



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

April 3, 1989

MEMORANDUM TO: Daniel R. Muller, Director
Project Directorate III-2
Division of Reactor Projects III,
IV, V, and Special Projects

FROM: Byron L. Siegel, Project Manager
Project Directorate III-2
Division of Reactor Projects III,
IV, V, and Special Projects

SUBJECT: SUMMARY OF MEETING WITH COMMONWEALTH EDISON COMPANY
TO DISCUSS 4KV UNDERVOLTAGE SETPOINTS FOR DRESDEN
UNITS 2 AND 3

A meeting was held on March 20, 1989 at the USNRC office located at One White Flint North in Rockville, Maryland with Commonwealth Edison Company (CECo). A list of meeting attendees is contained in Enclosure 1.

The purpose of the meeting was to discuss the proposed change to the 4KV undervoltage trip setpoints contained in the proposed Technical Specification (TS) amendment submitted by CECo in a letter dated March 28, 1989 for Dresden Units 2 and 3. CECo requested the change because it was discovered that the current undervoltage setpoints in the TS are not consistent with the field settings on the undervoltage relays. The basis for the acceptability of the proposed TS change was presented by CECo during the meeting and a copy of the handouts is contained in Enclosure 2.

After CECo's presentation, the staff caucused and determined that the proposed amendment for Dresden was acceptable provided CECo committed to the following actions:

1. Develop a procedure for all the CECo plants for the operators to manually disconnect offsite power if the undervoltage is less than 75% of the bus voltage for longer than one minute.
2. Re-confirm for Dresden that only two systems needed for safe shutdown are operating prior to the occurrence of a degraded voltage condition (evaluation should include all safety related equipment, down to 120V, connected to bus that would be subjected to the low voltage).

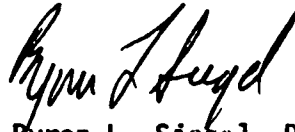
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CECo tentatively agreed to the staff's proposed actions pending further plant and corporate management approval and stated that within one week a formal response would be provided.



Byron L. Siegel, Project Manager
Project Directorate III-2
Division of Reactor Projects III,
IV, V, and Special Projects

Enclosures:
As stated

cc: See next page

April 3, 1989

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Byron L. Siegel, Project Manager
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Enclosures:
As stated

cc: See next page

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MARCH 20, 1989 MEETING BETWEEN CECo & NRC TO DISCUSS 4KV UNDERVOLTAGESETPOINT ISSUE

<u>NAME</u>	<u>AFFILIATION</u>
John Silady	CECo NLA
Nick Kalivianakis	CECo Production
Jack Brunner	CECo Dresden
Mark Kluge	CECo BWR Eng.
James S. Abel	CECo BWR Eng.
Suheil Z. Haddad	S&L Elect. Analytical Div.
George P. Wagner	CECo Production Services
Ashok Thadani	NRC SAD
Thomas J. Kovach	CECo Licensing Manager
Dennis Galle	CECo V.P. BWR Operations
William L. Forney	NRC Reg.III, Deputy Dir.,DRP
Byron Siegel	NRC Dresden Project Manager
Gary M. Holahan	NRC Director DRSP
Faust Rosa	NRC SELB
Dom Tondi	NRC SELB
Fred Burrows	NRC SELB
D. R. Muller	NRC NRR/PDIII-2

Mr. Henry E. Bliss
Commonwealth Edison Company

Dresden Nuclear Power Station
Units 2 and 3

cc:

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Mr. Michael E. Parker, Chief
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Illinois Department of Nuclear Safety
1035 Outer Park Drive, 5th Floor
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**4 KV UNDERVOLTAGE
TRIP SETPOINT
DRESDEN UNITS 2 AND 3**

