more than minor safety significance. Failure to comply with reactivity management requirements can lead to an uncontrolled reactivity event. In this particular event, the failure to follow the procedural sequence could have resulted in shutdown margin being less than that required by Technical Specifications. However, this finding is of very low significance because the actual shutdown margin did not go below the minimum required by Technical Specifications. This finding affected the cross-cutting issue of human performance. (Section 4OA3.4.b)

- Green. The inspectors identified a finding associated with an non-cited violation of 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," of very low safety significance associated with an event. The inspectors identified that Procedure N-0-01, "Plant Startup from Cold Shutdown Condition to Hot Shutdown Condition," Revision BI, Step 4.45 was inadequate to start up the reactor for the conditions that existed on May 17, 2006. The procedure, as written, would have required the operators to dilute the reactor to a lower boron concentration than the Estimated Critical Position boron concentration prior to withdrawing the Shutdown Bank

rods. Corrective actions to address this finding included placing Procedure N-0-01 on administrative hold until appropriate procedure changes could be implemented.

This finding was more than minor in safety significance because this issue, if left uncorrected, would have resulted in the core reactivity shutdown margin being less than that required by Technical Specifications. However, this finding is of very low significance because the procedure step was not executed and shutdown was never below that required by Technical Specifications. This finding affected the cross-cutting issue of human performance. (Section 4OA3.5.b.(2))

B. Licensee-Identified Violations

No findings of significance were identified.

REPORT DETAILS

Summary of Plant Event

On Tuesday, May 16, 2006, operators were performing a plant heatup in preparation for a reactor startup. Between approximately 6:00 and 6:30 pm a shift turnover occurred. The plant was in a Hot Shutdown (HSD) condition, Reactor Coolant System (RCS) temperature was approximately 547°F, all rods inserted, and RCS boron concentration 1219 ppm. The off-going shift had completed Operations Procedure N-0-01, "Plant Startup from Cold Shutdown Condition to Hot Shutdown Condition," Steps 4.22 through Step 4.44. Procedure N-0-01, Step 4.43, required the determination of the HSD Xenon (Xe) free boron concentration using Figure RD 6.6, and recording that value. The HSD boron concentration was determined to be 620 ppm. Procedure Step 4.45 was required to be performed by the on-coming crew and required dilution to the HSD boron value plus 50 to 150 ppm. The Shift Manager (SM) and Unit Supervisor (US) recognized that it would be inappropriate, as well as take a significant amount of time, to dilute from the current boron concentration to the HSD boron value because a later procedure step would require boration back to the Estimated Critical Position (ECP) boron concentration. However, neither the SM nor US took action to change the procedure or consult additional personnel. They made a decision to mark the step N/A (Not Applicable) and directed the reactor operators to dilute to the ECP boron concentration. After completion of the N-0-01 procedure, the crew transitioned to the HSD to Power procedure, N-0-02, which required withdrawal of Shutdown Bank (SDB) rods followed by dilution to ECP boron concentration. After withdrawal of the SDB rods, and with ECP boron concentration previously established, the crew withdrew Control Bank (CB) rods and established criticality. Although several oversight personnel questioned the sequence of SDB withdrawal and dilution to ECP, the startup continued. Between approximately 5:00 and 6:30 am on May 17, 2006, based on a phone call from corporate management, the licensee initiated an investigation to confirm the procedure sequencing issue. The licensee informed the resident inspectors at 3:00 pm that based on earlier action to dilute to ECP boron concentration, the steps to perform withdrawal of SDB rods and dilution to ECP boron concentration had been performed out of sequence. The reactor startup continued until a forced shutdown at 11:27 pm due to mechanical problems associated with the Main Turbine.

4. OTHER ACTIVITIES (OA)

4OA3 Special Inspection (93812) (Charter Attached as Attachment 2)

.1 Sequence of Events - (Charter Item 1)

a. Inspection Scope

The inspectors reviewed selected corrective action program documents, work orders, and control room logs, and conducted interviews to determine the sequence of events on May 16 and 17, 2006. The sequence of events was compared with Technical Specification 6.8.a and 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," to determine if these requirements were met.

b. Findings and Observations

Description and Chronology of the Events

A timeline of the event is attached to the inspection report as Attachment 3.

On May 16, 2006, Kewaunee operators were conducting a plant heatup in preparation for a reactor startup. The on-coming shift assumed the watch between approximately 6:00 and 6:30 pm. The plant was stable in a HSD condition: RCS temperature was approximately 547°F, RCS boron concentration 1219 ppm, and all rods were fully inserted. The off-going shift had completed Operations Procedure N-0-01, "Plant Startup from Cold Shutdown Condition to Hot Shutdown Condition," Steps 4.22 through Step 4.44. Procedure N-0-01, Step 4.43, required the determination of the HSD Xe free boron concentration using Figure RD 6.6, and recording that value. The HSD boron concentration was determined to be 620 ppm. Procedure Step 4.45 was required to be performed by the on-coming crew and required dilution to the HSD boron value plus 50 to 150 ppm. Subsequently, the crew would have to transition to Operations Procedure N-0-02, "Plant Startup from Hot Shutdown To 35% Power." All of the regularly scheduled licensed operators on the on-coming shift except for the SM and US were relieved at the beginning of shift to complete the remainder of their reactor startup Just-In-Time-Training (JITT) in the simulator.

