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ACCESSION NBR:9611140044 DOC.DATE: 96/11/01 NOTARIZED: NO DOCKET #
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SUBJECT: Provides addl info to assist NRC in evaluating issues in insp rept 50-397/96-16 & NOV.

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Videocassette located in File Center

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CATEGORY 1 DOCUMENT

WASHINGTON PUBLIC POWER SUPPLY SYSTEM

P.O. Box 968 • 3000 George Washington Way • Richland, Washington 99352-0968 • (509) 372-5000

November 1, 1996
GO2-96-216

Docket No. 50-397

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D.C. 20555

Gentlemen:

Subject: **WNP-2, OPERATING LICENSE NPF-21**
NRC INSPECTION REPORT 96-16, ADDITIONAL INFORMATION

Reference: Letter dated September 12, 1996, KE Brockman (NRC) to JV Parrish (SS), "NRC Inspection Report 50-397/96-16 and Notice of Violation"

The Supply System attended a predecisional enforcement conference on October 22, 1996, in the Region IV offices regarding the apparent violations identified in the referenced inspection report. Based on the discussion that occurred relative to two of the apparent violations, the Supply System is providing additional information to assist the staff in evaluating these issues.

Attachment 1 lists the corrective actions taken or planned as a result of the reactivity management issues indicating miscalculation of the estimated critical position as discussed in the referenced report. These corrective actions were identified as part of the resolution of WNP-2 Problem Evaluation Report (PER) 296-0522 issued on June 27, 1996. The Supply System considers the miscalculation to be of significant concern and, in response, has identified a broad spectrum of corrective actions to prevent recurrence.

Attachment 2 provides a timeline for the approach to critical activities. This timeline is consistent with the discussion provided at the predecisional enforcement conference. The accuracy has been verified based on control room records and written and verbal statements provided by the individuals involved. Attachment 3 contains signed statements used to generate the timeline.

Attachment 4 provides a brief synopsis of a videocassette that is included for your review. As discussed at the predecisional enforcement conference, a "Time Out" was held with WNP-2 employees on July 23, 1996 to address concerns with recent station performance.

IE01 1/1

Videocassette [illegible] in File Center -

Attachment 5 contains the Incident Review Board (IRB) report for PER 296-0522, assessing criticality achieved prior to minimum estimated critical position (ECP). The purpose of the IRB is to immediately investigate plant events where performance is suspected to be a main contributor, or those events with significant safety, economic, process or regulatory impact. The IRB provides the initial information gathering and is only an input to the formal root cause as part of the PER processes. This report has not been certified for accuracy and is being included for your information. The report has been redacted to remove individual's names for privacy purposes.

The Supply System regrets not having this information readily available at the predecisional enforcement conference. We appreciate the opportunity to provide this information at this time.

If you require additional information please contact me or D.A. Swank at (509) 377-4563.

Respectfully,

DA Swank For

R.L. Webring
Vice President, Operations Support/PIO
Mail Drop PE08

Attachments

1 Reactivity Management Corrective Actions Taken or Planned
2 Approach to Critical Timeline
3 Signed Statements
4 Timeout Videocassette
5 Incident Review Board Report Criticality

cc: J. Lieberman - NRR (with videocassette)
LJ Callan - NRC RIV (with videocassette)
KE Perkins, Jr. - NRC RIV, Walnut Creek Field Office
NS Reynolds - Winston & Strawn
TG Colburn - NRR
DL Williams - BPA/399
NRC Sr. Resident Inspector - 927N

REACTIVITY MANAGEMENT CORRECTIVE ACTIONS

1) Develop procedure to calculate Estimated Critical Positions (ECP).
   - Procedure PPM 9.3.6 was issued on July 19 for this purpose.

2) Evaluate significant differences between versions of POWERPLEX for changes which provide increased option selection or changes in the default settings. Provide training on differences.
   - Differences between versions were evaluated and training was provided on July 30 and August 8.

3) Issue a letter to Siemens Power Corporation (SPC) explaining the significance of the event and requesting an explanation. Request corrections to POWERPLEX Users Manual and request SPC to evaluate the need to inform other users of the situation.
   - A letter was issued to SPC on September 23.

4) Evaluate the possibility of developing tools to analytically estimate criticality based on subcritical multiplication. Investigate and evaluate industry practice to explore the possibility of implementing alternate means of monitoring the approach to criticality at WNP-2 and implement the enhancements. Provide the conclusion of the evaluation to Engineering Management.
   - Action is scheduled to be complete by November 20.

5) Evaluate personnel performance issues both negative and positive in the performance evaluations of the individuals involved.
   - Issues were documented in performance evaluations of individuals involved - Action was completed on September 25.

6) Evaluate the effects of frequent turnover of the Reactor Engineering Supervisor and the potential impact on the consistency and quality of supervision. Provide recommendations to Reactor/Fuels Engineering Management.
   - An evaluation was performed and succession planning for the Reactor Engineering group will be a formal expectation for the Reactor Engineering Supervisor and Fuels Manager. This action was completed on September 18.

7) Evaluate the practice of having the Supervisor of Reactor Engineering also working on shift as a duty Station Nuclear Engineer (SNE). Evaluate different strategies that may provide the supervisors with current training and experience while performing as supervisor as well.
   - Action was completed on September 18.

8) Provide event discussion, overview, and Lessons Learned training during upcoming SNE continued training.
   - Training was conducted on July 30 and August 6.

REACTIVITY MANAGEMENT
CORRECTIVE ACTIONS

9) Provide formal training on the current version of POWERPLEX for Reactor Fuels personnel relating new features with practical uses of new options.
   - Training was conducted September 10, 11 and 12.

10) Identify which plant evolutions should have second order SNE review and transmit to the Reactor Engineering organization.
   - Procedure PPM 9.3.9, "Control Rod Withdrawal Sequence Development & Control," was reviewed to identify evaluations requiring second review by a qualified Reactor Engineer. No changes were recommended and the action was completed on October 28.

11) Revise procedure PPM 3.1.2 to reinforce the management expectations for control of reactivity manipulations.
   - Procedure PPM 3.1.2 has been updated to include managements expectations on reactivity control (i.e., instruction was added to stop control rod withdrawal if it is anticipated that the core will not go critical within the ECP limits). Action was completed on July 3.

12) Discuss relevant aspects of individual performance and provide counselling to the SNEs and Fuel Design Engineers directly involved with the miscalculation of the ECP.
   - On June 27 and 28 the Supervisor, Fuels Design and Manager, Reactor/Fuels Engineering provided counselling to those individuals involved on the need for conservative decision making and improved vertical communication.

13) Discuss relevant aspects of individual performance and provide counselling to the Operating crew members directly involved with the ECP event.
   - The Acting Operations Manager discussed the ECP event with the Operating crew members directly involved. Counselling was given on the need for conservative decision making and improved vertical communication.

14) Discuss technical and personnel performance aspects of miscalculation of the ECP with the SNEs and other Engineering personnel not directly involved to ensure common understanding of causes and performance expectations.
   - On June 28 a Time Out was held to ensure understanding of causes and performance expectations. In addition an Interoffice Memorandum from a reactor engineer dated July 11 to Management provided additional information on the ECP calculation process.

