From: "McCutchen, Edward L." <elmccut@nppd.com>
To: "Michelle C. Honcharik (E-mail)" <mch3@nrc.gov>
Date: 2/23/04 2:45PM
Subject: FW: Draft RAI Response

Best Regards,
Edward (Ed) L. McCutchen, Jr.
Licensing Supervisor, Cooper Nuclear Station
(402) 825-2707 office, (402) 943-0921 pager

-----Original Message-----
From: Blair, Coy L.
Sent: Friday, February 20, 2004 2:55 PM
To: 'MCH@NRC.GOV'
Cc: McCutchen, Edward L.; Blair, Coy L.; Able, Alan L.
Subject: Draft RAI Response

Attached is the draft RAI response for the Requested License Amendment concerning TS SR 3.3.2.1.4 and TS Table 3.3.2.1-1. This request concerns mathematical symbols and allowable values. The teleconference is proposed for 3 pm EST on Monday, 2/23/04.

<<2004006.wpd>>
Coy L. Blair
Licensing Engineer
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Mail Envelope Properties (403A5848.27D : 19 : 21117)

Subject:	FW: Draft RAI Response
Creation Date:	2/23/04 2:44PM
From:	"McCutchen, Edward L." <elmccut@nppd.com>
Created By:	elmccut@nppd.com

Recipients
nrc.gov
owf4_po.OWFN_DO
MCH3 (Michelle Honcharik)

Post Office	**Route**
owf4_po.OWFN_DO	nrc.gov

Files	**Size**	**Date & Time**
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Options

Expiration Date:	None
Priority:	Standard
Reply Requested:	No
Return Notification:	None
Concealed Subject:	No
Security:	Standard

NLS2004006

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555-0001

Subject: Response to Request for.Additional Information Regarding Licensing Amendment Request to Revise Technical Specifications (TS) Surveillance Requirements and TS Table for Mathematical Symbols and Use of Allowable Values in the Place of Analytical Limits
Cooper Nuclear Station, Docket 50-298, DPR-46

References:

1. Letter from M. Honcharik (U.S. Nuclear Regulatory Commission) to C. C. Warren (Nebraska Public Power District) dated November 26, 2003, "Cooper Nuclear Station - Request for Additional Information Regarding Revision of Technical Specification Surveillance Requirement 3.3.2.1.4 and Table 3.3.2.1-1 for Mathematical Symbols and Use of Allowable Values in Place of Analytical Limits (TAC No. MC0629)"

2. Letter from C. C. Warren (Nebraska Public Power District) to U.S. Nuclear Regulatory Commission dated October 31, 2003, "Response to Request for Additional Information Regarding Licensing Amendment Request to Revise Technical Specifications (TS) Surveillance Requirements and TS Table for Mathematical Symbols and Use of Allowable Values in the Place of Analytical Limits" (NLS2003111)

3. Letter from C. C. Warren (Nebraska Public Power District) to U. S. Nuclear Regulatory Commission dated August 25, 2003, "License Amendment Request to Revise Technical Specification (TS) Surveillance Requirement (SR) 3.3.2.1.4 and TS Table 3.3.2.1-1 for Mathematical Symbols and Use of Allowable Values" (NLS2003077)

The purpose of this letter is for the Nebraska Public Power District (NPPD) to respond to a Nuclear Regulatory Commission (NRC) Request for Additional Information (RAI) provided in Reference 1. This RAI refers to information previously provided in References 2 and 3. Reference 3 was the original amendment request while Reference 2 provided additional materials to facilitate the NRC review of the requested amendment. The response to the RAI is provided in Attachment 1 to this letter.

This RAI response is limited to supplying information to assist the NRC in completing the review of the license amendment requested in Reference 3 and does not change any part of the original license amendment request and therefore does not change the original no significant hazards consideration.

Should you have any questions concerning this matter, please contact Mr. Paul Fleming at (402) 825-2774.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on ________________
Date

Randall K. Edington
Vice President Nuclear and Chief Nuclear Officer

/clb
Attachment

cc: Regional Administrator w/attachment
USNRC - Region IV

Senior Project Manager w/attachment
USNRC - NRR Project Directorate IV-1

Senior Resident Inspector w/attachment
USNRC

Nebraska Health and Human Services w/attachment
Department of Regulation and Licensure

NPG Distribution w/o attachment

Records w/attachment

NLS2004006
Attachment 1
Page 1 of 10

Response to Request for Additional Information Regarding Licensing Amendment Request to Revise Technical Specifications (TS) Surveillance Requirements and TS Table for Mathematical Symbols and Use of Allowable Values in the Place of Analytical Limits