The SM and US discussed Step 4.45 and reasoned that the RCS was already borated greater than the ECP boron concentration and there was no need to dilute down to the HSD boron concentration. Additionally, the SM and US reasoned that dilution to ECP boron concentration was allowed because N-CRD-49B, "Reactor Startup," Precaution and Limitation, 2.10, stated that when positive reactivity is being added, one of the following shall be satisfied: 1) SDB rods are fully withdrawn, or; 2) RCS shall be borated to at least HSD boron concentration AND RCS temperature shall be greater than or equal to 540°F, or; 3) RCS shall be borated to Cold Shutdown boron concentration. The SM was satisfied that the second condition was met. The SM and US determined that it was not necessary to dilute from the current boron concentration (1219 ppm) to the HSD boron value (670-770 ppm) because a subsequent procedure step would require boration back to the ECP boron concentration (1052 ppm). However, neither the SM or US took action to change the procedure or consult additional personnel. They made a decision to not perform N-0-01, Step 4.45, and marked the step N/A.

The regularly scheduled licensed operator crew members returned from JITT and assumed their watchstations by approximately 8:30 pm. Transition from Procedure N-0-01 to N-0-02 occurred at 10:15 pm. Procedure N-0-02, Step 4.8, identified five sub steps that were to be performed sequentially for reactor startup, including dilution to ECP boron concentration (Step 4.8.3) after withdrawal of SDBs (Step 4.8.2). However, the crew reasoned that the steps did not require the SDBs to be withdrawn before diluting the RCS. Although Procedure N-0-02 required dilution to ECP boron concentration (Step 4.8.3) after withdrawal of SDBs (Step 4.8.2), the crew commenced dilution to ECP boron concentration at 12:16 am (May 17, 2006) and completed the dilution at 3:16 am. The crew commenced withdrawal of SDB rods at 3:55 am and completed rod withdrawal at 4:28 am. Although several oversight personnel questioned the sequence of SDB withdrawal and dilution to ECP, the startup continued. Between

approximately 5:00 and 6:30 am on May 17, 2006, based on a phone call from corporate management, the licensee initiated an investigation to confirm the procedure sequencing issue. After withdrawal of the SDB rods, and with ECP boron concentration previously established, the crew withdrew Control Bank rods and established criticality at 5:50 am. The licensee informed the resident inspectors at 3:00 pm that the steps to perform withdrawal of SDB rods and dilution to ECP boron concentration had been performed out of sequence. The reactor startup continued until a forced shutdown at 11:27 pm due to mechanical problems associated with the Main Turbine.

.2 Control Room Personnel Performance and Oversight - (Charter Item 2)

a. Inspection Scope

The inspectors interviewed operators and oversight personnel present in the control room during the event to confirm the presence of reactor engineering, quality assurance, or senior managers that were providing oversight of the plant heatup and reactor startup during the event of May 16 - 17, 2006, in accordance with Technical Specification manning requirements and station administrative requirements. The inspectors reviewed operator logs, and years of experience to determine compliance with REG GUIDE 1.149 requirements. The inspectors reviewed work week work hour status records of the licensed operators involved in the event to establish compliance with fitness for duty requirements of 10 CFR 26.

b. Findings and Observations

(1) Control Room Licensed Operator Crew Experience and Work Hours - (Charter Item 2)

There were four licensed SROs assigned to the control room crew for the plant startup. This included a SM, a US, an extra SRO for directing reactivity operations, and Shift Technical Advisor (STA). There were three licensed ROs including an RO at the controls, a balance of plant (BOP) operator, and an extra Nuclear Control Operator (NCO). The on-shift control room crew was a mix of experienced and recently licensed operators. Half of the licensed SROs (SM, Extra SRO) averaged 9 years and the other half (US, STA) averaged 3 years at the SRO level. Although the ROs averaged about five years overall, two of three of the ROs had 2 years or less of experience as a licensed RO, while the BOP had about 11 years of experience. Two individuals had exceeded the licensee's allowed overtime work-hour limit by several hours; however, those individuals had pre-authorized exemptions and the total hours for the balance of the crew did not exceed the allowed administrative limits. During NRC interviews, the licensed crew members did not identify fatigue as a precursor to the event.

The inspectors concluded that the crew mix of job experience and qualifications was adequate to perform their respective duties to execute and oversee the plant startup operations. The overall weekly work hours were not excessive and the operating crew was considered fit-for-duty during the event.

(2) Control Room Oversight - (Charter Item 2)

The presence of direct licensee oversight in the control room during the event included the Operations Management Representative (OMR), two licensed SRO shift mentors from other Dominion sites, and a Nuclear Oversight person. The OMR provided management oversight of operations and control room activities. The Nuclear Oversight person was performing an audit of operations activities. The SRO mentors were providing oversight of the SM as part of a licensee response to performance issues identified during the previous shutdown. Additional control room oversight was intermittently provided by the Operations Outage Manager (OOM) and Plant Manager (PM). The Reactor Engineer (RE) was available, but not required to be in the control room during reactivity manipulations such as dilution. Based on interviews, inspectors determined that at times during the plant heatup and reactor startup, various oversight personnel reviewed the associated procedure status and questioned the evolutions in progress.