15) Discuss technical and personnel performance aspects of miscalculation of the ECP with the Operations crew not directly involved to ensure common understanding of causes and performance expectations.
   - The Acting Operations Manager conducted training for Operations personnel on July 31, August 1, 2, and 16.

REACTIVITY MANAGEMENT CORRECTIVE ACTIONS

16) Conduct Time-out sessions with other station personnel regarding causes of miscalculation of the ECP event and management's expectation.
   - On June 28 a Broadcast message was issued advising Managers and Supervisors to conduct a Time Out on this issue.

17) Review and revise if necessary PPM 1.4.14 to include formal training on future general versions of POWERPLEX for Reactor/Fuels Engineering personnel relating to new features with practical uses of new options.
   - The procedure was reviewed and no changes were deemed necessary but an Interoffice Memorandum was issued to Reactor/Fuel personnel requesting that each engineer review the portions of the procedure which deal with training and their responsibilities in that area. Action was completed on October 11.

18) Provide evidence of a self-assessment done on reactivity management. Followup on recommendations by initiating additional corrective action plans (CAPs) if necessary.
   - Review was conducted and report was issued July 29. Recommendations were followed up by initiating CAPs 22 through 29 (items 23 through 30 below).

19) Conduct independent review by SPC to identify the differences introduced with the new version of POWERPLEX and identify what safety issues were associated with the ECP incident.
   - Letter was sent to Supply System on July 18 from SPC who conducted the independent review. The POWERPLEX input deck and run options were reviewed and the changes made for Cycle 12 were determined to be correct. No safety issues were associated with the ECP.

20) Provide refresher training to Operations Crew regarding the relative effects, e.g., magnitude, duration on reactivity of Xenon, moderator temperature and other significant physical parameters.
   - Action is scheduled to be complete by November 30, 1996.

21) Provide refresher training to Reactor/Fuels Engineering regarding the relative effects, e.g., magnitude, duration on reactivity of Xenon, moderator temperature and other significant physical parameters.
   - Action was completed on October 8.

22) Provide evidence of communicating the findings of the Reactivity Management Team concerning training and qualification of vendors, use of verbal communications requirements, procedural enhancements to the adjustable speed drive (ASD) startup test procedure, and conservative decision making examples from the events to involved Engineering staff, and management oversight/test directors and any other groups identified by management.
   - All the individuals identified by the Team were trained during the Timeout conducted June 28.

REACTIVITY MANAGEMENT
CORRECTIVE ACTIONS

23) Provide evidence of communicating the findings of the Reactivity Management Team concerning training and qualification of vendors, use of verbal communications requirements, procedural enhancements to the ASD startup test procedure, and conservative decision making examples from the events to involved Operations staff, and management oversight/test directors and any other groups identified by management.
- Training was conducted on July 31, August 1, 2, and 16.

24) Review and revise if necessary procedures to clearly delineate those activities and evolutions which have the potential for affecting reactivity. Provide the expectations for licensed operators command and control during those activities and evolutions
- Procedures PPMs 1.3.1 and 1.3.2 were revised and include operator expectations. Action was completed on October 16.

25) Review and revise if necessary procedures to clearly define approach to criticality to establish a consistent understanding with and between operating crews. Provide specific expectations of activities which should be avoided that can distract operators and supervisors involved in reactor startup during approach to criticality. It should be clearly delineated that individual turnover, shift meetings in the control room, and surveillance testing are definitely included in activities which should be avoided.
- Procedure PPM 1.3.1 was revised. Action was completed on October 17.

26) Benchmark other utilities to determine if other nuclear power plants are providing the Reactor Operators with more data concerning estimated criticality point. Based upon results of this benchmarking and the experiences at other facilities, consider supplying minimum and maximum bracketing of ECP to the Reactor Operators.
- CROs will be provided with the ECP hi/low band. Action was completed on October 16.

27) Provide evidence of enhancing training for reactor startup to include information and expectations for: 1) periodic pauses during rod withdrawal to allow stabilization of neutron level; 2) consistent interpretation of data to define approach to criticality; 3) instrument and/or equipment failure responses; 4) inaccurate estimated critical conditions calculations; and 5) preventing distractions.
- Action is scheduled to be complete by June 15, 1997 on operations rotaing training.

28) Develop simulator scenarios to allow operators to experience the adverse consequences that result from instrument failures or ECP errors. The scenarios should reinforce the need for consistency from crew to crew for defining and estimating the approach to criticality and responses to minimize distractions during that time period.
- Action is scheduled to be complete by June 15, 1997 on operatings rotating training.

REACTIVITY MANAGEMENT
CORRECTIVE ACTIONS

29) Review PPM 3.1.2 to include the requirement to consider the applicability of Technical Specification 3.1.2 whenever criticality occurs outside minimum/maximum ECP band.
   - PPM 3.1.2 was revised on September 25.

30) Review problems concerning vertical communication of issues such as those evidenced in the ECP error, and develop corrective actions to ensure proper supervisory and management notification of concerns and problems.
   - June 28 Time Out closed this action.

APPROACH TO CRITICAL
TIMELINE

TIMELINE OF EVENTS

0315 - Control rod pull for reactor startup commences.

0533 - IRM C declared inoperable

0542 - IRM C LCO sheet completed

~0605- Oncoming Control Room Supervisor (CRS) begins turnover with offgoing CRS at CRS desk.

~0620- Offgoing CRS approaches P603 to direct "Stuck Rod Full-In" procedure.

~0625- After stuck rod is resolved the two CRSs commence control room panel walkdown. Oncoming CRS looks at SRM recorder during walkdown and sees no indication of imminent criticality.

~0635- Both CRSs return to CRS desk to continue their turnover.

~0640- Shift Technical Advisor (STA) tells CRSs that they were getting close to criticality.

~0645- Control Room Operator (CRO) announces criticality is imminent. The CRSs immediately complete their turnover and approach P603. The oncoming CRS announces to the CRO and STA that he is the Reactivity Manager.

~0647- Station Nuclear Engineer (SNE) and CRS review the estimated critical position (ECP) and observe count rate. CRS reviews PPM 3.1.2 statement which states "if the criticality is achieved prior to minimum ECP, commence shutdown by inserting rods in reverse sequence." CRS informs STA and CRO that they are four pull sheet pages away from ECP and directs that rod pull be halted.

~0650- CRS informs the Shift Manager (SM) of the situation and they discuss the statement in PPM 3.1.2 regarding criticality outside ECP limits. CRS recommends commencing rod pull to record the count rate at criticality and then shutting down, as directed by PPM 3.1.2.

~0700- SM asked CRS if conduct of the shift briefing will distract the personnel at P603. The CRS states that they will not be distracted and will stay focused on the rod pull (the STA and CRO were holding over, and the CRSs had completed their turnover).

0705 - Criticality is achieved and count rate is recorded.

0712 - Shutdown is commenced.

SIGNED STATEMENTS

To: Whom It May Concern.

From: Charles Townsend

Re: NRC Inspection Report 50-397/96-16, specifically in regards to the ECP discussion.

I was the off-going CRS as described in the subject report.

The Reactivity Management discussions of PPMs 1.3.1 and 3.1.2 were briefed by me to the RO and STA/SNEs who participated in the pull to criticality. It was understood that the reactor would be shutdown if it went critical before the ECP window.

