

# REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR: 8201110665 DOC. DATE: 82/01/06 NOTARIZED: NO DOCKET #  
 FACIL: 50-331 Duane Arnold Energy Center, Iowa Electric Light & Pow 05000331  
 AUTH. NAME AUTHOR AFFILIATION  
 ROOT, L.D. Iowa Electric Light & Power Co.  
 RECIP. NAME RECIPIENT AFFILIATION  
 DENTON, H.R. Office of Nuclear Reactor Regulation, Director

SUBJECT: Forwards info requested in NRC 820902 ltr re reactor protection sys mod for facility, superseding info submitted w/utl 800925 ltr. Two oversize drawings encl. Aperture cards are available in PDR.

*See repts w/drawg*

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Iowa Electric Light and Power Company  
January 6, 1982  
LDR-82-002

LARRY D. ROOT  
ASSISTANT VICE PRESIDENT  
OF NUCLEAR DIVISION



Mr. Harold R. Denton, Director  
Office of Nuclear Reactor Regulation  
U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555

Dear Mr. Denton:

This letter and enclosures provide information requested in Mr. Thomas Ippolito's letter dated September 2, 1981 regarding the Reactor Protection System modification for the Duane Arnold Energy Center. This letter supersedes the information provided by our letter dated September 25, 1980 regarding the same subject. The request and response numbers listed in the attachments correspond to the numbers listed in enclosures to Mr. Ippolito's letter.

The Electrical Protection Assemblies required for this modification are presently on order from the General Electric Company. We intend to complete the modifications during the 1982 refueling outage.

Mr. Ippolito's letter of September 2, 1981 provided model Technical Specifications for use in preparing our response. Iowa Electric will provide a proposed Technical Specification amendment which reflects the information outlined by the model technical specifications and consistent with the information provided in Enclosure 1 of this response. The proposed amendment will be submitted two to three months prior to implementation of the modifications.

Very truly yours,

*Larry D. Root*

Larry D. Root  
Assistant Vice President  
Nuclear Generation

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Agent's Dist

LDR/BDS/dmh\*  
Enclosures

cc: B. Shah  
NRC Resident Office  
K. Eccleston (NRC)

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\* 1882 - A CENTURY OF SERVICE - 1982 \*

Enclosure 1  
to LDR-82-002  
REQUEST FOR ADDITIONAL INFORMATION

Request #1: Submit detailed drawings of the proposed design modification to the monitoring system for the RPS power supplies (MGs and alternate source). The drawings should include component ratings, and schematic and wiring diagrams. Detailed relay information may be submitted in the form of the manufacturers Technical Bulletin.

Response #1: Please see the attachment for requested information. Enclosure (2) provides an index of documents attached.

Request #2: Provide justification that proposed time delays, if any, will not result in damage to RPS system components or affect the performance or required safety functions.

Response #2: The Electrical Protection Assembly (EPA) time delay of 115 milliseconds was selected based on the following two considerations:

A. Plant Availability versus Component Protection

Based on the recommendation of General Electric, we have selected the 115 milliseconds as a conservative limit to maintain plant availability. Once an abnormal voltage or frequency condition is sensed by the EPA trip circuitry, the time delay is activated and will allow for source power recovery for up to eight (8) cycles (including tolerance) of alternating current before activating circuit breaker trip.

Voltage and frequency tolerances of several selected RPS typical components, such as the Relay and Contactor have been reviewed by General Electric with their respective vendors. General Electric has concluded after technical discussions, including vendor surge test criteria (i.e., 2500 volt for 1.0 sec), that RPS downstream components can withstand, up to eight (8) cycles of abnormal power conditions without degradation.

B. Existing Time Delays

Most RPS motor-generator sets have an existing underfrequency time delay of 0.1 to 6.0 seconds. The minimum setpoint would be 0.1 seconds (extended time delays increase risks to downstream components). These motor-generator sets have had substantial use in RPS

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power bus applications and no known incidents of component degradation, caused by underfrequency, have been reported to the General Electric Company.