The inspectors concluded that although the presence of oversight personnel was adequate in number and type to ensure a safe reactor startup, the oversight personnel were ineffective in enforcing procedure usage and compliance.

.3 Identify Procedures Used During Event - (Charter Item 3)

a. Inspection Scope

The inspectors interviewed the licensed operators involved in the event, senior operations management, and the RE present during the reactor startup. The inspectors also reviewed control room operator logs and licensee corrective action program (CAP) documents to identify licensee procedures used during the event.

The inspectors identified that the following licensee procedures were important to this event:

N-0-01, “Plant Startup from Cold Shutdown Condition to Hot Shutdown Condition,” Revision BI;

N-0-01-CLB, “Initial Conditions Summary Sheet,” Revision J;

N-0-02, “Plant Startup From Hot Shutdown to 35% Power,” Revision AT;

N-CRD-49B, “Reactor Startup,” Revision AK;

RD 6.6, “Cycle 27 1.542% Shutdown HZP No Xe, T_{mod} = 547 F, ARI with 100 ppm Allowance” [Curve for appropriate boron concentration versus plant burnup to maintain 1.542 percent shutdown margin xenon free with all rods inserted and the moderator temperature at 547°F], Revision October 28, 2004;

RE 28, “Manual Estimated Critical Position Calculation,” Revision N; and

GNP-03.01.03, “Procedure Use and Adherence,” Revision U.

b. Findings and Observations

No findings of significance were identified.

.4 Determine Inappropriate Procedure Changes - (Charter Item 4)

a. Inspection Scope

The inspectors interviewed the licensed ROs and SROs involved in the event, reviewed the procedures used and/or referenced during the event and reviewed control room operator logs to determine if there was a failure to implement required procedural steps in accordance with Technical Specification 6.8.a.

b. Findings and Observations

Introduction: The inspectors identified that no procedures were changed (per SIT Charter), however, control room operators did not execute operating procedures correctly. The control room operators failed to correctly execute operating procedures on three separate occasions. Inspectors identified a finding of very low safety significance (Green) associated with the event.

Description: [1st Example] Procedure N-0-01, Step 4.45 was marked with an asterisk and stated:

"WHEN RCS temperature is greater than 540°F, THEN PERFORM one of the following:

> 1. DILUTE RCS to 50-150 ppm greater than boron concentration recorded in Step 4.44 per N-CVC-35A."

A note in Step 4.0 of N-0-01 defined the asterisk step as: "Steps marked with asterisk [*] are optional depending on initial conditions for heatup as indicated in N-0-01-CLB." The licensed operators interviewed stated that their understanding of the asterisk was that if the desired condition did not already exist (per N-0-01-CLB), then put the plant (equipment) in that condition. The existing RCS boron concentration was 1219 ppm. The operators recognized that they did not want to lower boron concentration from 1219 ppm to 670-770 ppm (HSD boron concentration) required by Step 4.45. Instead of executing the procedure step, they chose to mark the procedure step N/A and diluted to the ECP boron concentration. The operators felt that since procedure Step 4.45 was marked as optional this was an acceptable course of action.

[2nd Example] In Example 1, operators chose to dilute RCS boron concentration to the ECP boron concentration at Step 4.45. When they transitioned to Step 4.8.2 of N-0-02 (withdraw SDB control rods), step 4.8.3 (dilute to ECP boron concentration) was already completed. Therefore, control room operators performed steps out of sequence during the reactor startup on May 17, 2006.

[3rd Example] Operators executed the same steps in the same incorrect sequence during a previous startup on November 29, 2005. Specifically, N-0-02, Step 4.8.3, was performed prior to Step 4.8.2.

Analysis: The inspectors compared this finding against the guidance contained in Appendix B, "Issue Disposition Screening," of Manual Chapter (MC) 0612, "Power Reactor Inspection Reports." Incorrectly marking Step 4.45 "N/A" and performing withdrawal of the SDB rods and dilution to ECP boron concentration out of sequence did not result in going below the Technical Specification required Shutdown Margin (SDM). Consistent with the guidance in MC 0612, the inspectors determined that the finding was of more than minor significance because this issue, if left uncorrected, could have become a more significant safety concern. Specifically, performing reactivity management procedures out of sequence can lead to an uncontrolled reactivity event. The inspectors performed a Phase 1 SDP in accordance with Inspection Manual Chapter 0609, Appendix A, "Determinating the Significance of Reactor Inspection Findings for At-Power Situations," dated November 22, 2005. The inspectors found this issue to be associated with the Mitigating Systems Cornerstone, "Reactivity Control Degraded." The inspectors determined that the answers to all five questions under the Mitigating Systems Cornerstone Section on page A1-9 were "NO." Therefore, based on all questions being answered "NO," and the SDM maintained greater than the Technical Specification during the startup, the inspectors determined this finding was a licensee performance deficiency of very low safety significance (Green).

The inspectors also concluded that this finding affected the cross-cutting issue of human performance because the licensee did not use a systematic decision-making process, did not obtain interdisciplinary input on a risk significant decision and failed to use guidance provided in Procedure GNP-03.01.03, "Procedure Use and Adherence," Revision U, Step 6.3, that required the operators to stop use of, and correct the technically incorrect procedure before continuing with the procedure.