It is true that I thought that Dale Atkinson knew of the contents of the ECP Memo because it was addressed to Dale.

I was unaware of the difficulties and concerns that the SNEs had in regards to the ECP calculation. It simply was not discussed with me on that night.

I spent approximately 2.5 hours at the beginning of the pull to critical at P603 with the RO and STA/SNE pulling rods. I was verifying that they conducted themselves within the procedures, briefs, and management expectations as laid out in PPMs 1.3.1, 3.1.2, and the OI-9 for control rod movement. The conduct of the control room staff was exemplary as documented in the subject OI-9s.

The report, section 01.2b.(3) says that I spent the majority of my attention and focus from 0533 until the end of turnover on activities other than the pull to criticality. During the time that I was filling out the LCO sheet I was focused on the LCO the majority of the time. LCO log entry 1682 shows IRM-C Inop at 0533 and signed as such by me and the Shift Manager at 0542. The majority of my attention and focus was on the pull to criticality from that time on; I did spend time arranging for turnover and organizing the CRS workload, but spent most of my time reviewing the rod pull. This was true during the actual turnover time as well because it was the main topic discussed during turnover (there was not much else to discuss).

Section 01.2b.(4) says that the CRS did not stop turnover after the STA told them the reactor was close to going critical. We did stop the turnover and were at the P603 within about 2 minutes.

I attended the on-coming CRS during the discusions at P603 and at no time did he appear surprised or anything to support that he, '...suddenly observed the condition of the plant...'.

I learned a great deal about how to be the CRS and Reactivity Manager from this event and the discussions and coaching directed towards my actions. With perfect hindsight I would not have conducted the CRS turnover as it was done (either stop the rod pull or wait to turnover after criticality). Better command and control practice would have been to ask the SNEs numerous questions about the ECP Memo. The LCO sheet can be filled out for my review by someone else familiar with the LCO computer program. The CRS/Reactivity Manager is responsible for all control room activities, especially a pull to criticality, and must therefore be especially vigilant in every step of the process.

Although I believe we did a good job of following procedures and safely bringing the reactor critical, I could have been more diligent in observing the pull to crititcality in the last stages and more conservative in directing activities based on the procedural guidance.

If there are any unanswered issues, please call me.

Respectfully,

Charles Townsend

WASHINGTON PUBLIC POWER SUPPLY SYSTEM

P.O. Box 968 • 3000 George Washington Way • Richland, Washington 99352-0968 • (509) 372-5000

To: Andy Langdon
From: Don Hughes

This statement is being written at your request to give my answers to some apparent discrepancies documented in NRC Inspection Report 50-397/96-16 as relate to the early criticality event of June 27, 1996. This is my recollection of the events as they occurred, in answer to those sections of the report you have requested I look at.

On June 27, 1996 I arrived to the Control room at WNP-2 at approximately 0605 to relieve the CRS. As I always do, I went to the kitchen and put away my lunch, and got a cup of coffee. I then returned to the CRS desk and started reviewing the prior 48 hours of Control Room logs since I had not been on Watch for several days. The off-going CRS was at the CRS desk filling out an inop sheet for an IRM detector that had apparently failed during Startup. After I finished reviewing the logs, the off-going CRS started to turnover to me the events of the previous night, this included a statement that a Plant Startup was in progress. This was approximately 0620, and at that time the offgoing CRS went to the CRO desk to direct the "Stuck rod full in" procedure as the CRO had informed him they had a rod that would not move at normal CRD drive pressure. The rod was moved with raised drive pressure, drive pressure was returned to normal, and the offgoing CRS returned to me and we commenced our Control Room Panel walk down.

On page 6 of the NRC report in paragraph (5) it states that "During the Control Room Supervisor turnover walkthrough of the control board panels, the Oncoming CRS suddenly observed the condition of the plant and source range monitor neutron level. The reactor operator stated that Criticality was imminent ....." This action did not occur as described, I did look at source range monitors during the control board walkdown but did not recognize any imminent condition and the CRO did not state that Criticality was imminent until later after the walkdown of the panels was complete and both CRS's were back at the CRS desk completing the turnover. On page 5 of the NRC report in paragraph (4) it states that "at the time of turnover the STA advised both CRS's that the plant was close to going critical" and that the CRS's did not stop their turnover when criticality was imminent. The offgoing CRS and myself were at the end of our turnover and were just about to review the Startup procedure 3.1.2 when the STA informed us that we were getting close to criticality.

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The offgoing CRS acknowledged this, the STA went back to the CRO desk and startup continued, approximately 1 and 1/2 min later as I was reviewing PPM 3.1.2 the CRO pulling rods turned and informed me that Criticality was imminent. I told the offgoing CRS "I have no further questions, I relieve you as CRS" picked up the startup procedure and immediately went to the CRO desk to monitor the approach to criticality. I informed the CRO and STA that I was now the Reactivity Manager and opened the startup procedure to look at the ECP. I believe this addresses page 5 paragraph (4), page 6 paragraph (5) and page 7 paragraph (4). It was at this time that the SNE came to my side and asked if I knew what the Minimum Allowable Critical Position was, I told him I was just looking at it and he had me go to the SNE computer to show me that we were 4 pages from the minimum allowable critical position. I returned to the CRO desk, observed SRM counts and asked the STA and CRO if they were aware of the Minimum Allowable Critical position, the CRO stated he was not since INPO good practice recommends he not be informed of the ECP or Minimum Allowable positions. The STA stated that he had seen the positions but had then put his copy of the ECP in the STA desk so as not to allow the CRO to see them, and he did not remember what it was.

I informed the CRO and STA we were 4 pages from the Minimum Allowable position and stopped them from pulling anymore rods. I then went in to inform the Shift Manager of the problem with the ECP. I suggested to him that since PPM 3.1.2 stated that "if the reactor goes critical prior to the Minimum Allowable Critical Position," stop pulling rods, inform the CRS and he will direct a shutdown, and we were not critical by the definition in 3.1.2, that we continue the startup to allow us to record the log readings normally taken at criticality for record purposes even though I was certain we would go critical prior to the Min Allow Crit Position. I believed he agreed with me and went back to the CRO desk and reviewed the statements regarding criticaliy occurring prior to the min allow position or not occurring by the max allow position with the STA and CRO and directed them to continue the Startup to allow us to record log readings.

At this time (approximately 0700)the Shift Manager came out and asked if conducting the Shift meeting would be distracting to us, I told him that myself the STA and CRO1 would not participate and we could stay focused on the approach to criticality so they could conduct the shift meeting with out distracting us. I believe this answers page 7 paragraph (6).

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At 0705 the reactor was declared critical, I recorded the readings in PPM 3.1.2 and then directed the reactor be shutdown to all rods full in. I was unaware of the fact that CRO 3 had recorded erroneous readings in the control room log until it was pointed out by the NRC inspectors during my interview with them. I recorded the reactor critical at $7x10^4$ from SRM A meter and CRO 3 used SRM D which read lower ($5x10^4$) but recorded 5000 instead of 50000 which I believe was just a misprint on his part. This answers page 7 paragraph (7).I cannot answer page 7 para (8) I was unaware of this until pointed out by the NRC, I can only say that the chart paper was in the recorder for some time and all our chart paper comes in the same boxes.