Cooper Nuclear Station
Docket 50-298, DPR-46

1. NRC Request

The Technical Specification (TS), Table 3.3.2.1-1 and associated TS Bases, define several separate "zones" of percent rated thermal power (%RTP) and minimum critical power ratio (MCPR), in which various trip functions are enabled or suppressed. The functional zones are defined by Conditions a, b, c and d. Condition e overlaps Conditions a, b and c. The associated TS Bases define "no-trip" zones (i.e., zones not requiring any trip function) at power levels below 30 percent for all MCPRs, at all power levels for MCPRs of 1.7 or greater, and at power levels above 90% for MCPR greater than or equal to 1.4. The proposed Allowable Values (AVs) protect against errors in determining which zone is in effect at any given time. The margin applied to the 30 percent limit ensures that an underestimation of thermal power when operating just above 30 percent will tend to result in the application of the Condition a setpoints rather than in the assumption of "low power no-trip" zone and the suppression of all trips. This is clearly conservative. But it is not clear whether Condition a setpoints or Condition b setpoints are more conservative for thermal power estimation errors when operating near 65 percent. Similarly, for Condition b and c near 85 percent. The inverse relationship of setpoint to power regime further confuses this matter (the low power trip setpoints are higher than the high power trip setpoints). In addition, the "high power no-trip" zone for power greater than or equal to 90 percent with MCPR greater than or equal to 1.4 seems to indicate, counter intuitively, that operation is safer above 90 percent than below 90 percent.

For all RBM Functions in TS Table 3.3.2.1-1 and for the "no-trip" zones in the TS Bases for the RBM (B3.3.2.1, page B3.3-45), please indicate whether overestimation or underestimation of thermal power is more conservative and provide the reasoning behind each determination. Show that the proposed margins are on the correct side (i.e., where the margins produce, rather than detract from, conservatism) of each zone boundary. Explain why no margin is needed at the 90 percent power level.

NPPD Response:

