50-237 CEC DRESDEN 2

REQUEST FOR TECH SPEC CHANGES RE
CONVERSTION TO IMPROVED
STANDARD TECH SPECS

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THE RULES

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ATTACHMENT 1

ComEd Boiling Water Reactor (BWR) Improved Technical Specifications (ITS) Submittal Synopsis

The ComEd BWR ITS submittal consists of three enclosures for the Dresden Nuclear Power Station, Units 2 and 3, LaSalle County Station, Units 1 and 2, and the Quad Cities Nuclear Power Station, Units 1 and 2, ITS conversion. Enclosures A and C consist of 12 volumes each for the Dresden Nuclear Power Station, Units 2 and 3, and the Quad Cities, Units 1 and 2, ITS Conversion Documents, respectively. Enclosure B consists of 13 volumes for the LaSalle County Station, Units 1 and 2, ITS Conversion Document. This attachment describes each component of the ComEd BWR ITS submittal, and their organization within each volume. This attachment is designed to facilitate distribution of each ComEd BWR ITS section within the NRC and to familiarize reviewers with the content and organization of each section. A description of each volume included in the ComEd BWR ITS submittal follows.

Volume 1 of each Enclosure

Volume 1 contains the plant specific Split Report which includes the Application of the Technical Specification Selection Criteria. This document lists each of the plant specific Current Technical Specifications (CTS) and shows the results of the application of the 10CFR50.36, "Technical specifications," criteria for retention of requirements in Technical Specifications. For each of the plant specific CTS, this document identifies whether or not the requirement is retained in the ITS, and the basis for its retention or exclusion. For those CTS items that did not meet the selection criteria and have not been retained in the proposed ITS, a detailed explanation of the application of the selection criteria and justification for relocation is provided.

Volumes 1 through 11 of each Enclosure

Volumes 1 through 11 contain the plant specific ITS and associated supporting documentation for the proposed TS changes. The volumes are ordered on a Chapter/Section basis, as follows, to facilitate distribution to NRC reviewers:

Volume 1:	Plant Specific Split Report (as described above)		
	Plant Specific ITS Chapter	1.0,	Use and Application
	Chapter	2.0,	Safety Limits
	Section	3.0,	Limiting Condition for Operation Applicability and Surveillance Requirement Applicability
Volume 2:	Plant Specific ITS Sections	3.1,	Reactivity Control Systems
		3.2,	Power Distribution Limits
Volumes 3 and 4:	Plant Specific ITS Section	3.3,	Instrumentation

Volume 5:	Plant Specific ITS Sections	3.4,	Reactor Coolant System
		3.5,	Emergency Core Cooling Systems and Reactor Core Isolation Cooling System (Emergency Core Cooling Systems and Isolation Condenser System, Dresden only)
Volumes 6 and 7:	Plant Specific ITS Section	3.6,	Containment Systems
Volume 8:	Plant Specific ITS Section	3.7,	Plant Systems
Volume 9:	Plant Specific ITS Section	3.8,	Electrical Systems
Volume 10:	Plant Specific ITS Sections	3.9,	Refueling Operations
		3.10,	Special Operations
Volume 11:	Plant Specific ITS Chapter	4.0,	Design Features
	Chapter	5.0,	Administrative Controls

Each volume contains, as appropriate, the plant specific ITS Specifications and Bases, a markup of the CTS, a discussion of changes to the CTS, the No Significant Hazards Considerations for each of the changes to the CTS, and markup of NUREG-1433, Revision 1, "Standard Technical Specifications for General Electric Plants, BWR 4," or NUREG-1434, Revision 1, "Standard Technical Specifications for General Electric Plants, BWR 6," as applicable, to indicate the plant specific ITS and justifications for deviations from the applicable NUREGs. Each Chapter/Section in a volume or volumes is organized as follows.

Tab: ITS

This tab contains the proposed plant specific ITS

Tab: Bases

This tab contains the proposed plant specific ITS Bases, as applicable.

Tab: CTS Markups/DOCs

This tab contains a copy of the CTS pages annotated to provide a cross-reference to the equivalent ITS requirements, showing the disposition of the existing requirements into the plant specific ITS.

The annotated copy of the CTS pages is marked with sequentially numbered "boxes" which provide a cross-reference to a Discussion of Change (DOC) between the CTS and the plant specific ITS. The ITS number is noted on the top right corner of each CTS page, identifying the ITS Limiting Condition for Operation (LCO) where the CTS requirement is located. Items on the CTS page that are located in one or more ITS locations or sections have the appropriate location(s) noted adjacent to the items. When the ITS requirement differs from the CTS requirement, the CTS being revised is annotated with an alpha-numeric designator. This designator relates to the appropriate DOC. Each DOC provides a justification for the proposed change. The DOC for each ITS section immediately follows the marked up CTS pages. The alpha-numeric designator also relates the proposed change to the applicable No Significant Hazards Consideration (NSHC).

The alpha-numeric designator is based on the category of the change and a sequential number within that category. The changes to the CTS are categorized as follows.

A ADMINISTRATIVE - associated with restructuring, interpretation, and complex rearranging of requirements, and other changes not substantially revising an existing requirement. There is a single NSHC for this category.

M TECHNICAL CHANGES - MORE RESTRICTIVE - changes to the CTS being proposed in converting to the ITS, resulting in added restrictions or eliminating flexibility. There is a single NSHC for this category.

L TECHNICAL CHANGES - LESS RESTRICTIVE - changes where requirements are relaxed, relocated, eliminated, or new flexibility is provided. There are two groups of changes - "Generic" and "Specific" in this category. Each "Specific" LESS RESTRICTIVE change has a corresponding unique NSHC. The "Generic" LESS RESTRICTIVE changes are subdivided into six subcategories, each of which is identified uniquely as either an LA, LB, LC, LD, LE, or LF change. Each subcategory of "Generic" LESS RESTRICTIVE change is justified by a single NSHC. The subcategories and their designation are as follows:

The "LA" changes consist of relocation of details out of the CTS and into the Bases, Updated Final Safety Analysis Report, Quality Assurance Topical Report, or other plant controlled documents. Typically, this involves details of system design and function or procedural details on methods of conducting a surveillance.

The "LB" changes are related to the extension of an instrument Completion Time or Surveillance Frequency in accordance with NRC approved vendor topical reports.

The "LC" changes reflect elimination of various instrumentation requirements, where the instrument is an alarm or an indication-only instrument function that does not otherwise meet the NRC TS selection criteria.

The "LD" changes reflect extension of the refueling outage surveillance interval from 18 months to 24 months for surveillances other than Channel Calibrations.

The "LE" changes reflect extension of the refueling outage surveillance interval from 18 months to 24 months for Channel Calibration surveillances.

The "LF" changes reflect revisions to Allowable Values for instrumentation functions.

R RELOCATED - specific requirements that do not meet the NRC TS selection criteria. These items are being relocated to other plant documents as part of the conversion to ITS. There is a single NSHC for this category.

Tab: ISTS/JFDs

This tab contains a copy of NUREG-1433, Revision 1, or NUREG-1434, Revision 1, as applicable, Improved Standard Technical Specifications (ISTS) which have been annotated to indicate deviations between the applicable NUREGs, as modified by generic changes approved through November 11, 1999, and the proposed plant specific ITS. Justifications for each of the deviations (i.e., Justification for Deviation (JFD)) are provided with the individual ITS Chapters/Sections. The annotated copy of NUREG-1433, Revision 1, or NUREG-1434, Revision 1, as applicable, and the discussion of the deviations are cross-referenced by "boxes" which are numbered sequentially for each Chapter/Section.

Each line item in the annotated copy of the applicable NUREG-1433, Revision 1, or NUREG-1434, Revision 1, Technical Specifications contains a cross-reference to the equivalent CTS requirement and/or discussion of change, as appropriate. This cross-reference is intended to provide reviewers with a quick reference to the equivalent CTS section.

Tab: ISTS Bases/JFDs

This tab contains a copy of the applicable NUREG-1433, Revision 1, or NUREG-1434, Revision 1, Technical Specifications Bases which have been annotated to indicate deviations between the NUREG Bases, as modified by generic changes approved through November 11, 1999, and the proposed plant specific ITS Bases. Justifications for the deviations are provided with the individual ITS Chapters/Sections. The annotated copy of NUREG-1433, Revision 1, or NUREG-1434, Revision 1, as applicable, and the discussion of the deviations are cross-referenced by "boxes" which are numbered sequentially for each Chapter/Section.

Tab: NSHC & EA

This tab contains our evaluation performed using the criteria in 10 CFR 50.91(a)(1) and provides information supporting a finding of no significant hazards consideration (NSHC) using the standards in 10 CFR 50.92(c) for the proposed changes associated with the corresponding ITS section. The NSHCs are categorized as Administrative, Relocated, More Restrictive, Less Restrictive - Generic, and Less Restrictive - Specific, and are identified by an alpha-numeric designator relating the marked-up CTS and DOC to the applicable NSHC. Each Chapter/Section also includes information supporting an Environmental Assessment (EA).

<u>Volume 12 of each Enclosure and Volume 13 for LaSalle only</u>: CTS markup in CTS order.

These volumes contain a copy of all the CTS pages that have been marked up in Volumes 1 through 11. The CTS pages are organized in CTS order. Multiple copies of certain pages of the CTS appear in these volumes since these same pages appear more than once in Volumes 1 through 11. Multiple copies of the same CTS pages are further organized in ITS order. The contents of this volume demonstrate that all aspects of the CTS have been addressed in the proposed amendment requests.

ATTACHMENT 2

ComEd Boiling Water Reactor (BWR) Improved Technical Specifications (ITS) Conversion Document Status

The lists below identify Current Technical Specifications (CTS) changes that are pending approval from the NRC which have been included in the plant specific ITS Conversion Documents.

Dresden Nuclear Power Station, Units 2 and 3

1. Instrumentation Allowed Outage Time/Surveillance Test Interval Extensions
2. Condensate Storage Tank Level Switches
3. Elimination of 900 lb Electro-Hydraulic Control Reactor Protection System (RPS) Scram
4. Pressure/Temperature Limit Curves
5. Target Rock Safety/Relief Valve
6. Minimum Critical Power Ratio Safety Limit (Unit 2 only)
7. Minimum Suppression Chamber Water Level

LaSalle County Station, Units 1 and 2

1. Pressure/Temperature Limit Curves
2. Minimum Critical Power Ratio Safety Limit (Unit 2 only)

Quad Cities Nuclear Power Station, Units 1 and 2

1. Instrumentation Allowed Outage Time/Surveillance Test Interval Extensions
2. Elimination of Main Steam Line Radiation Monitor RPS Scram and Primary Containment Isolation

The lists below identify Current Technical Specifications (CTS) changes that are pending approval from the NRC or are scheduled for submittal after March 3, 2000, which will be (or in the case of the Diesel Generator Voltage Tolerance Changes have already been incorporated) in the plant specific ITS Conversion Documents during the NRC review process.

Dresden Nuclear Power Station, Units 2 and 3

1. Reactor Coolant System Specific Activity - Expected to be submitted by August 2000
2. Degraded Voltage Setting (Unit 2 only) - Expected to be submitted by August 2000
3. Mechanical Vacuum Pump Trip Instrumentation - Expected to be submitted by August 2000
4. Diesel Generator Voltage Tolerance Change - Expected to be submitted by August 2000

LaSalle County Station, Units 1 and 2

1. Core Alterations License Condition Change - Expected to be submitted by March 2000
2. Oscillation Power Range Monitor Scram Function - Expected to be submitted by October 2000
3. Diesel Generator Allowed Outage Time Extension - Expected to be submitted by October 2000
4. Power Uprate - Pending NRC Approval

Quad Cities Nuclear Power Station, Units 1 and 2

1. Reactor Coolant System Specific Activity - Expected to be submitted by August 2000
2. Diesel Generator Cooling Water System Allowed Outage Time Extension - Expected to be submitted by August 2000
3. Diesel Generator Voltage Tolerance Change - Expected to be submitted by August 2000

In addition, at LaSalle County Station, Technical Specifications Amendments Nos.133 and 118 were issued to reduce the number of required safety/relief valves. An outage is required to remove five of the currently installed safety/relief valves on each unit to allow implementation of these amendments. For Unit 2, the removal of these safety/relief valves will be performed during an outage which will occur prior to implementation of the ITS. For Unit 1, the removal of these safety/relief valves will be performed during an outage which will occur after implementation of the ITS. Therefore, the LaSalle County Station, Unit 1 and 2, ITS Conversion Document has incorporated the Unit 2 Amendment No. 118. Unit 1 Amendment No. 133 will be incorporated in the LaSalle County Station ITS after completion of the removal of the Unit 1 safety/relief valves. The removal of the Unit 1 safety/relief valves will occur prior to startup for LaSalle County Station, Unit 1, Cycle 10.

ATTACHMENT 3

Improved Technical Specifications (ITS) Deviations from the Dresden Nuclear Power Station, Units 2 and 3, LaSalle County Station, Units 1 and 2, and Quad Cities Nuclear Power Station, Units 1 and 2, Current Technical Specifications (CTS) and NUREG-1433, Rev. 1, or NUREG-1434, Rev. 1, as applicable

This attachment provides a list of the plant specific ITS changes which represent deviations from both NUREG-1433, Revision 1, "Standard Technical Specifications for General Electric Plants, BWR 4," and NUREG-1434, Revision 1, "Standard Technical Specifications for General Electric Plants, BWR 6," as applicable, and the CTS.

Dresden Nuclear Power Station, Units 2 and 3

- Surveillance frequencies are extended from 18 to 24 months per NRC Generic Letter 91-04, "Changes in Technical Specification Surveillance Intervals to Accommodate a 24 Month Fuel Cycle"

ITS 3.1.7, DOC LD.1	ITS 3.3.6.1, DOC LD.1	ITS 3.6.1.7, DOC LD.1
ITS 3.1.8, DOC LD.1	ITS 3.3.6.1, DOC LE.1	ITS 3.6.1.8, DOC LD.1
ITS 3.3.1.1, DOC LD.1	ITS 3.3.6.2, DOC LD.1	ITS 3.6.4.1, DOC LD.1
ITS 3.3.1.1, DOC LD.2	ITS 3.3.6.2, DOC LE.1	ITS 3.6.4.2, DOC LD.1
ITS 3.3.1.1, DOC LE.1	ITS 3.3.6.3, DOC LD.1	ITS 3.6.4.3, DOC LD.1
ITS 3.3.1.2, DOC LE.1	ITS 3.3.6.3, DOC LE.1	ITS 3.7.2, DOC LD.1
ITS 3.3.2.2, DOC LD.1	ITS 3.3.8.1, DOC LD.1	ITS 3.7.4, DOC LD.1
ITS 3.3.2.2, DOC LE.1	ITS 3.3.8.1, DOC LE.1	ITS 3.7.5, DOC LD.1
ITS 3.3.3.1, DOC LD.1	ITS 3.3.8.2, DOC LD.1	ITS 3.8.1, DOC LD.1
ITS 3.3.3.1, DOC LE.1	ITS 3.3.8.2, DOC LE.1	ITS 3.8.4, DOC LD.1
ITS 3.3.4.1, DOC LD.1	ITS 3.5.1, DOC LD.1	ITS 5.5, DOC LD.1
ITS 3.3.4.1, DOC LE.1	ITS 3.5.2, DOC LD.1	ITS 5.5, DOC LD.2
ITS 3.3.5.1, DOC LD.1	ITS 3.5.3, DOC LD.1	ITS 5.5, DOC LD.3
ITS 3.3.5.1, DOC LE.1	ITS 3.6.1.1, DOC LD.1	
ITS 3.3.5.2 , DOC LD.1	ITS 3.6.1.3, DOC LD.1	

- Allowable Values/Trip Setpoints revised using ComEd Setpoint Methodology

ITS 3.3.1.1, DOC LF.1	ITS 3.3.5.1, DOC LF.1	ITS 3.3.6.3, DOC LF.1
ITS 3.3.2.1, DOC LF.1	ITS 3.3.5.2, DOC LF.1	ITS 3.3.8.1, DOC LF.1
ITS 3.3.2.2, DOC LF.1	ITS 3.3.6.1, DOC LF.1	ITS 3.3.8.2, DOC LF.1
ITS 3.3.4.1, DOC LF.1	ITS 3.3.6.2, DOC LF.1	

- Allowing the feedwater pump to be removed from service in lieu of shutting down the unit to < 25% RTP when a feedwater and main turbine high water level channel is inoperable and untripped. This is a generic change that has not been approved yet. (ITS 3.3.2.2, DOC L.2)