This is what occurred on June 27, 1996 during the startup, as best as I can recall, I believe that no procedural noncompliance occurred. That the turnover of the CRS occurred during the approach to criticality, was unknown since the reactor, the STA, the CRO, nor the SNE, ever gave any indication that the plant was at the point of "Approach to Criticality", for had this been known I never would have commenced Turnover. The failure to use a conservative decision making process can be put directly on me for not stopping the Startup when it was very clear in my mind that we would achieve criticality prior to the Minimum Allowable Critical position, but as I have stated in this letter and during my interview with the NRC I wanted the log readings for a positive indication of a bad ECP. If I can provide any further assistance I would be happy to make myself available to you or anyone else for more interviews.

Respectfully yours;
Donald T. Hughes Jr.

Donald T. Hughes Jr.

To: Bill Pfitzer 10/9/96

From: Steve Berry

I am writing this statement at your request to answer some apparent discrepancies documented in the NOV for the Criticality that was achieved prior to the minimum calculated value. I apologize if my leaving the Supply System to pursue a career at another Utility has caused any difficulty with this inspection. At your request I have looked at parts of the Notice of Violation. It is my understanding the Rob Barr has stated that some statements made in this report are based on a telephone discussion that he and I had. The specific areas of concern are sections 3 through 6. I will restate the events as I remember them and then address my telephone conversation with Rob Barr with respect to NOV sections 3 through 6. I will try to the best of my ability recall the events that transpired on June 27, 1996 with regard to the Criticality that was achieved prior to the calculated minimum value.

Events on June 27

My function on June 27, 1996 was that of the Shift Technical Advisor. I was holding over from graveyard shift to day shift as part of a previously scheduled rotation. I had worked closely with the Station Nuclear Engineers (SNEs) to assure that things were ready for the startup, such as control rod pull sheets and a memo documenting the minimum and maximum calculated criticality. I reviewed the minimum and max. values and ensured the maximum value was designated in the pull sheets. The minimum value is withheld from the Reactor Operators because of a Good Practice from INPO. The CRS held a pre-job brief prior to pulling control rods as part of the start-up process. All of the precautions and limitations were discussed in detail as part of the brief, including if criticality was achieved prior to the minimum or after the maximum calculated value.

We commended pulling control rods at ~ 0315. In all cases control rod movement was directed by the CRS. The CRS was at the controls for most of the rod pulls. At some time he left the controls and sat at his desk. During this time he was still maintaining oversight of moving control rods. He signed each pull sheet when they were completed and we discussed where we were as far a criticality. In every case he directed the RO on the number of rods to pull and when the RO was allowed to pull the rods. At ~ 0640 hrs I informed the CRS and the SNEs that we were approaching criticality and that we that we needed them at the P603. Soon there after, the one of the SNEs and both of the CRSs were at P603. It was then brought to my attention that we were no where near the minimum estimated critical position. We discussed the possibility of going critical prior to the minimum value and the procedural requirements to re-insert rods in reverse order to ensure the reactor is subcritical, write a PER, and required actions prior to continuing with startup. A discussion was had as to whether we should continue or not. We again reviewed the procedure for the data required to document the criticality (i.e. doubling time, SRM levels, etc..) and who would obtain it. At the direction of the CRS control rod

withdrawal continued and the reactor was declared critical at 0705 hrs. The step was less than the minimum value and as required by the startup procedure, the reactor was taken subcritical at the direction of the CRS.

I had no prior knowledge that there was a concern by Reactor Engineers about the calculated critical values. My experience in the past was that the calculated value was within a few steps on the pull sheet from the actual step that criticality was declared.

We were very precise and methodical in the actions that were taken. I had heard from people that had been in many startups that this was the smoothest that they had ever seen. Though I had stated that we were close to criticality at ~ 0640 hrs, it was not until 25 minutes later that criticality was achieved.

NOV Section 3

I remember that there was a problem with an IRM. As stated above, at some time the CRS went to his desk. I do not recall what he was doing at the desk or discussing this issue with Rob Barr.

NOV Section 4

I did notify the CRS that we were close to going critical at about 0640 hours. Both the day and night shift CRSs were at the desk at the time. There was still plenty of time before criticality was achieved. This was not an imminent notification of criticality. We continually discussed where we were in the approach to criticality, what control rods would be moved next and estimated the impact of pulling the next rods (i.e. big or little worth). After each discussion, the CRS would direct the RO on the next rods to pull.

I remember discussing with Rob Barr about my notifying the CRS that we were getting close to criticality and that at that time he was at his desk. Soon there after, the CRS was at P603 and the discussion about the possibility of going critical prior to the minimum calculated value occured. I did not tell him, that the CRS did not stop their turnover.

The report implies that RO and myself were pulling control rods without the oversight of the reactivity manager. The is definitely not the case. As discussed above, pulling control rods was precise and methodical. No control rod was withdrawn without the specific direction from the CRS.

A turnover occurred between the day and night shift CRSs occurred while control rods were being withdrawn. During this turnover, they were informed of the status of P603. They were the only ones involved in pulling control rods that turned over. The RO and myself were holding over on day shift to cover for absences. We were specifically excluded from turnover activities. The Shift Manager conducted the shift meeting away from P603 so that we (CRSs, RO, SNEs and myself) would not be distracted.

NOV Section 5

The report states that it was "During the CRS walkthrough of the control board panels, the oncoming control room supervisor suddenly observed the conditions of the plant...." and "The reactor operator stated that criticality was imminent." I did not state either of these things to Rob Barr. I did state that soon after I notified the CRSs and the SNEs that we were getting close to critical that they came up to the control panel. I also discussed the review of the procedure, the discussion that ensued, and how the decision came about to continue with pulling control rods.

NOV Section 6

I did tell Rob Barr that I reviewed the letter from Reactor Engineering on the estimated critical. That I did not remember the minimum value and that it was Donny Hughes that raised to my attention that even though we were close to going critical, that we were not as close to the minimum value than he thought we should be. The maximum value is documented on the pull sheets. The minimum value is intentionally kept from the Reactor Operator. Procedurally, Reactor Engineering is required to provide the estimated critical to the Reactivity Manager and the STA. The SNE is procedurally required to monitor when criticality occurs and the calculated values.

I take exception to the statement that "as such, did not serve as a barrier to identify and inform the control room supervisor of the out-of-tolerance estimated critical position/criticality conditions." Yes, I did not tell the CRS that it was possible that criticality would occur prior to the minimum value. In fact, the CRS told me. It is the practice that the CRS, SNE and the STA all have the min./max. critical values and that we monitor them for compliance with the startup procedure. In this case, I was at P603 verifying control rod manipulations. I did not think it appropriate to have the memo with me, because I sat next to the RO who was forbidden to have the information. I also ensured that the CRS and the SNE were well aware of which step we were on in the pull sheet and discussed with them where we were with respect to criticality.

What troubles me about the whole write up is that it implies that we were not paying attention to what we were doing and that we went critical prior to realizing that we exceeded the minimum critical value. This is in fact not true!

If I can provide any further information, please feel free to call me.

