March 15, 2000

FACILITY: Waterford Steam Electric Station, Unit 3

LICENSEE: Entergy Operations, Inc.

SUBJECT: WATERFORD STEAM ELECTRIC STATION, UNIT 3 RE: SUMMARY OF DECEMBER 2, 1999, MEETING WITH ENTERGY OPERATIONS, INC.

On December 2, 1999, representatives of the U. S. Nuclear Regulatory Commission (NRC) and Entergy Operations, Inc. (EOI, the licensee), met in Rockville, Maryland, to discuss application of instrumentation uncertainty at Waterford Steam Electric Station, Unit 3 (Waterford 3). Enclosure 1 is a list of attendees. Enclosure 2 is a copy of the handout used by the licensee during the meeting.

The licensee requested this meeting to have a discussion with the NRC staff regarding the application of instrument uncertainty at Waterford 3. EOI stated that the NRC staff and the EOI's positions are fundamentally consistent. Basically, uncertainties must be accounted for and managed to preserve limiting conditions for operation (LCO) bases. The licensee indicated that EOI is moving forward in developing its program that is consistent with the intent of NRC and industry guidance. EOI presented its approach for managing the instrument uncertainty considerations at Waterford 3. The licensee discussed a graded approach to deal with instrument uncertainty that is based on the safety significance of instrument function. EOI proposed that uncertainty should be addressed as a generic issue, and EOI will support an approach to develop a generic resolution.

The NRC staff encourages the industry to take the initiative to develop necessary guidance when it recognizes the need to resolve issues. However, the staff was not aware that this was considered an industry-wide concern at this point. The staff indicated that it may have internal discussion to consider the merits of the licensee's program to resolve the instrument uncertainty concerns at Waterford 3. Some discussion ensued about the merits of EOI proposing a risk-informed type pilot, a voluntary initiative, or a topical report under the auspices of an industry organization. The staff stated its willingness to discuss this issue further with Waterford 3 and any other interested parties.

/RA/
N. Kalyanam, Project Manager, Section 1
Project Directorate IV & Decommissioning
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-382

Enclosures: As stated (2)

cc w/encls: See next page

DISTRIBUTION:

E-MAIL
JZwolinski/SBlack
SRichards
DLange
PHarrell
WBeckner
JFoster
JWermiel
CPaulk
AKugler
DPowers
AMarinos
JStrosnider
TCollins
HGarg
FOrr
MShuaibi
EWeiss

HARD COPY
File Center
PUBLIC
PDIV-1 RF
OGC
ACRS

To receive a copy of this document, indicate "C" in the box				
OFFICE	PDIV-1/PM	PDIV-1/PM C	PDIV-1/LA	PDIV-1/SC C
NAME	CPatel:db	NKalynanam	DJohnson	R.Gramm
DATE	3/14/00	3/13/00	3/13/00	3/14/00

DOCUMENT NAME: G:\PDIV-1\Waterford\MTGSUM120299.wpd

OFFICIAL RECORD COPY

cc:

Administrator
Louisiana Radiation Protection Division
P. O. Box 82135
Baton Rouge, LA 70884-2135

Vice President, Operations Support
Entergy Operations, Inc.
P. O. Box 31995
Jackson, MS 39286

Director
Nuclear Safety & Regulatory Affairs
Entergy Operations, Inc.
P. O. Box B
Killona, LA 70066

Wise, Carter, Child & Caraway
P. O. Box 651
Jackson, MS 39205

General Manager Plant Operations
Entergy Operations, Inc.
P. O. Box B
Killona, LA 70066

Licensing Manager
Entergy Operations, Inc.
P. O. Box B
Killona, LA 70066

Winston & Strawn
1400 L Street, N.W.
Washington, DC 20005-3502

Resident Inspector/Waterford NPS
Post Office Box 822
Killona, LA 70066

Regional Administrator, Region IV
U.S. Nuclear Regulatory Commission
611 Ryan Plaza Drive, Suite 1000
Arlington, TX 76011

Parish President Council
St. Charles Parish
P. O. Box 302
Hahnville, LA 70057

Executive Vice-President
and Chief Operating Officer
Entergy Operations, Inc.
P. O. Box 31995
Jackson, MS 39286-1995

Chairman
Louisiana Public Service Commission
One American Place, Suite 1630
Baton Rouge, LA 70825-1697