Dresden Nuclear Power Station, Units 2 and 3 (continued)

- A Note is added to ITS 3.3.3.1 to allow 6 hours to perform Surveillance testing of the Post Accident Monitoring instrumentation channels prior to entering TS Actions. The CTS does not have this allowance. This allowance has been approved at WNP-2. (ITS 3.3.3.1, DOC L.2)

- Eight additional Functions have been added to ITS 3.3.5.1 for Core Spray Pump Start-Time Delay Relays and Low Pressure Coolant Injection (LPCI) Loop Select Logic. (ITS 3.3.5.1, DOC M.1)

- The Applicability of the Reactor Building Ventilation High Radiation and Refuel Floor High Radiation Instrumentation Functions for Secondary Containment Isolation is revised to be required during CORE ALTERATIONS and not just during movement of irradiated fuel in the Secondary Containment. (ITS 3.3.6.2, DOC M.1)

- The Applicability of the Reactor Building Ventilation High Radiation and Refuel Floor High Radiation Instrumentation Functions for Secondary Containment Isolation is revised to be required during Operations with a Potential for Draining the Reactor Vessel (OPDRV's) and not just during movement of irradiated fuel in the Secondary Containment. (ITS 3.3.6.2, DOC M.2)

- Control Room Emergency Ventilation System Instrumentation requirements are added to support actions required to place the Control Room Emergency Ventilation System in operation when required. (ITS 3.3.7.1, DOC M.1)

- The Applicability of the Reactor Protection System Electric Power Monitoring requirements is revised to remove Modes 3 and 4. (ITS 3.3.8.2, DOC L.1)

- CTS requires tripping one recirculation pump when speed mismatch is not within limits. ITS 3.4.1 will not require the recirculation pump to be tripped, but will require a recirculation pump to be declared "not in operation" with the appropriate TS Actions being taken. (ITS 3.4.1, DOC L.2)

- Changing the CTS Frequency for monitoring the primary containment sump flow rate from 8 hours to 12 hours. The ISTS require this Surveillance to be performed every 8 hours. This change is essentially consistent with Generic Letter 88-01, Supplement 1, "NRC Position on Intergranular Stress Corrosion Cracking (IGSCC) in BWR Austenitic Stainless Steel Piping," which requires the Surveillance once per shift, not to exceed 12 hours. Surveillance Requirement (SR) 3.0.2 will limit the extensions past 12 hours. This has been approved at Edwin I. Hatch Plant and WNP-2. (ITS 3.4.4, DOC L.1)

- The Primary Containment Atmospheric Radioactivity Sampling System at Dresden does not meet any of the criteria in 10 CFR 50.36(c)(2)(ii) and is to be relocated from the Technical Specifications. (ITS 3.4.5, DOC R.1)

- The number of Automatic Depressurization System valves required to be operable in ITS 3.5.1 is being reduced from 5 to 4. (ITS 3.5.1, DOC L.1)

Dresden Nuclear Power Station, Units 2 and 3 (continued)

- ITS 3.5.1 describes the LPCI System as two LPCI subsystems. CTS allows 7 days for the LPCI System to be inoperable but ITS only allows 72 hours if both LPCI subsystems are inoperable. (ITS 3.5.1, DOC M.1)

- Surveillances are added to ITS 3.5.1 to verify correct breaker alignment to the LPCI swing bus every 31 days and to verify automatic transfer of LPCI swing bus power supply every 24 months. (ITS 3.5.1, DOC M.2)

- The available amount of water in the Contaminated Condensate Storage Tank for the low pressure Emergency Core Cooling System pumps is decreased from 140,000 gallons to 50,000 gallons. (ITS 3.5.2, DOC L.5)

- CTS requires entry into Specification 3.0.C (ITS LCO 3.0.3) if total leakage between Drywell and Suppression Chamber exceeds the TS limit. ITS 3.6.1.1 allows one hour to restore leakage to within required limits or shutdown. No ITS LCO 3.0.3 entry is required. Also, the limits for the Drywell-to-Suppression Chamber Leakrate are changed. (ITS 3.6.1.1, DOC L.3)

- The CTS requirement that each excess flow check valve (EFCV) must check flow has been changed in ITS 3.6.1.1 to require the EFCVs to actuate to their isolation position. (ITS 3.6.1.3, DOC L.7)

- An additional Surveillance requirement has been provided in ITS 3.6.1.3 to verify the 18 inch vent and purge valves are closed every 31 days. (ITS 3.6.1.3, DOC M.2)

- A requirement is added for the opposite unit diesel generator cooling water pump to be operable to support the opposite unit diesel generator. (ITS 3.7.2, DOC M.1)

- A new Specification is added which requires the Main Turbine Bypass System to be operable. Testing is provided which will require a full stroke of each main turbine bypass valve on a quarterly basis and will also require a Main Turbine Bypass System Response Time Test every 24 months. (ITS 3.7.7, DOC M.1)

- The spent fuel pool water level requirement in ITS 3.7.8 is increased to 19 feet. (ITS 3.7.8, DOC M.1)

- The CTS full load testing requirement to maintain diesel generator load between 95% - 100% for two hours is being relaxed slightly to maintain diesel generator load between 90% - 100% for two hours. (ITS 3.8.1, DOC L.12)

- Two additional requirements are provided requiring the operability of a qualified offsite circuit available from the other unit and the opposite unit diesel generator. A Note has been added to allow a unit to change Modes if the opposite unit diesel generator is inoperable. (ITS 3.8.1, DOC M.1)

- A limitation on power factor is added to CTS for the 24-hour diesel generator run. ISTS SR 3.8.1.14 is revised to place the specific power factor in the Bases. (ITS 3.8.1, DOC M.4)

Dresden Nuclear Power Station, Units 2 and 3 (continued)

- ITS 3.8.6 allows a temporary electrolyte level increase during and following an equalize charge. (ITS 3.8.6, DOC L.4)

- ITS 3.8.7 will require the opposite unit's electrical power distribution subsystem capable of supporting Standby Gas Treatment and Control Room Emergency Ventilation Systems to be operable. (ITS 3.8.7, DOC M.3)

- The Reactor Water Cleanup and Shutdown Cooling Systems are being added to the list of systems in ITS 5.5, Reactor Coolant Sources Outside Primary Containment. (ITS 5.5, DOC M.1)

LaSalle County Station, Units 1 and 2

- Surveillance frequencies are extended from 18 to 24 months per NRC Generic Letter 91-04

ITS 3.1.7, DOC LD.1	ITS 3.3.5.2, DOC LD.1	ITS 3.6.1.3, DOC LD.1
ITS 3.1.8, DOC LD.1	ITS 3.3.5.2, DOC LE.1	ITS 3.6.1.6, DOC LD.1
ITS 3.3.1.1, DOC LD.1	ITS 3.3.6.1, DOC LD.1	ITS 3.6.3.1, DOC LD.1
ITS 3.3.1.1, DOC LD.2	ITS 3.3.6.1, DOC LE.1	ITS 3.6.4.1, DOC LD.1
ITS 3.3.1.1, DOC LE.1	ITS 3.3.6.2, DOC LD.1	ITS 3.6.4.2, DOC LD.1
ITS 3.3.1.2, DOC LE.1	ITS 3.3.6.2, DOC LE.1	ITS 3.6.4.3, DOC LD.1
ITS 3.3.2.2, DOC LD.1	ITS 3.3.7.1, DOC LD.1	ITS 3.7.1, DOC LD.1
ITS 3.3.2.2, DOC LE.1	ITS 3.3.7.1, DOC LE.1	ITS 3.7.3, DOC LD.1
ITS 3.3.3.1, DOC LD.1	ITS 3.3.8.1, DOC LD.1	ITS 3.7.4, DOC LD.1
ITS 3.3.3.1, DOC LE.1	ITS 3.3.8.1, DOC LE.1	ITS 3.7.7, DOC LD.1
ITS 3.3.3.2, DOC LD.1	ITS 3.3.8.2, DOC LD.1	ITS 3.8.1, DOC LD.1
ITS 3.3.3.2, DOC LE.1	ITS 3.3.8.2, DOC LE.1	ITS 3.8.4, DOC LD.1
ITS 3.3.4.1, DOC LD.1	ITS 3.4.2, DOC LD.1	ITS 5.5, DOC LD.1
ITS 3.3.4.1, DOC LE.1	ITS 3.4.7, DOC LE.1	ITS 5.5, DOC LD.2
ITS 3.3.4.2, DOC LD.1	ITS 3.5.1, DOC LD.1	ITS 5.5, DOC LD.3
ITS 3.3.4.2, DOC LE.1	ITS 3.5.2, DOC LD.1	
ITS 3.3.5.1, DOC LD.1	ITS 3.5.3, DOC LD.1	
ITS 3.3.5.1, DOC LE.1	ITS 3.6.1.1, DOC LD.1	

- Allowable Values/Trip Setpoints revised using ComEd Setpoint Methodology

ITS 3.3.1.1, DOC LF.1	ITS 3.3.4.2, DOC LF.1	ITS 3.3.6.2, DOC LF.1
ITS 3.3.2.1, DOC LF.1	ITS 3.3.5.1, DOC LF.1	ITS 3.3.7.1, DOC LF.1
ITS 3.3.2.2, DOC LF.1	ITS 3.3.5.2, DOC LF.1	ITS 3.3.8.1, DOC LF.1
ITS 3.3.4.1, DOC LF.1	ITS 3.3.6.1, DOC LF.1	ITS 3.3.8.2, DOC LF.1

- The minimum Standby Liquid Control System suction piping temperature is increased from the CTS value of 60 °F to 68 °F. (ITS 3.1.7, DOC M.1)

- The Rod Block Monitor (RBM) operability requirements are expanded to clarify requirements for verification of RBM automatic enabling points. (ITS 3.3.2.1, DOC M.4)

- Allowing the feedwater pump to be removed from service in lieu of shutting down the unit to < 25% RTP when a feedwater and main turbine high water level channel is inoperable and untripped. This is a generic change that has not been approved yet. (ITS 3.3.2.2, DOC L.2)

- The Channel Calibration Surveillance Frequency for the Containment Oxygen Concentration Monitor is revised from 18 months to 92 days. (ITS 3.3.3.1, DOC M.5)

- A Note is added to ITS 3.3.3.1 to allow 6 hours to perform Surveillance testing of the Post Accident Monitoring instrumentation channels prior to entering TS Actions. The CTS does not have this allowance. This allowance has been approved at WNP-2. (ITS 3.3.3.1, DOC L.2)

LaSalle County Station, Units 1 and 2 (continued)

- Automatic Depressurization System Actuation Instrumentation operability was required above 122 psig in CTS, and has been revised in ITS to above150 psig. (ITS 3.3.5.1, DOC L.2)

- The default actions requiring entry into CTS 3.0.3 are made more restrictive by requiring the reactor mode switch to be immediately placed in the shutdown position. The requirement does not exist in ISTS. (ITS 3.4.1, DOC M.3)

- CTS 3.4.1.5.b requires the THERMAL POWER to be in Region III of TS Figure 3.4.1.5-1. However, there is no Surveillance Requirement that verifies this requirement on a periodic basis. ITS SR 3.4.1.2 has been added to verify operation is in Region III of ITS Figure 3.4.1-1 every 24 hours. This will ensure that entry into a region where potential instabilities can occur will not go undetected. (ITS 3.4.1, DOC M.4)

- In the event no recirculation loops are in operation, the time required to shutdown is relaxed from 6 hours to 12 hours. (ITS 3.4.1, DOC L.2)

- The restriction on the use of the CTS allowance to substitute Safety/Relief Valves is extended from until the next refueling outage to indefinitely. This is a generic change that has not been approved yet. (ITS 3.4.4, DOC L.3)

- The CTS requirement to determine the source of Reactor Coolant System (RCS) leakage and ISTS requirement to determine if RCS leakage is from "service sensitive material" are modified in ITS 3.4.5 to require determination that "IGSCC susceptible material" is not involved. (ITS 3.4.5, DOC M.1)

- Changing the CTS Frequency for determining RCS leakage from 8 hours to 12 hours. The ISTS require this Surveillance to be performed every 8 hours. This change is essentially consistent with Generic Letter 88-01, Supplement 1, which requires the Surveillance once per shift, not to exceed 12 hours. SR 3.0.2 will limit the extensions past 12 hours. This has been approved at Edwin I. Hatch Plant and WNP-2. (ITS 3.4.5, DOC L.1)

- A Note is added to ITS 3.4.7 to allow 6 hours to perform Surveillance testing of the Leak Detection System instrumentation channels prior to entering Actions. The CTS do not include this allowance. This allowance has been approved at WNP-2. (ITS 3.4.7, DOC L.1)

- A Note from ISTS SR 3.5.1.2 describing Emergency Core Cooling System operability has been moved to the LCO description in the ITS. The Note did not exist in CTS. (ITS 3.5.1, DOC L.1)

- Automatic Depressurization System operability was required above 122 psig in CTS, and has been revised in ITS to above150 psig. (ITS 3.5.1, DOC L.6)

- A Note from ISTS SR 3.5.2.4 describing Emergency Core Cooling System operability has been moved to the LCO description in the ITS. The Note did not exist in CTS. (ITS 3.5.2, DOC L.4)

- Drywell-to-Suppression Pool Bypass leakrate has been added for Primary Containment Operability. This requirement does not appear in the CTS for Primary Containment or the BWR/6 ISTS 3.6.1.1. (ITS 3.6.1.1, DOC L.1)

- The acceptable leakrate value of 10% specified in CTS for the Drywell-to-Suppression Pool Bypass leakrate will only be applicable after the first startup in ITS, thereafter the acceptable leakrate value of 100% will apply. Bypass leakrate testing does not appear in ISTS 3.6.1.1. (ITS 3.6.1.1, DOC L.3)

- The accelerated Drywell-to-Suppression Pool Bypass Leakrate testing schedule that appears in CTS is not included in the ITS. Also, accelerated bypass leakrate testing does not appear in the ISTS 3.6.1.1. (ITS 3.6.1.1, DOC L.4)

- The requirement for NRC approval of the Drywell-to-Suppression Pool Bypass Leakrate test schedule that appears in CTS is not included in the ITS. Also, bypass leakrate testing has been included in ITS 3.6.1.1, it does not appear in the ISTS 3.6.1.1. (ITS 3.6.1.1, DOC L.5)

- A note has been added to allow administrative methods of verifying air lock door position in areas that are inaccessible due to high radiation area or inerting. This allowance does not exist in CTS or the BWR/6 ISTS that was used as the basis for ITS 3.6.1.2. (ITS 3.6.1.2, DOC L.4)

- The CTS SR 4.6.3.4 acceptance criteria are modified and the Surveillance Requirement for excess flow check valve functional testing is added to the ISTS as ITS SR 3.6.1.3.8. (ITS 3.6.1.3, DOC L.9)

- The limits for primary containment pressure have been revised from the CTS value to reflect design analysis assumptions. (ITS 3.6.1.4, DOC M.1)

- CTS surveillance interval for cycling the suppression chamber-to-drywell vacuum breakers is revised from 31 days to 92 days. (ITS 3.6.1.6, DOC L.1)

- The Action in both the CTS and ISTS for an inoperable diesel generator cooling water subsystem is to declare the associated diesel generator inoperable. ITS will require that the supported equipment be declared inoperable. (ITS 3.7.2, DOC M.1)

- The phrase "each required actual or simulated" has been added to ITS SR 3.7.2.2 for verification of the diesel generator cooling water automatic start feature, and does not appear in either the CTS or ISTS. (ITS 3.7.2, DOC L.1)

- ITS SR 3.7.5.1 and 3.7.5.2 provide an alternative method of verifying Control Room and Auxiliary Electric Equipment Room Air Conditioning unit capability from that specified in the ISTS. Also, the requirements of ITS 3.7.5 do not appear in the CTS. (ITS 3.7.5, DOC M.1)

- A limitation on power factor is added to CTS for the 24-hour diesel generator run. ISTS SR 3.8.1.14 is revised to place the specific power factor in the Bases. (ITS 3.8.1, DOC M.10)

- A maximum restoration limit imposed for multiple concurrent inoperabilities of AC sources is added to CTS, and revised for ISTS from 6 days to 10 days. (ITS 3.8.1, DOC L.1)

- The prohibitions for conducting some AC source surveillance testing during MODES 1, 2, and 3 is omitted from both CTS and ISTS. (ITS 3.8.1 DOC L.6)

- The Frequency for performing diesel generator fuel oil transfer pump testing is revised from 31 days to 92 days. (ITS 3.8.1, DOC L.8)