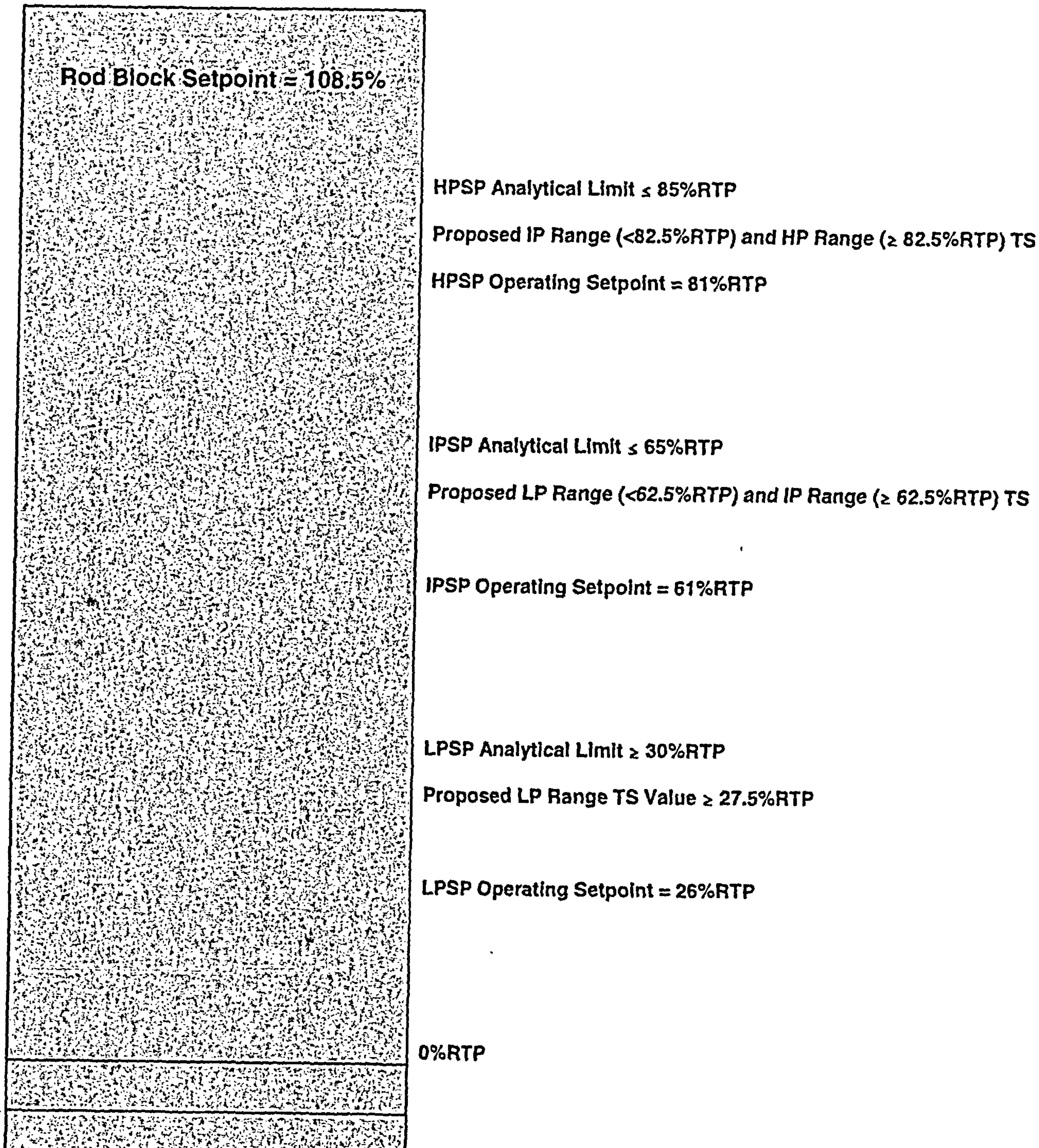
Please refer to the graph on the following page along with the following explanation. The way that the setpoints for the various regions were determined has not changed from when Cooper converted from flow-biased RBM setpoints to the current three zone method. Instrument uncertainties are deducted from the Analytical Limit (AL) to determine the Allowable Value (AV) and Nominal Trip Setpoint (NTSP), per GE Setpoint Methodology. Additional tests are then applied to the NTSP (i.e. LER Avoidance, Required Limits Evaluation) and a final operating setpoint determined. In the case for the transition from the 'No Rod Block Required' region less than 30% RTP to the lov power (LP) region, the conservative situation is to have the rod block in effect prior to reaching 30%, so the calculated AV is 27.5% and the setpoint is 26%. As mentioned, clearly this is conservative. For the transition from the low power setpoint (LPSP) to the intermediate power setpoint (IPSP) and the IPSP to high power setpoint (HPSP), the same calculational methodology was used, i.e. deducted instrument uncertainties from the AL to determine the AV and NTSP. In those two cases, it is conservative to have the transition region below the AL (and also below the AV) and use the rod block setpoint of the "higher region." Specifically, when moving from the LP region to the IP region, the rod block setpoint will shift from 118% down to 113% at 61% RTP, even though the rod block setpoint could be 118% up to the AV of 62.5% RTP. The same discussion holds for the transition from the IP region to the HP region. Additionally, an underestimation of thermal power when operating just above the AL will still result in a shift to the next higher region's rod block setpoint before reaching the AL, while an overestimation of thermal power will cause a shift to the next higher region at some point below the AL, both of which are more limiting.

The calculation Conclusion Section lists a set of permissible rod block values for AL, AV and Operating Setpoint, based on different MCPR Limits. From USAR Section XIV-7, Table XIV-7-2, the MCPR Limit for Rod Withdrawal Error for the current fuel cycle is 1.32. Therefore, the setpoints for the various regions were selected based on a MCPR Limit of 1.30, which yields the lower rod block setpoints.

The proposed change to the "algebraic signs" in SR 3.3.2.1.4 and Table 3.3.2.1-1 (Notes) is based on our determination that it is conservative to ensure that the rod block setpoint for the next higher region is in effect prior to the AL because that rod block setpoint is a lower value, and thus more limiting.

Even though the Rod Block Monitor function is not required above 90% when MCPR is greater than 1.4, there is no bypass for this region. The only conditions that will automatically bypass the RBM is operation below the Low Power Setpoint (analytical limit of 30%RTP) or a peripheral control rod selected for movement. Therefore, there is no "high power no-trip" zone and no need to calculate a margin for this value.