Enforcement: Technical Specification 6.8.a. required, in part, that written procedures and administrative policies be established, implemented and maintained to meet the requirements and recommendations of Section 5.2.2, of ANSI N18.7-1976. Section 5.2.2 of ANSI N18.7-1976, states, in part, that procedures shall be followed, and the requirements for use shall be prescribed in writing.

Contrary to this, while executing steps of N-0-01 and N-0-02 on May 17, 2006, operators incorrectly marked a required step "N/A" and executed other procedural steps in an incorrect sequence. On November 29, 2005, operators performed the same out-of-sequence actions to dilute reactor coolant system boron concentration prior to withdrawing SDB control rods while conducting a reactor startup. Corrective actions to address this finding included placing Procedure N-0-01 on administrative hold until appropriate procedure changes could be made and training operating crews on procedure adherence. Because this failure to correctly follow prescribed procedures was of very low safety significance and has been entered into the CAP (CAP 033942), this violation is being treated as an NCV, consistent with Section VI.A of the NRC Enforcement Policy. (NCV 05000305/2006011-01)

.5 Procedure Revisions Prior to May 17, 2006, Validation, Verification - (Charter Item 5)

a. Inspection Scope

The inspectors reviewed procedures and interviewed licensee staff regarding validation and verification of recent changes to the following licensee procedures:

N-0-01, “Plant Startup from Cold Shutdown Condition to Hot Shutdown Condition,” Revision BI;

N-0-01-CLB, “Initial Conditions Summary Sheet,” Revision J;

N-0-02, “Plant Startup From Hot Shutdown to 35% Power,” Revision AT;

N-CRD-49B, “Reactor Startup,” Revision AK; and

RD 6.6, “Cycle 27 1.542% Shutdown HZP No Xe, Tmod = 547°F, ARI with 100 ppm Allowance” [Curve for appropriate boron concentration versus plant burnup to maintain 1.542 percent shutdown margin xenon free with all rods inserted and the moderator temperature at 547°F], Revision October 28, 2004.

In addition, the inspectors reviewed CAP 034046, N-0-01, “Revision BI, Sub-optimizes Operating Margin.” These procedures were reviewed to determine compliance with 10 CFR Part 50, Appendix B, Criterion V.

b. Findings and Observations

(1) Recent Procedure Changes

On the morning of May 17, 2006, the operating crew was using N-0-01, Revision BI, dated May 8, 2006. Revision BH had been implemented on May 3, 2006 and Revision BG had been implemented on April 27, 2006. There were no changes between Revision BG and BH that impacted this event. There was a change to procedure steps between Revision BH and BI that impacted this event.

Procedure N-0-01, Revision BH, Step 4.43 required dilution to HSD Xe free boron concentration. Prior to Revision BI, determination of the boron concentration was considered skill of the craft because there was no procedure step to direct how this concentration was to be obtained. This was changed in Revision BI, such that Step 4.43 required the determination of HSD Xe free boron concentration using Figure RD 6.6. Procedure Step 4.44 required recording the value, and Step 4.45 required dilution to 50 to 150 ppm above the concentration recorded in Step 4.44. The inspectors did not consider these changes to be significant.

There were no recent changes to Procedures N-0-02 or N-CRD-49B that would have impacted this event.

(2) Old Procedure Changes

Introduction: The inspectors identified that Procedure N-0-01, "Plant Startup from Cold Shutdown Condition to Hot Shutdown Condition," Revision BI, Step 4.45 was inappropriate for the circumstances. The inspectors identified a finding of very low safety significance (Green). Reactor startup Procedure N-0-01, Step 4.45 was inadequate for reactor startup with the conditions that existed on May 17, 2006. This was a violation of 10 CFR Part 50, Appendix B, Criterion V.

Description: Procedure N-0-01, Step 4.43, required Figure RD 6.6 to be used to determine the HSD boron concentration in preparation for the startup. The inspectors reviewed and questioned the contents of CAP 034046 which stated that in previous startups HSD boron concentration resulted in a higher SDM of 3.4 percent. Through discussion with licensee personnel the inspectors identified that Figure RD 6.6 was used to calculate HSD boron concentration in startups during refueling Cycle 26 and the current refueling Cycle 27. Prior to Cycle 26 the licensee used Figure 3.10.5 to calculate HSD boron concentration. The difference between the two graphs was that boron concentrations in Figure 3.10.5 assumed that SDB rods were withdrawn; however, the Figure RD 6.6 HSD boron concentration assumed that all rods were inserted. Between Cycle 25 and 26 the licensee used a new fuel vendor and went from preparing Figure 3.10.5 in-house to having Westinghouse prepare Figure RD 6.6. The inspectors identified that when the licensee went from calculating HSD boron concentration with SDB rods withdrawn to calculating HSD boron concentration with SDB rods inserted, no change was made to Procedure N-0-01 to adjust for the difference in SDM.