**COMMONWEALTH EDISON - NRC
MEETING**

**ROCKVILLE, MARYLAND
MARCH 20, 1989**

AGENDA

SUBJECT

OPENING REMARKS

DEFINITIONS

HISTORY

PURPOSE OF 1ST AND 2ND LEVEL
UNDervOLTAGE TRIPS

RESPONSE TO NRC QUESTIONS

CONCLUSIONS

OVERVIEW

PRESENTER

D. P. GALLE

J. A. SILADY

J. A. SILADY

J. A. SILADY

J. D. BRUNNER

J. A. SILADY

D. P. GALLE

CECO 4 KV UNDERVOLTAGE TERMINOLOGY

<u>LEVEL</u>	<u>TECH SPEC TERM</u>	<u>TYPICAL VALUE</u>
• "FIRST"	LOSS OF VOLTAGE RELAYS	~ 70%
•• "SECOND"	DEGRADED VOLTAGE RELAYS	~ 90%

• CALLED "FIRST"
LEVEL BECAUSE THEY
WERE THE FIRST AS
PART OF ORIGINAL
DESIGN

•• CALLED "SECOND"
LEVEL BECAUSE THEY
WERE ADDED LATER
(EARLY 1980'S)

DRESDEN 4 KV UNDERVOLTAGE SETTINGS

<u>LEVEL</u>	<u>VOLTS</u>	<u>%</u>
NORMAL OPERATION	4160	100%
SECOND LEVEL (CURRENT TECH SPEC & ACTUAL)	≥ 3708	$\geq 89\%$ *
FIRST LEVEL (CURRENT TECH SPEC)	≥ 3092	$\geq 74\%$
FIRST LEVEL (ACTUAL & PROPOSED TECH SPEC)	$2930 \pm 5\%$	70%

* IN TODAY'S
DISCUSSION, WILL
REFER TO AS *90%

GENERAL BACKGROUND - HISTORY

■ ORIGINAL DRESDEN DESIGN BASIS

- INCLUDED ONLY FIRST LEVEL TO DETECT LOSS OF OFFSITE POWER
- SETTING NOT INCLUDED IN TECH SPECS

■ LATE 1970'S - EARLY 1980'S

- NRC LETTERS TO ALL LICENSEES ON NEED FOR SECOND LEVEL (6/77)
- NRC LETTER TO ALL LICENSEES REQUESTING STUDY OF ADEQUACY OF ELECTRICAL DISTRIBUTION SYSTEM (8/79)
- SUBMITTED DRESDEN STUDY (11/79)
- COMMITTED TO ADD SECOND LEVEL FOR DEGRADED VOLTAGE (6/80)
- NRC SER ISSUED ON DRESDEN STUDY (10/81)
- SUBMITTED PROPOSED AMENDMENT ADDING SECOND LEVEL WITH 5 MINUTE DELAY, AS WELL AS FIRST LEVEL SETPOINT (3/82)
- NRC SER ISSUED ON DRESDEN REVISED UNDERVOLTAGE SCHEME AND TECH SPECS (5/82)

HISTORY

HOW THE INCORRECT SETPOINT WAS PLACED INTO TECH SP.

1982

- 1ST LEVEL UV TECH SPEC ADDED AT TIME OF 2ND LEVEL UV MODIFICATION AND TECH SPEC CHANGE
- TECH SPEC ON-SITE REVIEW (OSR) PREPARED BY TECH STAFF ENGINEER WHO USED INCORRECT FIRST LEVEL OF 3092 BASED ON 3255 - 5%

HISTORY

DISCOVERY OF PROBLEM (MARCH 1988)

- TECH STAFF GROUP LEADER REVIEW OF DOS-6600-9 (TESTING ECCS UV AND DEGRADED VOLTAGE RELAYS)
 - REVIEW INCLUDED COMPARISON TO TECH SPEC AND CECO'S OPERATIONAL ANALYSIS DEPARTMENT'S CALIBRATION RECORDS
 - DISCOVERED DIFFERENCES BETWEEN CURRENT TRIP VALUE & THE TECH SPEC VALUE
- PROMPTLY NOTIFIED NRR AND R-III
- REQUESTED AND RECEIVED WAIVER