- C. Based on considerations A and B above, and based on the recommendation from the General Electric Company, we feel the 115 millisecond EPA time delay for under voltage, over voltage, and underfrequency protection will not result in damage to RPS or associated downstream components or affect the performance of their required safety function.

NOTE: The EPA time delay will be set at 115 milliseconds with a tolerance of  $\pm 15$  milliseconds.

Request #3: Provide justification that the design modification and components will meet the requirements of GDC 2 and GDC 21 of 10 CFR Part 50, Appendix A.

Response #3: Criterion 2 of 10CFR50 Appendix A

- A. "Design Bases for Protection Against Natural Phenomena", has been considered in the design of the Electrical Protection Assembly (EPA).

The EPA fully meets the requirements for an IEEE Class 1E device and has been qualified by General Electric to the following criteria exceeding the DAEC requirements.

Temperature: 40 to 137°F

Relative Humidity: 10 to 95%

Radiation:  $2 \times 10^5$  Rad (total integrated dose)

Seismic: Operating base earthquake (OBE) 5.0 g

Safe shutdown earthquake (SSE) 7.0 g

Frequency spectrum 1 to 33 Hz.

IEEE Standards 323-1974 and 344-1975 were used as testing guidelines.

- B. The EPA's will be installed in the DAEC control building at elevation 757'-6" which can withstand the effects of Criterion 2.

- C. The importance of safety function performed by the EPA has been reviewed. Failure of the EPA caused by natural phenomena will result in a disconnect of the RPS power source including subsequent half scram which does not present a safety concern.

NOTE: The EPA assemblies will be installed with the following separation criteria:

Minimum vertical separation 3 feet

Minimum horizontal separation 3 feet  
between any two EPAs in series  
with any other series of two EPAs

Input and output power and instrumentation cables will be routed independently and in separate conduit or cable trays to meet the divisional requirements of IEEE 384, and Regulatory Guide 1.75.

Criterion 21 of 10CFR50 Appendix A

"Protection System Reliability and Testability," has been considered in the design and application of the EPA's.

- A. Two IEEE Class 1E qualified EPA units are installed, in series, in each of the two Reactor Protection System power buses and in the alternate input bus. Redundancy is provided such that if any one EPA unit in a power bus fails, the second EPA unit is totally capable of protecting the RPS and associated downstream components from over voltage, under voltage, and underfrequency conditions.
- B. Periodic functional testing will be performed on the EPA by removing the motor generator set from the RPS distribution bus and sourcing power from the alternate feed. The alternate feed EPA's are tested while the distribution bus is sourced from the motor generator set. Therefore, independent periodic testing may be accomplished while the reactor is in operation and without any effect on redundancy.

Request #4: Specify monitoring system over-voltage, under-voltage, and under-frequency trip setpoints.

Response #4: The following will be the trip set points for the Electrical Protection Assembly:

Over voltage:  $\leq$  132 Vac

Under voltage:  $\geq$  108 Vac

Underfrequency:  $\geq$  57 Hz

Time Delay for Over Voltage, Under Voltage and Underfrequency will be 115 milliseconds with a tolerance of  $\pm$  15 milliseconds.

Enclosure 2  
to LDR-82-002  
INDEX OF DOCUMENTS ATTACHED

<u>ORIGIN</u>	<u>DOCUMENT NUMBER</u>	<u>REVISION NUMBER</u>	<u>DOCUMENT TITLE</u>	<u>IELP ASSIGNED #</u>
Bechtel	E-29	13 (marked-up)	Instrument AC uninterruptible AC & RPS AC Distribution System	E-29
GE(APED)	913E940	0	ELEM. Diagram RPS MG Control	APED-C71-027-NI
GE(APED)	22A7878	0	Installation Specification	APED-C71-028-NI
GE(APED)	VPF-3830- 83-6	12/17/80	Instruction Manual	APED-C71-030-NI
GE(APED)	NEDO-24317	Jan. 81	Licensing Description	APED-C71-031-NI