NLS2004006
Attachment 1
Page 3 of 10



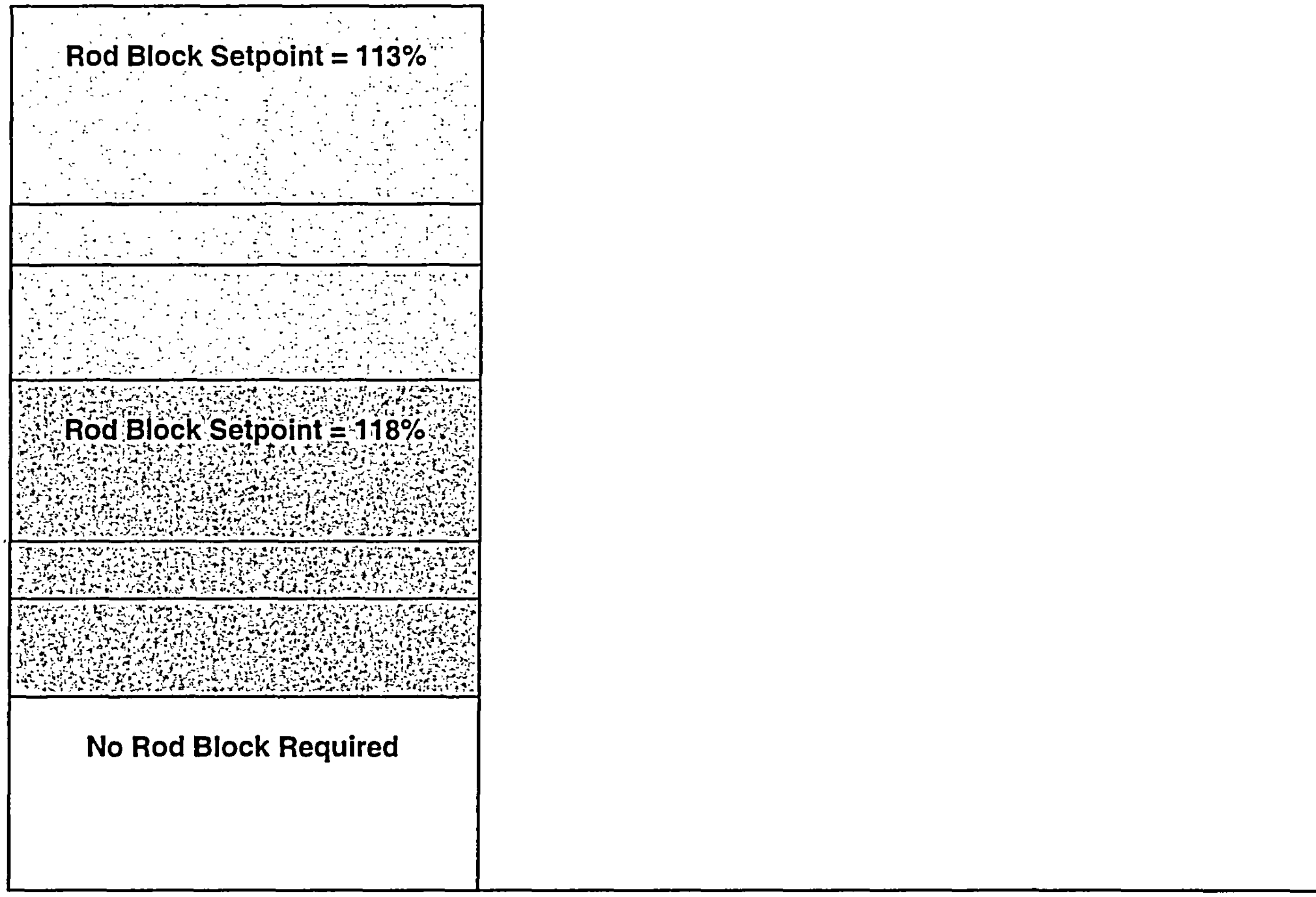


Figure 1, Rod Block Monitor operating regions showing associated setpoint values.

2. <u>NRC Request</u>

If the estimated MCPR were above 1.7, but the actual MCPR were less than 1.7, then Functions 1a, 1b, 1c and 1e would be suppressed when in fact they should be active. This would be a non-conservative condition. A similar situation exists for the MCPR limit of 1.4 for power levels of 90 percent and above, associated with Function 1d. Please explain how this condition is to be avoided, given that the proposed TS changes do not include the addition of margin to the MCPR limits.

<u>NPPD Response</u>

The question implies that the system is not in-service during periods when the MCPR is above 1.7. However, this is not the case. The system is in service whenever the reference power level is above the Low Power Setpoint, regardless of the calculated MCPR.

3. NRC Request

The mark-up for pages B3.3-45 of the TS Bases shows the 30 percent limit changed to 27.5 percent. The description in the TS Bases should show the objectives of the TS settings, not necessarily the TS settings themselves. The TS value is proposed to be changed from 30 percent to 27.5 percent to ensure that the power-related adjustment in trip setpoint does indeed occur at or below 30 percent despite anticipated uncertainty in the power estimation. As far as the bases are concerned, the objective is to establish a limit at 30 percent. It would seem the TS Bases should not be changed here. Please explain the proposed change.

