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September 1995

Duane Arnold Energy Center
USI A-46 Relay
Evaluation Report

Prepared for

IES Utilities, Inc.
Duane Arnold Energy Center
3277 DAEC Road
Palo, Iowa 52324

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RECORD OF REVISION

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Section 1

INTRODUCTION

1.1 PURPOSE

This report documents the status of the USI A-46 relay seismic functionality review for the Duane Arnold Energy Center (DAEC) of the IES Utilities Inc., formerly known as Iowa Electric Light and Power Company (IELP). This work was performed for IELP in order to address NRC Generic Letter 87-02, "Verification of Seismic Adequacy of Mechanical and Electrical Equipment in Operating Reactors, Unresolved Safety Issue (USI), A-46" (Reference 1) for the DAEC.

A review of relays associated with safe shutdown equipment is required as part of the resolution of NRC Unresolved Safety Issue (USI) A-46, "Seismic Qualification of Equipment in Operating Plants". The purpose of the relay functionality review is to verify that safe shutdown systems cannot be prevented from performing their safe shutdown functions because of relay (contact) chatter during the period of strong ground motion associated with a Design Basis Earthquake (DBE).

1.2 BACKGROUND

In December 1980, the Nuclear Regulatory Commission (NRC) Staff identified an unresolved safety issue, USI A-46, "Seismic Qualification of Equipment in Operating Plants," related to the seismic adequacy of mechanical and electrical equipment in older nuclear plants. In response to this concern, a number of nuclear plant owners formed the Seismic Qualification Utility Group (SQUG) to investigate the issue and develop a cost effective approach for its resolution. Initial investigations indicated that the application of current seismic qualification standards (i.e., testing equipment on shake tables) to the older plants would not be practical since many equipment types and models are no longer available and the use of installed equipment for testing is, in general, not possible. After further consideration of the problem and alternative resolution approaches, SQUG undertook a pilot program to determine if actual experience in power plants and other industrial facilities which have undergone significant earthquakes could be used as a basis for evaluating the seismic adequacy of similar equipment in nuclear plants.

The results of the SQUG pilot program showed the feasibility of using earthquake experience data as a means of assessing the seismic ruggedness of a large cross section of standard power plant equipment used in nuclear plants (see Reference 2). The SQUG effort also demonstrated that, with a few exceptions, nuclear plant equipment is generally

similar to that installed in conventional plants and, when properly anchored, has inherent seismic ruggedness and a demonstrated capability to withstand substantial seismic motion without structural damage or loss of functionality. The pilot program results were subsequently confirmed by additional data collection and analysis.

After substantial technical research by both the SQUG and the NRC, the NRC Staff published, on February 19, 1987, a detailed approach for resolving the issue in Generic Letter 87-02 (Reference 1). Implementation guidance for generic and plant-specific resolution of USI A-46 was provided in an enclosure to the Generic Letter, entitled "Seismic Adequacy Verification Procedure." The Generic Letter Procedure sets forth an approach for verifying seismic adequacy of equipment using earthquake experience data supplemented by test results and analyses, as necessary. Licensees subject to USI A-46 were encouraged to participate in a generic program to accomplish seismic verification of equipment. As a result, SQUG developed the "Generic Implementation Procedure (GIP) for Seismic Verification of Nuclear Plant Equipment (Reference 3).

The GIP provides the detailed technical approach, generic procedures and documentation guidance which USI A-46 licensees should use to verify the seismic adequacy of mechanical and electrical safe shutdown equipment. In this regard, the GIP also contains all of the activities necessary for resolution of USI A-46. A Safety Evaluation Report on Revision 2 of the GIP was prepared by the NRC and is documented in Reference 4. In its response to Supplement 1 of Generic Letter 87-02 IELP committed to the NRC that the SQUG methodology would be used to resolve USI A-46 for DAEC (see Reference 5). The NRC evaluation and acceptance of this approach for DAEC is documented in Reference 6.

1.3 USI A-46 RELAY EVALUATION

For most essential (functionally required for safe shutdown) equipment in nuclear plants, demonstration of seismic adequacy under USI A-46 will be accomplished by verifying that the equipment is comparable to that in the conventional plants which have successfully withstood significant earthquakes and by assuring that the equipment is properly anchored. In the case of electrical relays, this approach is not sufficient. First, the types of relays used in power plants are diverse and not easily grouped in generic equipment classes. Second, there have been instances of relay malfunction in earthquakes and in seismic shake-table tests at acceleration levels which may be near nuclear plant design levels. For these reasons, the Electric Power Research Institute (EPRI) established a project to develop a methodology for evaluating relay seismic functionality in operating nuclear power plants. The project developed EPRI Reports NP-7148-SL (Reference 7) and NP-7148-SL Volume 2: Addendum (Reference 11), which provide the methodology and procedures for evaluating relay seismic functionality.

Section II.6 of the GIP provides an overview of the USI A-46 relay review criteria and methodology. Section II.9 of the GIP defines, in part, the information which should be included in the relay evaluation report. The content of the GIP concerning relay

evaluations is based on the detailed criteria, methodology and procedure documented in EPRI Report NP-7148-SL (Reference 7). Accordingly, the review of the relays associated with the USI A-46 safe shutdown equipment for DAEC was performed and documented in accordance with the requirements of the GIP, the NRC SSER on the GIP, and EPRI Report NP-7148-SL.

1.4 REPORT ORGANIZATION

Section 2 of this report contains a summary of the status of the USI A-46 relay review for DAEC. Section 3 describes the overall technical approach and assumptions used in the review. A summary of the safe shutdown systems and the list of safe shutdown equipment included in the relay review is contained in Section 4. The seismic demands which are applicable to the relay review are discussed in Section 5 of this report. Section 6 documents the relay screening and evaluation results. Table 6-2 addresses each safe shutdown equipment item listed in Section 4. A summary of the results of the relay walkdown is contained in Section 7. The references used to support the evaluation documented by this report are listed in Section 8.

Appendix A contains a list of essential relays, including the relay identification numbers, the manufacturers' model numbers, and plant location where the relay is mounted. Appendix B contains a list of essential relays screened as seismically rugged using the switchgear GERS. The enclosures containing essential relays are listed in Appendix C. This list was used as the basis for the essential relay enclosures listed in the Safe Shutdown Equipment list for seismic verification. Appendix D contains a description of relay outliers. The résumé of the lead relay reviewer is contained in Appendix E.

Section 2

RESULTS AND PLANNED ACTIONS

2.1 SUMMARY OF RESULTS

This report documents the seismic functionality review of relays affecting USI A-46 safe shutdown components for the Duane Arnold Energy Center (DAEC). The review was performed in accordance with the methodology and procedures established for plant specific resolution of USI A-46; specifically, the Generic Implementation Procedure (GIP), the NRC safety evaluation report on the GIP, and EPRI Report NP-7148-SL. This section of the report provides a summary of the results of the review.

The DAEC safe shutdown earthquake (SSE) ground response spectrum is bounded by the SSRAP Bounding Spectrum. The DAEC design basis earthquake (DBE) has a peak horizontal ground acceleration of 0.12g.

The DAEC Safe Shutdown Equipment List (SSEL) items requiring a relay review are listed in Table 4-1 of Section 4. That list contains 287 items. Relay reviews were performed for each of these items. The reviews are documented in Section 6 of this report. Table 2-1 provides a quantitative summary of the evaluation results.

The majority of the relay (contact) devices associated with the 287 equipment items were screened (i.e., eliminated from further review) on the basis that contact chatter is acceptable, that operator action can correct relay chatter effect, or that the contacts are not vulnerable to chatter (e.g., a mechanically actuated limit switch on a valve motor operator). In addition to those screened (non-essential) relays, 536 essential relays or relay sets were identified.

The essential relays (individual relays or relay sets) identified by the review are listed in Table A-1 of Appendix A. Seismic capacity versus seismic demand evaluations were performed for each of the essential relays. The seismic capacities of contact devices and equipment were established using formal seismic equipment qualification test results for specific DAEC equipment items and relays where such results were available. The seismic capacities of the remaining essential relays were established using the Generic Equipment Ruggedness Spectra (GERS) developed under the EPRI program supporting the SQUG. The GERS data used are documented in EPRI Report NP-7147-SL (and its forthcoming addenda) and EPRI Report NP-5223-SL. The seismic demands, established for the 51 enclosures containing essential relays and used in the demand versus capacity comparisons, are discussed in Section 5 of this report.

Of the 536 essential relays identified and evaluated, the seismic adequacy of 502 was confirmed during the initial capacity versus demand comparisons. The remaining 34 relays were classified as outliers. Forty-four (44) of the 502 essential relays were evaluated using the GERS for switchgear. These 44 devices are listed in Appendix B of this report.

Among the relays screened as non-essential, 34 contacts or contact groups were screened on the basis that operator action could correct the adverse effects postulated due to seismic chatter. Operator action disposition for these devices affects five SSEL equipment items. The operator actions required and the timing for each were evaluated. The actions required are considered to be reasonable because the operators are provided with indications of the status of the affected components, the controls necessary to reset the affected components are easily accessible to the operators, and sufficient time for the operator actions is available. Section 6.2.2 of this report discusses each of the operator actions required and identifies the affected equipment.

Relay walkdowns of a sample of the essential relay enclosures evaluated during the review indicated that relay mountings are standard and adequate. No damaged relays or abnormal mountings of essential relays were found. The checks also indicate that the relays installed in the field are consistent with those shown in the documentation. The relay walkdowns are discussed further in Section 7 of this report.

2.2 SIGNIFICANT OR PROGRAMMATIC DEVIATION

There were no significant or programmatic deviations from the GIP taken during the USI A-46 relay seismic functionality review for DAEC.

2.3 RELAY OUTLIERS

Thirty-four (34) of the 536 essential relays were classified as outliers. These outliers are listed in Table D-1 of Appendix D of this report. The outliers fall into the following two categories:

- Essential relays with a seismic demand that exceeds the seismic capacity of the device - 30 relays or relays sets identified.
  - 1 auxiliary relay located in essential switchgear 1A3
  - 1 auxiliary relay located in essential switchgear 1A4
  - 14 protective relay sets located in essential switchgear 1A3
  - 14 protective relay sets located in essential switchgear 1A4
- Essential relays for which seismic capacity data is unavailable - 4 relays identified.
  - 1 GE HGA14AR auxiliary relay located in essential switchgear 1A3

- 1 GE ICW51A protective relay located in essential switchgear 1A3

- 1 GE HGA14AR auxiliary relay located in essential switchgear 1A4

- 1 GE ICW51A protective relay located in essential switchgear 1A4

An evaluation of the outliers is contained in Section 6.3 of this report. This evaluation involved a re-assessment of the in-cabinet seismic demand for the essential switchgear 1A3 and 1A4 using the measured cabinet natural frequency and the SQUG off-peak amplification method.

The re-assessment indicates that the actual in-cabinet demand for the switchgear is lower than that obtained by using a generic in-cabinet amplification factor of 7 (amplified spectral demand of 5g versus 8.3g). A comparison was made between the actual seismic demand and the seismic capacity of the 30 essential relays classified as outliers on the basis that demand exceeds capacity. The results of that comparison indicate that 28 of the relays classified as outliers are seismically adequate. These 28 devices are highlighted in the Appendix D list with a footnote.

Based on the re-assessment, there are 6 relays that are classified as unresolved outliers by this report. These unresolved outliers are comprised of the following relays:

- Two GE HFA151A relays with seismic demands that exceed the seismic capacity of the device. One of these relays is located in essential switchgear 1A3 and the other is located in essential switchgear 1A4.

- Two GE ICW51A reverse power relays for which seismic capacity data is unavailable. One of these relays is located in essential switchgear 1A3 and the other is located in essential switchgear 1A4.

- Two GE HGA14AR auxiliary relays for which seismic capacity data is unavailable. One of these relays is located in essential switchgear 1A3 and the other is located in essential switchgear 1A4.

As discussed below, DAEC has developed a plan of action to resolve these unresolved relay outliers.

2.4 PLAN FOR RESOLVING RELAY OUTLIERS

DAEC is currently planning to take the following actions to resolve the six relay outliers:

- The two HFA151A relays consist of normally closed contacts in the essential circuits.

The seismic capacity of the normally open contacts of this relay model is considerably higher (PSA of 10g versus 3g for de-energized state). DAEC plans to resolve these outliers by one of the following approaches:

1) to modify the circuits to change the relay's normal operating state to the more seismically rugged normally open state, OR

2) relocate the relays to a location where seismic demand is less than 3 g.

This modification will be implemented during outage RFO-14 (essential switchgear 1A4) and RFO-15 (essential switchgear 1A3).

- The two HGA14AR relays will be replaced with seismically qualified devices during RFO-14 (essential switchgear 1A4) and RFO-15 (essential switchgear 1A3).

- The two ICW51A relays will be upgraded by replacing the target/seal-in units in these relays with the Hi-G units. This change will make the seismic capability of the modified relays similar to the seismically qualified ICW51A (capacity 15g). This modification will be implemented during RFO-14 (essential switchgear 1A4) and RFO-15 (essential switchgear 1A3).

Table 2-1

Summary of DAEC USI A-46 Relay Review

Number of Safe Shutdown Equipment Items Requiring a Relay Review		287
Number of Enclosures Containing Essential Relays		51
Number of Essential Relays:		536
Number of Essential Relay Outliers:		34
- Number Resolved (Seismically Adequate)	28	
- Number Unresolved	6	
	34	

Note:
Quantities listed for essential relays and essential relay outliers are based on the numbers of individual relays and relay sets (groups of relays in a circuit each having the same device identifier) as documented in the relay evaluation. For example, the overcurrent protective relays associated with an individual 4160 Volt breaker were counted as one relay set. Depending on the circuit, however, each of these protective relay sets consist of two or three single phase relays.

Section 3

TECHNICAL APPROACH

USI A-46 requires the verification of seismic adequacy of the equipment necessary to achieve and maintain safe shutdown during first 72 hours following a design basis earthquake (DBE). The process for resolution of USI A-46 entails:

- Selection of Safe Shutdown Equipment;
- Equipment Seismic Verification Walkdowns and Evaluations; and
- Relay Functionality Review.

The selection of the plant systems and associated equipment necessary to achieve and maintain safe shutdown and the seismic verification walkdowns and evaluations of the safe shutdown equipment for DAEC are not addressed by this report. The purpose of the USI A-46 relay functionality review is to verify that safe shutdown systems cannot be prevented from performing their safe shutdown functions due to relay (contact) chatter during the period of strong ground motion.

The systems and components selected to perform these safe shutdown functions at DAEC were identified as discussed in Reference 10. A Safe Shutdown Equipment List (SSEL) was made for each of the functions necessary to achieve and maintain safe shutdown. Separate SSELs were then generated, one for seismic walkdowns and the other for relay review. The Relay Review List is comprised of a subset of the SSEL. The Relay Review List contains: (1) the SSEL active equipment which is electrically powered or controlled, and (2) the SSEL electrically powered or controlled passive equipment which, if it changes state or inadvertently operates due to contact chatter, could prevent one of the safe shutdown functions from being accomplished. Section 4 further discusses the SSEL selection process and contains a copy of the Relay Review List for DAEC.

Section II.6 of the GIP provides an overview of the USI A-46 relay review criteria and methodology. Section II.9 of the GIP defines, in part, the information which should be included in the relay evaluation report. The content of the GIP concerning relay evaluations is based on the detailed criteria, methodology and procedure documented in EPRI Report NP-7148-SL. Accordingly, the USI A-46 relay review documented in this report is based on the methodologies defined in the GIP, the NRC SSER on the GIP, and EPRI Report NP-7148-SL. Figure 3-1 illustrates the overall relay review process.

A broad definition of relay contacts is used in the USI A-46 relay functionality review. Under this definition contact devices which require evaluation include protective and auxiliary relays, control switch contacts, motor starters and contactors, and sensor switch contacts. The relay evaluation methodology consists of a step-by-step process to screen and evaluate the relays associated with the equipment items included in the Relay Review List. Non-essential relays, e.g., contact devices for which temporary malfunction (contact chatter or change of state) would not prevent safe shutdown of the plant or cause other unacceptable actions, are screened out utilizing systems and circuit evaluation techniques. This process also identifies the subset of the relays which are considered essential to the safe shutdown functions. These essential relays are evaluated further to verify the seismic adequacy of each essential relay.

An essential relay is a contact device or relay associated with a safe shutdown equipment and which meets the following criterion:

- A relay that must remain functional without chatter during a DBE (i.e., is not inherently rugged, chatter is not acceptable, and operator action is not practical.)

A relay which is demonstrated to be seismically adequate on the basis of a seismic capacity versus demand evaluation for convenience (i.e., it was not determined if chatter is acceptable or operator action is practical) is also documented as an essential relay. The seismic adequacy of each essential relay is evaluated to ensure the relay model is not a low ruggedness device and that seismic capacity of the device exceeds the applicable seismic demand. A Low Ruggedness Relay is a relay or contact device which is known to be susceptible to seismic damage or chatter due to moderate vibration based on earthquake experience or test data, or operational experience. These devices are documented in Appendix E of EPRI NP-7148-SL. After the low ruggedness relay check, seismic capacity data is used to assess the seismic adequacy of the essential relays. The seismic ruggedness data have been developed utilizing available relay test data supplemented by testing of old relays obtained from SQUG plants. EPRI Report NP-7147-SL (Reference 8) and its addenda provide a source of Generic Ruggedness Spectra (GERS) for a variety of relay models. EPRI Report NP-5223-SL (Reference 9) provides, in part, GERS data for switchgear, motor control centers, and contactors.

A walkdown of relays is also required as part of relay review. The purposes of the walkdown are to:

1. Obtain, as necessary, information needed to determine cabinet types and in-cabinet amplification factors for seismic capacity screening;

2. Spot check mountings of essential relays to determine if they are in accordance with manufacturers' recommendations; and

3. Confirm relay types and locations are consistent with documentation sources used to establish relay types and locations during the relay circuit reviews.

Verification of the seismic adequacy (e.g., anchorage and seismic interactions) of the cabinets and enclosures which contain essential relays is outside the scope of the relay walkdown. This effort was accomplished by the team of seismic capability engineers during the seismic verification walkdowns and evaluations (see Duane Arnold Energy Center USI A-46 Seismic Evaluation Report).

Appendix D of this report contains a list of Relay Outliers identified during the relay review for DAEC. A Relay Outlier is an Essential Relay for which one or more of the following criteria apply:

1. Seismic demand exceeds the seismic capacity of the relay;

2. Seismic capacity of the device is unknown;

3. Relay or contact device which is classified as a low ruggedness relay; or

4. Mounting configuration is not in accordance with the manufacturer's recommendations.

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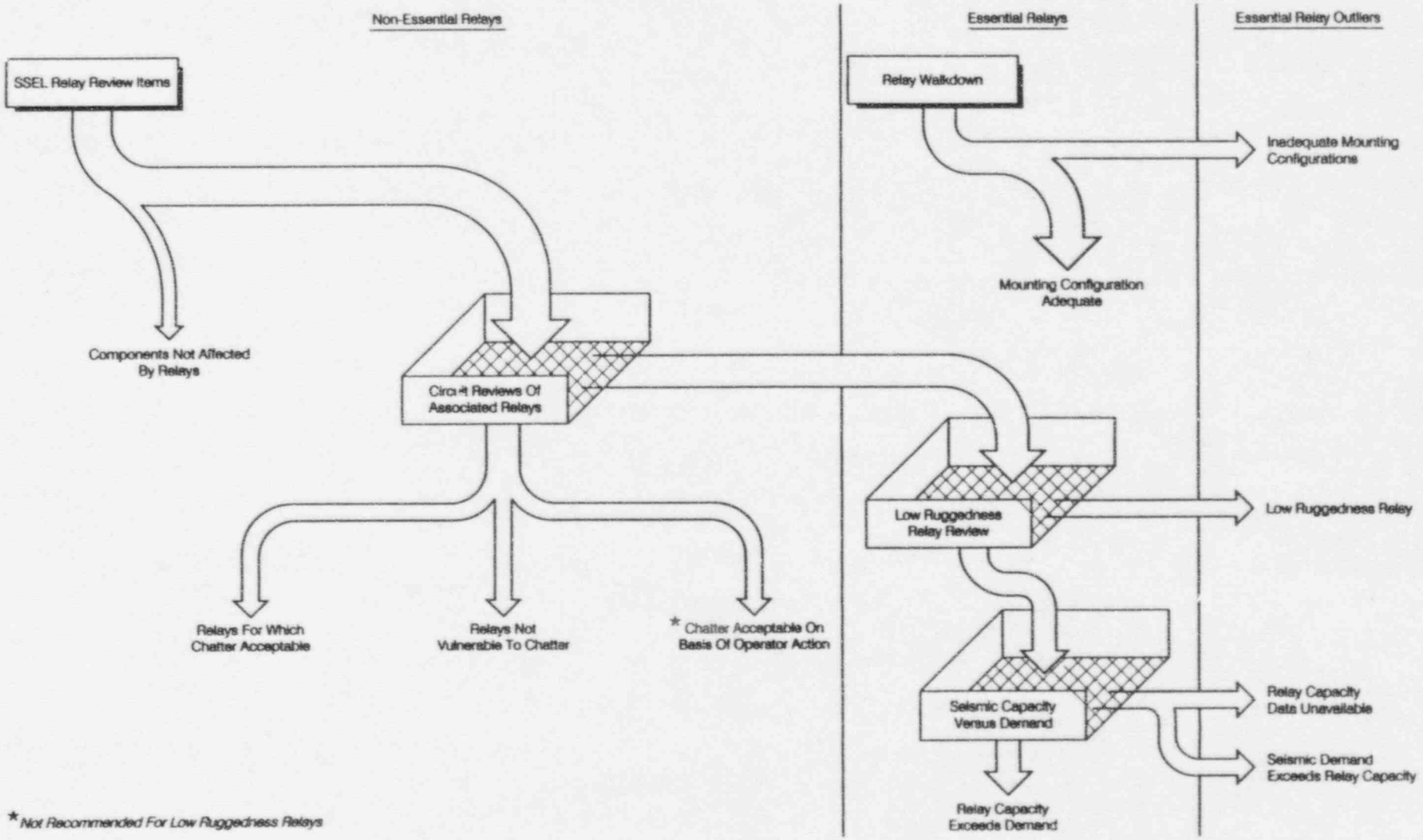
02/14/94 (101)

Figure 3-1. USI A-46 Relay Functionality Review - Process Overview



Section 4

SAFE SHUTDOWN EQUIPMENT

4.1 SAFE SHUTDOWN FUNCTIONS

Resolution of USI A-46 requires verification of the seismic adequacy of the equipment necessary to achieve and maintain a safe shutdown condition for the unit during the first 72 hours following a Design Basis Earthquake (DBE); sometimes referred to as a Safe Shutdown Earthquake - SSE. The key assumptions used in the USI A-46 review are:

1) The unit will be operating normally, with the reactor coolant system at or near normal operating pressure and temperature, prior to the DBE;

2) The earthquake will not cause a loss of coolant accident (LOCA);

3) No other extraordinary event or accident (e.g., fire, flood, or LOCA) will occur simultaneously with the DBE;

4) Loss of off-site power may occur as a result of the earthquake; and

5) There should be sufficient redundancy such that the failure of the active function of a single component will not prevent safe shutdown.

The four basic functions necessary to achieve and maintain safe shutdown are:

- Reactivity Control;
- Reactor-Coolant Pressure Control;
- Reactor-Coolant Inventory Control; and
- Decay-Heat Removal

Section II.3 and Appendix A of the GIP describe in detail the overall method for identifying the mechanical and electrical equipment required to address USI A-46 safe shutdown criteria. The Duane Arnold Energy Center USI A-46 Seismic Evaluation Report, documents, in part, the selection of safe shutdown equipment for DAEC. The following subsections outline the approach used to achieve the four basic safe shutdown

functions in the event of a DBE at DAEC. Each subsection identifies the objectives to be achieved, the systems used and the major equipment.

4.1.1 Reactivity Control

Reactivity control is required to bring the reactor core to a subcritical state and maintain it subcritical over the 72-hour period following an earthquake. The reactor core is maintained subcritical by quickly inserting all 89 control rods into the core with a Control Rod Drive (CRD) System scram. Upon receiving a scram signal automatically from the reactor protection system (RPS) or manually from the control room, high pressure water is used to force the control rods up into the core. The high pressure water is provided from a nitrogen-water accumulator contained in each of 89 hydraulic control units (HCUs). Water from the drive piston of each CRD is exhausted to a scram discharge volume.

Each HCU has an inlet and outlet scram valve (CV-1849 and CV-1850, respectively). Upon loss of instrument air, these valves open allowing high pressure water from the accumulator to enter the CRD housing and water from the drive piston to exhaust to the scram discharge volume. The instrument air supply to the scram valves is controlled by scram pilot valves SV-1855 and SV-1856 (two for each HCU). Upon loss of electrical power to both solenoid-operated scram pilot valves, instrument air pressure supply to the scram valves is interrupted. In the event that a scram pilot valve fails to function, two backup scram valves SV-1840A and SV-1840B ensure that all control rods are inserted by interrupting air supply to the scram pilot valves in all 89 HCUs.

The RPS provides a signal to the scram pilot valves SV-1855 and SV-1856 and backup scram valves SV-1840A and SV-1840B to interrupt instrument and service air supply to the inlet and outlet scram valves. A reactor scram can also be manually initiated from the control room.

The reactor core is designed to remain subcritical with the rod of highest worth fully withdrawn as long as all other control rods are fully inserted. To provide position indication of each control rod in the control room, the control rods have position indicator probes. These probes have magnetic switches which indicate whether the control rod is fully withdrawn, fully inserted, or in an intermediate position.

4.1.2 Reactor Coolant Pressure Control

Reactor Coolant System (RCS) pressure control is required in the short term to prevent over-pressurization during the initial scram transient and in the long term to reduce RCS pressure to allow the low-pressure makeup systems to operate.

The six (6) safety/relief valves (SRVs) will be used to control RCS pressure. The SRVs will actuate automatically to control RCS pressure during the initial transient. The SRVs will

be manually actuated to depressurize the RCS. Three of the six SRVs are required for depressurization. The Automatic Depressurization System (ADS) will not be used.

4.1.3 Reactor Coolant Inventory Control

The RCS inventory control function is required to maintain the RCS liquid volume such that the reactor core remains covered with water. The Main Steam Isolation Valves (MSIVs) will close following the presumed LOOP to prevent loss of RCS inventory. There are two MSIVs on each main steam line. The Low Pressure Coolant Injection (LPCI) mode of the Residual Heat Removal (RHR) system will be used together with core spray to provide inventory control. The LPCI mode of the RHR system is discussed under decay heat removal because the primary function of the RHR system is to remove decay heat.

The LPCI mode of the RHR System could be disabled for 10 minutes by a single failure of the inject valve selected by the loop select logic. The LPCI inject valve could be opened manually using the hand wheel, however this was judged to be too much of a burden on the operators. Therefore, the Core Spray system was added to the SSEL as the backup to failure of a LPCI inject valve.

4.1.4 Decay-Heat Removal

Decay-heat must be removed from the reactor core and control RCS temperature. Decay-heat will be carried from the core to the suppression pool by steam vented through the SRVs. Makeup to the RCS will be handled by the LPCI or Core Spray systems, as discussed in the inventory control function. Heat will be removed from the suppression pool with the Residual Heat Removal (RHR) system operating in the suppression pool cooling (SPC) mode. The RHR system will transfer the heat to the RHR emergency service water system. The RHR system also is used for LPCI and containment spray functions.

4.1.5 Electrical Distribution

Many safe shutdown equipment items require electrical power in order to perform their function. Because the assumption is made that loss of offsite power occurs during safe shutdown, only equipment that is powered by the standby diesel generators or batteries is included in the SSEL. The equipment listed in the SSEL is also capable of safely shutting down the plant and maintaining safe shutdown if offsite power is not lost. The SSEL includes the 4160 VAC, 480 VAC, and 120 VAC (instrument air control) power distribution systems. Also included are the 250 VDC and 125 VDC batteries and the associated distribution system.

4.1.6 Emergency Service Water

The Emergency Service Water (ESW) system provides cooling water to many other systems in the plant. The ESW system has two emergency service water pumps which draw river water from the pump house stilling basin. The river water is then strained and sent to various cooling loads in the plant. Safe shutdown equipment that receives cooling water from the ESW system includes the standby diesel generators, Core Spray and RHRSW pump motor coolers, the control room HVAC chillers, RHR pump seal cooling, and various other HVAC heat exchangers.

4.1.7 Residual Heat Removal Service Water

The Residual Heat Removal Service Water (RHRSW) system provides cooling water to the RHR system heat exchangers. River water is drawn from the pump house stilling basin by four RHR Service Water pumps and passes through the RHR heat exchangers. This supports the decay heat removal function of the RHR system.

4.1.8 River Water Supply

The River Water Supply (RWS) system supports the ESW and RHRSW systems by providing river water to the pump house stilling basin. Four RWS pumps draw river water from the plant intake structure and pump it to the pump house stilling basin.

4.1.9 Diesel Generator Support

There are several systems that provide support to the standby diesel generators. These include the air start system, fuel storage and handling system, lubricating system, circulating water system, and scavenging and exhaust system. Equipment items related to these support functions that are mounted directly on the diesel generator skid are not included in the SSEL because they can be evaluated along with the diesel itself using the "Rule-of-the-Box" as described in the GIP. Supporting equipment that is not mounted directly on the diesel skid is listed separately in the SSEL.

4.1.10 Control Room HVAC

The control room HVAC system is a supporting system for the other safe shutdown systems because it prevents the control room area from becoming excessively warm, which could have an adverse effect on the performance of both operators and electronics. The two control room air-conditioning units are supplied with water from the control building chillers. Because the control room air-conditioning units are pneumatically controlled, the heating and ventilation instrument air compressors are also included in the SSEL. Also included in the SSEL are the three battery room exhaust fans, which exhaust heat and prevent possible buildup of hydrogen from the battery rooms on the first floor of the control building.

4.1.11 Other HVAC

Some SSEL items require cooling to ensure that they can perform their safe shutdown function. For this reason several HVAC units have been included in the SSEL where necessary to support safe shutdown. HVAC systems included in the SSEL are intake structure ventilation, pump house ventilation, RHR and Core Spray room HVAC, and standby diesel room ventilation.

4.1.12 Emergency Lighting

Lighting panels are included in the SSEL to provide lighting to the control room if there is a loss of offsite power during safe shutdown.

4.2 RELAY REVIEW SAFE SHUTDOWN EQUIPMENT LIST

The Safe Shutdown Equipment List (SSEL) contains the plant equipment necessary to achieve and maintain safe shutdown under the USI A-46 governing assumptions and ground rules for identifying equipment. The SSEL is a composite list of both mechanical and electrical equipment. Not all of the equipment items included on the SSEL are affected by relays or other contact devices. As a result, only a subset of the SSEL components require a USI A-46 relay functionality review.

The SSEL equipment items requiring a relay review are those items which are electrically powered or controlled and:

1. Must operate or change state to accomplish a safe shutdown function (active equipment); or

2. Do not need to operate to accomplish safe shutdown (passive equipment) but whose inadvertent operation due to relay chatter could adversely affect the accomplishment of safe shutdown.

Table 4-1 lists the SSEL equipment items requiring a relay review for DAEC. Table 4-1 was derived from the SSEL which is documented in the DAEC USI A-46 Seismic Evaluation Report. The items listed in Table 4-1 are sorted by equipment Mark Number. There are 287 equipment items listed in Table 4-1. The relay evaluation of each of these items is contained in Section 5 of this report.

Table 4-2 through 4-4 provide additional information which clarifies the information contained in Table 4-1 and makes it easier to use. Table 4-2 defines each of the column headings found in Table 4-1 and describes the informational content which can be found under each column of the SSEL. Table 4-3 defines the notes to the SSEL. Table 4-4 defines the abbreviations used in Table 4-1 for system identifiers.

Table 4-1
DUANE ARNOLD ENERGY CENTER
SAFE SHUTDOWN EQUIPMENT LIST (SSEL)
Relay Review Items

Data Base File Name/Date/Time: DAEC_R1.DBF / 04/19/95 / 15:50:14
Sort Criteria: ID Number
Filter Criteria: (Eval. Type CONTAINS 'R')
Program File Name & Version: SSEM 2.2

LINE NO.	TRAIN	EQUIP CLASS	MARK NO.	SYSTEM/EQUIPMENT DESCRIPTION	Dwg. No./Rev./Zone	<--------- Building	EQUIPMENT Flr.Elv.	LOCATION -----> Rm. or Row/Col.	SORT	NOTES	<-- OP. ST. --> Normal	Desired	POWER REQD?	SUPPORTING SYS. DWG. NO./REV.	REQ'D INTERCONNECTIONS & SUPPORTING COMPONENTS	REG. ISSUE
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
6001	1	03	1A3	4160VAC/4160VAC ESSENTIAL SWITCHGEAR	BECH-E001<1>/19/E5	CB	757	H13	SR	04	ENER	ENER	YES	BECH-E104<10> BECH-E104<12>	1G031, 1D23	AI
6050	2	03	1A4	4160VAC/4160 VAC ESSENTIAL SWITCHGEAR	BECH-E001<1>/19/E4	CB	757	F11	SR	04	ENER	ENER	YES	--	1G02i, 1D23	AI
6006	1	02	1B03	480VAC/CONTROL BUILDING, 480VAC LOAD CENTER	BECH-E001<1>/19/B4	CB	757	H12	SR	04	ENER	ENER	YES	--	1X031, 1D13	AI
6055	2	02	1B04	480VAC/CONTROL BUILDING 480VAC LOAD CENTER	BECH-E001<1>/19/B4	CB	757	G12	SR	04	ENER	ENER	YES	--	1X041, 1D23	AI
6003	1	02	1B09	480VAC/INTAKE STRUCTURE 480VAC LOAD CENTER	BECH-E001<1>/19/D5	IS	767	A2, DOOR 609	SR	04	ENER	ENER	YES	--	1X091, 1D13	AI
6052	2	02	1B20	480VAC/INTAKE STRUCTURE 480VAC LOAD CENTER	BECH-E001<1>/19/D3	IS	767	B2, DOOR 603	SR	04	ENER	ENER	YES	--	1X020, 1D23	AI
6053	2	01	1B21	480VAC/INTAKE STRUCTURE 480VAC MOTOR CONTROL CENTER	BECH-E001<1>/19/D3	IS	767	B2, DOOR 603	SR	--	ENER	ENER	YES	--	1B20	AI
6007	1	01	1B32	480VAC/CB 480VAC ESSENTIAL MOTOR CONTROL CENTER	BECH-E001<1>/19/A5	CB	757	H12	SR	04	ENER	ENER	YES	--	1B03	AI
6009	1	01	1B34	480VAC/RB 786' LEVEL 480VAC MOTOR CONTROL CENTER	BECH-E001<1>/19/A5	RB	786	F6	SR	04	ENER	ENER	YES	--	1B03	AI
6010	1	01	1B34A	480VAC/RB 786' LEVEL 480VAC MOTOR CONTROL CENTER	BECH-E001<1>/19/A4	RB	786	F6	SR	04	ENER	ENER	YES	--	1B03	AI
6012	1	01	1B36	480VAC/PUMP HOUSE 480VAC MOTOR CONTROL CENTER	BECH-E001<1>/19/A5	PH	761	B3, "A" SIDE RM	SR	--	ENER	ENER	YES	--	1B32	AI
6056	2	01	1B42	480VAC/CONTROL BUILDING 480VAC MOTOR CONTROL CENTER	BECH-E001<1>/19/A4	CB	757	F11	SR	04	ENER	ENER	YES	--	1B04	AI
6058	2	01	1B44	480VAC/RB 757' LEVEL 480VAC MOTOR CONTROL CENTER	BECH-E001<1>/19/A4	RB	757	D9.1	SR	04	ENER	ENER	YES	--	1B04	AI
6059	2	01	1B44A	480VAC/RB 757' LEVEL 480VAC MOTOR CONTROL CENTER	BECH-E001<1>/19/A4	RB	757	D8.1	SR	04	ENER	ENER	YES	--	1B04	AI
6061	2	01	1B46	480VAC/PUMP HOUSE 480VAC MOTOR CONTROL CENTER	BECH-E001<1>/19/A4	PH	761	C1, "B" SIDE RM	SR	--	ENER	ENER	YES	--	1B04	AI
6004	1	01	1B91	480VAC/INTAKE STRUCTURE 480VAC MOTOR CONTROL CENTER	BECH-E001<1>/19/D5	IS	767	A2, DOOR 609	SR	--	ENER	ENER	YES	--	1B09	AI
8667	1	20	1C093	480VAC/SBDG 1G-31 CONTROL PANEL	BECH-E005/9/G8	TB	757	P5	SR	04	OFF	ON	YES	BECH-E005	1D11, 1C008	AI
8668	2	20	1C094	SBDG/SBDG 1G-21 CONTROL PANEL	BECH-E005/9/G3	TB	757	N5	SR	04	OFF	ON	YES	BECH-E005	1D21, 1C008	AI
6101	1	15	1D1	125VDC/125VDC DIVISION 1 BATTERY	BECH-E027/18/H5	CB	757	H13	SR	--	ENER	ENER	YES	--	1D12	AI

Table 4-1
DUANE ARNOLD ENERGY CENTER
SAFE SHUTDOWN EQUIPMENT LIST (SSEL)
Relay Review Items

Data Base File Name/Date/Time: DAEC_R1.DBF / 04/19/95 / 15:50:14
Sort Criteria: ID Number
Filter Criteria: (Eval. Type CONTAINS 'R')
Program File Name & Version: SSEM 2.2

LINE NO.	TRAIN	EQUIP CLASS	MARK NO.	SYSTEM/EQUIPMENT DESCRIPTION	Dwg. No./Rev./Zone	<---------- EQUIPMENT LOCATION -----> Building	Flr.Elv.	Rm. or Row/Col.	SORT	NOTES	<-- OP. ST. --> Normal	Desired	POWER REQD?	SUPPORTING SYS. DWG. NO./REV.	REQ'D INTERCONNECTIONS & SUPPORTING COMPONENTS	REG. ISSUE
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
6102	1	14	1D10	125VDC/125VDC DIVISION 1 DISTRIBUTION PANEL B 1	BECH-E027/18/H6	CB	757	G12	SR	--	ENER	ENER	YES	--	1D1	AI
6103	1	14	1D11	125VDC/125VDC DIVISION 1 DISTRIBUTION PANEL A	BECH-E027/18/D8	CB	757	G12	SR	--	ENER	ENER	YES	--	1D1^	AI
6104	1	16	1D12	125VDC/1D1 125VDC DIVISION 1 MAIN BATTERY CHARGER	BECH-E027/18/F5	CB	757	G12	SR	--	ENER	ENER	YES	--	1B32	AI
6112	OPT	16	1D120	125VDC/125VDC BACKUP BATTERY CHARGER	BECH-E027/18/E5	CB	757	H12	SR	--	ENER	ENER	YES	--	1B32, 1B42	AI
6105	1	14	1D13	125VDC/125VDC DIVISION 1 DISTRIBUTION PANEL C	BECH-E027/18/D6	CB	757	G12	SR	--	ENER	ENER	YES	--	1D10	AI
6106	1	01	1D14	125VDC/RCIC SYSTEM 125VDC MOTOR CONTROL CENTER	BECH-E027/18/C6	RB	786	F6	SR	04	ENER	ENER	YES	--	1D10	AI
6306	1	16	1D15	120VAC/120 VOLT INSTRUMENT AC POWER SUPPLY	BECH-E029<2>/0/E7	CB	757	H11	SR	04	ENER	ENER	YES	--	1D10	AI
6107	2	15	1D2	125VDC/125VDC DIVISION 2 BATTERY	BECH-E027/18/H4	CB	757	F13	SR	--	ENER	ENER	YES	--	1D22	AI
6108	2	14	1D20	125VDC/125VDC DIVISION 2 DISTRIBUTION PANEL B 2	BECH-E027/18/H4	CB	757	F12	SR	--	ENER	ENER	YES	--	1D2	AI
6109	2	14	1D21	125VDC/125VDC DIVISION 2 DISTRIBUTION PANEL B	BECH-E027/18/D2	CB	757	F12	SR	--	ENER	ENER	YES	--	1D20	AI
6110	2	16	1D22	125VDC/1D2 125VDC (DIVISION 2) MAIN BATTERY CHARGER	BECH-E027/18/F4	CB	757	F12	SR	--	ENER	ENER	YES	--	1B42	AI
6111	2	14	1D23	125VDC/125VDC DIVISION 2 DISTRIBUTION PANEL D	BECH-E027/18/D4	CB	757	F12	SR	--	ENER	ENER	YES	--	1D20	AI
6301	2	16	1D25	120VAC/120 VOLT INSTRUMENT AC POWER SUPPLY	BECH-E029<2>/0/E5	CB	757	F11	SR	04	ENER	ENER	YES	--	1D20	AI
6200	1,2	15	1D4	250VDC/250VDC BATTERY	BECH-E028/10/H6	CB	757	G13	SR	--	ENER	ENER	YES	--	1D43, 1D44	AI
6201	1,2	14	1D40	250VDC/250VDC DISTRIBUTION PANEL	BECH-E028/10/G7	CB	757	G13	SR	--	ENER	ENER	YES	--	1D4	AI
6202	1,2	01	1D41	250VDC/HPCI 250VDC MOTOR CONTROL CENTER	BECH-E028/10/C7	RB	757	G5.2	SR	04	ENER	ENER	YES	--	1D40	AI
6203	1,2	01	1D42	250VDC/RB 757' LEVEL 250VDC MOTOR CONTROL CENTER	BECH-E028/10/E6	RB	757	G10	SR	04	ENER	ENER	YES	--	1D40	AI
6204	1	16	1D43	250VDC/1D4 250VDC BATTERY CHARGER	BECH-E028/10/F6	TB	757	H12	SR	--	ENER	ENER	YES	--	1B32	AI
6205	2	16	1D44	250VDC/1D4 250VDC BATTERY CHARGER	BECH-E028/10/F6	CB	757	F12	SR	--	ENER	ENER	YES	--	1B42	AI
6404	1,2	16	1D45	120VAC/120 VOLT UNINTERRUPTIBLE AC POWER SUPPLY	BECH-E29<2>/0/E3	CB	757	H11	SR	--	ENER	ENER	YES	--	1D40	AI

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DUANE ARNOLD ENERGY CENTER
SAFE SHUTDOWN EQUIPMENT LIST (SSEL)
Relay Review Items

Data Base File Name/Date/Time: DAEC_R1.DBF / 04/19/95 / 15:50:14
Sort Criteria: ID Number
Filter Criteria: (Eval. Type CONTAINS 'R')
Program File Name & Version: SSEM 2.2

LINE NO.	TRAIN	EQUIP CLASS	MARK NO.	SYSTEM/EQUIPMENT DESCRIPTION	Dwg. No./Rev./Zone	<--------- EQUIPMENT LOCATION -----> Building	Flr.Elv.	Rm. or Row/Col.	SORT	NOTES	<-- OP. ST. --> Normal	Desired	POWER REQD?	SUPPORTING SYS. DWG. NO./REV.	REQ'D INTERCONNECTIONS & SUPPORTING COMPONENTS	REG. ISSUE
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
6063	2	17	1G021	SBDG/DIESEL GENERATOR, EMER AC PWR TO 1A4	BECH-E005/9/G3	TB	757	P5	SR	--	OFF	ON	YES	--	--	AI
6015	1	17	1G031	SBDG/DIESEL GENERATOR, EMER AC PWR TO 1A3	BECH-E005/9/G7	TB	757	P5	SR	--	OFF	ON	YES	--	--	AI
8438	1	12	1K003	HVIA/HVAC INSTRUMENT AIR COMPRESSOR A	BECH-M173/27/A6	RB	787	G10	SR	--	OFF	RUNNING	YES	BECH-E113<13<144> BECH-E105<12A>	PS7335A, 1B3232(1B32)	AI
8439	2	12	1K004	HVIA/HVAC INSTRUMENT AIR COMPRESSOR B	BECH-M173/27/A8	RB	787	G10	SR	--	OFF	RUNNING	YES	BECH-E113<14> BECH-E105<16A>	PS7335B, 1B4230(1B42)	AI
8702	OPT	18	1L08	CRL/480V/277V LIGHTING PANEL	BECH-E426/16/F6	CB	757	G21	SR	19	N/A	N/A	YES	BECH-E505<56>	1B42	AI
8101	1	06	1P022A	RHRSW/RHR SERVICE WATER PUMP A	BECH-M146/44/A8	PH	761	D4, "A" SIDE RM	SR	--	OFF	RUNNING	YES	BECH-E121<42> BECH-E104<3D>	1A307(1A3), 1D13	AI
8103	2	06	1P022B	RHRSW/RHR SERVICE WATER PUMP B	BECH-M146/44/A6	PH	761	D2, "B" SIDE RM	SR	--	OFF	RUNNING	YES	BECH-E121<42A> BECH-E104<36>	1A407(1A4), 1D23	AI
8102	1	06	1P022C	RHRSW/RHR SERVICE WATER PUMP C	BECH-M146/44/A7	PH	761	D3, "A" SIDE RM	SR	--	OFF	RUNNING	YES	BECH-E121<42> BECH-E104<3D>	1A308(1A3), 1D13	AI
8104	2	06	1P022D	RHRSW/RHR SERVICE WATER PUMP D	BECH-M146/44/A5	PH	761	D1, "B" SIDE RM	SR	--	OFF	RUNNING	YES	BECH-E121<42D> BECH-E104<36>	1A408(1A4), 1D23	AI
8303	2	05	1P044A	DGS/DIESEL OIL TRANSFER PUMP	BECH-M132/37/A2	N/A	757	--	SR	--	OFF	RUNNING	YES	BECH-E106<5> BECH-E105<12>	1B3226(1B32)	AI
8302	1	05	1P044B	DGS/DIESEL OIL TRANSFER PUMP	BECH-M132/37/A3	N/A	757	--	SR	--	OFF	RUNNING	YES	BECH-E106<5A> BECH-E105<16>	1B4210(1B42)	AI
8001	1	06	1P099A	ESW/EMERGENCY SERVICE WATER PUMP A	BECH-M146/44/A7	PH	761	C3, "A" SIDE RM	SR	--	OFF	RUNNING	YES	BECH-E111<08>	1B3214(1B32)	AI
8002	2	06	1P099B	ESW/EMERGENCY SERVICE WATER PUMP B	BECH-M146/44/A6	PH	761	C2, "B" SIDE RM	SR	--	OFF	RUNNING	YES	BECH-E111<08A>	1B4207(1B42)	AI
8201	1	06	1P117A	RWS/RIVER WATER SUPPLY PUMP A	BECH-M129/20/C7	IS	767	A3, DOOR 609	SR	--	OFF	RUNNING	YES	BECH-E024<1> BECH-E111<11>	1B0901(1B09), 72-1106(1D11)	AI
8203	2	06	1P117B	RWS/RIVER WATER SUPPLY PUMP B	BECH-M129/20/C4	IS	767	B3, DOOR 603	SR	--	OFF	RUNNING	YES	BECH-E024<1> BECH-E111<11A>	1B2001(1B20), 72-2106(1D21)	AI
8202	1	06	1P117C	RWS/RIVER WATER SUPPLY PUMP C	BECH-M129/20/C6	IS	767	A3, DOOR 609	SR	--	OFF	RUNNING	YES	BECH-E024<1> BECH-E111<11>	1B0902(1B09), 72-1106(1D11)	AI
8204	2	06	1P117D	RWS/RIVER WATER SUPPLY PUMP D	BECH-M129/20/C3	IS	767	B3, DOOR 603	SR	--	OFF	RUNNING	YES	BECH-E024<1> BECH-E111<11B>	1B2002(1B20), 72-2106(1D21)	AI
3109	1	06	1P211A	CS/CORE SPRAY PUMP A	BECH-M121/27/C3	RB	716	H6.5	SR	--	OFF	RUNNING	YES	BECH-E121<3>	1A304(1A3), 1D13	AI
3119	2	06	1P211B	CS/CORE SPRAY PUMP B	BECH-M121/27/C4	RB	716	D10, HW CR	SR	--	OFF	RUNNING	YES	BECH-E121<3A>	1A404(1A4), 1D23	AI
4005	1	06	1P229A	RHR/RHR PUMP A	BECH-M120/38/B3	RB	716	H6.5	SR	--	OFF	RUNNING	YES	BECH-E104<3D> BECH-E121<41>/B	1A305(1A3), 1D13	AI

Table 4-1
DUANE ARNOLD ENERGY CENTER
SAFE SHUTDOWN EQUIPMENT LIST (SSEL)
Relay Review Items

Data Base File Name/Date/Time: DAEC_R1.DBF / 04/19/95 / 15:50:14
Sort Criteria: ID Number
Filter Criteria: (Eval. Type CONTAINS 'R')
Program File Name & Version: SSEM 2.2