Stephen L. Berry

[signature]

NRC INSPECTION REPORT 96-16, ADDITIONAL INFORMATION
Attachment 4

Included for your review is a videocassette of an all-employee "Time Out" conducted by Paul Bemis, Vice President, Nuclear Operations on July 23, 1996.

In the "Time Out" Mr. Bemis addressed the following topics:

- The improving performance trend the Supply System has established over the past 2 years.

- The positive comments of several Nuclear Vice Presidents visiting WNP-2 to assess our performance.

- The two recent reactivity management events (criticality outside ECP and ASD testing transient) may indicate a loss of safety focus

- The immediate corrective actions after these two events were to stop all testing and hold reactor power at 65%, and to establish two independent senior management teams; one to assess our reactivity management program/measures, and a second team to assess the process and procedures we use to conduct testing of the ASD and DFW systems.

- Finally, Mr. Bemis called for a return to the safety focus which helped establish our improvement over the last two years, and a renewed commitment to effective communication and the teamwork necessary to maintain our high performance standard.

IRB REPORT
CRITICALITY ACHIEVED PRIOR TO MINIMUM ECP

SS2-RXFE-96-044

INTEROFFICE MEMORANDUM

DATE: July 2, 1996

TO: [redacted] WNP-2 Plant Manager (927M)

FROM: [redacted] Acting Manager, Reactor/Fuel Engineering Department (PE14)

SUBJECT: INCIDENT REVIEW BOARD REPORT FOR PER 296-0522, CRITICALITY ACHIEVED PRIOR TO MINIMUM ESTIMATED CRITICAL POSITION(ECP)

REFERENCE:
1. PER 296-0522
2. PPM 1.1.8 Rev. 5 - Incident Review Board
3. IOM from [redacted] "Estimated Critical Position(ECP) for BOC-12", dated June 26, 1996.

PER 296-0522 was initiated Thursday, June 27, 1996 to document that reactor criticality was achieved prior to the minimum expected point calculated by the Station Nuclear Engineer(SNE). The Plant Manager requested convening an Incident Review Board (IRB) to investigate the details of this event. This memorandum documents the circumstances surrounding the event, actions taken, and recommendations resulting from the review performed by this IRB.

IRB Members: [redacted]
Manager, Reactor/Fuel Engineering (Chairman)
Supervisor, Fuel Design Engineering (Lead Investigator)
Quality (Coordinator)
Shift Manager, Operations

All individuals interviewed during the investigation were open, candid, and willing to discuss all aspects of this incident. The Shift Manager, Control Room Supervisors and Station Nuclear Engineers involved understood well their responsibilities with respect to Reactivity Management and have internalized the significance of the event.

INCIDENT DESCRIPTION:

PPM 1.3.59 "Reactivity Management Program" requires that an ECP calculation be performed by the SNE, and be provided to the CRS prior to initiating rod withdrawal. An acceptable band of $\pm 1\%$ ΔK is applied to the ECP to account for calculational uncertainties. If the core fails to go critical within this band then the reactor is made/maintained subcritical until a determination is made that explains the deviation.

Tuesday evening(June 25), the night shift SNE prepared the ECP calculation based on a projected startup time of 0600 June 26. He used the cold options found in the PREDICT module of POWERPLEX to perform his calculations. He prepared and issued an IOM(Reference 3) which stated his assumptions and contained the ECP and its acceptance band. The SNE noticed that his calculated ECP was significantly different than the point where criticality was achieved during the first critical this cycle. The ECP was several steps later in the pullsheets indicating a less reactive core. He expected a shift in that direction due to two reasons: 1) the presence of increased poison inventories associated with the short but significant time at power; 2) the ECP had to include one fully inserted in-sequence inoperabie control rod. However, the magnitude of the change was larger than he expected based on experience. Therefore, he requested the day shift SNE and SNE in training to investigate and independently calculate and validate his answer.

During the day shift, June 26, the day shift SNEs repeated the ECP calculation and explored the sensitivity to the moderator temperature assumptions as well as time since shutdown. The answers obtained were consistent with the documented calculation and no significant differences were found. There was an effort by one of the engineers to use an alternate approach to estimate the ECP. He predicted RWM step 9-1 based on the cold(68 °F) clean rod worth tables contained in the Cycle 12 Startup and Operations Report. Although this answer happened to be closer to the BOC critical(step 7-3), it could not be used because it did not correctly account for the out of sequence rod and the effect of accumulated poisons.

Still not satisfied, Wednesday afternoon around 14:00, the engineers from Reactor Engineering sought help by contacting members of the Fuel Design group. One Fuel Design engineer was asked to independently evaluate the ECP using the design code SIMULATE. He proceeded to update the SIMULATE model to catch up with the core burn up conditions at plant shutdown. In the meantime, at approximately 15:30, another Fuel Design engineer was asked to estimate the residual worth of Xenon given the cycle power history. Using a point model he estimated the worth to be approximately 0.5% ΔK. He recognized that his answer was inconsistent with the POWERPLEX results and recommended additional investigation. Since he was not familiar with POWERPLEX he asked the other Fuel Design engineer to continue to investigate.

The Reactor Engineering Supervisor, who was also the night shift SNE, called around 15:30 and requested that the investigation focus on repeating the POWERPLEX calculation independently. Therefore the Fuel Design engineer who was working on the SIMULATE model, switched efforts to comply with this request. Using POWERPLEX, the engineer started from the BOC conditions, recreated the exposure history and analyzed the ECP conditions. This independent evaluation arrived at results consistent with those of Reactor Engineering. Then, the Fuel Design engineer went back to work on his SIMULATE model. He analyzed the POWERPLEX predicted critical configuration using SIMULATE and obtained a result which was 0.6% ΔK earlier than POWERPLEX. The difference between the two code answers was within expected range based on experience. When at power, core conditions are tracked on-line automatically by POWERPLEX. On the other hand, the SIMULATE model must manually be updated at much coarser time steps and therefore differences of this magnitude are not unusual.

The Fuel Design engineer shared the results of his investigation and consulted over the phone with the Fuel Design engineer who had earlier estimated the Xenon worth. Based on this discussion, he sought help by calling the Computer Engineering Lead who suggested looking at the code switches for the Samarium/Promethium as well as time dependent Xenon. The switches appeared to be set correctly. He then communicated the results and extent of his investigation to the Reactor Engineering Supervisor(night shift SNE) and left the site at 21:00.

The Reactor Engineering Supervisor determined the code answer to be acceptable. His decision was based on the results of the investigative work that had transpired during the day and the fact that three independent POWERPLEX evaluations of the ECP had given consistent results. As SNE, he delivered a copy of the IOM to the night shift STA and to the Shift Manager(Reference 3).

The STA did not have enough experience with critical predictions to form a basis to challenge the validity of the ECP. He reviewed it and placed his copy out of sight knowing that, by process, the RO on the panel is not supposed to see the ECP.

The Shift Manager had a brief discussion with the SNE about the ECP. Based on experience, the Shift Manager questioned the reasonableness of the ECP. The SNE discussed the level of scrutiny that had transpired during the day. After the explanation, the Shift Manager felt satisfied based on the thorough evaluation performed.