NPPD Response

CNS agrees with the comment. The 30 % number will be retained in TS Bases. The bases is discussing the results of an analysis which has a bases value of 30%. We are adjusting the setpoint and allowable value to address instrumentation uncertainty.

4. NRC Request

Please show that the margin between each proposed AV and the corresponding Analytical Limit (AL) is adequate to include all uncertainties remaining in the instrument sensor and channel following calibration. Confirm that the AVs are not affected by the "LER Avoidance Evaluation" or by any other setpoint adjustment based upon operational considerations.

NPPD Response

By the definition of GE Setpoint Methodology (NEDC-31336P-A, General Electric Instrument Setpoint Methodology), the margin between the AV and AL is a statistical combination of all uncertainties identified except instrument drift. The margin between AL and the NTSP is the statistical combination of all uncertainties identified. The LER Avoidance Evaluation is an adjustment (if necessary) of the trip setpoint (NTSP) away from the AV to assure that there is sufficient margin to avoid violating the AV during surveillance testing. Likewise, any other setpoint adjustments based on operational considerations would be away from the AV to provide additional margin.

5. NRC Request

Calculation Section 2.2: The units for the RBM Trip Function AL's are not specified. We presume these to be % RTP. The units for the AL's for the various Trip Setpoints (SP's) are also not specified. Since the Low Trip SP values are higher than the High Trip SP values, these cannot be % RTP. Since they are above 100 percent, they cannot be % Calibrated Span. Please describe the units and scaling, and provide a brief explanation as to how the associated trip signals are derived. For example: Is there a separate comparator for each of the three neutron monitors, with one of the three comparators enabled on the basis of power level? Is there just one comparator with analog input selected from among the three neutron monitors on the basis of power level?

NPPD Response

The preset limits vary with power. The system monitors local thermal power by generating a signal from the Local Power Range Monitors (LPRM) in the detector assemblies which surround the rod selected for movement. The system receives a "rod select" signal from Reactor Manual Control System (RMCS).

It routes the LPRM outputs from the LPRM assemblies adjacent to the selected rod to the averaging circuit. The system adjusts the averaged signal to equal a constant reference signal. The gain change circuit increases the gain of the averaged signal until its output equals, or exceeds, the constant reference signal. The system then compares this signal to a power-biased trip setpoint. This power biased trip setpoint has three different values. The value used is based on the Average Power Range Monitor (APRM) Reference channel power. A rod withdrawal block is generated if the normalized LPRM signal rises above the power-biased trip setpoint. On the selection of a rod, the control circuitry controls the sequence of events which prepares the RBM system for proper operation. This sequence of events is called the "Nulling Sequence".

Low power setpoint (LPSP) provides the reference for the RBM auto bypass (30% of rated power). Below LPSP the RBM is bypassed.

Intermediate power setpoint (IPSP) provides a fixed reference of 65% rated power. Between LPSP and IPSP, the Low Trip Setpoint is in effect.

High power setpoint (HPSP) provides a fixed reference of 85% rated power. Between IPSP and HPSP, the Intermediate Trip Setpoint is in effect. Above HPSP the High Trip Setpoint is in effect.

These setpoints provide a reference for rod block signals. Each time power level increases (on the reference APRMs) the RBM setpoints automatically change to a lower trip setpoint as discussed below.

Low Trip Setpoint (LTSP):

When power level is below 65% (below IPSP), the rod block trip setpoint is ≤ 120%.

Intermediate Trip Setpoint (ITSP):

When power level is above 65% but below 85%, the rod block trip setpoint is automatically changed to ≤ 115%.

High Trip Setpoint (HTSP):

When power level is above 85%, the rod block trip setpoint changes to ≤ 110.5%.

The units for the "power setpoints" (LPSP, IPSP, HPSP) are a reference input from an APRM channel, and are in units of percent of rated thermal power (%RTP).

The units for the "trip setpoints" (LTSP, ITSP, HTSP) are the indicated value based on a full scale of 125. Therefore, the units are divisions of full scale.

6. NRC Request

Calculation Section 2.2 note "**": The TSs show the limit as 90 percent, not 89 percent. Please explain.

NPPD Response

The 90% listed to in TS Table 3.3.2.1-1 notes c, d and e refer to a change in the operating region for the Rod Block Monitor. However, the RBM does not actually change operation at this point, it continues to function as it did below 90%. The note is referring to the Downscale Trip Setpoint (DTSP) with an analytical limit of 89%. The DTSP will generate a control rod block if the selected RBM channel power is too low from its most recent normalized calibration conditions. This assures that the normalization performed at the time of rod selection remains valid before permitting withdrawal of the rod. Therefore, the 90% value listed in the TS table notes is not the same thing as the 89% DTSP.