PURPOSE OF 4KV UNDERVOLTAGE RELAY TRIPS

- **1ST LEVEL: TO DETECT LOSS OF OFFSITE POWER
(~ 70%)**
- **2ND LEVEL: TO DETECT DEGRADED VOLTAGE AS
(~ 90%) DETERMINED BY LOAD ANALYSIS**
- **BOTH LEVELS: TO TRANSFER SAFETY BUSES TO ONSITE
POWER (DIESEL GENERATORS)**

SECOND LEVEL 5 MINUTE TRIP DELAY

- **APPLICABLE ONLY FOR NON-LOCA SITUATIONS:**
 - **TO ALLOW OPERATOR SUFFICIENT TIME TO ATTEMPT VOLTAGE RESTORATION**
 - **TO MINIMIZE UNNECESSARY TRANSFER OF EQUIPMENT FROM OFFSITE POWER**
 - **TO AVOID UNNECESSARY DUTY ON DIESEL GENERATOR**
- **BYPASSED WHENEVER LOCA SIGNALS ARE PRESENT (HIGH DRYWELL PRESSURE OR LOW LOW WATER LEVEL WITH LOW REACTOR PRESSURE) SO THAT ONLY THE INHERENT 7 SECOND DELAY OCCURS**

NRC QUESTION #1

- WHAT IS THE EFFECT ON EQUIPMENT OF OPERATION AT 67% RATED VOLTAGE FOR FIVE MINUTES?
 - ASSUMING THIS OCCURRED, THE EQUIPMENT WOULD EXPERIENCE NO PERMANENT DAMAGE
 - ✓ FOR MOTORS, BASED ON DRESDEN MOTOR STUDY DATED 9/20/88
 - ✓ FOR OTHER EQUIPMENT, (E.G. RELAYS, BATTERY CHARGERS ETC.) DRAW LESS CURRENT UNDER DEGRADED VOLTAGES
 - HOWEVER, THIS CONDITION IS NOT A CREDIBLE SCENARIO
 - ✓ 7/77 AND 11/79 SUBMITTALS TO NRC INDICATED LOWEST EXPECTED TRANSIENT VOLTAGE WOULD BE 81.5% OF NOMINAL VOLTAGE. LOWEST STEADY STATE VOLTAGE WOULD BE 88%.
 - ✓ LASALLE YIELDS SIMILAR NOMINAL
- CONFORMANCE TO BTP PSB-1
 - ✓ APPENDIX DESCRIBES COMPLIANCE

NRC QUESTION #2

- CAN MOTORS BE RESTARTED FOLLOWING OVERCURRENT TRIPS BY OPERATION AT 67% VOLTAGE?

- EXAMPLE

VOLTAGE: 67% NOMINAL
CURRENT: 165% NOMINAL
TRIPS: 60 SECONDS
TEMP RISE: ≤ 60 DEGREES C

- CONCLUSION

MOTOR COULD BE STARTED WITH NO TIME DELAY ASSUMING ADEQUATE BUS VOLTAGE IS RESTORED

- CONSEQUENCES

FOR TRIPPED MOTORS, LOCKED OUT RELAYS MUST BE RESET

- WHAT ARE CONSEQUENCES OF MOTORS TRIPPING PRIOR TO OR DURING AN ACCIDENT?

- EXTREMELY LOW PROBABILITY

✓ ASSUMES SEVERELY DEGRADED OFFSITE POWER FOR A SUSTAINED PERIOD FOLLOWED BY A DBA CONCURRENT WITH ECCS PUMPS SURVEILLANCE

NRC QUESTION #2 (CONT'D)

- **WHAT ARE CONSEQUENCES OF MOTORS TRIPPING PRIOR TO OR DURING A TRANSIENT?**
- **EXTREMELY LOW PROBABILITY**
 - ✓ **ALSO ASSUMES SEVERELY DEGRADED OFFSITE POWER FOR A SUSTAINED PERIOD FOLLOWED BY A TRANSIENT**
 - ✓ **ALL SYSTEMS CREDITED IN FSAR TRANSIENT ANALYSES ARE DC INITIATED AND THEREFORE MOTOR TRIPS HAVE NO EFFECT (E.G. ISOLATION CONDENSER, RELIEF VALVES, HPCI)**