- A maximum restoration limit imposed for offsite circuit inoperability is revised for both CTS and ISTS from 72 hours to 7 days. (ITS 3.8.1, DOC L.18)

- CTS requires a weekly verification that overall battery voltage is ≥ 250 volts for 250 volt battery. This number has been revised to be ≥ 256 volts in ITS to be consistent with the cell voltages for the 125 volt batteries. (ITS 3.8.4, DOC M.3)

- CTS and the ISTS both allow a battery performance discharge test to be substituted for the battery service test once per 60 months. The Note to ITS SR 3.8.4.7 will allow this substitution at any time. (ITS 3.8.4, DOC L.4)

- CTS and the ISTS both allow a battery performance discharge test to be substituted for the battery service test. The Note to ITS SR 3.8.4.7 will allow this substitution to be made with a battery modified performance discharge test. (ITS 3.8.4, DOC L.5)

- CTS and the ISTS both require demonstration of battery charger capacity by an 8 hour test. The test duration is reduced to 4 hours in ITS SR 3.8.4.6. (ITS 3.8.4, DOC L.7)

- A Note describing Applicability of allowing energization of a DC electrical power distribution subsystem from an opposite unit DC electrical power distribution subsystem when the opposite unit is in Modes 1, 2, or 3 has been added to ITS 3.8.5 Condition A. (ITS 3.8.5, DOC M.4)

- The ITS 3.8.5 Required Action A.1 Completion Time allows 1 hour to verify a DC power supply subsystem is being powered from the opposite power supply subsystem following discovery of an inoperable DC power supply subsystem. CTS have an immediate Completion Time. (ITS 3.8.5, DOC L.2)

- The Facility Operating Licenses requirement to not load fuel into the vessel with multiple control rods withdrawn has been adopted in the ITS 3.10.5. (ITS 3.10.5, DOC M.1)

Quad Cities Nuclear Power Station, Units 1 and 2

- Surveillance frequencies are extended from 18 to 24 months per NRC Generic Letter 91-04

ITS 3.1.7, DOC LD.1	ITS 3.3.6.2, DOC LD.1	ITS 3.6.1.1, DOC LD.1
ITS 3.1.8, DOC LD.1	ITS 3.3.6.2, DOC LE.1	ITS 3.6.1.3, DOC LD.1
ITS 3.3.1.1, DOC LD.1	ITS 3.3.6.3, DOC LD.1	ITS 3.6.1.7, DOC LD.1
ITS 3.3.1.1, DOC LD.2	ITS 3.3.6.3, DOC LE.1	ITS 3.6.1.8, DOC LD.1
ITS 3.3.1.1, DOC LE.1	ITS 3.3.7.1, DOC LD.1	ITS 3.6.4.1, DOC LD.1
ITS 3.3.1.2, DOC LE.1	ITS 3.3.7.1, DOC LE.1	ITS 3.6.4.2, DOC LD.1
ITS 3.3.2.2, DOC LD.1	ITS 3.3.7.2, DOC LD.1	ITS 3.6.4.3, DOC LD.1
ITS 3.3.3.1, DOC LD.1	ITS 3.3.7.2, DOC LE.1	ITS 3.7.2, DOC LD.1
ITS 3.3.3.1, DOC LE.1	ITS 3.3.8.1, DOC LD.1	ITS 3.7.4, DOC LD.1
ITS 3.3.4.1, DOC LD.1	ITS 3.3.8.1, DOC LE.1	ITS 3.7.5, DOC LD.1
ITS 3.3.4.1, DOC LE.1	ITS 3.3.8.2, DOC LD.1	ITS 3.8.1, DOC LD.1
ITS 3.3.5.1, DOC LD.1	ITS 3.3.8.2, DOC LE.1	ITS 3.8.4, DOC LD.1
ITS 3.3.5.1, DOC LE.1	ITS 3.4.5, DOC LE.1	ITS 5.5, DOC LD.1
ITS 3.3.5.2 , DOC LD.1	ITS 3.5.1, DOC LD.1	ITS 5.5, DOC LD.2
ITS 3.3.6.1, DOC LD.1	ITS 3.5.2, DOC LD.1	ITS 5.5, DOC LD.3
ITS 3.3.6.1, DOC LE.1	ITS 3.5.3, DOC LD.1	

- Allowable Values/Trip Setpoints revised using ComEd Setpoint Methodology

ITS 3.3.1.1, DOC LF.1	ITS 3.3.5.2, DOC LF.1	ITS 3.3.7.2, DOC LF.1
ITS 3.3.2.1, DOC LF.1	ITS 3.3.6.1, DOC LF.1	ITS 3.3.8.1, DOC LF.1
ITS 3.3.2.2, DOC LF.1	ITS 3.3.6.2, DOC LF.1	ITS 3.3.8.2, DOC LF.1
ITS 3.3.4.1, DOC LF.1	ITS 3.3.6.3, DOC LF.1	
ITS 3.3.5.1, DOC LF.1	ITS 3.3.7.1, DOC LF.1	

- Allowing the feedwater pump to be removed from service in lieu of shutting down the unit to < 25% RTP when a feedwater and main turbine high water level channel is inoperable and untripped. This is a generic change that has not been approved yet. (ITS 3.3.2.2, DOC L.2)

- A Note is added to ITS 3.3.3.1 to allow 6 hours to perform Surveillance testing of the Post Accident Monitoring instrumentation channels prior to entering Actions. The CTS does not have this allowance. This allowance has been approved at WNP-2. (ITS 3.3.3.1, DOC L.2)

- Eight additional Functions have been added to ITS 3.3.5.1 for Core Spray Pump Start-Time Delay Relays and LPCI Loop Select Logic. (ITS 3.3.5.1, DOC M.1)

- The Applicability of the Reactor Building Ventilation High Radiation and Refuel Floor High Radiation Instrumentation Functions for Secondary Containment Isolation is revised to be required during CORE ALTERATIONS and not just during movement of irradiated fuel in the Secondary Containment. (ITS 3.3.6.2, DOC M.1)

Quad Cities Nuclear Power Station, Units 1 and 2 (continued)

- The Applicability of the Reactor Building Ventilation High Radiation and Refuel Floor High Radiation Instrumentation Functions for Secondary Containment Isolation is revised to be required during Operations with a Potential for Draining the Reactor Vessel (OPDRVs) and not just during movement of irradiated fuel in the Secondary Containment. (ITS 3.3.6.2, DOC M.2)

- The Applicability of the Reactor Building Ventilation High Radiation and Refuel Floor High Radiation Instrumentation Functions for Control Room Emergency Ventilation System Isolation is revised to be required during Core Alterations and not just during movement of irradiated fuel in the Secondary Containment. (ITS 3.3.7.1, DOC M.2)

- The Applicability of the Reactor Protection System Electric Power Monitoring requirements are revised to remove Modes 3 and 4. (ITS 3.3.8.2, DOC L.1)

- CTS requires tripping one recirculation pump when speed mismatch is not within limits. ITS 3.4.1 will not require the recirculation pump to be tripped, but will require a recirculation pump to be declared "not in operation" with the appropriate actions being taken. (ITS 3.4.1, DOC L.2)

- Changing the CTS Frequency for monitoring the primary containment sump flow rate from 8 hours to 12 hours. The ISTS require this Surveillance to be performed every 8 hours. This change is essentially consistent with Generic Letter 88-01, Supplement 1, which requires the Surveillance once per shift, not to exceed 12 hours. SR 3.0.2 will limit the extensions past 12 hours. This has been approved at Edwin I. Hatch Plant and WNP-2. (ITS 3.4.4, DOC L.1)

- A Note is added to ITS 3.4.5 to allow 6 hours to perform Surveillance testing of the Leak Detection System instrumentation channels prior to entering Actions. The CTS does not have this allowance. This allowance has been approved at WNP-2. (ITS 3.4.5, DOC L.3)

- The Surveillance Requirement in ITS 3.4.7 is revised to verify both Residual Heat Removal (RHR) Shutdown Cooling subsystems are operable every 12 hours instead of the CTS requirement to only verify one RHR Shutdown Cooling subsystem is operable. (ITS 3.4.7, DOC M.1)

- The number of Automatic Depressurization System valves required to be operable in ITS 3.5.1 is reduced from 5 to 4. (ITS 3.5.1, DOC L.1)

- ITS 3.5.1 describes the LPCI System as two LPCI subsystems. CTS allows 7 days for the LPCI System to be inoperable but ITS only allows 72 hours if both LPCI subsystems are inoperable. (ITS 3.5.1, DOC M.1)

- Surveillances are added to ITS 3.5.1 to verify correct breaker alignment to the LPCI swing bus every 31 days and to verify automatic transfer of LPCI swing bus power supply every 24 months. (ITS 3.5.1, DOC M.2)

- The available amount of water in the Contaminated Condensate Storage Tank for the low pressure Emergency Core Cooling System pumps is decreased from 140,000 gallons to 50,000 gallons. (ITS 3.5.2, DOC L.5)

Quad Cities Nuclear Power Station, Units 1 and 2 (continued)

- CTS requires entry into Specification 3.0.C (ITS LCO 3.0.3) if total leakage between Drywell and Suppression Chamber exceeds the limit. ITS 3.6.1.1 allows one hour to restore leakage to within required limits or shutdown. No ITS LCO 3.0.3 entry is required. Also, the limits for the Drywell-to-Suppression Chamber Leakrate are changed. (ITS 3.6.1.1, DOC L.3)

- The CTS requirement that each excess flow check valve (EFCV) must check flow has been changed in ITS 3.6.1.1 to require the EFCVs to actuate to their isolation position. (ITS 3.6.1.3, DOC L.7)

- An additional Surveillance requirement has been provided in ITS 3.6.1.3 to verify the 18 inch vent and purge valves are closed every 31 days. (ITS 3.6.1.3, DOC M.2)

- A new Surveillance Requirement is provided to verify the RHR Suppression Pool Spray nozzles are unobstructed every 5 years. (ITS 3.6.2.4, DOC M.1)

- A requirement is added for the opposite unit diesel generator cooling water pump to be operable to support the opposite unit diesel generator. (ITS 3.7.2, DOC M.1)

- A new Specification is added which requires the Main Turbine Bypass System to be operable. Testing is provided which will require a full stroke of each main turbine bypass valve on a quarterly basis and will also require a Main Turbine Bypass System Response Time Test every 24 months. (ITS 3.7.7, DOC M.1)

- The spent fuel pool water level requirement in ITS 3.7.8 is increased to 19 feet. (ITS 3.7.8, DOC M.1)

- The CTS full load testing requirement to maintain diesel generator load between 95% - 100% for two hours is being relaxed slightly to maintain diesel generator load between 90% - 100% for two hours. (ITS 3.8.1, DOC L.12)

- Two additional requirements are provided requiring the operability of a qualified offsite circuit available from the other unit and the opposite unit diesel generator. A Note has been added to allow a unit to change Modes if the opposite unit diesel generator is inoperable. (ITS 3.8.1, DOC M.1)

- A limitation on power factor is added to CTS for the 24-hour diesel generator run. ISTS SR 3.8.1.14 is revised to place the specific power factor in the Bases. (ITS 3.8.1, DOC M.4)

- ITS 3.8.6 allows a temporary electrolyte level increase during and following an equalize charge. (ITS 3.8.6, DOC L.4)

- ITS 3.8.7 will require the opposite unit's electrical power distribution subsystem capable of supporting Standby Gas Treatment and Control Room Emergency Ventilation Systems to be operable. (ITS 3.8.7, DOC M.3)

- The Reactor Water Cleanup System is being added to the list of systems in ITS 5.5, Reactor Coolant Sources Outside Primary Containment. (ITS 5.5, DOC M.1)

ATTACHMENT 4

Justification of 24-Month Surveillance Requirement Frequencies

I. PURPOSE:

To accommodate a 24-month fuel cycle for Dresden Nuclear Power Station, Units 2 and 3, LaSalle County Station, Units 1 and 2, and Quad Cities Nuclear Power Station, Units 1 and 2, Commonwealth Edison (ComEd) is integrating the necessary changes to the Dresden Nuclear Power Station, Units 2 and 3, LaSalle County Station, Units 1 and 2, and Quad Cities Nuclear Power Station, Units 1 and 2, Technical Specifications Surveillance Requirements into the documents being used to convert to the Improved Standard Technical Specifications. To facilitate the review of the 24-month fuel cycle portion of this submittal, the following overview document is being provided to identify the scope of changes and the methodology used to justify the changes.

It is intended to implement longer fuel cycles for Dresden Nuclear Power Station, Units 2 and 3, LaSalle County Station, Units 1 and 2, and Quad Cities Nuclear Power Station, Units 1 and 2, during the current operating cycles. The proposed changes are submitted in support of the 24-month fuel cycle conversion. As demonstrated in this submittal, the proposed changes will not adversely impact safety. The proposed changes are being submitted to the NRC as a Cost Beneficial Licensing Action, and is similar to license amendments issued for a number of other nuclear units.

The proposed changes were evaluated in accordance with the guidance provided in NRC Generic Letter 91-04, "Changes in Technical Specification Surveillance Intervals to Accommodate a 24 Month Fuel Cycle," dated April 2, 1991.

Historical surveillance test data and associated maintenance records were reviewed in evaluating the effect on safety. In addition, the licensing basis was reviewed for each revision to ensure it was not invalidated. Based on the results of these reviews, it is concluded that there is no adverse effect on plant safety due to increasing the surveillance test intervals from 18 to 24 months and the continued application of Surveillance Requirement (SR) 3.0.2.

II. SCOPE

The 24-month fuel cycle portion of this submittal includes a justification, when the SR Frequency is being changed from 18 to 24 months. The justification is limited to those existing Current Technical Specification (CTS) Surveillance Requirements (SRs) that are being retained in the Improved Technical Specifications (ITS) which have a CTS Frequency of 18 months. New SRs for ITS have been evaluated (qualitatively or quantitatively) for a Frequency of 24 months.

These changes have been divided into two categories. The categories are: 1) changes involving the Channel Calibration Frequency identified as "Instrumentation Changes" (identified in the ITS conversion document Discussion of Changes as "LEs"), and 2) other changes identified as "Non-Instrumentation Changes" (identified in the ITS conversion document Discussion of Changes as "LDs").

III METHODOLOGY

In NRC Generic Letter 91-04, the NRC provided generic guidance for evaluating a 24 month surveillance test interval for Technical Specification (TS) SRs. NRC Generic Letter 91-04 specifies the steps for the evaluation needed to justify a 24 month surveillance interval. The following defines each step outlined by the NRC in Generic Letter 91-04 and provides a description of the methodology used by the Dresden Nuclear Power Station, Units 2 and 3, LaSalle County Station, Units 1 and 2, and Quad Cities Nuclear Power Station, Units 1 and 2, personnel to complete the evaluation for each specific CTS SR line item. This methodology is very similar to the methodology used to justify extensions for a 24 month fuel cycle at the Carolina Power & Light Company Brunswick Nuclear Plant. The Brunswick Nuclear Plant methodology was found acceptable by the NRC in the Brunswick Nuclear Plant ITS/24 Month extension Safety Evaluation issued on June 5, 1998.

A. Non-Instrumentation changes ("LD" Discussion of Changes):

NRC Generic Letter 91-04 identifies three steps to evaluate Non-Instrumentation changes:

STEP 1:

"...licensees should evaluate the effect on safety of the change in surveillance intervals to accommodate a 24 Month fuel cycle. This evaluation should support a conclusion that the effect on safety is small."

Evaluation

Dresden Nuclear Power Station, Units 2 and 3, LaSalle County Station, Units 1 and 2, and Quad Cities Nuclear Power Station, Units 1 and 2, have individually evaluated each SR being changed with respect to its effect on plant safety. This evaluation provides a justification for each CTS non-instrumentation SR which is being retained in ITS. The evaluation is summarized in the Discussion of Change identified as "LDs". The following information provides a description of the purpose of surveillance testing and a general description of the methodology utilized to justify the conclusion that extending the testing interval has a minimal effect on safety.

The purpose of surveillance testing is to verify through the performance of the specified SRs that the tested TS Function/Feature will perform as assumed in the associated safety analysis or in accordance with the associated Function's design. By periodically testing the TS Function/Feature, the availability of the associated Function/Feature is confirmed. As such, with the extension of the Dresden Nuclear Power Station, Units 2 and 3, LaSalle County Station, Units 1 and 2, and Quad Cities Nuclear Power Station, Units 1 and 2, operating cycle and the associated extension of the refueling cycle surveillance test interval (i.e., frequency), a longer period of time will exist between performances of a surveillance test. If a failure resulting in the loss of a Safety Function occurs during the operating cycle and that failure would be detected only by the performance of the periodic TS SR, then the increase in the surveillance testing interval would result in a decrease in the associated Function's availability and thus have a potential impact on safety.