WATERFORD STEAM ELECTRIC STATION, UNIT 3

ATTENDANCE LIST

PUBLIC MEETING HELD DECEMBER 2, 1999

Name	Organization	Telephone Number
Chandu Patel	NRC/NRR/DLPM	301-415-3025
Jerry Holman	Entergy - W3	504-739-6265
Fred Titus	Entergy Operations	601-368-5390
A. J. Wrape, III	Entergy - W3	504-739-6680
Rex Putnam	Entergy - W3	504-739-6341
Ron Byrd	Entergy - Corporate Licensing	601-368-5792
Jared Wermiel	NRC/NRR/DSSA/SRXB	301-415-2895
Suzanne Black	NRC/NRR/DLPM	301-415-1453
C. J. Paulk	NRC/RIV/DRS/EMB	817-860-8236
Dale A. Powers	NRC/RIV/DRS/EMB	817-860-8195
Angelo Marinos	NRC/NRR/DE/EEIB	301-415-2911
Jack Strosnider	NRC/NRR/DE	301-415-3298
Tim Collins	NRC/NRR/DSSA	301-415-3226
N. Kalyanam	NRC/NRR/DLPM	301-415-1480
Frank Orr	NRC/NRR/DSSA/SRXB	301-415-1815
Jim Riley	NEI	202-739-8137
Mohammed Shuaibi	NRC/NRR/DSSA/SRXB	301-415-2859
Bob Gramm	NRC/NRR/DLPM/PDIV-1	301-415-1010
Eric Weiss	NRC/NRR/DSSA/SRXB	301-415-3264
Wesley Frewin	NPPD-CNS	402-825-5040
Stuart Richards	NRC/DLPM/PDIV	301-415-1395
James Allen	Vermont Yankee/BWROG	802-451-3078
Hukam Garg	NRC/NRR/DE/EEIB	301-415-2929
Glenn Warren	BWROG	205-992-5940
Charles Dugger	Entergy - W3	504-739-6661
Everett Perkins	Entergy - W3	504-739-6379

Enclosure 1

Entergy Operations, Inc. Instrument / ECCS Flow Uncertainty Management Meeting

Presentation to the
U. S. Nuclear Regulatory Commission Staff
December 2, 1999

Enclosure 2

Entergy

Agenda

• Introduction/Definition of Issues	C.M. Dugger (W3)
• Regulatory Requirements	F.W. Titus (EOI)
• Accounting for/Managing Instrument Uncertainties	A.J. Wrape (W3)
• Generic Considerations	E.P. Perkins (W3)
• Conclusions	F.W. Titus (EOI)

Entergy

Introduction/Definition of Issues

C.M. Dugger

Vice-President, Waterford 3

Entergy

Introduction

- ***Meeting purpose*:** Reach common understanding with NRC Staff regarding the application of instrument uncertainty at W3
  - Regulatory requirements
  - Technical requirements
  - Graded approach based on safety significance of the instrument function
- ***Conclusion:***
  - EOI complies with the regulations and Licensing Basis for W3
  - EOI has established measures to account for instrument uncertainty
  - NRC and EOI positions are fundamentally consistent
    - We must account for uncertainties
    - We must manage uncertainties to preserve LCO basis

* We are here to present our program and how we are moving forward to address instrument uncertainty

Definition of Issues

- **Key NRC Positions in August 18, 1999 letter:**
  - "The conservatisms inherent in the Appendix K methodology do not envelop emergency core cooling system flow uncertainties. Such uncertainties must be accounted for and this can be done either through the analysis itself or through the surveillance testing program."
  - "Instrument uncertainties must be managed in a manner that ensures that technical specification limiting conditions for operation (LCOs) preserve the analytical values on which the LCOs are based."

- **Key EOI Positions**
  - EOI guidance is that plants must account for uncertainties (implicitly or explicitly) either in the analysis or surveillance testing acceptance criteria
  - Some LCOs do not have analytical value bases to be "preserved"
  - In-service testing (ASME) already considers instrument *accuracy*

Entergy

EOI is moving forward consistent with the NRC and the industry

- EOI considered BTP HICB-12 recommendations in the development of our program
- Our program is consistent with the intent of Staff guidance
- Continuing to perform/document instrument uncertainty decision-making methodologies
- Continuing to ensure component/system operability
- Ensuring compliance with regulatory requirements