7. NRC Request

Calculation Section 2.2 note "**": There appears to be missing text between the final two lines. Please clarify.

NPPD Response

The last sentence of the note "The DTSP limit is not utilized in any licensing bases Rod Withdrawal Error (RWE) analysis or that the range is restricted by design to values considered in the RWE analysis." is a combination of statements from two GE documents. The first ones states "Also, the DTSP limit is not utilized in any of the licensing basis RWE analyses." as part of the justification for changing the Analytical Limit from 91% to 89%. The second one defines 'no limitations' in a table which gives trip level settings for the various RBM functions, but does not list a value for DTSP other than N/L; "N/L - no limitations; means either that the setpoint does not affect the RWE analysis or that the range is restricted by design to values considered in the RWE analysis." The last half of the sentence does not add to the discussion and may be deleted in a future revision.

8. NRC Request

Calculation Section 2.2 note "***": TS Table 3.3.2.1-1 Function 1e, Condition e, indicates that an MCPR limit (less than 1.7) does apply to the Downscale Trip Setpoint. Please resolve this apparent conflict between the calculation and TS.

NPPD Response

Condition e associated with function 1e refers to the plant operating conditions when the downscale function is required. The MCPR Limits listed in Section 2.2 of the calculation show what the AL should be to protect the fuel during a rod withdrawal accident.

9. NRC Request

Assumption 3.2: Please justify the claim that seismic effects are insignificant. Note that the zero period acceleration (ZPA) is a property of the mounting location, not of the device itself; and must be at least equal to the floor ZPA, which is likely greater than the ground ZPA. It is not clear that this is an inconsequential value.

NPPD Response

GE document NEDC-31336P-A, General Electric Instrument Setpoint Methodology, sections 3.19 and 3.20 provide guidance for assumptions for the RBM and APRM. Neither section discusses seismic effect. Additionally, the prior setpoint calculation for the APRM and RBM was performed by GE, and included an assumption that stated "GE APRM/RBM equipment accuracy specification includes the uncertainties due to seismic effect on the equipment located in the relay room panels. The panels are qualified as a unit." Therefore, seismic effect is not included as a separate item in the setpoint calculation.

10. NRC Request

Calculation Assumption 3.3: Uncertainties are usually two-sigma values. The assumption that the standard deviation is only 1/3 - rather than ½ - of the uncertainty seems non-conservative. This is especially true since the accuracy of the calibration standard is assumed to be only as good as the test equipment that it is used to calibrate. In addition, it is not clear how the fact that "100 percent testing" is implemented relates to the question of whether the associated uncertainties are two-sigma or three-sigma values. Please clarify and justify Assumption 3.3.

NPPD Response

The assumption that individual calibration accuracy terms are three-sigma values is from a CNS specific, GE setpoint guidance document This document also uses the term controlled by 100% testing to signify that the calibration tests performed on both the instrument itself and all of the calibration standards are actual performance results and not sample results that are statistically applied to a batch of instruments or standards. Additionally, by assuming that the calibration standard's uncertainty is equal to the calibration tool's uncertainty, NPPD is adding additional conservatism to the determination of the Allowable Value.

11. NRC Request

Calculation Assumption 3.9: The important quantity is the expected variation in current with the design basis variation in voltage, not necessarily just a 1 percent variation in voltage. Is this effect not already addressed in the overall accuracy specification for the detection system?

NPPD Response: Yes, it is addressed. Per GE document NEDC-31336P-A, General Electric Instrument Setpoint Methodology, sections 3.20 and 4.5, the sensor accuracy is included.

12. NRC Request

Calculation Assumption 3.11: This addresses a fundamental design issue that seems too important to be covered in an assumption, and it begs the question of why such an assumption should be required. Is the installed equipment the same as that originally provided by General Electric or not? If it is not actually the same equipment, in what sense is it "the same?" Why is the calculation not simply based explicitly upon the actually-installed equipment?

NPPD Response

The equipment installed is the same as originally provided by General Electric.

13. NRC Request

Calculation Assumption 3.14: Please show that the temperature and humidity effects are negligible, based upon the design conditions at the equipment locations and upon the anticipated limiting effects of temperature and humidity upon the equipment.

NPPD Response

GE document NEDC-31336P-A, *General Electric Instrument Setpoint Methodology*, sections 3.19 and 3.20 provide guidance for the environmental effects assumptions for the RBM and APRM. For the RBM, "There will not be an environmental effect during the RWE (Rod Withdrawal Error) transient before the rod block function is completed." Similar wording is provided for the APRM in section 3.20, "There will not be an environmental effect during the Design Basis Events before the scram function is complete. Therefore, the harsh environment effect is not applicable." Therefore, temperature and humidity effects do not need to be considered.