The Shift Manager gave a copy of the ECP to the CRS. This was the CRS first experience with ECPs. As the Reactivity Manager, the CRS focused on coaching the RO on the requirements of PPM 3.1.2 and PPM 1.3.1 to ensure that rod pulls to criticality would proceed in a faultless manner and that all procedural expectations were clear and followed. His review included the actions associated with the ECP and what to do if the criticality is not experienced within the expected band.

Rod Pulls commenced at 3:15 AM on June 27, 1996. The SNE and the CRS had a shift change at 6:00 AM. The RO on the panel, the STA, and the Shift Manager were holding over until 10:00. The outgoing CRS felt that at the time of commencing turnover there were no indications that criticality was imminent. This was confirmed by the day shift SNE who on turnover had reviewed SRM count rate on the back panels and found them between 200 and 500 CPS.

At approximately 6:40 the STA, who was performing as second verifier for control rod moves, told the CRS that it appeared that they were getting close to criticality. The CRS recognized that we may be going critical sooner than predicted by ECP. The required action was clear in his mind but he consulted the PPM 3.1.2 guidance again.

The on-coming CRS assumed the shift at approximately 0645. At that time the RO on the panel and the STA had informed him that they were very close to criticality. Both on-coming and off-going CRSs consulted with the SNE and concluded that they were likely going to miss the ECP window and this would require a shutdown. The SNE did not have a safety concern since shutdown margin had been demonstrated at BOC and they were beyond the point where the core had gone critical at BOC, indicating a less reactive core as expected. The SNE in anticipation that they may go critical prior to the minimum point, initiated actions to retrieve a fresh set of pullsheets to support the required shutdown.

Discussion and consideration was given to whether rod withdrawal should be continued. The on-coming CRS discussed the situation with the Shift Manager and reviewed PPM 3.1.2. Based on the procedural guidance(PPM 3.1.2) and considering that this was a well controlled evolution the decision was made to proceed. The off-going CRS remained in the Control Room until the reactor went critical to assist as necessary.

At approximately 7:05 AM the reactor was declared critical on rod 18-47 at position 26 (RWM step 8-3). This occurred prior to reaching the minimum allowable ECP position and therefore required a shutdown to investigate.

IMMEDIATE ACTION TAKEN:

At 7:12 AM, under the direction of the CRS and following guidance from the SNE, control rod insertion was initiated to shutdown the reactor. Action was taken by the SNE to contact the Reactor/Fuel Engineering Manager, the Reactor Engineering Supervisor and the Fuel Design Supervisor to request assistance. Rod insertion continued until all but Group 1 rods were full in. Eventually all the rods were inserted by 10:00 AM.

Action was initiated by the Reactor Engineering and Fuel Design groups to investigate the cause of the error in the ECP as well as the human performance aspects of the incident.

PER 296-0522 was initiated and an IRB convened. At approximately 11:00 AM the IRB investigators commenced taking statements and interviewing personnel involved to determine the sequence of events and other information which led to this incident. By this time the error in the ECP had been traced to the fact that the POWERPLEX calculations had not correctly depleted Xenon as intended.

IRB INVESTIGATION OVERVIEW

Written statements were obtained from the Shift Manager, CRS, STA, SNE, and SNE-in-training that were present during the critical. These personnel as well as others were also interviewed for additional details.

Applicable procedures were identified and reviewed. These included PPM 1.3.1, 1.3.59, and 3.1.2. The conduct of the control room personnel can be characterized as exemplary, as all participants were well focused on performing the reactivity manipulations in a well controlled professional manner. Strict adherence to procedures was maintained and reinforced by supervising personnel, consistent with station policy.

When personnel were asked why the decision was made to continue to the point of criticality, a contributing factor was based on literal procedural compliance. Step 4.2.5 of PPM 3.1.2 said:

> "If criticality occurs before the Minimum Allowable Critical Position, stop control rod withdrawal and notify the CRS. The CRS should direct the CRO to drive control rods in the reverse order. The SNE provides a rod pattern that maintains the reactor subcritical."

This implied that an adequate stop point was at the point of criticality. Although there were 40 steps remaining to reach the minimum point, they were performing steps of relatively low worth so it was possible to get closer to the target.

Reactor criticals have been done without ECPs previously. The BWROG Reactivity Controls Review Committee considers the use of ECPs as optional. There was no safety issue associated with this critical. In hind sight it would have been optimum to stop and shutdown prior to criticality, once it was recognized that the ECP had a problem. However, with respect to Reactivity Management, conservative actions were already prescribed in the procedure. These include having an ECP and taking conservative actions if criticality is experienced outside the acceptable band.

In shutting down the reactor after reaching criticality prior to the minimum allowable ECP, the SNE prescribed an adequate stopping point that would preclude inadvertent criticality. This was consistent with the procedural guidance. Then after consultation with management it was decided to drive to all rods fully inserted.

The questioning attitude of the Reactor Engineers was commendable as they pursued corroboration of the ECP by independent evaluations. Not satisfied with the answer, they interacted and requested technical support from other groups. Good teamwork was displayed.

It is unfortunate that the problem went undetected despite the significant analytical effort undertaken. It seems that the effort focused on demonstrating that the ECP was calculated correctly and credible instead of focusing on what could be wrong with the code. In hindsight, the engineering personnel involved recognize that their technical and human performance, although well intended, was unsatisfactory as they failed to uncover the error in code use.

Management involvement during the ECP investigations was limited to the Acting Supervisor of Reactor Engineering. He correctly tried to investigate the concern using available engineering resources. His judgement to proceed based on the available evidence was less than optimum. Further appropriate conservative actions would have been to involve the Manager of Reactor/Fuel Engineering whenever questions of this nature arise. Similarly, the Supervisor of Fuel Design should have been contacted.

The Reactor/Fuel Engineering Manager and the Supervisor of Fuel Design collectively addressed the department personnel during a Time Out. The need for conservative actions when questions arise was reemphasized, including stopping evolutions whenever expectations are not met. The need for improved communications with management was also discussed.

ECP ERROR SPECIFICS

The error in the ECP was traced to selecting the wrong XENON DEPENDENCE option in POWERPLEX when the COLD critical cases were analyzed. An upgraded version of POWERPLEX was installed during the last outage. This was needed to incorporate the ABB fuel CPR correlation as well as ABB fuel preconditioning rules and thermal limits. The upgraded version of POWERPLEX included Siemens latest standard version of the software package. This change contributed directly to the event.

POWERPLEX now has two options for time dependent Xenon. These are selected by setting the selection flag to -1 or 0. Based on this flag, the case will deplete Xenon based on the restart file "previous" power level, or based on the input file "current" power level. The default option is set to -1 as this is the correct setting for the MONITOR on-line runs. This option is also normally used for performing HOT PREDICT cases. Both options will provide time dependent Xenon for HOT cases. However, for COLD cases, the -1 option does not consider the outage time and will not deplete Xenon correctly. For COLD cases the flag needs to be set to 0.

During POWERPLEX software testing, the POWERPLEX system administrator noticed that there were now two choices for Xenon dependence. He contacted the Siemens POWERPLEX software engineer for guidance on which option to use. The Siemens software engineer recommended to always use the default flag of -1. In fact, the POWERPLEX Users Manual(EMF-1886P) issued by Siemens contained two examples of COLD critical calculations where the flag was incorrectly set to -1. This interaction with Siemens personnel contributed to this event.