Regulatory Requirements

F.W. Titus

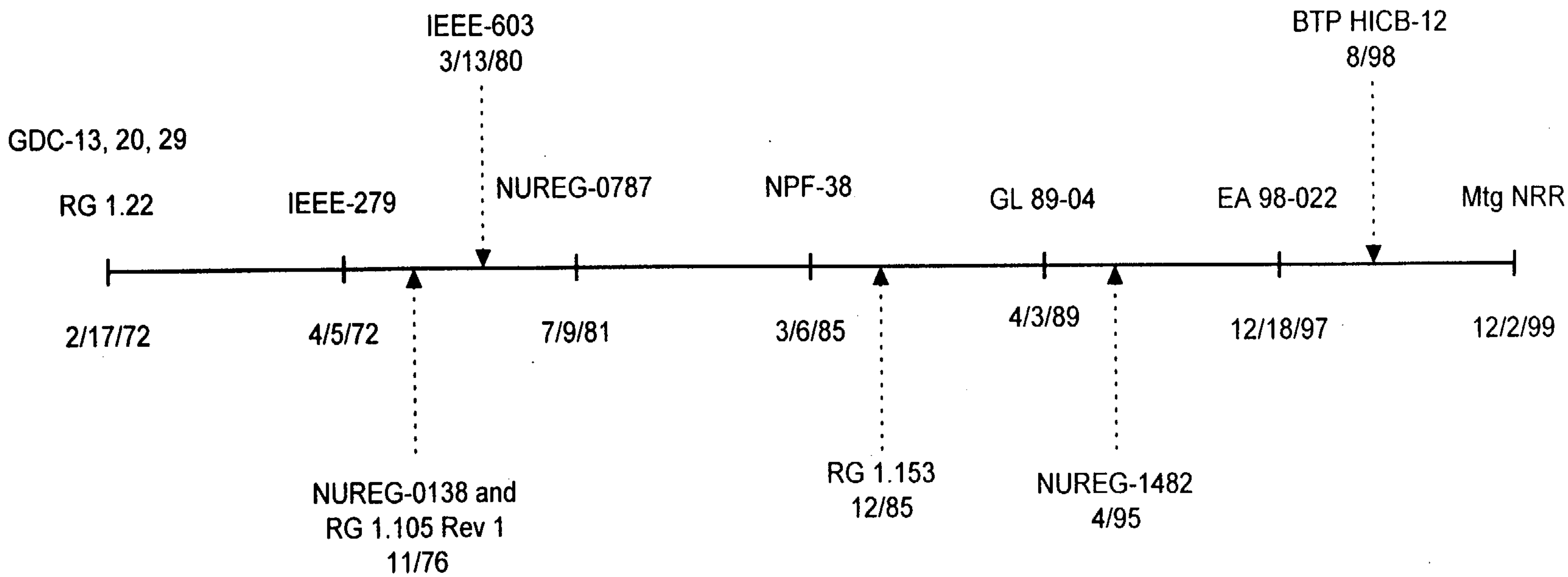
Vice-President Engineering, EOI

Entergy

Regulatory Timeline

- The Timeline relates:
  - the Waterford 3 Licensing Basis
  - other regulatory guidance
- Waterford 3 conforms to its Licensing Basis

Regulatory Timeline



Entergy

The Regulatory Bottom Line is this...

- Licensees must:
  - Account for uncertainties
  - Manage uncertainties to preserve LCO basis
- Instrument uncertainty has been an evolving area of NRC scrutiny
  - Requirements are not prescriptive
  - Regulatory guidance supports a "graded approach"
- EOI has developed a program framework that is consistent with NRC and industry guidance and the W3 LB.

Accounting for/Managing Instrument Uncertainties

A.J. Wrape
Director-Engineering, Waterford 3

Entergy

The EOI Approach is designed to meet certain goals...

- Ensure safety
- Ensure regulatory compliance
- Apply sound engineering practices
- Avoid unnecessary operating restrictions

There are multiple parts of the uncertainty equation...

Process Related | Instrument Related

Process Monitoring Effects	+	Sensing Element Transmitter	+	Signal Conditioning	+	End Device Indicator/bistable	=	Total Instrument Uncertainty
•Density effect •Ref leg effect •Piping config •Line pressure loss		•Ref accuracy •Temp effect •Pressure effect •Drift		•Ref accuracy •Temp effect •Pressure effect •Drift		•Ref accuracy •Temp effect •Pressure effect •Drift •Readability		

W3 employs the EOI program for managing Instrument Uncertainty

Design Engineering Administrative Manual (DEAM) No: IC-G-001-02

- Documents EOI philosophy for determining the safety significance of the instrument function and level of rigor for instrument values/ setpoints
- Satisfies NRC requirements
- Graded approach for value/setpoint determinations
  - Rigorous for LSSS and safety significant instrument functions
  - Decreased level of rigor for less safety significant instrument functions
    - 8 categories/bases justifying decreased level of rigor
- EOI agrees that instrument uncertainty must be considered
  - Implicitly and explicitly addressed
  - Qualitative and quantitative methods used
- Remember, many TS values are not set-points

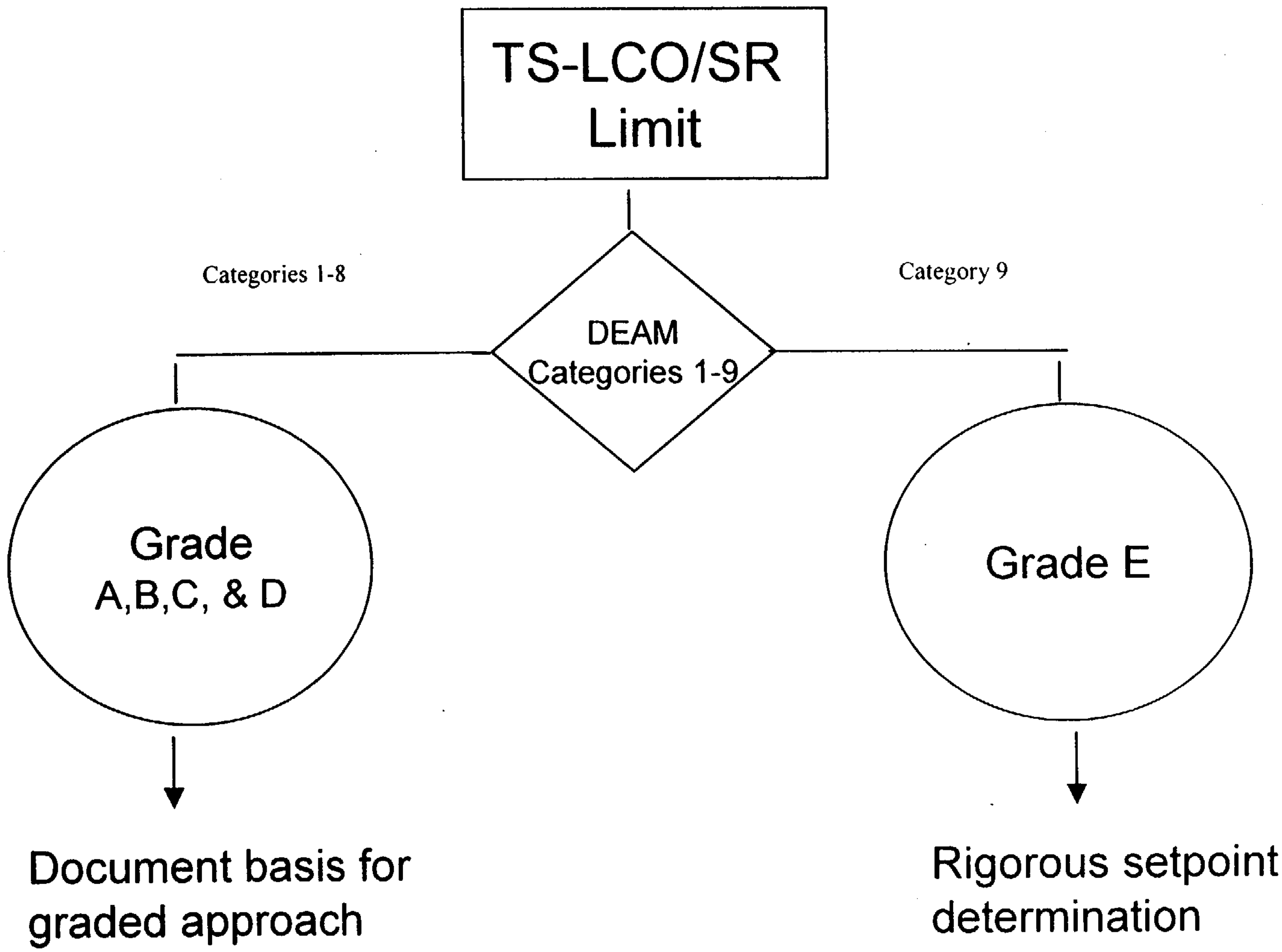
"Margin" is part of the decision-making process