14. NRC Request

Calculation Assumption 3.16: Flow element uncertainty would normally be expressed in terms of the uncertainty in the differential pressure produced for a given flow rate. The actual flow measurement uncertainty includes uncertainty in the measurement of that differential pressure as well as in the behavior of the venturi itself. Please confirm that the assumed 2 percent uncertainty is the composite flow measurement channel uncertainty, not just the element uncertainty. Please explain how the uncertainty in this specific application is known to be bounded by the analyses in the referenced documents.

NPPD Response

The venturi uncertainty is 2% of flow based on the design specification. However, the overall flow loop uncertainty is 2.965% of flow as determined in the first half of Step 4 on page 15 of 64. This value is then 'converted' in the second half of Step 4 to an equivalent power level of 1.957%. Additionally, the factory test report results for the flow venturi's states "the average flow rate for each run should be within ± 0.25% of the true value" which indicates that the flow uncertainty assumed in the calculation is conservative.

15. NRC Request

Calculation Assumption 3.18: Please clarify. The uncertainty in the output of the summer would be equal to the combination of the uncertainties in the input signals combined with the additional uncertainty introduced by the summer itself. It is not clear that the summer uncertainty is included here.

NPPD Response

The uncertainty of the flow loop is a combination of the uncertainties of the 2 flow elements, 2 flow transmitters, and the flow unit (which includes the summer) and is calculated in step 4.1.3.3.4.1.1b on pages 14 and 15 of 64, and in Appendix B. The assumption simply assumes that the As Left Tolerance (ALT) on the output of the summer is equal to twice the ALT of the two summer input values. Refer to diagram on page 23 and the values for ALT_{10} and ALT_{11} on page 21 of the calculation.

16. NRC Request

Calculation Assumption 3.20: Show that the design basis limits on control room temperature are bounded by the temperature variation assumed in the derivation of the accuracy specification.

NPPD Response

The GE design and performance specification for the APRM's specifies the uncertainty to be used based on environmental conditions (temperature and humidity), either in the "restricted" case or the "full" case. For the 'restricted case' (which is used in the calculation), the temperature range is 60-90°F and humidity range of 40-50%RH. If the Control Room ambient temperature should increase above 90°F, station procedures direct the operator to commence a normal plant shutdown, and if temperature exceeds 95°F, to scram the reactor.

From: Joseph Sebrosky
To: Caudle Julian; Chuck Paulk; Jerome Blake; Mary Ann Ashley; Ronald Gardner; Thomas Foley; Tony Cerne
Date: 02/24/2004 7:47:27 AM
Subject: FY 2006 budget and AP1000 construction schedule

Good morning,

The purpose of this note is to let you know (1) what the FY2006 proposed budget is for construction inspection infrastructure, (2) previous FY2006 budget assumption and ramifications, and (3) to provide background on an AP1000 CD that I placed in the mail for you.

FY2006 Proposed Budget

My group (New Reactors Section) is currently in the process of developing the FY2006 budget for new reactors. The proposed FY2006 budget for inspection manual chapter development is the same as FY2005. There is also some regional budget to help support regional review of COL application guidance. The overall regional budget for FY2006 is 2.9 FTE which is consistent with the FY2005 budget. The FY2006 budget allows for 1 FTE in Region II and III, 0.2 FTE in Region I and 0.7 FTE in Region IV. (0.1FTE of Region IV's budget also assumes a small amount of work to support the tail end of the Grand Gulf ESP review).

FY2006 Change in Assumption

The program review committee (PRC) (consisting of senior NRC managers) has determined that they will supply no resources in FY 2006 to support a COL application reivew. This information has not yet been shared with industry and goes against what NEI is telling us (i.e., expect one COL application in mid to late calendar year 2006). I guess that the PRC is rolling the dice that if we do receive a COL application it will be late in the fiscal year and that we will be able to delay the start of the review until FY2007.

Anyway the reason that the PRC assumption is important is because there is a large amount of inspection resources tied to the beginning of a COL application. The budget assumption for a COL application is that modular fabrication would begin around the same time as the COL application is submitted. This assumption leads to heavy regional and headquarters resource expenditures (approx 15 FTE for the 1st year of a COL application - 7 FTE to write plant specific procedures and 8 FTE to do inspections in the field). These budget numbers are based on the future licensing and inspection readiness assessement SECY paper. I'm not sure how and if we will adjust these numbers as more information comes to light regarding the status of a COL application, but I wanted to make you aware of the obvious (i.e., a COL application could have a large impact on regional resources)

AP1000 CD

I sent all of you in the mail a CD that contains two AP1000 video files. The first file shows the construction sequence for the nuclear island through the first 3 months (starting with concrete placement). The modules first appear "green" the day that they are placed and turn to pink after their placement is completed. The second video is a flythrough of one of the first large modules placed on the nuclear island. The videos are non-proprietary and are consistent with the presentations that Westinghouse has shown us in the past regarding the rapid pace of construction.