LINE NO.	TRAIN	EQUIP CLASS	MARK NO.	SYSTEM/EQUIPMENT DESCRIPTION	Dwg. No./Rev./Zone	<--- EQUIPMENT LOCATION ---> Building	Flr.Elv.	Rm. or Row/Col.	SORT	NOTES	<-- OP. ST. --> Normal	Desired	POWER REQD?	SUPPORTING SYS. DWG. NO./REV.	REQ'D INTERCONNECTIONS & SUPPORTING COMPONENTS	REG. ISSUE
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
4025	2	06	1P229B	RHR/RHR PUMP B	BECH-M119/47/A6	RB	716	D10, NW CR	SR	--	OFF	RUNNING	YES	BECH-E121<41A>	1A405(1A4)	AI
4008	1	06	1P229C	RHR/RHR PUMP C	BECH-M120/38/B2	RB	716	H6.5	SR	--	OFF	RUNNING	YES	BECH-E121<41>	1A306(1A3), 1D13	AI
4028	2	06	1P229D	RHR/RHR PUMP D	BECH-M119/47/A8	RB	716	D10, NW CR	SR	--	OFF	RUNNING	YES	BECH-E121<41D>	1A406(1A4), 1D23	AI
3163	1,2	088	1S218ABALL	TIP/BALL VALVE (1S260A/BALL ?)	--	--	--	--	R	--	CLOSED	CLOSED	NO	APED-C51-006<1> APED-C51-003<2>	--	AI
3164	1,2	088	1S218BBALL	TIP/BALL VALVE (1S260B/BALL ?)	--	--	--	--	R	--	CLOSED	CLOSED	NO	APED-C51-006<1> APED-C51-003<2>	--	AI
3165	1,2	088	1S218CBALL	TIP/BALL VALVE (1S260C/BALL ?)	--	--	--	--	R	--	CLOSED	CLOSED	NO	APED-C51-006<1> APED-C51-003<2>	--	AI
8533	1	10	1VAC011	HVAC/RHR & CS ROOM AC UNIT A	BECH-M171/18/C5	RB	747	D10, NW CR	SR	--	OFF	RUNNING	YES	BECH-E113<147A>	1B4403(1B44)	AI
8534	2	10	1VAC012	HVAC/RHR & CS ROOM AC UNIT B	BECH-M171/18/C4	RB	747	H5.2	SR	--	OFF	RUNNING	YES	BECH-E113<147>	1B3404(1B34)	AI
8401	1	10	1VAC030A	CRHVAC/CONTROL ROOM AC UNIT A	BECH-M161/29/F6	CB	800	H13	SR	--	OFF	RUNNING	YES	BECH-E113<26> BECH-E105<12>	1B3207(1B32)	AI
8402	2	10	1VAC030B	CRHVAC/CONTROL ROOM AC UNIT B	BECH-M161/29/D6	CB	800	H13	SR	--	OFF	RUNNING	YES	BECH-E113<26> BECH-E105<16>	1B4218(1B42)	AI
8446	1	11	1VCH001A	CRHVAC/CONTROL BUILDING CHILLER A	BECH-M169<2>/02/A6	RB	812	F10	SR	--	RUNNING	RUNNING	YES	BECH-E024<1> BECH-E113<31>	1C429A, 1B0305(1B03)	AI
8447	2	11	1VCH001B	CRHVAC/CONTROL BUILDING CHILLER B	BECH-M169<2>/02/A3	RB	812	F10	SR	--	RUNNING	RUNNING	YES	BECH-E024<1> BECH-E113<31>	1C429B, 1B0405(1B04)	AI
8446A	1	05	1VCP030A	CRHVAC/CB HVAC CHILLED WATER PUMP	BECH-M169<2>/02/C6	RB	812	CHILLERS AREA	SR	--	RUNNING	RUNNING	YES	BECH-E113<32>	1B3225(1B32)	AI
8447A	2	05	1VCP030B	CRHVAC/CB HVAC CHILLED WATER PUMP	BECH-M169<2>/02/C3	RB	812	CHILLERS AREA	SR	--	RUNNING	RUNNING	YES	BECH-E113<32>	1B4214(1B42)	AI
8435	1	09	1VEF030A	CRHVAC/BATTERY ROOM EXHAUST FAN A	BECH-M161/29/D1	CB	800	G13	SR	--	OFF	RUNNING	YES	BECH-E113<40> BECH-E105<12>	1B3212(1B32)	AI
8436	2	09	1VEF030B	CRHVAC/BATTERY ROOM EXHAUST FAN B	BECH-M161/29/E1	CB	800	G13	SR	--	OFF	RUNNING	YES	BECH-E113<40A> BECH-E105<16>	1B4205(1B42)	AI
8437	OPT	09	1VEF030C	CRHVAC/BATTERY ROOM EXHAUST FAN C	BECH-M161/29/E1	CB	800	G13	SR	--	OFF	RUNNING	YES	BECH-E113<40> BECH-E105<12>	1B3217(1B32)	AI
8407	1	09	1VRF030A	CRHVAC/EXHAUST FAN A	BECH-M161/29/F5	CB	800	J13	SR	--	OFF	RUNNING	YES	BECH-E113<27> BECH-E105<12>	1B3208(1B32)	AI
8408	2	09	1VRF030B	CRHVAC/EXHAUST FAN B	BECH-M161/29/D5	CB	800	J13	SR	--	OFF	RUNNING	YES	BECH-E113<27> BECH-E105<16>	1B4219(1B42)	AI
8551	1	09	1VSF020	HVAC/EMER DIESEL ROOM VENT FAN	BECH-M170/25/F7	TB	757	P5	SR	--	OFF	RUNNING	YES	BECH-E113<52> BECH-E105<12>	1B3213(1B32), 1D11	AI
8552	2	09	1VSF021	HVAC/EMER DIESEL ROOM VENT FAN	BECH-M170/25/F7	TB	757	N5	SR	--	OFF	RUNNING	YES	BECH-E113<52A> BECH-E105<16>	1B4206(1B42), 1D21	AI

Table 4-1
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SAFE SHUTDOWN EQUIPMENT LIST (SSEL)
Relay Review Items

Data Base File Name/Date/Time: DAEC_R1.DBF / 04/19/95 / 15:50:14
Sort Criteria: ID Number
Filter Criteria: (Eval. Type CONTAINS 'R')
Program File Name & Version: SSEN 2.2

LINE NO.	TRAIN	EQUIP CLASS	MARK NO.	SYSTEM/EQUIPMENT DESCRIPTION	Dwg. No./Rev./Zone	<--------- Building	EQUIPMENT Flr.Elv.	LOCATION -----> Rm. or Row/Col.	SORT	NOTES	<-- OP. ST. --> Normal	Desired	POWER REQD?	SUPPORTING SYS. DWG. NO./REV.	REQ'D INTERCONNECTIONS & SUPPORTING COMPONENTS	REG. ISSUE
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
8513	1	09	1VSF056A	HVAC/SW PUMP ROOM VENTILATION FAN A	BECH-M175/20/E7	PH	761	A3	SR	--	OFF	RUNNING	YES	BECH-E113<79> BECH-E105<34>	1B3601(1B36)	AI
8514	2	09	1VSF056B	HVAC/SW PUMP ROOM VENTILATION FAN B	BECH-M175/20/E8	PH	775	A1	SR	--	OFF	RUNNING	YES	BECH-E113<79> BECH-E105<35>	1B4601(1B46)	AI
8507	1	09	1VSF50	HVAC/INTAKE STRUCTURE VENT FAN A	BECH-M177/28/E6	IS	767	A2, DOOR 609	SR	--	OFF	RUNNING	YES	BECH-E113<63> BECH-E105<31>	1B9101(1B91)	AI
8508	2	09	1VSF51	HVAC/INTAKE STRUCTURE VENT FAN B	BECH-M177/28/E6	IS	767	B2, DOOR 603	SR	--	OFF	RUNNING	YES	BECH-E113<63> BECH-E105<30>	1B2101(1B21)	AI
5403	2	04	1Y002	IAC/INSTRUMENT AC PANEL 1Y021 SUPPLY TRANSFORMER	BECH-E29<2>/0/E4	CB	763	G13	SR	--	ENER	ENER	YES	--	1B42	AI
6402	1,2	04	1Y004	120VAC/REGULATING TRANSFORMER	BECH-E29<2>/0/E2	CB	757	H12	SR	04	ENER	ENER	YES	--	1B32	AI
6309	1	14	1Y010	IAC/INSTRUMENT AC 1Y11 MAIN AND TIE BREAKER PANEL	BECH-E029<2>/0/D7	CB	757	G12	SR	--	ENER	ENER	YES	--	1Y15	AI
6305	2	14	1Y021	120VAC/120V INSTRUMENT AC DISTRIBUTION PANEL	BECH-E029<2>/0/C5	CB	757	G13	SR	--	ENER	ENER	YES	--	1Y20	AI
6401	1,2	14	1Y022	120VAC/1Y002 TO 1Y023 AUTOMATIC TRANSFER SWITCH	BECH-E29<2>/0/D3	CB	757	H11	SR	04	ENER	ENER	YES	--	1D45, 1Y004, 1Y002	AI
6400	1,2	14	1Y023	120VAC/120V UNINTERRUPTIBLE AC DISTRIBUTION PANEL	BECH-E29<2>/0/C2	CB	757	H11	SR	--	ENER	ENER	YES	--	1Y022, 1Y004, 1D45, 1Y002	AI
6310	1	14	1Y11	120VAC/120V INSTRUMENT AC DISTRIBUTION PANEL	BECH-E029<2>/0/C7	CB	757	G12	SR	--	ENER	ENER	YES	--	1Y010	AI
6307	1	14	1Y15	IAC/MANUAL BYPASS SWITCH PANEL	BECH-E029<2>/0/D7	CB	757	H11	SR	--	ENER	ENER	YES	--	1D15, 1Y1A	AI
6308	1	04	1Y1A	IAC/REGULATING TRANSFORMER	BECH-E029<2>/0/E6	CB	757	H11	SR	04	ENER	ENER	YES	--	1B32	AI
6304	2	14	1Y20	IAC/INSTRUMENT AC 1Y21 MAIN AND TIE BREAKER PANEL	BECH-E029<2>/0/D5	CB	757	G13	SR	--	ENER	ENER	YES	--	1Y25	AI
6302	2	14	1Y25	IAC/MANUAL BYPASS SWITCH PANEL	BECH-E029<2>/0/D5	CB	757	F11	SR	--	ENER	ENER	YES	--	1D25, 1Y2A	AI
6303	2	04	1Y2A	IAC/REGULATING TRANSFORMER	BECH-E029<2>/0/E4	CB	757	F11	SR	04	ENER	ENER	YES	--	1B42	AI
8112	2	18	FT1944	RHRSW/LOOP B FLOW RATE TRANSMITTER	BECH-M113/39/E7	RB	735	(1C058)	SR	--	N/A	N/A	YES	APED-E11-007<10 A>	FY1944(1C018), E/S1944(1C018), F11944(1C003), 1Y021	AI
4042	1	18	FT1971A	RHR/LOOP A FLOW TRANSMITTER	BECH-M120/38/E7	RB	716	(1C129A)	SR	--	N/A	N/A	YES	APED-E11-007<10 A> APED-E11-007<12 > BECH-E121<57>	FY1971A(1C019), F11971A(1C003), E/S1971A(1C019), 1Y11	AI
4044	2	18	FT1971B	RHR/LOOP B FLOW TRANSMITTER	BECH-M119/47/E2	RB	716	(1C129B), MW CR	SR	--	N/A	N/A	YES	APED-E11-007<10 A>	FY1971B(1C018), F11971B(1C003), E/S1971B(1C018), 1Y021	AI

Table 4-1
DUANE ARNOLD ENERGY CENTER
SAFE SHUTDOWN EQUIPMENT LIST (SSEL)
Relay Review Items

Data Base File Name/Date/Time: DAEC_R1.DBF / 04/19/95 / 15:50:14
Sort Criteria: ID Number
Filter Criteria: (Eval. Type CONTAINS 'R')
Program File Name & Version: SSEM 2.2

LINE NO.	TRAIN	EQUIP CLASS	MARK NO.	SYSTEM/EQUIPMENT DESCRIPTION	Dwg. No./Rev./Zone	<-- Building	EQUIPMENT Flr.Elv.	LOCATION --> Rm. or Row/Col.	SORT	NOTES	<-- OP. Normal	ST. --> Desired	POWER REQD?	SUPPORTING SYS. DWG. NO./REV.	REQ'D INTERCONNECTIONS & SUPPORTING COMPONENTS	REG. ISSUE
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
8111	1	18	FT2050	RHRSW/LOOP A FLOW RATE TRANSMITTER	BECH-M113/39/F6	RB	724	(1C120)	SR	--	N/A	N/A	YES	APED-E11-007<10>	FY2050(1C019), E/S2050(1C003), F12050(1C003), 1Y11	AI
3125	1	18	FT2110	CS/LOOP A FLOW RATE TRANSMITTER	BECH-M121/27/G5	RB	716	(1C123)	SR	--	N/A	N/A	YES	APED-E21-009 APED-E21-006<3>	E/S2110(1C019), F12110(1C003), 1Y11	AI
3126	2	18	FT2130	CS/LOOP B FLOW RATE TRANSMITTER	BECH-M121/27/E5	RB	716	(1C124), NW CR	SR	--	N/A	N/A	YES	BECH-E121<10> APED-E21-006<1>	E/S2130(1C018), F12130(1C003), 1Y021	AI
8214	2	18	FT4916	RWS/LOOP B FLOW RATE TRANSMITTER	BECH-M146/44/E6	PH	727	A1	SR	--	N/A	N/A	YES	FP-M155<1A>	E/S4916(1C006), F14916(1C006)	AI
8213	1	18	FT4917	RWS/LOOP A FLOW RATE TRANSMITTER	BECH-M146/44/E6	PH	747	B2	SR	--	N/A	N/A	YES	FP-M155<1B>	E/S4917(1C006), F14917(1C006)	AI
8019	1	18	FT4938A	ESW/LOOP A FLOW RATE TRANSMITTER	BECH-M146/44/C7	PH	761	A3	SR	--	N/A	N/A	YES	BECH-E112<11>	PDI4938A, E/S4938A(1C006), F14938A(1C006)	AI
8020	2	18	FT4938B	ESW/LOOP B FLOW RATE TRANSMITTER	BECH-M146/44/C6	PH	761	A3	SR	--	N/A	N/A	YES	BECH-E112<11>	PDI4938B, E/S4938B(1C006), F14938B(1C006)	AI
8309	2	18	LIS3207	DGS/DIESEL OIL DAY TANK LOW-LOW LEVEL ALARM	BECH-M132/37/F5	TB	757	(1C008)	SR	--	N/A	N/A	YES	--	--	AI
8307	2	18	LIS3208	DGS/DIESEL OIL DAY TANK LEVEL SWITCH	BECH-M132/37/E4	TB	757	P4	SR	--	N/A	N/A	YES	BECH-E106<5A>	--	AI
8308	1	18	LIS3209	DGS/DIESEL OIL DAY TANK LOW-LOW LEVEL ALARM	BECH-M132/37/C5	TB	757	(1C008)	SR	--	N/A	N/A	YES	--	--	AI
8306	1	18	LIS3210	DGS/DIESEL OIL DAY TANK LEVEL SWITCH	BECH-M132/37/B4	TB	757	N4	SR	--	N/A	N/A	YES	BECH-E106<5A>	--	AI
3132E	1	18	LIS4535	REACTOR VESSEL WATER LEVEL (ATWS TRIP)	BECH-M115/37/F7	RB	786	(1C056)	SR	14	N/A	N/A	YES	--	--	AI
3132F	1	18	LIS4536	REACTOR VESSEL WATER LEVEL (ATWS TRIP)	BECH-M115/37/F3	RB	757	(1C055)	SR	14	N/A	N/A	YES	--	--	AI
3132G	2	18	LIS4537	REACTOR VESSEL WATER LEVEL (ATWS TRIP)	BECH-M115/37/F7	RB	786	(1C056)	SR	14	N/A	N/A	YES	--	--	AI
3132H	2	18	LIS4538	REACTOR VESSEL WATER LEVEL (ATWS TRIP)	BECH-M115/37/F3	RB	757	(1C055)	SR	14	N/A	N/A	YES	--	--	AI
3132A	OPT	18	LIS4592A	REACTOR VESSEL NR LEVEL (RCIC, PCIS TRIP)	BECH-M115/37/E6	RB	786	(1C056)	SR	14, 15	N/A	N/A	YES	APED-C71-004<6> BECH-E121<37>	--	AI
3132B	OPT	18	LIS4592B	REACTOR VESSEL NR LEVEL (RCIC, PCIS TRIP)	BECH-M115/37/E6	RB	786	(1C056)	SR	14, 15	N/A	N/A	YES	APED-C71-004<4> BECH-E121<24>	--	AI

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DUANE ARNOLD ENERGY CENTER
SAFE SHUTDOWN EQUIPMENT LIST (SSEL)
Relay Review Items

Data Base File Name/Date/Time: DAEC_R1.DBF / 04/19/95 / 15:50:14
Sort Criteria: ID Number
Filter Criteria: (Eval. Type CONTAINS 'R')
Program File Name & Version: SSEN 2.2

LINE NO.	TRAIN	EQUIP CLASS	MARK NO.	SYSTEM/EQUIPMENT DESCRIPTION	Dwg. No./Rev./Zone	<--------- EQUIPMENT LOCATION -----> Building	Flr.Elv.	Rm. or Row/Col.	SORT	NOTES	<-- OP. ST. --> Normal	Desired	POWER REQD?	SUPPORTING SYS. DWG. NO./REV.	REQ'D INTERCONNECTIONS & SUPPORTING COMPONENTS	REG. ISSUE
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
3132C	OPT	18	LIS4592C	REACTOR VESSEL NR LEVEL (RCIC, PCIS TRIP)	BECH-M115/37/E3	RB	757	(1C055)	SR	14, 15	N/A	N/A	YES	APED-C71-004<6> BECH-E121<37>	--	AI
3132D	OPT	18	LIS4592D	REACTOR VESSEL NR LEVEL (RCIC, PCIS TRIP)	BECH-M115/37/E3	RB	757	(1C055)	SR	14, 15	N/A	N/A	YES	APED-C71-004<4> APED-E41-006<3>	--	AI
3127	1	18	LITS4539	RCS/REACTOR VESSEL WATER LEVEL TRANSMITTER	BECH-M115/37/F7	RB	786	(1C056)	SR	05	N/A	N/A	YES	APED-ES1-009<4> BECH-E074	LY4539(1C056), LI4539(1C005), ES1-K603-1C004(1C004), 1D13	AIR
3128	2	18	LITS4540	RCS/REACTOR VESSEL WATER LEVEL TRANSMITTER	BECH-M115/37/F2	RB	757	(1C055)	SR	05	N/A	N/A	YES	APED-E41-006<2> BECH-E074	LY4540(1C055), LI4540(1C005), E41-K603-1C003(1C003), 1D23	AIR
3133	1	18	LT4397A	RCS/TORUS WATER LEVEL TRANSMITTER	BECH-M143<2>/B/A7	BAY 02	716	(1C009)	SR	05	N/A	N/A	YES	BECH-E122<19A> APED-B21-119<1>	I/E4397A(1C009), LI4397A(1C003), LR4396A(1C009), 1Y11	AIR
3134	2	18	LT4397B	RCS/TORUS WATER LEVEL TRANSMITTER	BECH-M143<2>/B/B5	BAY 02	716	(1C009)	SR	05	N/A	N/A	YES	BECH-E122<19A> APED-B21-119<1>	I/E4397B(1C009), LI4397B(1C003), LR4396B(1C009), 1Y11	AIR
3129	1	18	LT4565A	RCS/REACTOR VESSEL WATER LEVEL TRANSMITTER	BECH-M115/37/E7	RB	757	(1C122)	SR	05	N/A	N/A	YES	APED-E11-007<10 A>	LY4565A(1C003), LR4565A(1C003), E/S4565A(1C003), 1Y11	AIR
3130	1	18	LT4565B	RCS/REACTOR VESSEL WATER LEVEL TRANSMITTER	BECH-M115/37/E7	RB	757	(1C122)	SR	05	N/A	N/A	YES	APED-E11-007<10 A>	LY4565B(1C003), LI4565B(1C003), E/S4565B(1C003), 1Y21	AIR
3131	2	18	LT4565C	RCS/REACTOR VESSEL WATER LEVEL TRANSMITTER	BECH-M115/37/E2	RB	757	(1C121)	SR	05	N/A	N/A	YES	APED-E11-007<10 A>	LY4565C(1C003), LI4565C(1C003), E/S4565A(1C003), 1Y11	AIR
3132	2	18	LT4565D	RCS/REACTOR VESSEL WATER LEVEL TRANSMITTER	BECH-M115/37/E2	RB	757	(1C121)	SR	05	N/A	N/A	YES	--	LI4565D(1C003), LY4565D(1C003), E/S4565D(1C003), 1Y21	AIR
4036A	2	08A	MO1902	RHR/LOOP B DRYWELL SPRAY INBOARD ISOLATION VALVE	BECH-M119/47/F7	RB	766	E7.1	SR	05	CLOSED	OPEN	YES	BECH-E121<48>	1B4419(1B44)	AIR
4036	2	08A	MO1903	RHR/LOOP B DRYWELL SPRAY OUTBOARD ISOLATION VALVE	BECH-M119/47/F6	BAY 14	716	D7.1	SR	05	CLOSED	OPEN	YES	BECH-E121<60>	1B4420(1B44)	AIR
4038	2	08A	MO1904	RHR/LOOP B LPCI OUTBOARD INJECT VALVE	BECH-M119/47/E6	RB	757	RHR ROOM	SR	05	OPEN	OP/CL	YES	BECH-E121<53A>	1B4494(1B44A)	AI
4039	2	08A	MO1905	RHR/LOOP B LPCI INBOARD INJECT VALVE	BECH-M119/47/E6	RB	757	RHR ROOM	SR	05	CLOSED	OP/CL	YES	BECH-E121<52A>	1B4493(1B44A)	AIR
3170	1,2	08A	MO1908	RHR/RHR SHUTDOWN COOLING SUCTION ISOLATION	BECH-M119/47/D8	DW	775	SW QUADRANT	R	--	CLOSED	CLOSED	NO	BECH-E122<2A> APED-E11-007<4>	--	AI

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DUANE ARNOLD ENERGY CENTER
SAFE SHUTDOWN EQUIPMENT LIST (SSEL)
Relay Review Items

Data Base File Name/Date/Time: DAEC_R1.DBF / 04/19/95 / 15:50:14
Sort Criteria: ID Number
Filter Criteria: (Eval. Type CONTAINS 'R')
Program File Name & Version: SSEM 2.2

LINE NO.	TRAIN	EQUIP CLASS	MARK NO.	SYSTEM/EQUIPMENT DESCRIPTION	Dwg. No./Rev./Zone	Building	EQUIPMENT Flr.Elv.	LOCATION Rm. or Row/Col.	SORT	NOTES	OP. Normal	ST. Desired	POWER REQD?	SUPPORTING SYS. DWG. NO./REV.	REQ'D INTERCONNECTIONS & SUPPORTING COMPONENTS	REQ. ISSUE
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
4024	2	08A	MO1912	RHR/RHR PUMP B ISOLATION VALVE	BECH-M119/47/B7	RB	716	D10	R	--	CLOSED	CLOSED	NO	BECH-E121<44B>	--	AI
4023	2	08A	MO1913	RHR/RHR PUMP B ISOLATION VALVE	BECH-M119/47/B7	RB	716	D10	R	--	OPEN	OPEN	NO	BECH-E121<43D>	--	AI
4027	2	08A	MO1920	RHR/RHR PUMP D ISOLATION VALVE	BECH-M119/47/B8	RB	716	D10	R	--	CLOSED	CLOSED	NO	BECH-E121<44D>	--	AI
4026	2	08A	MO1921	RHR/RHR PUMP D ISOLATION VALVE	BECH-M119/47/B7	RB	716	D10	R	--	OPEN	OPEN	NO	BECH-E121<43E>	--	AI
4037	2	08A	MO1932	RHR/LOOP B TORUS SPRAY OUTBOARD ISOLATION VALVE	BECH-M119/47/E5	BAY 14	716	D7.1	SR	05	CLOSED	OPEN	YES	BECH-E121<49A>	1B4427(1B44)	AIR
4040	2	08A	MO1933	RHR/LOOP B TORUS SPRAY INBOARD ISOLATION VALVE	BECH-M119/47/E5	BAY 13	716	D7.1	SR	05	CLOSED	OPEN	YES	BECH-E121<59A>	1B4428(1B44)	AIR
4041	2	08A	MO1934	RHR/LOOP B TORUS RETURN ISOLATION VALVE	BECH-M119/47/E5	BAY 13	716	D7.1	SR	05	CLOSED	OP/CL	YES	BECH-E121<59B>	1B4429(1B44)	AIR
4028A	1	08A	MO1935	RHR/RHR PUMPS 1P-229B/D MIN FLOW BYPASS	BECH-M119/47/B5	BAY 16	716	E9.1	SR	05	CLOSED	OP/CL	YES	BECH-E121<54A>	1B4430(1B44)	AIR
4046A	1,2	08A	MO1937	RHR/RHR DRAIN TO WASTE SURGE TANK INBOARD ISOL	BECH-M119/47/D6	BAY 14	716	D8.1	R	--	CLOSED	CLOSED	NO	BECH-E122<15>	--	AI
4030	2	08A	MO1939	RHR/LOOP B HX ISOLATION VALVE	BECH-M119/47/C4	RB	732	D10	R	--	OPEN	OPEN	NO	BECH-E121<43F>	--	AI
4029	2	08A	MO1940	RHR/LOOP B HX BYPASS VALVE	BECH-M119/47/D4	RB	732	D10, N&V CR	SR	--	OPEN	CLOSED	YES	BECH-E121<51A>	1B4432(1B44)	AI
4034	2	08A	MO1941	RHR/LOOP B HX ISOLATION VALVE	BECH-M119/47/D3	RB	732	D10	R	--	OPEN	OPEN	NO	BECH-E121<43C>	--	AI
8105	1	08A	MO1943A	RHRSW/LOOP A RHR HEADER ISOLATION VALVE	BECH-M113/39/F7	RB	736	H5.2	R	--	CLOSED	CLOSED	NO	BECH-E121<45>	--	AI
8106	2	08A	MO1943B	RHRSW/LOOP B RHR HEADER ISOLATION VALVE	BECH-M113/39/E7	BAY 12	716	E6.1	R	--	CLOSED	CLOSED	NO	BECH-E121<45>	--	AI
8110	2	08A	MO1947	RHRSW/LOOP B PRESSURE CONTROL VALVE	BECH-M113/39/C6	RB	734	D10, N&V CR	SR	--	CLOSED	OPEN	YES	BECH-E121<55A> BECH-E105<19> APED-E11-007<7>	1D4434(1B44), ZM1947(1C018), 1Y021	AI
4031A	1,2	08A	MO1949B	RHR/RHR HX 1E-201B SHELL SIDE INBOARD VENT	BECH-M119/47/C3	RB	732	N&V CORNER ROOM	R	--	CLOSED	CLOSED	NO	BECH-E121<047>	--	AI
4022	2	08A	MO1989	RHR/LOOP B TORUS INTAKE ISOLATION VALVE	BECH-M119/47/C7	BAY 16	716	E10	R	--	OPEN	OPEN	NO	BECH-E121<45B>	--	AI
8017	1	08A	MO1998A	ESW/LOOP A COOLING TOWER DISCHARGE ISOLATION VALVE	BECH-M113/39/A7	RB	731	G5, HPCI ROOM	R	--	OPEN	OPEN	NO	BECH-E111<06>	--	AI
8018	2	08A	MO1998B	ESW/LOOP B COOLING TOWER DISCHARGE ISOLATION VALVE	BECH-M113/39/B7	RB	731	G5, HPCI ROOM	R	--	OPEN	OPEN	NO	BECH-E111<06>	--	AI
4016A	1	08A	MO2000	RHR/LOOP A DRYWELL SPRAY INBOARD ISOLATION VALVE	BECH-M120/38/E2	RB	786	D8	SR	05	CLOSED	OPEN	YES	BECH-E121<48>	1B3419(1B34)	AIR

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Sort Criteria: ID Number
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Program File Name & Version: SSEM 2.2

LINE NO.	TRAIN	EQUIP CLASS	MARK NO.	SYSTEM/EQUIPMENT DESCRIPTION	Dwg. No./Rev./Zone	EQUIPMENT LOCATION Building	Flr.Elv.	Rm. or Row/Col.	SORT	NOTES	OP. ST. Normal	Desired	POWER REQD?	SUPPORTING SYS. DWG. NO./REV.	REQ'D INTERCONNECTIONS & SUPPORTING COMPONENTS	REG ISSUE
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
4016	1	08A	MO2001	RHR/LOOP A DRYWELL SPRAY OUTBOARD ISOLATION VALVE	BECH-M120/38/E4	BAY 16	716	E9.1	SR	05	CLOSED	OPEN	YES	BECH-E121<60>	1B3420(1B34)	AIR
4019	1	08A	MO2003	RHR/LOOP A LPCI INBOARD INJECT VALVE	BECH-M120/38/D3	RB	757	RHR ROOM	SR	05	CLOSED	OP/CL	YES	BECH-E121<52>	1B3493(1B34A)	AIR
4018	1	08A	MO2004	RHR/LOOP A LPCI OUTBOARD INJECT VALVE	BECH-M120/38/D4	RB	757	RHR ROOM	SR	05	OPEN	OP/CL	YES	BECH-E121<53>	1B3494(1B34A)	AI
4017	1	08A	MO2005	RHR/LOOP A TORUS SPRAY OUTBOARD ISOLATION VALVE	BECH-M120/38/E4	BAY 15	716	E9.1	SR	05	CLOSED	OPEN	YES	BECH-E121<49>	1B3423(1B34)	AIR
4020	1	08A	MO2006	RHR/LOOP A TORUS SPRAY INBOARD ISOLATION VALVE	BECH-M120/38/E4	BAY 15	716	E9.1	SR	05	CLOSED	OPEN	YES	BECH-E121<59A>	1B3425(1B34)	AIR
4021	1	08A	MO2007	RHR/LOOP A TORUS RETURN ISOLATION VALVE	BECH-M120/38/E5	BAY 15	716	E9.1	SR	05	CLOSED	OP/CL	YES	BECH-E121<59>	1B3425(1B34)	AIR
4008A	2	08A	MO2009	RHR/RHR PUMPS 1P-229A/C MIN FLOW BYPASS	BECH-M120/38/C4	BAY 10	716	F5.2	SR	05	CLOSED	OP/CL	YES	BECH-E121<54> BECH-E121<59>	1B3426(1B34)	AIR
4046	1,2	08A	MO2010	RHR/CROSS TIE ISOLATION VALVE	BECH-M120/38/C5	BAY 15	716	D8.1	SR	--	OPEN	CLOSED	YES	BECH-E121<45A>	1B3437(1B34)	AI
4004	1	08A	MO2011	RHR/RHR PUMP A ISOLATION VALVE	BECH-M120/38/C3	RB	716	H6.5	R	--	CLOSED	CLOSED	NO	BECH-E121<59> BECH-E121<44F>	--	AI
4003	1	08A	MO2012	RHR/RHR PUMP A ISOLATION VALVE	BECH-M120/38/C3	RB	716	H6.5	R	--	OPEN	OPEN	NO	BECH-E121<48> BECH-E121<43A>	--	AI
4006	1	08A	MO2015	RHR/RHR PUMP C ISOLATION VALVE	BECH-M120/38/C2	RB	716	H6.5	R	--	OPEN	OPEN	NO	BECH-E121<43A>	--	AI
4007	1	08A	MO2016	RHR/RHR PUMP C ISOLATION VALVE	BECH-M120/38/C2	RB	716	H6.5	R	--	CLOSED	CLOSED	NO	BECH-E121<44G>	--	AI
4010	1	08A	MO2029	RHR/LOOP A HX ISOLATION VALVE	BECH-M120/38/C5	RB	731	H5.2	R	--	OPEN	OPEN	NO	BECH-E121<43B>	--	AI
4009	1	08A	MO2030	RHR/LOOP A HX BYPASS VALVE	BECH-M120/38/D5	RB	731	H5.2	SR	--	OPEN	CLOSED	YES	BECH-E121<51>	1B3432(1B34)	AI
4014	1	08A	MO2031	RHR/LOOP A HX ISOLATION VALVE	BECH-M120/38/D7	RB	731	H5.2	R	--	OPEN	OPEN	NO	BECH-E121<43>	--	AI
8025	1	08A	MO2039A	ESW/CB CHILLER 1V-CH-1A WELL WATER SUPPLY ISOLATION	BECH-M004	RB	812	CHILLER AREA	SR	--	OPEN	CLOSED	YES	BECH-E111<05>	1B3227(1B32)	AI
8026	2	08A	MO2039B	ESW/CB CHILLER 1V-CH-1B WELL WATER SUPPLY ISOLATION	BECH-M004	RB	812	CHILLER AREA	SR	--	OPEN	CLOSED	YES	BECH-E111<05>	1B4225(1B42)	AI
4011A	1,2	08A	MO2044B	RHR/RHR HX 1E-201A SHELL SIDE INBOARD VENT	BECH-M120/38/C6	RB	747	SE CORNER ROOM	R	--	CLOSED	CLOSED	NO	BECH-E121<047>	--	AI
8109	1	08A	MO2046	RHRSW/LOOP A PRESSURE CONTROL VALVE	BECH-M113/39/C5	RB	731	H5, HPCI ROOM	SR	--	CLOSED	OPEN	YES	BECH-E121<55> BECH-E105<14A> APED-E11-007<4>	1B3436(1B34), ZH2046(1C019), 1Y11	AI
4002	1	08A	MO2069	RHR/LOOP A TORUS INTAKE ISOLATION VALVE	BECH-M120/38/C3	BAY 08	716	H6.1	R	--	OPEN	OPEN	NO	BECH-E121<45>	--	AI

Table 4-1
DUANE ARNOLD ENERGY CENTER
SAFE SHUTDOWN EQUIPMENT LIST (SSEL)
Relay Review Items

Data Base File Name/Date/Time: DAEC_R1.DBF / 04/19/95 / 15:50:14
Sort Criteria: ID Number
Filter Criteria: (Eval. Type CONTAINS 'R')
Program File Name & Version: SSEM 2.2

LINE NO.	TRAIN	EQUIP CLASS	MARK NO.	SYSTEM/EQUIPMENT DESCRIPTION	Dwg. No./Rev./Zone	<--- Building	EQUIPMENT Flr.Elv.	LOCATION ---> Rm. or Row/Col.	SORT	NOTES	<-- OP. Normal	ST. --> Desired	POWER REQD?	SUPPORTING SYS. DWG. NO./REV.	REQ'D INTERCONNECTIONS & SUPPORTING COMPONENTS	REG. ISSUE
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
8015	1	08A	MO2077	ESW/LOOP A DISCHARGE HEADER ISOLATION VALVE	BECH-M113/39/F3	RB	812	F10	SR	--	OPEN	CLOSED	YES	BECH-E111<24>	1B3228(1B32)	AI
8016	2	08A	MO2078	ESW/LOOP B DISCHARGE HEADER ISOLATION VALVE	BECH-M113/39/F1	RB	812	F10	SR	--	OPEN	CLOSED	YES	BECH-E111<24>	1B4226(1B42)	AI
3106	1	08A	MO2100	CS/LOOP A OUTBOARD TORUS ISOLATION VALVE	BECH-M121/27/B5	RB	716	H5.2	R	--	OPEN	OPEN	NO	BECH-E121<4>	--	AI
3110	1	08A	MO2104	CS/LOOP A MINIMUM FLOW LINE ISOLATION VALVE	BECH-M121/27/D4	BAY 10	716	F5.2	SR	05	OPEN	CLOSED	YES	BECH-E121<6>	1B3415(1B34)	AIR
3112	1	08A	MO2112	CS/LOOP A TEST LINE ISOLATION VALVE	BECH-M121/27/F5	BAY 10	716	F5.2	R	--	CLOSED	CLOSED	NO	BECH-E121<7>	--	AI
3113	1	08A	MO2115	CS/LOOP A OUTBOARD VESSEL ISOLATION VALVE	BECH-M121/27/G5	RB	786	[illegible]	R	--	OPEN	OPEN	NO	BECH-E121<8>	--	AI
3114	1	08A	MO2117	CS/LOOP A INBOARD VESSEL ISOLATION VALVE	BECH-M121/27/G6	RB	786	F7	SR	05	CLOSED	OPEN	YES	BECH-E121<5>	1B3413(1B34)	AIR
3116	2	08A	MO2120	CS/LOOP B OUTBOARD TORUS ISOLATION VALVE	BECH-M121/27/C5	RB	716	D10	R	--	OPEN	OPEN	NO	BECH-E121<4A>	--	AI
3120	2	08A	MO2124	CS/LOOP B MINIMUM FLOW LINE ISOLATION VALVE	BECH-M121/27/D4	BAY 01	716	E10	SR	05	OPEN	CLOSED	YES	BECH-E121<6A>	1B4415(1B44)	AIR
3122	2	08A	MO2132	CS/LOOP B TEST LINE ISOLATION VALVE	BECH-M121/27/E5	BAY 02	716	F10	R	--	CLOSED	CLOSED	NO	BECH-E121<7A>	--	AI
3123	2	08A	MO2135	CS/LOOP B OUTBOARD VESSEL ISOLATION VALVE	BECH-M121/27/E5	RB	786	F9	R	--	OPEN	OPEN	NO	BECH-E121<8A>	--	AI
3124	2	08A	MO2137	CS/LOOP B INBOARD VESSEL ISOLATION VALVE	BECH-M121/27/E6	RB	786	F9	SR	05	CLOSED	OPEN	YES	BECH-E121<5A>	1B4413(1B44)	AIR
3115	2	08A	MO2146	CS/LOOP B INBOARD TORUS ISOLATION VALVE	BECH-M121/27/C5	BAY 14	716	D8.1	R	--	OPEN	OPEN	NO	BECH-E121<4C>	--	AI
3105	1	08A	MO2147	CS/LOOP A INBOARD TORUS ISOLATION VALVE	BECH-M121/27/B5	BAY 10	716	F5.2	R	--	OPEN	OPEN	NO	BECH-E121<4>	--	AI
3161	1	08A	MO2238	HPCI/STEAM SUPPLY INBOARD ISOL	BECH-M122/32/E6	DW	775	F7.1	SR	05	OPEN	CLOSED	YES	BECH-E121<14>	1B3453(1B34)	AIR
3162	2	08A	MO2239	HPCI/STEAM SUPPLY OUTBOARD ISOL	BECH-M122/32/F5	RB	775	F7.1	SR	05	OPEN	CLOSED	YES	BECH-E121<15>	1D4109(1D41)	AIR
3158	1	08A	MO2400	RCIC/RCIC STEAM SUPPLY INBOARD ISOL	BECH-M124/30/E6	DW	775	G8	SR	05	OPEN	CLOSED	YES	BECH-E121<29>	1B4209(1B42)	AIR
3159	2	08A	MO2401	RCIC/RCIC STEAM SUPPLY OUTBOARD ISOL	BECH-M124/30/E6	RB	757	H8.1	SR	05	OPEN	CLOSED	YES	BECH-E121<30>	1D1401(1D14)	AIR
3159A	OPT	08A	MO2404	RCIC/RCIC TURBINE STEAM SUPPLY ISOLATION	BECH-M124/30/E3	RB	716	RCIC ROOM	SR	12	OP/CL	CLOSED	YES	BECH-E121<32A>	LIS4592A, LIS4292C, 1D1402(1D14)	AI

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Program File Name & Version: SSEN 2.2

LINE NO.	TRAIN	EQUIP CLASS	MARK NO.	SYSTEM/EQUIPMENT DESCRIPTION	Dwg. No./Rev./Zone	<--------- LOCATION -----> Building	EQUIPMENT Flr.Elv.	LOCATION -----> Rm. or Row/Col.	SORT	NOTES	<-- OP. ST. --> Normal	Desired	POWER REQD?	SUPPORTING SYS. DWG. NO./REV.	REQ'D INTERCONNECTIONS & SUPPORTING COMPONENTS	REG. ISSUE
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
3101	1	08A	MO2700	RWCU/RWCU INLET INBOARD ISOLATION VALVE	BECH-M127/43/E8	DW	775	F7.1	SR	05	OPEN	CLOSED	YES	BECH-E122<3>	1B3219(1B32)	AIR
3102	2	08A	MO2701	RWCU/RWCU INLET OUTBOARD ISOLATION VALVE	BECH-M127/43/E7	RB	786	G6.1	SR	05	OPEN	CLOSED	YES	BECH-E122<5>	1D4204(1D42)	AIR
3139	1,2	08A	MO4423	MS/MS LINE DRAIN INBOARD ISOLATION	BECH-M114/45/B3	DW	757	G8.1	R	--	CLOSED	CLOSED	NO	APED-E44-006<8> BECH-E122<2>	--	AI
3171	1,2	08A	MO8401A	MSIV/MSIV-LCS LOOP A INBOARD BLEEDOFF ISOLATION	BECH-M104/11/F3	RB	757	STEAM TUNNEL	R	--	CLOSED	CLOSED	NO	BECH-E122<038>	--	AI
3172	1,2	08A	MO8401B	MSIV/MSIV-LCS LOOP B INBOARD BLEEDOFF ISOLATION	BECH-M104/11/F3	RB	757	STEAM TUNNEL	R	--	CLOSED	CLOSED	NO	BECH-E122<038>	--	AI
3173	1,2	08A	MO8401C	MSIV/MSIV-LCS LOOP C INBOARD BLEEDOFF ISOLATION	BECH-M104/11/F3	RB	757	STEAM TUNNEL	R	--	CLOSED	CLOSED	NO	BECH-E122<038>	--	AI
3174	1,2	08A	MO8401D	MSIV/MSIV-LCS LOOP D INBOARD BLEEDOFF ISOLATION	BECH-M104/11/F3	RB	757	STEAM TUNNEL	R	--	CLOSED	CLOSED	NO	BECH-E122<038>	--	AI
8023	1	18	PDI4938A	ESW/LOOP A FLOW ELEMENT DP	BECH-M146/44/C7	PH	761	B3, "A" SIDE RM	SR	--	N/A	N/A	YES	--	--	AI
8024	2	18	PDI4938B	ESW/LOOP B FLOW ELEMENT DP	BECH-M146/44/C6	PH	761	C2, "B" SIDE RM	SR	--	N/A	N/A	YES	--	--	AI
3136A	1	18	PS4593A	RECIRC PUMP ATWS HIGH VESSEL PRESSURE TRIP	BECH-M115/37/E8	RB	786	(1C056)	SR	14	N/A	N/A	YES	--	--	AI
3136B	2	18	PS4593B	RECIRC PUMP ATWS HIGH VESSEL PRESSURE TRIP	BECH-M115/37/E8	RB	786	(1C056)	SR	14	N/A	N/A	YES	--	--	AI
3136C	1	18	PS4593C	RECIRC PUMP ATWS HIGH VESSEL PRESSURE TRIP	BECH-M115/37/E2	RB	757	(1C055)	SR	14	N/A	N/A	YES	--	--	AI
3136D	2	18	PS4593D	RECIRC PUMP ATWS HIGH VESSEL PRESSURE TRIP	BECH-M115/37/E2	RB	757	(1C055)	SR	14	N/A	N/A	YES	--	--	AI
8440	1	18	PS7335A	HVIA/LOOP A PRESSURE SWITCH	BECH-M173/27/A5	RB	786	G10	SR	--	N/A	N/A	YES	--	--	AI
8441	2	18	PS7335B	HVIA/LOOP B PRESSURE SWITCH	BECH-M173/27/A7	RB	786	G10	SR	--	N/A	N/A	YES	--	--	AI
4045	2	18	PT1962	RHR/LOOP B PRESSURE TRANSMITTER	BECH-M119/47/D3	RB	716	(1C129B), NW CR	SR	--	N/A	N/A	YES	APED-E11-007<10 A> BECH-E121<57A>	E/S1962(1C018), P11962B(1C003), 1Y021	AI
4043	1	18	PT2032	RHR/LOOP A PRESSURE TRANSMITTER	BECH-M120/38/D7	RB	716	(1C129A)	SR	--	N/A	N/A	YES	APED-E11-007<10 > APED-E11-007<27 >	E/S2032(1C019), P12032(1C003), 1Y11	AI
3135	1	18	PT2106	CS/LOOP A PRESSURE TRANSMITTER	BECH-M121/27/E3	RB	716	(1C123)	SR	--	N/A	N/A	YES	APED-E21-006<3>	E/S2106(1C019), P12106(1C003), 1Y11	AI
3136	2	18	PT2126	CS/LOOP B PRESSURE TRANSMITTER	BECH-M121/27/E4	RB	716	(1C124), NW CR	SR	--	N/A	N/A	YES	APED-E21-006<3>	E/S2126(1C018), P12126(1C003), 1Y21	AI

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DUANE ARNOLD ENERGY CENTER
SAFE SHUTDOWN EQUIPMENT LIST (SSEL)
Relay Review Items

Data Base File Name/Date/Time: DAEC_R1.DBF / 04/19/95 / 15:50:14
Sort Criteria: ID Number
Filter Criteria: (Eval. Type CONTAINS 'R')
Program File Name & Version: SSEM 2.2

LINE NO.	TRAIN	EQUIP CLASS	MARK NO.	SYSTEM/EQUIPMENT DESCRIPTION	Dwg. No./Rev./Zone	<--- Building	EQUIPMENT Flr.Elv.	LOCATION ---> Rm. or Row/Col.	SORT	NOTES	<-- OP. Normal	ST. --> Desired	POWER REQD?	SUPPORTING SYS. DWG. NO./REV.	REQ'D INTERCONNECTIONS & SUPPORTING COMPONENTS	REG. ISSUE
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
2019	1	1B	PT4599A	SRV/RCS PRESSURE TRANSMITTER	BECH-M115/37/G8	RB	786	(1C056)	SR	05	N/A	N/A	YES	BECH-E122<20>	1/E4599A(1C009), P14599A(1C003), E/S4599A(1C009), 1Y11	AIR
2020	2	1F	PT4599B	SRV/RCS PRESSURE TRANSMITTER	BECH-M115/37/F2	RB	757	(1C055)	SR	05	N/A	N/A	YES	BECH-E122<20>	1/E4599B(1C009), P14599B(1C003), E/S4599B(1C009), 1Y11	AIR
3150	2	08B	SV1804A	CRD/CV-1804A CONTROL AIR SUPPLY ISOL	BECH-M117/39/A5	RB	757	F6.1	SR	05	AIR	VENT	GIP	APED-A71-003<14>	--	AIR
3151	2	08B	SV1804B	CRD/CV-1804B CONTROL AIR SUPPLY ISOL	BECH-M117/39/A5	RB	757	F6.1	SR	05	AIR	VENT	GIP	APED-A71-003<15>	--	AIR
1008	OPT	08B	SV1840A	CRD/BACKUP SCRAM PILOT VALVE	BECH-M117/39/F6	RB	757	G6.1	SR	--	DENER	ENER	YES	APED-C71-001<3>	1D1309(1D13)	AI
1009	OPT	08B	SV1840B	CRD/BACKUP SCRAM PILOT VALVE	BECH-M117/39/F6	RB	757	G6.1	SR	--	DENER	ENER	YES	APED-C71-001<3>	1D2308(1D23)	AI
1006	1,2	08B	SV1855	CRD/SCRAM PILOT VALVE (89 TOTAL)	BECH-M118/17/E6	RB	757	CRD AREA	SR	--	ENER	DENER	GIP	APED-C71-004<10>	--	AI
1007	1,2	08B	SV1856	CRD/SCRAM PILOT VALVE (89 TOTAL)	BECH-M118/17/E6	RB	757	CRD AREA	SR	--	ENER	DENER	GIP	APED-C71-004<10>	--	AI
1018	2	08B	SV1868A	CRD/SCRAM DISCHARGE VOLUME ISOLATION PILOT VALVE	BECH-M118/17/D4	RB	757	G6.1	SR	05	AIR	VENT	GIP	APED-C71-001<1>	--	AI
1019	1	08B	SV1868B	CRD/SCRAM DISCHARGE VOLUME ISOLATION PILOT VALVE	BECH-M118/17/D3	RB	757	G6.1	SR	05	AIR	VENT	GIP	APED-C71-001<1>	--	AI
1020	2	08B	SV1869A	CRD/SCRAM DISCHARGE VOLUME ISOLATION PILOT VALVE	BECH-M118/17/D4	RB	757	G6.1	SR	05	AIR	VENT	GIP	APED-C71-001<1>	--	AI
1021	1	08B	SV1869B	CRD/SCRAM DISCHARGE VOLUME ISOLATION PILOT VALVE	BECH-M118/17/D3	RB	757	G6.1	SR	05	AIR	VENT	GIP	APED-C71-001<1>	--	AI
8013	1	08B	SV1956A	ESW/LOOP A DISCHARGE HEADER ISOLATION VALVE SOLENOID	BECH-M113/39/F3	RB	812	F10	SR	--	AIR	VENT	GIP	BECH-E111<08>	1B3214(1B32)	AI
8014	2	08B	SV1956B	ESW/LOOP B DISCHARGE HEADER ISOLATION VALVE SOLENOID	BECH-M113/39/F1	RB	812	F10	SR	--	AIR	VENT	GIP	BECH-E111<08A>	1B4207(1B42)	AI
4033A	1,2	08B	SV1972	RHR/RHR HX 1E-201B PASS SAMP LINE INBOARD ISOL	BECH-M119/47/C2	RB	716	D10	R	--	CLOSED	CLOSED	NO	BECH-E122<13>	--	AI
4013A	1,2	08B	SV2051	RHR/RHR HX 1E-201A PASS SAMP LINE INBOARD ISOL	BECH-M120/38/D7	RB	716	H6.5	R	--	CLOSED	CLOSED	NO	BECH-E122<13>	--	AI
8005	1	08B	SV2080	ESW/LOOP A DIESEL COOLER ISOLATION VALVE SOLENOID	BECH-M113/39/F5	TB	757	(1C091)	SR	--	AIR	VENT	GIP	BECH-E111<08>	1B3214(1B32)	AI
8006	2	08B	SV2081	ESW/LOOP B DIESEL COOLER ISOLATION VALVE SOLENOID	BECH-M113/39/F5	TB	757	(1C092)	SR	--	AIR	VENT	GIP	BECH-E111<08A>	1B4207(1B42)	AI

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- DUANE ARNOLD ENERGY CENTER
SAFE SHUTDOWN EQUIPMENT LIST (SSEL)
Relay Review Items

Data Base File Name/Date/Time: DAEC_R1.DBF / 04/19/95 / 15:50:14
Sort Criteria: ID Number
Filter Criteria: (Eval. Type CONTAINS 'R')
Program File Name & Version: SSEM 2.2