- The safety significance of the instrument function considers the:
  - intended function being protected by the TS-LCO/SR limit
  - relative magnitudes of the "safety margin" and "instrument uncertainty"
- It is important to recognize the distinction between:
  - margin to the regulatory limits (sometimes determined using regulatory judgement)
  - margin to safety limits or the postulated point of failure
- EOI is implementing a program that is consistent with current regulatory philosophy:
  - focus attention where the GREATEST SAFETY BENEFIT is realized.

A Systematic Process Implements the Graded Approach

- Systematic Process
  - convene expert panel
  - apply EOI screening criteria
  - document the basis
- In general:
  - Screening criteria determines the category
  - Category leads to the grade
  - Grade determines the level of rigor of setpoint determination
- In summary, the EOI DEAM was the starting point for a pilot application of the grading process at W3
  - some program details were clarified as part of meeting preparation
  - they are being incorporated into our program

The Process looks like this...



Entergy

Tech Spec Parameters Instrument Uncertainty Screening Checklist

Applicable Technical Specification Section: ____________________

Applicable Technical Specification Subsection: ____________________

Applicable Technical Specification Parameter: ____________________

Check the functional description that best fits the Technical Specification parameter. This list applies only to Technical Specification Sections 3 and 4:

Cat	Parameter Functional Description
1	TS-LCO/SR limit does not meet any of the criteria specified by 10CFR50.36(c)(2)(ii) for TS-LCO/SR limits
2	TS-LCO/SR limit is <u>only</u> used to detect and indicate in the control room a significant degradation of the reactor coolant pressure boundary (criteria 1)
3	TS-LCO/SR limit is not assumed as an initial condition, is not part of the primary success path in any design basis accident or transient analysis fission product barrier, and operating experience/PRA does not show the limit as being risk significant
4	TS-LCO/SR limit is not included in the applicable Improved Technical Specification NUREG
5	TS-LCO/SR limit a) does not utilize an instrument (including M&TE) to perform the surveillance requirement or b) does not have any acceptance criteria which requires measurement c) limit is validated by gross detection means, (pass/fail, open/closed, etc.)
6	TS-LCO/SR has the method of performing the surveillance and acceptance criteria in the TS or associated bases
7	TS-LCO/SR is to verify the rate of change of a parameter
8	TS-LCO/SR limit has sufficient margin to the associated analytical limit to ensure a low probability of instrument uncertainties exceeding the available margin due to: a) Analysis is not sensitive to changes in the parameter monitored by the TS-LCO/SR limit b) The instrument uncertainty is expected to be negligible with respect to the margin available in the associated analyses c) The instrument uncertainty is expected to be negligible with respect to the margin available as a result of the conservative analysis methods
9	None of the criteria listed above is applicable; the TS-LCO/SR limit may be a significant contributor to meeting the acceptance criteria for the safety or design basis accident analyses. A rigorous uncertainty calculation is required. Analysis Limit or accuracy requirement: ____________

Entergy

Definition of Grades

- **Grade A** - Instrument Uncertainty Not Applicable (Category 5)
  - Definition: The TS-LCO/SR does not use an instrument to measure a process variable, does not include a measurable parameter, and the limit is validated by gross detection means.
  - Action: An Expert Panel concurs that no instrument is used for this particular function. Uncertainty is accounted for implicitly in overall safety margin.
  - Examples:
    - valve position status indicator lights
    - requirement for venting and draining a system