Analysis: The inspectors compared this finding against the guidance contained in Appendix B, "Issue Disposition Screening," of Manual Chapter (MC) 0612, "Power Reactor Inspection Reports." The inspectors determined that Procedure N-0-01, Step 4.45, was inadequate for the circumstances and was a performance deficiency. Consistent with the guidance in MC 0612, Power Reactor Inspection Reports," Appendix B, " Issue Disposition Screening," issued on September 30, 2005, the inspectors determined that the finding was of more than minor significance because this issue, if left uncorrected, could have become a more significant safety concern since diluting to the HSD boron concentration at that point in the startup would have resulted in a SDM less than that required by Technical Specifications. The inspectors performed a Phase 1 SDP in accordance with Inspection Manual Chapter 0609, Appendix A, "Determinating the Significance of Reactor Inspection Findings for At-Power Situations," dated November 22, 2005. The inspectors found this issue to be associated with the Mitigating Systems Cornerstone, "Reactivity Control Degraded." The inspectors determined that answers to all five questions under the Mitigating Systems Cornerstone section on page A1-9 were "NO." Based on all questions being answered "NO" and that the SDM was maintained greater than the Technical Specification requirement during the startup, the inspectors determined this finding was a licensee performance deficiency of very low safety significance (Green).

The inspectors also concluded that this finding affected the cross-cutting issue of human performance because the licensee did not provide accurate and up to date operating

procedures to plant personnel. Specifically, Procedure N-0-01 was inadequate for the circumstances for the plant startup on May 17, 2006.

Enforcement: Regulatory requirement 10 CFR Part 50, Appendix B, Criterion V, Instructions, Procedures, and Drawings," states, in part, activities affecting quality shall be prescribed by documented instructions, procedures, or drawings of a type appropriate to the circumstances and shall be accomplished in accordance with these instructions, procedures, or drawings.

Plant startup Procedure N-0-01, Step 4.43, required the operators to determine HSD Xe free boron concentration using Figure RD-6.6. The result of using Figure RD 6.6 was a boron concentration of 620 ppm. Procedure Step 4.44 required that the concentration calculated be recorded. Procedure Step 4.45 was marked with an asterisk and stated:

"WHEN RCS [reactor coolant system] temperature is greater than 540°F, THEN PERFORM one of the following:

1. DILUTE RCS to 50-150 ppm greater than boron concentration recorded in Step 4.44 per N-CVC-35A."

Per licensee calculations, diluting to the above boron concentration at that point in the procedure would have resulted in a 0.8 percent SDM after the SDB rods were withdrawn. Technical Specifications required a SDM of 1.542 percent. Therefore, the procedure was inadequate for the circumstances. Corrective actions to address this finding included placing Procedure N-0-01 on administrative hold until appropriate procedure changes could be made. Because this violation was of very low safety significance and it was entered into the licensee's corrective action program as CAP 033942, this violation is being treated as a NCV, consistent with Section VI.A of the NRC Enforcement Policy. (NCV 05000305/2006011-02)

.6 Prior Operations Training on Procedure Revisions And Reactor Startup - (Charter Items 6 and 7)

a. Inspection Scope

The inspectors conducted individual interviews with operating crew members, reviewed operating procedures, and the licensee event review team response to this event to assess the licensee's operator training for conformance with the requirements of 10 CFR Part 55. The inspectors also reviewed lesson plans and attended simulator sessions for JITT provided to another operating crew subsequent to the event to verify operator training was being conducted in accordance with plant requalification program training procedures.

b. Findings and Observations

Introduction: The JITT developed prior to the event by the operations training staff included the approach to criticality and power ascension in the simulator using the following procedures:

N-0-02, “Plant Startup from Hot Shutdown to 35% Power,” Revision 12/22/2005
N-CRD-49B, “Reactor Startup,” Revision 4/18/2006

The licensee typically provides some form of JITT to their licensed operators for infrequently performed evolutions. The JITT for the approach to criticality and plant startup (an infrequently performed evolution) was written by the training department and included both classroom and simulator sessions.

Description: The SM and US standing watch during the event on May 17, 2006, did not attend JITT for reactor startup and power ascension. The inspectors discovered that the JITT had the simulator setup in a condition such that Procedure N-0-01, had already been completed and many steps of N-0-02 for reactor startup were already completed. Therefore, no training was conducted for the N-0-01 portion of the startup procedures. When the crew commenced the simulator training, Procedure N-0-02, Step 4.8.2, (“WITHDRAW Shutdown Banks per N-CRD-49B”) and Step 4.8.3, (“ESTABLISH RCS boron concentration at ECP value per N-CVC-35A”) had already been completed. Hence, these steps were outside the scope of the JITT. The procedure Steps 4.8.2 and 4.8.3 were the steps which were completed out of sequence during the event.

In essence, the JITT did not provide an opportunity for the operating crews to receive training on the procedural issues that were improperly addressed by the crew during the event on May 17, 2006. Since the SM and US did not receive JITT, and since the steps in question were not addressed by JITT for other control room operators, no one on the control room crew was recently trained on the missed procedure steps. The inspectors concluded that the JITT was ineffective in preparing the operators for the reactor startup and in addressing the procedural compliance issues that occurred during reactor startup on May 17, 2006.