Each associated non-instrumentation SR has been evaluated to demonstrate that the potential impact on availability, if any, is minimal as a result of the change to a 24 month frequency. A program plan was developed that defined the scope of the analysis to be performed (e.g., failure history analysis) and the methods for performing these analyses. The process included: 1) identification of the 18 month surveillances in the CTS, 2) determining the plant tests that verified the operation of the equipment associated with the surveillance, 3) collection of the test history associated with the function, and 4) evaluation of the test history results. The evaluations were based on the fact that either the Function/Feature is tested on a more frequent basis during the operating cycle by other plant programs (e.g., pump flow rate tested quarterly), is designed to be single failure proof, or is highly reliable.

The more frequent testing may include the performance of Channel Checks which verify that the instrument transmitter and indication are functional, and the system parameters (e.g. pump flow, system pressure, etc.) are within expected values. More frequent testing also includes Channel Functional Tests which verify the operation of circuits associated with alarms, interlocks, displays, trip functions, time delays and channel failure trips. Where a Channel Check or Channel Functional Test is not required, normally the circuit is simple and these checks would not provide any additional assurance that the components are functional. In several cases (e.g. switches) the more frequent testing may not verify the operation of the circuits directly associated with the switch, but may verify the operation of other circuits associated with the Function with which the switch is associated. In most cases the same circuit (with the exception of the open loop associated with the switch) is used for manual operation of a pump and for pump automatic start functions. In these cases the Channel Checks and Channel Functional Tests would also test most of the circuit associated with the initiation push button, with the exception of the switch itself and the wire to connect the switch to the circuit.

Additional testing, such as inservice pump or valve testing, will also verify that the power and control circuits associated with the specific TS components, relays and contacts associated with these components are operational. Inservice programs test components based on performance oriented schedules. The requirements of 10 CFR 50.65, "Requirements for monitoring the effectiveness of maintenance at nuclear power plants," (i.e., Maintenance Rule) also support testing based on safety significant components and their unavailability or performance. Decreased component performance requires increased testing. Some system components may not be tested more frequently based on the impact on plant operation (e.g., Emergency Core Cooling System injection valves). However, performance of these components are tracked on the basis of system availability, and increased failures or maintenance will be identified and corrected as a part of the station's maintenance program.

Additionally, as previously stated by the NRC in Reference 8, industry reliability studies for Boiling Water Reactors (BWRs), prepared by the BWR Owners Group in Reference 9, show that the overall safety systems' reliabilities are not dominated by the reliabilities of the logic system, but by that of the mechanical components, (e.g., pumps and valves), which are consequently tested on a more frequent basis, usually by the

Inservice Testing Program. Since the probability of a relay or contact failure is small relative to the probability of mechanical component failure, increasing the logic system functional test interval represents no significant change in the overall safety system unavailability.

STEP 2:

"Licensees should confirm that historical maintenance and surveillance data do not invalidate this conclusion".

EVALUATION

The surveillance test history of the affected SRs has been evaluated. This evaluation consisted of a review of surveillance test results and associated maintenance records. Only SR test failures were evaluated because failures detected by other plant activities such as Preventative Maintenance Tasks or Surveillance Tests that are performed more frequently than 24 months were assumed to continue to detect failures. This review of surveillance test history validated the conclusion that the impact, if any, on system availability will be minimal as a result of the change to a 24 month testing frequency.

STEP 3:

"...licensees should confirm that the performance of surveillances at the bounding surveillance interval limit provided to accommodate a 24-month fuel cycle would not invalidate any assumption in the plant licensing basis."

EVALUATION

As part of the evaluation of each SR, the impact of the changes against the assumptions in the respective Dresden Nuclear Power Station, Units 2 and 3, LaSalle County Station, Units 1 and 2, and Quad Cities Nuclear Power Station, Units 1 and 2, licensing basis was reviewed. In general, these changes have no impact on the plant licensing basis. However, in some cases, the change does require a change to licensing basis information, as described in the Dresden Nuclear Power Station, Units 2 and 3, LaSalle County Station, Units 1 and 2, or Quad Cities Nuclear Power Station, Units 1 and 2, Updated Final Safety Analysis Report (UFSAR). Since no Unreviewed Safety Questions have been identified in the changes, the UFSAR changes will be performed and submitted in accordance with 10 CFR 50.59, "Changes, tests and experiments," and 10 CFR 50.71(e).

The performance of surveillances extended for a 24 month fuel cycle will be trended as a part of the Maintenance Rule Program. Any degradation in performance will be evaluated to verify that the degradation is not due to the extension of surveillance or maintenance activities.

B. Instrumentation (Channel Calibration changes (LE Discussion of Changes)):

NRC Generic Letter 91-04 identifies 7 steps for the evaluation of Instrumentation changes.

STEP 1:

Confirm that instrument drift as determined by as-found and as-left calibration data from surveillance and maintenance records has not, except on rare occasions, exceeded acceptable limits for a calibration interval.

EVALUATION

The effect of longer calibration intervals on the TS instrumentation was evaluated by performing a review of the surveillance test history for the affected instrumentation, including, where necessary, an instrument drift study. In performing the drift study, an effort was made to retrieve recorded Channel Calibration data for associated instruments for the past five operating cycles. By obtaining recorded calibration data for the past several cycles of operation, a true representation of instrument drift can be determined. However, for several different sets of instruments at Dresden Nuclear Power Station, Units 2 and 3, and Quad Cities Nuclear Power Station, Units 1 and 2, sufficient data was not available to perform the drift analysis using data from only one plant. For these cases the data collected from both plants were combined. Generally, the combination of data was limited to identical manufacturer and model numbers performing the same functions in the two plants. In some limited cases, after performing statistical grouping evaluations different model numbers may have also been combined between the plants. The failure history evaluation and drift study demonstrates that except on rare occasions, instrument drift has not exceeded the current allowable limits.

Many of the instances where the drift exceeded the allowable values or where transmitters failed calibration were due to an oil loss problem. This generic Rosemount failure mode was identified during 1986 and 1987, based on the failure of five Rosemount model 1153 HD5PC differential pressure transmitters at Northeast Utilities' Millstone Nuclear Power Station, Unit 3. These failures were documented in NRC Information Notice No. 89-42,"Failure of Rosemount Models 1153 and 1154 Transmitters," dated April 21, 1989, and NRC Bulletin No. 90-01, "Loss of Fill-oil in Transmitters Manufactured by Rosemount," dated March 9, 1990. During power operation, the Millstone Nuclear Power Station, Unit 3, operators noted that the signals from the Rosemount 1153 transmitters were deviating from redundant channel signals and that the transmitters were indicating reduced levels of process noise. Further investigation by the NRC and Rosemount lead to identification of the root cause as oil loss from the Rosemount sealed sensing module. NRC Bulletin No. 90-01 and Supplement 1 defined specific replacement and testing criteria for any suspected transmitters. Additionally Supplement 1 to NRC Bulletin No. 90-01 defined a maturity period after which the probability of failure due to oil loss is greatly reduced and monitoring of the transmitters may be performed at longer intervals (not exceeding 24 months).

For the Dresden Nuclear Power Station, Units 2 and 3, and Quad Cities Nuclear Power Station, Units 1 and 2, all applicable Rosemount transmitters have been identified and replaced. For LaSalle County Station, Units 1 and 2, some but not all of the Rosemount transmitters have been replaced. LaSalle County Station has committed, in response to NRC Bulletin No. 90-01 and Supplement 1, to an enhanced monitoring program for these transmitters. This commitment will be addressed in separate correspondence.

STEP 2:

Confirm that the values of drift for each instrument type (make, model, and range) and application have been determined with a high probability and a high degree of confidence. Provide a summary of the methodology and assumptions used to determine the rate of instrument drift with time based upon historical plant calibration data.

EVALUATION

Data Collection and Conditioning

Dresden Nuclear Power Station, Units 2 and 3, LaSalle County Station, Units 1 and 2, and Quad Cities Nuclear Power Station, Units 1 and 2, have performed drift evaluations, based on a ComEd Specific Drift Analysis Design Guide (i.e., Appendix J of ComEd Nuclear Engineering Standard NES-EIC-20.04, "Analysis of Instrument Channel Setpoint Error and Instrument Loop Accuracy") provided in Attachment 5. The ComEd Specific Drift Analysis Design Guide is based on EPRI TR-103335, "Guidelines for Instrument Calibration Extension/Reduction Programs," Revision 1, dated October 1998. The ComEd methodology utilizes the As Found/As Left (AFAL) analysis methodology to statistically determine drift for current calibration intervals. The AFAL methodology utilizes historical data obtained from surveillance tests. The raw calibration data is conditioned prior to use for the drift calculation. The conditioning consists of eliminating tests or individual data points that do not reflect actual drift. The removed data is generally limited to data associated or affected by:

a. Instrument failures,
b. Procedural problems which affect the calibration data,
c. Measurement and Test Equipment (M&TE) problems which affect the calibration data, or
d. Human performance problems that affect the calibration data.

If adjustments or elimination of data points were made during the conditioning process, these changes were limited to one of the following seven categories:

1) Data Transcription Errors. The review identified typographical data entry error. The data point was adjusted to correct the error.
2) Technician Data Entry Error. The review identified an obvious transposition error by the technician entering data. The data point was eliminated based on the data entry error.
3) Equipment Replacement. The review identified that a new instrument was installed. The data point "as-found" data was zeroed because this data would not be reflective of drift. Any repetitive instrument failures would be identified in the Surveillance Test History Review.
4) Chronic Equipment Failure. The review of the data indicated repetitive bad data

points for a single instrument with excessive changes in the input/output relationship, while all other instruments in the same application did not exhibit the same characteristics. This instrument's data was eliminated based on a unique instrument problem. Any repetitive instrument failures would be identified in the Surveillance Test History review. The ComEd trending program will identify such future conditions and require appropriate root cause evaluation and replacement.

5) Scaling or Setpoint Changes. Changes in instrument scaling or setpoints can appear in the data set as a larger-than-actual drift point unless the change is detected during the data entry process. These changes were only eliminated where insufficient as found or as left data was available (e.g., the as found test was performed using the new scale or setpoint). Where there was not clear annotation of the change, the data was maintained in the data set.
6) Measuring and Test Equipment (M&TE) Out of Calibration. The review indicated that the instrument was calibrated with out of calibration M&TE. The data point was eliminated based on the fact that any recorded change could not be correlated to the performance of the instrument.
7) Poor Calibration Techniques. The review identified that poor calibration techniques were used. The data point was eliminated based on the fact that any recorded change could not be correlated to the performance of the instrument. Eliminated or adjusted data points were individually evaluated and independently verified to meet these categories.

Development of Simple Statistics

Microsoft Excel spreadsheets are used to calculate the basic statistics surrounding the drift data (e.g., standard deviations, means, minimums, maximums, variances, skewness, and kurtosis), and the general results of the regression analyses. These results are then used for additional analysis.

Outlier and Pooling Verification Requirements

Procedurally, outliers removed by the critical t-test will be limited to 5% of the initial data set. Data that is identified as incorrect before statistical analysis is not counted against this percentage or as a part of the initial data set. Generally, the outliers removed will be limited to 3% of the initial data set, based on the circumstances. Removal of greater than 3% of the initial data set due to outliers will only be allowed under very unusual circumstances.

To evaluate outlier patterns, the critical t value is reduced until at least ten percent of the data are outliers. These outliers are computed ONLY for analysis of outlier patterns and are not to be removed from the data set. Once an analysis of the pattern is complete, the database will be returned to its original condition. This exercise is only to provide verification of the pooling techniques used in the analysis. If all of the outliers appear in one instrument or application, then generally the inclusion of that data would be questioned and investigated.

Initial Analysis Process

For drift analyses of devices with 9 calibration points, each of the nine points will be analyzed across all devices, after removal of outliers. The calibration point containing the set of data with the largest mean and standard deviation terms will be used for the remainder of the analysis. The worst case values will be assumed to apply across the calibrated span of the instruments, for the purposes of uncertainty consideration.

Normality

The preferred method of resolution if the data does not pass any of the normality tests listed will be to expand the value of the standard deviation until all of the data is bounded by the number of standard deviations required for a 95/95 tolerance value. This should be used unless the distribution is obviously skewed. Normality plots will also be generated as a part of the coverage analysis.

Section 2.5 – Time Dependency

Appendix J of NES-EIC-20.04 (i.e, the ComEd Setpoint Methodology) prescribes regression analysis (absolute value and raw drift values) on the data in the selected bins and the data between the selected bins. Additionally, if 4 or more bins are selected for analysis, regressions are also to be run on the data points generated for the binning plots (i.e., standard deviations and means versus average time intervals).

The preferred method of addressing a single bin condition is to determine the 99/95 tolerance value and assume a time independent condition for that bin and one bin to either side of the selected bin. The multipliers to obtain the drift value from the standard deviation value are to be taken from the table at the end of this agreement, which were extracted from Department of Energy Research and Development Report No. WAPD-TM-1292, "Statistics for Nuclear Engineers and Scientists Part 1: Basic Statistical Inference, " dated February 1981.

It is recognized that the majority of the cases will yield time intervals that are less than the 24 month required interval of 915 days. For cases where time independent drift has been determined for a time interval less than that required, the random drift term may be extrapolated to the required 915 day interval by method of Square Root Sum of the Squares (SRSS), per equation A2 to NES-EIC-20.04. Time independent bias terms will be considered applicable for the 30 month period without additional extrapolation.

Time dependent random or bias terms will be linearly extrapolated to 915 days to cover the 30 month calibration interval requirement.

Special Case Time Dependency

Where time dependency is discovered in the binning or regression processes, then the bias portions of the drift error could be analyzed separately from the random portion. If a time dependent bias is discovered, the random portion will be re-derived based on variance of the drift value from the estimated value, based on the line equation of the time dependent mean, at the associated time interval value. The line equation for the time dependent mean will be developed from the slope and intercept developed from the linear regression analysis of the data in the selected bins and the bins in between those selected. The standard deviation will be computed from that deviation as shown in the example calculation in the ComEd Setpoint Methodology.

If a time dependent mean is discovered, the line mentioned above will also be used to extrapolate the mean value out to the time interval defined by the next larger bin within Appendix J of the ComEd Setpoint Methodology. For those devices being extended to a nominal 24 month interval (i.e., 30 months with the 25% extension allowance of ITS SR 3.0.2), the drift will be extrapolated to the worst case of 915 days. This mean value will be considered a bias term. The bias will be applied in one direction, but will not be used to offset the uncertainties in the other direction. For instance, if a bias term of –3 is determined, the drift bias to be used will be +0 / -3. The time dependent random terms will also be extrapolated to 915 days for those devices whose calibration interval will be extended to a nominal 24 months.

Tolerance Interval

The tolerance interval is sometimes referred to as tolerance limits because the calculated interval establishes upper and lower bounds that contain the stated proportion of the population at the stated confidence level. Tolerance interval factors, k, were obtained from EPRI TR-103335, "Guidelines for Instrument Calibration Extension/Reduction Programs," Revision 1, dated October 1998, Table 6-1 or Table B-3. The appropriate tolerance factor depends on the sample size. As the sample size grows larger, the tolerance factor becomes smaller demonstrating a statistical confidence that the larger sample size is more representative of the total population.

For instruments that were recently installed or where the drift methodology could not be applied, a different methodology was utilized to demonstrate that the drift was acceptable. For each instrument where the drift methodology was not utilized to evaluate the drift data, a summary of the methodology is contained in the specific LE Discussion of the Change.

Commonwealth Edison Staff Evaluation of the NRC Status Report on the Staff Review of EPRI Technical Report-103335, "Guidelines for Instrument Calibration Extension/Reduction Programs"

The following are excerpts or paraphrases from the NRC Status Report dated March, 1994, on the Staff review of EPRI Technical Report (TR)-103335, "Guidelines for Instrument Calibration Extension /Reduction Programs." These excerpts are followed by the ComEd interpretation of EPRI TR-103335. The ComEd interpretations were used to determine if additional information and analyses were warranted.

STATUS REPORT

Item 4.1, Section 1, "Introduction," Second Paragraph

"The staff has issued guidance on the second objective (evaluating extended surveillance intervals in support of longer fuel cycles) only for 18-month to 24-month refueling cycle extensions (GL 91-04). Significant unresolved issues remain concerning the applicability of 18 month (or less) historical calibration data to extended intervals longer than 24 months (maximum 30 months), and instrument failure modes or conditions that may be present in instruments that are unattended for periods longer than 24 months."