Definition of Grades

- **Grade B** - Engineering Judgement, Broad (Categories 1, 4 and 6)
  - Definition: TS-LCO/SR limit does not meet any of the criteria specified in 10 CFR 50.36(c)(2)(ii), is not included in the applicable Improved Standard TS NUREGs, or the method of performing the SR is specified in TS or Bases.
  - Action: An Expert Panel documents the engineering judgement used to assess significance to safety of the instrument function. Uncertainty is accounted for implicitly in overall safety margin.
  - Examples:
    - Required number of instruments for Accident Monitoring Instrumentation
    - Sealed source contamination limits
    - ASME Inservice Testing Requirements

Definition of Grades

- **Grade C** - Engineering Judgement, Variable Change (Categories 2, 3, and 7)
  - Definition: A change or trend is used to detect a significant degradation of the reactor coolant pressure boundary or to ensure that the plant is maintained such that the integrity of the fission product barriers are not challenged.
  - Action: An Expert Panel develops the engineering judgement used to assess significance to safety of the instrument function. Uncertainty is accounted for implicitly in overall safety margin.
  - Examples:
    - Containment atmosphere monitoring channel check
    - Containment sump level and flow monitoring channel check
    - Reactor coolant leakage limits
    - Heatup and Cooldown Rates

Definition of Grades

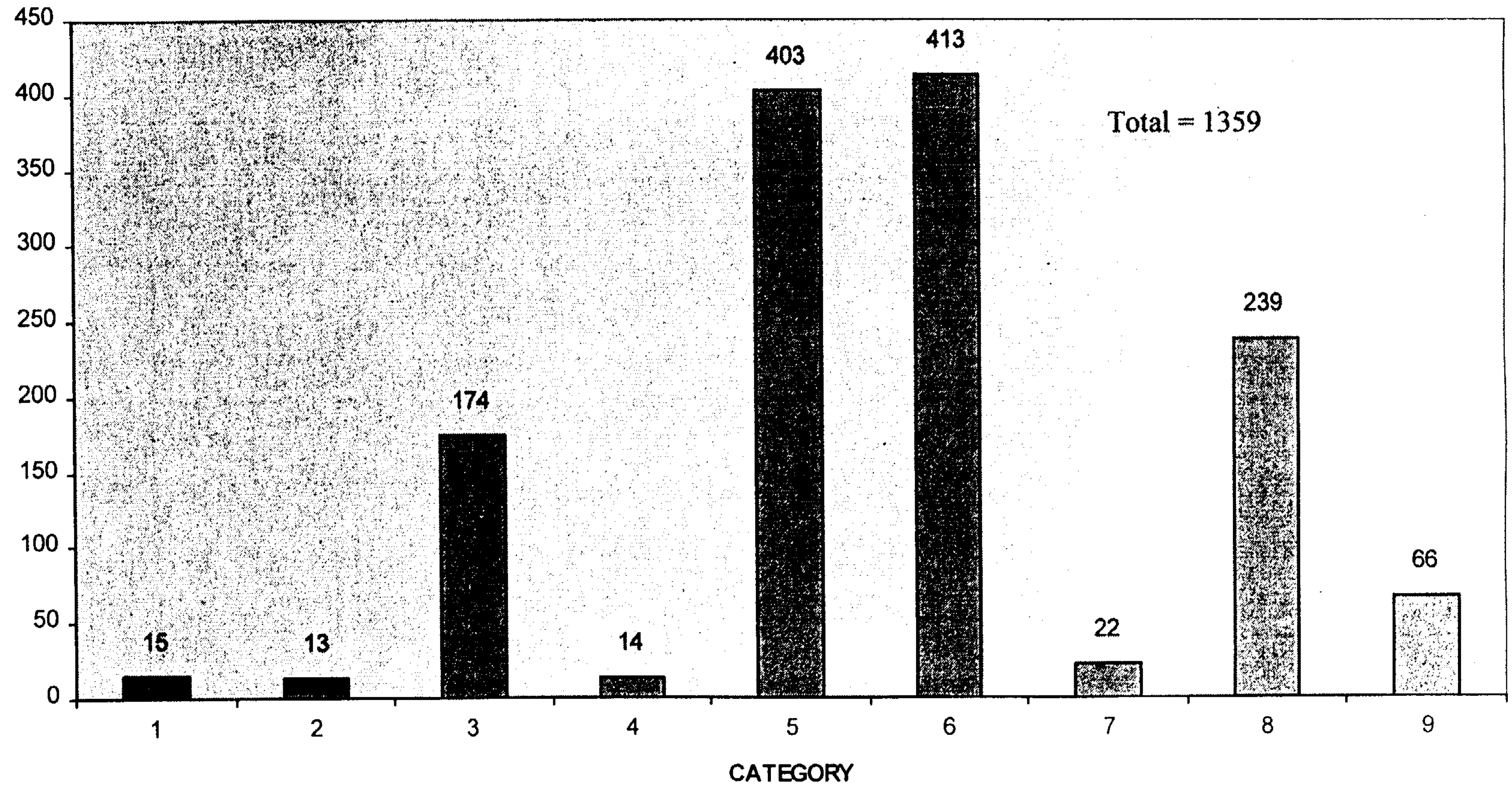
- **Grade D -** Engineering Judgement, with Supplemental Evaluation (Category 8)
  - Definition: TS-LCO/SR limit has sufficient margin to the associated safety limit or to a failure point to ensure a low probability of instrument uncertainties exceeding the available margin.
  - Action: An Expert Panel develops the engineering judgement used to assess significance to safety of the instrument function. Supplemental evaluations are prepared to substantiate the judgement that uncertainty is small when compared to overall margin. Uncertainty is accounted for implicitly in overall safety margin.
  - Examples:
    - HPSI flow > 675 gpm
    - Normal Containment Pressure < 27 in-wg
    - Containment Spray Riser level > 149.5 MSL elevation

