PROPOSED CHANGE RTS-247 TO THE DUANE ARNOLD ENERGY CENTER TECHNICAL SPECIFICATIONS

The holders of license DPR-49 for the Duane Arnold Energy Center propose to amend Appendix A (Technical Specifications) to said license by deleting a certain current page and replacing it with the attached, new page. The List of Affected Pages is given below.

LIST OF AFFECTED PAGES

3.1-2

SUMMARY OF CHANGES:

The following list of proposed changes is in the order that the changes appear in the Technical Specifications.

Page	Description of Changes
3.1-2	Deletes the Reactor Protection System Electrical Protection Assemblies time delay specifications from Technical Specification Section 4.1.B.2.

LIMITING CONDITIONS FOR OPERATION	SURVEILLANCE REQUIREMENT
	tested immediately before the trip system containing the failure is tripped. The trip system containing the unsafe failure may be placed in the untripped condition during the period in which surveillance testing is being performed on the other RPS channels. The trip system may be in the untripped position for no more than eight hours per functional trip period for this testing.
B. Two RPS electric power monitoring modules (or Electric Protective Assemblies - EPA's) for each in-service RPS MG set or alternate source shall be OPERABLE or	B. The RPS power monitoring system (EPA's) instrumentation shall be determined OPERABLE:
1. With one RPS electric power monitoring module (or EPA) for an in-service RPS MG set or alternate power supply inoperable, restore the inoperable module (EPA) to OPERABLE status within 72 hours or remove the associated RPS MG set or alternate power supply from service.	1. Once per six months by performing a CHANNEL FUNCTIONAL TEST; and
2. With both RPS electric power monitoring modules (EPA's) for an in-service MG set or alternate power supply inoperable, restore at least one to OPERABLE status within 30 minutes or remove the associated RPS MG set or alternate power supply from service.	2. Annually by demonstrating the OPERABILITY of over-voltage, under-voltage and under-frequency protective instrumentation by performance of a CHANNEL CALIBRATION including simulated automatic actuation of the protective relays, tripping logic and output circuit breakers and verifying the following limits: a. Over voltage ≤ 132 VAC b. Under voltage ≥ 108 VAC c. Under frequency ≥ 57 Hz

ENVIRONMENTAL CONSIDERATION

10 CFR 51.22 (c)(9) identifies certain licensing and regulatory actions which are eligible for categorical exclusion from the requirement to perform an environmental assessment. A proposed amendment to an operating license for a facility requires no environmental assessment if operation of the facility in accordance with the proposed amendment would not: (1) involve a significant hazards consideration; (2) result in a significant change in the types or significant increase in the amounts of any effluents that may be released offsite; and (3) result in a significant increase in individual or cumulative occupational radiation exposure. Iowa Electric Light and Power has reviewed this request and determined that the proposed amendment meets the criteria for categorical exclusion set forth in 10 CFR 51.22 (c)(9). Pursuant to 10 CFR 51.22 (b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment. The basis for this determination follows:

Basis:

The change meets the criteria for categorical exclusion set forth in 10 CFR 51.22 (c)(9) for the following reasons:

1. As demonstrated in Attachment 1, the proposed amendment does not involve a significant hazards consideration.

2. The proposed relocation and revision of the RPS EPA time delay requirements have no effect on the types or amounts of effluents released offsite.

3. The proposed relocation and revision of the RPS EPA time delay requirements have no effect on individual or cumulative occupational radiation exposure.

SAFETY ASSESSMENT

Introduction:

By letter dated March 13, 1992, Iowa Electric Light and Power Company (IELP) submitted a request for revision of the Technical Specifications, Appendix A to Operating License No. DPR-49 for the Duane Arnold Energy Center (DAEC). The proposed change would delete the Reactor Protection System (RPS) Electrical Protection Assembly (EPA) time delay requirements from Technical Specifications, Section 4.1.B.2. The amendment would incorporate revised EPA time delay requirements into the DAEC Updated Final Safety Analysis Report. The present time delay requirements for under voltage, over voltage and under frequency protection would be increased from 115 $\pm$ 15 milliseconds to a value no greater than 3.8 seconds.

Evaluation:

The time delays in the RPS power supply protective trips should be chosen so as not to stress the RPS bus components. However, the time delay values selected should ensure prevention of spurious and unwarranted separation of the RPS buses from their power supply.

In response to RPS EPA performance problems which included spurious EPA trips, General Electric conducted a generic study to evaluate longer time delay requirements and their effect on RPS bus components. That study determined that over voltage, under voltage and under frequency conditions could be tolerated by RPS bus loads for up to four (4) seconds with acceptable results. IELP subsequently commissioned GE to evaluate DAEC loads. In response, GE issued GE-NE-909-013-0392 (Attachment 5), which confirmed that the results of the original generic study are applicable to the DAEC. The proposed revision of the EPA time delay requirements is consistent with these results.