NRC QUESTION #3

- WHAT IS THE CONCERN ABOUT RAISING UNDERVOLTAGE RELAY SETPOINT TO 75% OF RATED VOLTAGE?
 - RAISING SETPOINT PRESENTS THESE CONCERNS:
 - ✓ INCREASE PROBABILITY OF TRANSFER TO THE DIESEL GENERATORS
 - ✓ INCREASE PROBABILITY OF UNIT TRIPS
 - ✓ INCREASE PROBABILITY OF MOTOR TRIPS IF ON DIESEL GENERATORS
 - ✓ DELAY IN LOCA RESPONSE DUE TO RELAY RESET CHARACTERISTICS

(CONT'D)

NRC QUESTION #3 (CONT'D)

■ ANSWERS TO OTHER RELATED QUESTIONS

- LOADS HAVE BEEN ADDED BUT NO VOLTAGE CHANGES OF CONSEQUENCE HAVE RESULTED**
- EFFECT OF LOAD ADDITIONS ARE ADDRESSED AT TIME LOAD IS ADDED BASED ON ANALYSIS OR ENGINEERING JUDGEMENT**
- POTENTIAL MODIFICATIONS DO NOT MITIGATE THE FIRST TWO CECO CONCERNS**

NRC QUESTION #4

- WHAT ARE THE LOWEST ALLOWABLE STARTING AND RUNNING MOTOR VOLTAGES?
 - TYPICAL RATINGS
 - ✓ STARTING ANSI: 85% MOTOR VOLTAGE RATING
 CECO: NORMALLY SPECIFIED AS 75-85%
 MOTOR VOLTAGE RATING
 - ✓ RUNNING ANSI: 75% MOTOR VOLTAGE RATING
 FOR ONE MINUTE
 - LARGE MOTORS ARE ONLY STARTED SIMULTANEOUSLY DURING A LOCA AND WHEN THE BUS VOLTAGE IS ABOVE 90%
 - DURING A LOCA, IF BUS VOLTAGE IS LESS THAN 90%, WE TRANSFER TO THE DIESEL GENERATORS AND THEN LOAD THE MOTORS SEQUENTIALLY

NRC QUESTION #5

- **HOW WAS STAFF INFORMED THAT THE TECHNICAL SPECIFICATIONS LISTED TAP VALUES RATHER THAN TRIP SETTINGS?**
 - **CECO DID NOT INTEND TO GIVE THE IMPRESSION THAT THE STAFF WAS INFORMED OR COULD HAVE KNOWN THAT THE 1982 TECHNICAL SPECIFICATION TRIP LEVEL SETTINGS WERE THE TAP SETTING VALUES.**

CECO CONCLUSIONS

- **DRESDEN 1st AND 2nd LEVEL RELAYS FULFILL INTENDED FUNCTION AND COMPLY WITH DESIGN BASIS AND STANDARDS**
- **FSAR QUESTIONS AND ANSWERS ON LASALLE AND BYRON/BRAIDWOOD HAVE SATISFACTORILY ADDRESSED THE SAME ISSUES AS DISCUSSED TODAY**

CECO CONCLUSIONS (CONT'D)

- HAVE APPLIED THE SAME PROTECTION METHODOLOGY
AT NEW CECO SITES

CURRENT TECH SPEC ALLOWABLE SETTINGS

<u>STATION</u>	<u>FIRST LEVEL</u>		<u>SECOND LEVEL</u>		<u>NON-LOCA DELAY</u>	<u>LOCA DELAY</u>
	<u>VOLTS</u>	<u>%***</u>	<u>VOLTS</u>	<u>%***</u>		
DRESDEN	≥3092	≥74	≥3708	≥89	≤ 5 MIN	~7 SEC
LASALLE						
DIV. I/II	2625*	~63	3814**	~92	~ 5 MIN	~10 SEC
DIV. III	2870*	~69	3814**	~92	~ 5 MIN	~10 SEC
BYRON	≥2730	≥69	≥3728	≥90	310 SEC	~10 SEC
BRDWD	≥2730	≥69	≥3728	≥90	310 SEC	~10 SEC