LINE NO.	TRAIN	EQUIP CLASS	MARK NO.	SYSTEM/EQUIPMENT DESCRIPTION	Dwg. No./Rev./Zone	<---------- Building	EQUIPMENT Flr.Elv.	LOCATION -----> Rm or Row/Col.	SORT	NOTES	<-- OP. ST. --> Normal	Desired	POWER REQD?	SUPPORTING SYS. DWG. NO./REV.	REQ'D INTERCONNECTIONS & SUPPORTING COMPONENTS	REG. ISSUE
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
3162C	OPT	088	SV2259	HPCI/HPCI TURBINE REMOTE TRIP VALVE	BECH-M122/32/A5	RB	724	HPCI ROOM	SR	15	AIR	VENT	YES	--	LIS45928, LIS45920	AI
2007	2	088	SV4400	SRV/SRV PILOT VALVE	BECH-M114/45/E5	DW	775	--	SR	--	VENT	AIR	YES	BECH-E121<2F> APED-B21-18	1D23, 1D13	AI
2008	2	088	SV4401	SRV/SRV PILOT VALVE	BECH-M114/45/E4	DW	775	--	SR	--	VENT	AIR	YES	BECH-E121<2F> APED-B21-18	1D23, 1D13	AI
2009	1	088	SV4402	SRV/SRV PILOT VALVE	BECH-M114/45/E6	DW	775	--	SR	--	VENT	AIR	YES	BECH-E121<2F> APED-B21-18	1D23, 1D13	AI
2010	2	088	SV4405	SRV/SRV PILOT VALVE	BECH-M114/45/D4	DW	775	--	SR	--	VENT	AIR	YES	BECH-E121<2F> APED-B21-18	1D23, 1D13	AI
2011	1	088	SV4406	SRV/SRV PILOT VALVE	BECH-M114/45/E6	DW	775	--	SR	--	VENT	AIR	YES	BECH-E121<2F> APED-B21-18	1D23, 1D13	AI
2012	1	088	SV4407	SRV/SRV PILOT VALVE	BECH-M114/45/E6	DW	775	--	SR	--	VENT	AIR	YES	BECH-E121<2F> APED-B21-18	1D23, 1D13	AI
3009	1	088	SV4412A	MS/MSIV AC SOLENOID	BECH-M114/45/G3	DW	757	G7.1 (CV4412)	R	13	AIR	VENT	GIP	BECH-E122<11> APED-A71-003	--	AI
3013	1	088	SV4412B	MS/MSIV DC SOLENOID	BECH-M114/45/G3	DW	757	G7.1 (CV4412)	R	13	AIR	VENT	GIP	BECH-E122<11> APED-A71-003	--	AIR
3033	2	088	SV4413A	MS/MSIV AC SOLENOID	BECH-M114/45/F2	RB	757	H7.1 (CV4413)	R	13	AIR	VENT	GIP	BECH-E122<11> APED-A71-003	--	AI
3037	2	088	SV4413B	MS/MSIV DC SOLENOID	BECH-M114/45/F2	RB	757	H7.1 (CV4413)	R	13	AIR	VENT	GIP	BECH-E122<11> APED-A71-003	--	AIR
3010	1	088	SV4415A	MS/MSIV AC SOLENOID	BECH-M114/45/G3	DW	757	G7.1 (CV4415)	R	13	AIR	VENT	GIP	BECH-E122<11> APED-A71-003	--	AI
3014	1	088	SV4415B	MS/MSIV DC SOLENOID	BECH-M114/45/G3	DW	757	G7.1 (CV4415)	R	13	AIR	VENT	GIP	BECH-E122<11> APED-A71-003	--	AIR
3034	2	088	SV4416A	MS/MSIV AC SOLENOID	BECH-M114/45/F2	RB	757	H7.1 (CV4416)	R	13	AIR	VENT	GIP	BECH-E122<11> APED-A71-003	--	AI
3038	2	088	SV4416B	MS/MSIV DC SOLENOID	BECH-M114/45/F2	RB	757	H7.1 (CV4416)	R	13	AIR	VENT	GIP	BECH-E122<11> APED-A71-003	--	AIR
3011	1	088	SV4418A	MS/MSIV AC SOLENOID	BECH-M114/45/G3	DW	757	G8.1 (CV4418)	R	13	AIR	VENT	GIP	BECH-E122<11> APED-A71-003	--	AI
3015	1	088	SV4418B	MS/MSIV DC SOLENOID	BECH-M114/45/G3	DW	757	G8.1 (CV4418)	R	13	AIR	VENT	GIP	BECH-E122<11> APED-A71-003	--	AIR
3035	2	088	SV4419A	MS/MSIV AC SOLENOID	BECH-M114/45/F2	RB	757	H8 (CV4419)	R	13	AIR	VENT	GIP	BECH-E122<11> APED-A71-003	--	AI

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Program File Name & Version: SSEM 2.2

LINE NO.	TRAIN	EQUIP CLASS	MARK NO.	SYSTEM/EQUIPMENT DESCRIPTION	Dwg. No./Rev./Zone	<--- Building	EQUIPMENT Flr.Elv.	LOCATION ----> Rm. or Row/Col.	SORT	NOTES	<-- OP. ST. --> Normal	Desired	POWER REQD?	SUPPORTING SYS. DWG. NO./REV.	REQ'D INTERCONNECTIONS & SUPPORTING COMPONENTS	REG. ISSUE
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
039	2	088	SV4419B	MS/MSIV DC SOLENOID	BECH-M114/45/F2	RB	757	HB (CV4419)	R	13	AIR	VENT	GIP	BECH-E122<11> APED-A71-003	--	AIR
012	1	088	SV4420A	MS/MSIV AC SOLENOID	BECH-M114/45/G3	DW	757	G8.1 (CV4420)	R	13	AIR	VENT	GIP	BECH-E122<11> APED-A71-003	--	AI
016	1	088	SV4420B	MS/MSIV DC SOLENOID	BECH-M114/45/G3	DW	757	G8.1 (CV4420)	R	13	AIR	VENT	GIP	BECH-E122<11> APED-A71-003	--	AIR
036	2	088	SV4421A	MS/MSIV AC SOLENOID	BECH-M114/45/F2	RB	757	H8.1 (CV4421)	R	13	AIR	VENT	GIP	BECH-E122<11> APED-A71-003	--	AI
040	2	088	SV4421B	MS/MSIV DC SOLENOID	BECH-M114/45/F2	RB	757	H8.1 (CV4421)	R	13	AIR	VENT	GIP	BECH-E122<11> APED-A71-003	--	AIR
138	1,2	088	SV4428	RCS/CV-4428 NITROGEN SUPPLY ISOLATION	BECH-M114/45/H6	DW	805	SW QUADRANT	R	--	VENT	VENT	NO	APED-A71-003<8>	--	AI
166	1	088	SV4594A	RVI/LOOP A JET PUMP SAMPLE LINE INBOARD ISOLATION	BECH-M115/37/D3	RB	774	G9	R	--	CLOSED	CLOSED	NO	BECH-E112<25> BECH-E112<19> BECH-E112<20>	--	AI
167	1	088	SV4594B	RVI/LOOP B JET PUMP SAMPLE LINE INBOARD ISOLATION	BECH-M115/37/C6	RB	780	F6.1	R	--	CLOSED	CLOSED	NO	BECH-E112<25> BECH-E112<19> BECH-E112<20>	--	AI
3168	2	088	SV4595A	RVI/LOOP A JET PUMP SAMPLE LINE OUTBOARD ISOLATION	BECH-M115/37/D3	RB	774	G9	R	--	CLOSED	CLOSED	NO	BECH-E112<25> BECH-E112<19> BECH-E112<20>	--	AI
3169	2	088	SV4595B	RVI/LOOP B JET PUMP SAMPLE LINE OUTBOARD ISOLATION	BECH-M115/37/C6	RB	757	F6.1	R	--	CLOSED	CLOSED	NO	BECH-E112<25> BECH-E112<19> BECH-E112<20>	--	AI
82088	2	088	SV4909	RWS/CV4909 INSTRUMENT AIR SUPPLY ISOLATION	BECH-M146/44/F6	PH	727	C2	SR	--	AIR/VENT	VENT	GIP	--	--	AI
8207	1	088	SV4910A	RWS/LOOP A DILUTION FLOW LINE ISOLATION VALVE SOLENOID	BECH-M146/44/F7	PH	727	B3	SR	--	AIR	VENT	GIP	BECH-E111<13>	--	AI
8208	2	088	SV4910B	RWS/LOOP B DILUTION FLOW LINE ISOLATION VALVE SOLENOID	BECH-M146/44/F7	PH	727	B3	SR	--	AIR	VENT	GIP	BECH-E111<13>	--	AI
8212	2	088	SV4914	RWS/LOOP B STILLING BASIN DISCHARGE ISOL VALVE PILOT	BECH-M146/44/E6	PH	747	B4	SR	--	AIR	VENT	GIP	BECH-E111<13>	--	AI
8211	1	088	SV4915	RWS/LOOP A STILLING BASIN DISCHARGE ISOL VALVE PILOT	BECH-M146/44/E6	PH	747	B2	SR	--	AIR	VENT	GIP	BECH-E111<13>	--	AI
8405	1	088	SV6113A	CRHVAC/LOOP A AC EXHAUST DAMPER SOLENOID	BECH-M161/29/F6	CB	800	(1C133A)	SR	--	VENT	AIR	YES	BECH-E113<26>	TC6109A(1C133A), 1B32	AI
8406	2	088	SV6113B	CRHVAC/LOOP B AC EXHAUST DAMPER SOLENOID	BECH-M161/29/D6	CB	800	(1C133B)	SR	--	VENT	AIR	YES	BECH-E113<26>	TC6109B(1C133B), 1B42	AI

Table 4-1
DUANE ARNOLD ENERGY CENTER
SAFE SHUTDOWN EQUIPMENT LIST (SSEL)
Relay Review Items

Data Base File Name/Date/Time: DAEC_R1.DBF / 04/19/95 / 15:50:14
Sort Criteria: ID Number
Filter Criteria: (Eval. Type CONTAINS 'R')
Program File Name & Version: SSEM 2.2

LINE NO.	TRAIN	EQUIP CLASS	MARK NO.	SYSTEM/EQUIPMENT DESCRIPTION	Dwg. No./Rev./Zone	<---------- EQUIPMENT LOCATION -----> Building	Flr.Elv.	Rm. or Row/Col.	SORT	NOTES	<-- OP. ST. --> Normal	Desired	POWER REQD?	SUPPORTING SYS. DWG. NO./REV.	REQ'D INTERCONNECTIONS & SUPPORTING COMPONENTS	REG. ISSUE
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
8411	1	088	SV6127A	CRHVAC/LOOP A EXHAUST FAN DAMPER SOLENOID	BECH-M161/29/F5	CB	800	(1C133A)	SR	--	VENT	AIR	YES	BECH-E113<27>	1B32	AI
8412	2	088	SV6127B	CRHVAC/LOOP B EXHAUST FAN DAMPER SOLENOID	BECH-M161/29/D5	CB	800	(1C133B)	SR	--	VENT	AIR	YES	BECH-E113<27>	1B42	AI
8458	1	088	SV6920A	CRHVAC/NON-ESSENTIAL COOLING HX A ISOL VALVE SOLENOID	BECH-M169<2>/02/C5	RB	812	F10	SR	--	AIR	VENT	GIP	--	--	AI
8459	2	088	SV6920B	CRHVAC/NON-ESSENTIAL COOLING HX B ISOL VALVE SOLENOID	BECH-M169<2>/02/C4	RB	812	F10	SR	--	AIR	VENT	GIP	--	--	AI
8543	1	088	SV7000A	HVAC/EMER DIESEL ROOM VENT INLET DAMPER SOLENOID	BECH-M170/25/F7	TB	757	(1C151)	SR	--	AIR	VENT	GIP	--	--	AI
8544	2	088	SV7000B	HVAC/EMER DIESEL ROOM VENT INLET DAMPER SOLENOID	BECH-M170/25/F7	TB	757	(1C152)	SR	--	AIR	VENT	GIP	--	--	AI
8547	1	088	SV7001A	HVAC/EMER DIESEL ROOM VENT INLET DAMPER SOLENOID	BECH-M170/25/F7	TB	757	(1C151)	SR	--	AIR	VENT	GIP	--	--	AI
8548	2	088	SV7001B	HVAC/EMER DIESEL ROOM VENT INLET DAMPER SOLENOID	BECH-M170/25/F7	TB	757	(1C152)	SR	--	AIR	VENT	GIP	--	--	AI
8559	1	088	SV7002A	HVAC/EMER DIESEL ROOM VENT EXHAUST DAMPER SOLENOID	BECH-M170/25/E7	TB	757	(1C151)	SR	--	AIR	VENT	GIP	--	--	AI
8560	2	088	SV7002B	HVAC/EMER DIESEL ROOM VENT EXHAUST DAMPER SOLENOID	BECH-M170/25/E7	TB	757	(1C152)	SR	--	AIR	VENT	GIP	--	--	AI
8444	1	088	SV7333A	HVIA/LOOP A RECEIVER ISOLATION VALVE	BECH-M173/27/B5	CB	800	J13	SR	--	OPEN	CLOSED	YES	--	--	AI
8445	2	088	SV7333B	HVIA/LOOP B RECEIVER ISOLATION VALVE	BECH-M173/27/B7	CB	800	J13	SR	--	OPEN	CLOSED	YES	--	--	AI
8529	1	088	SV7536	HVAC/SW PUMP ROOM EXHAUST DAMPER SOLENOID	BECH-M175/20/F7	PH	780	A1	SR	--	AIR	VENT	GIP	--	--	AI
8532	2	088	SV7537	HVAC/SW PUMP ROOM EXHAUST DAMPER SOLENOID	BECH-M175/20/F8	PH	780	A1	SR	--	AIR	VENT	GIP	--	--	AI
8521	1	088	SV7538A	HVAC/SW PUMP ROOM VENT FAN OUTLET DAMPER A SOLENOID	BECH-M175/20/D7	PH	761	A3	SR	--	AIR	VENT	GIP	--	--	AI
8522	2	088	SV7538B	HVAC/SW PUMP ROOM VENT FAN OUTLET DAMPER B SOLENOID	BECH-M175/20/D8	PH	775	A1	SR	--	AIR	VENT	GIP	--	--	AI
8517	1	088	SV7539A	HVAC/SW PUMP ROOM VENT FAN INLET DAMPER A SOLENOID	BECH-M175/20/E7	PH	761	A3	SR	--	AIR	VENT	GIP	--	--	AI
8518	2	088	SV7539B	HVAC/SW PUMP ROOM VENT FAN INLET DAMPER B SOLENOID	BECH-M175/20/E8	PH	775	A1	SR	--	AIR	VENT	GIP	--	--	AI

Table 4-1
DUANE ARNOLD ENERGY CENTER
SAFE SHUTDOWN EQUIPMENT LIST (SSEL)
Relay Review Items

Data Base File Name/Date/Time: DAEC_R1.DBF / 04/19/95 / 15:50:14
Sort Criteria: ID Number
Filter Criteria: (Eval. Type CONTAINS 'R')
Program File Name & Version: SSEM 2.2

LINE NO.	TRAIN	EQUIP CLASS	MARK NO.	SYSTEM/EQUIPMENT DESCRIPTION	Dwg. No./Rev./Zone	<--------- Building	EQUIPMENT Flr.Elv.	LOCATION -----> Rm. or Row/Col.	SORT	NOTES	<-- OP. Normal	ST. --> Desired	POWER REQD?	SUPPORTING SYS. DWG. NO./REV.	REQ'D INTERCONNECTIONS & SUPPORTING COMPONENTS	REG. ISSUE
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
4049	OPT	19	TE4324	CNT/TORUS WATER TEMPERATURE (20-220 DEGREES F)	BECH-M143<2>/B/B7	BAY 15	716	TORUS CATWALK	SR	--	N/A	N/A	YES	BECH-E122<019>	TT4324(1C142), I/E4324(1C003), TY4325(1C003), TIA4325(1C003), 1Y21	AI
4050	OPT	19	TE4325	CNT/TORUS WATER TEMPERATURE (20-220 DEGREES F)	BECH-M143<2>/B/B7	BAY 04	716	TORUS CATWALK	SR	--	N/A	N/A	YES	BECH-E122<019>	TT4325(1C142), I/E4325(1C003), TY4325(1C003), TIA4325(1C003), 1Y11	AI
4048	OPT	19	TE4386J	CAC/DRYWELL TEMPERATURE (ELEVATION 780')	BECH-M143<2>/B/D6	DW	775	NE QUADRANT	SR	--	N/A	N/A	YES	BECH-E122<020>	TT4386J(1C142), I/E4386G(1C003), TY4386(1C003), TSY4386(1C003), TIA4386(1C003)	AI
4047	OPT	19	TE4386L	CAC/DRYWELL TEMPERATURE (ELEVATION 830')	BECH-M143<2>/B/E6	DW	824	SE QUADRANT	SR	--	N/A	N/A	YES	BECH-E122<020A>	TT4386L(1C142), I/E4386G(1C003), TY4386(1C003), TSY4386(1C003), TIA4386(1C003)	AI
8327	2	18	ZC3236A	DGS/DIESEL OVERSPEED SENSOR	BECH-M132/37/H1	TB	757	P4	SR	--	N/A	N/A	YES	--	--	AI
8326	1	18	ZC3236B	DGS/DIESEL OVERSPEED SENSOR	BECH-M132/37/A8	TB	757	P4	SR	--	N/A	N/A	YES	--	--	AI
1003	1,2	18	ZS1857	CRD/CONTROL ROD POSITION INDICATOR PROBE (89 TOTAL)	BECH-M118/17/G7	DW	757	UNDER VESSEL	R	16	N/A	N/A	YES	APED-C11-024<1>	RPIS(1C027), RC(1C005), 1Y023	AI

Table 4-2

Definition of Column Headings For
Safe Shutdown Equipment List

Heading		Description of Contents
(1)	Line No.	This column contains a four- or five-digit record number. Note that because some items were deleted during production of the list, the record numbers are not always sequential.
(2)	Train	This column contains one of the following "train" numbers which serves to group components required to complete the path for the safe shutdown function: 1 = Train 1; can be considered the primary train. 2 = Train 2; can be considered the secondary, or redundant, train. OPT = Optional equipment; can be used as a backup to similar equipment in Trains 1 or 2.
(3)	Equipment Class	This column contains a number between 0 and 23 or the letter "R". The number corresponds to the major equipment class, assigned in the GIP, which corresponds to the equipment categories included in the seismic experience database. Equipment Class 23 is the IPEEE designation for NSSS equipment. The "R" equipment class is used to identify inherently rugged equipment for which USI A-46 verification of seismic adequacy is not needed.
(4)	Mark No.	This column contains the DAEC equipment ID number, a plant-specific unique identifier as contained in the CHAMPS database or drawings used to prepare the SSEL. For some components, an equipment ID number could not be readily determined from the P&ID. In these cases, a unique identifier, indicated by an asterisk (*), was assigned to the component.
(5)	System/ Equipment Description	This column contains an abbreviation for the system in which the item of equipment is a part. A slash (/) separates the system designation from a description of the equipment.

Table 4-2 (Continued)

Definition of Column Headings For
Safe Shutdown Equipment List

	Heading	Description of Contents
(6)	Drawing No./ Revision/Zone	This column contains the P&ID number (and sheet) which identifies the equipment described by the database record. The second entry is the revision of the drawing used in developing the SSEL. When included, the zone where the equipment is identified on the drawing is indicated with a letter (row) and a number (column).
(7)	Building	This column identifies the DAEC building where the equipment is located.
(8)	Floor Elevation	This column contains the elevation of the building floor from which the equipment can be seen. This information was obtained from the CHAMPS database.
(9)	Room or Row/Column	This column identifies the room or nearest building row/column intersection to where the equipment is located. In cases where the equipment is located on a cabinet or panel, the cabinet or panel ID number is entered in parentheses (e.g., (1C003)). This information was obtained from the CHAMPS database.
(10)	Sort	This column assists in manipulating the database. This field contains any one of the following four options: "--" - No seismic or relay review needed, "S" - Seismic review only, "R" - Relay review only, "SR" - Seismic and relay review needed.
(11)	Notes	This column may contain a number which identifies a note (applicable to the equipment) found in the notes section of this report.
(12)	Normal State	This column identifies the normal state of the equipment during normal operation of the plant (e.g., OPEN, CLOSED, or OP/CL for valves; OFF or RUNNING for pumps, etc.).
(13)	Desired State	This column identifies the desired state of the equipment required for the safe shutdown function.

Table 4-2 (Continued)

Definition of Column Headings For
Safe Shutdown Equipment List

Heading	Description of Contents
(14) Power Req'd?	This column identifies whether electrical control or operating power is needed to achieve or maintain the desired state of the equipment. This field contains any one of the following three options: "NO" - Power not required, "YES" - electrical power required, "GIP" - control power required. The criteria used to determine whether power is required can be found in Appendix A of the GIP.
(15) Supporting System Drawing No./Revision	When included, this column contains the electrical drawing (or P&ID for AOVs) which identifies the operating and control power sources and the corresponding drawing revision used in developing the SSEL.
(16) Required Interconnections and Supporting Components	When included, this column contains the supporting equipment (by equipment ID number) needed by the equipment described in this database record for it to perform its safe shutdown function. Supporting or associated components required to achieve safe shutdown have a separate database record.
(17) Regulatory Issue	This column identifies which regulatory issues(s) the item is included to address. A combination of the following three letters was used: "A" - A-46, "I" - IPEEE, and "R" - RG 1.97.

Table 4-3

Definition of Notes For
Safe Shutdown Equipment List

Note	Description
01.	CRD Scram valves CV1849 and CV1850 cannot be isolated. As such, valves downstream of the scram valves have been added to the SSEL to ensure isolation.
02.	The drywell cooling system is a closed loop piping system in the drywell. The valves in this system (CV5704A and CV5704B) do not require, by design, redundant valves to satisfy the containment isolation function for seismic IPEEE.
03.	SRV tail pipe vacuum breakers PSV4439A though F are expected to open following the initial transient. There is no backup should one of the breakers fail in the open position. In this case, containment spray would be used to limit drywell pressure.
04.	This item is an enclosure that contains essential relays.
05.	This item is also listed in another part of the SSEL. This record will appear in a seismic review sort of the SSEL.
06.	This item is also listed in another part of the SSEL. This record will not appear in a seismic review sort of the SSEL.
07.	This cabinet or instrument rack is listed in another part of the SSEL (line numbers 8600 - 8699). Its seismic review requirements are shown there.
08.	Motor control center 1B37 contains essential relays but does not require electric power to perform its safe shutdown function. Therefore no relay review is required.
09.	Valves SV1963, SV2033, MO1967, and MO2036 do not need a relay review because they have been abandoned in place and disconnected electrically.
10.	This note number is not used.
11.	This Regulatory Guide 1.97 item could not be found in the CHAMPS database.

Table 4-3 (Continued)

Definition of Notes For
Safe Shutdown Equipment List

Note	Description
12.	This equipment is not required to function in order to achieve safe shutdown; however, it is not isolated from a safe shutdown support system. This equipment should therefore be examined to ensure that the system's pressure/inventory integrity will be maintained.
13.	The "Rule-Of-The-Box" has been applied to this item of equipment. The host item for this item is listed in the "Rm or Row/Col." column (column 9) in parentheses.
14.	This item of equipment has been established to be installed on an instrument rack, cabinet, or panel from a P&ID drawing. The instrument rack, cabinet, or panel is listed in the "Rm or Row/Col." column (column 9) in parentheses.
15.	This item is on the SSEL as part of an automatic trip of the HPCI, RCIC, or Feedwater systems. This automatic trip is in addition to the manual trips of these systems contained in the SSEL to satisfy USI A-46, so a backup train for this item is not required.
16.	This equipment has lateral restraints and does not require further seismic evaluation.
17.	This equipment item is considered to be inherently rugged and does not require a seismic evaluation.
18.	This optional equipment item is included on the SSEL to supplement the control room HVAC system by providing ventilation with outside air. This equipment has been designated to receive a seismic evaluation, however, no relay evaluations have been specified because the equipment could remain out of service for an extended period and operator action to reset any malfunctioning relays is acceptable. Similarly, redundancy and onsite power has not been required for this optional equipment.
19.	This optional equipment item is included on the SSEL to enhance control room habitability by providing overhead lighting in the control room.

Table 4-4

Definition of Safe Shutdown Equipment List
System Identifiers

SSEL System ID	Description
120VAC	120 Volt AC Instrument Power System
125VDC	125 Volt DC Power Distribution System
250VDC	250 Volt DC Power Distribution System
4160VAC	4160 Volt AC Power Distribution System
480VAC	480 Volt AC Power Distribution System
CAC	Containment Atmosphere Control
CNT	Primary Containment
CRD	CRD Electric
CRHVAC	Control Room HVAC
CRL	Control Room Lighting
CS	Low Pressure Core Spray
DGS	Diesel Generator System
ESW	Emergency Service Water System
HPCI	High Pressure Coolant Injection
HVAC	Heating, Ventilation & Air Conditioning
HVIA	HVAC Instrument Air
IAC	Instrument AC Control Power
MS	Main Steam
MSIV	Main Steam Isolation Valves
RCIC	Reactor Core Isolation Cooling
RCS	Reactor Coolant System
RHR	Residual Heat Removal System
RHRSW	RHR Service Water System
RVI	Reactor Vessel Instrumentation

Table 4-4 (Continued)

Definition of Safe Shutdown Equipment List
System Identifiers

SSEL System ID	Description
RWCU	Reactor Water Cleanup System
RWS	River Water Supply System
SBDG	Standby Diesel Generator
SRV	Safety Relief Valve
TIP	Traversing Incore Probe

Table 4-5

Definition of Line Number Organization of
Safe Shutdown Equipment List

Line Number	Safe Shutdown System
1001 - 1999	Reactivity Control (Control Rod Drive System).
2001 - 2999	Pressure Control (Safety Relief Valves).
3001 - 3999	Inventory Control (MSIVs, Core Spray System).
4001 - 4999	Decay Heat Removal (Residual Heat Removal System).
5001 - 5999	Containment Isolation (IPEEE only).
6001 - 6999	Standby Diesel Generators and Electrical Distribution Systems.
8001 - 8099	Emergency Service Water System.
8101 - 8199	RHR Service Water System.
8201 - 8299	River Water System.
8301 - 8399	Standy Diesel Generator Support System.
8401 - 8499	Control Room HVAC System.
8501 - 8599	Other HVAC Systems.
8601 - 8699	Control Panels, Control Cabinets, and Instrumentation Racks.
8701 - 8799	Emergency Lighting System.
9001 - 9999	Regulatory Guide 1.97 Category 1 Equipment.

Section 5

SEISMIC DEMAND

This section summarizes the relay seismic capacity versus demand comparisons for the essential relay types at DAEC. The evaluation methodology is in accordance with the USI A-46 relay evaluation procedure which is detailed in EPRI NP-7148 (Reference 7) and summarized in Section 6 of the GIP (Reference 3).

5.1 DESIGN BASIS EARTHQUAKE

The USI A-46 program uses the design basis earthquake (DBE) as input. The DBE for DAEC has a ground response spectrum with a peak horizontal ground acceleration of 0.12 g. The operating basis earthquake (OBE) ground motion response spectrum is equal to one-half the DBE spectrum.

5.2 EFFECTIVE GRADE

The effective grade is defined as the average elevation of the ground surrounding a building along its perimeter. The effective grades for DAEC structures were established in accordance with Section II.4.2.3 of the GIP (Reference 3). The following summarizes the effective grades for the structures of interest at DAEC:

Structure	Effective Grade (ft)
Reactor Building	751.6
Pump House	757.5
Intake Structure	739.8
Turbine Building	753.4
Control Building	757.5

5.3 SSRAP BOUNDING SPECTRA

In order to compare the potential seismic performance of equipment at a given nuclear power plant with the actual earthquake performance of similar equipment in the SQUG database facilities, the Senior Seismic Review and Advisory Panel (SSRAP) developed a generic Seismic Motion Bounding Spectrum. The SSRAP Bounding Spectrum represents approximately two-thirds of the estimated average free-field ground motion to which the

database equipment was actually exposed at earthquake sites with estimated peak ground accelerations in excess of about 0.4 g (Reference 2).

The DBE response spectrum for DAEC was compared to the SSRAP Bounding Spectrum. The comparison shows that the DBE for DAEC is bounded by the SSRAP Bounding Spectrum.

5.4 FLOOR RESPONSE SPECTRA

The DAEC in-structure floor response spectra applicable to the USI A-46 evaluations were submitted to the NRC staff by IELP in response to Supplement 1 to Generic Letter 87-02 (Reference 5). These spectra provide values of Peak Spectral Acceleration (PSA) and Zero Period Acceleration (ZPA) for various elevations where enclosures containing essential relays are located. The spectra contained in Reference 5 are the floor response to an OBE. The in-structure response spectra values for the DBE are two times the OBE spectra values.

Table 5-1 lists values of PSA and ZPA for the DBE floor response at various elevations where enclosures containing essential relays are located. These values are for five percent damping and were derived from the spectra contained in Reference 5. The values listed in Table 5-1 represent the highest horizontal acceleration in the 4-16 Hz region for the PSA and 33 Hz and above region for the ZPA.

Some of the spectra contained in Reference 5 have a maximum damping of two percent. The values of PSA and ZPA listed in Table 5-1 were converted to five percent damping values using the methods for scaling spectral accelerations at one damping level to equivalent spectral acceleration at a different damping level provided in Section II.4.4.3 of the GIP.

5.5 CAPACITY VERSUS DEMAND SCREENING APPROACHES

Level 1 Screening

The Level 1 screening approach, defined in EPRI NP-7148-SL and Section II.6.4.2 of the GIP, is an option for high capacity relays at DAEC because the SSE spectrum is bounded by the SSRAP Bounding Spectrum. The Level 1 screening approach is applicable only for essential relays installed at 40 feet above effective grade or below that elevation. Essential relays installed at these elevations are considered seismically adequate, provided one of the following is true:

1. The relay has a PSA capacity of 5g or higher and is mounted in an adequately anchored, conventional motor control center (MCC) or other similar enclosure; or

2. The relay has a PSA capacity of 8g or higher and is mounted in an adequately anchored, conventional switchgear enclosure, vertical control panel, bench board control panel, or other similar type of enclosure.

The relay evaluation assumes that such enclosures are adequately anchored, because the GIP requires a seismic walkdown, including an anchorage evaluation, of all enclosures containing essential relays. Therefore, the adequacy of the anchorage for these enclosures will be verified by the seismic capability engineers during the seismic walkdown and if found to be inadequate, it will be addressed as an outlier.

Level 2 Screening

The Level 2 screening approach, defined in EPRI NP-7148-SL and Section II.6.4.2 of the GIP involves establishing an in-cabinet seismic demand and comparing it to the seismic capacity of a specific relay type. Essential relays are seismically adequate if the seismic capacity of the relay exceeds the seismic demand.

There are two methods for using the Level 2 screening approach. The first method is based on the DBE ground response spectrum. The second method is based on the in-structure or floor response spectra (IRS) discussed, previously. The following describes the requirements for each method:

1. Method 1 - Ground Response Spectrum

   The applicable seismic demand at the floor for contact devices installed in enclosures with a natural frequency of 8 Hz or greater and located at 40 feet above effective grade or below that elevation is given below. This is the applicable floor demand for comparisons of GERS data for equipment such as metal-clad circuit breakers found in switchgear and motor starter contactors found in MCCs.

   Method 1 Floor Demand = DBE x 1.5 x 1.5

   The in-cabinet seismic demand for contact devices installed in enclosures with a natural frequency of 8Hz or greater and located at 40 feet above effective grade or below that elevation is given by:

   Method 1 Cab Demand = Floor Demand x AF = DBE x 1.5 x 1.5 x AF

   where: AF is the cabinet amplification factor.

Appendix I of EPRI NP-7148-SL provides guidelines for categorizing enclosures containing essential relays and defines an effective in-cabinet amplification factor for each category of enclosure. The following summarizes the generic in-cabinet

amplification factors defined in Appendix I of EPRI NP-7148-SL. These factors were used to establish in-cabinet seismic demands for comparison with GERS data where cabinet specific response data are not available:

- AF = 7 for switchgear enclosures;
- AF = 4.5 for benchboards and control panels;
- AF = 3 for motor control centers.

2. Method 2 - Floor Response Spectra

For contact devices installed in enclosures where the natural frequency is unknown or less than 8Hz, or is located at elevations which are more than 40 feet above effective grade, the seismic demand at the floor is given by the applicable in-structure or floor response spectrum and the in-cabinet seismic demand is given by:

Method 2 Floor Demand = IRS x FS

Method 2 Cab Demand = IRS x FS x AF

where: FS - is a factor of safety to account for uncertainties in the in-structure response spectra.
AF - is the cabinet amplification factor.

For DAEC the in-structure response spectra are considered conservative design spectra. Therefore, FS = 1.0

Level 3 Screening

The Level 3 screening approach, defined in EPRI NP-7148-SL and Section II.6.4.2 of the GIP, is the same as the Level 2 screening approach except that instead of using a generic in-cabinet amplification factor, a cabinet specific amplification factor is used. Essential relays are seismically adequate if the seismic capacity of the relay exceeds the seismic demand.

Level 4 Screening

The Level 4 screening approach, defined in EPRI NP-7148-SL and Section II.6.4.2 of the GIP, involves use of formal seismic qualification methods specified in NRC-approved IEEE standards (e.g., IEEE 344-1975, -1987).

5.6 ESSENTIAL RELAY ENCLOSURES

Table 5-2 contains a list of enclosures which contain USI A-46 essential relays at DAEC. The table indicates the PSA and ZPA seismic demands (floor and in-cabinet) which are applicable to seismic adequacy determinations for contact devices found in these enclosures. The floor demands listed in Table 5-2 were obtained from the in-structure or floor response spectra. The in-cabinet demands were established based on the amplification factors listed in Table 5-2 or, in the case of the main control room cabinets (CB786) and the diesel generator guage boards (1C093 and 1C094), a calculation of the in-cabinet response spectrum.

The instrument racks in the Reactor Building have an amplification factor of unity for frequencies below 10 Hz. For frequencies between 10-33 Hz, the instrument racks have an amplification factor of 2.5 (Reference 12). For the sake of conservatism, an amplification factor of 2.5 is used in Table 5-2.

Table 5-1

Design Basis Earthquake Floor Response Spectra PSA and ZPA

Location	Elevation (ft)	PSA (g)*	ZPA (g)*
Reactor Building	757	0.35	0.15
Reactor Building	786	0.90	0.15
Reactor Building	812	1.05	0.18
Turbine Building	757	1.63	0.38
Control Building	757	1.18	0.15
Control Building	786	1.38	0.18
Intake Structure	767	1.47	0.24

* Values are for 5% damping; conversion from 2% damping values, where necessary, was done in accordance with equations provided in GIP. Values are twice those from the spectra (Reference 5) since the spectra are for the OBE. See Section 5.4 of text.

Table 5-2

Seismic Demands for Enclosures Containing Essential Relays

Panel	Description	Bldg.	Elev.	Amplification Factor	Floor Demand		In-Cabinet Demsnd	
					PSA (g)	ZPA (g)	PSA (g)	ZPA (g)
1A3	4160 VAC Essential Switchgear	CB	757	7	1.18	0.15	8.3	1.05
1A4	4160 VAC Essential Switchgear	CB	757	7	1.18	0.15	8.3	1.05
1B03	Control Building 480 VAC Load Center	CB	757	--	1.18	0.15	--	--
1B04	Control Building 480 VAC Load Center	CB	757	--	1.18	0.15	--	--
1B09	Intake Structure 480 VAC Load Center	IS	767	--	1.47	0.24	--	--
1B20	Intake Structure 480 VAC Load Center	IS	767	--	1.47	0.24	--	--
1B32	Control Building 480 VAC Essential MCC	CB	757	--	1.18	0.15	--	--
1B34	Reactor Building 480 VAC MCC	RB	786	3	0.9	0.15	2.7	0.45
1B34A	Reactor Building 480 VAC Motor Control Center	RB	786	3	0.9	0.15	2.7	0.45
1B37	Reactor Bilding 480 VAC MCC	RB	786	--	0.9	0.15	--	--
1B42	Control Building 480 VAC MCC	CB	757	--	1.18	0.15	--	--
1B44	Reactor Building 480 VAC MCC	RB	757	--	0.35	0.15	--	--
1B44A	Reactor Building 480 VAC Motor Control Center	RB	757	--	0.35	0.15	--	--
1C003	RB & DW Cooling & Isolation Control Panel	CB	786	--	--	--	2.24	0.66
1C006	Feedwater And Condensate Control Panel	CB	786	--	--	--	2.24	0.66
1C008	Generator and Auxiliary Power Panel	CB	786	--	--	--	2.24	0.66
1C015	Chan A Primary Isol & Rx Protection Vertical Brd	CB	786	--	--	--	2.24	0.66
1C017	Chan B Primary Isol & Rx Protection Vertical Brd	CB	786	--	--	--	2.24	0.66
1C031	Turbine Generator Relay Panel	CB	786	--	--	--	2.24	0.66

Table 5-2 (Continued)

Seismic Demands for Enclosure Containing Essential Relays

Panel	Description	Bldg.	Elev.	Amplification Factor	Floor Demand		In-Cabinet Demand	
					PSA (g)	ZPA (g)	PSA (g)	ZPA (g)
1C032	Div I RHR, Core Spray, & Auto Blowdown Relay Panel	CB	786	--	--	--	2.24	0.66
1C033	DivII RHR, Core Spray, & Auto Blowdown Relay Panel	CB	786	--	--	--	2.24	0.66
1C041	Inboard Pri Cntmnt Isol Valve Relay Panel	CB	786	--	--	--	2.24	0.66
1C042	Outboard Pri Cntmnt Isol Valve Relay Panel	CB	786	--	--	--	2.24	0.66
1C043	Division I Core Spray Relay Vertical Board	CB	786	--	--	--	2.24	0.66
1C044	Division II Core Spray Relay Vertical Board	CB	786	--	--	--	2.24	0.66
1C045	Auto Blowdown Relay Vertical Board	CB	786	--	--	--	2.24	0.66
1C055	RPS Rx Vessel Level And Press Instrument Panel	RB	757	2.5	0.35	0.15	0.88	0.38
1C056	RPS Rx Vessel Level And Press Instrument Panel	RB	786	2.5	0.85	0.15	2.1	0.38
1C057	Rx Recirc Pump IP-201A Instrument Rack	RB	738	2.5	0.35	0.15	0.88	0.38
1C058	Rx Recirc Pump IP-201B Instrument Rack	RB	739	2.5	0.35	0.15	0.88	0.38
1C093	SBDG 1G-31 Gauge Board	TB	757	--	1.63	0.33	4.45	1.37
1C094	SBDG 1G-21 Gauge Board	TB	757	--	1.63	0.33	4.45	1.37
1C121	Jet Pump Instrument Rack	RB	757	2.5	0.35	0.15	0.88	0.38
1C122	RB Instrument Rack	RB	757	2.5	0.35	0.15	0.88	0.38
1C126	Main Steam Instrument Rack	RB	757	2.5	0.35	0.15	0.88	0.38
1C129A	RHR Loop A Instrument Rack	RB	718	2.5	0.35	0.15	0.88	0.38
1C129B	RHR Loop B Instrument Rack	RB	718	2.5	0.35	0.15	0.88	0.38
1C351	Essential Bus 1A3 Degraded Voltage Detector	CB	757	4.5	1.18	0.15	5.31	0.68

Table 5-2 (Continued)

Seismic Demands for Enclosure Containing Essential Relays

Panel	Description	Bldg.	Elev.	Amplification Factor	Floor Demand		In-Cabinet Demand	
					PSA (g)	ZPA (g)	PSA (g)	ZPA (g)
1C352	Essential Bus 1A4 Degraded Voltage Detector	CB	757	4.5	1.18	0.15	5.31	0.68
1C422B	Remote Shutdown Fuse Panel	RB	757	4.5	0.35	0.15	1.58	0.68
1D14	RCIC System 125 VDC MCC	RB	786	--	0.85	0.15	--	--
1D15	120 Volt Instrument AC Power Supply	CB	757	--	1.18	0.15	--	--
1D25	120 Volt Instrument AC Power Supply	CB	757	--	1.18	0.15	--	--
1D41	HPCI System 250 VDC MCC	RB	757	--	0.35	0.15	--	--
1D42	Reactor Building 250 VDC MCC	RB	757	--	0.35	0.15	--	--
1N305	Chiller 1V-CH-1A Star-Delta Local Starter	RB	812	3	1.05	0.18	3.15	0.54
1N405	Chiller 1V-CH-1B Star-Delta Local Starter	RB	812	3	1.05	0.18	3.15	0.54
1Y004	Regulating Transformer	CB	757	--	1.18	0.15	--	--
1Y022	1Y002 To 1Y023 Automatic Transfer Switch	CB	757	3	1.18	0.15	3.54	0.45
1Y1A	Regulating Transformer	CB	757	--	1.18	0.15	--	--
1Y2A	Regulating Transformer	CB	757	--	1.18	0.15	--	--

Notes:

1. In-cabinet demands established based on amplification factor or calculated response spectrum.
2. Enclosures without in-cabinet demands required comparisons of capacity versus floor demand only (e.g. switchgear or MCC GERs)
3. Double-dash indicates data not required.

Section 6

RELAY SCREENING AND EVALUATION

This section documents the relay screening and evaluations for each of the SSEL relay review equipment items listed in Table 4-1 of this report. The evaluation approaches are consistent with the relay screening and evaluations criteria found in EPRI Report NP-7148-SL, the GIP, and the NRC SSER on the GIP. The information provided for the relay evaluation results is consistent with the documentation requirements of Section II.9 of the GIP (Reference 3). Section 6.1 below, discusses evaluation approaches used for general classes of equipment. Section 6.2 documents the results of the relay screening and evaluations.

6.1 COMMON EQUIPMENT AND CONTACT GROUPS

There are several types of equipment and contact groups which occur repeatedly in the control circuits associated with safe shutdown components at DAEC. The following subsections discuss these devices and indicate the manner in which the contacts associated with each were addressed during the relay screening and evaluation process.

6.1.1 Contacts Affecting Alarms

Throughout the control logic circuits for components in the DAEC safe shutdown systems there are contacts that feed the control room alarm system. These contacts are from switches, limit switches and various types of relays. The closure of one of these contacts leads to an alarm in the control room. Some of these contacts could chatter during a seismic event.

The DAEC alarm system is described in the DAEC System Description I-14 titled, "Annunciation System." The alarm system provides the capability to Acknowledge alarms and to Test the system. The Acknowledge and Test functions are accomplished via pushbuttons. There are sets of these two pushbuttons on each panel that has annunciators.

When the alarm system is in its normal state, the field contacts are in their normal position, be it open or closed, and the flasher control logic and sound control logic are in the reset state. When the field contacts go to the off-normal state, an input signal to the input logic sets the sound control and flasher control logic, and enables the lamp driver. This results in producing an alarm (sound #1) and causing the lamp to flash at a fast rate. By depressing the Acknowledge pushbutton, the alarm is silenced and the light remains on steady. When the off-normal condition clears, the output logic inputs the ringback logic,

which re-enables the sound control logic activating an alarm (sound #2) and causing the flasher control logic to again alternate between the set and reset state, flashing the lamp at a slow rate. Depressing the Acknowledge pushbutton resets the logic, returns the lamp to off and silences the alarm.

A simpler version of the above circuitry is used in some annunciator panels. The circuit works the same, with one exception; when the off-normal condition clears the lamp goes out and the alarm is not reactivated. This type of circuitry resets itself automatically, with no operator notification of a returned to normal condition.

During a seismic event there will likely be spurious actuation of alarms both in safe shutdown system equipment and in systems not essential to the safe shutdown process. For example, water level alarms in various tanks throughout the plant may actuate because of sloshing of the fluid. Vibration alarms on rotating equipment may also actuate. This will produce alarms that will come up on the main control board and may remain for the short period during the strong earthquake motion.

After the strong ground motion is over, and the possible alarm contact chattering or the actual event such as water sloshing has stopped, the alarm input will be in a cleared state. Accordingly, the spurious alarms will be cleared the next time the operator pushes the Acknowledge button in the normal course of activities for handling the reactor shutdown and stabilizing the plant. Since the strong ground motion is not expected to last more than one minute, any alarms that come in during this period will be part of many other valid alarms resulting from a reactor trip and the likely loss of off-site power.
During the first minute of the event, the operators will be busy confirming a reactor trip, associated shutdown functions and other key confirmations associated with a loss of off-site power along with the turbine and reactor trip. The presence of some spurious alarms along the large number of other valid alarms will not impact the operators' actions during the first minute of their response to the reactor trip and loss of off-site power. If the earthquake is minor and off-site power is not lost, the plant will be in a relatively normal state since reactor trip and turbine trip will likely not have occurred. In this case, the operators will be faced with only a few alarms and a stable plant. These can be expected to be handled in a normal manner of operation. Accordingly, chatter of relay contacts and other contacts feeding the alarm system is acceptable and the relays in these systems need not be seismically qualified. This conclusion is consistent with the guidance found in EPRI NP-7148-SL (Reference 7).

6.1.2 Contacts Affecting Computer Points And Indicating Lights

Similar to alarm contacts, there are contacts throughout the control logic circuits for components in the DAEC safe shutdown systems that feed indicating lights and computer points. These contacts are from switches, limit switches and various types of relays. The closure of one of these contacts leads to a change in indicating light and/or computer point status. Some of these contacts could chatter during a seismic event.

Changes in status of indicating lights and computer points do not, in general, require operator acknowledgement. After the period of strong ground motion, indicating lights and computer points will return to normal operation. As with the alarm contacts, this is expected to occur within the first minute of the event. Therefore, spurious operation of indicating lights and computer points caused by relay chatter and other spurious events such as water sloshing may likely occur during the strong motion but will self correct before their effect can be of consequence. Accordingly, chatter of relay contacts and other contacts feeding indicating lights and computer points is acceptable and the relays in these systems need not be seismically qualified.

6.1.3 Limit Switch And Torque Switch Contacts

The standard motor operated valves at DAEC use Limitorque operators. Valve sizes range from a few to more than 20 inches. The stroke time for these valves is normally less than one inch per second. Included in the motor operated valve is a set of limit switch (LS or 33) contacts which consist of a rotary shaft with one set of contacts on a shaft and spring clips making up the other half of the contacts. Actuation of a contact requires the rotary shaft to turn 90 degrees. Due to this feature, these contacts are not prone to seismic chatter. Also included with the motor operated valve is a torque switch with contacts (TS). A torque switch is a mechanical device which is not prone to chatter.

6.1.4 Motor Control Centers

The standard AC motor control center is manufactured by Allis-Chalmers, while the standard DC motor control center is manufactured by ITE. Each type of MCC includes cubicles filled with a standard set of components. The MCC cubicles, which contain the power control equipment for each device, include a molded case circuit breaker and typically one or two Allis-Chalmers, or ITE, starters. A pair of starters are used for motor operated valves, and a single starter for small pump motors. The contactors have thermal overloads to provide time overcurrent protection and mechanically linked auxiliary contacts. The auxiliary contacts are spring loaded and are operated by the motion of the contactor plunger. There are no other standard relays or devices which are susceptible to contact chatter in the MCCs.

The relay evaluation screens MCC starter, overload and auxiliary contacts for seismic adequacy via a capacity versus demand comparison. MCC GERS provide the seismic capacity data. MCC GERS may be applied because the MCCs will be determined to be structurally adequate using GERS or bounding spectra. If necessary, corrective actions will be taken to make or demonstrate the MCCs structurally adequate.

6.1.5 Low Voltage Switchgear

The standard 480V low voltage switchgear at DAEC uses ITE K-line breakers (i.e., models K225, K600, K1600 and K2000). The specific model depends on the size of the load

supplied by the breaker. The K-line breakers are air circuit breakers which come in two types. One type can be automatically/remotely operated through control logic circuits and the other type can only be operated manually at the switchgear.

The K-line breakers are stored energy devices in which springs are charged by an electric motor (automatically operated breaker only) when control power is applied and there is no close signal. If a close signal is present when the control power is applied, the springs will not charge. Manually operated K-line breakers must have the closing springs charged manually.

The K-line breakers have a set of mechanically operated auxiliary contacts (L/a, L/b, LS) associated with the breaker. These are considered seismically adequate because they are mechanically actuated. It also has a latch release coil (52X) which causes closing of the breaker, and a trip coil (TC) which causes the breaker to open. K-line breakers have an anti-pump or lockout relay contact (52Y), located on the breaker, which prevents the closing circuit from closing the breaker more than one time unless the close contacts are first released. Since the anti-pump relay (52Y) type does not appear on the low ruggedness relay list of Reference (7), it is seismically adequate per GERS MVS/LVS. The MVS/LVS GERS may be applied because the switchgear will be determined structurally adequate using GERS or bounding spectra. If necessary, corrective actions will be taken to make or demonstrate the switchgear structurally adequate.

6.1.6 Medium Voltage Switchgear

The standard 4160V medium voltage switchgear at DAEC uses GE Magne-Blast air circuit breakers. The specific model depends on the size of the load supplied by the breaker. As with the low voltage switchgear, the Magne-Blast circuit breakers are stored energy devices in which springs are charged by an electric motor when control power is applied and there is no close signal. If a close signal is present when the control power is applied, the springs will not charge.

There are several type 52 limit switch contacts and auxiliary contacts included on the breaker. These are mechanically actuated and not prone to chatter. The breaker also includes a 152Y anti-pump relay. At DAEC the anti-pump relay is a GE HMA type relay. Since the anti-pump relay (52Y) type does not appear on the low ruggedness relay list of Reference (7), it is seismically adequate per GERS MVS/LVS. The MVS/LVS GERS may be applied because the switchgear will be determined structurally adequate using GERS or bounding spectra. If necessary, corrective actions will be taken to make or demonstrate the switchgear structurally adequate.

6.1.7 Essential Relay Types

The essential relays identified during the USI A-46 relay review process for DAEC are comprised of a number of relay types (i.e., unique manufacturer and part model numbers).

The seismic adequacy of many of the essential relays associated with these device types was demonstrated on the basis of a satisfactory seismic capacity versus seismic demand comparison. Table 6-1 lists the seismic capacity used in the comparisons. The table provides the PSA and ZPA for each applicable combination of contact arrangement / device state, e.g., normally closed (NC) / energized (E). Table 6-1 also provides the reference sources from which the capacity data were obtained.