After the event, a different Siemens software engineer(the MICROBURN custodian) was consulted and he confirmed that only the case where the flag is set to 0 would work correctly for COLD ECP calculations. Attachment 1 shows how the flag was set in the previous version of POWERPLEX(there was only one TIME DEPENDENT Xenon option). Attachment 2 shows the current version with the additional option flag.

The SNEs used the Siemens original recommendation as the basis for flag selection. Because this was the default setting, the error in code use was repeated in all three independent ECP evaluations. Having the -1 as the default contributed to this event.

Armed with the new understanding, ECPs were recalculated showing excellent agreement with the actual critical. The SNEs lack of experience using the new options contributed to this event.

SOFTWARE TESTING

The new version of POWERPLEX software was tested rigorously by following the Installation Acceptance Test Procedure(IATP) provided by Siemens. The Siemens IATP was significantly augmented by the Supply System POWERPLEX administrator and incorporated into PPM 9.3.31. This test exercised the different options but failed to detect the subtle difference. The COLD test cases were done at BOC where no Xenon inventory exists and differences are not expected.

The IATP testing paid particular attention to differences between the old and new version. Software deficiencies identified in the previous version were tested to ensure they were not reintroduced. New features were also tested to ensure they met functional requirements. The amount of testing associated with this installation was well in excess of any previous testing efforts.

SNE TRAINING

The SNEs received formal training on the new POWERPLEX system. Approximately three hours were spent reviewing changes in the code. It was partly change management and SNE refresher. The training focused more on changes in the way information is presented to the user, changes in thermal limits

nomenclature, new preconditioning rules, etc., but did not include how to use the PREDICT module for calculating ECPs. The training did not include explaining the difference between the two TIME DEPENDENT Xenon options. This may have been a contributor to the event.

Calculation of ECPs is currently considered skill of the trade and as such requires training as part of the formal SNE Qualification Program. There is currently no procedural guidance describing how to calculate the COLD ECP cases. The SNE has available the POWERPLEX Users Manual which contains details and guidance on how to exercise the different user options. A draft procedure was developed years ago but was never finalized or implemented. The lack of a formal ECP calculation procedure is not considered a contributor to this event because the same answer was independently calculated by at least three different individuals without a procedure. The procedure would have likely contained the vendor's recommendations which were in error. However, there should be a procedure to ensure consistent and correct application of the code.

CORRECTIVE ACTIONS

The procedural guidance found in PPM 1.3.59 and PPM 3.1.2 was considered conservative. However, enhancement to this guidance was recommended to emphasize that the operating crew should stop rod withdrawal and turn around if they were to anticipate that criticality is going to be achieved prior to the minimum allowable point. The procedures were revised to include this enhanced guidance.

A new ECP was calculated by Reactor Engineering using the correct Xenon TIME DEPENDENT flag. An independent ECP calculation was generated by the Fuel Design using the SIMULATE code. Both independent methods predicted RWM step 7-1 as the ECP.

A POC review of the incident was conducted the morning of June 28, 1996. POC reviewed the new ECP and the nature of the procedural enhancements and approved restart of the plant based on the findings and corrective actions implemented.

A general station Time Out was declared to be held prior to plant startup. The purpose of the time out was to review the recent negative trend in human performance errors that have been experienced over the last two weeks, including this event. The emphasis was to remain focused on the job at hand paying attention to detail and to work as a team to help each other turnaround this trend. Additional root cause and corrective actions are expected to result from the normal PER resolution process.

IRB RECOMMENDATIONS:

In addition to the corrective actions already taken the following additional recommendations are offered for consideration:

1. The ECP calculation process should be included in a procedure. This will ensure consistent application of the POWERPLEX code.

2. The evaluation of all differences introduced by the new version of POWERPLEX should be revisited to ensure that similar traps do not exist in other areas of the software.

3. Issue a letter to Siemens explaining the significance of the event and requesting an explanation. Request that they issue corrections to the POWERPLEX Users Manual. Request that they evaluate the need to inform their other customers about this event.

4. It is possible to provide tools to analytically estimate how close to critical the reactor is, based on subcritical multiplication. Investigate and evaluate industry practice to explore the possibility of implementing alternate means of monitoring the approach to criticality at WNP-2.

5. An evaluation of the Reactor/Fuel Engineering personnel human performance issues, both negative and positive, should be completed. These include:

   a) Discussions of personnel performance issues both negative and positive should be documented in the performance evaluations of the individuals involved.

   b) Evaluating the effects of the frequent turnover of the Reactor Engineering Supervisor and potential impact on the consistency and quality of supervision.

   c) The practice of having the Supervisor of Reactor Engineering also working on shift as an SNE, may have reduced the supervisory performance level. This practice should be evaluated for an alternate approach.

6. Include discussion of this event and lessons learned in the next SNE continued training session.

Attachment: 1. Edit of old POWERPLEX version
2. Edit of new POWERPLEX version
3. PER 296-0522

DISTRIBUTION:

[redacted]	9270	WNP-2 Files	964Y
	PE14		
	PE14		
	PE16		
	PE21		
	9270		
	PE14		
	PE16		
	9270		
	9270		
	PE14		
	PE14		
	9270		
	9270		
	PE21		
	PE21		

```
PREDICT> OP

                    M I C R O B U R N   O P T I O N S
                ********* CALCULATION  OPTIONS *********

       (1)  XENON DEPENDENCE   (MPTXE) . . . . . . . . . . . . . . . . . . .  0
       (2)  Q-CORE MICROBURN   (KSYM). . . . . . . . . . . . . . . . . . . .  1
       (4)  CALCULATED TIP     (MTIJK) . . . . . . . . . . . . . . . . . . .  1
       (5)  HALING SOLUTIONS   (MXHALN). . . . . . . . . . . . . . . . . . .  0
       (6)  COLD CRITICALITY   (MCOLD) . . . . . . . . . . . . . . . . . . .  0
       (7)  LPRM POWER UPDATE  (MUPDT) . . . . . . . . . . . . . . . . . . .  0
       (8)  CRITICALITY SEARCH (IPFTYP). . . . . . . . . . . . . . . . . . .  0
       (9)  PRECONDITION FUEL  (CONDIN). . . . . . . . . . . . . . . . . . .  0
       (10) CHAIN PREDICT CALC (CHAIN) . . . . . . . . . . . . . . . . . . .  0
       (11) FLAT POWER GUESS   (MPFLAT). . . . . . . . . . . . . . . . . . .  0

DO YOU WISH TO MODIFY THE CALCULATION OPTIONS ? > Y
ENTER ITEM # AND VALUE > 1

     MPTXE = 0, TIME DEPENDENT XENON
     MPTXE = 1, EQUILIBRIUM XENON
     MPTXE = 2, (NOT SUPPORTED)
     MPTXE = 3, XENON NOT INCLUDED IN CALCULATION

ENTER ITEM # AND VALUE > 2

     KSYM = 0, FULL CORE MICROBURN CALCULATION
     KSYM = 1, QUARTER CORE MICROBURN CALCULATION
               (IF CONTROL ROD SYMMETRY EXISTS)

ENTER ITEM # AND VALUE > 4

     MTIJK = 0, NO TIP PRINT
     MTIJK = 1, 2D PRINT
     MTIJK = 2, 2D + 3D PRINT
     MTIJK = 3, 2D + 3D PRINT + PUNCH

ENTER ITEM # AND VALUE > 5

     MXHALN = 0, NO CALCULATION
     MXHALN > 1, NUMBER (INTEGER) OF HALING ITERATIONS
                 (RECOMMENDED VALUE IS 20)

ENTER ITEM # AND VALUE > 6

     MCOLD = 0, HOT, POWER CALCULATION
     MCOLD = 1, COLD CRITICAL CALCULATION

ENTER ITEM # AND VALUE > 7

     MUPDT = 0, UPDATE POWER USING BLPRM FILE
     MUPDT = 1, BYPASS POWER UPDATE PROCEDURE
```

The 'OP' function allows the user to edit the MICROBURN calculation and output options, in a two-stage process similar to the 'RX' function. In this case, the user just reviews the meanings of the options, but does not actually change any of the settings.