.7 Problem Recognition and Concerns Expressed During Event - (Charter Item 8)

a. Inspection Scope

The inspectors reviewed control room logs and interviewed the operating crew that performed the reactor startup plus those plant personnel assigned as oversight management. This was done to determine if the control room activities were performed in accordance with station procedures.

b. Findings and Observations

The inspectors confirmed that a procedure change was not made by operators to N-0-01. When the crew assumed the watch the plant was at HSD conditions with all rods inserted, RCS boron concentration was 1219 ppm, and ECP boron concentration was calculated to be 1052 ppm. The off-going shift had completed Step 4.44 of the operations procedure for plant startup from cold to HSD, N-0-01. The crew was expected to transition to the operations procedure for plant startup from HSD to 35 percent power, N-0-02, and withdraw control rods to startup the reactor.

Subsequent to the decision by the SM and US to N/A Step 4.45 of N-0-01, which required dilution to HSD boron concentration, the RO that was directed to perform the dilution to ECP boron concentration questioned the extra SRO providing the direction to

dilute on whether they would have adequate SDM to pull the SDB rods. The SRO discussed the question with the SM and relayed the response to the RO. The response indicated requirements were met to dilute to ECP boron concentration based on adequate SDM in accordance with N-CRD-49B. Several oversight personnel questioned the sequence of dilution to ECP boron concentration during the lengthy dilution and prior to withdrawal of SDB rods: the OMR overheard discussions of dilution between shift members; the RE made a remark about the sequence during one of his control room trips; and the Nuclear Oversight individual discussed the sequence with the extra SRO. However, all were satisfied with the SM and US rationalization that the procedures allowed the actions, and SDM was adequate. A similar observation by corporate management questioning the sequence of steps during a phone conversation with the station's outage manager resulted in an internal investigation by the licensee who eventually identified the operations procedural steps for withdrawal of SDBs and dilution to ECP boron concentration had been performed out of sequence.

The inspectors concluded that oversight was ineffective because it allowed procedure rationalization vice procedure compliance to justify continued plant startup. The licensee continued the plant startup after the procedure performance error was discovered until a forced shutdown occurred due to mechanical problems associated with the main turbine.

.8 Licensee Actions Taken in Response to Event - (Charter Item 9)

a. Inspection Scope

The inspectors reviewed the licensee's event response activities. The inspectors conducted individual interviews and reviewed associated event procedures, logs and corrective action reports to assess adequacy of the licensee's response to the event.

b. Findings and Observations

Introduction: The inspectors identified that actions taken by the licensee to address the plant startup procedure and human performance issues were adequate once the issues were identified. Long term corrective actions had not been completed prior to completion of the onsite inspection and were not assessed.

Description: The following actions were taken by the licensee in response to the event:

- An all-staff memo was issued by management entitled "Bad Things Happen When We Proceed in the Face of Uncertainty;"

- Several licensed operator crew members were promptly removed from licensed duties and disciplinary action was taken against one licensed operator;

- Senior management briefed operating crews on the specific N-0-01 and N-0-02 procedure discrepancies including the steps performed out of sequence, expectations for addressing procedure discrepancies, procedure adherence requirements with emphasis on "stopping" when unsure, lack of challenge by crew and management oversight, and lack of request for peer input;

- All SRO and STAs were briefed on command and control, operations chain of command, and conservative decision making issues;

- Remediation training for operation crew members was conducted and included conservative decision making, procedure use and compliance, questioning attitude, validation and verification, and “stop” when unsure;

- The JITT was re-performed and covered internal / external Operating Experience including changes to startup procedures, plant and reactor startup training activities. The revised JITT for the subsequent plant startup after the event incorporated lessons learned from the event. The training emphasized procedural use and adherence, conservative decision making, and “stopping” when unsure;

- Written guidelines were established for the Shift Mentors to clarify management expectations for control room oversight;

- The licensee formed an Event Review Team (ERT) that investigated the event and issued a report reviewed by the Plant Onsite Review Committee (PORC). The scope and manning of the ERT was appropriate and the final ERT report was of good quality;

- A Special Reactivity Management Review Team Meeting was conducted by the licensee’s corporate representatives;

- All startup procedures and changes were reviewed by PORC and the N-0-01 operations procedure was placed on administrative hold. The two PORCs held to review procedures and the ERT report were thorough, and identified good issues;

- A corrective action (CAP 033977) was written to address the issue of not adhering to procedure guidance;

- A Station Safety Stand-Down was scheduled prior to plant restart;

- Senior management scheduled interviews with SROs to gauge readiness for restart and uphold management standards; and

- Several layers of independent oversight were scheduled for restart, including 24-hour Kewaunee management and Fleet oversight throughout reactor startup and power escalation; briefing of Kewaunee and Fleet oversight representatives on their roles and responsibilities; scheduling a Nuclear Oversight representative to observe the reactor startup.

The inspectors conducted individual interviews with operating crew members, oversight personnel, and licensee management, as well as reviewed various logs, procedures, memos to staff, and corrective action reports to assess adequacy of the licensee’s response to the event. The inspectors determined that the licensee was slow at identification of the significance of the event based on the continuance of the plant and reactor startup.

The inspectors determined that the safety significance of this event was such that it did not preclude a subsequent reactor plant startup. The inspectors concluded that the licensee's immediate corrective actions to address the issues of procedure use and adherence, inadequate procedures, and management oversight were adequate to allow them to restart the plant and reactor.