Definition of Grades

- **Grade E** - Rigorous Determination (Category 9)
  - Definition: TS-LCO/SR limit may be a significant contributor to meeting the acceptance criteria for the safety or design basis accident analysis.
  - Actions: An Expert Panel develops the engineering judgement used to assess significance to safety of the instrument function. Uncertainty is accounted for explicitly in rigorous setpoint determinations.
  - Examples:
    - LSSS setpoints
    - COLR limits for core power, azimuth power tilt, DNBR margin
    - Toxic gas trip setpoints
    - High linear power level trip setpoints with inop S/G relief valves

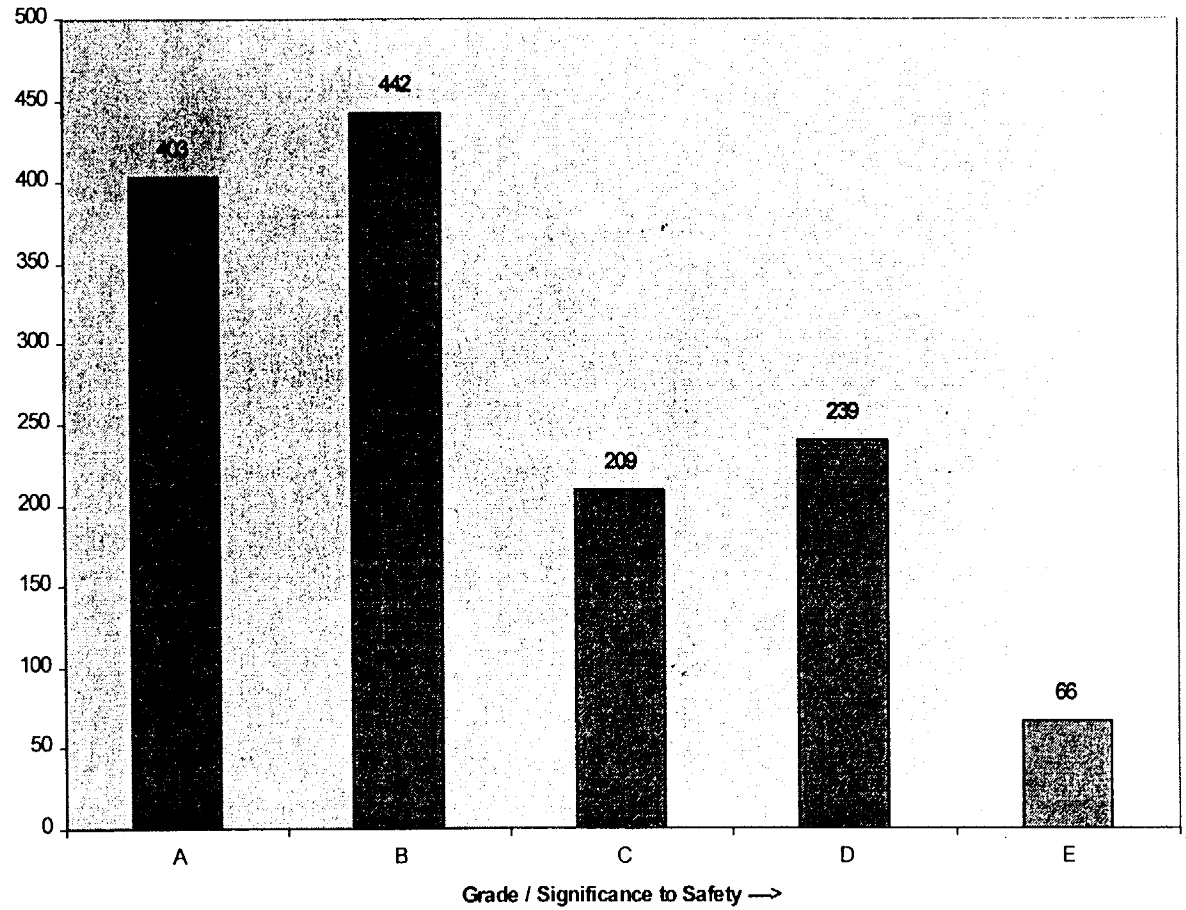
Entergy

TS-LCO Screening Results



Entergy

TS-LCO Grading Results



Entergy

Safety Related Pump IST

- Most recent NRC Staff Letter (dated August 18, 1999) raised this issue.
- EOI position:
  - IST requirements are specified in ASME Section XI
  - IST for safety related pumps is intended to indicate any performance degradation (trend)
  - IST occurs more often than safety function tests
  - ASME Section XI specifies required instrument accuracy
  - Examples:
    - HPSI (18 month function test, quarterly ASME test)
    - ACCW (18 month function test, quarterly ASME test)
    - EFW (18 month function test, quarterly ASME test)
  - IST acceptance criteria consistent with design limits
  - Rigorous application of instrument uncertainty to pump test results is not necessary nor required
  - **Summary**: IST - Category 6 and IU doesn't apply.