Entering the option number, WITHOUT a value to go with it, displays a summary definition of that option.

ATTACHMENT 1

```
(1)  XENON DEPENDENCE   (NPTXE) . . . . . . . . . . . . . . . . . . -1
(2)  Q-CORE MICROBURN   (KSYM). . . . . . . . . . . . . . . . . . .  0
(4)  CALCULATED TIP     (NTIJK) . . . . . . . . . . . . . . . . . .  1
(5)  HALING SOLUTIONS   (MXHALN). . . . . . . . . . . . . . . . . .  0
(6)  COLD CRITICALITY   (NCOLD) . . . . . . . . . . . . . . . . . .  0
(7)  LPRM POWER UPDATE  (NUPDT) . . . . . . . . . . . . . . . . . .  0
(8)  CRITICALITY SEARCH (IPFTYP). . . . . . . . . . . . . . . . . .  0
(9)  PRECONDITION FUEL  (CONDTN). . . . . . . . . . . . . . . . . .  1
(10) CHAIN PREDICT CALC (CHAIN) . . . . . . . . . . . . . . . . . .  0
(11) FLAT POWER GUESS   (NPFLAT). . . . . . . . . . . . . . . . . .  0
(12) THERMAL LIMIT FILE (TLxx  ). . . . . . . . . . . . . . . . . .  4

DO YOU WISH TO MODIFY THE CALCULATION OPTIONS ? > Y
ENTER ITEM # AND VALUE > 1

    NPTXE = -1, TIME DEPENDENT XENON(PREVIOUS POWER)
    NPTXE =  0, TIME DEPENDENT XENON(CURRENT POWER)
    NPTXE =  1, EQUILIBRIUM XENON
    NPTXE =  2, (NOT SUPPORTED)
    NPTXE =  3, XENON NOT INCLUDED IN CALCULATION

ENTER ITEM # AND VALUE >
```

WASHINGTON PUBLIC POWER SUPPLY SYSTEM	PER RESOLUTION	① PER No. 296-0522 ② Quality Assessments Initiated ☐ Yes

③ Followup Assessment of Operability ☐ Yes	☒ NA
④ Interim Equipment Disposition Classifications ☐ Interim Accept As Is + ☐ Interim Repair + ☐ Conditional Release ++ ☐ Other (specify)	☒ NA
⑤ Permanent Equipment Disposition Classifications ☐ Permanent Accept-As-Is (10CFR50.59 and POC approval required) ☐ Permanent Repair (10CFR50.59 and POC approval required) ☐ Rework	☒ NA
⑥ Equipment Classification: Quality Class: ☐ 1 ☐ A ☐ 2 ☐ G ☐ Safety Related ☐ ASME+++	☒ NA

⑦ Comments (Include: See Resolution Form instructions for information to include in this section)

a) During reactor startup 96-02, the minimum estimated critical position band was not achieved prior to reactor criticality. The reactor went critical at RWM step 8-3. The Minimum allowable critical position was calculated to be RWM step 11-12. The reactor was shutdown per PPM 3.1.2 and an investigation to resolve the discrepancy was initiated.

b) Disposition and equipment classification are marked N/A because this was a problem associated with a miscalculation of the estimated critical position (ECP). ECPs are part of the programatic control of reactivity and not part of any equipment.

c) PTL search found PTL H-92085, Non-symetric Criticality during Beginning of Cycle 8 startup. Passport search is not applicable for engineering calculation errors. No equipment failed.

d) Actions for H-92085 resulted in future startup pullsheets having notch worths reduced to even core responsiveness.
e)The event occurred due to misuse of the POWERPLEX predictive options. A contributing cause was that major changes to the POWERPLEX code during the R12 outage were not fully evaluated for use after beginning of cycle.
f)The potential for similar errors to occur is possible every time code changes are made. Code test cases should be evaluated for multiple conditions to determine effectiveness. Code changes should be presented in training sessions to appropriate personnel.

☐ Continued

⑧ RCA Report Required ☒ Yes ☐ No	⑨ Number of Interim Corrective Actions Ø Number of permanent disposition Corrective Actions 11

APPROVALS FOR INTERIM DISPOSITION	CAUSE DETERMINATION ROOT CAUSE CODES
⑪ PER Dispositioner (print)/Signature/Date	⑩
⑫ PER Dispositioning Manager (print)/Signature/Date	☐ Unknown (UNKN), Justify above
⑬ ANI (print)/Signature/Date (Note 3)	☐ Assumed Risk (AR01), Justify above
⑭ POC review required prior to implementing Interim Actions ☐ Yes ☐ No POC review required prior to declaring operability ☐ Yes ☐ No	☒ Verbal Communication (PE01), 03
⑮ Engineering Concurrence (print)/Signature/Date (Note 1 & 2)	☐ Work Practice (PE02),
⑯ Quality (print)/Signature/Date	☐ Work Schedule (PE03),
⑰ POC Chairman Approval (print)/Signature/Date/Meeting No. (N/A when POC not required)	☒ Written Procedures and Documents (PR01),
APPROVALS FOR PERMANENT DISPOSITION	☐ Ergonomics (EQ01),
⑱ PER Dispositioner (print)/Signature/Date [redacted] 7/22/96	☐ Conditions of Environment (EQ02),
⑲ Dispositioning Manager (print)/Signature/Date [redacted] 7/23/96	☐ Design Configuration and Analysis (EQ03),
⑳ Quality Concurrence if applicable (print)/Signature/Date [redacted]	☐ Specification Manufacture Construction (EQ04),
	☐ Maintenance/Testing (EQ05),
	☐ Plant/System Operation (EQ06),
	☐ External Influence (EX01),
	☒ Training/Qualification (TR01), 06, 07, 03
	☐ Work Organization/Planning (MM01),
	☒ Supervisory Methods (MM02), 12, 01
	☒ Change Management (MM03), 10
	☒ Resource Management (MM04), 02
	☐ Managerial Methods (MM05),

NOTES:
+ 1. Engineering concurrence should be obtained prior to implementation of PER interim disposition for safety related equipment.
++ 2. Engineering concurrence should be obtained prior to declaring safety related equipment operable.
+++ 3. ANI approval required for ASME material or pressure bounding items.