4OA6 Meetings

Exit Meetings

On June 23, 2006, the inspectors presented the preliminary inspection results to Ms. L. Hartz and members of Kewaunee plant management and staff. The licensee acknowledged the information presented. The inspectors asked the licensee whether any materials examined during the inspection should be considered proprietary. No proprietary information was identified.

ATTACHMENTS:
1. SUPPLEMENTAL INFORMATION
2. SPECIAL INSPECTION TEAM CHARTER
3. TIMELINE

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Dominion Energy Kewaunee, Inc.
L. Hartz, Site Vice-President
L. Armstrong, Engineering Director
T. Breene, Manager, Nuclear Licensing
K. Davison, Operations and Maintenance Director
M. Hicks, OR Manager
J. Ruttar, Operations Manager
T. Webb, Director, Safety and Licensing

Nuclear Regulatory Commission
C. Pederson, Director, Division of Reactor Safety
P. Higgins, Kewaunee Resident Inspector
M. Bielby, Senior Operations Engineer - Team Leader

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened and Closed

05000305/2006011-01	NCV	Failure to follow operating procedures (Section 4OA3.4.b)
05000305/2006011-02	NCV	Inadequate operating procedure (Section 4OA3.5.b.(2))

LIST OF DOCUMENTS REVIEWED (continued)

LIST OF DOCUMENTS REVIEWED

The following is a list of documents reviewed during the inspection. Inclusion on this list does not imply that the NRC inspectors reviewed the documents in their entirety but rather that selected sections of portions of the documents were evaluated as part of the overall inspection effort. Inclusion of a document on this list does not imply NRC acceptance of the document or any part of it, unless this is stated in the body of the inspection report.

Procedures	Title	Revision
DNAP-1907	Human Performance (HU) Program	Revision 7
GNP-03.30.01	Operations Management and Leadership	Revision D
GNP-03.30.02	Conduct of Operations	Revision E
GNP-03.01.03	Procedure Use and Adherence	Revision U
RE 28	Manual Estimated Critical Position Calculation	Revision N
N-0-01	Plant Startup from Cold Shutdown Condition to Hot Shutdown Condition	Revision BG
N-0-01	Plant Startup from Cold Shutdown Condition to Hot Shutdown Condition	Revision BH
N-0-01	Plant Startup from Cold Shutdown Condition to Hot Shutdown Condition	Revision BI
N-0-01-CLB	Initial Conditions Summary Sheet	Revision J
N-0-02	Plant Startup From Hot Shutdown to 35% Power	Revision AT
N-CRD-49B	Reactor Startup	Revision AK
RD 6.6	Cycle 27 1.542 percent Shutdown HZP No Xe, Tmod = 547 F, ARI with 100 ppm Allowance	October 28, 2004
CAPs	Title	
033942	N-0-01 and N-0-02 Guidance Discrepancies Regarding Boron	
033977	Procedural Guidance Not Adhered To	
034027	N-0-01, Revision BI, Procedure Convention Weakness	
034043	Reactivity Manipulations Not Recorded Per BNP-3.30.02	
034046	N-0-01, Revision BI, Sub-optimizes Operating Margin	

LIST OF DOCUMENTS REVIEWED (continued)

034047	During Reactor Startup on 11/29/05 Dilution to ECP Was Prior to SDB Withdrawal

Miscellaneous	Title	Revision
Report	Event Review Team Report: Procedure Sequence for Shutdown Bank Withdrawal and Dilution	May 21, 2006
Handout	Station Safety Stand-Down	May 23, 2006
Memo	Restart Recommendation From: K. Davison/To: L. Hartz/CC: B. Matthews	May 21, 2006
Logs	Control Room Log	May 16, 2006, 6:00 pm through May 18, 2006, 4:19 am
LRC-JT-SE204	Simulator Exercise Guide (SEG): JITT Reactor Startup to the Point of Adding Heat, Secondary Plant Startup	Revision A
LRC-JT-SE203	SEG: JITT Reactor Startup and Power Ascension	Revision A
JITT	Operating Experience: Control Rod Manipulations at Low Power	
Mass Mailer	Bad Things Happen when We Proceed in the Face of Uncertainty	May 17, 2006

LIST OF ACRONYMS USED

BOP	Balance of Plant
CAP	Corrective Action Program Document
CB	Control Bank
CFR	Code of Federal Regulations
DRP	Division of Reactor Projects
DRS	Division of Reactor Safety
ECP	Estimated Critical Position
HSD	Hot Shutdown
IMC	Inspection Manual Chapter
JITT	Just-In-Time-Training
MD	Management Directive
N/A	Not Applicable
NCO	Nuclear Control Operator
NCV	Non-Cited Violation
NRC	Nuclear Regulatory Commission
OA	Other Activities
OMR	Operations Management Representative
OOM	Operations Outage Manager
PM	Plant Manager
RCS	Reactor Coolant System
RE	Reactor Engineer
RO	Reactor Operator
SDB	Shutdown Bank
SDM	Shutdown Margin
SDP	Significance Determination Process
SRO	Senior Reactor Operator
STA	Shift Technical Advisor
SM	Shift Manager
US	Unit Supervisor
Xe	Xenon

KEWAUNEE SPECIAL INSPECTION (SI) CHARTER

This Special Inspection Team is chartered to assess the circumstances surrounding the deviation during a reactor startup on May 17, 2006, from the procedurally established sequence of withdrawing the shutdown bank control rods and diluting reactor coolant system boron to the estimated critical position boron concentration. The Special Inspection will be conducted in accordance with Inspection Procedure 93812, "Special Inspection," and will include, but not be limited to, the items listed below.