The proposed deletion of RPS EPA time delay requirements from TS, Section 4.1.B.2 is consistent with the content of the Standard Technical Specifications. The incorporation of revised time delay requirements into the UFSAR will ensure that any future revision of these values is subject to review under 10 CFR 50.59.

Based on the above evaluation, we conclude that the proposed Technical Specification changes are acceptable.

GE Nuclear Energy

General Electric Company
175 Curtner Avenue, San Jose, CA 95125

GE-NE-909-013-0392
MARCH 11, 1992
DRF C71-00089

KG920311.DA

Mr. William M. Clark
Duane Arnold Energy Center
3277 DAEC Rd.
Palo, IA 52324

Subject: Review of Components Powered by the Reactor Protection System 120Vac Buses for Acceptability of Electrical Protection Assembly Extended Time Delay Settings

Dear Mr. Clark,

On February 28, 1992 we wrote a letter (KG920228.DA) to you stating the acceptability of extending the time delay of the Electrical Protection Assembly (EPA) trips. We based this acceptability on the results of a previously conducted study that concluded it was acceptable to allow an under-voltage, over-voltage, or under-frequency condition to exist for up to four (4) seconds. Subsequent to this letter you sent to us a list of components (Attachment 1) powered by, or having contacts in circuits powered by, the Reactor Protection System (RPS) 120Vac buses and asked us to review these components to either ensure that they were encompassed by the referenced study or to evaluate them as to acceptability to the same transient conditions. This letter report documents our review of these components.

The components from the Attachment 1 list powered by the RPS buses fall into three categories; 1) those that are encompassed by a previous study [DRFs A00-00510-1 and C71-00034-4(1)], 2) those for which evaluation is needed, and 3) those to which the transients do not apply. The component groupings are as follows:

1) Those encompassed by a previous study -

Relays - Covered by DRF A00-00510-1

CR305	[A00-00510-1 evaluated CR105 and CR205 models. CR305 is direct replacement so no further evaluation needed.]
EGPI	
EGPIC	
EGPI002	
GPIC-750	

Relays (continued)

12HFA151A9F
12HFA151A9H

Electrical Modules - Covered by DRF A00-00510-1

194X606G003
238X660G003
112C2235 [Power Supply for 194X927G011]
145C3105AA [Includes the following RPS powered components]
193B1392AAG001 Ion Chamber Power Supply
112D1902G001-G004 Switching Power Supply
135B9879G001 5 Volt Power Supply
136B1347G001 24 Volt Power Supply

Solenoid Valves - Covered by DRF C71-00034-4(1)

HVA90405-2A

2) Those for which evaluation is needed -

Relays

CR120A

Electrical Modules

136B3058AAG001 Transducer Power Supply

Solenoid Valves

HB8320A90
HT8323A22
NP8316A65V
NP831665E
NP831665V
NP8323A36V

All contacts (from manual switches, position switches, relays, level switches, d/p switches, pressure switches, temperature switches, etc.) that are in circuits powered by the RPS buses are lumped into one group and are discussed later.

3) Those to which the transients do not apply -

Relays

CR2820B	C71A-K022A,B	Time delay relays - Normally deenergized - Energized only for 10 seconds immediately following a scram.
7022AB	A71B-K064,065	Time delay relays - Normally deenergized.
12HFA650A9F	C71A-K017A,B	Time delay relays - Normally deenergized - Energized only in "Startup" and "Refuel" modes.
12HFAI51A2F	125Vdc Relay - Not applicable to this evaluation.	

Solenoid Valves

NP8320A183V	MSIV Test Pilot Valve - Normally deenergized - Used only during slow-movement testing of the MSIVs.
206-832-2RVF 206-832-2U 72V001	Sample line isolation valves - Normally deenergized - Energized only while sample is being taken.

Discussion

The first step in evaluating the acceptability of extending the time delays is to determine the transients for which the components must be evaluated. The EPAs are monitoring for conditions of under-voltage, over-voltage, and under-frequency. The form of the possible transient varies depending on the source from which the RPS is being powered.

Transient Assumptions

These assumptions are applicable to all components powered by the RPS 120Vac buses at DAEC.

Buses Powered by MG Sets

Over-Voltage: These transients should be minor in amplitude since there are no large switched loads on the RPS buses. The largest rapid switching transient occurs during the initiation of a scram when all the scram pilot valve solenoids are deenergized. The only long term over-voltage

transient expected from MG Set power would be caused by voltage regulator failure in the MG Set itself.

Under-Voltage: As with the over-voltage MG Set induced transients, most transients should be minor. The only long term under-voltage transient expected from MG Set power would be caused by voltage regulator failure in the MG Set itself.