The General Electric types HFA and HGA relays identified as essential relays have coil voltages of 120 Volts AC and 125 Volts DC, consistent with the applicability of the GERS data for these device types. In establishing the seismic capacity of the GE HFA and HGA essential relays, it was assumed that the adjustments for these devices are in accordance with the standard factory setting. Based on telephone conversations with site Electrical Maintenance personnel, it was concluded that this assumption is consistent with DAEC practice.

For protective relays, the seismic capacity utilized in the evaluation is the device capacity in the non-operated normally open state, unless otherwise noted. This is considered the appropriate value applicable for this evaluation since the control circuit's action is completed as soon as the protective relays transition to the operated state.

Pressure and level switches mounted in racks in the reactor building at elevations 786, 757, 738 and 716 are used by the Core Spray and RHR logic circuits. The seismic adequacy of these devices was determined by performing seismic capacity versus demand comparisons.

The seismic demand for the pressure and level switches is the amplification factor of the instrument rack (less than 2.5 -- Reference 12 and Section 5.6) multiplied by the applicable floor response peak spectral acceleration (PSA) and zero-period acceleration (ZPA). For reactor building elevations less than 757 feet (i.e., the 738 and 716 foot elevations), the floor response values of the 757-foot elevation were used for conservatism.

The seismic capacities of the pressure and level switches were developed from GE test data and from instrument GERS. The capacity data represents the maximum acceleration that the device can withstand without malfunction at a frequency of 33 Hz. Below is a list of the types and respective seismic capacities of the switches commonly found in the RHR and Core Spray circuits.

Switch Type	Manufacturer and Model	GE NEDO-10678 Capacity (g)
Pressure Switch	Barksdale B2T	15
Pressure Switch	Barksdale P1H	10
Pressure Level Switch	Barton 288	15
Pressure Switch	Barton 289	5
Pressure Switch	Static O-Ring 12N	15
Pressure Switch	Static O-Ring 5N	15
Level Switch	Yarway 4418C	8

GERS PS.5, Reference 9, justifies a capacity of 3.0g PSA for various instrument types. Among the listed types are the Barksdale B2T and Barton 289 pressure switches. Since the GE ZPA capacity levels for all of the above devices exceeds the PSA of the GERS instrument data, the GERS capacity level of 3.0g PSA (1.2g ZPA) is used conservatively in Tables 6-1 and 6-2.

The Yarway 4418C level switches are mounted on instrument racks 1C055 and 1C056, which are located on Reactor Building elevations 757 feet and 786 feet, respectively. General Electric report NEDO-10678 indicates that the seismic capacity of these devices is 1.0 g in the vertical direction. A separate evaluation of the capacity and demand was made for the vertical acceleration of these devices.

Instrument Racks 1C055 and 1C056 were seismically verified during plant walkdowns. These racks are rigid in the vertical. It was determined that amplification of the vertical floor response would not occur in these racks. The peak spectral accelerations in the vertical direction for these racks was determined to be 0.23 g for 1C055 and 0.60 g for 1C056. These demands are less than the 1.0 g vertical capacity for the Yarway switches. Therefore these devices are considered seismically adequate in the vertical direction. The comparison of capacity versus demand for the horizontal direction is addressed in Table 6-2

6.2 RELAY EVALUATIONS

6.2.1 Relay Evaluations Results Table

The detailed relay screening and evaluation results for each component listed in the SSEL Relay Review Items Table 4-1 are documented in Table 6-2. The SSEL line number associated with each component mark number is provided in column one of Table 6-2. This provides a means for cross referencing between the SSEL Relay Review Lists (Table 4-1) and the relay screening and evaluation results (Table 6-2).

For each component addressed by the relay review, the contacts or contact groups which affect its operation or control are listed in Table 6-2 under the column heading CONTACT ID. The Table 6-2 entries for contacts or contact groups are the device designations listed on the elementary drawings; these are not unique device identifiers. The entries under the heading - RELAY TYPE provide the manufacturers and model numbers associated with the listed contacts or contact groups. The table entries under the heading - CONTACT ARRANGEMENT, refer to the type of contacts (i.e., NO - normally open, NC - normally closed, or ALL - NO and NC contacts) used in the evaluated control circuits. The entries under the heading - STATE (i.e., E - energized, D - de-energized, or ALL - E or D) refers to the normal condition for the relay coil(s), associated with the contacts or contact groups listed, during a USI A-46 seismic event. The entries under the PANEL, BLDG, and ELEV column headings refer to the enclosure where the contact or contact group is located, and the building and plant elevation where the enclosure is located, respectively.

Table 6-2 provides a screening disposition for each contact or contact group listed. The dispositions are listed under the Table 6-2 column heading DISP. Different disposition categories were used for Non-essential and Essential relays.

Nonessential relays are placed into one of the following disposition categories:

NV — Contact or contact group is seismically adequate on the basis that it is not vulnerable to chatter (e.g., mechanically-actuated contact or solid state relay).

CA — Contact or contact group is seismically adequate on the bases that chatter is acceptable.

NA — SSEL component is not affected by relays.

OA — Chatter of contact or contact group is acceptable on the basis that operator action is feasible.

Essential relays are placed into one of the four disposition categories listed below. Where GERS were used as the screening disposition, Table 6-2 lists the PSA and ZPA associated the device's seismic capacity and seismic demand. In the cases where switchgear (SWGR) GERS or MCC GERS were used, the applicable seismic demand is the demand established in Table 5-2 for the base of the enclosure (i.e. floor demand). In the cases where Relay GERS were used, the applicable seismic demand is the in-cabinet demand established in Table 5-2.

GERS — Contact or contact group screened on the basis of a seismic capacity versus demand comparison using Generic Equipment Ruggedness Spectra data to establish the capacity of the device.

LEVEL 1	Contact or contact group screened using the level I screening approach of Section II.6.4.2 of the GIP. Refer to Section 5.5 for a discussion of this approach.
QUALIFIED	Contact or contact group screened on the basis of a seismic capacity versus demand comparison using formal seismic qualification tests results (e.g., IEEE Standard 344-1975) to establish the capacity of the device.
GE DATA	Contact or contact group screened on the basis of a seismic capacity versus demand comparison. Generic Equipment Ruggedness Spectra data for pressure and level switching are used to establish the capacity of the device. Refer to the discussion on pressure and level switches in Section 6.1.7.
LR	Relay type has been determined to be essential and known to have low seismic ruggedness (Appendix E of Reference 7). Corrective action is required.
CDU	Seismic capacity data is unavailable. Corrective action is required.

The seismic adequacy of each contact or contact group is indicated in Table 6-2 by the entry under the column heading- PASS. A "Y" entry indicates the contact is seismically adequate. All non-essential relay contact or contact groups are considered seismically adequate. Essential relay contacts or contact groups are considered seismically adequate if the seismic capacity of the device exceeds the applicable seismic demand. Contacts or contact groups not considered to be seismically adequate are denoted by an "N" entry under the PASS column heading. Corrective action is required for these devices.

As defined in Section 3, an essential relay is one that is not inherently rugged, and is used in a circuit where chatter is not acceptable and operator action has not been shown to be feasible. The ESSENT column in Table 6-2 provides an indication of which relays were classified as essential. A "Y" entry indicates that a relay is essential, while an "N" entry indicates that a relay is not essential. A summary list of the essential relays is provided in Appendix A.

6.2.2 Operator Actions

Among the relays classified as non-essential, some contacts were screened on the basis that operator action could correct the adverse effects postulated for seismic chatter. The operator action disposition for these contacts affects the five SSEL equipment items listed in Table 6-3. The operator actions required and the timing for each were evaluated. The actions required are considered to be reasonable because the operators are provided with indications of the status of the affected components, the controls necessary to reset the affected components are easily accessible to the operators, and sufficient time for the operator actions is available.

The operator action disposition affects the battery room exhaust fans 1VEF030A, 1VEF030B, and 1VEF030C and the control building chillers - 1VCH001A and 1VCH001B. In the case of the battery room exhaust fans, chatter of the contacts listed in Table 6-3 could cause the Westinghouse lockout relays LR-7315A and LR-7315B to trip; causing the fans to stop. The resets for these lockout relays are located in panel 1C026, which is in the main control room area. In the case of the control building chillers, chatter of the contacts listed in Table 6-3 could cause the master control relays for the chiller compressor to deenergize, causing the chillers to stop. The operator has indication of the chiller status on control room panel 1C026. If chatter caused the chillers to trip, the operator could reset the chiller logic at panels 1N305A (1VCH001A) and 1N405A (1VCH001B).

A review of the operator actions was performed by the Operations Department at DAEC. As part of its review, the procedures necessary to perform the required action were identified.

6.3 Evaluation Of Outliers

Appendix D of this report lists the 34 essential relays that were classified as outliers. These outliers fall into the following two categories:

- Essential relays with a seismic demand that exceeds the seismic capacity of the device -- 30 relays or relays sets identified.
  - 1 auxiliary relay located in essential switchgear 1A3
  - 1 auxiliary relay located in essential switchgear 1A4
  - 14 protective relay sets located in essential switchgear 1A3
  - 14 protective relay sets located in essential switchgear 1A4
- Essential relays for which seismic capacity data is unavailable -- 4 relays identified.
  - 1 GE HGA14AR auxiliary relay located in essential switchgear 1A3
  - 1 GE ICW51A protective relay located in essential switchgear 1A3
  - 1 GE HGA14AR auxiliary relay located in essential switchgear 1A4
  - 1 GE ICW51A protective relay located in essential switchgear 1A4

The 30 essential relays located in essential switchgear 1A3 and 1A4 and classified as outliers on the bases that the seismic demand exceeds the seismic capacity of the device were evaluated using a generic in-cabinet amplification factor equal to 7. Using an in-cabinet amplification factor of 7 resulted in an in-cabinet PSA demand of 8.3g and a ZPA of 1.05g. The in-cabinet seismic demand for the essential switchgear 1A3 and 1A4 was re-assessed using the measured cabinet natural frequency and the SQUG off-peak amplification method.

The reassessment indicates that the actual in-cabinet demand for the switchgear is a PSA of 5g and a ZPA of 0.9g. A comparison of the actual seismic demand with the seismic capacity of the 30 essential relays classified as outliers on the basis that the seismic demand exceeds the seismic capacity was made. The results of that comparison indicate that 28 of these devices are seismically adequate. These 28 devices are highlighted in Appendix D with a footnote. The remaining 2 essential relays with a demand that exceeds capacity are listed below:

- One GE HFA151 relay located in essential switchgear 1A3; and
- One GE HFA151 relay located in essential switchgear 1A4.

Based on the above evaluation of outliers, there are only 6 essential relays that are not considered seismically adequate.

Table 6-1

Applicable Seismic Capacity for Essential Relay Types
(See Note 1)

Relay Type	Contact Arrangement	State	PSA	ZPA	SOURCE
AGASTAT 2412	NC	D	12.5	5	GERS PNT.7
AGASTAT 2412	NC	E	12.5	5	GERS PNT.7
AGASTAT 2412	NO	D	12.5	5	GERS PNT.7
AGASTAT 2412	NO	E	12.5	5	GERS PNT.7
AGASTAT 7012	NC	D	12.5	7	GERS PNT.7
AGASTAT 7012	NC	E	12.5	7	GERS PNT.7
AGASTAT 7012	NO	D	12.5	7	GERS PNT.7
AGASTAT 7012	NO	E	12.5	7	GERS PNT.7
AGASTAT E7012	NC	D	12.5	7	GERS PNT.7
AGASTAT E7012	NC	E	12.5	7	GERS PNT.7
AGASTAT E7012	NO	D	12.5	7	GERS PNT.7
AGASTAT E7012	NO	E	12.5	7	GERS PNT.7
AGASTAT E7022	NC	D	4	2.4	GERS PNT.7
AGASTAT E7022	NC	E	4	2.4	GERS PNT.7
AGASTAT E7022	NO	D	4	2.4	GERS PNT.7
AGASTAT E7022	NO	E	4	2.4	GERS PNT.7
AGASTAT EGP	NC	D	3.3	1.3	GERS ARS.4
AGASTAT EGP	NC	E	9	5.4	ADDENDUM 2
AGASTAT EGP	NO	D	9	5.4	ADDENDUM 2
AGASTAT EGP	NO	E	9	5.4	ADDENDUM 2
AGASTAT GP	NC	D	3.3	1.3	GERS ARS.4
AGASTAT GP	NC	E	9	5.4	ADDENDUM 2
AGASTAT GP	NO	D	9	5.4	ADDENDUM 2
AGASTAT GP	NO	E	9	5.4	ADDENDUM 2
AGASTAT TR	NC	D	3.8	1.5	GERS ARS.4
AGASTAT TR	NC	E	3.8	1.5	GERS ARS.4
AGASTAT TR	NO	D	3.8	1.5	GERS ARS.4
AGASTAT TR	NO	E	3.8	1.5	GERS ARS.4

Table 6-1 (Continued)

Applicable Seismic Capacity for Essential Relay Types
(See Note 1)

Relay Type	Contact Arrangement	State	PSA	ZPA	SOURCE
CON GERS			4.5	3	GERS CON.3
GE CR120A	NC	D	9	5.4	GERS AI2.4
GE CR120A	NC	E	10	6	GERS AI2.4
GE CR120A	NO	D	10	6	GERS AI2.4
GE CR120A	NO	E	10	6	GERS AI2.4
GE CR120KT (time delay)	NC	D	12	4.8	UFSAR/DAEC-1, Table 3.10-2 Page T3.10-3 Rev. 6
GE CR120KT (time delay)	NC	E	12	4.8	UFSAR/DAEC-1, Table 3.10-2 Page T3.10-3 Rev. 6
GE CR120KT (time delay)	NO	D	12	4.8	UFSAR/DAEC-1, Table 3.10-2 Page T3.10-3 Rev. 6
GE CR120KT (time delay)	NO	E	12	4.8	UFSAR/DAEC-1, Table 3.10-2 Page T3.10-3 Rev. 6
GE DATA			3	1.2	GERS PS.5 and Section 6.1.7
GE HFA11A	NC	D	2	1.2	GERS ARH.5
GE HFA11A	NC	E	10	6	GERS ARH.5
GE HFA11A	NO	D	8	4.8	GERS ARH.5
GE HFA11A	NO	E	10	6	GERS ARH.5
GE HFA151A	NC	D	3	1.8	ADDENDUM 1
GE HFA151A	NC	E	10	6	ADDENDUM 1
GE HFA151A	NO	D	10	6	ADDENDUM 1
GE HFA151A	NO	E	10	6	ADDENDUM 1
GE HFA51A	NC	D	1	0.4	GERS ARH.5
GE HFA51A	NC	E	7	2.8	GERS ARH.5
GE HFA51A	NO	D	6	2.4	GERS ARH.5
GE HFA51A	NO	E	7	2.8	GERS ARH.5
GE HGA11A DC	NC	E	10	4	GERS ARH.5
GE HGA11A DC	NO	D	8.8	3.5	GERS ARH.5
GE HGA11A DC	NO	E	4.4	1.8	GERS ARH.5
GE HGA11J DC	NC	E	10	4	GERS ARH.5

Table 6-1 (Continued)

Applicable Seismic Capacity for Essential Relay Types
(See Note 1)

Relay Type	Contact Arrangement	State	PSA	ZPA	SOURCE
GE HGA11J DC	NO	D	8.8	3.52	GERS ARH.5
GE HGA11J DC	NO	E	4.4	1.8	GERS ARH.5
GE HMA11 DC	NC	D	5	3	GERS ARH.5
GE HMA11 DC	NC	E	10	6	GERS ARH.5
GE HMA11 DC	NO	D	10	6	GERS ARH.5
GE HMA11 DC	NO	E	10	6	GERS ARH.5
GE IAC53A	NO	D	7	4.2	GERS PPI.5
GE IAC53A	NO	E	10	6	GERS PPI.5
GE IAC66K	NO	D	5	3	ADDENDUM 2
GE IJCV51A	NO	D	8	4.8	ADDENDUM 2
GE IJCV51A	NO	E	10	6	ADDENDUM 2
GE NGV11C	NO	D	8	3.2	Based on General Electric Instruction Manual GEI-98307 the NGV11C is similar to the NGV11A which has the same type of components as the NGV12A.
GE NGV11C	NO	E	8	3.2	Based on General Electric Instruction Manual GEI-98307 the NGV11C is similar to the NGV11A which has the same type of components as the NGV12A.
GE PJC11A	NO	D	5	3	GERS PPM.4
GE PJC11A	NO	E	7.5	4.5	GERS PPM.4
ITE 27D	NC	D	15	6	GERS PPM.4
ITE 27D	NC	E	15	6	GERS PPM.4
ITE 27D	NO	D	15	6	GERS PPM.4
ITE 27D	NO	E	15	6	GERS PPM.4
MCC GERS			1.5	1	GERS MCC.9
ROWAN 2190	NC	D	9	5.4	GERS AI2.4
ROWAN 2190	NC	E	10	6	GERS AI2.4
ROWAN 2190	NO	D	10	6	GERS AI2.4
ROWAN 2190	NO	E	10	6	GERS AI2.4

Table 6-1 (Continued)

Applicable Seismic Capacity for Essential Relay Types
(See Note 1)

Relay Type	Contact Arrangement	State	PSA	ZPA	SOURCE
SWGR GERS			1.8	1	GERS MVS/LVS.7
WESTINGHOUSE WL	NC	D	10	6	GERS ALO.2
WESTINGHOUSE WL	NC	E	10	6	GERS ALO.2
WESTINGHOUSE WL	NO	D	10	6	GERS ALO.2
WESTINGHOUSE WL	NO	E	10	6	GERS ALO.2

Note 1: The referenced capacity data sources require specific caveats to be met for each relay type. These caveats were taken into account, as appropriate, for the relays in this report. Capacity data in this table should not be used for other relays without consideration of the source document caveats.

Table 4-2
Duane Arnold Energy Center - Relay Evaluation

ESSEL UMBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGE MENT	ENERGIZE	CAPACITY PSA	CAPACITY EPA	DEMAND PSA	DEMAND EPA	PASS	RESENT	COMMENTS
03	CRD/Control Rod Position Indicator Probe ES1857(xx-xx) 89 total	APED-C11-24<2>/5 APED-C11-24<4>/16 APED-C11-24<8>/4	ALL	--	--			CA	--	--					Y	N	Contact chatter could affect rod position indication during strong ground motion only. There are no seal-ins or lockouts which could affect the rod position indication after strong ground motion. This is considered acceptable.
06	CRD/Scram Pilot Valve SV1855 (xx-xx) 89 Total	APED-C71-004<10>/8 APED-C71-004<9>/20	ALL	--	--			CA	--	--					Y	N	The scram valve solenoids are normally energized. The desired state following the earthquake is deenergized (scram). Contact chatter may deenergize the solenoids. This is considered acceptable.
07	CRD/Scram Pilot Valve SV1856 (xx-xx) 89 Total	APED-C71-004<10>/8 APED-C71-004<8>/20	ALL	--	--			CA	--	--					Y	N	The scram valve solenoids are normally energized. The desired state following the earthquake is deenergized (scram). Contact chatter may deenergize the solenoids. This is considered acceptable.
08	CRD/Backup Scram Pilot Valve SV1840A	APED-C71-004<11>/7 APED-C71-004<8>/20	ALL	--	--			CA	--	--					Y	N	The backup scram valve solenoids are normally deenergized. The desired state, following the earthquake, is energized (scram). Contact chatter may energize the solenoids. This is considered acceptable.
09	CRD/Backup Scram Pilot Valve SV1840B	APED-C71-004<11>/7 APED-C71-004<9>/20	ALL	--	--			CA	--	--					Y	N	The backup scram valve solenoids are normally deenergized. The desired state, following the earthquake, is energized (scram). Contact chatter may energize the solenoids. This is considered acceptable.
18	CRD/Scram Discharge Volume Isolation Pilot Valve SV1868A	APED-C71-001<1>/9 APED-C71-004<10>/8 APED-C71-004<6>/20	ALL	--	--			CA	--	--					Y	N	The discharge volume isolation valves are normally energized. The desired state, following the earthquake, is deenergized (scram). Contact chatter may deenergize the solenoids. This is considered acceptable.
19	CRD/Scram Discharge Volume Isolation Pilot Valve SV1868B	APED-C71-001<1>/9 APED-C71-004<10>/8 APED-C71-004<8>/20	ALL	--	--			CA	--	--					Y	N	The discharge volume isolation valves are normally energized. The desired state, following the earthquake, is deenergized (scram). Contact chatter may deenergize the solenoids. This is considered acceptable.
20	CRD/Scram Discharge Volume Isolation Pilot Valve SV1869A	APED-C71-001<1>/9 APED-C71-004<10>/8 APED-C71-004<9>/20	ALL	--	--			CA	--	--					Y	N	The discharge volume isolation valves are normally energized. The desired state, following the earthquake, is deenergized (scram). Contact chatter may deenergize the solenoids. This is considered acceptable.
21	CRD/Scram Discharge Volume Isolation Pilot Valve SV1869B	APED-C71-001<1>/9 APED-C71-004<10>/8 APED-C71-004<9>/20	ALL	--	--			CA	--	--					Y	N	The discharge volume isolation valves are normally energized. The desired state, following the earthquake, is deenergized (scram). Contact chatter may deenergize the solenoids. This is considered acceptable.
07	SRV/SRV Pilot Valve SV4400	BECH-E121<2F>/0 APED-B21-018<1>/22 APED-B21-018<2>/21 APED-B21-018<3A>/2	HS4400 (S1A)	GE CR2940	1C003	CB	786	MV	--	--					Y	N	Manual control switch
			HS4400A (43)	GE SB1	1C388			MV	--	--					Y	N	Manual keylocked switch
			HS4400B (42E)	GE CR2940	1C388			MV	--	--					Y	N	Manual control switch
			B21C-K006A	GE HFA151A	1C045	CB	786	RELAY GERS	NO	ALL	10.00	6.00	2.24	0.66	Y	Y	Contact chatter may open valve. Normally open contact only. Coil voltage 125 VDC An evaluation of the ADS circuitry has determined that the contacts that affect the coil of K6A do not seal-in due to chatter. Also, the contacts that affect the coil of K6A are in series with a normally open, seismically rugged contact off of K2A.
			B21C-K006B	GE HFA151A	1C045	CB	786	RELAY GERS	NO	ALL	10.00	6.00	2.24	0.66	Y	Y	Contact chatter may open valve. Normally open contact only. Coil voltage 125 VDC An evaluation of the ADS circuitry has

Table 4-2
Duane Arnold Energy Center - Relay Evaluation

SEL NBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGEMENT	ENERGIZE	CAPACITY PSA	CAPACITY IPA	DEMAND PSA	DEMAND IPA	PASS	ESSENT	COMMENTS
																	determined that the contacts that affect the coil of K6B do not seal-in due to chatter. Also, the contacts that affect the coil of K6B are in series with a normally-open, seismically-rugged contact off of K2B.
3			B21C-K007A	GE HFA151A	1C045	CB	786	CA	--	--					Y	N	Contact is in series with normally open, seismically-rugged contact K6A. Therefore, contact chatter is acceptable. An evaluation of the ADS circuitry has determined that the contacts that affect the coil of K7A do not seal-in due to chatter.
			B21C-K007B	GE HFA151A	1C045	CB	786	CA	--	--					Y	N	Contact is in series with normally-open, seismically-rugged contact K6B. Therefore, contact chatter is acceptable. An evaluation of the ADS circuitry has determined that the contacts that affect the coil of K7B do not seal-in due to chatter.
			B21C-K002A	GE HFA151A	1C045	CB	786	RELAY GERS	NO	ALL	10.00	6.00	2.24	0.66	Y	Y	The contact that affects the coil of K3A is off a normally-open, seismically-rugged 120 second timer K4400A. K3A affects K6A. Normally-open contact only. Coil voltage 125 VDC.
			B21C-K002B	GE HFA151A	1C045	CB	786	RELAY GERS	NO	ALL	10.00	6.00	2.24	0.66	Y	Y	The contact that affects the coil of K3B is off a normally-open, seismically-rugged 120 second timer K4400B. K3B affects K6B. Normally-open contact only. Coil voltage 125 VDC.
			B21C-K011A	--	1C045	CB	786	CA	--	--					Y	N	Contact chatter may cause the valve to close briefly, if the valve is open during strong ground motion. This is considered acceptable.
			K4400A, K4400B	EAGLE TIMER HP52	1C003	CB	786	QUALIFIED	ALL	ALL					Y	Y	Seismically qualified per Southern Testing Services Report S129-RP-01 (see DCP 1410, index number 7.06 thru 7.09). Affects K2A and K2B.
8	SRV/SRV Pilot Valve SV4401	BECH-E121<2F>/0 APED-B21-018<1>/22 APED-B21-018<2>/21 APED-B21-018<3A>/2	HS4401 (S6A)	GE CR2940	1C003	CB	786	MV	--	--					Y	N	Manual control switch
			HS4401B (43)	GE SB1	1C388			MV	--	--					Y	N	Manual keylockad switch
			HS4401C (42E)	GE CR2940	1C388			MV	--	--					Y	N	Manual control switch
			B21C-K011B	--	1C045	CB	786	CA	--	--					Y	N	Contact chatter may cause the valve to close briefly, if the valve is open during strong ground motion. This is considered acceptable.
9	SRV/SRV Pilot Valve SV4402	BECH-E121<2F>/0 APED-B21-018<1>/22 APED-B21-018<2>/21 APED-B21-018<3A>/2	HS4402 (S1B)	GE CR2940	1C003	CB	786	MV	--	--					Y	N	Manual control switch
			HS4401B (43)	GE SB1	1C388			MV	--	--					Y	N	Manual keylocked switch
			HS4402A (42E)	GE CR2940	1C388			MV	--	--					Y	N	Manual control switch
			B21C-Z006A	GE HFA151A	1C045	CB	786	RELAY GERS	NO	ALL	10.00	6.00	2.24	0.66	Y	Y	Contact chatter may open valve. Normally-open contact only. Coil voltage 125 VDC An evaluation of the ADS circuitry has determined that the contacts that affect the coil of K6A do not seal-in due to chatter. Also, the contacts that affect the coil of K6A are in series with a normally-open, seismically rugged contact off of K2A.

Table 4-2
Duane Arnold Energy Center - Relay Evaluation

EL MBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGE MENT	ENERGIZE	CAPACITY PSA	CAPACITY IPA	DEMAND PSA	DEMAND IPA	PASS	ESSENT	COMMENTS
9			B21C-K006B	GE HFA151A	1C045	CB	786	RELAY GERS	NO	ALL	10.00	6.00	2.24	0.66	Y	Y	Contact chatter may open valve. Normally-open contact only. Coil voltage 125 VDC. An evaluation of the ADS circuitry has determined that the contacts that affect the coil of K6B do not seal-in due to chatter. Also, the contacts that affect the coil of K6B are in series with a normally-open, seismically-rugged contact off of K2B.
			B21C-K007A	GE HFA151A	1C045	CB	786	CA	--	--					Y	N	Contact is in series with normally-open, seismically-rugged contact K6A. Therefore, contact chatter is acceptable. An evaluation of the ADS circuitry has determined that the contacts that affect the coil of K7A do not seal-in due to chatter.
			B21C-K007B	GE HFA151A	1C045	CB	786	CA	--	--					Y	N	Contact is in series with normally-open, seismically-rugged contact K6B. Therefore, contact chatter is acceptable. An evaluation of the ADS circuitry has determined that the contacts that affect the coil of K7B do not seal-in due to chatter.
			B21C-K002A	GE HFA151A	1C045	CB	786	RELAY GERS	NO	ALL	10.00	6.00	2.24	0.66	Y	Y	The contact that affects the coil of K2A is off a normally-open, seismically rugged 120 second timer K4400A. K2A affects K6A. Normally-open contact only. Coil voltage 125 VDC.
			B21C-K002B	GE HFA151A	1C045	CB	786	RELAY GERS	NO	ALL	10.00	6.00	2.24	0.66	Y	Y	The contact that affects the coil of K2B is off a normally-open, seismically-rugged 120 second timer K4400B. K2B affects K6B. Normally-open contact only. Coil voltage 125 VDC.
			B21C-K011C	--	1C045	CB	786	CA	--	--					Y	N	Contact chatter may cause the valve to close briefly, if the valve is open during strong ground motion. This is considered acceptable.
			K4400A, K4400B	EAGLE TIMER MP52	1C003	CB	786	QUALIFIED	ALL	ALL					Y	Y	Seismically qualified per Southern Testing Services Report S129-RP-01 (see DCP 1410, Index Number 7.04 thru 7.09). Affects K2A and K2B.
10	SRV/SRV Pilot Valve SV4405	SECH-E121<2F>/0 APED-B21-018<1>/22 APED-B21-018<2>/21 APED-B21-018<3A>/2	HS4405 (S1C)	GE CR2940	1C003	CB	786	MV	--	--					Y	N	Manual control switch.
			HS4405A (43)	GE SB1	1C389			MV	--	--					Y	N	Manual keylocked switch.
			B21C-K004A	GE HFA151A	1C045	CB	786	RELAY GERS	NO	ALL	10.00	6.00	2.24	0.66	Y	Y	Contact chatter may open valve. Normally-open contact only. Coil voltage 125 VDC. An evaluation of the ADS circuitry has determined that the contacts that affect the coil of K4A do not seal-in due to chatter. Also, the contacts that affect the coil of K4A are in series with a normally-open, seismically-rugged contact off of K2A.
			B21C-K004B	GE HFA151A	1C045	CB	786	RELAY GERS	NO	ALL	10.00	6.00	2.24	0.66	Y	Y	Contact chatter may open valve. Normally-open contact only. Coil voltage 125 VDC. An evaluation of the ADS circuitry has determined that the contacts that affect the coil of K4B do not seal-in due to chatter. Also, the contacts that affect the coil of K4B are in series with a normally-open, seismically-rugged contact off of K2B.
			B21C-K007A	GE HFA151A	1C045	CB	786	CA	--	--					Y	N	Contact is in series with normally-open, seismically-rugged contact K4A. Therefore, contact chatter is acceptable.

Table 6-2
Duane Arnold Energy Center - Relay Evaluation

SEEL NUMBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGEMENT	ENERGIZE	CAPACITY PSA	CAPACITY IPA	DEMAND PSA	DEMAND IPA	PASS	EXSENT	COMMENTS
																	An evaluation of the ADS circuitry has determined that the contacts that affect the coil of K7A do not seal-in due to chatter.
10			B21C-K007B	GE HFA151A	1C045	CB	786	CA	--	--					Y	N	Contact is in series with normally-open, seismically-rugged contact K6B. Therefore, contact chatter is acceptable. An evaluation of the ADS circuitry has determined that the contacts that affect the coil of K7B do not seal-in due to chatter.
			B21C-K003A	GE HFA151A	1C045	CB	786	RELAY GERS	NO	ALL	10.00	6.00	2.24	0.66	Y	Y	The contact that affects the coil of K2A is off a normally-open, seismically-rugged 120 second timer K4400A. K2A affects K6A. Normally-open contact only. Coil voltage 125 VDC.
			B21C-K003B	GE HFA151A	1C045	CB	786	RELAY GERS	NO	ALL	10.00	6.00	2.24	0.66	Y	Y	The contact that affects the coil of K2B is off a normally-open, seismically-rugged 120 second timer K4400B. K2B affects K6B. Normally-open contact only. Coil voltage 125 VDC.
			B21C-K011D	--	1C045	CB	786	CA	--	--					Y	N	Contact chatter may cause the valve to close briefly, if the valve is open during strong ground motion. This is considered acceptable.
			K4400A, K4400B	EAGLE TIMER HP52	1C003	CB	786	QUALIFIED	ALL	ALL					Y	Y	Seismically qualified per Southern Testing Services Report, S129-RP-01 (see DCP 1410, Index Number 7.01-7.09). Affects K2A and K2B.
11	SRV/SRV Pilot Valve SV4406	BECH-E121<2F>/0 APED-B21-018<1>/22 APED-B21-018<2>/21 APED-B21-018<3A>/2	HS4406 (S1D)	GE CR2940	1C003	CB	786	NV	--	--					Y	N	Manual control switch
			HS4406A (43)	GE SB1	1C189			NV	--	--					Y	N	Manual keylocked switch
			B21C-K006A	GE HFA151A	1C045	CB	786	RELAY GERS	NO	ALL	10.00	6.00	2.24	0.66	Y	Y	Contact chatter may open valve. Normally-open contact only. Coil voltage 125 VDC. An evaluation of the ADS circuitry has determined that the contacts that affect the coil of K6A do not seal-in due to chatter. Also, the contacts that affect the coil of K6A are in series with a normally-open, seismically-rugged contact off of K2A.
			B21C-K006B	GE HFA151A	1C045	CB	786	RELAY GERS	NO	ALL	10.00	6.00	2.24	0.66	Y	Y	Contact chatter may open valve. Normally-open contact only. Coil voltage 125 VDC. An evaluation of the ADS circuitry has determined that the contacts that affect the coil of K6B do not seal-in due to chatter. Also, the contacts that affect the coil of K6B are in series with a normally-open, seismically-rugged contact off of K2B.
			B21C-K007A	GE HFA151A	1C045	CB	786	CA	--	--					Y	N	Contact is in series with normally-open, seismically-rugged contact K6A. Therefore, contact chatter is acceptable. An evaluation of the ADS circuitry has determined that the contacts that affect the coil of K7A do not seal-in due to chatter.
			B21C-K007B	GE HFA151A	1C045	CB	786	CA	--	--					Y	N	Contact is in series with normally-open, seismically-rugged contact K6B. Therefore, contact chatter is acceptable. An evaluation of the ADS circuitry has determined that the contacts that affect the coil of K7B do not seal-in due to chatter.

Table 6-1
Duane Arnold Energy Center - Relay Evaluation

SEL NBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGE MENT	ENERGIZE	CAPACITY PSA	CAPACITY IPA	DEMAND PSA	DEMAND IPA	PASS	ESSENT	COMMENTS
11			B21C-K002A	GE HFA151A	1C045	CB	786	RELAY QERS	NO	ALL	10.00	6.00	2.24	0.64	Y	Y	The contact that affects the coil of K2A is off a normally-open, seismically-rugged 120 second timer K4400A. K2A affects K4A. Normally-open contact only Coil voltage 125 VDC.
			B21C-K002B	GE HFA151A	1C045	CB	786	RELAY QERS	NO	ALL	10.00	6.00	2.24	0.64	Y	Y	The contact that affects the coil of K2B is off a normally-open, seismically-rugged 120 second timer K4400B. K2B affects K4B. Normally-open contact only Coil voltage 125 VDC.
			B21C-K011E	--	1C045	CB	786	CA	--	--					Y	N	Contact chatter may cause the valve to close briefly, if the valve is open during strong ground motion. This is considered acceptable.
			K4400A, K4400B	EAGLE TIMER MP52	1C003	CB	786	QUALIFIED	ALL	ALL					Y	Y	Seismically qualified per Southern Testing Services Report S129-RP-01 (see DCP 1410, Index Number 7.06-7.09). Affects K2A and K2B.
12	SRV/SRV Pilot Valve SV4407	BECH-E121<2P>/0 APED-B21-018<1>/22 APED-B21-018<3>/24 APED-B21-018<3A>/2	HS4407 (S4B)	GE CR2940	1C003	CB	786	NV	--	--					Y	N	Manual control switch
			HS4407A (43)	GE SB1	1C389			NV	--	--					Y	N	Manual keylocked switch
			B21C-K011F	--	1C045	CB	786	CA	--	--					Y	N	Contact chatter may cause the valve to close briefly, if the valve is open during strong ground motion. This is considered acceptable.
19	SRV/RCS Pressure Transmitter PT4599A	BECH-E122<20>/15	--	--	--			NA	--	--					Y	N	Not affected by relays.
20	SRV/RCS Pressure Transmitter PT4599B	BECH-E122<20>/15	NA	--	--			NA	--	--					Y	N	Not affected by relays.
9	MS/MSIV AC SOLENOID SV4412A	BECH-E122<11>/17 APED-A71-003<10>/21 APED-A71-003<4>/25 APED-A71-003<1>/42 APED-A71-003<5>/33	All	--	--			CA	--	--					Y	N	The desired position of the MSIV following the earthquake is closed. Deenergizing pilot solenoid will cause MSIV to close. Contact chatter may cause the valve to close, but will not prevent the valve from closing.
10	MS/MSIV AC SOLENOID SV4415A	BECH-E122<11>/17 APED-A71-003<10>/21 APED-A71-003<4>/25 APED-A71-003<1>/42 APED-A71-003<5>/33	All	--	--			CA	--	--					Y	N	The desired position of the MSIV following the earthquake is closed. Deenergizing pilot solenoid will cause MSIV to close. Contact chatter may cause the valve to close, but will not prevent the valve from closing.
11	MS/MSIV AC SOLENOID SV4418A	BECH-E122<11>/17 APED-A71-003<10>/21 APED-A71-003<4>/25 APED-A71-003<1>/42 APED-A71-003<5>/33	All	--	--			CA	--	--					Y	N	The desired position of the MSIV following the earthquake is closed. Deenergizing pilot solenoid will cause MSIV to close. Contact chatter may cause the valve to close, but will not prevent the valve from closing.
2	MS/MSIV AC SOLENOID SV4420A	BECH-E122<11>/17 APED-A71-003<10>/21 APED-A71-003<4>/25 APED-A71-003<1>/42 APED-A71-003<5>/33	All	--	--			CA	--	--					Y	N	The desired position of the MSIV following the earthquake is closed. Deenergizing pilot solenoid will cause MSIV to close. Contact chatter may cause the valve to close, but will not prevent the valve from closing.
3	MS/MSIV DC SOLENOID SV4412B	BECH-E122<11>/17 APED-A71-003<10>/21 APED-A71-003<4>/25 APED-A71-003<1-/42 APED-A71-003<6>/35	All	--	--			CA	--	--					Y	N	The desired position of the MSIV following the earthquake is closed. Deenergizing pilot solenoid will cause MSIV to close. Contact chatter may cause the valve to close, but will not prevent the valve from closing.
4	MS/MSIV DC SOLENOID SV4415B	BECH-E122<11>/17 APED-A71-003<10>/21 APED-A71-003<4>/25 APED-A71-003<1>/42	All	--	--			CA	--	--					Y	N	The desired position of the MSIV following the earthquake is closed. Deenergizing pilot solenoid will cause MSIV to close. Contact chatter may cause the valve to close, but will

Table 6-2
Duane Arnold Energy Center - Relay Evaluation

EL MBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DIEP	CONTACT ARRANGE MENT	ENERGIZE	CAPACITY PSA	CAPACITY IPA	DEMAND PSA	DEMAND IPA	PASS	ESSENT	COMMENTS
		APED-A71-003<6>/35															not prevent the valve from closing.
15	MS/MSIV DC SOLENOID SV4416B	BECH-E122<11>/17 APED-A71-003<10>/21 APED-A71-003<4>/25 APED-A71-003<1>/42 APED-A71-003<6>/35	All	--	--			CA	--	--					Y	N	The desired position of the MSIV following the earthquake is closed. Deenergizing pilot solenoid will cause MSIV to close. Contact chatter may cause the valve to close, but will not prevent the valve from closing.
16	MS/MSIV DC SOLENOID SV4420B	BECH-E122<11>/17 APED-A71-003<10>/21 APED-A71-003<4>/25 APED-A71-003<1>/42 APED-A71-003<6>/35	All	--	--			CA	--	--					Y	N	The desired position of the MSIV following the earthquake is closed. Deenergizing pilot solenoid will cause MSIV to close. Contact chatter may cause the valve to close, but will not prevent the valve from closing.
13	MS/MSIV AC SOLENOID SV4413A	BECH-E123<11>/17 APED-A71-003<11>/21 APED-A71-003<11A>/3 APED-A71-003<4>/25 APED-A71-003<1>/42 APED-A71-003<6>/35	All	--	--			CA	--	--					Y	N	The desired position of the MSIV following the earthquake is closed. Deenergizing pilot solenoid will cause MSIV to close. Contact chatter may cause the valve to close, but will not prevent the valve from closing.
14	MS/MSIV AC SOLENOID SV4416A	BECH-E123<11>/17 APED-A71-003<11>/21 APED-A71-003<11A>/3 APED-A71-003<4>/25 APED-A71-003<1>/42 APED-A71-003<6>/35	All	--	--			CA	--	--					Y	N	The desired position of the MSIV following the earthquake is closed. Deenergizing pilot solenoid will cause MSIV to close. Contact chatter may cause the valve to close, but will not prevent the valve from closing.
15	MS/MSIV AC SOLENOID SV4419A	BECH-E122<11>/17 APED-A71-003<11>/21 APED-A71-003<11A>/3 APED-A71-003<4>/25 APED-A71-003<1>/42 APED-A71-003<6>/35	All	--	--			CA	--	--					Y	N	The desired position of the MSIV following the earthquake is closed. Deenergizing pilot solenoid will cause MSIV to close. Contact chatter may cause the valve to close, but will not prevent the valve from closing.
16	MS/MSIV AC SOLENOID SV4421A	BECH-E122<11>/17 APED-A71-003<11>/21 APED-A71-003<11A>/3 APED-A71-003<4>/25 APED-A71-003<1>/42 APED-A71-003<6>/35	All	--	--			CA	--	--					Y	N	The desired position of the MSIV following the earthquake is closed. Deenergizing pilot solenoid will cause MSIV to close. Contact chatter may cause the valve to close, but will not prevent the valve from closing.
17	MS/MSIV DC SOLENOID SV4413B	BECH-E122<11>/17 APED-A71-003<11>/21 APED-A71-003<11A>/3 APED-A71-003<4>/25 APED-A71-003<1>/42 APED-A71-003-5>/33	All	--	--			CA	--	--					Y	N	The desired position of the MSIV following the earthquake is closed. Deenergizing pilot solenoid will cause MSIV to close. Contact chatter may cause the valve to close, but will not prevent the valve from closing.
18	MS/MSIV DC SOLENOID SV4416B	BECH-E122<11>/17 APED-A71-003<11>/21 APED-A71-003<11A>/3 APED-A71-003<4>/25 APED-A71-003<1>/42 APED-A71-003<5>/33	All	--	--			CA	--	--					Y	N	The desired position of the MSIV following the earthquake is closed. Deenergizing pilot solenoid will cause MSIV to close. Contact chatter may cause the valve to close, but will not prevent the valve from closing.
19	MS/MSIV DC SOLENOID SV4419B	BECH-E122<11>/17 APED-A71-003<11>/21 APED-A71-003<11A>/3 APED-A71-003<4>/25 APED-A71-003<1>/42 APED-A71-003<5>/33	All	--	--			CA	--	--					Y	N	The desired position of the MSIV following the earthquake is closed. Deenergizing pilot solenoid will cause MSIV to close. Contact chatter may cause the valve to close, but will not prevent the valve from closing.
20	MS/MSIV DC SOLENOID SV4421B	BECH-E122<11>/17 APED-A71-003<11>/21 APED-A71-003<11A>/3 APED-A71-003<4>/25 APED-A71-003<1>/42 APED-A71-003<5>/33	All	--	--			CA	--	--					Y	N	The desired position of the MSIV following the earthquake is closed. Deenergizing pilot solenoid will cause MSIV to close. Contact chatter may cause the valve to close, but will not prevent the valve from closing.
1	RWCU/RWCU INLET INBOARD ISOLATION VALVE MO2700	BECH-E122<3>/4 FP 7874-E9-85/6 APED-A71-003<1>/42 APED-A71-003<13>/13 APED-A71-003<9>/15 APED-A71-003<6>/35 APED-C71-004<7>/25 APED-C71-004<6>/22 APED-G31-011<1>/19	MS2700	GE SBM	1C004			NV	--	--					Y	N	Manual control switch

Table 4-2
Duane Arnold Energy Center - Relay Evaluation

ASEL NUMBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGEMENT	ENERGIZE	CAPACITY PSA	CAPACITY EPA	DEMAND PSA	DEMAND EPA	PASS	ESSENT	COMMENTS
101			LS, TS	Limitorque SMB-00	MO2700			NV	--	--					Y	N	
			42/C, 42/O and 49	Allis-Chalmers, NEMA Size 1, Model 25-111	1B32	CB	757	MCC GERS	ALL	ALL	1.50	1.00	1.18	0.15	Y	Y	
			R26	--	--			CA	--	--					Y	N	Valve is normally open and the desired position is closed. Contact chatter may delay automatic closure of the valve only during strong ground motion. Operator has the capability to close valve manually if desired. There are no seal-in or lock-out contacts controlling this device that would prevent normal operation of this device following strong ground motion.
102	RHCU/RHCU INLET OUTBOARD ISOLATION VALVE MO2701	BECH-E122<5>/9 FP 7884-E10-1 <16>/6 FP 7884-E10-1<20>/8 APED-A71-3<13>/33 APED-A71-3<1>/42 APED-A71-3<6>/35 APED-A71-3<9>/ APED-031-011<1>/19	42/CS	GE SBM	1C004			NV	--	--					Y	N	Manual Control Switch
			LS, TS	Limitorque SMB-00	MO2701			NV	--	--					Y	N	
			42-O, 42-C, 49	ITE Class A21, Reversing, NEMA Size 1	1D42	RB	757	MCC GERS	ALL	ALL	1.50	1.00	0.35	0.15	Y	Y	
			42X-C and 42X-O	ITE J13P20	1D42	RB	757	MCC GERS	ALL	ALL	1.50	1.00	0.35	0.15	Y	Y	
			R27	--	--			CA	--	--					Y	N	Valve is normally open and the desired position is closed. Contact chatter may delay automatic closure of the valve only during strong ground motion. The operator has the capability to close valve manually if des. ed. There are no seal-in or lock-out contacts controlling this device that would prevent normal operation of this device follow..g strong ground motion.
105	CS/Loop A Inboard Torus Isolation Valve MO2147	BECH-E121<4>/4 FP-7884-E9-85/6	42/CS	GE CR2940	1C003	CB	786	NV	--	--					Y	N	
			LS, TS	Limitorque SMB-00	MO2147			NV	--	--					Y	N	
			42-O, 42-C, 49	Allis-Chalmers, NEMA Size 1, Model 25-111	1B34	RB	786	MCC GERS	ALL	ALL	1.50	1.00	0.90	0.15	Y	Y	
106	CS/Loop A Outboard Torus Isolation Valve MO2100	BECH-E121<4>/4 FP-7884-E9-85/6	42/CS	GE CR2940	1C003	CB	786	NV	--	--					Y	N	
			LS, TS	Limitorque SMB-00	MO2100			NV	--	--					Y	N	
			42-O, 42-C, 49	Allis-Chalmers, NEMA Size 1, Model 25-111	1B34	RB	786	MCC GERS	ALL	ALL	1.50	1.00	0.90	0.15	Y	Y	
09	CS/Core Spray Pump A 1P211A	BECH-E121<3>/9 BECH-E104<3D>/0 APED-E21-006<2>/25 BECH-E104<25>/14	152/CS (HS2103)	GE SBM	1C003	CB	786	NV	--	--					Y	N	
			CS	GE SBM	1A3	CB	757	NV	--	--					Y	N	

Table 6-2
Duane Arnold Energy Center - Relay Evaluation

SEL MBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGEMENT	ENERGIZE	CAPA... PSA	CAPA... EPA	DEMAND PSA	DEMAND EPA	PASS	ESSENT	COMMENTS
9			E21A-K012A	GE HFA51A	1C043	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.24	0.64	Y	Y	Core Spray Actuation Circuit. See evaluation for SSEL item CS LOGIC for contacts that affect relay coil. Normally-open contact only. Coil voltage 125 VDC.
			E21A-K015A	GE HFA151A	1C043	CB	786	CA	--	--					Y	N	Core Spray Actuation Circuit. Chatter may momentarily delay breaker closure during strong ground motion only. Relay will not seal-in or lock-out due to chatter (refer to evaluation for SSEL item CS LOGIC).
			186/N	WESTINGHOUSE WL	1A3	CB	757	RELAY GERS	ALL	ALL	10.00	6.00	8.30	1.05	Y	Y	
			E21A-K026A	AGASTAT EGP	1C043	CB	786	RELAY GERS	NO	ALL	9.00	5.40	2.24	0.64	Y	Y	Core Spray Actuation Circuit. See evaluation for SSEL item CS LOGIC for contacts that affect relay coil. Normally-open contact only.
			196-31	GE HFA151A	1A3	CB	757	RELAY GERS	NO	ALL	10.00	6.00	8.30	1.05	Y	Y	Load Shed Circuit. See evaluation for SSEL item LDSHD 1A3 contacts that affect relay coil. Normally open contact only. Coil voltage 125 VDC.
			150/151	GE IAC66K	1A3	CB	757	RELAY GERS	NO	D	5.00	3.00	8.30	1.05	N	Y	Contact chatter may energize lockout device 186/N and cause breaker to trip.
			150G	GE PJC11A	1A3	CB	757	RELAY GERS	NO	D	5.00	3.00	8.30	1.05	N	Y	Contact chatter may energize lockout device 186/N and cause breaker to trip.
			152H 75CS 75 152-CL/MS 152-SM/LS 152/IS 152/POS 152/a 152/b PB	--	1A3	CB	757	MV	--	--					Y	N	Mechanically actuated contacts.
			152Y	GE HMA, Cat. No. 0137A7575P001	1A3	CB	757	SWGR GERS	ALL	ALL	1.80	1.00	1.18	0.15	Y	Y	Anti-pump relay. Screened using switchgear GERS.
9	CS/Loop A Minimum Flow Line Isolation Valve MO2104	BECH-E121<6>/5 APED-E21-006<4>/14 FP 7884-89-85/6	42/CS (H5-2104)	GE SBM	1C003	CB	786	MV	--	--					Y	N	
			LS, TS	Limitorque SMB-000	MO2104			MV	--	--					Y	N	
			42-O, 42-C, 49	Allis-Chalmers, NEMA Size 1, Model 25-111	1B14	RB	786	MCC GERS	ALL	ALL	1.50	1.00	0.90	0.15	Y	Y	
			FIS/2111	--	1C123			CA	--	--					Y	N	Chatter may open or close valve depending upon the initial state of the valve. The valve will return to desired position after the period of strong ground motion. This valve response is considered acceptable.
			E21A-K2104A2 E21A-K2104A1	--	1C003	CB	786	CA	--	--					Y	N	Chatter may briefly delay valve closing or opening. No seal-in or lock-out contacts affect the coil of these devices.