1. Identify the timeline for the event. Include plant conditions and shutdown margin.

2. Determine who was in the control room during the event and the years-of-experience and work-week work-hour status of licensed operators. Include in this determination, the presence in the control room or onsite of nuclear engineering personnel, and any quality assurance personnel or senior managers providing oversight of the reactor start-up.

3. Identify which procedures were being used during the event.

4. Determine if the change(s) made to the procedure(s) by the senior reactor operators was appropriate and who else other than the senior reactor operators were involved in the change. Interview, if possible, the senior reactor operators who revised the procedure(s) to determine their reasoning for making the change, instead of suspending the startup.

5. Determine what changes, if any, had recently been made to the procedures prior to use on May 17, and what verification and validation had been performed on the revised procedures.

6. Determine the extent of training provided to the operating crew on any revisions to the procedures.

7. Determine the extent of training provided to the operating crew on the startup of the reactor.

8. Identify and interview, if possible, any individuals who recognized the problem with the procedure(s) that resulted in the change by the senior reactor operators and any individuals who raised a concern about the appropriateness of the changes made to the procedure(s) by the two senior reactor operators or about the sequence of dilution and control bank control rod withdraw.

9. Identify any actions that the licensee took in response to the event (e.g., briefings on the event, informing staff and mangers of expectations, enhanced training, enhanced management oversight, review of other recent procedure changes, disciplinary actions).

10. Evaluate the scope, schedule, and staffing of the licensee's investigation of the event.

11. Assist the resident inspectors with an assessment of the licensee's readiness to restart the reactor and with observations of control room operators during reactor startup.

12. Document the results of the special inspection in Inspection Report 05000305/2006011.

TIMELINE

Time	Event Description
May 16, 2006 6:00 - 6:30 pm	Crew takes shift. Off-going crew completed N-0-01, "Plant Startup from Cold Shutdown Condition to Hot Shutdown Condition," through Step 4.44. Initial conditions: all rods in, Hot Shutdown (HSD) conditions, Reactor Coolant System (RCS) Boron 1219 ppm, RCS pressure 2235 psig. On-coming Shift Manager (SM) and Unit Supervisor (US) maintained their watch stations while rest of crew members were relieved to finish Just-In-Time-Training (JITT) in the simulator for reactor startup.
~6:30 pm	Crew members return from JITT and assume their watch stations.
9:00 pm	N-0-01, Step 4.46, verified seal injection valves correctly throttled.
10:15 pm	N-0-01 complete. Transitioned to N-0-02, "Plant Startup from Hot Shutdown to 35% Power."
May 17, 2006 12:16 am	RCS Boron concentration 1219 ppm. ECP boron calculated to be 1052 ppm with control Bank 'D' at 100 steps. Required HSD Xenon Free boron concentration from Figure RD-6.6 is 620 ppm. Commenced 3500 gallon RCS dilution to ECP boron concentration. [Shutdown Margin (SDM) is 6.4 percent]
1:20 am	Completed 3502 gallon dilution.
2:44 am	RCS Boron at 1117 ppm. Started 2126 gallon dilution to ECP critical boron concentration. Required ECP boron is 1052 ppm.
3:00 am	Outage Mode Checklist signed off for reactor criticality.
3:16 am	Completed 2126 gallon dilution.
~3:00 - 4:00 am	Corporate Chief Nuclear Officer (CNO) contacted Outage Manager (OM) to determine status of startup. OM informed CNO that ECP boron dilution was in progress prior to withdrawing shutdown banks. CNO indicated that this condition was unacceptable and would not be allowed in the future.
3:55 am	Started withdrawing Shutdown Banks A and B per N-CRD-49B.
4:00 am	RCS Boron is 1053 ppm. [SDM is 5.5 percent]
4:28 am	Shutdown Banks A and B fully withdrawn to 226 steps. [SDM is 3.6 percent]
4:34 am	Estimated critical control rod position for Startup #27 is 'D' bank at 100 steps.
4:36 am	Authorized approach to criticality per N-CRD-49B, Reactor Startup

~5:00 - 6:30 am	Site Vice President Technical Advisor informed of conversation with CNO by OM, investigated issue, verified the reported condition was correct, and notified the Plant Manager (PM). Two crew members removed from shift duties and interviewed.
5:50 am	Reactor Critical, entered Hot Standby Mode, Critical data is 1053 ppm boron, Tave is 545°F, and Control Bank 'D' at 98 steps, RCS pressure is 2234 psig.
~3:00 pm	NRC Resident Inspectors informed of the procedure deviation issue.
5:13 pm	Identified turning gear engaged to the main turbine with main turbine spinning about 200 rpm due to turbine stop valve leakage.
11:27 pm	Shutdown reactor. Exit Hot Standby Mode and entered HSD Mode.