Generic Implications

E.P. Perkins

Director, Nuclear Safety Assurance (acting)

Entergy

Generic Implications

- There are wide variations across the industry on how this issue is being addressed.
- Examples of plants dealing with this issue:
  - Palo Verde - APS
  - Limerick - PECO Energy
  - Sequoyah - TVA
  - Cooper - NPPD
  - Crystal River 3 - FPC
  - St. Lucie - FP&L
- Inspection criteria can differ from site to site

Generic Implications

- What are some of our conclusions:
  - Variety of solutions points to a lack of clarity - does this indicate the need for generic resolution?
  - There are significant costs to generate and maintain IU calculations - is there a real safety benefit?
  - Explicit accounting for instrument uncertainty (particularly where the instrument uncertainty was previously accounted for implicitly in the overall safety margin):
  - does not improve safety (already assured in design)
    - expends significant site resources on low safety activities
    - shrinks operating margin and complicates plant operation

Summary and Conclusions

F.W. Titus

Vice-President, Engineering - EOI

Entergy

Summary

- Discussed regulatory requirements
- Discussed technical requirements
- Detailed a graded approach that is based on safety significance of instrument function

Conclusion

- W3 is safe.
- W3 satisfies regulatory requirements on instrument uncertainty
  - Accounts for uncertainties
  - Manages uncertainties and preserves LCO basis
  - Utilizes good engineering judgement
  - Utilizes other standards (ASME) when appropriate
- EOI position is consistent with W3 LB and DB
- W3 and NRC positions on accounting for instrument uncertainty are fundamentally consistent
  - Account for and manage uncertainties to preserve LCO bases

Where do we go from here?

- EOI proposal
  - Instrument uncertainty should be addressed as a generic industry issue
  - EOI would support an industry/NRC Staff partnership to develop a generic resolution
  - EOI would also meet with the Staff separately to resolve any remaining W3 items

Backup Information

Key Licensing Basis Documents (W3) Instrument Uncertainty

Date	Document	Key Provisions
2/17/72	RG 1.22, "Periodic Testing of Protection System Actuation Functions"	Protection system design (as defined in IEEE-279-1971) should permit testing during reactor operation
4/5/72	IEEE-279-1971, "Criteria for Protection Systems for Nuclear Power Generating Stations"	Specifies the requirements for protection system setpoint design basis documentation
3/6/85	NPF-38 issued, Waterford Operating License	Waterford license nor FSAR include commitments to RG 1.105, "Instrument Spans and Setpoints" or IEEE-603-1980, "Criteria for Safety Systems for Nuclear Power Generating Stations"
4/3/89	GL 89-04, "Guidance on Developing Acceptance Inservice Test Programs	Must consider design limits in IST acceptance criteria
7/9/81	NUREG-0787 issued: Waterford license Safety Evaluation Report	Also does not commit to RG 1.153, "Criteria for Power, Instrumentation, and Control Portions of Safety Systems"
12/18/97	NRC EA 98-022, Notice of Violation and Proposed Imposition of Civil Penalty - $110,000 (NRC IR 50-382/97-25) -- And Exercise of Enforcement Discretion	NRC provided that based on the lack of explicit regulatory or industry standards/requirements for the application of instrument uncertainties beyond Technical Specification parameters, the NRC agrees that the apparent violation (4.c) for failing to consider flow uncertainties in the ACCW pump flow test should be withdrawn.

Entergy

Key Regulatory Requirements

10 CFR Part 50

- *Appendix A, Criterion 13, Instrumentation and Control*
  - Requires that instrumentation be provided to monitor variables and systems and that controls be provided to maintain these variables and systems within prescribed ranges.
  - *Appendix A, Criterion 20, Protection System Functions*
  - Requires that the protection system be designed to initiate operation of appropriate systems to ensure that specified acceptable fuel design limits are not exceeded and to sense accident conditions and to initiate the operation of systems and components important to safety.
  - *Appendix A, Criterion 29, Protection Against Anticipated Operational Occurrences*
  - The protection and reactivity control systems shall be designated to assure an extremely high probability of accomplishing their safety functions in the event of anticipated operational occurrences

Key Regulatory Requirements

<u>10 CFR Part 50 (cont)</u>

- *10 C.F.R. § 50.36(c)(1)(ii)(A)*
  - Requires that, where a limiting safety system setting (LSSS) is specified for a variable on which a safety limit has been placed, the setting be so chosen that automatic protective action will correct the abnormal situation before a safety limit is exceeded.

- *10 C.F.R. § 50.36(c)(2)(i)*
  - Requires a shutdown when a limiting condition for operation (LCO), which is the lowest functional capability or performance levels of equipment required for safe operation of the facility, is not met.