Table 6-1
Duane Arnold Energy Center - Relay Evaluation

SSEL NUMBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGEMENT	ENERGIZE	CAPACITY PSA	CAPACITY IPA	DEMAND PSA	DEMAND IPA	PASS	ESSENT	COMMENTS
112	CS/Loop A Test Line Isolation Valve MO2112	BECH-E121<7>/5 APED-E21-006<4>/14	42/CS (HS2112)	GE SBM	1C003	CB	786	MV	--	--					Y	N	Manual control switch
			LS, TS	Limitorque SMB-1	MO2112			MV	--	--					Y	N	
			42-G, 42-C, 49	Allis-Chalmers, NEMA Size 1, Model 25-111	1B34	RB	786	MCC GERS	ALL	ALL	1.50	1.00	0.90	0.15	Y	Y	
			E21A-K010A	--	1C043	CB	786	CA	--	--					Y	N	Core Spray Actuation Circuit. Normal and desired position of valve is closed. Chatter of contact cannot open valve as it is in series with a rugged normally-open contact 42/CS. Contacts that affect relay coil will not seal-in or lock-out due to chatter (Refer to evaluation for SSEL item CS LOGIC).
113	CS/Loop A Outboard Vessel Isolation Valve MO2115	BECH-E121<8>/7 APED-E21-006<4>/14 FP 7884-E9-85/6	42/CS (HS2115)	GE SBM	1C003	CB	786	MV	--	--					Y	N	
			LS, TS	Limitorque SMB-0	MO2115			MV	--	--					Y	N	
			42-G, 42-C, 49	Allis-Chalmers, NEMA Size 1, Model 25-111	1B34	RB	786	MCC GERS	ALL	ALL	1.50	1.00	0.90	0.15	Y	Y	
			E21A-K013A	--	1C043	CB	786	CA	--	--					Y	N	Core Spray Actuation Circuit. Normal and desired position of valve is open. Chatter cannot close valve as a rugged normally-open contact 42/CS is in series. Contacts that affect relay coil will not seal-in or lock-out due to chatter (Refer to evaluation for SSEL item CS LOGIC).
116	CS/Loop A Inboard Vessel Isolation Valve MO2117	BECH-E121<5>/9 APED-E21-006<4>/14 FP 7884-E9-85/6	42/CS (HS2117)	GE SBM	1C003	CB	786	MV	--	--					Y	N	
			LS, TS	Limitorque SB-3	MO2117			MV	--	--					Y	N	
			42-G,42-C,49	Allis-Chalmers, NEMA Size 1, Model 25-111	1B34	RB	786	MCC GERS	ALL	ALL	1.50	1.00	0.90	0.15	Y	Y	
			E21A-K013A	GE HFA51A	1C043	CB	786	CA	--	--					Y	N	Core Spray Actuation Circuit. Chatter may briefly delay valve opening. Contacts that affect relay coil will not seal-in or lock-out due to chatter (Refer to evaluation for SSEL item CS LOGIC).
			E21A-K014A	GE HFA151A	1C043	CB	786	CA	--	--					Y	N	Core Spray Actuation Circuit. Chatter may briefly delay valve opening. Contacts that affect relay coil will not seal-in or lock-out due to chatter (Refer to evaluation for SSEL item CS LOGIC).
			E21A-K020A	GE NGA11A	1C043	CB	786	CA	--	--					Y	N	Core Spray Actuation Circuit. Chatter may briefly delay manual valve opening. Contacts that affect relay coil will not seal-in or lock-out due to chatter (Refer to evaluation for SSEL item CS LOGIC).
			LS	Limitorque SMB-0	MO2115			MV	--	--					Y	N	See evaluation for SSEL item 113 for contacts that affect valve position.

Table 6-2
Duane Arnold Energy Center - Relay Evaluation

SSEL NUMBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGEMENT	ENERGIZE	CAPACITY PSA	CAPACITY IPA	DEMAND PSA	DEMAND IPA	PASS	RESENT	COMMENTS
115	CS/Loop B Inboard Torus Isolation Valve MO2146	BECH-E121<4C>/2 BECH-E121<5B>/0 FP 7884-E9-85/4 BECH-E112<31>/1 BECH-E112<33>/1	42/CS (HS2146)	GE CR2940	1C003	CB	786	MV	--	--					Y	N	
			42E/CS (HS2146A)	GE CR2940	1C388			MV	--	--					Y	N	
			43 (HS2137A)	GE SB1	1C388			MV	--	--					Y	N	
			LS, TS	Limitorque SMB-00	MO2146			MV	--	--					Y	N	
			42-G,42-C, 49	Allis-Chalmers, NEMA Size 1, Model 25-111	1B44	RB	757	MCC GERS	ALL	ALL	1.50	1.00	0.35	0.15	Y	Y	
			43-EM206B13	AGASTAT EGP	1C422B	RB	757	CA	--	--					Y	N	Normal and desired position of valve is open. Contact chatter cannot close valve.
			43-206	GE SB1	1C388			MV	--	--					Y	N	
116	CS/Loop B Outboard Torus Isolation Valve MO2120	BECH-E121<4A>/1 FP 7884 E9-85/4 BECH-E121<4B>/2 BECH-E112<31>/1 BECH-E112<33>/1	42/CS (HS2120)	GE CR2940	1C003	CB	786	MV	--	--					Y	N	
			42E/CS (HS2120B)	GE CR2940	1C388			MV	--	--					Y	N	
			43 (HS2120A)	GE SB1	1C388			MV	--	--					Y	N	
			LS, TS	Limitorque SMB-00	MO2120			MV	--	--					Y	N	
			42-G, 42-C, 49	Allis-Chalmers, NEMA Size 1, Model 25-111	1B44	RB	757	MCC GERS	ALL	ALL	1.50	1.00	0.35	0.15	Y	Y	
			43-EM206G19	AGASTAT EGPD	1C422B	RB	757	CA	--	--					Y	N	Normal and desired position of valve is open. Contact chatter cannot close valve.
			43-206	GE SB1	1C388			MV	--	--					Y	N	
119	CS/Core Spray Pump B 1P211B	BECH-E121<3A>/2 BECH-E121<3C>/0 BECH-E121<3B>/1 BECH-E104<3G>/0 BECH-E112<31>/1 BECH-E112<33>/1 BECH-E104<26>/15 APED-E21-006<2>/25	152/CS (HS2123)	GE SBM	1C003	CB	786	MV	--	--					Y	N	
			152E/CS (HS2123B)	GE SBM	1C388			MV	--	--					Y	N	
			43 (HS2123A)	GE SB1	1C388			MV	--	--					Y	N	
			CS	GE SBM	1A4	CB	757	MV	--	--					Y	N	
			E21A-K12B	GE HFA51A	1C044	CB	786	RELAY GERS	NO	ALL	6.00	3.40	2.24	0.64	Y	Y	Core Spray Actuation Circuit. See evaluation for SSEL item CB LOGIC for contacts that affect relay coil. Normally-open contact only. Coil voltage 125 VDC.
			E21A-K15B	--	1C044	CB	786	CA	--	--					Y	N	Core Spray Actuation Circuit. Chatter may momentarily delay breaker closure. Contacts that affect relay coil will not seal-in due to chatter (Refer to evaluation for SSEL item CB LOGIC).

Table 6-2
Duane Arnold Energy Center - Relay Evaluation

SSEL NUMBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGEMENT	ENERGIZE	CAPACITY PSA	CAPACITY IPA	DEMAND PSA	DEMAND IPA	PASS	ESSENT	COMMENTS
119			E21A-K26B	AGASTAT EGP	1C044	CB	786	RELAY GERS	NO	ALL	9.00	5.40	2.26	0.66	Y	Y	Core Spray Actuation Circuit. See evaluation for SSEL item CS LOGIC for contacts that affect relay coil. Normally-open contact only.
			196-41	GE HFA151A	1A4	CB	757	RELAY GERS	NO	ALL	10.00	6.00	8.30	1.05	Y	Y	Automatic Load Shedding Circuit. See evaluation for SSEL item LDSHD 1A4 for contacts that affect relay coil. Normally-open contact only. Coil voltage 125 VDC.
			150/151	GE IAC66R	1A4	CB	757	RELAY GERS	NO	D	5.00	3.00	8.30	1.05	N	Y	Contact chatter may energize lockout device 186/M and cause breaker to trip.
			150Q	GE 9JC11A	1A4	CB	757	RELAY GERS	NO	D	5.00	3.00	8.30	1.05	N	Y	Contact chatter may energize lockout device 186/M and cause breaker to trip.
			186/M	WESTINGHOUSE WL	1A4	CB	757	RELAY GERS	ALL	ALL	10.00	6.00	8.30	1.05	Y	Y	
			152H 75CS 75 152-CL/MS 152-SN/LS 152/IS 152/POS 152/a 152/b PB	--	1A4	CB	757	MV	--	--					Y	N	Mechanically actuated contacts.
			152Y	GE HMA, Cat. No. 0137A7575P001	1A4	CB	757	SWGR GERS	ALL	ALL	1.90	1.00	1.10	0.15	Y	Y	Anti-pump relay. Screened using switchgear GERS.
			43-KM206B2 43-KM206B1	--	1C422A			CA	--	--					Y	N	Chatter does not affect breaker position and could only momentarily affect breaker control.
			43-206	GE SB1	1C388			MV	--	--					Y	N	
120	CS/Loop B Minimum Flow Line Isolation Valve MO2124	BECH-E121<4A>/2 FP 7884-E9-85/6 BECH-E121<4B>/1 BECH-E112<31>/1 BECH-E113<33>/1	42/CS (MS2124)	GE SBM	1C003	CB	786	MV	--	--					Y	N	
			42E/CS (MS2124B)	GE CR2940	1C338			MV	--	--					Y	N	
			43 (MS2124A)	GE SB1	1C338			MV	--	--					Y	N	
			LS, TS	Limitorque SMB-000	MO2124			MV	--	--					Y	N	
			42-0, 42-C, 49	Allis-Chalmers, NEMA Size 1, Model 25-111	1B44	RB	757	MCC GERS	ALL	ALL	1.50	1.00	0.35	0.15	Y	Y	
			FIS-2131	--	1C124			CA	--	--					Y	N	Chatter may open or close valve depending upon the initial state of the valve. The valve will return to desired position after the period of strong ground motion. This valve response is considered acceptable.
			E21A-K2124B2	Agastat E7022A	1C388			CA	--	--					Y	N	Chatter may briefly delay opening or closing of valve. No seal-in or lock-out contacts affect the coil for this device.
			E21A-K2124B1	Agastat E7022A	1C388			CA	--	--					Y	N	Chatter may briefly delay opening or closing of valve. No seal-in or lock-out contacts affect the coil for this device.

Table 4-2
Duane Arnold Energy Center - Relay Evaluation

SSEL MBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGEMENT	ENERGIZE	CAPACITY PSA	CAPACITY EPA	DEMAND PSA	DEMAND EPA	PASS	ESSENT	COMMENTS
20			43-EM206B20	AGASTAT EGP	1C622B	RB	757	CA	--	--					Y	N	Chatter may momentarily affect operation of the valve only if it is opening or closing during strong ground motion. Valve will achieve demanded position after contact chatter has stopped. Contact chatter will not cause a change in valve position. This is considered acceptable.
			43-206	GE SB1	1C388			NV	--	--					Y	N	
22	CS/Loop B Test Line Isolation Valve MO2132	BECH-E121<7A>/6 FP-7884-E9-85/6 BECH-E112<31>/1 BECH-E112<33>/1 APED-E21-006<4>/16 BECH-E121<6B>/1	42/CS (HS2132)	GE SBM	1C003	CB	786	NV	--	--					Y	N	Manual control switch
			43 (HS2124A)	GE SB1	1C388			NV	--	--					Y	N	Manual keylocked switch
			LS, TS	Limitorque SMB-1	MO2132			NV	--	--					Y	N	
			42-O, 42-C, 49	Allis-Chalmers, NEMA Size 1, Model 25-111	1B44	RB	757	MCC GERS	ALL	ALL	1.50	1.00	0.35	0.15	Y	Y	
			43-EM206B20	AGASTAT EGP	1C622B	RB	757	CA	--	--					Y	N	Normal and desired state of valve is closed. Contact chatter will not cause a change in valve position.
			43-206	GE SB1	1C388			NV	--	--					Y	N	Manual keylocked switch
			E21A-K010B	--	1C044	CB	786	CA	--	--					Y	N	Core Spray Actuation Circuit. Normal and desired position of valve is closed. Chatter of contact cannot open valve as it is in series with a rugged normally-open contact 42/CS. Contacts that affect relay coil will not seal-in or lock-out due to chatter (Refer to evaluation for SSEL item CS LOGIC).
23	CS/Loop B Outboard Vessel Isolation Valve MO2135	BECH-E121<8A>/5 FP 7884-E9-85/6 BECH-E121<4B>/2 BECH-E121<5A>/5 BECH-E112<31>/1 BECH-E112<33>/1	42/CS (HS2135)	GE SBM	1C003	CB	786	NV	--	--					Y	N	
			42E/CS (HS2135A)	GE CR2940	1C388			NV	--	--					Y	N	
			43 (HS 2130A)	GE SB1	1C388			NV	--	--					Y	N	
			LS, TS	Limitorque SMB-0	MO2135			NV	--	--					Y	N	
			42-O, 42-C, 49	Allis-Chalmers, NEMA Size 1, Model 25-111	1B44	RB	757	MCC GERS	ALL	ALL	1.50	1.00	0.35	0.15	Y	Y	
			LS-MO2137	Limitorque SMB-2	MO2137			NV	--	--					Y	N	See evaluation for SSEL item 3124 for contacts that affect valve position.
			E21A-K013B	--	1C044	CB	786	CA	--	--					Y	N	Core Spray Actuation Circuit. Normal and desired position of valve is open. Contact chatter cannot close as it is in series with a normally-open rugged contact 42/CS. Contacts that affect relay coil will not seal-in or lock-out due to chatter (Refer to evaluation for SSEL item CS LOGIC).
			43-EM206B19	--	1C622B	RB	757	CA	--	--					Y	N	Normal and desired state of valve is open. Contact chatter will not affect valve position.

Table 4-2
Duane Arnold Energy Center - Relay Evaluation

SSEL NUMBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGEMENT	ENERGIZE	CAPACITY PSA	CAPACITY IPA	DEMAND PSA	DEMAND IPA	PASS	ESSENT	COMMENTS
23			43-206	GE SB1	1C388			NV	--	--					Y	N	
24	CS/Loop B Inboard Vessel Isolation Valve MO2137	BECH-E121<5A>/5 BECH-E121<5B>/0 FP-7884 E9 R/6 APED-E21-006<4>/14 BECH-E121<04B>/2 BECH-E121<08A>/5 APED-C51-008<4>/21 BECH-E112<11>/1 BECH-E112<31>/1	42/CS (NS2137)	GE SBM	1C003	CB	786	NV	--	--					Y	N	
			42E/CS (NS2137B)	GE CR2940	1C388			NV	--	--					Y	N	
			43 (NS2137A)	GE SB1	1C388			NV	--	--					Y	N	
			LS, TS	Limitorque SMB-2	MO2137			NV	--	--					Y	N	
			82-0, 82-C, 89	Allis-Chalmers, NEMA Size 1, Modal 25-111	1B44	RB	757	MCC GERS	ALL	ALL	1.50	1.00	0.35	0.15	Y	Y	
			R-3	--	1C388			CA	--	--					Y	N	Wired in series with normally-open rugged contact 43.
			E21A-K013B	GE HFA51A	1C044	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.34	0.66	Y	Y	Core Spray Actuation Circuit. Chatter may partially open valve. See evaluation for SSEL item CS LOGIC for contacts that affect relay coil. Normally-open contact only. Coil voltage 125 VDC.
			E21A-K014B	--	1C044	CB	786	CA	--	--					Y	N	Core Spray Actuation Circuit. Chatter may briefly delay opening of valve. Contacts that affect relay coil will not seal-in or lock-out due to chatter (Refer to evaluation for SSEL item CS LOGIC).
			E21A-K020B	--	1C045	CB	786	CA	--	--					Y	N	Core Spray Actuation Circuit. Chatter may briefly delay opening of valve. Contacts that affect relay coil will not seal-in or lock-out due to chatter (Refer to evaluation for SSEL item CS LOGIC).
			E21A-K030B	--	1C046	CB	786	CA	--	--					Y	N	Core Spray Actuation Circuit. Chatter may briefly delay opening of valve. Contacts that affect relay coil will not seal-in or lock-out due to chatter (Refer to evaluation for SSEL item CS LOGIC).
			43-KM104B19	AGASTAT EGP	1C422B	RB	757	CA	--	--					Y	N	Chatter may momentarily affect operation of the valve only if it is opening or closing during strong ground motion. Valve will achieve demanded position after contact chatter has stopped. Contact chatter will not cause a change in valve position. This is considered acceptable.
			43-206	GE SB1	1C388			NV	--	--					Y	N	Manual keylocked switch
125	CS/Loop A Flow Rate Transmitter FT2110	APED-E21-006<3>/16	--	--	--			NA	--	--					Y	N	Not affected by relays.
126	CS/Loop B Flow Rate Transmitter FT2130	APED-E21-006<3>/16	43	GE SB1	1C388			NV	--	--					Y	N	Transfer switch
127	RCS/Reactor Vessel Water Level Transmitter	APED-E51-009<4>/29 BECH-E074/11	NA	--	--			NA	--	--					Y	N	Not affected by relays.

Table 4-2
Duane Arnold Energy Center - Relay Evaluation

REL NBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGEMENT	ENERGIZE	CAPACITY PSA	CAPACITY IPA	DEMAND PSA	DEMAND IPA	PASS ESSMT		COMMENTS
	LIT94539																
8	RCS/Reactor Vessel Water Level Transmitter	APED-E41-006<2>/25 BECH-E074/11	43	GE SB1	1C388			NV	--	--					Y	N	
	LIT94540																
9	RCS/Reactor Vessel Water Level Transmitter	APED-E11-007<10A>/3 APED-E11-007<12>/13	--	--	--			NA	--	--					Y	N	Not affected by relays.
	LT4545A																
0	RCS/Reactor Vessel Water Level Transmitter	APED-E11-007<10A>/3 APED-E11-007<12>/13	--	--	--			NA	--	--					Y	N	Not affected by relays.
	LT4545B																
1	RCS/Reactor Vessel Water Level Transmitter	APED-E11-007<10A>/3 APED-E11-007<12>/13	--	--	--			NA	--	--					Y	N	Not affected by relays.
	LT4545C																
2	RCS/Reactor Vessel Water Level Transmitter	APED-E11-007<10A>/3 APED-E11-007<12>/13	--	--	--			NA	--	--					Y	N	Not affected by relays.
	LT4545D																
2A	Reactor Vessel NR Level (RCIC, PCIS Trip)	BECH-M115/37	--	--	--			NA	--	--					Y	N	Not affected by relays.
	LIB4592A																
2B	Reactor Vessel NR Level (RCIC, PCIS Trip)	BECH-M115/37	--	--	--			NA	--	--					Y	N	Not affected by relays.
	LIB4592B																
2C	Reactor Vessel NR Level (RCIC, PCIS Trip)	BECH-M115/37	--	--	--			NA	--	--					Y	N	Not affected by relays.
	LIB4592C																
2D	Reactor Vessel NR Level (RCIC, PCIS Trip)	BECH-M115/37	--	--	--			NA	--	--					Y	N	Not affected by relays.
	LIB4592D																
2E	Reactor Vessel Water Level (ATWS Trip)	BECH-E122<45A>/0 BECH-M115/37	--	--	--			NA	--	--					Y	N	Not affected by relays.
	LIB4535																
2F	Reactor Vessel Water Level (ATWS Trip)	BECH-E122<45A>/0 BECH-M115/37	--	--	--			NA	--	--					Y	N	Not affected by relays.
	LIB4536																
2G	Reactor Vessel Water Level (ATWS Trip)	BECH-E122<46A>/0 BECH-M115/37	--	--	--			NA	--	--					Y	N	Not affected by relays.
	LIB4537																
2H	Reactor Vessel Water Level (ATWS Trip)	BECH-E122<46A>/0 BECH-M115/37	--	--	--			NA	--	--					Y	N	Not affected by relays.
	LIB4538																
3	RCS/Torus Water Level Transmitter	BECH-E122<19A>/2 APED-B21-119<1>/4	--	--	--			NA	--	--					Y	N	Not affected by relays.
	LT4397A																
4	RCS/Torus Water Level Transmitter	BECH-E122<19A>/2 APED-B21-119<1>/4	--	--	--			NA	--	--					Y	N	Not affected by relays.
	LT4397B																

Table 5-2
Duane Arnold Energy Center - Relay Evaluation

SPL NBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGE MENT	ENERGIZE	CAPACITY PSA	CAPACITY IPA	DEMAND PSA	DEMAND IPA	PASS	ESSENT	COMMENTS
5	CS/Loop A Pressure Transmitter PT2106	APED-E21-006<3>/16	--	--	--			NA	--	--					Y	N	Not affected by relays
6	CS/Loop B Pressure Transmitter PT2136	APED-E21-006<3>/16	--	--	--			NA	--	--					Y	N	Not affected by relays
6A	Recirc Pump ATWS High Vessel Pressure Trip PS4593A	BECH M115/37	--	--	--			NA	--	--					Y	N	Not affected by relays.
6B	Recirc Pump ATWS High Vessel Pressure Trip PS4593B	BECH M115/37	--	--	--			NA	--	--					Y	N	Not affected by relays.
6C	Recirc Pump ATWS High Vessel Pressure Trip PS4593C	BECH M115/37	--	--	--			NA	--	--					Y	N	Not affected by relays.
6D	Recirc Pump ATWS High Vessel Pressure Trip PS4593D	BECH M115/37	--	--	--			NA	--	--					Y	N	Not affected by relays.
8	RCS/CV-4428 Nitrogen Supply Isolation SV4428	APED-A71-003<8>/19 APED-A71-003<1>/42	S46 (H11-P402)	GE SBM	1C004			NV	--	--					Y	N	Manual control switch
			62E/CS	GE CR2940	1C188			NV	--	--					Y	N	Manual control switch
			43	GE SB1	1C188			NV	--	--					Y	N	Manaul transfer switch
9	MS/MS Line Drain Inboard Isolation MO4423	BECH-E122<2>/8 APED-A71-003<9>/15 PP-7884-E9-85/6	42/CS (HS4423)	GE SBM	1C003	CB	786	NV	--	--					Y	N	Manual control switch
			LS, TS	Limitorque SMB-00	MO4423			NV	--	--					Y	N	
			42-O, 42-C, 49	Allis-Chalmers, NEMA Size 1, Model 25-111	1B32	CB	757	MCC GERS	ALL	ALL	1.50	1.00	1.10	0.15	Y	Y	
			A71B-K056	--	1C041	CB	786	CA	--	--					Y	N	Normal and desired state of valve MO4423 is closed. Contact affects both closing and opening coils. The K56 contact in the closing circuit is in series with a normally-open seismically-rugged limit switch. Therefore, chatter of the K56 contact cannot affect the closing coil. The K56 contacts in the opening circuit are in series with a normally-open seismically-rugged control switch and a starter auxiliary contact. Therefore, chatter of the K56 contact cannot affect the opening coil. There are no seal-in or lock-out contacts that could affect K56's coil due to chatter.
10	CRD/CV-1804A Control Air Supply Isol SV1804A	APED-A71-007<14>/35 APED-A71-003<1>/42	HS1804A	GE CR2940	1C004			NV	--	--					Y	N	Manual control switch
			A71B-K1804A	AGASTAT GP	1C041	CB	786	RELAY GERS	NO	ALL	9.00	5.40	2.24	0.66	Y	Y	Normally-open contact only

Table 6-2
Duane Arnold Energy Center - Relay Evaluation

EXCEL NUMBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGEMENT	ENERGIZE	CAPACITY PSA	CAPACITY IPA	DEMAND PSA	DEMAND IPA	PASS	ESSENT	COMMENTS
50			A71B-K019	--	1C041	CB	786	CA	--	--					Y	N	This normally-open contact is in series with a normally-open contact on an inherently-rugged switch HS1804A and a seismically-rugged relay K1804A. There are no seal-in or lock-out contacts that will prevent normally operation of this device following strong ground motion.
51	CRD/CV-1804B Control Air Supply Isolation SV1804B	APED A71-003<15>/34 APED A71-003<1>/42	HS-1804B	GE CR2980	1C004			NV	--	--					Y	N	Manual control switch
			A71B-K1804B	AGASTAT GP	1C042	CB	786	RELAY GERS	NO	ALL	9.00	5.40	2.24	0.66	Y	Y	Normally-open contact only.
			A71B-K020	--	1C043	CB	786	CA	--	--					Y	N	This normally-open contact is in series with a normally-open contact on an inherently-rugged switch HS1804B and a seismically-rugged relay K1804B. There are no seal-in or lock-out contacts that will prevent normaly operation of this device following strong ground motion.
58	RCIC/RCIC Steam Supply Inboard Isol MO2400	BECH-E121<29>/12 FP-7884-E9-85/6 APED-E51-009<6>/25 APED-E51-009<2>/22 APED-E51-009<3>/24	42/CS (HS2400)	GE SBM	1C004			NV	--	--					Y	N	Manual control switch
			HS2400A	GE CR2940	1C033	CB	786	NV	--	--					Y	N	Manual control switch
			LS, TS	Limitorque SMB-00	MO2400			NV	--	--					Y	N	
			42-O, 42-C, 49	Allie-Chalmers, NEMA Size 1, Modal 25-111	1B42	CB	757	MCC GERS	ALL	ALL	1.50	1.00	1.18	0.15	Y	Y	
			E51A-K003	GE NFA51A	1C036			CA	--	--					Y	N	Normal state of valve MO2400 is open. Relay K3 only affects the opening circuit. Since the valve is normally open, the K3 contact will be in series with a normally-open, seismically-rugged limit switch contact. Therefore, chatter of the K3 contact is acceptable. There are no seal-ins or lock-outs which will prevent normal operation of this device following strong ground motion.
			E51A-K033	GE NFA51A	1C033	CB	786	CA	--	--					Y	N	Normal state of valve MO2400 is open. Desired state of valve following the earthquake is closed. Chatter, or change of state, of the K33 contacts may close valve, but cannot open valve. Since the desired state is closed, this is considered acceptable. Potential seal-in of K33 can be reset by operator if necessary. This is considered acceptable.
59	RCIC/RCIC Steam Supply Outboard Isol MO2401	BECH-E121<30>/12 FP-7884-E10-1 APED E51-009<6>/25 APED-E51-009<2>/22	42/CS (HS2401)	GE SBM	1C004			NV	--	--					Y	N	Manual control switch
			HS2437	GE CR2940	1C030			NV	--	--					Y	N	Manual control switch
			LS, TS	Limitorque SMB-00	MO2401			NV	--	--					Y	N	
			42-O, 42-C, 49	ITE Class A21, Reversing, NEMA Size 1	1D14	RB	786	MCC GERS	ALL	ALL	1.50	1.00	0.85	0.15	Y	Y	
			42X/C, 42X/O	ITE J13P20	1D14	RB	786	MCC GERS	ALL	ALL	1.50	1.00	0.85	0.15	Y	Y	
			E51A-K002	GE NFA51A	1C030			CA	--	--					Y	N	Normal state of valve MO2401 is open. Relay K2 only affects the opening circuit. Since the valve is normally open, the K2 contact will be in series with a normally-open, seismically-rugged limit switch contact. Therefore, chatter

Table 4-2
Duane Arnold Energy Center - Relay Evaluation

SSEL MBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGE MENT	ENERGIZE	CAPACITY PSA	CAPACITY IPA	DEMAND PSA	DEMAND IPA	PASS	ESSENT	COMMENTS
																	of the K2 contact is acceptable. There are no seal-ins or lock-outs that will prevent normal operation of this device following strong ground motion.
59			E51A-K015	GE HFA51A	1C030			CA	--	--					Y	N	Normal state of valve MO2401 is open. Desired state of valve following the earthquake is closed. Chatter, or change of state, of the K15 contacts may close valve, but cannot open valve. Since the desired state is closed, this is considered acceptable. Potential seal-in of K15 can be reset by operator, if necessary. This is considered acceptable.
59A	RCIC/RCIC Turbine Steam Supply Isolation MO2404	BECH E121<32A>/3 FP-7884-E10-1<19> APED-E51-009<2>/22	42/CS (HS2404)	GE SBM	1C004			MV	--	--					Y	N	
			43 (HS2404A)	GE SBM	1C390			MV	--	--					Y	N	
			LS, TS	Limitorque SMB-0	--			MV	--	--					Y	N	
			42-O, 42-C, 69	ITE Class A21, Reversing, NEMA Size 2	1D14	RB	786	MCC GERS	ALL	ALL	1.50	1.00	0.85	0.15	Y	Y	
			42X-O, 42X-C	ITE J13P20	1D14	RB	786	MCC GERS	ALL	ALL	1.50	1.00	0.85	0.15	Y	Y	
			R1, R2	--	1C388			CA	--	--					Y	N	Contact is in series with a normally-open, seismically-rugged control switch contact 43.
			E51A-K002	GE HFA5?A	1C030			CA	--	--					Y	N	Contact chatter may open valve. After the period of strong ground motion, the valve's control circuit will return to normal operation, and the valve will close. An evaluation of the contacts that affect K2 determined that there are no seal-ins or lock-outs that will prevent normal operation of this device following the period of strong ground motion.
			E51A-K049	--	1C035			CA	--	--					Y	N	Desired state of valve is closed. Contact chatter, or change of state, may close valve. This is considered acceptable.
61	NPCI/Steam Supply Inboard Isol MO2238	BECH-E121<14>/11 FP-7884-E9-85/6 APED-E41-006<1>/36 APED-E41-006<3>/19 APED-E41-006<4>/25	42/CS (HS2238)	GE SBM	1C003	CB	786	MV	--	--					Y	N	Manual control switch
			HS2229A	GE CR2940	1C039			MV	--	--					Y	N	Manual control switch
			LS, TS	Limitorque SB-2	MO2238			MV	--	--					Y	N	
			42-O, 42-C, 69	Allis-Chalmers, NEMA Size 1, Model 25-111	1B36	RB	786	MCC GERS	ALL	ALL	1.50	1.00	0.90	0.15	Y	Y	
			E41-K003	GE HFA151A	1C039			CA	--	--					Y	N	Normal position of MO2238 is open. Desired position of valve following the earthquake is closed. Automatic closure of valve is acceptable, but not relied upon. Chatter, or change of state, of this contact will not prevent the operator from manually closing MO2238.
			E41A-K005	GE HFA151A	1C039			CA	--	--					Y	N	Normal position of MO2238 is open. Desired position of valve following the earthquake is closed. Automatic closure of valve is acceptable, but not relied upon. Chatter, or change of state, of this contact will not

Table 6-2
Duane Arnold Energy Center Relay Evaluation

SSEL UMBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGE MENT	ENERGIZE	CAPACITY PSA	CAPACITY IPA	DEMAND PSA	DEMAND IPA	PASS	ESSENT	COMMENTS
																	prevent the operator from manually closing MO2238.
A1			E41A-K034	GE HFA151A	1C032	CB	786	CA	--	--					Y	N	Normal position of MO2238 is open. Desired position of valve following the earthquake is closed. Automatic closure of valve is acceptable, but not relied upon. Chatter, or change of state, of this contact will not prevent the operator from manually closing MO2238.
			E41A-K046	GE HFA51A	1C032	CB	786	CA	--	--					Y	N	Contact affects closing coil only. Chatter of contact may close valve. Chatter is considered acceptable, since the desired position of this valve is closed.
			E41A-K048	GE HFA51A	1C032	CB	786	CA	--	--					Y	N	Normal position of MO2238 is open. Desired position of valve following the earthquake is closed. Automatic closure of valve is acceptable, but not relied upon. Chatter, or change of state, of this contact will not prevent the operator from manually closing MO2238.
42	MPCI/STEAM SUPPLY OUTBOARD ISOL MO2239	BECH-E121<15>/9 PP-E10-1<20>/7 APED-E41-006<1>/36 APED-E41-006<3>/19 APED-E41-006<4>/25	42/CS (HS2239)	GE SSM	1C003	CB	786	MV	--	--					Y	N	Manual control switch
			HS2239B	GE CR2940	1C039			MV	--	--					Y	N	Manual control switch
			LS, TS	Limitorque SB-3	MO2239			MV	--	--					Y	N	
			42-O, 42-C, 49	ITE Class A21, Reversing, NEMA Size 2	1D41	RB	757	MCC GERS	ALL	ALL	1.50	1.00	0.35	0.15	Y	Y	
			42X/O, 42X/C	--	1D41	RB	757	CA	--	--					Y	N	Chatter of contact does not affect valve position. Chatter during a valve stroke may stop the stroke. This is considered acceptable since manual action is relied upon to close valve and manual valve closure during the earthquake is unlikely.
			E41A-K002	GE HFA151A	1C039			CA	--	--					Y	N	Normal position of MO2239 is open. Desired position of valve following the earthquake is closed. Automatic closure of valve is acceptable, but not relied upon. Chatter, or change of state, of this contact will not prevent the operator from manually closing MO2239.
			E41A-K004	GE HFA151A	1C039			CA	--	--					Y	N	Normal position of MO2239 is open. Desired position of valve following the earthquake is closed. Automatic closure of valve is acceptable, but not relied upon. Chatter, or change of state, of this contact will not prevent the operator from manually closing MO2239.
			E41A-K015	GE HFA151A	1C039			CA	--	--					Y	N	Normal position of MO2239 is open. Desired position of valve following the earthquake is closed. Automatic closure of valve is acceptable, but not relied upon. Chatter, or change of state, of this contact will not prevent the operator from manually closing MO2239.
			E41A-K016	GE HFA151A	1C039			CA	--	--					Y	N	Normal position of MO2239 is open. Desired position of valve following the earthquake is closed. Automatic closure of valve is acceptable, but not relied upon. Chatter, or change of state, of this contact will not prevent the operator from manually closing MO2239.

Table 4-2
Duane Arnold Energy Center - Relay Evaluation

SSEL MBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGE MENT	ENERGIZE	CAPACITY PSA	CAPACITY IPA	DEMAND PSA	DEMAND IPA	PASS	ESSENT	COMMENTS
12C	HPCI/HPCI Turbine Remote Trip Valve SV2259	APED-E41-006<3>/19 APED-E41-006<4>/25	ALL	--	--			CA	--	--					Y	N	Chatter of contacts may cause turbine to trip. Desired state of HPCI turbine is tripped. Therefore, contact chatter is acceptable.
53	TIP/Ball Valve 1B219ABALL	APED-C51-006<3>/7 APED-C51-006<2>/2 GE Manual GEK9693	LS, CS	--	--			MV	--	--					Y	N	Manual control switch and mechanically-actuated limit switch contacts control valve.
54	TIP/Ball Valve 1B219BBALL	APED-C51-006<3>/7 APED-C51-006<2>/2 GE Manual GEK9693	LS, CS	--	--			MV	--	--					Y	N	Manual control switch and mechanically-actuated limit switch contacts control valve.
55	TIP/Ball Valve 1B219CBALL	APED-C51-006<3>/7 APED-C51-006<2>/2 GE Manual GEK9693	LS, CS	--	--			MV	--	--					Y	N	Manual control switch and mechanically-actuated limit switch contacts control valve.
56	RVI/Loop A Jet Pump Sample Line Inboard Isolation SV4594A	BECH-E112<25>/4 BECH-E112<19>/3 BECH-E112<20>/3 BECH-E112<26>/4	95-K5830A	--	--			CA	--	--					Y	N	Solenoid coil is isolated from chatter of this contact by normally open contact of hand switch. There are no seal-ins or lock-outs which will affect the normal operation of this device following strong ground motion.
			95-K4594A	--	--			CA	--	--					Y	N	Solenoid coil is isolated from chatter of this contact by normally open contact of hand switch.
			HS-4594A	GE CR2940	--			MV	--	--					Y	N	Manual keylock switch
57	RVI/Loop B Jet Pump Sample Line Inboard Isolation SV4594B	BECH-E112<25>/4 BECH-E112<19>/3 BECH-E112<20>/3 BECH-E112<26>/4	95-K5830A	--	--			CA	--	--					Y	N	Solenoid coil is isolated from chatter of this contact by normally open contact of hand switch. There are no seal-ins or lock-outs which will affect the normal operation of this device following strong ground motion.
			95-K4594B	--	--			CA	--	--					Y	N	Solenoid coil is isolated from chatter of this contact by normally open contact of hand switch.
			HS-4594B	GE CR2940	--			MV	--	--					Y	N	Manual keylock switch
58	RVI/Loop A Jet Pump Sample Line Outboard Isolation SV4595A	BECH-E112<25>/4 BECH-E112<19>/3 BECH-E112<20>/3 BECH-E112<26>/4	95-K4595A	--	--			CA	--	--					Y	N	Solenoid coil is isolated from chatter of this contact by normally open contact of hand switch.
			95-K5810B	--	--			CA	--	--					Y	N	Solenoid coil is isolated from chatter of this contact by normally open contact of hand switch. There are no seal-ins or lock-outs which will affect the normal operation of this device following strong ground motion.
			HS-4595A	GE CR2940	--			MV	--	--					Y	N	Manual keylock switch
59	RVI/LOOP B Jet Pump Sample LIne Outboard Isolation SV4595B	BECH-E112<25>/4 BECH-E112<19>/3 BECH-E112<20>/3 BECH-E112<26>/4	95-K4595B	--	--			CA	--	--					Y	N	Solenoid coil is isolated from chatter of this contact by normally open contact of hand switch.
			95-K5810B	--	--			CA	--	--					Y	N	Solenoid coil is isolated from chatter of this contact by normally open contact of hand switch. There are no seal-in or lock-out contacts which will affect the normal operation of this device following strong ground motion.
			HS-4595B	GE CR2940	--			MV	--	--					Y	N	Manual keylock switch
70	RHR/RHR Shutdown Cooling Suction Isolation MO1908	BECH-E112<2A>/4 BECH-E112<2B>/0 FP-7864-E9-85/4 BECH-E112<32>/1 APED-A71-3<1>/42 BECH-E131<44H>/2	42/CS (HS1908)	GE SBM	1C003	CB	786	MV	--	--					Y	N	Manual control switch

Table 6-2
Duane Arnold Energy Center - Relay Evaluation

ESSEL UMBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGE MENT	ENERGIZE	CAPACITY PSA	CAPACITY IPA	DEMAND PSA	DEMAND IPA	PASS	ESSENT	COMMENTS
70			62E/CS (HS1908B)	GE CR2940	1C390			MV	--	--					Y	N	Manual control switch
			43 (HS1908A)	GE SB1	1C390			MV	--	--					Y	N	Manual keylocked switch
			LS, TS	Limitorque SB-2	MO1908			MV	--	--					Y	N	
			42-O, 42-C, 49	Allis-Chalmers, NEMA Size 1, Model 25-111	1B34	RB	786	MCC GERS	ALL	ALL	1.50	1.00	0.90	0.15	Y	Y	
			PS-4596	--	PS-4596			CA	--	--					Y	N	Normal and desired position of MO1908 is closed. Chatter of pressure switch cannot open valve because its contact in the opening circuit is in series with normally-open, seismically-rugged control switch contacts.
			A71B-K029	GE CR120A	1C041	CS	786	CA	--	--					Y	N	Normal and desired position of MO1908 is closed. Chatter, or position change, of contact cannot open valve as it is in series with a normally-open, seismically-rugged control switch contact.
			A71B-K053	GE CR120A	1C041	CB	786	CA	--	--					Y	N	Normal and desired position of MO1908 is closed. Chatter, or position change, of contact cannot open valve as it is in series with a normally-open, seismically-rugged control switch contact.
			43-KM106A7	AGASTAT EGP	1C422C			CA	--	--					Y	N	Chatter of contact does not affect valve position.
			43 (HS2011B)	GE SB1	1C390			MV	--	--					Y	N	Manual keylocked switch
71	MSIV/MSIV-LCS Loop A Inboard Bleedoff Isolation MO8401A	BECH-E122<38>/4 FP-7884-E9-85/6 APED-B21-40<4A>/5	LS, TS	Limitorque SB-000	MO8401A			MV	--	--					Y	N	
			42-O, 42-C, 49	Allis-Chalmers, NEMA Size 1, Model 25-111	1B37	RB	786	MCC GERS	ALL	ALL	1.50	1.00	0.90	0.15	Y	Y	
			B21J-K008A	Agastat GPI	1C014			CA	--	--					Y	N	Normal and desired state of valve is closed. Contact chatter may momentarily open valve. After the period of strong ground motion, valve control will return to normal, and the valve will close. This is considered acceptable. There are no seal-in or lock-out contacts which affect the coil of this relay. Desired state of valve is the same as the normal state and power is not required to maintain the desired state. Therefore, power is not required from MCC 1B37. This valve has been evaluated to ensure that contact chatter will not spuriously actuate valve, if power were available.
72	MSIV/MSIV-LCS Loop B Inboard Bleedoff Isolation MO8401B	BECH-E122<38>/4 FP-7884-E9-85/6 APED-B21-40<4A>/5	LS, TS	Limitorque SB-000	MO8401B			MV	--	--					Y	N	
			42-O, 42-C, 49	Allis-Chalmers, NEMA Size 1, Model 25-111	1B37	RB	786	MCC GERS	ALL	ALL	1.50	1.00	0.90	0.15	Y	Y	
			B21J-K008B	Agastat GPI	1C014			CA	--	--					Y	N	Normal and desired state of valve is closed. Contact chatter may momentarily open valve. After the period of strong ground motion, valve control will return to normal, and the valve will close. This is considered acceptable.

Table 4-2
Duane Arnold Energy Center - Relay Evaluation

REL NBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGE MENT	ENERGIZE	CAPACITY PSA	CAPACITY ZPA	DEMAND PSA	DEMAND ZPA	PASS	ESSENT	COMMENTS
																	There are no seal-in or lock-out contacts which affect the coil of this relay. Desired state of valve is the same as normal state and power is not required to maintain desired state. Therefore, power is not required from MCC 1B37. This valve has been evaluated to ensure that contact chatter does not spuriously actuate valve, if power were available.
3	MSIV/MSIV-LCS Loop C Inboard Bleedoff Isolation MO8401C	BECH-E122<38>/4 FP-7884-E9-85/4 APED-B21-40<4A>/5	LS, TS	Limitorque SB-000	MO8401C			NV	--	--					Y	N	
			42-O, 42-C, 49	Allis-Chalmers, NEMA Size 1, Model 25-111	1B37	RB	786	MCC GERS	ALL	ALL	1.50	1.00	0.90	0.15	Y	Y	
			B21J-K008C	Agastat GPI	1C014			CA	--	--					Y	N	Normal and desired state of valve is closed. Contact chatter may momentarily open valve. After the period of strong ground motion, valve control will return to normal, and the valve will close. This is considered acceptable. There are no seal-in or lock-out contacts which affect the coil of this relay. Desired state of valve is the same as normal state and power is not required to maintain desired state. Therefore, power is not required from MCC 1B37. This valve has been evaluated to ensure that contact chatter does not spuriously actuate valve, if power were available.
4	MSIV/MSIV-LCS Loop D Inboard Bleedoff Isolation MO8401D	BECH-E122<38>/4 FP-7884-E9-85/4 APED-B21-40<4A>/5	LS, TS	Limitorque SB-000	MO8401D			NV	--	--					Y	N	
			42-O, 42-C, 49	Allis-Chalmers, NEMA Size 1, Model 25-111	1B37	RB	786	MCC GERS	ALL	ALL	1.50	1.00	0.90	0.15	Y	Y	
			B21J-K008D	Agastat GPI	1C014			CA	--	--					Y	N	Normal and desired state of valve is closed. Contact chatter may momentarily open valve. After the period of strong ground motion, valve control will return to normal, and the valve will close. This is considered acceptable. There are no seal-in or lock-out contacts which affect the coil of this relay. Normal state of valve is the same as desired state and power is not required to maintain desired state. Therefore, power is not required from MCC 1B37. This valve has been evaluated to ensure that contact chatter does not spuriously actuate valve, if power were available.
2	RHR/Loop A Torus Intake Isolation Valve MO2069	BECH-E121<45>/5 FP-7884-E9-85/4	42/CS (HS2069)	GE CR2940	1C003	CB	786	NV	--	--					Y	N	
			LS, TS	Limitorque SMB-0	MO2069			NV	--	--					Y	N	
			42-O, 42-C, 49	Allis-Chalmers, NEMA Size 1, Model 25-111	1B34	RB	786	MCC GERS	ALL	ALL	1.50	1.00	0.90	0.15	Y	Y	
3	RHR/RHR Pump A Isolation Valve MO2012	BECH-E121<41A>/4 FP-7884-E9-85/4	HS2012	GE CR2940	1C003	CB	786	NV	--	--					Y	N	

Table 6-2
Duane Arnold Energy Center - Relay Evaluation

SSEL NUMBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGEMENT	ENERGIZE	CAPACITY PSA	CAPACITY EPA	DEMAND PSA	DEMAND EPA	PASS	ESSENT	COMMENTS
3			HS2012A	C-H 10250T	1B3428			NV	--	--					Y	N	
			LS, TS	Limitorque SMB-00	MO2012			NV	--	--					Y	N	
			42-O, 42-C, 49	Allis-Chalmers, NEMA Size 1, Model 25-111	1B34	RB	786	MCC GERS	ALL	ALL	1.50	1.00	0.90	0.15	Y	Y	
			LS-MO2011	Limitorque SMB-00	MO2011			NV	--	--					Y	N	See evaluation for SSEL item 4004 for contacts that affect valve position.
4	RHR/RHR Pump A Isolation Valve MO2011	BECH-E121<44F>/1 BECH-E121<46H>/2 FP-7886-E9-85/6 BECH-E112<32>/1	HS2011	GE CR2940	1C003	CB	786	NV	--	--					Y	N	
			HS2011A	C-H 10250T16244	1B3427			NV	--	--					Y	N	
			43 (2011B)	GE SB1	1C390			NV	--	--					Y	N	
			LS, TS	Limitorque SMB-00	MO2011			NV	--	--					Y	N	
			42-C, 42-O, 49	Allis-Chalmers, NEMA Size 1, Model 25-111	1B34	RB	786	MCC GERS	ALL	ALL	1.50	1.00	0.90	0.15	Y	Y	
			LS-MO2012	Limitorque SMB-00	MO2012			NV	--	--					Y	N	See evaluation for SSEL item 4003 for contacts that affect valve position.
			43-XN104A8	AGASTAT EGP	1C422C			CA	--	--					Y	N	Contact chatter does not affect valve position
5	RHR/RHR Pump A 1P229A	BECH-E121<41>/8 BECH-E104<3D>/0 APED-E11-007<8>/30	152/CS	GE SBM	1C003	CB	786	NV	--	--					Y	N	
			CS	GE SBM	1A305	CB	757	NV	--	--					Y	N	
			E11A-K018A	GE HFA51A	1C032	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.24	0.66	Y	Y	RHR Actuation Circuit. Contact chatter may close pump breaker. See evaluation for SSEL item RHR LOGIC for contacts that affect relay coil. Normally-open contact only. Coil voltage 125 VDC.
			E11A-K019A	GE HFA51A	1C032	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.24	0.66	Y	Y	RHR Actuation Circuit. Contact chatter may trip pump breaker. See evaluation for SSEL item RHR LOGIC for contacts that affect relay coil Contact chatter may open valve. Normally-open contact only. Coil voltage 125 VDC.
			196-31	GE HFA151A	1A303	CB	757	RELAY GERS	NO	ALL	10.00	6.00	8.30	1.05	Y	Y	Automatic Load Shed Circuit. Contact chatter may trip pump breaker. See evaluation for SSEL item LDSHD 1A3 for contacts that affect relay coil Contact chatter may open valve. Normally-open contact only. Coil voltage 125 VDC.
			150/151	GE IAC66K	1A305	CB	757	RELAY GERS	NO	D	5.00	3.00	8.30	1.05	N	Y	Contact chatter may energize lockout device 186/M and cause breaker to trip.
			150G	GE PJC11A	1A305	CB	757	RELAY GERS	NO	D	5.00	3.00	8.30	1.05	N	Y	Contact chatter may energize lockout device 186/M and cause breaker to trip.