EVALUATION

Extensions for longer than 24 months were not requested for any instrument calibrations.

STATUS REPORT

Item 4.2, Section 2, "Principles of Calibration Data Analysis," First Paragraph

"This section describes the general relation between the as-found and as-left calibration values, and instrument drift. The term 'time dependent drift' is used. This should be clarified to mean time dependence of drift uncertainty, or in other words, time dependence of the standard deviation of drift of a sample or a population of instruments."

EVALUATION

Both EPRI TR-103335, Revision 0 and Revision1 failed to adequately determine if there existed a relationship between the magnitude of drift and the time interval between the calibration process. The drift analysis performed by ComEd looked at the time to magnitude relationship using several different statistical and non-statistical methods. First, during the evaluation of data for grouping, data was grouped for the same or similar manufacturer, model number, and application combinations even though the t' statistical test may have shown that the groups were not necessarily from the same population if the groups were performed on significantly different frequencies. This test grouping was made to ensure that the analysis did not cover-up a significant time dependent bias or random element magnitude shift. After the standard deviation and other simple statistics were calculated, the data was evaluated for the time to magnitude relationship. Two separate regression type of analyses were performed; the first, a simple regression calculation based on the scatter of the raw "drift" values and the absolute value "drift" regression. Second, a regression of the calculated standard deviation and mean for the different calibration frequencies was performed if sufficient samples were available. Additionally, if these analyses did not contain sufficient samples for the regression of standard deviations, then different analyses may have been used or the samples may have conservatively been assumed to have a time dependent relationship, and the drift value extrapolated based on a time dependent relationship.

STATUS REPORT

Item 4.2, Section 2, "Principles of Calibration Data Analysis," Second Paragraph

"Drift is defined as as-found – as-left. As mentioned in the TR this quantity unavoidably contains uncertainty contributions from sources other than drift. These uncertainties account for variability in calibration equipment and personnel, instrument accuracy, and environmental effects. It may be difficult to separate these influences from drift uncertainty when attempting to estimate drift uncertainty but this is not sufficient reason to group these allowances with a drift allowance. Their purpose is to provide sufficient margin to account for differences between the instrument calibration environment and its operating environment see Section 4.7 of this report for a discussion of combining other uncertainties into a 'drift' term."

EVALUATION

The drift determined by analysis was compared to the equivalent set of variables in the setpoint calculation. The variables for the comparison were all associated with the calibration process (Measurement and Test Equipment error, Setting Tolerance error, Reference Accuracy, and Vendor Drift). The errors associated with the environment were not considered in the comparison although some portion of environmental error would be expected to contribute to the differences between calibrations.

STATUS REPORT

Item 4.2, Section 2, "Principles of Calibration Data Analysis," Third Paragraph

"The guidance of Section 2 is acceptable provided that time dependency of drift for a sample or population is understood to be time dependent [sic] of the uncertainty statistic describing the sample or population; e.g., the standard deviation of drift. A combination of other uncertainties with drift uncertainty may obscure any existing time dependency of drift uncertainty, and should not be done before time-dependency analysis is done."

EVALUATION

Time dependency evaluations were performed on the basic as-left/as-found data. Obviously other error contributors are contained in this data and it is impossible to separate the contribution from drift from the contribution due to Measurement and Test Equipment, Setting Tolerance, Reference Accuracy or other errors associated with the calibration process. Using the raw values appears to give the most reliable interpretation of the time dependency for the calibration process, which is the true value of interest. No other uncertainties are combined with the basic as-left/as-found data for time dependency determination.

STATUS REPORT

Item 4.3, Section 3, "Calibration Data Collection," Second Paragraph

"When grouping instruments, as well as manufacturer make and model, care should be taken to group only instruments that experience similar environments and process effects. Also, changes in manufacturing method, sensor element design, or the quality assurance program under which the instrument was manufactured should be considered as reasons for separating instruments into different groups. Instrument groups may be divided into subgroups on the basis of instrument age, for the purpose of investigating whether instrument age is a factor in drift uncertainty."

EVALUATION

Instruments were originally grouped based on manufacturer make, model number, and specific range of setpoint or operation. The groups were then evaluated, and combined based on the ComEd methodology. Based on the condition of the data, if there were differences between groupings that could have a significant affect on the pooling, a critical t-test was performed to verify the pooling. In addition, a modified critical t test (outlier style) with a reduced critical t value to help to identify patterns of data, which might indicate differing performance of groups of instruments versus others was performed.

STATUS REPORT

Item 4.3, Section 3, "Calibration Data Collection," Second Paragraph (continued)

"Instrument groups should also be evaluated for historical instrument anomalies or failure modes that may not be evident in a simple compilation of calibration data. This evaluation should confirm that almost all instruments in a group performed reliably and almost all required only calibration attendance."

EVALUATION

A separate surveillance test failure evaluation was performed for surveillance test performances. This evaluation identified calibration-related and non-calibration-related failures for single instruments, and groups of instruments supporting a specific function. After all relevant device and multiple device failures were identified, a cross check of failures across manufacturer make and model number was also performed to determine if common mode failures could present a problem for the cycle extension. This evaluation confirmed that almost all instruments in a group (associated with extended Technical Specification line items) performed reliably and most failures were detected by more frequent testing.

STATUS REPORT

Item 4.3, Section 3, "Calibration Data Collection," Third Paragraph

"Instruments within a group should be investigated for factors that may cause correlation between calibrations. Common factors may cause data to be correlated, including common calibration equipment, same personnel performing calibrations, and calibrations occurring in the same conditions. The group, not individual instruments within the group, should be tested for trends."

EVALUATION

Instruments were only investigated for correlation factors where multiple instruments appeared to have been driven out of tolerance by a single factor. Correlation may exist between the specific type of test equipment (e.g., Fluke 863 on the 0-200 mV range) and the personnel performing calibrations for each plant. This correlation would only affect the measurement if it caused the instrument performance to be outside expected boundaries, e.g., where additional errors should be considered in the setpoint analysis or where it showed a defined bias. Because Measurement and Test Equipment (M&TE) is calibrated more frequently than most process components being monitored, the effect of test equipment between calibrations is considered to be negligible and random. The setting tolerance, readability, and other factors which are more personnel based, would only affect the performance if there was a predisposition to leave or read settings in a particular direction (e.g., always in the more conservative direction). Plant training and evaluation programs are designed to eliminate this type of predisposition. Therefore, the correlation between M&TE and instrument performance or between personnel and instrument performance has not been evaluated. Observed as-found values outside the allowable tolerance (i.e., Extended Tolerance or Allowable Value) were evaluated to determine if a common cause existed as a part of the data entry evaluation.

STATUS REPORT

Item 4.3, Section 3, “Calibration Data Collection,” Fourth Paragraph

“TR-103335, Section 3.3, advises that older data may be excluded from analysis. It should be emphasized that when selecting data for drift uncertainty time dependency analysis it is unacceptable to exclude data simply because it is old data. When selecting data for drift uncertainty time dependency analysis, the objective should be to include data for time spans at least as long as the proposed extended calibration interval, and preferably, several times as long, including calibration intervals as long as the proposed interval. For limited extensions (e.g., a GL 91-04 extension), acceptable ways to obtain this longer interval data include obtaining data from other nuclear-plants or from other industries for identical or close-to-identical instruments, or combining intervals between which the instrument was not reset or adjusted. If data from other sources is used, the source should be analyzed for similarity to the target plant in procedures, process, environment, methodology, test equipment, maintenance schedules and personnel training. An appropriate conclusion of the data collection process may be that there is insufficient data of appropriate time span for a sufficient number of instruments to support statistical analysis of drift uncertainty time dependency.”

EVALUATION

Data was selected for the last 90 months (5 cycles) if available. 90 months of data may not have been available due to replacement of instruments, changes in calibration methods, or missing records. This data allowed for the evaluation of data with various different calibration spans over several calibration intervals to provide representative information for each type of instrument. Data from outside the ComEd data set was not used to provide longer interval data. In most cases the time dependency determination was based on calibrations performed at or near 18 months and data performed at shorter intervals (monthly, quarterly, or semiannually). There did not appear to be any time based factors that would be present from 18 to 24 months that would not have been present between 1, 3, 6, or 12 and 18 months. In some cases multiple intervals were evaluated (where the instrument was not reset) to simulate a longer calibration interval. When intervals were combined, the sample set size was reduced to account for the combination of data points into longer calibration intervals. In some cases, it was determined that there was insufficient data to support statistical analysis of drift time dependency. For these cases, a correlation between drift magnitude and time was assumed and the calculation reflects time dependent drift values.

STATUS REPORT

Item 4.3, Section 3, "Calibration Data Collection," Fifth Paragraph

"TR-103335, Section 3.3 provides guidance on the amount of data to collect. As a general rule, it is unacceptable to reject applicable data, because biases in the data selection process may introduce biases in the calculated statistics. There are only two acceptable reasons for reducing the amount of data selected: enormity, and statistical dependence. When the number of data points is so enormous that the data acquisition task would be prohibitively expensive, a randomized selection process, not dependent upon engineering judgment, should be used. This selection process should have three steps. In the first step, all data is screened for applicability, meaning that all data for the chosen instrument grouping is selected, regardless of the age of the data. In the second step, a proportion of the applicable data is chosen by automated random selection, ensuring that the data records for single instruments are complete, and enough individual instruments are included to constitute a statistically diverse sample. In the third step, the first two steps are documented. Data points should be combined when there is indication that they are statistically dependent on each other, although alternate approaches may be acceptable. See Section 4.5, below, on 'combined point' data selection and Section 4.4.1 on 0%, 25%, 50%, 75%, and 100% calibration span points."

EVALUATION

A time interval of 90 months was selected as representative based on the ComEd operating history. No data points were rejected from this time interval, and no sampling techniques were used. In some cases either due to upgrade of equipment, revision of calibration methods extended plant shutdowns or other plant changes 90 months of data was not available. In these cases the analysis was performed using the available data set.

STATUS REPORT

Item 4.4, Section 4, “Analysis of Calibration Data”

Subitem, 4.4.1, Sections 4.3 and 4.4, "Data Setup and Spreadsheet Statistics," First Paragraph

“The use of spreadsheets, databases, or other commercial software is acceptable for data analysis provided that the software, and the operating system used on the analysis computer, is under effective configuration control. Care should be exercised in the use of Windows or similar operating systems because of the dependence on shared libraries. Installation of other application software on the analysis machine can overwrite shared libraries with older versions or versions that are inconsistent with the software being used for analysis.”

EVALUATION

The project used Microsoft Excel spread sheets to perform the statistical analysis. Each drift calculation was independently verified using a combination of other diverse programs. Certain aspects, such as AFAL, outliers, d prime, w test, normality plot, histogram, and scatter were checked versus the EPRI IPASS program. Lotus 123 was generally used to check the regressions and extrapolations. Final drift computations were checked by a hand calculator generally.

STATUS REPORT

Item 4.4, Section 4, “Analysis of Calibration Data”

Subitem, 4.4.1, Sections 4.3 and 4.4, "Data Setup and Spreadsheet Statistics," Second Paragraph:

“Using either engineering units or per-unit (percent of span) quantities is acceptable. The simple statistic calculations (mean, sample standard deviation, sample size) are acceptable. Data should be examined for correlation or dependence to eliminate over-optimistic tolerance interval estimates. For example, if the standard deviation of drift can be fitted with a regression line through the 0%, 25%, 50%, 75%, and 100% calibration span points, there is reason to believe that drift uncertainty is correlated over the five (or nine, if the data includes a repeatability sweep) calibration data points. An example is shown in TR-103335, Figure 5.4, and a related discussion is given in TR-103335 Section 5.1.3. Confidence/tolerance estimates are based on (a) an assumption of normality (b) the number of points in the data set, and (c) the standard deviation of the sample. Increasing the number of points (utilizing each calibration span point) when data is statistically dependent decreases the tolerance factor k, which may falsely enhance the confidence in the predicted tolerance interval. To retain the information, but achieve a reasonable point count for confidence/tolerance estimates, the statistically dependent data points should be combined into a composite data point. This retains the information but cuts the point count. For drift uncertainty estimates with data similar to that in the TR example, an acceptable method requires that the number of independent data points should be one-fifth (or one ninth) of the total number of data points in the example and a combined data point for each set of five span points should be selected that is representative of instrument performance at or near the span point most important to the purpose of the analysis (i.e., trip or normal operation point)."

EVALUATION

The analysis for ComEd used either engineering units or percent of calibrated span as appropriate to the calibration process. As an example, for switches which do not have a realistic span value, the engineering units were used in the analyses; for analog devices, normally percent of span is used. The data was evaluated for dependence, normally dependence was found between points (0%, 25%, 50%, 75%, and 100%) for a single calibration. However, due to the changes in M&TE and personnel performing the calibrations, independence was found between calibrations of the same component on different dates. To ensure conservatism, the most conservative simple statistic values for the points closest to the point of interest were selected or the most conservative values for any data point were selected. The multiplier was determined based on the number of actual calibrations associated with the worst case value selected. Selection of the actual number of calibrations is equivalent to the determination of independent points (e.g., one fifth or one ninth of the total data point count). Selection of the worst case point is also more conservative than the development of a combined data point.

STATUS REPORT

Item 4.4, Section 4, "Analysis of Calibration Data"

Subitem 4.4.2, Section 4.5, "Outlier Analysis"

"Rejection of outliers is acceptable only if a specific, direct reason can be documented for each outlier rejected. For example, a documented tester failure would be cause for rejecting a calibration point taken with the tester when it had failed. It is not acceptable to reject outliers on the basis of statistical tests alone. Multiple passes of outlier statistical criterion are not acceptable. An outlier test should only be used to direct attention to data points, which are then investigated for cause. Five acceptable reasons for outlier rejection provided that they can be demonstrated, are given in the TR: data transcription errors, calibration errors, calibration equipment errors, failed instruments, and design deficiencies. Scaling or setpoint changes that are not annotated in the data record indicate unreliable data, and detection of unreliable data is not cause for outlier rejection, but may be cause for rejection of the entire data set and the filing of a licensee event report. The usual engineering technique of annotating the raw data record with the reason for rejecting it, but not obliterating the value, should be followed. The rejection of outliers typically has cosmetic effects: if sufficient data exists, it makes the results look slightly better; if insufficient data exists, it may mask a real trend. Consequently, rejection of outliers should be done with extreme caution and should be viewed with considerable suspicion by a reviewer."

EVALUATION

Rejected data was based on categorization into one of the following:

1) Data Transcription Errors. The review identified typographical data entry error. The data point was adjusted to correct the error.
2) Technician Data Entry Error. The review identified an obvious transposition error by the technician entering data. The data point was eliminated based on the data entry error.
3) Equipment Replacement. The review identified that a new instrument was installed. The data point "As-found" data was zeroed because this data would not be reflective of drift. Any repetitive instrument failures would be identified in the Surveillance Test History Review.
4) Chronic Equipment Failure. The review of the data indicated repetitive bad data points for a single instrument with excessive changes in the input/output relationship, while all other instruments in the same application did not exhibit the same characteristics. The data of this instrument was eliminated based on a unique instrument problem. Any repetitive instrument failures would be identified in the Surveillance Test History review. The ComEd trending program will identify such future conditions and require appropriate root cause evaluation and replacement.
5) Scaling or Setpoint Changes. Changes in instrument scaling or setpoints can appear in the data set as a larger-than-actual drift point unless the change is detected during the data entry process. These changes were only eliminated where insufficient as-found or as left data was available (e.g., the as-found test was performed using the new scale or setpoint). Where there was not clear annotation of the change, the data was maintained in the data set.
6) Measuring and Test Equipment (M&TE) Out of Calibration. The review indicated that the instrument was calibrated with out of calibration M&TE. The data point was eliminated based on the fact that any recorded change could not be correlated to the performance of the instrument.
7) Poor Calibration Techniques. The review identified that poor calibration techniques were used. The data point was eliminated based on the fact that any recorded change could not be correlated to the performance of the instrument.

All eliminated or adjusted data points were individually evaluated and independently verified to meet these categories. The seven criteria are consistent with the five reasons defined in EPRI TR-103335 and in the NRCs status report. The additional two criteria for scaling or setpoint change and chronic failure are included to prevent past poor practices from generating excessively large acceptance criteria for the future. The allowed tolerance for as-found in the ComEd trending program is based on the calculated drift value. Where a large drift value ensures that the drift used to calibrate the setpoint adequately envelops all performance conditions, the large drift value used to generate as-found acceptance criteria actually makes it more difficult to predict when an instrument is failing. The data is only eliminated after the careful identification of bad practices, (e.g. leaving marginal performing instruments in the plant or changing the setpoint without first taking as left data) and procedurally eliminating those practices.