* ± 10% of setpoint

** ± 2% of setpoint

*** % of 4160 volts

CECO CONCLUSIONS (CONT'D)

- **CURRENT CONFIGURATION ADDRESSES SEVERLY DEGRADED VOLTAGES (BETWEEN FIRST AND SECOND LEVELS)**
 - **CHARACTERISTICS OF THE OFFSITE POWER SYSTEM ESSENTIALLY PRECLUDE OPERATION IN THIS RANGE**
 - **SECOND LEVEL DELAY (5 MIN) IS BYPASSED IF LOCA SIGNAL PRESENT: TRIPS WITHIN 7 SECONDS**
 - **THERMAL OVERLOAD TRIPS ALSO PROTECT MOTORS FOR NON-LOCA EVENTS WITH DEGRADED VOLTAGE IN THIS RANGE**
 - **EQUIPMENT WHICH ARE CREDITED IN FSAR TRANSIENT ANALYSES ARE UNAFFECTED**

CECO CONCLUSIONS (CONT'D)

- **NO NET IMPROVEMENT IN PLANT SAFETY IF FIRST LEVEL RELAY SETPOINT IS CHANGED FROM 70% TO 75%**
- **MODIFICATIONS DO NOT RESOLVE ALL CECO CONCERNS PRESENTED BY A SETPOINT CHANGE**

APPENDIX

REGULATORY HISTORY

JUNE 77 POSITION	CECO RESPONSE (DOCKET)80-82	MAY 82 SER	PSB-1 JULY 81
• 2nd LEVEL UV W/TIME DELAY	WILL PROVIDE RELAYS	COMPLY	SAME
• SETPOINTS FROM VOLTAGE ANALYSIS	COMPLY	SAME	SAME
• COINCIDENT LOGIC	COMPLY	COMPLY	SAME
• TIME DELAY AVOIDS TRANSI- ENT DISTURBAN- CES DOES NOT EXCEED FSAR ANALYSIS, DOES NOT DAMAGE SAFETY EQUIP- MENT DURING DEGRADED VOLTAGE	PROVIDED SET- POINTS (IN- CORRECT SET- TINGS); SEPARATELY PROVIDED 1979 VOLTAGE ANALYSIS W/CORRECT SETPOINT (IEIN-7904 AND NRC LETTER)	COMPLY (SAME REVIEWER FOR 2nd LEVEL AND VOLTAGE ANALYSIS 10/81 SER)	TWO TIME DELAYS; -LONGER THAN MOTOR START VOLTAGE DIP TRANSIENT -NO DAMAGE TO PERMANENTLY CONNECTED 1E LOADS IF OPERATOR FAILS TO RESTORE VOLTAGE

REGULATORY HISTORY

JUNE 77 POSITION	CECO RESPONSE (DOCKET)80-82	MAY 82 SER	PSB-1 JULY 81
• AUTOMATICALLY DISCONNECTS OFF- SITE SOURCE	COMPLY	COMPLY	SAME
• IEEE-279	COMPLY	COMPLY	SAME
• TECH SPECS	PROVIDED TECH SPECS	ACCEPTED CECO POSITION	SAME
• LOAD SHED PREVENTED WHEN DIESEL ON BUS	COMPLY (2nd LEVEL ONLY)	COMPLY	PREVENT LOAD SHED DURING SE- QUENCING, REIN- STATE UPON COM- PLETION. LOAD SHED CAN BE RETAINED DURING SEQUENCING IF 1st LEVEL SET- POINT HAS MAX/ MIN LIMITS WITH BASIS
• ONSITE POWER TESTING EVERY 18 MONTHS	DESCRIBED TESTING	ACCEPTED CECO POSITION	VOLTAGE LEVELS OPTIMIZED BASED ON ANALYSIS -SAME AS 1979 ANALYSIS -VERIFIED BY MEASUREMENT