Table 6-3
Duane Arnold Energy Center - Relay Evaluation

SSEL NUMBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGEMENT	ENERGIZE	CAPACITY PSA	CAPACITY 2PA	DEMAND PSA	DEMAND 2PA	PASS	ESSENT	COMMENTS
95			186/M	WESTINGHOUSE WL	1A305	CB	757	RELAY GERS	ALL	ALL	10.00	6.00	8.30	1.05	Y	Y	Contact chatter may trip pump breaker.
			152H 75CS 75 152-CL/HS 152-SH/LS 152/IS 152/POS 152/a 152/b PB	--	1A305	CB	757	HV	--	--					Y	N	Mechanically actuated contacts.
			152Y	GE HMA, Cat. No. 0137A7575P001	1A305	CB	757	SWGR GERS	ALL	ALL	1.80	1.00	1.18	0.15	Y	Y	Anti-pump relay. Screened using switchgear GERS.
04	RHR/RHR Pump C Isolation Valve MO2015	BECH-E121<43A>/4 FP-7884-E9-85/6	MO2015	GE CR2940	1C003	CB	786	HV	--	--					Y	N	
			MS2015A	C-H 10250T	1B3428			HV	--	--					Y	N	
			LS, TS	Limitorque SMB-00	MO2015			HV	--	--					Y	N	
			42-O, 42-C, 49	Allis-Chalmers, NEMA Size 1, Modal 25-111	1B34	RB	786	MCC GERS	ALL	ALL	1.50	1.00	0.90	0.15	Y	Y	
			LS-MO2011	Limitorque SMB-00	MO2011			HV	--	--					Y	N	See evaluation for SSEL item 4004 for contacts that affect valve position.
07	RHR/RHR Pump C Isolation Valve MO2016	BECH-E121<44G>/1 BECH-E121<44H>/2 FP-7884-E9-85/6 BECH-E112<32>/1	MS2016	GE CR2940	1C003	CB	786	HV	--	--					Y	N	
			MS2016A	C-H 10250T16244	1B3430			HV	--	--					Y	N	
			43 (MS2011B)	GE SB1	1C390			HV	--	--					Y	N	
			LS, TS	Limitorque SMB-00	MO2016			HV	--	--					Y	N	
			42-O, 42-C, 49	Allis-Chalmers, NEMA Size 1, Model 25-111	1B34	RB	786	MCC GERS	ALL	ALL	1.50	1.00	0.90	0.15	Y	Y	
			LS-2015	Limitorque SMB-00	MO2015			HV	--	--					Y	N	See evaluation for SSEL item 4006 for contacts that affect valve position.
			43-EN106A8	AGASTAT EGP	1C422C			CA	--	--					Y	N	Contact chatter does not affect valve position.
08	RHR/RHR Pump C 1P229C	BECH-E121<41>/8 BECH-E104<3D>/0 APED-E11-007<4>/30	152/CS	GE SBM	1C003	CB	786	HV	--	--					Y	N	
			CS	GE SBM	1A306	CB	757	HV	--	--					Y	N	
			E11A-K021A	GE HFA51A	1C032	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.26	0.66	Y	Y	RHR Actuation Circuit. Contact chatter may close pump breaker. See evaluation for SSEL item RHR LOGIC for contacts that affect relay coil. Contact chatter may open valve. Normally-open contact only. Coil voltage 125 VDC.
			E11A-K022A	GE HFA51A	1C032	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.26	0.66	Y	Y	RHR Actuation Circuit. Contact chatter may trip pump breaker. See evaluation for SSEL item RHR LOGIC for contacts that affect relay coil. Contact chatter may open valve. Normally-open contact only. Coil voltage 125 VDC.

Table 6-2
Duane Arnold Energy Center - Relay Evaluation

SEL NBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGE MENT	ENERGIZE	CAPACITY PSA	CAPACITY IPA	DEMAND PSA	DEMAND IPA	PASS	ESSENT	COMMENTS
			194-31	GE HFA151A	1A303	CB	757	RELAY GERS	NO	ALL	10.00	6.00	8.30	1.05	Y	Y	Automatic Load Shed Circuit. Contact chatter may trip pump breaker. See evaluation for SSEL item LDSHD 1A3 for contacts that affect relay coil. Contact chatter may open valve. Normally-open contact only. Coil voltage 125 VDC.
			150/151	GE IAC66K	1A304	CB	757	RELAY GERS	NO	D	5.00	3.00	8.30	1.05	N	Y	Contact chatter may energize lockout device 186/M and cause breaker to trip.
			150G	GE PJC11A	1A304	CB	757	RELAY GERS	NO	D	5.00	3.00	8.30	1.05	N	Y	Contact chatter may energize lockout device 186/M and cause breaker to trip.
			186/M	WESTINGHOUSE WL	1A304	CB	757	RELAY GERS	ALL	ALL	10.00	6.00	8.30	1.05	Y	Y	Contact chatter may trip pump breaker.
			152H 75CB 75 152-CL/MS 152-SM/LS 152/IR 152/POS 153/a 153/b PB	--	1A304	CB	757	MV	--	--					Y	N	Mechanically actuated contacts.
			152Y	GE NMA, Cat. No. 0137A7575P001	1A304	CB	757	SWGR GERS	ALL	ALL	1.80	1.00	1.18	0.15	Y	Y	Anti-pump relay. Screened using switchgear GERS.
8A	RHR/RHR PUMPS 1P-229A/C MIN FLOW BYPASS MO2009	RECH-E121<56>/10 FP-7884-E5-85/6 APED-E11-007<4>/30	42/CS (HS2009)	GE SBM	1C003	CB	786	MV	--	--					Y	N	Manual control switch
			LS, TS	Limitorque SMB-000	MO2009			MV	--	--					Y	N	
			42-O, 42-C, 49	Allis-Chalmers, NEMA Size 1, Model 25-111	1B36	RB	786	MCC GERS	ALL	ALL	1.50	1.00	0.90	0.15	Y	Y	
			E11A-K2009A1, E11A-K2009A2	AGASTAT E7022	1C003	CB	786	CA	--	--					Y	N	Contact chatter cannot affect valve position. Chatter may, at worst, briefly delay a demanded valve opening or closing. This is considered acceptable.
			E11A-K084A	--	1C032	CB	786	CA	--	--					Y	N	Chatter of contact may open or close valve. After the period of strong ground motion, the valve control will return to normal. This is considered acceptable. There are no seal-in or lock-out contacts that affect the coil of this relay.
			52-a	--	1A305,1A306			MV	--	--					Y	N	Auxiliary contacts off of seismically rugged breakers. Refer to evaluations for SSEL items 4005 and 4008 for contacts that affect breaker position.
			PDIS1971A	--	--			CA	--	--					Y	N	Pressure switch affects coil of time delay relay K84A. Time delay relay has a time delay to pick-up of 10 seconds. Chatter of contact is unlikely to pick up a coil that has such a long time delay.
9	RHR/Loop A Hx Bypass Valve MO2030	RECH-E121<51>/3 FP-7884-E9-85/6 APED-E11-007<4>/30	42/CS (HS2030)	GE SBM	1C003	CB	786	MV	--	--					Y	N	
			LS, TS	Limitorque SMB-4	MO2030			MV	--	--					Y	N	

Table 6-2
Duane Arnold Energy Center - Relay Evaluation

SSEL NUMBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGEMENT	ENERGIZE	CAPACITY PSA	CAPACITY ZPA	DEMAND PSA	DEMAND ZPA	PASS	ESSENT	COMMENTS
09			42-O, 42-C, 49	Allis-Chalmers, NEMA Size 2, Model 25-113	1B34	RB	786	MCC GERS	ALL	ALL	1.50	1.00	0.90	0.15	Y	Y	
			E11A-K059A	GE HGA	1C012	CB	786	CA	--	--					Y	N	RHR Actuation Circuit. Normal state of valve is open. Contact chatter may briefly delay valve closure. Contacts that affect relay coil will not seal-in due to chatter (Refer to evaluation for SSEL item RHR LOGIC).
10	RHR/Loop A Hx Isolation Valve MO2029	BECH-E121<43B>/2 FP-7886-E9-85/6	42/CS (HS2029)	GE SBM	1C003	CB	786	MV	--	--					Y	N	
			LS, TS	Limitorque SMB-0	MO2029			MV	--	--					Y	N	
			42-O, 42-C, 49	Allis-Chalmers, NEMA Size 1, Model 25-111	1B34	RB	786	MCC GERS	ALL	ALL	1.50	1.00	0.90	0.15	Y	Y	
11A	RHR/RHR HX 1E-201A SHELL SIDE INBOARD VENT MO2044B	BECH-E121<47>/2	42/CS (HS2044B)	GE SBM	1C003	CB	786	MV	--	--						N	Manual control switch
			LS, TS	Limitorque SMB-000	MO2044B			MV	--	--					Y	N	
			42-O, 42-C, 49	Allis-Chalmers, NEMA Size 1, Model 25-111	1B34	RB	786	MCC GERS	ALL	ALL	1.50	1.00	0.90	0.15	Y	Y	
13A	RHR/RHR HX 1E-201A PASS SAMP LINE INBOARD ISOL SV2051	BECH-E122<13>/19 APED-A71-003<16>/15	HS2051 (S20)	GE CR2940	1C003	CB	786	MV	--	--					Y	N	Manual control switch
			HS2051A (S20A)	GE CR2940	1C003	CB	786	MV	--	--					Y	N	Manual control switch
			A71B-K017	--	--			CA	--	--					Y	N	Normal and desired state of valve solenoid is deenergized (closed). This contact is in series with normally-open, seismically rugged control switches and relay K2501. An evaluation of the contacts that affect the coil of this relay determined that this relay cannot seal-in due to relay chatter.
			A71B-K2051	AGASTAT GP	1C041	CB	786	RELAY GERS	NO	ALL	9.00	5.40	2.24	0.66	Y	Y	Normally-open contact only
16	RHR/LOOP A Hx Isolation Valve MO2031	BECH-E121<43>/5 FP-7886-E9-85/6	42/CS (HS2031)	GE CR2940	1C003	CB	786	MV	--	--					Y	N	
			LS, TS	Limitorque SMB-0	MO2031			MV	--	--					Y	N	
			42-O, 42-C, 49	Allis-Chalmers, NEMA Size 1, Model 25-111	1B34	RB	786	MCC GERS	ALL	ALL	1.50	1.00	0.90	0.15	Y	Y	
14	RHR/LOOP A Drywell Spray Outboard Isolation Valve MO2001	BECH-E121<40>/6 FP-7886-E9-85/6 APED-E11-007<6>/20	42/CS	GE SBM	1C003	CB	786	MV	--	--					Y	N	
			LS, TS	Limitorque SMB-2	MO2001			MV	--	--					Y	N	
			42-O, 42-C, 49	Allis-Chalmers, NEMA Size 1, Model 25-111	1B34	RB	786	MCC GERS	ALL	ALL	1.50	1.00	0.90	0.15	Y	Y	
			E11A-K059A	GE HFA51A	1C012	CB	786	CA	--	--					Y	N	RHR Actuation Circuit. Normal state of valve is closed, and desired state of valve is open. Chatter of NO contact cannot open valve as contact is in series with a normally-open, seismically rugged contact. Chatter of NC contact could only momentarily delay valve closure. Contacts that affect relay coil will

Table 4-2
Duane Arnold Energy Center - Relay Evaluation

SSEL UMBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGEMENT	ENERGIZE	CAPACITY PSA	CAPACITY IPA	DEMAND PSA	DEMAND IPA	PASS	ESSENT	COMMENTS
																	not seal-in due to chatter (Refer to evaluation for SSEL item RHR LOGIC).
16			E11A-K061A	GE HFA51A	1C032	CB	786	CA	--	--					Y	N	RHR Actuation Circuit. Normal state of valve is closed, and desired state of valve is open. Chatter of NC contact cannot open valve as contact is in series with a normally-open, seismically rugged contact. Chatter of NO contact could only momentarily delay valve closure. Contacts that affect relay coil will not seal-in due to chatter (Refer to evaluation for SSEL item RHR LOGIC).
			LS-MO2000	Limitorque SMB-2	MO2000			MV	--	--					Y	N	See evaluation for SSEL item 4016A for contacts that affect valve position.
16A	RHR/LOOP A DRYWELL SPRAY INBOARD ISOLATION VALVE MO2000	BECH-E121<48>/6 APED-E11-007<1> FP-7884-E9-85/6	42/CS (MS2000)	GE SBM	1C003	CB	786	MV	--	--					Y	N	Manual control switch
			LS, TS	Limitorque SMB-2	MO2000			MV	--	--					Y	N	
			42-O, 42-C, 49	Allis-Chalmers, NEMA Size 1, Model 25-111	1B34	RB	786	MCC GERS	ALL	ALL	1.50	1.00	0.90	0.15	Y	Y	
			E11A-K059A	GE HFA51A	1C032	CB	786	CA	--	--					Y	N	RHR Actuation Circuit. Normal state of valve is closed. Desired state of valve is open. Opening of valve requires manual operator action. Contact chatter will at worst briefly delay a demanded valve opening. Contacts that affect relay coil will not seal-in due to chatter (Refer to evaluation for SSEL item RHR LOGIC).
			E11A-K061A	GE HFA51A	1C032	CB	786	CA	--	--					Y	N	RHR Actuation Circuit. Normal state of valve is closed. Desired state of valve is open. Opening of valve requires manual operator action. Contact chatter will at worst briefly delay a demanded valve opening. Contacts that affect relay coil will not seal-in due to chatter (Refer to evaluation for SSEL item RHR LOGIC).
			E11A-K068A	GE HFA51A	1C032	CB	786	CA	--	--					Y	N	RHR Actuation Circuit. Normal state of valve is closed. Desired state of valve is open. Opening of valve requires manual operator action. Contact chatter will at worst briefly delay a demanded valve opening. Contacts that affect relay coil will not seal-in due to chatter (Refer to evaluation for SSEL item RHR LOGIC).
			LS-MO2001	Limitorque SMB-2	MO2001			MV	--	--					Y	N	See evaluation for SSEL item 4016 for contacts that affect valve position.
17	RHR/LOOP A Torus Spray Outboard Isolation Valve MO2005	BECH-E121<49>/6 FP-7884-E9-85/6 APED-E11-007<6>/20	42/CS (MS2005)	GE CR2940	1C003	CB	786	MV	--	--					Y	N	
			42/CS (MS2005A)	C-H 1025 T16244	1B34	RB	786	MV	--	--					Y	N	
			LS, TS	Limitorque SMB-0	MO2005			MV	--	--					Y	N	
			42-O, 42-C, 49	Allis-Chalmers NEMA Size 1, Model 25-111	1B34	RB	786	MCC GERS	ALL	ALL	1.50	1.00	0.90	0.15	Y	Y	
			E11A-K058A	GE HFA51A	1C032	CB	786	RELAY GERS	NC	E	7.00	2.80	2.24	0.66	Y	Y	RHR Actuation Circuit. Desired state of valve is open. Chatter of the normally-open contact in the opening circuit is acceptable. Chatter

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Duane Arnold Energy Center - Relay Evaluation

SSEL UMBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGE MENT	ENERGIZE	CAPACITY PSA	CAPACITY IPA	DEMAND PSA	DEMAND IPA	PASS	ESSENT	COMMENTS
																	of the normally-closed contact in the closing circuit may close the valve, if the relay is energized. See evaluation for SSEL item RHR LOGIC for contacts that affect relay coil. Energized, normally-closed contact only. Coil voltage 125 VDC.
17			E11A-K061A	GE HFA51A	1C032	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.24	0.66	Y	Y	RHR Actuation Circuit. Desired state of valve is open. Contact chatter may close valve. See evaluation for SSEL item RHR LOGIC for contacts that affect relay coil. Normally-open contact only. Coil voltage 125 VDC.
			E11A-K068A	GE HFA51A	1C032	CB	786	CA	--	--					Y	N	RHR Actuation Circuit. Contact chatter may briefly delay valve opening. Contacts that affect relay coil will not seal-in due to chattar (Refer to evaluation for SSEL item RHR LOGIC).
			LS-MO2004	Limitorque SMB-00	MO2004			NV	--	--					Y	N	See evaluation for SSEL item 4020 for contacts that affect valve position.
18	RHR/Loop A LPCI Outboard Inject Valve MO2004	BECH-E121<51>/8 F9-7004-E9-150/4 APED-E11-007<9>/20	42/CS	GE SBM	1C003	CB	786	NV	--	--					Y	N	
			LS, TS	Limitorque SB-4	MO2004			NV	--	--					Y	N	
			42-O, 42-C, 49	Allis-Chalmers, NEMA Size 4, Modal 35-114	1B34A	RB	786	MCC GERS	ALL	ALL	1.50	1.00	0.90	0.15	Y	Y	
			E11A-K046A	GE HFA51A	1C032	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.24	0.66	Y	Y	RHR Actuation Circuit. Chatter of NC contact may momentarily interrupt an automatic valve closure. This is acceptable. Chatter of NO contact could cause a closed valve to open. See evaluation for SSEL item RHR LOGIC for contacts that affect relay coil. Coil voltage 125 VDC.
			E11A-K046B	GE HFA11A	1C033	CB	786	RELAY GERS	NO	ALL	8.00	4.80	2.24	0.66	Y	Y	RHR Actuation Circuit. Chatter of NC contact may momentarily interrupt an automatic valve closure. This is acceptable. Chatter of NO contact could cause a closed valve to open. See evaluation for SSEL item RHR LOGIC for contacts that affect relay coil. Coil voltage 125 VDC.
			E11A-K087A	GE HGA11A DC	1C033	CB	786	RELAY GERS	NO	ALL	4.40	1.80	2.24	0.66	Y	Y	RHR Actuation Circuit. Contact chatter may close an open valve. See evaluation for SSEL item RHR LOGIC for contacts that affect relay coil. Contact chatter may open valve. Normally-open contact only. Coil voltage 125 VDC.
			E11A-K087B	GE HGA11A DC	1C033	CB	786	RELAY GERS	NO	ALL	4.40	1.80	2.24	0.66	Y	Y	RHR Actuation Circuit. Contact chatter may close an open valve. See evaluation for SSEL item RHR LOGIC for contacts that affect relay coil. Contact chatter may open valve. Normally-open contact only. Coil voltage 125 VDC.
			E11A-K090A	GE HFA51A	1C032	CB	786	CA	--	--					Y	N	RHR Actuation Circuit. Contact chatter may affect a manual valve opening, but operator action during period of strong shaking is unlikely, and operator has indication of valve position and can open valve after chatter has stopped. Contacts that affect relay coil will not seal-in due to chatter (Refer to evaluation for SSEL item RHR LOGIC).

Table 6-2
Duane Arnold Energy Center - Relay Evaluation

SSEL NUMBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGEMENT	ENERGIZE	CAPACITY PSA	CAPACITY ZPA	DEMAND PSA	DEMAND ZPA	PASS	ESSENT	COMMENTS
8			42-2004	AGASTAT E7022	1336A	RB	786	RELAY GERS	NO	ALL	4.00	2.40	2.70	0.45	Y	Y	Contact chatter during a valve opening or closing may stop valve from completing stroke. Normally-open contact only.
			LS-MO2003	Limitorque SB-4	MO2003			MV	--	--					Y	N	See evalution for SSEL item 4019 for contacts that affect valve position.
9	RHR/Loop A LPCI Inboard Inject Valve MO2003	BECH-E121<52>/7 FP-7884-E9-150/4 APED-E11-007<3>/32 APED-E11-007<4>/30	42/CS (MS2003)	GE SBM	1C003	CB	786	MV	--	--					Y	N	
			LS, TS	Limitorque SB-4	MO2003			MV	--	--					Y	N	
			42-D, 42-C, 49	Allis-Chalmers, NEMA Size 3, Model 25-113	1B36A	RB	786	MCC GERS	ALL	ALL	1.50	1.00	0.90	0.15	Y	Y	
			LS-MO2004	Limitorque SB-4	MO2004			MV	--	--					Y	N	See evaluation for SSEL item 4018 for contacts that affect valve position.
			E11A-K043A	GE HFA51A	1C032	CB	786	CA	--	--					Y	N	RHR Actuation Circuit. Normal position of valve is closed. Contact chatter cannot open valve. Contacts that affect relay coil will not seal-in due to chatter (Refer to evaluation for SSEL item RHR LOGIC).
			E11A-K044A	GE HFA151A	1C032	CB	786	RELAY GEPS	NO	ALL	10.00	6.00	2.24	0.66	Y	Y	RHR Actuation Circuit. Contact chatter may open a closed valve. See evaluation for SSEL item RHR LOGIC for contacts that affect relay coil. Normally-open contact only. Coil voltage 125 VDC.
			E11A-K044B	GE HGA11A DC	1C033	CB	786	RELAY GERS	NO	ALL	4.40	1.60	2.24	0.66	Y	Y	RHR Actuation Circuit. Contact chatter may open a closed valve. See evaluation for SSEL item RHR LOGIC for contacts that affect relay coil. Normally-open contact only. Coil voltage 125 VDC.
			E11A-K087A	GE HGA11A DC	1C032	CB	786	CA	--	--					Y	N	RHR Actuation Circuit. Normal position of valve is closed. Contact chatter cannot open valve. Contacts that affect relay coil will not seal-in due to chatter (Refer to evaluation for SSEL item RHR LOGIC).
			E11A-K087B	GE HGA11A DC	1C033	CB	786	CA	--	--					Y	N	RHR Actuation Circuit. Normal position of valve is closed. Contact chatter cannot open valve. Contacts that affect relay coil will not seal-in due to chatter (Refer to evaluation for SSEL item RHR LOGIC).
			E11A-K090A	GE HFA51A	1C032	CB	786	CA	--	--					Y	N	RHR Actuation Circuit. Contact chatter may affect a manual valve opening, but operator action during period of strong shaking is unlikely and operator has indication of valve position and can open valve after chatter has stopped. Contacts that affect relay coil will not seal-in due to chatter (Refer to evaluation for SSEL item RHR LOGIC).
20	RHR/Loop A Torus Spray Inboard Isolation Valve MO2004	BECH-E121<52>/7 FP-7884-E9-150/4 APED-E11-007<4>/20	42/CS (MS2004)	GE SBM	1C003	CB	786	MV	--	--					Y	N	

Table 4-2
Duane Arnold Energy Center - Relay Evaluation

SSEL UMBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGEMENT	ENERGIZE	CAPACITY PSA	CAPACITY EPA	DEMAND PSA	DEMAND EPA	PASS	ESSENT	COMMENTS
0			LS	Limitorque SMB-00	MO2004			NV	--	--					Y	N	
			TS	Limitorque SMB-00	MO2004			NV	--	--					Y	N	
			42-O, 42-C, 49	Allis-Chalmers, NEMA Size 1, Model 25-111	1B34	RB	786	MCC GERS	ALL	ALL	1.50	1.00	0.90	0.15	Y	Y	
			E11A-K059A	GE HFA51A	1C032	CB	786	CA	--	--					Y	N	RHR Actuation Circuit. Normal position of valve is closed, and desired position of valve is open. Contact chatter cannot open valve as contacts are in series with a normally-open, seismically-rugged contact. Contacts that affect relay coil will not seal-in due to chatter (Refer to evaluation for SSEL item RHR LOGIC).
			E11A-K048A	GE HFA51A	1C032	CB	786	CA	--	--					Y	N	RHR Actuation Circuit. Normal position of valve is closed, and desired position of valve is open. Contact chatter cannot open valve as contacts are in series with a normally-open, seismically-rugged contact. Contacts that affect relay coil will not seal-in due to chatter (Refer to evaluation for SSEL item RHR LOGIC).
			LS-MO2005	Limitorque SMB-0	MO2005			NV	--	--					Y	N	See evaluation for SSEL item 4017 for contacts that affect valve position.
1	RHR/Loop A Torus Return Isolation Valve MO2007	BECH-E121<59>/7 FP-7884-E9-85/6 APED-E11-007<1>/27	42/CS	GE SBK	1C003	CB	786	NV	--	--					Y	N	
			LS, TS	Limitorque SMB-2	MO2007			NV	--	--					Y	N	
			42-O, 42-C, 49	Allis-Chalmers, NEMA Size 1, Model 25-111	1B34	RB	786	MCC GERS	ALL	ALL	1.50	1.00	0.90	0.15	Y	Y	
			E11A-K058A	GE HFA51A	1C032	CB	786	CA	--	--					Y	N	RHR Actuation Circuit. Normal state of valve is closed. Desired state of valve is open. Valve can only be opened by manually. Contact chatter may briefly delay valve opening. Contacts that affect relay coil will not seal-in due to chatter (Refer to evaluation for SSEL item RHR LOGIC).
			E11A-K048A	GE HFA51A	1C032	CB	786	CA	--	--					Y	N	RHR Actuation Circuit. Normal state of valve is closed. Desired state of valve is open. Valve can only be opened by manually. Contact chatter may briefly delay valve opening. Contacts that affect relay coil will not seal-in due to chatter (Refer to evaluation for SSEL item RHR LOGIC).
			LS-MO2011	Limitorque SMB-00	MO2011			NV	--	--					Y	N	
			LS-MO2016	Limitorque SMB-00	MO2016			NV	--	--					Y	N	
2	RHR/Loop B Torus Intake Isolation Valve MO1989	BECH-E121<45B>/1 FP-7884-E9-85/6 BECH-E121<59C>/0 BECH-E112<31>/1 BECH-E112<33>/1	42/CS (HS1989)	GE CR2940	1C003	CB	786	NV	--	--					Y	N	
			42E/CS (HS1989A)	GE CR2940	1C389			NV	--	--					Y	N	
			42 (HS1934A)	GE SB1	1C388			NV	--	--					Y	N	

Table 6-2
Duane Arnold Energy Center - Relay Evaluation

SEL NBER	SYSTEM DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGEMENT	ENERGIZE	CAPACITY PSA	CAPACITY IPA	DEMAND PSA	DEMAND IPA	PASS	ESSENT	COMMENTS
2			LS, TS	Limitorque SMB-0	MO1983			MV	--	--					Y	N	
			42-O, 42-C, 49	Allis-Chalmers, NEMA Size 1, Model 25-111	1B44	RB	757	MCC GERS	ALL	ALL	1.50	1.00	0.35	0.15	Y	Y	
			43-RM206B21	AGASTAT GP	1C422B	RB	757	CA	--	--					Y	N	Normal and desired state of valve is open. Contact chatter cannot close valve.
			43-206	GE SB1	1C388			MV	--	--					Y	N	
3	RHR/RHR Pump B Isolation Valve MO1913	BECH-E121<43D>/2 FP-7886-E9-85/6 BECH-E121<44C>/1 BECH-E112<31>/1 BECH-E112<33>/1	42/CS (HS1913)	GE CR2940	1C003	CB	786	MV	--	--					Y	N	
			42/CS (HS1913A)	C-H 10250T16224	1B4424			MV	--	--					Y	N	
			42E/CS (HS1913B)	GE CR2940	1C388			MV	--	--					Y	N	
			43 (HS1912B)	GE SB1	1C388			MV	--	--					Y	N	
			LS, TS	Limitorque SMB-00	MO1913			MV	--	--					Y	N	
			42-O, 42-C, 49	Allis-Chalmers, NEMA Size 1, Model 25-111	1B44	RB	757	MCC GERS	ALL	ALL	1.50	1.00	0.35	0.15	Y	Y	
			LS-MO1912	Limitorque SMB-00	MO1912			MV	--	--					Y	N	See evalution for SSEL item 4024 for contacts that affect valve position.
			43-RM206B20	AGASTAT GP	1C422B	RB	757	CA	--	--					Y	N	Normal and desired position of valve is open. Contact chatter cannot close valve.
			43-206	GE SB1	1C388			MV	--	--					Y	N	
4	RHR/RHR Pump B Isolation Valve MO1912	BECH-E121<44B>/2 FP-7886-E9-85/6 BECH-E111<44C>/2 BECH-E112<31>/1 BECH-E112<33>/1	42/CS (HS1912)	GE CR2940	1C003	CB	786	MV	--	--					Y	N	
			42/CS (HS1912A)	C-H;10250T16244	1B4423			MV	--	--					Y	N	
			42E/CS (HS1912C)	GE CR2940	1C388			MV	--	--					Y	N	
			43 (HS1912B)	GE SB1	1C388			MV	--	--					Y	N	
			LS, TS	Limitorque SMB-00	MO1912			MV	--	--					Y	N	
			42-O, 42-C, 49	Allis-Chalmers, NEMA Size 1, Model 25-111	1B44	RB	757	MCC GERS	ALL	ALL	1.50	1.00	0.35	0.15	Y	Y	
			LS-MO1913	Limitorque SMB-00	MO1913			MV	--	--					Y	N	See evaluation for SSEL item 4023 for contacts that affect valve position.
			43-RM206B20	AGASTAT GP	1C422B	RB	757	CA	--	--					Y	N	Normal and desired position of valve is closed. Contact chatter cannot open valve.
			43-206	GE SB1	1C388			MV	--	--					Y	N	
5	RHR/RHR Pump B 1P229B	BECH-E121<41A>/1 BECH-E121<41B>/1 BECH-E104<3G>/ BECH-E131<41C>/0	152/CS (HS1915)	GE SBM	1C003	CB	786	MV	--	--					Y	N	

Table 6-2
Duane Arnold Energy Center - Relay Evaluation

RAEL UMBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGE MENT	ENERGIZE	CAPACITY PSA	CAPACITY IPA	DEMAND PSA	DEMAND IPA	PASS	ESSENT	COMMENTS
		APED E11-007<6>/30															
25			43 (HS1915A)	GE SB1	1C388			NV	--	--					Y	N	
			152E/CS (HS1915B)	GE SBM	1C388			NV	--	--					Y	N	
			CS	GE SBM	1A405	CB	757	NV	--	--					Y	N	
			E11A-K018B	GE HFA51A	1C033	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.24	0.66	Y	Y	RHR Actuation Circuit. Contact chatter may close pump breaker. See evaluation for SSEL item RHR LOGIC for contacts that affect relay coil. Contact chatter may open valve. Normally-open contact only. Coil voltage 125 VDC.
			E11A-K019B	GE HFA51A	1C033	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.24	0.66	Y	Y	RHR Actuation Circuit. Contact chatter may trip pump breaker. See evaluation for SSEL item RHR LOGIC for contacts that affect relay coil. Contact chatter may open valve. Normally-open contact only. Coil voltage 125 VDC.
			198-41	GE HFA151A	1A403	CB	757	RELAY GERS	NO	ALL	10.00	6.00	8.30	1.05	Y	Y	Automatic Load Shed Circuit. Contact chatter may trip pump breaker. See table 5-4 for contacts that affect relay coil. Normally-open contact only.
			150/151	GE IAC66K	1A405	CB	757	RELAY GERS	NO	D	5.00	3.00	8.30	1.05	N	Y	Contact chatter may energize lockout device 186/M and cause breaker to trip.
			150G	GE BJC11A	1A405	CB	757	RELAY GERS	NO	D	5.00	3.00	8.30	1.05	N	Y	Contact chatter may energize lockout device 186/M and cause breaker to trip.
			186/M	WESTINGHOUSE WL	1A405	CB	757	RELAY GERS	ALL	ALL	10.00	6.00	8.30	1.05	Y	Y	Contact chatter may trip pump breaker.
			152H 75CS 75 152-CL/MS 152-SM/LS 152/IS 152/POS 152/a 152/b PB	--	1A405	CB	757	NV	--	--					Y	N	Mechanically actuated contacts.
			152Y	GE HMA, Cat. No. 0137A7575P001	1A405	CB	757	SMGR GERS	ALL	ALL	1.80	1.00	1.18	0.15	Y	Y	Anti-pump relay. Screened using switchgear GERS
26	RHR/RHR Pump D Isolation Valve MO1921	BECN-E1.:-a1E>/2 FP-7884 .:-85/5 BECN-E121<44E>/1 BECN-E112<31>/1 BECN-E112<33>/1	42/CS (HS1921)	GE CR2940	1C003	CB	786	NV	--	--					Y	N	
			42/CS (HS1921A)	C-H ;10250T-16224	1B4424			NV	--	--					Y	N	
			42E/CS (HS1921B)	GE CR2940	1C388			NV	--	--					Y	N	
			43 (HS1920B)	GE SB1	1C388			NV	--	--					Y	N	
			LS, TS	Limitorque SMB-00	MO1921			NV	--	--					Y	N	
			42-O, 42-C, 49	Allie-Chalmers, NEMA Size 1, Model 25-111	1B44	RB	757	MCC GERS	ALL	ALL	1.50	1.00	0.35	0.15	Y	Y	

Table 4-2
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SSEL NUMBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGEMENT	ENERGIZE	CAPACITY PSA	CAPACITY EPA	DEMAND PSA	DEMAND EPA	PASS	ESSENT	COMMENTS
26			LS-MO1920	Limitorque SMB-00	MO1920			NV	--	--					Y	N	See evaluation for SSEL item 4027 for contacts that affect valve position.
			43-KM206B21	AGASTAT GP	1C422B	RB	757	CA	--	--					Y	N	Chatter of contact does not affect valve position.
			43-206	GE SB1	1C388			NV	--	--					Y	N	
27	RHR/RHR Pump D Isolation Valve MO1920	BECH-E121<44D>/1 P P 7886-E9-85/4 BECH-E121<44E>/1 BECH-E112<31>/1 BECH-E112<33>/1	42/CS (HS1920)	GE CR2940	1C003	CB	786	NV	--	--					Y	N	
			42/CS (HS1920A)	C-H 10250T14246	1B4425			NV	--	--					Y	N	
			42E/CS (HS1930C)	GE CR2940	1C388			NV	--	--					Y	N	
			43 (HS1920B)	GE SB1	1C388			NV	--	--					Y	N	
			LS, TS	Limitorque SMB-00	MO1920			NV	--	--					Y	N	
			42-O, 42-C, 69	Allis-Chalmers, NEMA Size 1, Model 25-111	1B44	RB	757	MCC GERS	ALL	ALL	1.50	1.00	0.35	0.15	Y	Y	
			LS-MO1921	Limitorque SMB-00	MO1921			NV	--	--					Y	N	See evaluation for SSEL item 4026 for contacts that affect valve position.
			43-KM206B21	AGASTAT GP	1C422B	RB	757	CA	--	--					Y	N	Chatter of contact does not affect valve position.
			43-206	GE SB1	1C388			NV	--	--					Y	N	
28	RHR/RHR Pump D 1P229D	BECH-E121<41D>/1 BECH-E121<41C>/0 BECH-E121<41E>/1 BECH-E1G4<1Q>/0 APED-E11-0071<1>/27	152/CS (HS1923)	GE SBM	1C003	CB	786	NV	--	--					Y	N	
			152E/CS (HS1923A)	GE SBM	1C388			NV	--	--					Y	N	
			43 (HS1915A)	GE SB1	1C388			NV	--	--					Y	N	
			CS	GE SBK	1A406	CB	757	NV	--	--					Y	N	
			E11A-K021B	GE HFA51A	1C033	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.24	0.66	Y	Y	RHR Actuation Circuit. Contact chatter may close pump breaker. Seeevaluation for SSEL item RHR LOGIC2 for contacts that affect relay coil. Normally-open contact only. Coil voltage 125 VDC.
			E11A-K021B	GE HFA51A	1C033	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.24	0.66	Y	Y	RHR Actuation Circuit. Contact chatter may trip pump breaker. See evaluation for SSEL item RHR LOGIC for contacts that affect relay coil. Normally-open contact only. Coil voltage 125 VDC.
			196-41	GE HFA151A	1A401	CB	757	RELAY GERS	NO	ALL	10.00	4.00	8.30	1.05	Y	Y	Automatic Load Shed Circuit. Contact chatter may trip pump breaker. See evaluation for SSEL item LDSHD 1A4 for contacts that affect relay coil. Normally-open contact only. Coil voltage 125 VDC.

Table 6-2
Duane Arnold Energy Center - Relay Evaluation

SEL NBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGE MENT	ENERGIZE	CAPACITY PSA	CAPACITY IPA	DEMAND PSA	DEMAND IPA	PASS	ESSENT	COMMENTS
			150/151	GE IAC66K	1A606	CB	757	RELAY GERS	NO	D	5.00	3.00	8.30	1.05	N	Y	Contact chatter may energize lockout device 186/H and cause breaker to trip.
			150G	GE PJC11A	1A606	CB	757	RELAY GERS	NO	D	5.00	3.00	8.30	1.05	N	Y	Contact chatter may energize lockout device 186/H and cause breaker to trip.
			186/H	WESTINGHOUSE WL	1A606	CB	757	RELAY GERS	ALL	ALL	10.00	6.00	8.30	1.05	Y	Y	Contact chatter may trip pump breaker.
			152H 75CS 75 152-CL/HS 152-SM/LS 152/IS 152/POS 152/a 152/b PB	--	1A606	CB	757	NV	--	--					Y	N	Mechanically actuated contacts
			152Y	GE HMA, Cat. No. 0117A7575P001	1A606	CB	757	SWGR GERS	ALL	ALL	1.80	1.00	1.18	0.15	Y	Y	Anti-pump relay. Screened using switchgear GERS
DA	RHR/RHR PUMPS 1P129B/D MIN FLOW BYPASS MO1935	BECH-E121<54A>/2 BECH-E121<54B>/2 PP-7884-E9-85/6 APED-E11-007<7>/31 BECH-E112<31>/1 BECH-E112<33>/1 BECH-E121<41C>/0	42/CS (HS1935)	GE SBM	1C003	CB	786	NV	--	--					Y	N	Manual control switch
			42E/CS (HS1935B)	GE CR2940	1C388			NV	--	--					Y	N	Manual control switch
			43 (HS1935A)	GE SB1	1C388			NV	--	--					Y	N	Manual keylocked switch
			HS1915B	GE SBM	1C388			NV	--	--					Y	N	Manual control switch
			HS1923A	GE SBM	1C388			NV	--	--					Y	N	Manual control switch
			LS, TS	Limitorque SMB-000	MO1935			NV	--	--					Y	N	
			42-O, 42-C, 49	Allis-Chalmers, NEMA Size 1, Model 25-111	1B44	RB	757	MCC GERS	ALL	ALL	1.50	1.00	0.35	0.15	Y	Y	
			KY1935B1, KY1935B2	AGASTAT E7022	1C003	CB	786	CA	--	--					Y	N	Chatter of contact may briefly delay valve opening or closing. This is considered acceptable.
			KY1935B3, KY1935D4	AGASTAT E7022	1C388			CA	--	--					Y	N	Chatter of contact may briefly delay valve opening or closing. This is considered acceptable.
			KY1935A	AGASTAT 7014AC	1C388			CA	--	--					Y	N	Contact is normally isolated by a manual keylocked switch.
			E11A-K084B	--	1C032	CB	786	CR	--	--					Y	N	Chatter of contact may open or close valve. After the period of strong ground motion, the valve control will return to normal. This is considered acceptable. There are no seal-in or lock-out contacts that affect the coil of this relay.
			52-a	--	--			NV	--	--					Y	N	Auxiliary contacts off of seismically rugged breakers. Refer to evaluations of SSEL items 4005 and 4008 for contacts that affect breaker position.
			PDIS1971B	--	--			CR	--	--					Y	N	Pressure switch affects coil of time delay relay K84B. Time delay relay has a time delay to pick up of 10 seconds. Chatter of contact is unlikely to pick up a coil that has such a long

Table 6-2
Duane Arnold Energy Center - Relay Evaluation

SEL MBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGE MENT	ENERGIZE	CAPACITY PSA	CAPACITY IPA	DEMAND PSA	DEMAND IPA	PASS	ESSENT	COMMENTS
																	time delay.
RA			43-EM206B22	AGASTAT GP	1C422B	RB	757	RELAY GERS	ALL	ALL	3.30	1.30	1.50	0.60	Y	Y	Chatter of contact may interrupt a demanded valve closure or opening. Normally-closed and normally-open contacts.
			43-206	GE SB1	1C388			MV	--	--					Y	N	Manual keylocked switch
5	RHR/Loop B Hx Bypass Valve MO1940	BECH-E121<51A>/1 BECH-E121<51B>/0 BECH-E112<31>/1 BECH-E112<33>/1	42/CS (HS1940)	GE SBM	1C003	CB	786	MV	--	--					Y	N	
			42E/CS (HS1940B)	GE CR2940	1C388			MV	--	--					Y	N	
			43 (HS1940A)	GE SB1	1C388			MV	--	--					Y	N	
			LS, TS	Limitorque SMB-4	MO1940			MV	--	--					Y	N	
			42-O, 42-C, 49	Allis-Chalmers, NEMA Size 2, Model 25-112	1B44	RB	757	MCC GERS	ALL	ALL	1.50	1.00	0.35	0.15	Y	Y	
			E11A-K095B	GE HGA11A	1C033	CB	786	CA	--	--					Y	N	RHR Actuation Circuit. Normal state of valve is open. Desired state of valve is closed. Contact chatter cannot open valve. Contact chatter may briefly delay valve opening. Contacts that affect relay coil will not seal-in due to chatter (Refer to evaluation for SSEL item RHR LOGIC).
			43-EM206B22	AGASTAT GP	1C422B	RB	757	CA	--	--					Y	N	Chatter of contact does not affect valve position.
			43-206	GE SB1	1C388			MV	--	--					Y	N	
9	RHR/Loop B Hx Isolation Valve MO1939	BECH-E121<43F>/2 FP-7884-E9-85/6 BECH-E121<54B>/2 BECH-E112<31>/1 BECH-E112<33>/1	42/CS (HS1939)	GE SBM	1C003	CB	786	MV	--	--					Y	N	
			42E/CS (HS1939A)	GE CR2940	1C388			MV	--	--					Y	N	
			43 (HS1935A)	GE SB1	1C388			MV	--	--					Y	N	
			LS, TS	Limitorque SMB-0	MO1939			MV	--	--					Y	N	
			42-O, 42-C, 49	Allis-Chalmers, NEMA Size 1, Model 25-111	1B44	RB	757	MCC GERS	ALL	ALL	1.50	1.00	0.35	0.15	Y	Y	
			43-EM206B22	AGASTAT GP	1C422B	RB	757	CA	--	--					Y	N	Chatter of contact does not affect valve position.
			43-206	GE SB1	1C388			MV	--	--					Y	N	
1A	RHR/RHR HX 1E-201B SHELL SIDE INBOARD VENT MO1949B	F-ECH-E121<47>/2	42/CS (HS1949B)	GE SBM	1C003	CB	786	MV	--	--					Y	N	Manual control switch
			LS, TS	Limitorque SMB-000	MO1949B			MV	--	--					Y	N	
			42-O, 42-C, 49	Allis-Chalmers, NEMA Size 1, Model 25-111	1B44	RB	757	MCC GERS	ALL	ALL	1.50	1.00	0.35	0.15	Y	Y	

Table 4-2
Duane Arnold Energy Center - Relay Evaluation

SEL NUMBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGEMENT	ENERGIZE	CAPACITY PSA	CAPACITY IPA	DEMAND PSA	DEMAND IPA	PASS	ESSENT	COMMENTS
3A	RHR/RHR HX 1E-201B PASS SAMP LINE INBOARD ISOL HV1972	BECH-E123<13>/19 APED-A71-003<16>/15	HS1972 (S21)	GE CR2940	1C003	CB	786	MV	--	--					Y	N	Manual control switch
			(S21A)	GE CR2940	1C003	CB	786	MV	--	--					Y	N	Manual control switch
			A71B-K59	--	--			CA	--	--					Y	N	Normal and desired state of valve solenoid is deenergized (closed). This contact is in series with normally-open, seismically rugged control switches and relay K1972. An evaluation of the contacts that affect the coil of this relay determined that this relay cannot seal-in due to relay chatter.
			A71B-K1972	AGASTAT GP	1C042	CB	786	RELAY GERS	NO	ALL	9.00	5.40	2.24	0.66	Y	Y	Normally-open contact only.
4	RHR/Loop B Hx Isolation Valve MO1941	BECH-E121<43C>/1 FP-7884-E9-85/4 BECH-E121<51B>/ BECH-E112<31>/1 BECH-E112<33>/1	42/CS (HS1941)	GE CR2940	1C003	CB	786	MV	--	--					Y	N	
			42E/CS (HS1941A)	GE CR2940	1C388			MV	--	--					Y	N	
			43 (HS1940A)	GE SB1	1C388			MV	--	--					Y	N	
			LS	Limitorque SMB-0	MO1941			MV	--	--					Y	N	
			TS	Limitorque SMB-0	MO1941			MV	--	--					Y	N	
			42-O, 42-C, 49	Allis-Chalmers, NEMA Size 1, Model 25-111	1B44	RB	757	MCC GERS	ALL	ALL	1.50	1.00	0.35	0.15	Y	Y	
			43-EM206B22	AGASTAT GP	1C422B	RB	757	CA	--	--					Y	N	Chatter of contact does not affect valve position.
			43-206	GE SB1	1C388			MV	--	--					Y	N	
6	RHR/Loop B Drywell Spray Outboard Isolation Valve MO1903	BECH-E121<60>/4 FP-7884-E9-85/4	42/CS (HS1903A)	GE SBM	1C003	CB	785	MV	--	--					Y	N	
			LS, TS	Limitorque SMB-2	MO1903			MV	--	--					Y	N	
			42-O, 42-C, 49	Allis-Chalmers, NEMA Size 1, Model 25-111	1B44	RB	757	MCC GERS	ALL	ALL	1.50	1.00	0.35	0.15	Y	Y	
			E11A-K061B	GE HFA51A	1C033	CB	786	CA	--	--					Y	N	RHR Actuation Circuit. Normal state of valve is closed, and desired state of valve is open. Contact chatter cannot open valve. Contact chatter may briefly delay valve opening. Contacts that affect relay coil will not seal-in due to chatter (Refer to evaluation for SSEL item RHR LOGIC).
			E11A-K059B	GE HFA51A	1C033	CB	786	CA	--	--					Y	N	RHR Actuation Circuit. Normal state of valve is closed, and desired state of valve is open. Contact chatter cannot open valve. Contact chatter may briefly delay valve opening. Contacts that affect relay coil will not seal-in due to chatter (Refer to evaluation for SSEL item RHR LOGIC).
			LS-MO1902	Limitorque SB-2	MO1902			MV	--	--					Y	N	See evaluation for SSEL item 4036A for contacts that affect valve position.

Table 4-3
Duane Arnold Energy Center - Relay Evaluation

SSEL NUMBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGEMENT	ENERGIZE	CAPACITY PSA	CAPACITY IPA	DEMAND PSA	DEMAND IPA	PASS	ESSENT	COMMENTS
4A	RHR/Loop B Drywell Spray Inboard Isolation Valve MO1902	BECH-E121<48>/6	42/CS (HS1902)	GE SBM	1C003	CB	786	MV	--	--					Y	N	Manual control switch
			LS, TS	Limitorque SB-2	MO1902			MV	--	--					Y	N	
			42-G, 42-C, 49	Allis-Chalmers, NEMA Size 1, Model 25-111	1B44	RB	757	MCC GERS	ALL	ALL	1.50	1.00	0.35	0.15	Y	Y	
			E11A-K059B	GE HFA51A	1C033	CB	786	CA	--	--					Y	N	RHR Actuation Circuit. Normal state of valve is closed. Desired state of valve is open. Opening of valve requires manual operator action. Contact chatter will at worst briefly delay a demanded valve opening. Contacts that affect relay coil will not seal-in due to chatter (Refer to evaluation for SSEL item RHR LOGIC).
			E11A-K061B	GE HFA51A	1C033	CB	786	CA	--	--					Y	N	RHR Actuation Circuit. Normal state of valve is closed. Desired state of valve is open. Opening of valve requires manual operator action. Contact chatter will at worst briefly delay a demanded valve opening. Contacts that affect relay coil will not seal-in due to chatter (Refer to evaluation for SSEL item RHR LOGIC).
			E11A-K048B	GE HFA51A	1C033	CB	786	CA	--	--					Y	N	RHR Actuation Circuit. Normal state of valve is closed. Desired state of valve is open. Opening of valve requires manual operator action. Contact chatter will at worst briefly delay a demanded valve opening. Contacts that affect relay coil will not seal-in due to chatter (Refer to evaluation for SSEL item RHR LOGIC).
			LS-MO1903	Limitorque SMB-2	MO1903			MV	--	--					Y	N	See evaluation for SSEL item 4036 for contacts that affect valve position.
7	RHR/Loop B Torus Spray Outboard Isolation Valve MO1932	BECH-E121<49A>/2 FP-7064-E9-05/6 BECH-E121<49B>/0 BECH-E122<4A>/ BECH-E112<31>/1 BECH-E112<33>/1	42/CS (HS1932)	GE CR2940	1C003	CB	786	MV	--	--					Y	N	
			42/CS (HS1932A)	C-H 1025 T16244	1B4427			MV	--	--					Y	N	
			42E/CS (HS1932B)	GE CR2940	1C388			MV	--	--					Y	N	
			43 (HS1909A)	GE SB1	1C388			MV	--	--					Y	N	
			LS, TS	Limitorque SMB-0	MO1932			MV	--	--					Y	N	
			42-G, 42-C, 49	Allis-Chalmers, NEMA Size 1, Model 25-111	1B44	RB	757	MCC GERS	ALL	ALL	1.50	1.00	0.35	0.15	Y	Y	
			E11A-K058B	GE HFA51A	1C033	CB	786	CA	--	--					Y	N	RHR Actuation Circuit. Desired state of valve is open. Contact chatter may briefly delay manual valve opening. Contacts that affect relay coil will not seal-in due to chatter (Refer to evaluation for SSEL item RHR LOGIC).
			K11A-K061B	GE HFA51A	1C033	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.24	0.66	Y	Y	RHR Actuation Circuit. Desired state of valve is open. Contact chatter may close valve. See evaluation for SSEL item RHR LOGIC for contacts that affect relay coil. Normally-open contact only. Coil voltage 125 VDC.