STATUS REPORT

Item 4.4, Section 4, “Analysis of Calibration Data”

Subitem 4.4.3, Section 4.6, “Verifying the Assumption of Normality”

“The methods described are acceptable in that they are used to demonstrate that calibration data or results are calculated as if the calibration data were a sample of a normally distributed random variable. For example, a tolerance interval which states that there is a 95% probability that 95% of a sample drawn from a population will fall within tolerance bounds is based on an assumption of normality, or that the population distribution is a normal distribution. Because the unwarranted removal of outliers can have a significant effect on the normality test, removal of significant numbers of, or sometimes any (in small populations), outliers may invalidate this test.”

EVALUATION

Procedurally, outliers removed by the critical t-test will be limited to 5% of the initial data set. Data that is identified as incorrect before statistical analysis is ***not*** counted against this percentage or as a part of the initial data set. Generally, the outliers removed will be limited to 3% of the initial data set, based on the circumstances. Removal of greater than 3% of the initial data set due to outliers will only be allowed under very unusual circumstances.

To evaluate outlier patterns, the critical t value should be reduced until at least ten percent of the data are outliers. These outliers are computed only for analysis of outlier patterns and are not to be removed from the data set. Once an analysis of the pattern is complete, the database will be returned to its original condition. This exercise is only to provide verification of the pooling techniques used in the analysis. If all of the outliers appear in one instrument or application, then generally the inclusion of that data would be questioned and investigated.

STATUS REPORT

Item 4.4, Section 4, “Analysis of Calibration Data”

Subitem 4.4.4, Section 4.7, “Time-Dependent Drift Considerations,” First through Ninth Paragraphs

“This section of the TR discusses a number of methods for detecting a time dependency in drift data, and one method of evaluating drift uncertainty time dependency. None of the methods uses a formal statistical model for instrument drift uncertainty, and all but one of them focus on drift rather than drift uncertainty. Two conclusions are inescapable: regression analysis cannot distinguish drift uncertainty time dependency, and the slope and intercept of regression lines may be artifacts of sample size, rather than being statistically significant. Using the results of a regression analysis to rule out time dependency of drift uncertainty is circular reasoning: i.e., regression analysis eliminates time dependency of uncertainty; no time dependency is found; therefore, there is no time dependency.”

EVALUATION

Several different methods of evaluation for time dependency of the data were used for the analysis. One method was to evaluate the standard deviations at different calibration Intervals. This analysis technique is the most recommended method of determining time-dependent tendencies in a given sample pool. The test consists simply of segregating the drift data into different groups (bins) corresponding to different ranges of calibration or surveillance intervals, and comparing the standard deviations for the data in the various groups. The purpose of this type of calculation is to determine if the standard deviation tends to become larger as the time between calibration increases. Simple regression lines and regression of the absolute value of drift were generated and reviewed. Where drift was determined to be time independent, however increases in confidence interval and other methods were used to ensure a conservative 30 month drift term.

STATUS REPORT

Item 4.4, Section 4, “Analysis of Calibration Data”

Subitem 4.4.4, Section 4.7, “Time-Dependent Drift Considerations,” Thirteenth and Fourteenth Paragraphs

“A model can be used either to bound or project future values for the quantity in question (drift uncertainty) for extended intervals. An acceptable method would use standard statistical methods to show that a hypothesis (that the instruments under study have drift uncertainties bounded by the drift uncertainty predicted by a chosen model) is true with high probability. Ideally, the method should use data that include instruments that were unreset for at least as long as the intended extended interval, or similar data from other sources for instruments of like construction and environmental usage. The use of data of appropriate time span is preferable; however, if this data is unavailable, model projection may be used provided the total projected interval is no greater than 30 months and the use of the model is justified. A follow-up program of drift monitoring should confirm that model projections of uncertainty bounded the actual estimated uncertainty. If it is necessary to use generic instrument data or constructed intervals, the chosen data should be grouped with similar grouping criteria as are applied to instruments of the plant in question, and Student's "t" test should be used to verify that the generic or constructed data mean appears to come from the same population. The “F” test should be used on the estimate of sample variance. For a target surveillance interval constructed of shorter intervals where instrument reset did not occur, the longer intervals are statistically dependent upon the shorter intervals; hence, either the constructed longer-interval data or the shorter-interval data should be used, but not both. In a constructed interval, drift = as-left$_{(0)}$ – as found$_{(LAST)}$, the intermediate values are not used.

When using samples acquired from generic instrument drift analyses or constructed intervals, the variances are not simply summed, but are combined weighted by the degrees of freedom in each sample.”

EVALUATION

ISA S67.04, "Setpoints for Nuclear Safety-Related Instrumentation," recognizes two models for the extrapolation of drift: the linear method and the use of SRSS, which recognizes the random nature of drift, and extrapolates the magnitude accordingly. Through binning analysis and regression analysis, the drift bias and random terms were evaluated separately for each group of instruments. If the drift bias was determined to be time dependent, the value was linearly extrapolated to 30 months, using the regression prediction line from the data within the valid time bins. If the bias was determined to be time independent, the bias term was established as the mean of the final data set.

If the random portion of the drift was determined to be time dependent, the standard deviation was conservatively linearly extrapolated to the 30-month period. This extrapolation was performed from a regression of the standard deviation averages from the binning analysis. The extrapolated standard deviation is then multiplied by the 95/95 confidence factor (based on sample size) to obtain the value of the random portion of the drift.

If the random portion of drift was-found to be time independent, additional confidence was added (99/95 factor) to be able to use the value in the next time bin. If additional extrapolation was necessary, additional conservatism was added through means of an SRSS extrapolation to expand the drift value to 30 months.

STATUS REPORT

Item 4.4, Section 4, "Analysis of Calibration Data"

Subitem 4.4.5, Section 4.8, "Shelf Life of Analysis Results"

"The TR gives guidance on how long analysis results remain valid. The guidance given is acceptable with the addition that once adequate analysis and documentation is presented and the calibration interval extended, a strong feedback loop must be put into place to ensure drift, tolerance and operability of affected components are not negatively impacted. An analysis should be re-performed if its predictions turn out to exceed predetermined limits set during the calibration interval extension study. A goal during the re-performance should be to discover why the analysis results were incorrect The establishment of a review and monitoring program, as indicated in GL 91-04, Enclosure 2, Item 7 is crucial to determining that the assumptions made during the calibration interval extension study were true. The methodology for obtaining reasonable and timely feedback must be documented."

EVALUATION

As discussed in the submittal documents the plant is committed to establish a trending program to provide feedback on the acceptability of the drift error extension. This program will evaluate any as-found condition outside the Extended Tolerance and perform a detailed analysis of as-found values outside the Allowable Value. The drift analysis will be re-performed when the root cause analysis indicates drift is a probable cause for the performance problems.

STATUS REPORT

Item 4.5, Section 5, "Alternative Methods of Data Collection and Analysis"

"Section 5 discusses two alternatives to as-found/as-left (AFAL) analysis, combining the 0%, 25%, 50%, 75% and 100% span calibration points, and the EPRI Instrument Calibration Reduction Program (ICRP).

Two alternatives to AFAL are mentioned: as-found/setpoint (AFSP) analysis and worse case as-found/as-left (WCAFAL). Both AFSP and WCAFAL are more conservative than the AFAL method because they produce higher estimates of drift. Therefore, they are acceptable alternatives to AFAL drift estimation.

The combined-point method is acceptable, and in some cases preferable, if the combined value of interest is taken at the point important to the purpose of the analysis. That is, if the instrument being evaluated is used to control the plant in an operating range, the instrument should be evaluated near its operating point. If the instrument being evaluated is employed to trip the reactor, the instrument should be evaluated near the trip point. The combined-point method should be used if the statistic of interest shows a correlation between calibration span points, thus inflating the apparent number of data points and causing an overstatement of confidence in the results. The method by which the points are combined (e.g., nearest point interpolation, averaging) should be justified and documented."

EVALUATION

The worst case as-found/as-left method was one method used where there was insufficient data to perform simple statistics. The WCAFAL were evaluated against current allowances, and where the value had not exceeded the allowance, this was used as a limiting drift value for the calibration cycle time interval. This value was then extrapolated to the 30-month interval.

In other cases where an instrument had been recently replaced or was not calibrated in the past and a vendor drift expression existed, the drift term was extrapolated as appropriate for the 30-month interval. For some other installations, the instruments had been calibrated for the last 5 cycles without an adjustment. In this case the drift value assumed with simply used for the 30 month calibration cycle.

STATUS REPORT

Item 4.6, Section 6, "Guidelines for Calibration and Surveillance Interval Extension Programs"

This section presents an example analysis in support of extending the surveillance interval of reactor trip bistables from monthly to quarterly.

EVALUATION

The ComEd submittal used the same methodology for the extension of bistables as used for transmitters, switches and time delay relays.

STATUS REPORT

Item 4.7, Section 7, "Application to Instrument Setpoint Programs"

"Section 7 is a short tutorial on combining uncertainties in instrument setpoint calculations. Figure 7-1 of this section is inconsistent with ANSI/ISA-S67.04-1994, Part I, Figure 1. Rack uncertainty is not combined with sensor uncertainty in the computation of the allowable value in the standard. The purpose of the allowable value is to set a limit beyond which there is reasonable probability that the assumptions used in the setpoint calculation were in error. For channel functional tests, these assumptions normally do not include an allowance for sensor uncertainty (quarterly interval, sensor normally excluded). If a few instruments exceed the allowable value, this is probably due to instrument malfunction. If it happens frequently, the assumptions in the setpoint analysis may be wrong. Since the terminology used in Figure 7-1 is inconsistent with ANSI/ISA-S67.04-1994, Part I, Figure 1, the following correspondences are suggested: the 'Nominal Trip Setpoint' is the ANSI/ISA trip setpoint; ANSI/ISA value 'A' is the difference between TR 'Analytical Limit' and 'Nominal Trip Setpoint' [sic]; 'Sensor Uncertainty' is generally not included in the 'Allowable Value Uncertainty' and would require justification, the difference between 'Allowable Value' and 'Nominal Trip Setpoint' is ANSI/ISA value 'B'; the 'Leave-As-Is-Zone' is equivalent to the ANSI/ISA value 'E' and the difference between 'System Shutdown' and 'Nominal Trip Setpoint' is the ANSI/ISA value 'D'. Equation 7-5 (page 7-7 of the TR) combines a number of uncertainties into a drift term, D. If this is done, the reasons and the method of combination should be justified and documented. The justification should include an analysis of the differences between operational and calibration environments, including accident environments in which the instrument is expected to perform."

EVALUATION

Application of the drift values to plant setpoints is being performed in accordance with the ComEd Setpoint Methodology. The Allowable Value defined for the Setpoint Methodology is defined as the operability limit when performing the channel calibration. Therefore, the Allowable Value placed in Technical Specification includes the sensor drift for the refueling cycle and the trip unit drift (for transmitter/trip unit combinations) for its calibration cycle. No environmental terms are included in the drift value.

STATUS REPORT

Item 4.8, Section 8, "Guidelines for Fuel Cycle Extensions"

"The TR repeats the provisions of Enclosure 2, GL 91-04, and provides direct guidance, by reference to preceding sections of the TR, on some of them."

EVALUATION

A specific discussion of ComEd compliance to NRC Generic Letter 91-04 is provided in the other sections of this attachment.

STEP 3:

Confirm that the magnitude of instrument drift has been determined with a high probability and a high degree of confidence for a bounding calibration interval of 30 months for each instrument type (make, model number, and range) and application that performs a safety function. Provide a list of the channels by Technical Specification section that identifies these instrument applications.

EVALUATION

In accordance with the methodology described in the previous section, the magnitude of instrument drift has been determined with a high degree of confidence and a high degree of probability for a bounding calibration interval of 30 months for each instrument make and model number and range. This information, including the list of affected channels by Technical Specification section, is provided in the category "LE" Discussion of Changes provided in the ITS submittal.

STEP 4:

Confirm that a comparison of the projected instrument drift errors has been made with the values of drift used in the setpoint analysis. If this results in revised setpoints to accommodate larger drift errors, provide proposed TS changes to update trip setpoints. If the drift errors result in revised safety analysis to support existing setpoints, provide a summary of the updated analysis conclusions to confirm that safety limits and safety analysis assumptions are not exceeded.

EVALUATION

The projected drift values will be compared to the design allowances for the associated instruments as calculated in the associated setpoint analysis. Some of these analyses will be completed after the performance of the 24 month drift evaluation, and therefore, data obtained from the drift study will be utilized in the setpoint analysis. If the projected drift for an instrument falls outside the design allowances, the setpoint analysis will be reviewed and/or revised as necessary to accommodate the increased projected drift values. If the projected drift value for an instrument can not be accommodated in the setpoint analysis, the surveillance test interval will either not be changed or will be changed to a frequency that is supported by the projected drift. If an instrument has not been in service long enough to establish a projected drift value, the surveillance interval will be extended to a 24-month interval based on other, more frequent testing or justification obtained from qualitative analysis.

For LaSalle County Station, Units 1 and 2, in no case was it necessary to change the existing safety analysis to accommodate a larger instrument drift error. For Dresden Nuclear Power Station, Units 2 and 3, and Quad Cities Nuclear Power Station, Units 1 and 2, the safety analysis will be revised, prior to implementation, to increase the following Nuclear Instrumentation System Analytical Limits associated with ITS by 5%.

Intermediate Range Monitors Neutron Flux - High
APRM Flow Biased Neutron Flux - High
APRM Fixed Neutron Flux - High

An independent evaluation will be performed to verify that the safety limits and safety analysis assumptions are not exceeded. A summary of the updated analysis conclusions will be provided when the analysis is completed. Additional safety analysis changes may be identified during the process of completing calculations to support the plant Allowable Values and setpoints for the new calibration frequency. If additional changes are identified, they will be added a summary of the additional analysis will also be forwarded.

STEP 5:

Confirm that the projected instrument errors caused by drift are acceptable for control of plant parameters to effect a safe shutdown with the associated instrumentation.

EVALUATION

As discussed in the previous sections, the calculated drift values will be compared to drift allowances in the setpoint calculation, other uncertainty analysis, and the General Electric design basis. For instrument strings that provide process variable indication, an evaluation will be performed to verify that the instruments can still be effectively utilized to perform a safe plant shutdown.

The existing safe shutdown analysis will be revised if necessary based on this evaluation.

STEP 6:

Confirm that all conditions and assumptions of the setpoint and safety analyses have been checked and are appropriately reflected in the acceptance criteria of plant surveillance procedures for Channel Checks, Channel Functional Tests, and Channel Calibrations.

EVALUATION

As part of the implementation of the ITS project, applicable surveillance test procedures are being reviewed and updated to incorporate the necessary changes. The reviews include acceptance criteria and any changes resulting from the reviews will be incorporated into the instrument surveillance procedures prior to the implementation of the ITS or prior to implementation of the 24 month operating cycle surveillance test frequency, as appropriate.

STEP 7:

Provide a summary description of the program for monitoring and assessing the effects of increased calibration surveillance intervals on instrument drift and its effect on safety.

EVALUATION

Instruments with TS calibration surveillance frequencies extended to 24 months will be monitored and trended. As-found and as-left calibration data will be recorded for each calibration activity. This will identify occurrences of instruments found outside of their allowable value, or instruments whose performance is not as assumed in the drift or setpoint analysis.

When as-found conditions are outside the allowable value, an evaluation will be performed to determine if the assumptions made to extend the calibration frequency are still valid, to evaluate the effect on plant safety, and to evaluate instrument operability.

In addition, the trending program will address setpoints found to be outside of their Extended Tolerance (ET), i.e., a ComEd specific as found tolerance limit. This ET is based on a portion of the expected drift for the instruments. The trending program will require that any time a setpoint value is found outside the ET, an additional evaluation be performed to ensure that the instruments performance is still enveloped by the assumptions in the drift or setpoint analysis. The trending program will also evaluate setpoint or transmitter AFAL values to verify that the performance of the instruments is within expected boundaries and that adverse trends (repeated directional changes in AFAL even of smaller magnitudes) are detected and evaluated.

CONCLUSION

As described in the above discussion, the evaluations to justify a change in surveillance intervals necessary to support a 24 month fuel cycle have been completed. These evaluations have been determined to conform to the guidance provided in NRC Generic Letter 91-04.

COMMITMENTS

1. The performance of surveillances extended for a 24 month cycle will be trended as a part of the Maintenance Rule Program. Any degradation in performance will be evaluated to verify that the degradation is not due to the extension of surveillance or maintenance activities.