Under-Frequency: A major under-frequency transient on an MG Set powered RPS bus would only be expected if power to the MG Set motor was lost. The RPS design specification requires that the MG Set maintain the frequency within 5 percent of 60 Hz for one second at rated load following complete loss of power to the drive motor. Since an RPS bus is usually loaded to less than 50 percent of the MG Set rating one would not expect to see a frequency deviation of 5 percent for 2 seconds or longer. This is a very gradual transient because of the inertia of the MG Set fly-wheel.

Buses Powered by the Alternate Feed

Over-Voltage: These transients can be large due to the effects of switching loads on the buses that ultimately power the Alternate Feed. However, because of the capacity of the overall plant power bus structure, they are not expected to cause the RPS bus voltage to remain outside its required operating limits for periods exceeding four seconds.

The very fast, very-high voltage transients which could be present on the Alternate Feed due possibly to lightning strikes are not part of this evaluation since the EPAs are not designed to provide protection against them.

Under-Voltage: It is expected that these would be the most frequent severe transients due to the known effects that starting of large motors has on the affected buses. However, they would not be expected to cause the RPS bus to remain outside its required operating limits for periods exceeding four seconds.

Under-Frequency: This transient is not applicable to the Alternate Feed. The Alternate Feed is ultimately tied to the system grid which maintains an essentially constant frequency.

Component Evaluation

CR120A Relay and Solenoid Valves [HB8320A90, HT8323A22, NP8316A65V, NP831665E, NP831665V, NP8323A36V]

Over-Voltage: The prime concern of over-voltage on electromechanical components is the additional heating that occurs. The only assumed over-voltage transient that is projected to remain outside the operational

limits for the four second time period is that caused by failure of the MG Set regulator. Because of the mass of these components, the additional heating caused by this extremely infrequent transient would be insignificant during a four second time delay.

Under-Voltage: The under-voltage transient is of little concern unless the voltage remains at the precise value required to cause the component to chatter. For all assumed transients except for MG Set regulator failure the voltage might momentarily drop to a value which would be insufficient to hold one or more components in an energized state. This would be followed by a rise in voltage which, at some point, would cause the deenergized components to reenergize. Spurious actuations may occur but no component damage would occur. A failure of the MG Set regulator could cause the bus voltage to drop to a new steady state value. If this value is precisely that at which a component will chatter, damage could occur if it went undetected for a long period of time. However, if the time of the transient is limited to four seconds no component damage would occur. At worst the component would have seen the equivalent of 480 operations. When one considers the remote possibilities that a MG Set regulator will fail in such a manner that the output voltage would settle to the precise voltage to cause component chatter, component damage due to this transient is very unlikely.

Under-Frequency: The effect of under-frequency on these components is to increase the current due to a decrease in reactive impedance. This results in increased heating of the component. However, since the assumed transient is slow (coast down of an MG Set), heating would be very gradual and insignificant over the four second time delay. No component damage would occur.

136B3058AAG001 - Transducer Power Supply

Over-Voltage: An over-voltage transient on this module causes increased stress on the series and shunt regulating components, and on the filter capacitors of the transformer secondary. However, in no case are the component limits exceeded, even assuming a 100 percent transient value. Therefore, no component damage would occur.

Under-Voltage: An under-voltage transient cannot cause damage to this module. If the voltage drops low enough, the internal regulating circuitry may cease to regulate and the output voltage may drop. However, no component damage will occur.

Under-Frequency: An under-frequency transient would cause slight increased heating of the transformer and an increase in ripple on the full wave rectifier circuit. However, the transformer is rated for 47 to 63 Hz operation and the frequency would not be expected to drop below 47 Hz during the four second time delay. Therefore, it would never get outside

its specified operating range. The small increase in ripple would have no effect on the output voltage. No component damage would occur due to this transient.

Contacts

Over-Voltage: Over-voltage is the only transient that can have a damaging effect on current carrying contacts. As the voltage increases on the loads fed by the contacts, the current through the loads and the contacts increases and there becomes less margin between the actual and rated current of the contacts. Even if the current exceeds the continuous current rating of the contacts for short periods of time there will be no contact damage unless the contacts are called upon to open during this period of excessive current. Since it is general practice to load contacts to no more than 50 percent of their rated continuous current carrying capacity, the contacts of Attachment 1 should never have to open a circuit while carrying a current greater that rated, even if the command to open should occur during an over-voltage transient. No contact damage will occur.

Conclusions

The only credible transients that could ultimately cause component damage are those associated with MG Set regulator failure coupled with failure of the protective trips internal to the MG Sets. These transients could result in steady state voltages that are outside the required limits of the RPS power buses. However, because of the rare occurrence of this type failure, a four second time delay on the EPA trips would not result in any component damage.

Based on the above evaluation the assumed transients coupled with EPA trip time delays of four seconds or less will not cause damage to any of the components powered by the RPS 120Vac buses.

Prepared by: W.K. Green
Lead System Engineer
Reactor Protection System

Reviewed by: C.F. Canham - Manager
Plant Electronics Application
Engineering