Table 4-2
Duane Arnold Energy Center - Relay Evaluation

SSEL NUMBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGEMENT	ENERGIZE	CAPACITY PSA	CAPACITY EPA	DEMAND PSA	DEMAND EPA	PASS	ESSENT	COMMENTS
			E11A-K064B	GE HFA51A	1C033	CB	786	CA	--	--					Y	N	RHR Actuation Circuit. Desired state of valve is open. Contact chatter cannot close valve. Contacts that affect relay coil will not seal-in due to chatter (Refer to evaluation for SSEL item RHR LOGIC).
			LS-MO1913	Limitorque SMB-00	MO1913			MV	--	--					Y	N	See evaluation for SSEL item 4040 for contacts that affect valve position.
			43-EM104B21	AGASTAT GP	1C422B	RB	757	CA	--	--					Y	N	Contact chatter does not affect valve opening.
			43-206	GE SB1	1C388			MV	--	--					Y	N	
E	RHR/Loop B LPCI Outboard Inject Valve MO1904	BECH-E121<51A>/1 FP-7884-E9-85/4 BECH-E121<51B>/5 BECH-E113<31>/1 BECH-E112<33>/1	42/CS (HS1904)	GE SBM	1C003	CB	786	MV	--	--					Y	N	
			42E/CS (HS1904B)	GE CR2940	1C388			MV	--	--					Y	N	
			43 (HS1904A)	GE SB1	1C388			MV	--	--					Y	N	
			LS, TS	Limitorque SB-4	MO1904			MV	--	--					Y	N	
			42-O, 42-C, 49	Allis-Chalmers, NEMA Size 6, Model 25-114	1B44A	RB	757	MCC GERS	ALL	ALL	1.50	1.00	0.35	0.15	Y	Y	
			E11A-K047A	GE HFA51A	1C032	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.24	0.66	Y	Y	RHR Actuation Circuit. Chatter of NC contact may momentarily interrupt an automatic valve closure. This is acceptable. Chatter of NO contact could cause a closed valve to open. See evaluation for SSEL item RHR LOGIC for contacts that affect relay coil. Coil voltage 125 VDC.
			E11A-K047B	GE HFA11A	1C033	CB	786	RELAY GERS	NO	ALL	8.00	4.80	2.24	0.66	Y	Y	RHR Actuation Circuit. Chatter of NC contact may momentarily interrupt an automatic valve closure. This is acceptable. Chatter of NO contact could cause a closed valve to open. See evaluation for SSEL item RHR LOGIC for contacts that affect relay coil. Coil voltage 125 VDC.
			E11A-K088A	GE HGA11A DC	1C032	CB	786	RELAY GERS	NO	ALL	4.40	1.80	2.24	0.66	Y	Y	RHR Actuation Circuit. See evaluation for SSEL item RHR LOGIC for contacts that affect relay coil. Normally-open contact only. Coil voltage 125 VDC.
			E11A-K088B	GE HGA11A DC	1C033	CB	786	RELAY GERS	NO	ALL	4.40	1.80	2.24	0.66	Y	Y	RHR Actuation Circuit. See table 5-2 for contacts that affect relay coil. Normally-open contact only. Coil voltage 125 VDC.
			E11A-K090B	GE HFA51A	1C033	CB	786	CA	--	--					Y	N	RHR Actuation Circuit. Contact chatter may interrupt a manual valve opening. However, operator initiated valve opening during the period of strong shaking is unlikely. Also, operator has indication of valve position and can complete valve stroke by reapplying open signal. Contacts that affect relay coil will not seal-in due to chatter (Refer to evaluation for SSEL item RHR LOGIC).

Table 6-2
Duane Arnold Energy Center - Relay Evaluation

SSEL NUMBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGEMENT	ENERGIZE	CAPACITY PSA	CAPACITY IPA	DEMAND PSA	DEMAND IPA	PASS	ESSENT	COMMENTS
38			R-3	--	1C360			CA	--	--					Y	N	Contact is wired in series with normally-open seismically-rugged contact.
			42-1904	AGASTAT E7022	1B44A	RB	757	CA	--	--					Y	N	Contact chatter may interrupt a manual valve opening or closing. However, operator initiated valve opening or closing during the period of strong shaking is unlikely. Also, operator has indication of valve position and can complete valve stroke by reapplying open or close signal.
			LS-MO1905	Limitorque SB-4	MO1905			MV	--	--					Y	N	See evaluation for SSEL item 4039 for contacts that affect relay coil.
			43-RM206B24	AGASTAT GP	1C423B	RB	757	RELAY GERS	ALL	ALL	3.30	1.30	1.58	0.68	Y	Y	Normally-open and normally-closed contacts.
			43-206	GE SB1	1C368			MV	--	--					Y	N	
139	RHR/Loop B LPCI Inboard Inject Valve MO1905	BECH-E121<52A>/1 FP-7884-E9-150/4 BECH-E121<53B>/0 BECH-E113<31>/1 BECH-E112<33>/1	42/CS (HS1905A)	GE SBM	1C001	CB	786	MV	--	--					Y	N	
			42E/CS (HS1905C)	GE CR2940	1C388			MV	--	--					Y	N	
			43 (1904A)	GE SB1	1C388			MV	--	--					Y	N	
			LS, TS	Limitorque SB-4	MO1905			MV	--	--					Y	N	
			42-O 42-C, 49	Allis-Chalmers, NEMA Size 1, Model 25-113	1B44A	RB	757	MCC GERS	ALL	ALL	1.50	1.00	0.35	0.15	Y	Y	
			E11A-K043B	GE HFA51A	1C033	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.24	0.66	Y	Y	RHR Actuation Circuit. Chatter of normally-open contact may close an open valve. See evaluation for SSEL item RHR LOGIC for contacts that affect relay coil. Normally-open contact only. Coil voltage 125 VDC.
			E11A-K067A	GE HGA11A DC	1C032	CB	786	RELAY GERS	NO	ALL	4.40	1.80	2.24	0.66	Y	Y	RHR Actuation Circuit. Chatter of normally-open contact may open a closed valve. See evaluation for SSEL item RHR LOGIC for contacts that affect relay coil. Normally-open contact only. Coil voltage 125 VDC.
			E11A-K067B	GE HFA151A	1C033	CB	786	RELAY GERS	ALL	ALL	3.00	1.80	2.24	0.66	Y	Y	RHR Actuation Circuit. Contact chatter may open a closed valve. See evaluation for SSEL item RHR LOGIC for contacts that affect relay coil. Normally-open and normally-closed contacts. Coil voltage 125 VDC.
			E11A-K088A	GE HGA11A DC	1C032	CB	786	RELAY GERS	NO	ALL	4.40	1.80	2.24	0.66	Y	Y	RHR Actuation Circuit. Chatter of normally-open contact may close an open valve. See table 5-2 for contacts that affect relay coil. Normally-open contact only. Coil voltage 125 VDC.
			E11A-K088B	GE HGA11A DC	1C033	CB	786	RELAY GERS	NO	ALL	4.40	1.80	2.24	0.66	Y	Y	RHR Actuation Circuit. Chatter of normally-open contact may close an open valve. See evaluation for SSEL item RHR LOGIC for contacts that affect relay coil. Normally-open contact only. Coil voltage 125 VDC.

Table 6-2
Duane Arnold Energy Center - Relay Evaluation

SSEL MBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGE MENT	ENERGIZE	CAPACITY PSA	CAPACITY ZPA	DEMAND PSA	DEMAND ZPA	PASS	ESSENT	COMMENTS
39			E11A-K090B	GE HFA51A	1C033	CB	786	CA	--	--					Y	N	RHR Actuation Circuit. Chatter may briefly delay manual valve opening. However, operator has indication of valve position. Contacts that affect relay coil will not seal-in due to chatter (Refer to evaluation for SSEL item RHR LOGIC).
			LS-MO1904	Limitorque SB-4	MO1904			MV	--	--					Y	N	See evaluation for SSEL item 4038 for contacts that affect valve position.
			43-KM206B23	AGASTAT GP	1C422E	RB	757	RELAY GERS	ALL	ALL	3.30	1.30	1.58	0.68	Y	Y	Normally-open and normally-closed contacts.
			43-206	GE SB1	1C188			MV	--	--					Y	N	
40	RHR/Loop B Torus Spray Inboard Isolation Valve MO1933	BECH-E121<59A>/3 FP-7884-E9-85/6 APED-E11-007<1>/27	42/CS (HS1933)	GE SBM	1C003	CB	786	MV	--	--					Y	N	
			LS, TS	Limitorque SMB-00	MO1933			MV	--	--					Y	N	
			42-O, 42-C, 49	Allis-Chalmers, NEMA Size 1, Model 25-111	1B44	RB	757	MCC GERS	ALL	ALL	1.50	1.00	0.35	0.15	Y	Y	
			E11A-K059B	GE HFA51A	1C033	CB	786	CA	--	--					Y	N	RHR Actuation Circuit. Normal state of valve is closed, and desired state of valve is open. Contact chatter cannot open valve as contacts are in series with a normally-open seismically-rugged control switch contact. Contacts that affect relay coil will not seal-in due to chatter (Refer to evaluation for SSEL item RHR LOGIC).
			E11A-K046B	GE HFA51A	1C033	CB	786	CA	--	--					Y	N	RHR Actuation Circuit. Normal state of valve is closed, and desired state of valve is open. Contact chatter cannot open valve as contacts are in series with a normally-open seismically-rugged control switch contact. Contacts that affect relay coil will not seal-in due to chatter (Refer to evaluation for SSEL item RHR LOGIC).
			LS-MO1912	Limitorque SMB-0	MO1912			MV	--	--					Y	N	See evaluation for SSEL item 4037 for contacts that affect valve position.
41	RHR/Loop B Torus Return Isolation Valve MO1934	BECH-E121<59B>/3 FP-7884-E9-85/6 BECH-E121<59C>/0 BECH-E112<31>/1 BECH-E112<33>/1 APED-E11-007<1>/27	42/CS (HS1934)	GE SBM	1C003	CB	786	MV	--	--					Y	N	
			42E/CS (HS1934B)	GE CR2940	1C188			MV	--	--					Y	N	
			43 (HS1934A)	GE SB1	1C188			MV	--	--					Y	N	
			LS, TS	Limitorque SMB-2	MO1934			MV	--	--					Y	N	
			42-O, 42-C, 49	Allis-Chalmers, NEMA Size 1, Model 25-111	1B44	RB	757	MCC GERS	ALL	ALL	1.50	1.00	0.35	0.15	Y	Y	
			E11A-K058B	GE HFA51A	1C033	CB	786	RELAY GERS	NO	ALL	4.00	2.40	2.24	0.84	Y	Y	RHR Actuation Circuit. See below for evaluation of NC contact. Coil voltage 125 VDC.
			E11A-K048B	GE HFA51A	1C033	CB	786	CA	--	--					Y	N	RHR Actuation Circuit. Normal state of valve is closed. Contact chatter cannot open valve. Contact chatter may briefly delay manual valve

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Duane Arnold Energy Center - Relay Evaluation

SSEL NBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGEMENT	ENERGIZE	CAPACITY PSA	CAPACITY EPA	DEMAND PSA	DEMAND EPA	PASS	ESSENT	COMMENTS
																	opening. See evaluation for SSEL item RHR LOGIC for contacts that affect relay coil. Coil voltage 125 VDC.
1			LS-MO1912	Limitorque SMB-00	MO1912			NV	--	--					Y	N	See evaluation for SSEL item for contacts that affect valve position.
			LS-MO1920	Limitorque SMB-00	MO1920			NV	--	--					Y	N	See evaluation for SSEL item 4027 for contacts that affect valve position.
			43-KM206B21	AGASTAT GP	1C422B	RB	757	RELAY GERS	ALL	ALL	3.30	1.30	1.58	0.68	Y	Y	Normally-open and normally-closed contacts.
			43-206	GE SB1	1C388			NV	--	--					Y	N	
			E11A-K058B	GE HFA51A	1C033	CB	786	RELAY GERS	NC	E	7.00	2.80	2.24	0.84	Y	Y	RHR Actuation Circuit. See evaluation for SSEL item RHR LOGIC for contacts that affect relay coil. Chatter of NC contact is acceptable, if the relay is deenergized (this would only briefly delay a valve closure). Coil voltage 125 VDC.
2	RHR/Loop A Flow Transmitter FT1971A	APED-E11-007<10>/21 APED-E11-007<12>/13	--	--	--			NA	--	--					Y	N	Not affected by relays.
3	RHR/Loop A Pressure Transmitter PT2032	APED-E11-007<10>/23	--	--	--			NA	--	--					Y	N	Not affected by relays.
4	RHR/Loop B Flow Transmitter FT1971B	APED-E11-007<10A>/3 APED-E11-007<12>/13 APED-E11-007<10>/23	43 (HS1971)	GE SB1	1C392			NV	--	--					Y	N	
5	RHR/Loop B Pressure Transmitter PT1962	APED-E11-007<10A>/3	43 (HS2130)	GE SBM	1C388			NV	--	--					Y	N	
6	RHR/Cross Tie Isolation Valve MO2010	BECH-E121<45A>/4 FP-7884-E9-85/4 BECH-E121<32B>/1 BECH-E112<32>/1	42/CS (HS2010)	GE CR2940	1C003	CB	786	NV	--	--					Y	N	
			42/CS (HS2010A)	Cutler-Hammer 10250T	1B34	RB	786	NV	--	--					Y	N	
			43 (HS2404A)	GE SB1	1C390			NV	--	--					Y	N	
			LS, TS	Limitorque SMB-1	MO2010			NV	--	--					Y	N	
			42-O, 42-C, 49	Allis-Chalmers, NEMA Size 1, Model 25-111	1B34	RB	786	MCC GERS	ALL	ALL	1.50	1.00	0.90	0.55	Y	Y	
			43-KM106A7	AGASTAT EGP	1C422C			CA	--	--					Y	N	Contact chatter does not affect valve position.
			43 (HS2011B)	GE SB1	1C390			NV	--	--					Y	N	
6A	RHR/RHR DRAIN TO WASTE SURGE TANK INBOARD ISOL MO1937	BECH-E122<15>/8 APED-A71-003<12>/15 FP-7884-E10-1//5	42/CS (HS1937)	GE CR2940	1C003	CB	786	NV	--	--					Y	N	Manual control switch
			43	GE SB1	1C388			NV	--	--					Y	N	Manual twylocked switch
			HS1917A	GE CR2940	1C003	CB	786	NV	--	--					Y	N	Manual control switch

Table 6-2
Duane Arnold Energy Center - Relay Evaluation

REL NUMBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGEMENT	ENERGIZE	CAPACITY PSA	CAPACITY IPA	DEMAND PSA	DEMAND IPA	PASS	ESSENT	COMMENTS
6A			HS1937B	GE CR2940	1C033	CB	786	NV	--	--					Y	N	Manual control switch
			LS, TS	Limitorque SMB-000	MO1937			NV	--	--					Y	N	
			42-O, 42-C, 69, 42X-O	ITE Class A21, Revealing, NEMA Size 1	1D42	RB	757	NCC GERS	ALL	ALL	1.50	1.00	0.35	0.15	Y	Y	
			42X-C	--	1D42	RB	757	CA	--	--					Y	N	Normal and desired state of MO1937 is closed. Contacts from this relay do not affect the opening circuit.
			A71B-K018	--	1C042	CB	786	CA	--	--					Y	N	Normal and desired state of MO1937 is closed. Therefore, the chatter of the normally-closed contact in the closing circuit is acceptable. Chatter, or change of state, of the normally-open contacts in the opening circuit is acceptable since they are in series with a normally-open, seismically-rugged control switch (42/CS) contact and relay (42X-O) contact.
			A71B-K050	--	1C042	CB	786	CA	--	--					Y	N	Normal and desired state of MO1937 is closed. Contact does not affect opening coil. Therefore, its chatter, or change of state, is acceptable.
7	CAC/Drywell Temperature (Elevation 830') TR4386L	BECH-E122<20A>/5	--	--	--			NA	--	--					Y	N	Not affected by relays.
8	CAC/Drywell Temperature (Elevation 780') TR4386J	BECH-E122<20>/15	--	--	--			NA	--	--					Y	N	Not affected by relays.
9	CMT/Torus Water Temperature (20-220 Degrees F) TR4324	BECH-E122<19>/20 APED-E11-007<12>/13	--	--	--			NA	--	--					Y	N	Not affected by relays.
0	CMT/Torus Water Temperature (20-220 Degrees F) TR4325	BECH-E122<19D>/1 APED-E11-007<12>/13 BECH-E122<19C>/0	43 (HS4325)	GE SBM	1C392			NV	--	--					Y	N	
1	4160VAC/4160 VAC Essential Switchgear 1A3 Feeder Breaker from Standby Transformer 152-301	BECH-E104<10>/10 BECH-E104<12>/13 BECH-E104<3D>/0 BECH-E103<5>/5 BECH-E104<25A>/3 BECH-K31/21 BECH-E104<25>/14	152-301/CS	GE SBM	1C008	CB	786	NV	--	--					Y	N	
			152-301/SS	GE SBM	1C008	CB	786	NV	--	--					Y	N	
			CS	GE SBM	1A3	CB	757	NV	--	--					Y	N	
			143-3	GE SBM	1C008	CB	786	NV	--	--					Y	N	
			NS 127K/12	GE CR2940	1C151	CB	757	NV	--	--					Y	N	
			186/SB	--	1C031	CB	786	CA	--	--					Y	N	Chatter of contact may trip breaker. This is acceptable, as the emergency diesel generators are relied upon to supply power to bus 1A3 during an A-46 event.
			187/SB1, 187/SB2	--	--			CA	--	--					Y	N	Chatter of contact may trip breaker. This is acceptable, as the emergency diesel generators are relied upon to supply power to bus 1A3 during an A-46 event.

Table 6-2
Duane Arnold Energy Center - Relay Evaluation

SEL NBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGEMENT	ENERGIZE	CAPACITY PSA	CAPACITY IPA	DEMAND PSA	DEMAND IPA	PASS	ESSENT	COMMENTS
			184-3	W 422D96	1A3	CB	757	CA	--	--					Y	N	Chatter of contact may trip breaker. This is acceptable, as the emergency diesel generators are relied upon to supply power to bus 1A3 during an A-46 event.
			151N-302	--	1A3	CB	757	CA	--	--					Y	N	Chatter of contact may trip breaker. This is acceptable, as the emergency diesel generators are relied upon to supply power to bus 1A3 during an A-46 event.
			151-301, 151-302	GE IAC53A	1A3	CB	757	CA	--	--					Y	N	Chatter of contact may trip breaker. This is acceptable, as the emergency diesel generators are relied upon to supply power to bus 1A3 during an A-46 event.
			25-1	--	1C008	CB	786	CA	--	--					Y	N	Contact is in series with normally-open, seismically-rugged control switch. No seal-in contacts affect relay coil.
			127X/32	GE NFA51A	1C351	CB	757	CA	NC	ALL					Y	N	Automatic Load Shed Circuit. Only normally-closed contact could affect a breaker closure operation. As the effect of contact chatter is momentary, it is considered. For contacts that affect relay coil, refer to evaluation for SSEL item LDSHD 1A3.
			127/SB1	--	1A3	CB	757	CA	--	--					Y	N	Chatter of contact may trip breaker. This is acceptable, as the emergency diesel generators are relied upon to supply power to bus 1A3 during an A-46 event.
			127-3	GE HGA14AB	1A3	CB	757	CA	--	--					Y	N	Contact chatter may cause relay 127-3X to chatter. This is acceptable as stated below.
			127-3X	GE NFA151A	1A302	CB	757	CA	--	--					Y	N	Automatic load shed circuit. Contact feeds a relay coil that delays 4.5 seconds before it picks up. Continuous chatter for 4.5 seconds is unlikely. Refer to evaluation for SSEL item LDSHD 1A3 for contacts that affect the coil of this device. Note that relay has 5 NC contacts.
			102-301	AGASTAT 7012	1A3	CB	757	RELAY GERS	ALL	ALL	12.50	7.00	8.30	1.05	Y	Y	
			103-301	GE HGA11J DC	1C008	CB	78:	RELAY GERS	NC	E	10.00	6.00	3.24	0.66	Y	Y	Chatter of energized, normally-closed, HGA contact may cause breaker to close on bus 1A3 when the bus is already being energized by the diesel generator.
			152-302	Mechanically-actuated switch off breaker	1A3	CB	757	MV	--	--					Y	N	See evaluation for SSEL item 6001 (Breaker 152-302) for contacts that affect breaker position.
			152-311	Mechanically-actuated switch off breaker	1A3	CB	757	MV	--	--					Y	N	See evaluation for SSEL item 6001 (Breaker 152-311) for contacts that affect breaker position.
			352-J	Mechanically-actuated switch off breaker	OCB-J			MV	--	--					Y	N	Opening of breaker 352-J due to relay chatter is acceptable. Therefore, contacts that affect breaker position are not evaluated.
			386/ST	WESTINGHOUSE WL	1C031	CB	786	RELAY GERS	ALL	ALL	10.00	6.00	2.24	0.66	Y	Y	Chatter of contacts that affect relay coil is acceptable. Therefore, contacts that affect relay coil are not evaluated.
			152H 75CS 75 152-CL/MS 152-SW/LS 152/IS	--	1A4	CB	757	MV	--	--					Y	N	Mechanically actuated contacts.

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Duane Arnold Energy Center - Relay Evaluation

SSEL NUMBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGEMENT	ENERGIZE	CAPACITY PSA	CAPACITY IPA	DEMAND PSA	DEMAND IPA	PASS	ESSENT	COMMENTS
			152/POR 152/a 152/b PB														
001			152Y	GE HMA, Cat. No. 0137A7575P001	1A4	CB	757	SWGR GERS	ALL	ALL	1.80	1.00	1.18	0.15	Y	Y	Anti-pump relay. Screened using switchgear GERS.
	4160VAC/4160 VAC Essential Switchgear 1A3 Feeder Breaker from Startup Transformer 152-302	BECH-E104<12>/13 BECH-E104<1D>/0 BECH-E104<25A>/3 BECH-E104<25>/14	152-302/CB	GE SBM	1C008	CB	786	MV	--	--					Y	N	
			152-302/BS	GE SBM	1C008	CB	786	MV	--	--					Y	N	
			CS	GE SBM	1A3	CB	757	MV	--	--					Y	N	
			143-3	GE SBM	1C008	CB	786	MV	--	--					Y	N	
			NS 127X/32	GE CR2940	1C351	CB	757	MV	--	--					Y	N	
			186-3	W 422D94	1A3	CB	757	CA	--	--					Y	N	Chatter of contact may trip breaker. This is acceptable, as the emergency diesel generators are relied upon to supply power to bus 1A3 during an A-46 event.
			151N-302	--	1A3	CB	757	CA	--	--					Y	N	Chatter of contact may trip breaker. This is acceptable, as the emergency diesel generators are relied upon to supply power to bus 1A3 during an A-46 event.
			151-301, 151-302	GE IAC53A	1A3	CB	757	CA	--	--					Y	N	Chatter of contact may trip breaker. This is acceptable, as the emergency diesel generators are relied upon to supply power to bus 1A3 during an A-46 event.
			25-1	--	--			CA	--	--					Y	N	Contact is in series with NO seismically-rugged control switch.
			127X/32	GE HFA51A	1C351	CB	757	CA	--	--					Y	N	Automatic Load Shed Circuit. Only normally-closed contact could affect a breaker closure operation. As the affect of relay chatter is only momentary, chatter is acceptable. For contacts that affect relay coil, refer to evaluation for SSEL item LDSHD 1A3.
			127-3	GE HGA14AR	1A3	CB	757	CA	--	--					Y	N	Chatter of contact may delay manual breaker closure. This is acceptable, as the emergency diesel generators are relied upon to supply power to bus 1A3 during an A-46 event.
			127-3X	GE NFA151A	1A302	CB	757	CA	--	--					Y	N	Automatic load shed circuit. Chatter of contact may delay manual breaker closure and an auto-transfer. This is acceptable, as the emergency diesel generators are relied upon to supply power to bus 1A3 during an A-46 event. Refer to evaluation for SSEL item 1A3 for contacts that affect the coil of this device. Note that relay has 5 NC contacts.
			127/ST11	GE HGV11	1C031	CB	786	CA	--	--					Y	N	Chatter of contact may trip breaker. This is acceptable, as the emergency diesel generators are relied upon to supply power to bus 1A3 during an A-46 event.
			127X/ST11	GE NFA151A	1C031	CB	786	CA	--	--					Y	N	Chatter of contact may trip breaker. This is acceptable, as the emergency diesel generators are relied upon to supply power to bus 1A3 during an A-46 event.

Table 4-2
Duane Arnold Energy Center - Relay Evaluation

SSEL NUMBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGEMENT	ENERGIZE	CAPACITY PSA	CAPACITY IPA	DEMAND PSA	DEMAND IPA	PASS	ESSENT	COMMENTS
4001			186/ST	W 422D94	1C031	CB	786	CA	--	--					Y	N	Chatter of contact may trip breaker. This is acceptable, as the emergency diesel generators are relied upon to supply power to bus 1A3 during an A-46 event. Chatter of contacts that affect relay coil is acceptable. Therefore, contacts that affect relay coil are not referenced.
			152-J	Mechanically actuated switch off breaker	OCB-J			NV	--	--					Y	N	Opening of breaker 152-J due to relay chatter is acceptable. Therefore, contacts that affect breaker position are not evaluated.
			152H 75CS 75 152-CL/MS 152-SM/LS 152/IS 152/POS 152/a 152/b PB	--	1A4	CB	757	NV	--	--					Y	N	Mechanically actuated contacts.
			152Y	GE HMA, Cat. No. 0137A7575P001	1A4	CB	757	SWGR GERS	ALL	ALL	1.80	1.00	1.18	0.15	Y	Y	Anti-pump relay. Screened using switchgear GERS.
	4160VAC/4160 VAC Essential Switchgear 1A3 Feeder Breaker from Diesel Generator 152-311	BECH-E106<3>/6 BECH-E106<12>/13 BECH-E106<2>/3 BECH-E21/17 BECH-E23/21 BECH-E106<25>/14 BECH-E106<4>/3	143-3	GE SBM	1C008	CB	786	NV	--	--					Y	N	Manual control switch
			152-311/CS	GE SBM	1C008	CB	786	NV	--	--					Y	N	Manual control switch
			152-311/SS	GE SBM	1C008	CB	786	NV	--	--					Y	N	Manual control switch
			CS	GE SBM	1A3	CB	757	NV	--	--					Y	N	
			186/DG1	WESTINGHOUSE WL	1A311	CB	757	RELAY GERS	ALL	ALL	10.00	6.00	8.30	1.05	Y	Y	Contact chatter may trip breaker.
			187/DG1	ITE 87M	1A311	CB	757	NV	--	--					Y	N	Solid state relay. Contact chatter may trip breaker.
			151V/DG1	GE IJCV51A	1A311	CB	757	RELAY GERS	ALL	ALL	8.00	6.80	8.30	1.05	N	Y	Contact chatter may energize lockout device 186/DG1 and cause breaker to trip.
			132/DG1	GE ICW51A	1A311	CB	757	CDU	ALL	ALL			8.30	1.05	N	Y	Contact chatter may trip breaker.
			152-301, 152-302	Aux. breaker contact	1A3	CB	757	NV	--	--					Y	N	Auxiliary contacts off of rugged breakers. Refer to evaluation for SSEL item 4001 (breakers 152-301 and 152-302) for contacts that affect the status of the breakers.
			186/3	WESTINGHOUSE WL	1A3	CB	757	RELAY GERS	ALL	ALL	10.00	6.00	8.30	1.05	Y	Y	Contact chatter may delay or prevent breaker from closing.
			151-301	GE IAC53A	1A301	CB	757	RELAY GERS	NO	D	7.00	4.20	8.30	1.05	N	Y	Contact chatter may energize lockout device 186-3 and cause breaker to trip.
			151-303	GE IAC53A	1A302	CB	757	RELAY GERS	NO	D	7.00	4.20	8.30	1.05	N	Y	Contact chatter may energize lockout device 186-3 and cause breaker to trip.
			151N-303	GE IAC53A	1A302	CB	757	RELAY GERS	NO	D	7.00	4.20	8.30	1.05	N	Y	Contact chatter may energize lockout device 186-3 and cause breaker to trip.
			159/DG1	GE NGV11C	1A311	CB	757	SWGR GERS	ALL	ALL	1.80	1.00	1.18	0.15	Y	Y	Relay directly affects breaker closing coil. Therefore, switchgear GERS are used to demonstrate seismic adequacy.

Table 6-2
Duane Arnold Energy Center - Relay Evaluation

SSEL NUMBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGEMENT	ENERGIZE	CAPACITY PSA	CAPACITY EPA	DEMAND PSA	DEMAND EPA	PASS	ESSENT	COMMENTS
001			25-1	--	1C008	CB	786	CA	--	--					Y	N	Contact is in series with normally-open, seismically-rugged control switch. No seal-in contacts affect relay coil.
			127-3X	GE HFA151A	1A302	CB	757	RELAY GERS	NC	ALL	3.00	1.80	8.30	1.05	N	Y	Contact chatter may delay breaker closure, if relay is deenergized. Contact chatter may allow diesel generator to be connected to a live bus, if relay is energized. Therefore, chatter is not acceptable for either energized or deenergized state. Refer to Load Shed Circuitry for contacts that affect relay coil (SSEL item LDSHD 1A3). Normally-closed contact only. Coil voltage 125 VDC. Note that relay has 5 NC contacts. Addendum 2 to EPRI NP-7147-SL provides capacity data for HFA151 relays with more than 3 NC contacts.
			102-311	GE HGA14AE	1A1	CB	757	SWGR GERS	NO	ALL	1.80	1.00	1.18	0.15	Y	Y	Relay directly affects breaker closing coil. Therefore, switchgear GERS are used to demonstrate seismic adequacy. Coil Voltage 125 VDC.
			SDR	--	1C117			MV	--	--					Y	N	This contact was evaluated under SSEL line item number 6015 and was determined to be inherently rugged. Refer to evaluation for SSEL item 6015 for contacts that affect relay coil.
			K1B3	ITE A143D (Lighting Contactor)	1C093	TB	757	CON GERS	ALL	ALL	4.50	3.00	4.45	1.37	Y	Y	See SSEL line item number 6015 for contacts that affect the coil of contactor K1.
			ERA	--	1C117			MV	--	--					Y	N	See discussion for contact ESA under SSEL line item number 6015 (DG Starting Logic).
			152H 75CS 7S 152-CL/MS 152-SM/LS 152/TS 152/POS 152/a 152/b PB	--	1A4	CB	757	MV	--	--					Y	N	Mechanically actuated contacts.
			152Y	GE HMA. Cat. No. 0137A7575P001	1A4	CB	757	SWGR GERS	ALL	ALL	1.80	1.00	1.18	0.15	Y	Y	Anti-pump relay. Screened using switchgear GERS.
003	480VAC/Intake Structure 480VAC Load Center 1B09 Supply Breaker 152-312 (Located in 1A3)	BECH-E104<16>/5 BECH-E104<3D>/0	152-312	GE SBN	1C008	CB	786	MV	--	--					Y	N	
			CS	GE SBM	1A3	CB	757	MV	--	--					Y	N	
			150/151-312	GE IAC66B	1A3	CB	757	SWGR GERS	NO	D	1.80	1.00	1.18	0.15	Y	Y	Protective relays screened using switchgear GERS MVS/LVS 7 which specify that contact chatter is acceptable for all devices which directly affect breaker operation without interposing relay logic.
			150G-312	GE PJC11A	1A3	CB	757	SWGR GERS	NO	D	1.80	1.00	1.18	0.15	Y	Y	Protective relays screened using switchgear GERS MVS/LVS 7 which specify that contact chatter is acceptable for all devices which directly affect breaker operation without interposing relay logic.
			Alarm	--	--			CA	--	--					Y	N	

Table 6-2
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ESEL NUMBER	SYSTEM DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGEMENT	ENERGIZE	CAPACITY PSA	CAPACITY IPA	DEMAND PSA	DEMAND IPA	PASS	ESSENT	COMMENTS
003			152H 75CS 75 152-CL/MS 152-SM/LS 152/IS 152/POS 152/a 152/b PB	--	1A3	CB	757	MV	--	--					Y	N	
			152Y	GE HMA, Cat. No. 0137A7575P001	1A3	CB	757	SWGR GERS	ALL	ALL	1.80	1.00	1.18	0.15	Y	Y	Anti-pump relay. Screened using switchgear GERS.
004	48LVAC/Intake Structure 480VAC Motor Control Center 1B91 Supply Breaker 52-903	FP-7884-E8B-20/5 FP-7884-E8B-13/6 FP-7884-E8A-11<I>/4	CLOSE	GE SBM	1B0903	IS	767	MV	--	--					Y	N	
			LS/1, LS/2, LS/3, L/a, L/b	--	1B0903	IS	767	MV	--	--					Y	N	Mechanically actuated contacts.
			Y	GE NFA51A	1B0903	IS	767	SWGR GERS	ALL	ALL	1.80	1.00	1.47	0.24	Y	Y	Anti-pump relay; screened using switchgear GERS.
006	480VAC/Control Building, 480VAC Load Center 1B03 Supply Breaker 152-303	BECH-E104<16>/5 BECH-E104<3D>/6	152-303	GE SBM	1C006	CB	786	MV	--	--					Y	N	
			CS	GE SBM	1A3	CB	757	MV	--	--					Y	N	
			150/151-301	GE IAC66B	1A3	CB	757	SWGR GERS	NO	D	1.80	1.00	1.18	0.15	Y	Y	Protective relays screened using switchgear GERS MVS/LVS 7 which specify that contact chatter is acceptable for all devices which directly affect breaker operation without interposing relay logic.
			150G-303	GE PJC11A	1A3	CB	757	SWGR GERS	NO	D	1.80	1.00	1.18	0.15	Y	Y	Protective relays screened using switchgear GERS MVS/LVS 7 which specify that contact chatter is acceptable for all devices which directly affect breaker operation without interposing relay logic.
			152H 75CS 75 152-CL/MS 152-SM/LS 152/IB 152/POS 152/a 152/b PB	--	1A3	CB	757	MV	--	--					Y	N	Mechanically actuated contacts.
			152Y	GE HMA, Cat. No. 0137A7575P001	1A3	CB	757	SWGR GERS	ALL	ALL	1.80	1.00	1.18	0.15	Y	Y	Anti-pump relay. Screened using switchgear GERS.
007	480VAC/CB 480VAC Essential Motor Control Center 1B32 Supply Breaker 52-301	BECH-E104<22>/4 BECH-E104<17>/3 FP-7884-E8-11<1>/4 FP-7884-E8-11<2>/4	52-301	GE SBM	1C006	CB	786	MV	--	--					Y	N	
			CLOSE	GE SBM	1B03	CB	757	MV	--	--					Y	N	
			LS L/a L/b	--	1B03	CB	757	MV	--	--					Y	N	Mechanically actuated contacts

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Duane Arnold Energy Center - Relay Evaluation

SSEL NUMBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGEMENT	ENERGIZE	CAPACITY PSA	CAPACITY IPA	DEMAND PSA	DEMAND IPA	PASS	ESSENT	COMMENTS
007			Y	GE HFA51A	1B03	CB	757	SWGR GERS	ALL	ALL	1.80	3.00	1.15	0.15	Y	Y	Anti-pump relay. Screened using switchgear GERS.
009	480VAC/RB 786' Level 480VAC Motor Control Center 1B34 Supply Breaker 52-303	BECH-E104<12A>/1 BECH-E104<17A>/1 BECH-E104<22B>/0	52-303/CS	GE SBM	1C008	CB	786	MV	--	--					Y	N	
			52-303E/CS	GE SBM	1C190			MV	--	--					Y	N	
			52-303/SS	GE SB1	1C390			MV	--	--					Y	N	
			CLOSE	GE SBM	1B03	CB	757	MV	--	--					Y	N	
			LS L/a L/b	--	1B03	CB	757	MV	--	--					Y	N	Mechanically actuated contacts.
			Y	GE HFA51A	1B03	CB	757	SWGR GERS	ALL	ALL	1.80	1.00	1.10	0.15	Y	Y	Anti-pump relay. Screened using switchgear GERS.
010	480VAC/RB 786' Level 480VAC Motor Control Center 1B34A Supply Breaker 52-3401	FP-7886-E009-282/0 BECH-E006<1>/30 BECH-E104<21>/32 BECH-E104<21A>/3 BECH-E104<22B>/0	52-3401	GE SBM	1C008	CB	786	MV	--	--					Y	N	Manual control switch.
			52-3401E	GE SBM	1C390			MV	--	--					Y	N	Manual control switch.
			52-303/SS	GE SB1	1C390			MV	--	--					Y	N	Manual keylocked switch.
			CS	GE SBM	1B34	RS	786	MV	--	--					Y	N	Manual control switch.
			52-3401X	--	--			CA	--	--					Y	N	If breaker is open, contact chatter could delay momentarily breaker closure. This is considered acceptable.
			XY3401	--	--			CA	--	--					Y	N	If breaker is open, contact chatter could delay momentarily breaker closure. Contact chatter cannot cause breaker to close on a live bus because it is in series with mechanically-actuated, seismically rugged contact 52-4401/B. If breaker is closed, contact chatter could trip breaker, resulting in a momentary loss of power to busses 1B34A, 1B44A and 1B37. This is considered acceptable, because SSEL loads on these busses do not require power during the period of strong ground motion.
			27-3	--	--			CA	--	--					Y	N	If breaker is open, contact chatter could delay momentarily breaker closure. Contact chatter cannot cause breaker to close on a live bus because it is in series with mechanically-actuated, seismically rugged contact 52-4401/B. If breaker is closed, contact chatter could trip breaker, resulting in a momentary loss of power to busses 1B34A, 1B44A and 1B37. This is considered acceptable, because SSEL loads on these busses do not require power during the period of strong ground motion.
			52-303	--	1B03	CB	757	MV	--	--					Y	N	Seismically-rugged, mechanically actuated contacts on breaker 152-303. Refer to SSEL item number 4006 for contacts that affect breaker position.

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Duane Arnold Energy Center - Relay Evaluation

SSEL NUMBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGEMENT	ENERGIZE	CAPACITY PSA	CAPACITY IPA	DEMAND PSA	DEMAND IPA	PASS	ESSENT	COMMENTS
010			52-3401/POS LS L	--	1B34	RB	786	MV	--	--					Y	N	Seismically-rugged, mechanically actuated contacts.
			Y	GE HFA51A	1B14	RB	786	SWGR GERS	ALL	ALL	1.80	1.00	0.90	0.15	Y	Y	Anti-pump relay. Screened using switchgear GERS
			52-6401	--	1B44	RB	757	MV	--	--					Y	N	Seismically-rugged, mechanically-actuated contacts. Refer to SSEL line item 6059 for contacts that affect breaker position.
			27-3401	--	--			CA	--	--					Y	N	Contact chatter could cause breaker to trip. This is considered acceptable (see above).
			EY4401	--	--			CA	--	--					Y	N	Contact affects breaker closing circuit. Therefore, if breaker is closed, contact chatter has no effect. Chatter is acceptable, if breaker is open, because contact is in series with an open contact (52-4401/b) which is seismically-rugged.
	480VAC/RB 786' Level 480VAC Motor Control Center 1B34A Supply Breaker 52-3401	BECH-E006<1>/20	--	--	--			NA	--	--					Y	N	Manual breaker. Not affected by relays.
012	480VAC/Pump House 480VAC Motor Control Center 1B36 Supply Breaker 52-3226	BECH-E105<12>/17 FP-7884-E9-5/6	--	--	--			NA	--	--					Y	N	Manual Breaker, not affected by relays.
015	SBDG/Diesel Generator, Emer AC PWR to 1A3 1G011 Starting and Engine Shutdown Logic	FP-M015-006<1>/16	LOOP	--	--			CA	--	--					Y	N	Chatter of this contact or the contacts controlling it could result in automatic start of the diesel generator. This is considered acceptable because to diesel generator breaker is prevented from automatic closure unto the 4 kV bus if either of the offsite power source breakers is closed; see evaluation of SSEL line item 6001.
			127-31	--	--			CA	--	--					Y	N	See note for contact LOOP, above.
			ESS (E21-K011A)	--	--			CA	--	--					Y	N	See note for contact LOOP, above.
			CS/DG1	GE SBM	1C008	CB	786	MV	--	--					Y	N	Manual control switch
			CS/DG31	GE SBM	1C093	TB	757	MV	--	--					Y	N	Manual control switch
			ESA	--	1C117			MV	--	--					Y	N	This device is located inside an enclosure mounted on the diesel skid. Therefore, this device is routinely exposed to high vibration during engine operation and is considered inherently rugged in accordance with the guidance of the SSRAP Report SAND-92-0140 UC52, "Use of Seismic Experience and Test Data to Show Ruggedness of Equipment in Nuclear Power Plants", February 28, 1991
			ESB	--	1C117			MV	--	--					Y	N	See note for contact ESA, above.
			SDR	--	1C117			MV	--	--					Y	N	See note for contact ESA, above.
			LSA	--	1C117			MV	--	--					Y	N	See note for contact ESA, above.
			LSB	--	1C117			MV	--	--					Y	N	See note for contact ESA, above.
			4A	--	1C117			MV	--	--					Y	N	See note for contact ESA, above.

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Duane Arnold Energy Center - Relay Evaluation

SSEL NUMBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGEMENT	ENERGIZE	CAPACITY PSA	CAPACITY IPA	DEMAND PSA	DEMAND IPA	PASS	ESSENT	COMMENTS
6015			4B	--	1C117			NV	--	--					Y	N	See note for contact ESA, above.
			5A	--	1C117			NV	--	--					Y	N	See note for contact ESA, above.
			5	--	1C117			NV	--	--					Y	N	See note for contact ESA, above.
			186/DG1	ITE 87M	1A3	CB	757	--	--	--					Y	N	Chatter of this lockout relay or of the protective relays controlling could prevent the diesel starting on demand. The contacts associated with this device and the devices controlling it are evaluated with SSEL line item 6001.
			ES3237A	--	1G31 skid			NV	--	--					Y	N	1. Diesel-generator skid mounted speed sensor switch. 2. This device is routinely exposed to high vibration during engine operation and therefore is considered inherently rugged in accordance with the guidance of the SSRAP Report SAND-92-0140 UC52, 'Use of Seismic Experience and Test Data to Show Ruggedness of Equipment in Nuclear Power Plants', February 28, 1991
			PS3242A	--	1G31 skid			NV	--	--					Y	N	1. Diesel-generator skid mounted pressure switch. 2. See Note 2, above, for contact SS3237A.
			PS3234A	--	1G31 skid			NV	--	--					Y	N	1. Diesel-generator skid mounted pressure switch. 2. See Note 2, above, for contact SS3237A.
			PS3241A	--	1G31 skid			NV	--	--					Y	N	1. Diesel-generator skid mounted pressure switch. 2. See Note 2, above, for contact SS3237A.
			CW	--	1C117			NV	--	--					Y	N	See note for contact ESA, above.
			OP1	--	1C117			NV	--	--					Y	N	See note for contact ESA, above.
			OP2	--	1C117			NV	--	--					Y	N	1. See note for contact ESA, above. 2. This device is routinely exposed to high vibration during engine operation and therefore is considered inherently rugged in accordance with the guidance of the SSRAP Report SAND-92-0140 UC52, 'Use of Seismic Experience and Test Data to Show Ruggedness of Equipment in Nuclear Power Plants', February 28, 1991
			OP3	--	1C117			NV	--	--					Y	N	See note for contact ESA, above.
			PS3243A	--	1G31 skid			NV	--	--					Y	N	1. Diesel-generator skid mounted pressure switch. 2. See Note 2, above, for contact SS3237A.
			PS3244A	--	1G31 skid			NV	--	--					Y	N	1. Diesel-generator skid mounted pressure switch. 2. See Note 2, above, for contact SS3237A.
			CP1	--	1C117			NV	--	--					Y	N	See note for contact ESA, above.
			CP2	--	1C117			NV	--	--					Y	N	See note for contact ESA, above.
			CP3	--	1C117			NV	--	--					Y	N	See note for contact ESA, above.
			PS3235A	--	1G31 skid			NV	--	--					Y	N	1. Diesel-generator skid mounted pressure switch. 2. See Note 2, above, for contact SS3237A.
			PS3236A	--	1G31 skid			NV	--	--					Y	N	1. Diesel-generator skid mounted pressure switch. 2. See Note 2, above, for contact SS3237A.

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SSEL NUMBER	SYSTEM DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGEMENT	ENERGIZE	CAPACITY PSA	CAPACITY IPA	DEMAND PSA	DEMAND IPA	PASS	ESSENT	COMMENTS
015			CC1	--	1C117			NV	--	--					Y	N	See note for contact ESA, above.
			CC2	--	1C117			NV	--	--					Y	N	See note for contact ESA, above.
			CC3	--	1C117			NV	--	--					Y	N	See note for contact ESA, above.
			PS3247A	--	1G31 skid			NV	--	--					Y	N	1. Diesel-generator skid mounted pressure switch. 2. See Note 2, above, for contact SS3237A.
			PS3248A	--	1G31 skid			NV	--	--					Y	N	1. Diesel-generator skid mounted pressure switch. 2. See Note 2, above, for contact SS3237A.
			PS3249A	--	1G31 skid			NV	--	--					Y	N	1. Diesel-generator skid mounted pressure switch. 2. See Note 2, above, for contact SS3237A.
			EOR	--	1C117			NV	--	--					Y	N	See note for contact ESA, above.
			EOS (IC3236A)	--	11G31 skid			NV	--	--					Y	N	1. This device is located on the diesel skid. 2. See Note 2, above, for contact SS7237A.
			T2A	--	1C117			NV	--	--					Y	N	See note for contact ESA, above.
			T2B	--	1C117			NV	--	--					Y	N	See note for contact ESA, above.
	SBDG/Diesel Generator, Emer AC PWR to 1A3	FP M015-015<4>/8 FP M015-015<1>/8	CSLR	GE SBM	1C093	TB	757	NV	--	--					Y	N	Manual remote/local control switch
	1G031																
	Exciter/Voltage Regulator																
			AVR/L (LOCAL)	GE SBM	1C093	TB	757	NV	--	--					Y	N	Manual voltage control switch.
			AVR/L (REMOTE)	GE SBM	1C008	CB	786	NV	--	--					Y	N	Manual voltage control switch.
			VRMA	GE SBM	1C008	CB	786	NV	--	--					Y	N	Voltage regulator manual/automatic selector switch.
			40	WESTINGHOUSE D-3	1C093	TB	757	CA	--	--					Y	N	Loss of field relay; affects annunciator only.
			64	WESTINGHOUSE DGF	1C093	TB	757	CA	--	--					Y	N	Field ground detector relay; affects annunciator only.
			76	WESTINGHOUSE D-3	1C093	TB	757	CA	--	--					Y	N	Field overcurrent relay; affects annunciator only.
			47	GE 12ICR53C1A	1C093	TB	757	CA	--	--					Y	N	Single phasing relay; affects annunciator only.
			GMS	GE SBM	1C093	TB	757	NV	--	--					Y	N	Governor mode select switch.
			ERA	--	1C117			NV	--	--					Y	N	See note for contact ESA under SSEL line item number 6015 (DG Starting Logic).
			ERB	--	1C117			NV	--	--					Y	N	See note for contact ESA under SSEL line item number 6015 (DG Starting Logic).
			LSB	--	1C117			NV	--	--					Y	N	This contact was evaluated under SSEL line item number 6015 (DG Starting Logic) and was determined to be inherently rugged.

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SSEL NUMBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGEMENT	ENERGIZE	CAPACITY PSA	CAPACITY IPA	DEMAND PSA	DEMAND IPA	PASS	ESSENT	COMMENTS
6015			LSA	--	1C117			MV	--	--					Y	N	This contact was evaluated under SSEL line item number 6015 (DG Starting Logic) and was determined to be inherently rugged.
			5A	--	1C117			MV	--	--					Y	N	This contact was evaluated under SSEL line item number 6015 (DG Starting Logic) and was determined to be inherently rugged.
			K1	ITE A143D (Lighting Contactor)	1C093	TB	757	CON GERS	ALL	ALL	4.50	3.00	4.45	1.37	Y	Y	
			K2	ITE A133D (Lighting Contactor)	1C093	TB	757	CON GERS	ALL	ALL	4.50	3.00	4.45	1.37	Y	Y	
			K3	ROMAN 2190	1C093	TB	757	LEVEL 1	ALL	ALL	9.00	5.40			Y	Y	
			K4	ROMAN 2150	1C093	TB	757	LEVEL 1	ALL	ALL	9.00	5.40			Y	Y	
			S1	Electro Switch Corp. Part No. 105908LE	1C093	TB	757	MV	--	--					Y	N	Manual transfer switch
			Exciter Reset	GE SBM	1C093	TB	757	MV	--	--					Y	N	Manual pushbutton switch
			Exciter Shutdown	GE SBM	1C093	TB	757	MV	--	--					Y	N	Manual pushbutton switch
	SBDG/Diesel Generator, Emer AC PWR to 1A3 1G031 Governor Control Logic	FP-M015-015<1>/8 FP-M015-015<2>/8 FP-M015-015<4>/5 BECH-E080/11	GCS	GE SBM	1C093	TB	757	MV	--	--					Y	N	Local speed adjust - manual control switch
			CSLR	GE SBM	--			MV	--	--					Y	N	Remote/Local transfer switch
			GCS (190-DG1/CS)	GE SBM	1C008	CB	786	MV	--	--					Y	N	Remote speed adjust - manual control switch
			GMS	GE SBM	1C093	TB	757	MV	--	--					Y	N	Governor mode switch
			52a	--	1A3	CB	757	MV	--	--					Y	N	Mechanically actuated contact on 4160 VAC switchgear breaker.
4050	4160VAC/4160 VAC Essential Switchgear 1A4 Feeder Breaker from Standby Transformer 152-401	BECH-E104<11>/10 BECH-E104<11A>/2 BECH-E104<11B>/0 BECH-E104<12F>/0 BECH-E104<24A>/4 BECH-E103<5>/5 BECH-E104<4>/3 BECH-E23A<1>/2 BECH-E104<24>/15	152-401/CS	GE SBM	1C008	CB	786	MV	--	--					Y	N	
			152-401E/CS	GE SBM	1C306			MV	--	--					Y	N	
			152-401/SS	GE SBM	1C008	CB	786	MV	--	--					Y	N	
			152-401A/SS	GE SB1	1C388			MV	--	--					Y	N	
			CS	GE SBM	1A3	CB	757	MV	--	--					Y	N	
			143-4	GE SBM	1C008	CB	786	MV	--	--					Y	N	
			HS 127X/42	GE CR2940	1C351	CB	757	MV	--	--					Y	N	
			186/SB	--	1C031	CB	786	CA	--	--					Y	N	Chatter of contact may trip breaker. This is acceptable, as the emergency diesel generators are relied upon to supply power to bus 1A4

Table 4-2
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SSEL NUMBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGEMENT	ENERGIZE	CAPACITY PSA	CAPACITY IPA	DEMAND PSA	DEMAND IPA	PASS	ESSENT	COMMENTS
																	during an A-46 event.
6050			187/SB1, 187/SB2	--	--			CA	--	--					Y	N	Chatter of contact may trip breaker. This is acceptable, as the emergency diesel generators are relied upon to supply power to bus 1A4 during an A-46 event.
			184-4	W 422D94	1A4	CB	757	CA	--	--					Y	N	Chatter of contact may trip breaker. This is acceptable, as the emergency diesel generators are relied upon to supply power to bus 1A4 during an A-46 event.
			151M-402	--	1A4	CB	757	CA	--	--					Y	N	Chatter of contact may trip breaker. This is acceptable, as the emergency diesel generators are relied upon to supply power to bus 1A4 during an A-46 event.
			151-401, 151-402	GE IAC53A	1A4	CB	757	CA	--	--					Y	N	Chatter of contact may trip breaker. This is acceptable, as the emergency diesel generators are relied upon to supply power to bus 1A4 during an A-46 event.
			25-2 and other synchronization contacts	--	1C008	CB	786	CA	--	--					Y	N	Contact is in series with normally-open, seismically-rugged control switch. No seal-in contacts affect relay coil.
			127X/42	GE HFA51A	1C352	CB	757	CA	ALL	ALL					Y	N	Automatic load shed circuit. Only NC contact could affect a breaker closure operation. As the effect of contact chatter is momentary, it is considered acceptable. For contacts that affect relay coil, refer to evaluation for SSEL item LDSHD 1A4.
			143-1A4/SS	GE SB1	1C108			HV	--	--					Y	N	
			127/SB2	--	1A4	CB	757	CA	--	--					Y	N	Chatter of contact may trip breaker. This is acceptable, as the emergency diesel generators are relied upon to supply power to bus 1A4 during an A-46 event.
			127-4	GE HGA14AR	1A4	CB	757	CA	--	--					Y	N	Contact chatter may affect relay 127-4X. Chatter of this contact is acceptable as discussed below.
			127-4X	GE HFA151A	1A402	CB	757	CA	--	--					Y	N	Automatic Load Shed Circuit. Contact feeds a relay coil that delays 4.5 seconds before it picks up. Continuous contact chattar of this duration is unlikely. Refer to evaluation for SSEL item LDSHD 1A4 for contacts that affect the coil of this device. Note that relay has 5 NC contacts.
			102-401	AGASTAT 7012	1A4	CB	757	RELAY GERS	ALL	ALL	12.50	7.00	8.30	1.05	Y	Y	
			103-401	GE HGA11J DC	1C008	CB	786	RELAY GERS	NC	E	10.00	4.00	2.24	0.66	Y	Y	Chatter of energized, normally-closed, HGA contact may cause breaker to close on bus 1A4 when the bus is already being energized by the diesel generator.
			152-402	Mechanically-actuated contact off breaker.	1A4	CB	757	HV	--	--					Y	N	See evaluation of SSEL item 6050 (Breaker 152-402) for contacts that affect breaker position.
			152-411	Mechanically-actuated contact off breaker.	1A4	CB	757	HV	--	--					Y	N	See evaluation for SSEL item 6050 (Breaker 152-411) for contacts that affect breaker position.
			352-J	Mechanically-actuated contact off breaker.	OCB-J			HV	--	--					Y	N	Opening of breaker 352-J due to relay chatter is acceptable. Therefore, contacts that affect breaker position are not evaluated.