2. Instruments with TS calibration surveillance frequencies extended to 24 months will be monitored and trended. As-found and as-left calibration data will be recorded for each calibration activity. This will identify occurrences of instruments found outside of their allowable value, or instruments whose performance is not as assumed in the drift or setpoint analysis.

3. Appropriate procedures and programs will be revised or established prior to or in conjunction with implementation of the license amendment.

4. Allowable Value changes, which are less restrictive compared to the associated current Technical Specifications values, will be implemented after NRC approval of the license amendment.

REFERENCES

1. NRC Generic Letter No. 91-04, "Changes in Technical Specification Surveillance Intervals to accommodate a 24 Month Fuel Cycle," dated April 2, 1991.

2. Regulatory Guide 1.105, "Instrument Setpoints for Safety-Related Systems," Revision 1, dated November 1976.

3. ISA S67.04, Part I-1994, "Setpoints for Nuclear Safety-Related Instrumentation."

4. ISA RP67.04 Part II-1994, "Methodologies for the Determination of Setpoints for Nuclear Safety-Related Instrumentation."

5. EPRI TR-103335, "Statistical Analysis of Instrument Calibration Data, Guidelines for Instrument Calibration Extension/Reduction Programs," Revision 1.

6. NEDC 31336P-A, "General Electric Instrument Setpoint Methodology (ISM)," dated September 1996.

7. Commonwealth Edison Setpoint Methodology, NES-EIC-20.04, "Analysis of Instrument Channel Setpoint Error and Instrument Loop Accuracy."

8. NRC Safety Evaluation, dated August 2, 1993, relating to the Peach Bottom Atomic Power Station Unit 2 and 3 surveillance interval extension from 18 to 24 months.

9. NEDC 30936-P, " BWR Owners' Group Technical Specification Improvement Analyses for ECCS Actuation, Part 1 and Part 2," dated December 1998.

10. NRC Safety Evaluation, dated June 5, 1998, relating to the CP&L Brunswick Nuclear Plant ITS/24 Month Submittal.

ATTACHMENT 5

Guideline for the Analysis and Use of As-Found/As-Left Data

APPENDIX J

GUIDELINE FOR THE ANALYSIS AND USE OF AS-FOUND/AS-LEFT DATA

1.0 INTRODUCTION

The analysis of the data from calibration of installed instrumentation can provide the station with several pieces of information that will allow for better prediction of instrument behavior and will provide more "accurate" data for computation of loop uncertainties.

This attachment defines a process that will be used at ComEd to ensure consistency and compliance with regulatory position GL-91-04. This process will specifies certain requirements, but does not provide a step-by-step methodology. Each site should develop specific methodologies, utilizing these guidelines to support their specific needs.

There are several approaches to the analysis of data and it's subsequent use. ComEd has adopted a general methodology similar to that presented in EPRI TR-103335, *Guidelines for Instrument Calibration Extension/Reduction Programs. Revision 1*. Refer to this document for a complete understanding of the guidelines developed in this Appendix.

This Appendix is divided into the following sections:

2.1 DATA COLLECTION AND POOLING
2.2 INITIAL ANALYSIS PROCESS
2.3 OUTLIER AND POOLING VERIFICATION REQUIREMENTS
2.4 NORMALITY
2.5 TIME DEPENDENCE
2.6 RESULTS
2.7 USING RESULTS
2.8 CONTINUING EVALUATION

Each of these sections contains a general discussion of the expected actions that will conform to TR-103335 and the guidelines to be followed for analysis at ComEd sites.

2.0 ANALYSIS METHODOLOGY

2.1 DATA COLLECTION AND POOLING

2.1.1 To evaluate the performance of an instrument or group of instruments the data that is collected should consist of a sufficient number of independent samples to make statistical significance. The sample should also represent a good distribution of the instruments used. In most cases this will be the whole population. For instruments that are used extensively in the plant, a sample can be used. When collecting data, the application of each instrument must be identified to avoid application specific errors that will cause pooling of data to be an incorrect decision. Because the evaluation includes the important element of time dependency determination, the data collected should have data from different calibration intervals. The evaluation must include all of the times that the instrument has been calibrated. or checked for accuracy (i.e. surveillance testing without adjustment).

2.1.2 Selection of the Instruments to be Evaluated (Pooled) for a Given Drift Study

2.1.2.1. All instruments evaluated shall be from the same manufacturer and shall perform in an identical manner for the critical parameters that are to be analyzed. Determining which instruments meet this criterion is eschewed by the fact that many manufacturer's have different model numbers based on mounting, enclosure, etc. The differences typically have no effect on the method that the instrument uses to monitor the parameter of concern. In addition, the range of the instrument may vary without having any significant change in the measurement method. If multiple model numbers are used, the evaluations must include a discussion of the reason why the instruments are assumed to be identical. specifically in the critical areas of concern.

2.1.2.2. ComEd has specified that the number of valid data points that are required to make a drift study statistically significant shall be ≥ 20 data points. The value of 20 samples is generally accepted as a minimum valid sample size. An analysis using less than this number can be performed if justification is provided in the report. To allow for the potential of an outlier, this number should be > 20 data points. If there are more than approximately 150 data points, there is no significant improvement in the statistical rigor of the analysis.

2.1.2.3. In order to obtain the necessary number of data points required to ensure that there is variance in the calibration interval for the make/model of concern, the calibration data from multiple instruments will be needed. The following criteria for the selection of which instruments, and calibration data points shall be used:

a. All instruments that are directly associated with RPS/ESF/ECCS automatic trips and actuations shall include at least one channel's instruments.

b. To ensure that there is a historical perspective to the data evaluated. at least four calibration intervals of data shall be collected. If the instrument has not been installed for that period of time, then the available data will be used. There may be some problems in the evaluation of the instrument over a given calibration interval.

c. If more than 150 data points can be developed for a given analysis. then a sample of instruments can be used instead of the whole population. The selection of which instruments to include will be done on a random basis, provided Section 2.1.2.3.a requirements are maintained. If after the selection of instruments there is an insufficient range of calibration internals in the selected data. additional instruments shall be added to expand the range.

2.1.3 Data Collection is the transfer of data from the calibration records to the final analysis tool. This is a very sensitive process that will require independent verification and validation of data transferred.

2.1.3.1 A search of all preventive and corrective maintenance records shall be conducted on each instrument selected for inclusion in the study. This search shall identify every calibration and every corrective maintenance activity for the period of concern for the study. The search should go back at least three calibration intervals (i.e. at least four sets of calibration data). If there are less than seven instruments included in the study then additional historical data will need to be collected to achieve the minimum number of data points specified by Section 2.1.2.2.

2.1.3.2 The data from the calibrations will be entered into a spreadsheet or data base program using a format similar to Figure J1. For instruments that have multiple calibration points (transmitters, function generators, etc.) each calibration point will be entered in the spreadsheet using the percent of span as the column title. If there are discrepancies in the exact percent of span then calibration points that are within 5% of each other can be used together (e.g. 0% FS, 1% FS and 5% FS can be considered the same calibration point).

For switches, relays or other equipment where there is a single point that is calibrated the data can be entered in percent of instrument span or in process units.

Due to the diversity of software that can be used to compute this spreadsheet statistics, there may be some variation in format. The specific project or calculation shall identify the software used and justify that the data entry is in agreement with the intent of Section 4.0 of TR-103335.

Initial Data Analysis									
Date		Data	Interval	Tag	Calibration Data (mA)				
Mo	Yr	Status	Months	Number	0%	25%	50%	75%	100%
5	93	As-Found	12	LT-459	4.00	8.00	11.94	15.96	20.01
		As-Left		LT-459	4.00	8.00	11.94	15.96	20.01
5	92	As-Found	14	LT-459	4.20	8.04	12.05	16.05	20.04
		As-Left		LT-459	4.00	8.00	11.98	15.98	20.00
3	91	As-Found	11	LT-459	4.09	8.04	12.02	16.05	20.04
		As-Left		LT-459	4.09	8.04	12.02	16.05	20.04
4	90	As-Found	10	LT-459	4.06	7.92	11.95	15.98	19.95
		As-Left		LT-459	4.06	7.92	11.95	15.98	19.95
6	89	As-Found	13	LT-459	4.00	8.00	12.02	16.07	20.02
		As-Left		LT-459	4.00	8.00	12.02	16.07	20.02
5	88	As-Found	12	LT-459	4.24	8.20	12.16	16.12	20.15
		As-Left		LT-459	4.00	7.97	11.98	15.98	20.00
5	87	As-Found		LT-459	NEW	NEW	NEW	NEW	NEW
		As-Left		LT-459	4.02	7.99	11.99	16.07	20.01

Figure J1, Example Spreadsheet Data Entry

The following information is particularly valuable for the analysis:

- The date of calibration is documented. The time interval since the previous calibration is calculated in months in the *Interval* column. Depending on the data, the time interval might be calculated in days, weeks, or months.

- The as-found and as-left data are entered into the spreadsheet exactly as recorded on the instrument data sheet. The values are in milliamperes (in this case) corresponding to a range of 0% to 100% of calibrated span.

- Note that all calibration data points have been recorded. In general, it is preferable to consider and evaluate all available data. By this approach, a better understanding of instrument drift can be obtained.

2.1.3.3 All Data transfer will require 100% independent verification.

2.1.3.4. Due to legibility problems, even if it is obvious that the data recorded in original records is incorrect, verbatim transcription of the data is required. If the information cannot be determined from the original record (due to legibility problems) then the data point will be left blank. Record of this omission shall be included in the analysis.

2.1.3.5 In addition to the calibration point as-found and as-left values, the calibrated span of the instrument, date of the calibration and any significant calibration anomalies are to be recorded in the spreadsheet.

2.2 INITIAL ANALYSIS PROCESS

2.2.1 From the original data certain manipulations may be required to get the data in a form that can be evaluated across various instruments.

2.2.1.1 If the instrument loop is not a linear loop and the data has not been converted, then the raw calibration data should be converted to Linear Equivalent Full Scale (LEFS) to ensure that drift information is not masked.

2.2.1.2 If the instrument has a known span, the data should be normally converted into percent of calibrated span by dividing the raw data by the span.

If the instrument does not have a known span, the data should be left in process units or converted to percent of the setpoint.

2.2.1.3 For each calibration interval where there is an as-left value from the older calibration and an as-found value from the younger calibration, a raw drift value should be determined by subtracting the as-left value from the as-found value. The calibration interval, in days, should also be determined.

2.2.2 Once the data is in the correct format, the number of data points, the average and the sample standard deviation should be determined for each column, (reference Section 4.0 of TR-103335).

Due to the diversity of software that can be used to compute this spreadsheet statistics, there may be some variation in format. The specific project or calculation should identify the software used and justify that the data entry is in agreement with this Standard.

2.3. OUTLIER AND POOLING VERIFICATION REQUIREMENTS

2.3.1 After the initial computation of the average and the sample standard deviation, identification of any potential outliers and the cause of these outliers will provide important information as to the behavior of the data that was evaluated.

2.3.1.1 Using a T-Test, A statistical check of the raw data against the average and the sample standard deviation shall be conducted.

Outlier Detection by the Critical values for T-Test

ASTM Standard E 178-80 provides several methods for determining the presence of outliers. The recommended method for detection of an outlier is by the T-Test. This test compares an individual measurement to the sample statistics and calculates a parameter, T, known as the extreme studentized deviate as follows:

$$T = \frac{|x_i - \bar{x}|}{s}$$

Where,

T - Calculated value of extreme studentized deviate that is compared to the critical value of T for the sample size

$\bar{x}$ - Sample mean

x_i- Individual data point

s - Sample standard deviation

If the calculated value of T exceeds the critical value for the sample size and desired significance level, then the evaluated data point is identified as an outlier. The critical values of T for the upper 1%, 2.5%, and 5% levels are shown in Table J1.

Outlier Analysis			
Sample Size	Upper 5 % Significance Level	Upper 2.5% Significance Level	Upper 1% Significant Level
10	2.18	2.29	2.41
20	2.56	2.71	2.88
30	2.75	2.91	3.10
40	2.87	3.04	3.24
50	2.96	3.13	3.34
75	3.10	3.28	3.50
100	3.21	3.38	3.60
125	3.28	3.46	3.68
~150	3.33	3.51	3.73

Table J1. Critical Values for T

Note that the critical value of T increases as the sample size increases. The significance of this is that as the sample size grows, it is more likely that the sample is truly representative of the population. In this case, it is less likely that an extreme observation is truly an outlier. Thus, the T-Test makes it progressively more difficult to identify a point as an outlier as the sample size grows larger. This intuitively makes sense. As the sample size approaches infinity, there should be no outliers since all the data truly is a part of the total population. For this reason, it is relatively easy to identify a larger than average data point as an outlier if the sample size is small; however, it is (and should be) harder to call a given data point an outlier if the sample size is large.

Table J1 provides outlier criteria up to a sample of 150 data points. Beyond this size, it should be even more difficult to declare an observation as an outlier. For greater than 150 data points, an outlier factor of 4 (or 4 standard deviations) is recommended in order to assure that outliers are not easily rejected from the sample.

The T-Test inherently assumes that the data is normally distributed. The significance levels in Table J1 represent the probability that a data point will be chance exceed the stated critical value. Referring to Table J1 for a sample size of 40, we would expect to have a calculated value of T greater than 2.87 about 5% of the time and a calculated value of T greater than 3.24 about 1% of the time. For safety-related calculations, testing outliers at the 2.5% or 1% significance level is recommended. Refer to ASTM Standard E 178-80 for further information regarding the interpretation of the T-Test.

<u>Example, Instrument Draft Sample</u>

Consider the 20 instrument drift data points shown in Table J2. The data appears to be within a $\pm 1\%$ range with the exception of a single large data point, 5.20%. Would the T-Test identify this point as an outlier?

Instrument Drift Sample Data	
0.47%	5.20%
-0.27%	0.21%
0.03%	-0.12%
-0.28%	0.42%
0.60%	0.69%
-0.30%	-0.78%
-0.82%	0.30%
-0.28%	-0.08%
0.27%	0.03%
0.00%	-0.45%

Table J2, Instrument Draft Sample Data

The T-Test method requires the calculation of the sample mean and standard deviation before the calculated value of T can be obtained. For the above data. the sample mean and standard deviation are:

Sample mean: 0.23%
Sample Standard deviation: 1.24%

Now, evaluate the 5.20% data point to determine if it might be an outlier. The calculation of T is as follows:

$$T=\frac{|5.20-0.23|}{1.24}=4.01$$

As shown, the calculated value of T is 4.01. Compare this result to the critical values of T for this sample size is 2.56 at the 5% significant level and 2.88 at the 1% significant level (see Table J1). In either case. the calculated value of T exceeds the critical value of T and the 5.20% data point is identified as an outlier.

If the 5.205 data point is rejected from the sample, the sample statistics would be recomputed for the 19 remaining data points with the following results:

Sample mean: -0.03%
Sample standard deviation: 0.42%

Notice that the single outlying observation was the only reason for an apparent bias of 0.23%. The standard deviation was reduced by approximately 65% (from 1.24% to 0.42%) by elimination of this single extreme value.

2.3.1.2 For any raw drift value that exceeds the critical T-Test. an evaluation shall be performed to determine if the data point should be excluded from the final data set. In no case can more than 5% of the original data be removed. Removal of outliers from the data set should be minimized as the process is to predict actual instrument performance. Since the data is all that we have to depict that performance. whether we like it or not. we need to accept the data unless underlying information can be inferred. The outlier process can be repeated after an outlier or outliers have been removed within the constraints of this section.

2.3.1.3 Identification of a potential outlier in Section 2.3.1.2 does not mean that the value will be automatically excluded. Examples of when outliers should be removed include:

a. Review of the calibration indicates that a data entry error was likely. This will normally be seen as a random value that is significantly outside the rest of the data with no explanation. This type of outlier is a rare event and should not be done routinely.

b. Review of the data indicates that a bad calibration was performed. This will normally be seen by multiple outliers from the same calibration and a reverse drift of similar magnitude in the next calibration. In these cases both sets of raw data should be removed.

2.3.1.4 The pattern of outliers should also be evaluated to determine if there is a bad instrument or application that is contaminating the data set.

It is permissible for this evaluation to rerun the T-Test with a smaller critical T value to force outliers. If this is done, these outliers should not be removed from the final data set.

2.3.1.5 Bad instruments or bad applications will be detectable from the outliers that are identified. The best indication will be that the outliers will be bunched in the instrument or instruments used for a specific application. Other potential causes that could be identified by this process are:

a. Variations in range or span
b. Variations in age of calibration or equipment.