Related Regulatory Requirements

10 CFR Part 50 (cont)

- *10 C.F.R. § 50.36(c)(2)(ii)*

Criterion 1 - Installed instrumentation that is used to detect and indicate in the control room, a significant abnormal degradation of the reactor coolant pressure boundary

Criterion 2 - A process variable, design feature, or operating restriction that is an initial condition of a design basis accident or transient analysis that either assumes the failure of or presents a challenge to the integrity of a fission product barrier

Criterion 3 - A structure, system, or component that is part of the primary success path and which functions or actuates to mitigate a design basis accident or transient that either assumes the failure or or presents a challenge to the integrity of a fission product barrier.

Criterion 4 - A structure, system, or component which operating experience or probabilistic risk assessment has shown to be significant to public health and safety.

Related Regulatory Requirements

10 CFR Part 50 (cont)

- *10 C.F.R. § 50.36(c)(3)*
  - States that surveillance requirements must assure that the facility operation will be within safety limits and that LCOs will be met.

- *10 C.F.R. § 50.46(a)(3)(i)*
  - Requires, in part, each licensee estimate the effect of any change to, or error in, an acceptable ECCS evaluation model or in the application of a model to determine if the change, or error, is significant.
  - A significant change or error is one that results in a calculated peak fuel cladding temperature difference of more than 50° F from the temperature calculated for the limiting transient, or is an accumulation of changes and error that the sum of the absolute magnitudes of the respective temperature changes is greater than 50° F.

Related Regulatory Requirements

10 CFR 50 Appendix K

- Significant conservatisms acknowledged by AEC
  - Stored Heat
    - The assumption that the reactor has been operating continuously at a power level at least 1.02 times the licensed power level "represents at least an assumption that an accident happens at a time which is not typical."
    - Blowdown
    - "There is evidence that more stored heat would be removed than calculated." It is "probable that this represents a conservatism of several hundred degrees F in stored energy after blowdown"
    - Rate of Heat Generation
    - 20% greater than [proposed] ANS standard, "with a conservatism that is probably in the range of 5 to 15%"
  - Peak Temperature
    - Peak cladding temperature of 2200° F applied to hottest region of the hottest fuel rod provides "a substantial degree of conservatism"

Key Regulatory Guidance

- *NUREG-0800:BTP HICB-12, "Guidance on Establishing and Maintaining Instrument Setpoints"*
  - Addresses use of "discrete" setpoint establishment method
  - Acknowledges that ISA-S67.04, Section 4, Part 1, allows application of a less rigorous setpoint determination based on the safety significance of the instrument function
  - States that "the grading technique chosen by the applicant/licensee should be consistent with the standard and *should consider* all known applicable uncertainties regardless of setpoint application"

- *Reg. Guide 1.153, "Criteria for Power, Instrumentation, and Control Portions of Safety Systems"*
  - Endorses IEEE Std. 603-1991 as providing a method acceptable with respect to the design, reliability, qualification, and testability of power, instrument and control portions of safety systems
  - Provides source of "graded approach" to handling instrument uncertainties referred to in BTP HICB-12

Entergy

Key Regulatory Guidance

- *ISA-67-04, "Parts I and II, "Setpoints for Nuclear Safety-Related Instrumentation Used In Nuclear Power Plants"*
  - Because safety significance of various types of setpoints important to safety may differ, may apply less rigorous setpoint determination method for certain functional units and LCOs
  - Grading technique should be consistent with ISA and BTP standards
  - Grading technique should consider all known applicable uncertainties regardless of setpoint application
  - Graded approach also appropriate for non-safety system instrumentation maintaining design limits in TS

Key Regulatory Guidance

- *NUREG-0138*
  - November 1976
  - Acknowledges two methods for analysis
    - Generalized method in which uncertainties were implicit in the overall safety margin
    - Discrete method in which the uncertainties were explicitly quantified
  - Both methods determined to be acceptable and to contain conservatism
  - Adequate safety margins are provided by protection system trip setpoints in use at that time

- *Reg. Guide 1.105*
  - Endorses ISA-S67.04 as providing acceptable requirements for ensuring that instrument setpoints in safety related systems are initially within and remain within Technical Specification limits.

Regulatory Guidance Is Consistent With EOI Instrument Uncertainty Methodology

Date	Document	Key Provisions
11/76	NUREG-0138, Staff Technical Discussions of 15 Technical Issues	Two methods for accounting for instrumentation error, both conservative
11/76	RG 1.105, Rev. 1, "Instrument Setpoints"	Issued – not part of W3 licensing basis (see below)
3/13/80	IEEE-603-1980, "Criteria for Safety Systems for Nuclear Power Generating Stations"	Issued – not part of W3 licensing basis (see below)
12/85	RG 1.153, "Criteria for Power, Instrumentation, and Control Portions of Safety Systems"	Issued – not part of W3 licensing basis (see below)
4/95	NUREG 1482, "Guidelines for Inservice Testing at Nuclear Power Plants, Section 5.5, Pump Flow Rate and Differential Pressure Instruments"	Not required to consider process measurement effects in determining flow rate instrument accuracy for ASME XI testing
8/98	BTP HICB-12, "Guidance for Establishing and Maintaining Instrument Setpoints"	States 95/95 is typical acceptance criteria for setpoints and provides guidelines for graded approach in level of rigor for setpoint determination based on safety significance of instrument function

Entergy