Please let me know if you have any questions about the above.

Thanks,

Joe

CC: Armando Masciantonio; Joseph Colaccino; Timothy Frye

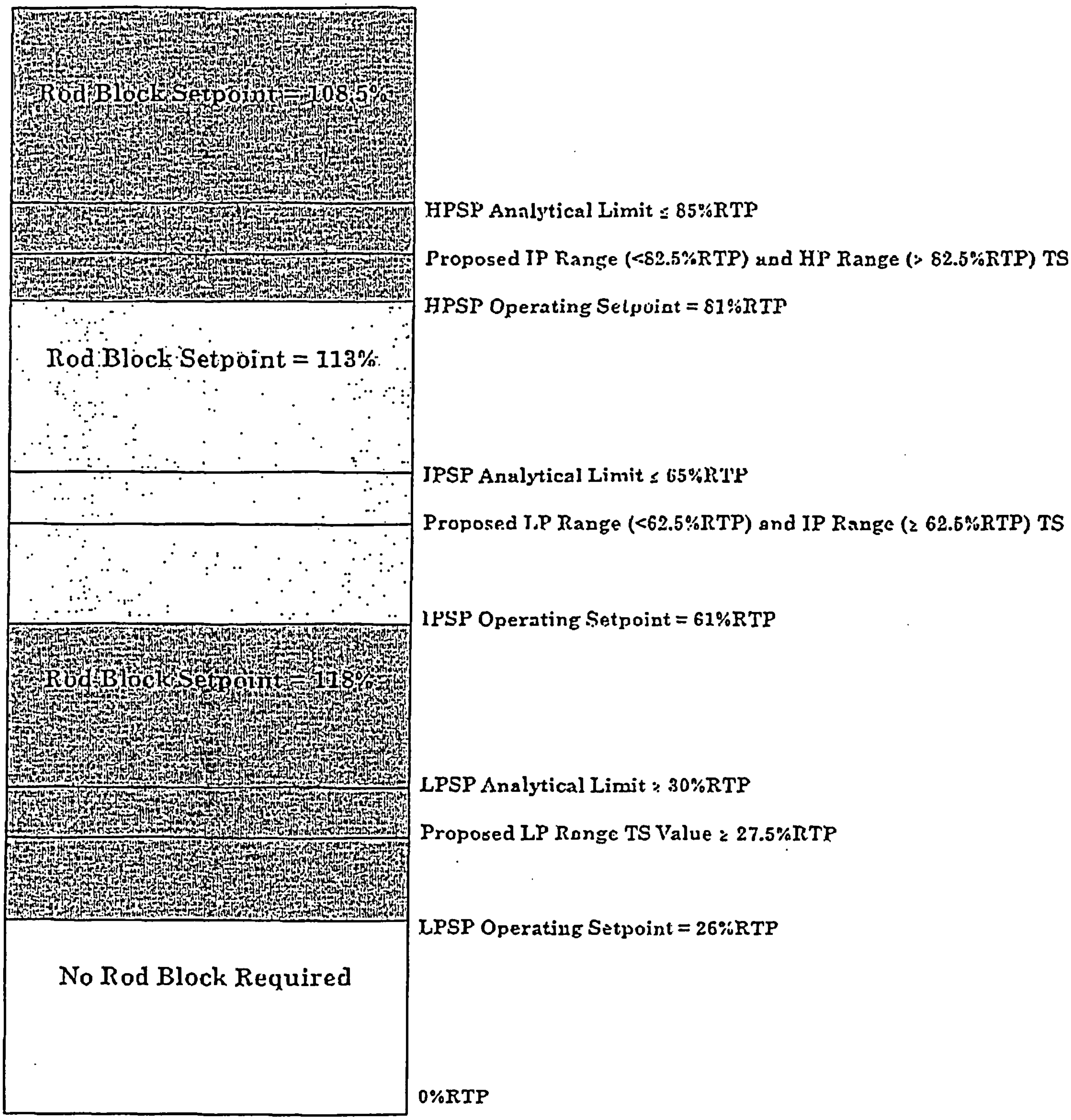


Figure 1, Rod Block Monitor operating regions showing associated setpoint values.