2.3.1.6 If the result of the outlier analysis indicates the potential for an application, range, age, etc. type of problem, then an analysis of the selection at that particular instrument should be conducted. Inclusion of data from any instrument can be checked by comparing this mean and variance of the instrument data to the mean and variance to the remainer of the data as explained in TR-103335 Section B.9.

2.4 NORMALITY

2.4.1 For this analysis the assumption of normality is an integral assumption. To ensure that the data is a normal distribution or that a normal distribution is a conservative assumption, a test for normality of the data will be performed for all as-found/as-left data analysis after any outliers have been removed.

2.4.2 There are several tests for the normality of a data set. (See Appendix C of TR-103335). ComEd requires at least one of the following numerical approaches be conducted before the qualitative evaluations are performed.

- Chi-Squared, χ^2, Goodness of Fit Test. This well known test is stated as a method for assessing normality in ISA-RP67.04, Recommended Practice, *Methodologies for the Determination of Setpoints for Nuclear Safety-Related Instrumentation*.

- WTest. This test is recommended by ANSI N15.15-1974, *Assessment of the Assumption of Normality (Employing Individual Observed Values)*, for sample sizes less than 50.
- D-Prime Test. This test is recommended by ANSI N15.15-1974, *Assessment of the Assumption of Normality (Employing Individual Observed Values)*, for moderate to large sample sizes.

2.4.3 If normality cannot be determined from a standard test then the data should be evaluated to determine if the assumption of normality is a conservative assumption. This can be done by one of the following techniques:

- Probability Plots. Probability plots (See Figure J2) provide a graphical presentation of the data which can reveal possible reasons for why the data is or is not normal. Use of a probability plot and qualitative evaluation demonstrates how close the tails of the curve approach a diagonal.

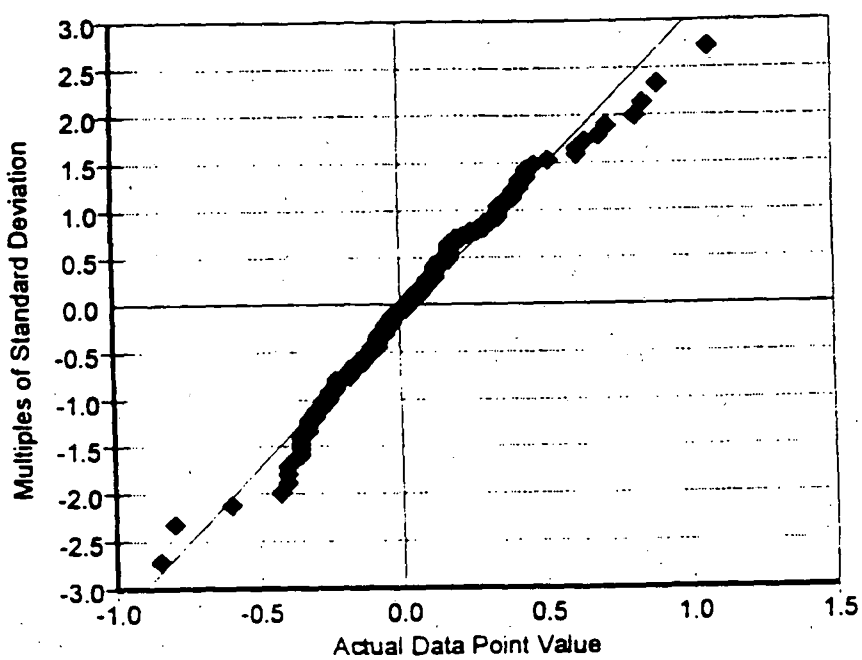

Figure J2, Typical Probability Plot for Approximately Normally Distributed Data

- Coverage Analysis. A coverage analysis (See figure J3) is used for cases in which the data fails a test for normality, but the assumption of normality can still be a conservative representation of the data.

This is performed by a visual evaluation of a histogram of the data with a normal curve for the data overlaid. In most cases instrument data will tend to have a high kurtosis (center peaked data). Since the area of concern for uncertainty analysis is in the tails of the normal curve beyond at least two standard deviations, a high kurtosis will not invalidate the conservative assumption of normality if there are not multiple data points outside the two standard deviation points.

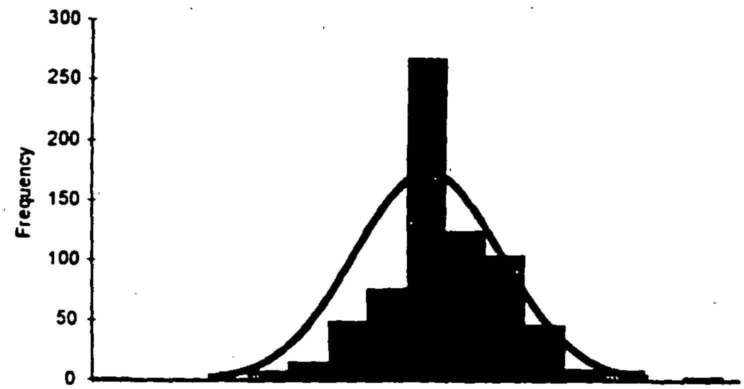

Figure J3, Coverage Analysis Histogram

2.4.4 If normality or a bounding condition of normality cannot be assumed for the data set, then depending on the distribution:

a. A distribution free tolerance value must be determined.
b. The size of the standard deviation will be expanded to bound the distribution.

As this is a seldom used case, this will not be discussed in this Standard. Refer to standard statistics texts to accomplish this activity.

2.5 TIME DEPENDENCE

2.5.1 The way the resultant drift value from this as-found/as-left analysis is used is very sensitive to the determination of the time dependency.

This is particularly important for the extension of operating cycles via the NRC Generic Letter 91-04. This drift analysis requires that some decision be made on how the drift at thirty months can be determined from data that is taken over an eighteen month period.

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2.5.2 The basic assumption that drift is linear time dependant will be used for the initial evaluation of the computed drift.

The methodology to determine the existence or lack of time dependency requires evaluation of the mean of the data over calibration interval and the variation in uncertainty over calibration interval.

The following methodology has been selected by ComEd for determining time dependency.

2.5.2.1 The data collected shall be placed in interval bins. The interval bins that will normally be used are:

a. 0 to 45 days (covers most weekly and monthly calibrations)
b. 46 to 135 days (covers most quarterly calibrations)
c. 136 to 225 days (covers most semi-annual calibrations)
d. 226 to 445 days (covers most annual calibrations)
e. 446 to 650 days (covers most old refuel cycle calibrations)
f. 651 to 800 days (covers most extended refuel cycle calibrations)
g. 801 to 999 days
h. > 1000 days

2.5.2.2 For each internal bin, the average ($\overline{x}$), sample standard deviation (σ) and data count (η) shall be computed. In addition, the average interval of the data points will also be computed.

2.5.2.3 To determine the existence of time dependency, ideally the data needs to be "equally" distributed across the multiple bins. However equal distribution in all bins would not normally occur. The minimum expected distribution that would allow this evaluation is:

a. A bin will be considered in the final analysis if it holds more than five data points and more than ten percent of the total data count.

b. For those bins that are to be considered the difference between bins will less than twenty percent of the total data count.

c. At least two bins including the bin with the most data must be left for evaluation to occur.

The following example demonstrates the process described above.

Example, Time Dependence Evaluation

For a given make and model of transmitter there were a total of twelve EPNs that were looked at with historical calibrations for five calibration periods. Including corrective actions there were a total of 66 data points. The distribution of the data by bins was:

Bin	Data Count	% of Total Count
0 to 45 days	7	11
46 to 135 days	4	6
136 to 225 days	29	44
226 to 445 days	6	9
446 to 650 days	18	27
651 to 800 days	2	3

The 46 to 135 day and 46 to 135 day bins are thrown out due to less than five data points and the 226 to 445 day bin is thrown out do to having less than ten percent of the data. Of the remaining three bins the 446 to 650 day bin is within twenty percent of the other two bins so there will be three bins used for evaluation.

With a slight variation in the data:

Bin	Data Count	% of Total Count
0 to 45 days	7	11
46 to 135 days	4	6
136 to 225 days	29	44
226 to 445 days	3	5
446 to 650 days	21	32
651 to 800 days	2	3

Now the 0 to 45 day bin is greater than twenty percent from the next bin and thus only the 136 to 225 day and 446 to 650 day bins can be used for analysis.

With another slight variation:

Bin	Data Count	% of Total Count
0 to 45 days	7	11
46 to 135 days	3	5
136 to 225 days	33	50
226 to 445 days	6	9
446 to 650 days	15	23
651 to 800 days	2	3

The majority of the data is in the 136 to 225 day bin and that bin is greater than twenty percent from the next most populous bin. In this case the normal analysis cannot be used. Engineering evaluation of the other bins with greater than ten percent of the data should be done to determine if they can be grouped with the data from the large bin. This could be done by the pooling techniques listed above.

2.5.2.4 Once the bins have been selected, data from selected bins and all bins between them will be entered into a regression analysis program. A regression analysis will be performed using calibration interval as the independent variable and drift as the dependant variable. Output of the regression analysis shall be in a standard ANOVA table similar to that shown in Table J3.

DEP VAR: DOT2 N: 21 MULTIPLE R: 0.178 SQUARED MULTIPLE R: 0.032						
ADJUSTED SQUARED MULTIPLE R: .000 STANDARD ERROR OF ESTIMATE: 1.304						
VARIABLE	**COEFFICIENT**	**STD ERROR**	**STD COEF**	**TOLERANCE**	**T**	**P (2 TAIL)**
CONSTANT	0.848	0.740	0.000		1.146	0.266
PERIOD	-0.001	0.002	-0.178	1.000	-0.787	0.441
ANALYSIS OF VARIANCE						
SOURCE	**SUM-OF-SQUARES**	**DF**	**MEAN-SQUARE**	**F-RATIO**	**P**	
REGRESSION	1.054	1	1.054	0.620	0.441	
RESIDUAL	32.319	19	1.701			

Table J3, Standard ANOVA Table

If the value for R^2 is greater than 0.3, then the drift appears to be linearly time dependent over the range of the calibration intervals included in the analysis. The constant and slope of the drift line will be used for drift values in uncertainty analysis for this instrument make and model. The appropriate tolerance interval for the 95/95 case should also be determined for this regression. [Note: This case will only occur rarely]

2.5.2.5 If the initial regression test did not find a linear time dependency, then the same regression test shall be applied to the absolute value of the same data.

The absolute value of the data is used to detect an expanding uncertainty with a sample mean near zero. Near zero sample mean exists for most drift data and thus there is a chance that the increasing uncertainty will be not detected.

2.5.2.6 If neither of the regression tests show an R^2 value greater than 0.3, then there is no time dependency for the time frame evaluated.

2.5.2.7 For those cases with no apparent time dependency, one additional check should be performed to identify any potential problems resulting from increasing uncertainty.

For each bin that was evaluated, plot the mean and sample standard deviation against the average calibration interval for that bin. These plots will provide visual indication of the stability of the mean and sample standard deviation for the data available. Indications of increased magnitude with increasing or decreasing calibration interval can be qualitatively assessed.

A linear extrapolation of the expected increase in sample standard deviation and mean to the next bin outside the analyzed interval can be determined through the regression of the plotted values for the mean and standard deviation. This will provide a value for the mean and sample standard deviation, in Units/Day, for projection into the next bin.

2.5.3 If two or more bins were not identified for analysis then the value of drift from this evaluation must determined from the data from the most populated bin. For this case the process utilized is:

2.5.3.1 Compute the mean and sample standard deviation for the most populated bin. In addition, compute the average calibration interval for the data in that bin.

2.5.3.2 Compute the bias (Section 2.6.1.1) and the tolerance (Section 2.6.1.3). The tolerance value is assumed to be random, allowing the use of the Square Root Sum of the sum of the Squares combination for longer time intervals.

2.5.3.3 Define the drift as either:

a. Time dependent with a bias and tolerance for the period up to the average calibration interval of the bin.

b. Time independent using the 99/95 tolerance value. Historically as-found/as-left studies have not identified any time dependency in drift. By using this expanded tolerance interval this historical information will allow expansion of time independent drift to one bin either side of the bin used for the analysis.

2.6 RESULTS

2.6.1 As a result of these as-found/as-left analyses, a value of derived drift for the instrument make/model will be determined. This value will require the following minimum elements:

2.6.1.1 Bias – Will normally be either the mean of the final data set for time independent drift or the intercept (constant) for linear time dependent drift. For time dependent drift, this cannot be from the regression of the absolute value data set but from the final data set. A mean that is less than 0.1% FS will be assumed to be zero. This is a standard value. Bias below this value has no significant effect on the loop uncertainty.

2.6.1.2 Time Dependent Drift Value – For drift that was classified as time dependent, the slope of the regression curve (Units/Day) is the dependant drift value. If this number was determined from the absolute value regression it still should be specified.

2.6.1.3 Tolerance Value – This value will come from the regression study for time dependent drift. For time independent drift it will be the sample standard deviation times a multiplier based on the sample size. The selection of the multiplier will be based on the required expectations. Some specific requirements are:

99/95 – For cases where only one bin has sufficient data for analysis use this tolerance if the intent is to still assume time independent drift.

95/95 – For RPS and ECCS automatic actuations. If any instruments of the make/model are used for this then the result must be this confidence and tolerance interval.

95/75 – For other safety related instrumentation. If no instruments of this make/model are used for automatic actuations but they are used in safety related indication and alarm circuits then the tolerance value can be reduced to 75%.

75/75 – If the make/model is only used for non-safety related activities.

2.6.1.4 Valid Interval – The bounds of the calibration interval that were included in the analysis. For the above example the first case would be 0 to 650 days and the second case would be 136 to 650 days. As extrapolation of statistical evaluations are not normally done this provides the data over the range where it should be valid. Some evaluation of the data within the bounding bins may be necessary to ensure that all of the data is not bunched at one interval. If there is bunching of data, the valid interval should be adjusted to account for this effect.

2.6.1.5 Extrapolation Margin – If the data from the analysis is to be extrapolated to either of the adjacent bins from the Valid Interval, then an additional margin will be added to the results of the evaluation. This additional margin will be:

a. Using the value for the mean and standard deviation (Units/Day) from the process described in Section 2.5.2.7, multiply each value by the number of days that the extrapolation is required. The extrapolation cannot go beyond the next bin. All negative values for standard deviation will be set to zero.

b. Add the extrapolated value to the mean and sample standard deviation to obtain an adjusted mean and sample standard deviation. These adjusted values will be the values used for computing the results required in Sections 2.6.1.1, 2.6.1.2 and 2.6.1.3.

2.6.2 The analysis should clearly indicate the make/model that it was performed for, and any functions excluded.

2.7 USING THE RESULTS

2.7.1 The data reduction has generated a "drift" value, but that number includes several uncertainties in addition to the classical drift. If the determined drift value is used in uncertainty calculations, the following uncertainties can normally be eliminated.

2.7.1.1 Reference Accuracy – The reference accuracy of the instrument is included in the calibration data and can be removed from the uncertainty calculation.

2.7.1.2 M&TE – As long as the calibration process uses the same, or more accurate, test equipment then this uncertainty is included in the calibration data and can be removed from the uncertainty calculation.

2.7.1.3 Drift – The true drift is included in the determined drift and is included in the calibration data and can be removed from the uncertainty calculation.

2.7.1.4 Normal Environmental Effects – For the instruments that are included in the calibration, the effects of variations in radiation, humidity, temperature, vibration, etc. experienced **during the calibration** are included in the calibration data and can be removed from the uncertainty calculation. These terms cannot be removed from the uncertainty calculations if these components see different conditions or magnitudes of the parameter, such as vibration or temperature, while operating then during calibration.

2.7.1.5 Power Supply Effects – If the instruments are attached to the same power supply during calibration that is used during operation, then the affects are included in the calibration data and can be removed from the uncertainty calculation.

2.7.2 For cases were there are time dependent drifts, the time frame used for determining the drift should be the normal surveillance interval plus twenty-five percent.

Time dependent drift that is random is assumed to be normally distributed and can be combined using the Square Root Sum of the Squares method for intervals beyond the given interval for the drift.

2.7.3 Time independent drift can be assumed to be constant over the Valid Interval. It can also be assumed to be constant over the interval in the next bin if the Extrapolation Margin is applied.

2.8 CONTINUING EVALUATION

2.8.1 To maintain these evaluations current and to detect increasing drift, the process stipulated in NSP-ER-3018 "Instrument Trending Program" shall be followed.

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