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SSEL NUMBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGEMENT	ENERGIZE	CAPACITY PSA	CAPACITY IPA	DEMAND PSA	DEMAND IPA	PASS	ESSENT	COMMENTS
050			186/ST	WESTINGHOUSE WC	1C031	CB	786	RELAY GERS	ALL	ALL	10.00	6.00	2.26	0.66	Y	Y	Chatter of contacts that affect relay coil is acceptable. Therefore, contacts that affect relay coil are not evaluated.
			152N 75CS 75 152-CL/MS 152-SM/LS 152/IS 152/POS 152/a 152/b PB	--	1A4	CB	757	MV	--	--					Y	N	Mechanically actuated contacts.
			152Y	GE HMA, Cat. No. 0137A7575P001	1A4	CB	757	SMGR GERS	ALL	ALL	1.80	1.00	1.18	0.15	Y	Y	Anti-pump relay. Screened using switchgear GERS.
	4160VAC/4160 VAC Essential Switchgear 1A6 Feeder Breaker from Startup Transformer 152-402	BECH-E104<13>/12 BECH-E104<13A>/3 BECH-E104<11B>/0 BECH-E104<22F>/0 BECH-E104<28A>/4 BECH-E104<4>/3 BECH-E104<36>/15 BECH-E104<3D>/0 BECH-E104<25A>/3 BECH-E104<35>/14	152-402/CS	BM	1C008	CB	786	MV	--	--					Y	N	
			152-402/SS	GE SBM	1C008	CB	786	MV	--	--					Y	N	
			152-402E/CS	GE SBM	1C389			MV	--	--					Y	N	
			152-401A/SS	GE SB1	1C389			MV	--	--					Y	N	
			CS	GE SBM	1A4	CB	757	MV	--	--					Y	N	
			143-4	GE SBM	1C004	CB	786	MV	--	--					Y	N	
			NS 127X/42	GE CR2940	1C352	CB	757	MV	--	--					Y	N	
			186-4	W 422D96	1A4	CB	757	CA	--	--					Y	N	Chatter of contact may trip breaker. This is acceptable, as the emergency diesel generators are relied upon to supply power to bus 1A4 during an A-46 event.
			151N-402	GE IAC53A	1A4	CB	757	CA		--					Y	N	Chatter of contact may trip breaker. This is acceptable, as the emergency diesel generators are relied upon to supply power to bus 1A4 during an A-46 event.
			151-401, 151-402	GE IAC53A	1A4	CB	757	CA	--	--					Y	N	Chatter of contact may trip breaker. This is acceptable, as the emergency diesel generators are relied upon to supply power to bus 1A4 during an A-46 event.
			25-2 and other synchronization contacts	--	1C008	CB	786	CA	--	--					Y	N	Contact is in series with normally-open, seismically-rugged control switch. No seal-in contacts affect re ay coil.
			127X/42	GE HFA51A	1C352	CB	757	CA	--	--					Y	N	Automatic Load Shed Circuit. Only NC contact could affect a breaker closure operation. As the effect of chatter is momentary, it is considered acceptable. For contacts that affect relay coil, refer to evaluation for SSEL item LDSHD 1A4 for contacts that affect the coil of this device.
			127-4	GE HGA16AR	1A1	CB	757	CA	--	--					Y	N	Chatter of contact may delay manual breaker closure. This is acceptable, as the emergency diesel generators are relied upon to supply power to bus 1A4 during an A-46 event.

Table 4-2
Duane Arnold Energy Center - Relay Evaluation

SSEL NUMBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGEMENT	ENERGIZE	CAPACITY PSA	CAPACITY ZPA	DEMAND PSA	DEMAND ZPA	PASS	ESSENT	COMMENTS
650			127-4X	GE HFA151A	1A402	CB	757	CA	--	--					Y	N	Automatic Load Shed Circuit. Chatter of contact may delay manual breaker closure. This is acceptable, as the emergency diesel generators are relied upon to supply power to bus 1A4 during an A-46 event. Refer to evaluation for SSEL item LDSHD 1A4 for contacts that affect the coil of this device. Note that relay has more than 5 NC contacts.
			127/ST13	GE NGV11	1C031	CB	786	CA	--	--					Y	N	Chatter of contact may trip breaker. This is acceptable, as the emergency diesel generators are relied upon to supply power to bus 1A4 during an A-46 event.
			127X/ST13	GE HFA151A	1C031	CB	786	CA	--	--					Y	N	Chatter of contact may trip breaker. This is acceptable, as the emergency diesel generators are relied upon to supply power to bus 1A4 during an A-46 event.
			386/ST	W 422D94	1C031	CB	786	CA	--	--					Y	N	Chatter of contact may trip breaker. This is acceptable, as the emergency diesel generators are relied upon to supply power to bus 1A4 during an A-46 event. Chatter of contacts that affect relay coil is acceptable. Therefore, contacts that affect relay coil are not referenced.
			352-J	Mechanically-actuated contact off breaker.	GCB-J			NV	--	--					Y	N	Opening of breaker 352-J due to relay chatter is acceptable. Therefore, contacts that affect breaker position are not evaluated.
			152H 75CS 75 152-CL/MS 152-SW/LS 152/IS 152/POS 152/a 152/b PB	--	1A4	CB	757	NV	--	--					Y	N	Mechanically actuated contacts.
			152Y	GE HMA, Cat. No. 0137A7575P001	1A4	CB	757	SWGR GERS	ALL	ALL	1.80	1.00	1.18	0.15	Y	Y	Anti-pump relay. Screened using switchgear GERS
	4160VAC/4160 VAC Essential Switchgear 1A4 Power Breaker from Diesel Generator 152-411	BECH-E106<4>/7 BECH-E106<4A>/2 BECH-E106<13>/12 BECH-E106<13A>/2 BECH-E106<2>/3 BECH-E21/17 BECH-E13/21 BECH-E106<26>/15 BECH-E106<4>/3 BECH-E106<22P>/0	143-4	GE SBM	1C008	CB	786	NV	--	--					Y	N	Manual control switch
			152-411/CS	GE SBM	1C008	CB	786	NV	--	--					Y	N	Manual control switch
			152-411/SS	GE SBM	1C008	CB	786	NV	--	--					Y	N	Manual control switch
			CS	GE SBM	1A3	CB	757	NV	--	--					Y	N	
			152-411E/CS	GE SBM	1C388			NV	--	--					Y	N	Manual control switch.
			43 (52-403/SS)	GE SB1	1C388			NV	--	--					Y	N	Manual keylocked switch.
			186/DG2	WESTINGHOUSE WL	1A611	CB	757	RELAY GERS	ALL	ALL	10.00	6.00	8.30	1.05	Y	Y	Contact chatter may trip breaker.
			187/DG2	ITE 87M	1A611	CB	757	NV	--	--					Y	N	Solid state relay. Contact chatter may trip breaker

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Duane Arnold Energy Center - Relay Evaluation

SSEL NUMBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGEMENT	ENERGIZE	CAPACITY PSA	CAPACITY IPA	DEMAND PSA	DEMAND IPA	PASS	ESSENT	COMMENTS
4050			151V/DG2	GE IJCV51A	1A411	CB	757	RELAY GERS	ALL	ALL	8.00	4.80	8.30	1.05	N	Y	Contact chatter may energize lockout device 186/DG2 and cause breaker to trip.
			132/DG2	GE ICM51A	1A411	CB	757	CDU	ALL	ALL			8.30	1.05	N	Y	Contact chatter may trip breaker.
			152-401, 152-402	Aux. breaker contact	1A4	CB	757	MV	--	--					Y	N	Auxiliary contacts off of rugged breakers. Refer to evaluations for SSEL item 4050 for contacts that affect the status of breakers 152-401 and 152-402.
			186/4	WESTINGHOUSE WL	1A4	CB	757	RELAY GERS	ALL	ALL	10.00	4.00	8.30	1.05	Y	Y	Contact chatter may delay or prevent breaker from closing.
			151-401	GE IAC53A	1A401	CB	757	RELAY GERS	NO	D	7.00	4.20	8.30	1.05	N	Y	Contact chatter may energize lockout device 186-3 and cause breaker to trip.
			151-403	GE IAC53A	1A402	CB	757	RELAY GERS	NO	D	7.00	4.20	8.30	1.05	N	Y	Contact chatter may energize lockout device 186-3 and cause breaker to trip.
			151N-402	GE IAC53A	1A402	CB	757	RELAY GERS	NO	D	7.00	4.20	8.30	1.05	N	Y	Contact chatter may energize lockout device 186-3 and cause breaker to trip.
			159/DG2	GE NGV11C	1A411	CB	757	SWGR GERS	ALL	ALL	1.80	1.00	1.18	0.15	Y	Y	Relay directly affects breaker closing coil. Therfore, switchgear GERS are used to demonstrate seismic adequacy.
			25-1	--	1A4	CB	757	CA	--	--					Y	N	Contact is in series with normally-open, seismically-rugged control switch. No seal-in contacts affect relay coil.
			127-4X	GE HFA151A	1A402	CB	757	RELAY GERS	NC	ALL	3.00	1.80	8.30	1.05	N	Y	Contact chatter may delay breaker closure, if relay is deenergized. Contact chatter may allow diesel generator to be connected to a live bus. Therefore, contact chatter is not acceptable for either the energized or deenergized state. Refer to Load Shed Circuitry for contacts that affect relay coil (SSEL item LOSHD 1A4). Normally-closed contact only. Coil voltage 125 VDC. Note that relay has 5 NC contacts. Addendum 2 to EPRI NP-7147-SL provides capacity data for HFA151A relays with more than 3 NC contacts.
			102-411	GE NGA14AK	1A4	CB	757	SWGR GERS	NO	ALL	1.80	1.00	1.18	0.15	Y	Y	Relay directly affects breaker closing coil. Therfore, switchgear GERS are used to demonstrate seismic adequacy. Coil voltage 125 VDC.
			SDR	--	1C118			MV	--	--					Y	N	This contact was evaluated under SSEL line item number 4063 and was determined to be inherently rugged. Refer evaluation for SSEL item 4063 for contacts that affect relay coil.
			K1B3	ITE A143D (Lighting Contactor)	1C094	YB	757	CON GERS	ALL	ALL	4.50	3.00	8.45	1.37	Y	Y	See SSEL line item number 4063 for contacts that affect the coil of contactor K1.
			ERA	--	1C118			MV	--	--					Y	N	See discussion for contact ESA under SSEL line item number 4063 (DG Starting Logic).
			152H 75CS 75 152-CL/MS 152-SN/LB 152/1S 152/POS 152/a 152/b PB	--	1A4	CB	757	MV	--	--					Y	N	Mechanically actuated contacts.

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Duane Arnold Energy Center - Relay Evaluation

SSEL NUMBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGEMENT	ENERGIZE	CAPACITY PSA	CAPACITY IPA	DEMAND PSA	DEMAND IPA	PASS	ESSENT	COMMENTS
1050			152Y	GE HMA, Cat. No. 0137A7575P001	1A4	CB	757	SWGR GERS	ALL	ALL	1.80	1.00	1.18	0.15	Y	Y	Anti-pump relay. Screened using switchgear GERS.
1052	480VAC/Intake Structure 480VAC Load Center 1B20 Supply Breaker 152-412 (Located in 1A4)	BECH-E104<16C>/1 BECH-E104<16E>/0 BECH-E104<16D>/0	152-412/CS	GE SBM	1C008	CB	786	MV	--	--					Y	N	
			152-412E/CS	GE SBM	1C388			MV	--	--					Y	N	
			152-412/SS	GE SB1	1C388			MV	--	--					Y	N	
			CS	GE SBM	1A4	CB	757	MV	--	--					Y	N	
			150/151-412	GE IAC66B	1A4	CB	757	SWGR GERS	NO	D	1.80	1.00	1.18	0.15	Y	Y	Protective relays screened using switchgear GERS MVS/LVS 7 which specify that contact chatter is acceptable for all devices which directly affect breaker operation without interposing relay logic.
			150G-412	GE PJC11A	1A4	CB	757	SWGR GERS	NO	D	1.80	1.00	1.18	0.15	Y	Y	Protective relays screened using switchgear GERS MVS/LVS 7 which specify that contact chatter is acceptable for all devices which directly affect breaker operation without interposing relay logic.
			152H 75CS 75 152-CL/HS 152-SM/LS 152/IS 152/POS 152/a 152/b PB	--	1A4	CB	757	MV	--	--					Y	N	Mechanically actuated contacts.
			152Y	GE HMA, Cat. No. 0137A7575P001	1A4	CB	757	SWGR GERS	ALL	ALL	1.80	1.00	1.18	0.15	Y	Y	Anti-pump relay. Screened using switchgear GERS.
1053	480VAC/Intake Structure 480VAC Motor Control Center 1B21 Supply Breaker 52-2003	FP-7884-E8B-20/5 FP-7884-E8B-13/6 FP-7884-E8A-11<1>/4	CLOSE	GE SBM	1B2003	IS	767	MV	--	--					Y	N	
			LS/1, LS/3, LS/3, L/a, L/b	--	1B2003	IS	767	MV	--	--					Y	N	Mechanically actuated contacts.
			Y	GE HFA51A	1B2003	IS	767	SWGR GERS	ALL	ALL	1.80	1.00	1.67	0.24	Y	Y	Anti-pump relay; screened using switchgear GERS.
1055	480VAC/Control Building 480VAC Load Center 1B04 Supply Breaker 152-403	BECH-E104<16A>/1 BECH-E104<22D>/0 BECH-E104<16B>/0	152-403/CS	GE SBM	1C008	CB	786	MV	--	--					Y	N	
			152-403E/CS	GE SBM	1C388			MV	--	--					Y	N	
			52-401/SS	GE SB1	1C388			MV	--	--					Y	N	
			CS	GE SBM	1A4	CB	757	MV	--	--					Y	N	
			150/151-403	GE IAC66B	1A4	CB	757	SWGR GERS	NO	D	1.80	1.00	1.18	0.15	Y	Y	Protective relays screened using switchgear GERS MVS/LVS 7 which specify that contact chatter is acceptable for all devices which directly affect breaker operation without interposing relay logic.

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REEL NUMBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGEMENT	ENERGIZE	CAPACITY PSA	CAPACITY IPA	DEMAND PSA	DEMAND IPA	PASS	ESSENT	COMMENTS
055			150G-40'	GE PJC11A	1A4	CB	757	SWGR GERS	NO	D	1.80	1.00	1.18	0.15	Y	Y	Protective relays screened using switchgear GERS MVS/LVS 7 which specify that contact chatter is acceptable for all devices which directly affect breaker operation without interposing relay logic.
			152H 75CH 75 152-CL/MS 152-SH/LS 152/IN 152/POS 152/a 152/b PB	--	1A4	CB	757	MV	--	--					Y	N	Mechanically actuated contacts.
			152Y	GE HMA, Cat. No. 0137A7575P001	1A4	CB	757	SWGR GERS	ALL	ALL	1.80	1.00	1.18	0.15	Y	Y	Anti-pump relay. Screened using switchgear GERS.
056	480VAC/Control Building 480VAC Motor Control Center 1B42 Supply Breaker 52-401	BECH-E104<22C>/1 BECH-E104<22D>/0 BECH-E104<17A>/1 FP-7884-E8-11<1>/4 FP-7884-E8-11<2>/4	52-401/CS	GE SBM	1C008	CB	786	MV	--	--					Y	N	
			52-401E/CS	GE SBM	1C388			MV	--	--					Y	N	
			52-401/SS	GE SB1	1C388			MV	--	--					Y	N	
			CLOSE	GE SBM	1B04	CB	757	MV	--	--					Y	N	
			LS L/a L/b	--	1B04	CB	757	MV	--	--					Y	N	Mechanically actuated contacts.
			Y	GE HFA51A	1B04	CB	757	SWGR GERS	ALL	ALL	1.80	1.00	1.18	0.15	Y	Y	Anti-pump relay. Screened using switchgear GERS.
058	480VAC/RB 757' LEVEL 480VAC Motor Control Center 1B44 Supply Breaker 52-403	BECH-E104<22E>/1 BECH-E104<22F>/0 BECH-E104<17A>/1 FP-7884-E8-11<1>/1 FP-7884-E8-11<2>/1	52-403/CS	GE SBM	1C008	CB	786	MV	--	--					Y	N	
			52-403E/CS	GE SBM	1C388			MV	--	--					Y	N	
			52-403/SS	GE SB1	1C388			MV	--	--					Y	N	
			CLOSE	GE SBM	1B04	CB	757	MV	--	--					Y	N	
			LS L/a L/b	--	1B04	CB	757	MV	--	--					Y	N	Mechanically actuated contacts.
			Y	GE HFA51A	1B04	CB	757	SWGR GERS	ALL	ALL	1.80	1.00	1.18	0.15	Y	Y	Anti-pump relay. Screened using switchgear GERS.
059	480VAC/RB 757' Level 480VAC Motor Control Center 1B44A Supply Breaker 52-4401	FP-7884-E009-282/0 BECH-E006<1>/20 BECH-E104<21B>/2 BECH-E104<21C>/3	52-4401	GE SBM	1C008	CB	786	MV	--	--					Y	N	Manual control switch.
			52-4401E	GE SBM	1C388			MV	--	--					Y	N	Manual control switch.
			52-4401/SS	GE SB1	1C388			MV	--	--					Y	N	Manual keylocked switch.

Table 6-2
Duane Arnold Energy Center - Relay Evaluation

SSEL NUMBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGEMENT	ENERGIZE	CAPACITY PSA	CAPACITY IPA	DEMAND PSA	DEMAND IPA	PASS	ESSENT	COMMENTS
059			C8	GE EBM	1B44	RB	757	NV	--	--					Y	N	Manual control switch.
			52-4401K	--	--			CA	--	--					Y	N	If breaker is open, contact chatter could delay momentarily breaker closure. This is considered acceptable.
			RY4401	--	--			CA	--	--					Y	N	If breaker is open, contact chatter could delay momentarily breaker closure. Contact chatter cannot cause breaker to close on a live bus because it is in series with mechanically-actuated, seismically rugged contact 52-3401/B. If breaker is closed, contact chatter could trip breaker, resulting in a momentary loss of power to busses 1B34A, 1B44A and 1B37. This is considered acceptable, because SSEL loads on these busses do not require power during the period of strong ground motion.
			27-4	--	--			CA	--	--					Y	N	If breaker is open, contact chatter could delay momentarily breaker closure. Contact chatter cannot cause breaker to close on a live bus because it is in series with mechanically-actuated, seismically rugged contact 52-3401/B. If breaker is closed, contact chatter could trip breaker, resulting in a momentary loss of power to busses 1B34A, 1B44A and 1B37. This is considered acceptable, because SSEL loads on these busses do not require power during the period of strong ground motion.
			52-403	--	1B04--			NV	--	--					Y	N	Mechanically-actuated, seismically-rugged contacts off of a rugged breaker. Refer to SSEL item number 6055 for contacts that affect breaker position.
			52-4401/POS LS L	--	1B44--			NV	--	--					Y	N	Mechanically-actuated contacts.
			Y	GE NFA51A	1B44	RB	757	SWGR GERS	ALL	ALL	1.80	1.00	0.35	0.15	Y	Y	Anti-pump relay. Screened using switchgear GERS.
			52-3401	--	1B34	RB	786	NV	--	--					Y	N	Seismically-rugged, mechanically-actuated contacts off of a rugged breaker. Refer to SSEL item number 6010 for contacts that affect breaker position.
			27-4401	--	--			CA	--	--					Y	N	Contact chatter could cause breaker to trip. This is considered acceptable (see above).
			RY3401	--	--			CA	--	--					Y	N	Contact is in breaker closing circuit. Therefore, if breaker is closed, then contact chatter has no affect. If breaker is open, chatter is acceptable since contact is in series with an open contact (52-3401/b) that is seismically-rugged.
	480VAC/RB 757' Level 480VAC Motor Control Center 1B44A Supply Breaker 52-4402	BECH-E006<1>/20	--	--	--			NA	--	--					Y	N	Manual breaker. Not affected by relays.
041	480VAC/Pump House 480VAC Motor Control Center 1B46 Supply Breaker 52-4212	BECH-E105<12>/17 FP-7884-E9-5/6	--	--	--			NA	--	--					Y	N	Manual Breaker, not affected by relays.

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Duane Arnold Energy Center - Relay Evaluation

SSEL NUMBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGEMENT	ENERGIZE	CAPACITY PSA	CAPACITY IPA	DEMAND PSA	DEMAND IPA	PASS	ESSENT	COMMENTS
6043	SBDG/Diesel Generator, Emer AC PWR to 1A4 1DG21 Starting and Engine Shutdown Logic	FP M015-006<1A>/5	LOOP	--	--			CA	--	--					Y	N	Chatter of this contact or the contacts controlling it could result in automatic start of the diesel generator. This is considered acceptable because to diesel generator breaker is prevented from automatic closure onto the 4 kV bus if either of the offsite power source breakers is closed; see evaluation of SSEL line item 6001.
			127-41	--	--			CA	--	--					Y	N	See note for contact LOOP, above.
			ESS (K21-K011B)	--	--			CA	--	--					Y	N	See note for contact LOOP, above.
			43/M	GE SB1	1C391			MV	--	--					Y	N	Manual keylock transfer switch
			CS/DG01	GE SBM	1C008	CB	786	MV	--	--					Y	N	Manual control switch
			CS/DG21	GE SBM	1C094	TB	757	MV	--	--					Y	N	Manual control switch
			ESA	--	1C118			MV	--	--					Y	N	1. This device is located inside an enclosure which mounted on the diesel skid. Therefore, this device is routinely exposed to high vibration during engine operation and is considered inherently rugged in accordance with the guidance of the SSRAP Report SAND-92-0140 UC52, 'Use of Seismic Experience and Test Data to Show Ruggedness of Equipment in Nuclear Power Plants; February 28, 1991
			ESB	--	1C118			MV	--	--					Y	N	See note for contact ESA.
			SDR	--	1C118			MV	--	--					Y	N	See note for contact ESA.
			LSA	--	1C118			MV	--	--					Y	N	See note for contact ESA.
			LSB	--	1C118			MV	--	--					Y	N	See note for contact ESA.
			4A	--	1C118			MV	--	--					Y	N	See note for contact ESA.
			4B	--	1C118			MV	--	--					Y	N	See note for contact ESA.
			5A	--	1C118			MV	--	--					Y	N	See note for contact ESA.
			5	--	1C118			MV	--	--					Y	N	See note for contact ESA.
			186/DG1	ITE 87M	1A4	CB	717	--	--	--					Y	N	Chatter of this lockout relay or of the protective relays controlling could prevent the diesel starting on demand. The contacts associated with this device and the devices controlling it are evaluated with SSEL line item 6001.
			SS1237B	--	1G21 skid			MV	--	--					Y	N	Diesel-generator skid mounted speed sensor switch.
			PS3242B	--	1G21 skid			MV	--	--					Y	N	Diesel-generator skid mounted pressure switch.
			PS3234B	--	1G21 skid			MV	--	--					Y	N	Diesel-generator skid mounted pressure switch
			PS3241B	--	1G21 skid			MV	--	--					Y	N	Diesel-generator skid mounted pressure switch
			CW	--	1C118			MV	--	--					Y	N	See note for contact ESA.
			CW-K2G14	AGASTAT 2GPD	1C391			CA	--	--					Y	N	Contacts of concern on this device are normally isolated. They are not isolated only when the manual keylock transfer switch HS-3279B is positioned to control the diesel from remote shutdown panel 1C391.

Table 4-2
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ESEL NUMBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGEMENT	ENERGIZE	CAPACITY PSA	CAPACITY IPA	DEMAND PSA	DEMAND IPA	PASS	ESSENT	COMMENTS
043			OP1	--	1C118			NV	--	--					Y	N	See note for contact ESA.
			OP2	--	1C118			NV	--	--					Y	N	See note for contact ESA.
			OP1	--	1C118			NV	--	--					Y	N	See note for contact ESA.
			PS1243B	--	--			NV	--	--					Y	N	This device is located on the diesel skid. Therefore, this device is routinely exposed to high vibration during engine operation and is considered inherently rugged in accordance with the guidance of the SSRAP Report SAND-92-0140 UC52, "Use of Seismic Experience and Test Data to Show Ruggedness of Equipment in Nuclear Power Plants", February 28, 1991.
			PS1244B	--	--			NV	--	--					Y	N	This device is located on the diesel skid. Therefore, this device is routinely exposed to high vibration during engine operation and is considered inherently rugged in accordance with the guidance of the SSRAP Report SAND-92-0140 UC52, "Use of Seismic Experience and Test Data to Show Ruggedness of Equipment in Nuclear Power Plants", February 28, 1991.
			CP1	--	1C118			NV	--	--					Y	N	See note for contact ESA.
			CP2	--	1C118			NV	--	--					Y	N	See note for contact ESA.
			CP1	--	1C118			NV	--	--					Y	N	See note for contact ESA.
			PS1215B	--	--			NV	--	--					Y	N	This device is mounted on the diesel skid. Therefore, this device is routinely exposed to high vibration during engine operation and is considered inherently rugged in accordance with the guidance of the SSRAP Report SAND-92-0140 UC52, "Use of Seismic Experience and Test Data to Show Ruggedness of Equipment in Nuclear Power Plants", February 28, 1991.
			PS1216B	--	--			NV	--	--					Y	N	This device is mounted on the diesel skid. Therefore, this device is routinely exposed to high vibration during engine operation and is considered inherently rugged in accordance with the guidance of the SSRAP Report SAND-92-0140 UC52, "Use of Seismic Experience and Test Data to Show Ruggedness of Equipment in Nuclear Power Plants", February 28, 1991.
			CC1	--	1C117			NV	--	--					Y	N	See note for contact ESA.
			CC2	--	1C117			NV	--	--					Y	N	See note for contact ESA.
			CC3	--	1C118			NV	--	--					Y	N	See note for contact ESA.
			PS1247B	--	--			NV	--	--					Y	N	Diesel generator skid mounted pressure switch.
			PS1248B	--	--			NV	--	--					Y	N	Diesel generator skid mounted pressure switch.
			PS1249B	--	--			NV	--	--					Y	N	Diesel generator skid mounted pressure switch.
			SPR	--	1C118			NV	--	--					Y	N	See note for contact ESA.
			T2A	--	1C118			NV	--	--					Y	N	See note for contact ESA.
			T2B	--	1C118			NV	--	--					Y	N	This device is located inside an enclosure which mounted on the diesel skid. Therefore, this device is routinely exposed to high vibration during engine operation and is considered inherently rugged in accordance with the guidance of the SSRAP Report SAND-92-0140 UC52, "Use of Seismic Experience and Test Data to Show Ruggedness of Equipment in Nuclear Power Plants", February 28, 1991.

Table 6-2
Duane Arnold Energy Center - Relay Evaluation

SSEL NMBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGEMENT	ENERGIZE	CAPACITY PSA	CAPACITY IPA	DEMAND PSA	DEMAND IPA	PASS	ESSENT	COMMENTS
61			EOR	--	1C118			NV	--	--					Y	N	This device is located inside an enclosure which mounted on the diesel skid. Therefore, this device is routinely exposed to high vibration during engine operation and is considered inherently rugged in accordance with the guidance of the SSRAP Report SAND-92-0140 UC52, 'Use of Seismic Experience and Test Data to Show Ruggedness of Equipment in Nuclear Power Plants', February 28, 1991
			EOS (2C3236A)	--	1G21 skid			NV	--	--					Y	N	This device is located on the diesel skid. Therefore, this device is routinely exposed to high vibration during engine operation and is considered inherently rugged in accordance with the guidance of the SSRAP Report SAND-92-0140 UC52, 'Use of Seismic Experience and Test Data to Show Ruggedness of Equipment in Nuclear Power Plants', February 28, 1991
	SBDG/Diesel Generator, Emer AC PWR to 1A4 1G021 Exciter/Voltage Regulator Control Logic	FP M015-015<4>/5 FP M015-004<1A>/5 FP M015-015<1>/8 FP M015-004<1A>/5	CSLR	GE SBM	1C094	TB	757	NV	--	--					Y	N	Manual remote/local control switch
			AVR/L (LOCAL)	GE SBM	1C094	TB	757	NV	--	--					Y	N	Manual voltage control switch.
			AVR/L (REMOTE)	GE SBM	1C008	CB	786	NV	--	--					Y	N	Manual voltage control switch.
			43/E (HS-3279B)	GE SB1	1C391			NV	--	--					Y	N	Manual keylock switch.
			AVR/L(E)	GE SBM	1C391			NV	--	--					Y	N	Manual control switch.
			CSLRX	AGASTAT GPD	1C391			CA	--	--					Y	N	Contacts of concern on this device are normally isolated. They are not isolated only when the manual keylock transfer switch HS-3279B is positioned to control the diesel from remote shutdown panel 1C391.
			VRMA	GE SBM	1C008	CB	786	NV	--	--					Y	N	Voltage regulator manual/automatic selector switch
			40	WESTINGHOUSE D-3	1C094	TB	757	CA	--	--					Y	N	Loss of field relay; affects annunciator only.
			64	WESTINGHOUSE DGP	1C094	TB	757	CA	--	--					Y	N	Field ground detector relay; affects annunciator only.
			76	WESTINGHOUSE D-3	1C094	TB	757	CA	--	--					Y	N	Field overcurrent relay; affects annunciator only.
			47	GE 121CR53C1A	1C094	TB	757	CA	--	--					Y	N	Single phasing relay; affects annunciator only.
			GMS	GE SBM	1C094	TB	757	NV	--	--					Y	N	Governor mode select switch
			ERA	--	1C118			NV	--	--					Y	N	See discussion for contact ESA under SSEL line item number 6063 (DG Starting Logic).
			ERB	--	1C118			NV	--	--					Y	N	See discussion for contact ESA under SSEL line item number 6063 (DG Starting Logic).
			LSB	--	1C118			NV	--	--					Y	N	This contact was evaluated under SSEL line item number 6063 (DG Starting Logic) and was determined to be inherently rugged.
			LSR	--	1C118			NV	--	--					Y	N	This contact was evaluated under SSEL line item number 6063 (DG Starting Logic) and was determined to be inherently rugged.

Table 4-2
Duane Arnold Energy Center - Relay Evaluation

SSEL NUMBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGEMENT	ENERGIZE	CAPACITY PSA	CAPACITY ZPA	DEMAND PSA	DEMAND ZPA	PASS	ESSENT	COMMENTS
6063			K1	ITE A143D (Lighting Contactor)	1C094	TB	757	CON GERS	ALL	ALL	4.50	3.00	4.45	1.37	Y	Y	
			K2	ITE A133D (Lighting Contactor)	1C094	TB	757	CON GERS	ALL	ALL	4.50	3.00	4.45	1.37	Y	Y	
			K3	ROWAN 2190	1C094	TB	757	LEVEL 1	ALL	ALL	9.00	5.40			Y	Y	
			K4	ROWAN 2190	1C094	TB	757	LEVEL 1	ALL	ALL	9.00	5.40			Y	Y	
			5A	--	1C117			MV	--	--					Y	N	This contact was evaluated under SSEL line item number 6063 (DG Starting Logic) and was determined to be inherently rugged.
			S1	Electro Switch Corp. Part No. 105906LE	1C094	TB	757	MV	--	--					Y	N	Manual transfer switch
			Excitar Reset	GE SBM	1C094	TB	757	MV	--	--					Y	N	Manual pushbutton switch
			Exciter Shutdown	GE SBM	1C094	TB	757	MV	--	--					Y	N	Manual pushbutton switch
	SSDG/Diesel Generator, Emer AC PWR to 1A4 1G021 Governor Control Logic	FP-M015-015<1>/8 FP-M015-015<3>/8 FP-M015-015<4>/9 BECH-E080/11 FP M015-006<1A>/5	GMS	GE SBM	1C094	TB	757	MV	--	--					Y	N	Governor mode switch
			52A	--	1A4	CB	757	MV	--	--					Y	N	Mechanically actuated contact on 4160 VAC switchgear breaker.
			CSLR	GE SBM	1C094	TB	757	MV	--	--					Y	N	Remote/Local transfer switch
			GCS	GE SBM	1C094	TB	757	MV	--	--					Y	N	Local speed adjust - manual control switch
			GCS (190-DG2/CS)	GE SBM	1C008	CB	786	MV	--	--					Y	N	Remote speed adjust - manual control switch
			GCSE	GE SBM	1C188			MV	--	--					Y	N	Emergency speed adjust - manual control switch
			41 (HS3279A)	GE SB1	1C191			MV	--	--					Y	N	Manual transfer switch
6101	125VDC/125VDC Division 1 Battery 1D1	BECH-E027/10	--	--	--			HA	--	--					Y	N	Not affected by relays.
6102	125VDC/125VDC Division 1 Distribution Panel #1 1D10 Supply Breaker From Battery Charger 72-102	BECH-E027/10	--	--	--			HA	--	--					Y	N	Manual breaker not affected by relays.
6103	125VDC/125VDC Division 1 Distrubution Panel A 1D11 Supply Breaker From 1D10 72-106	BECH-E027/10	--	--	--			HA	--	--					Y	N	Manual breaker not affected by relays.
6104	125VDC/1D1 125VDC Division 1 Main Battery Charger 1D12 Supply Breaker From 1B32 1B3201	BECH-E027/10 BECH-E105<12>/17	--	--	--			NA	--	--					Y	N	Manual breaker not affected by relays.

Table 4-2
Duane Arnold Energy Center - Relay Evaluation

EVEL NUMBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGEMENT	ENERGIZE	CAPACITY PSA	CAPACITY IPA	DEMAND PSA	DEMAND IPA	PASS	ESSENT	COMMENTS
6105	125VDC/125VDC Division 1 Distrubution Panel C 1D13 Supply Breaker From 1D10 72-104	BECH-E027/18	--	--	--			NA	--	--					Y	N	Manual breaker not affected by relays.
6106	125VDC/RCIC System 125 VDC Motor Control Center 1D14 Supply Breaker From 1D10 72-105	BECH-E027/18	--	--	--			NA	--	--					Y	N	Manual breaker not affected by relays.
6107	125VDC/125VDC Division 2 Battery 1D2	BECH-E027/18	--	--	--			NA	--	--					Y	N	Not affected by relays.
6108	125VDC/125VDC Division 2 Distribution Panel B2 1D20 Supply Breaker From Battery Charger 72-202	BECH-E027/18	--	--	--			NA	--	--					Y	N	Manual breaker not affected by relays.
6109	125VDC/125VDC Division 2 Distribution Panel B 1D21 Supply Breaker From 1D20 72-204	BECH-E027/18	--	--	--			NA	--	--					Y	N	Manual breaker not affected by relays.
6110	125VDC/1D2 125VDC (Division 2) Main Battery Charger 1D22 Supply Breaker From 1B42 1B4201	BECH-E027/18 BECH-E105<16>/19	--	--	--			NA	--	--					Y	N	Manual breaker not affected by relays.
6111	125VDC/125VDC Division 2 Distribution Panel D 1D23 Supply Breaker From 1D20 72-204	BECH-E027/18	--	--	--			NA	--	--					Y	N	Manual breaker not affected by relays.
6112	125VDC/125VDC Backup Battery Charger 1D120 Supply Breaker From 1B32 1B3202 and Supply Breaker From	BECH-E027/18 BECH-E105<12>/17 BECH-E105<16>/19	--	--	--			NA	--	--					Y	N	Manual breaker not affected by relays.
6200	250VDC/250VDC Battery 1D4	BECH-E028/10	--	--	--			NA	--	--					Y	N	Not affected by relays.
6201	250VDC/250VDC Distribution Panel 1D40 Supply Breaker From 1D4 72-401 Supply Breaker From 1D43 72-	BECH-E028/10	--	--	--			NA	--	--					Y	N	Manual breaker not affected by relays.
6202	250VDC/HPCI 250VDC Motor Control Center 1D41 Supply Breaker From 1D40 72-408	BECH-E028/10	--	--	--			NA	--	--					Y	N	Manual breaker not affected by relays.

Table 4-2
Duane Arnold Energy Center - Relay Evaluation

REEL NUMBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGEMENT	ENERGIZE	CAPACITY PSA	CAPACITY IPA	DEMAND PSA	DEMAND IPA	PASS	ESSENT	COMMENTS
203	250VDC/BB 757' Level 250VDC Motor Control Center 1D62 Supply Breaker From 1D60 72-405	BECH-E028/10	--	--	--			NA	--	--					Y	N	Manual breaker not affected by relays.
204	250VDC/1D4 250VDC Battery Charger 1D63 Supply Breaker From 1B32 1B3203	BECH-E028/10 BECH-E105<12>/17	--	--	--			NA	--	--					Y	N	Manual breaker not affected by relays.
205	250VDC/1D4 250VDC Battery Charger 1D64 Supply Breaker From 1B42 1B42002	BECH-E028/10 BECH-E105<16>/19	--	--	--			NA	--	--					Y	N	Manual breaker not affected by relays.
201	120VAC/120 Volts Instrument AC Power Supply 1D25 Supply Breaker From 1D20 72-207	BECH-E029<2>/0 BECH-E027/18	--	--	--			NA	--	--					Y	N	Manual breaker not affected by relays.
	120VAC/120 Volts Instrument AC Power Supply 1D25 Load Breakers 1Y2501, 1Y2502	BECH-E029<2>/0	--	--	--			NA	--	--					Y	N	Manual breaker not affected by relays.
	120VAC/120 Volts Instrument AC Power Supply 1D25 Static Transfer Switch JS2501	BECH-E029<2>/0	ALL	--	1D25	CB	757	QUALIFIED	--	--					Y	Y	1D25 is seismically qualified as documented in Index Item #6.41 of DCP-1411. Seismic qualification performed per IEEE-344, 1975.
202	IAC/Manual Bypass Switch Panel 1Y25	BECH-E029/0	--	--	--			NA	--	--					Y	N	Manual switch not affected by relays.
303	IAC/Regulating Transformer 1Y2A Supply Breaker From 1B62 1B6203A	BECH-E029/0 BECH-E105<16>/19	--	--	--			NA	--	--					Y	N	Manual breaker not affected by relays.
	IAC/Regulating Transformer 1Y2A Load Breakers 1Y2A01, 1Y2A02	BECH-E029/0	--	--	--			NA	--	--					Y	N	Manual breaker not affected by relays.
	IAC/Regulating Transformer 1Y2A Static Transfer Switch JS201	BECH-E029<2>/0	ALL	--	1Y2A	CB	757	QUALIFIED	--	--					Y	Y	1Y2A is seismically qualified as documented in Index Item #6.40 of DCP-1411. Seismic qualification was performed per IEEE-344, 1975.
304	IAC/Instrument AC 1Y21 Main and Tie Breaker Panel 1Y30	BECH-E029<2>/0	--	--	--			NA	--	--					Y	N	Manual breaker not affected by relays.

Table 6-1
Duane Arnold Energy Center - Relay Evaluation

ESEL NUMBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGEMENT	ENERGIZE	CAPACITY PSA	CAPACITY IPA	DEMAND PSA	DEMAND IPA	PASS	ESSENT	COMMENTS
6305	120VAC/120V Instrument AC Distribution Panel 1Y021	BECH-E029<2>/0	--	--	--			NA	--	--					Y	N	Supply breakers are covered under components 1D25, 1Y25, 1Y2A and 1Y20. Load breakers are manual circuit breakers that are not affected by relays.
6306	120VAC/120 Volts Instrument AC Power Supply 1D15 Supply Breaker From 1D10 73-107	BECH-E029<2>/0 BECH-E027/18	--	--	--			NA	--	--					Y	N	Manual breaker not affected by relays.
	120VAC/120 Volts Instrument AC Power Supply 1D15 Load Breakers 1Y1501, 1Y1502	BECH-E029<3>/0	--	--	--			NA	--	--					Y	N	Manual breaker not affected by relays.
	120VAC/120 Volts Instrument AC Power Supply 1D15 Static Transfer Switch JS1501	BECH-E029<2>/0	ALL	--	1D15	CB	757	QUALIFIED	--	--					Y	Y	1D15 is seismically qualified as documented in Index Item #6 41 of DCP-1411. Seismic qualification was performed per IEEE-344, 1975.
6307	IAC/Manual Bypass Switch Panel 1Y15	BECH-E029/0	--	--	--			NA	--	--					Y	N	Manual switch not affected by relays.
6308	IAC/Regulating Transformer 1Y1A Supply Breaker From 1B32 1B3216A	BECH-E029/0 BECH-E105<12>/17	--	--	--			NA	--	--					Y	N	Manual breaker not affected by relays.
	IAC/Regulating Transformer 1Y1A Load Breakers 1Y1A01, 1Y1A02	BECH-E029/0	--	--	--			NA	--	--					Y	N	Manual breaker not affected by relays.
	IAC/Regulating Transformer 1Y1A Static Transfer Switch JS101	BECH-E029<2>/0	ALL	--	1Y1A	CB	757	QUALIFIED	--	--					Y	Y	1Y1A is seismically qualified as documented in Index Item #5.40 of DCP-1411. Seismic qualification performed per IEEE-344, 1975.
6309	IAC/Instrument AC AC 1Y11 Main and Tie Breaker Panel 1Y010	BECH-E029<2>/0	--	--	--			NA	--	--					Y	N	Manual breaker not affected by relays.
6310	120VAC/120V Instrument AC Distribution Panel 1Y11	BECH-E029<2>/0	--	--	--			NA	--	--					Y	N	Supply breakers are covered under components 1D15, 1Y15, 1Y1A and 1Y010. Load breakers are manual circuit breakers that are not affected by relays.
6400	120VAC/120V Uninterruptible AC Distribution Panel 1Y023	BECH-E029<2>/0	--	--	--			NA	--	--					Y	N	Supply breakers are covered under components 1D45, 1Y4, 1Y2 and 1Y22. Load breakers are manual circuit breakers that are not affected by relays.
6401	120VAC/1Y002 TO 1Y023 Automatic Transfer Switch 1Y022	BECH-E029<2>/0 FP-7884-E030-003/6	HS01Y23A	GE CR2940	1Y022	CB	757	MV	--	--					Y	N	Manual control switch
			27-22	GE MOV15A	1Y022	CB	757	CA	ALL	ALL					Y	N	Chatter could interrupt power momentarily to the control rod position indication (from 1Y023) during strong ground motion only. Momentary loss of power is considered acceptable.

Table 4-2
Duane Arnold Energy Center - Relay Evaluation

RSEL NUMBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGEMENT	ENERGIZE	CAPACITY PSA	CAPACITY IPA	DEMAND PSA	DEMAND IPA	PASS	ESSENT	COMMENTS
001			E	ITE B2021F24P1	1Y022	CB	757	CON GERS	ALL	ALL	4.50	3.00	3.54	0.45	Y	Y	
			H	ITE B2021F24P1	1Y022	CB	757	CON GERS	ALL	ALL	4.50	3.00	3.54	0.45	Y	Y	
002	120VAC/Regulating Transformer 1Y004 Supply Breaker From 1B32 1B3204	BECH-E029<2>/0 BECH E105<12>/17	--	--	--			NA	--	--					Y	N	Manual breaker not affected by relays.
	120VAC/Regulating Transformer 1Y004 Load Breakers 1Y401, 1Y402 and 1Y403	BECH-E029<2>/0	--	--	--			NA	--	--					Y	N	Manual breakers not affected by relays.
	120VAC/Regulating Transformer 1Y004 Static Transfer Switch JS401	BECH-E029<2>/0	ALL	--	1Y004	CB	757	QUALIFIED	--	--					Y	Y	1Y004 is seismically qualified as documented in Index Item #6 40 of DCP-1411. Seismic qualification performed per IEEE-344, 1975.
003	IAC/Instrument AC Panel 1Y21 Supply Transformer 1Y002 Supply Breaker From 1B42 1B4203	BECH-E029<2>/0 BECH-E105<16>/19	--	--	--			NA	--	--					Y	N	Manual breaker not affected by relays.
004	120VAC/120 Volt Uninterruptible AC Power Supply 1D45 Supply Breaker From 1D40 72-406	BECH-E029<2>/0 BECH-E026/10	--	--	--			NA	--	--					Y	N	Manual breaker not affected by relays.
001	ESW/Emergency Service Water Pump A 1P099A	BECH-E111<8>/11 FP 7884-E9-159/3 BECH-E113<53>/9	PB/STOP and PB/START (HS-4927A)	Allis Chalmers	1B32	CB	757	MV	--	--					Y	N	Manual pushbutton switch
			42/CS (HS-4928A)	GE SBM	1C006	CB	786	MV	--	--					Y	N	Manual control switch
			42 and 49 (OL)	Allis-Chalmers, NEMA Size 4, Model 25-116	1B32	CB	757	MCC GERS	ALL	ALL	1.50	1.00	1.18	0.15	Y	Y	
			95-3213	--	1C032	CB	786	CA	--	--					Y	N	Contact closure initiates staring of emergency service water pump. Inadvertent starting of the pump is considered acceptable.
			CW	Clark Control	1C117			MV	--	--					Y	N	Panel 1C117 is mounted on the diesel engine skid which routinely experiences significant vibration during starting and ruonning of the diesel generator.
002	ESW/Emergency Service Water Pump B 1P099B	BECH-E111<8A>/2 BECH-E111<8B>/2 FP 7884-E9-159/3 BECH-E113<53>/9	PB/STOP (HS-4927C) and PB/START (HS-4927B)	Allis-Chalmers	1B42	CB	757	MV	--	--					Y	N	Manual pushbutton switch.
			42/CS (HS-4928A)	GE SBM	1C006	CB	786	MV	--	--					Y	N	Manual control switch
			42 and 49 (OL)	Allis-Chalmers, NEMA Size 4, Model 25-116	1B42	CB	757	MCC GERS	ALL	ALL	1.50	1.00	1.18	0.15	Y	Y	
			95-3213	--	1C032	CB	786	CA	--	--					Y	N	Contact closure initiates staring of emergency service water pump. Inadvertant starting of the pump is considered acceptable.

Table 6-2
Duane Arnold Energy Center - Relay Evaluation

SSEL NUMBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGEMENT	ENERGIZE	CAPACITY PSA	CAPACITY IPA	DEMAND PSA	DEMAND IPA	PASS	ESSENT	COMMENTS
8002			CW	Clark Control Type PM 4U3-1	1C118			MV	--	--					Y	N	Panel 1C117 is mounted on the diesel engine skid which routinely experiences significant vibration during starting and ruunning of the diesel generator.
8005	ESW/Loop A Diesel Cooler Isolation Valve Solenoid SV2080	BECH-E111<08>/11 FP 7884-M15-006<2>/10	CF3	Clark Control Type PM 4U2-1	1C117			MV	--	--					Y	N	Panel 1C117 is mounted on the diesel engine skid which routinely experiences significant vibration during starting and ruunning of the diesel generator.
			CW	Clark Control Type PM 4U3-1	1C117			MV	--	--					Y	N	Panel 1C117 is mounted on the diesel engine skid which routinely experiences significant vibration during starting and ruunning of the diesel generator.
			HS-2080	GE CR2940	1C091			MV	--	--					Y	N	Two postion maintained control switch.
8006	ESW/Loop B Diesel Cooler Isolation Valve Solenoid SV2081	BECH-E111<08A>/2 FP 7884-M15-006<2>/10	CF3	Clark Control Type PM 4U2-1	1C118			MV	--	--					Y	N	Panel 1C118 is mounted on the diesel engine skid which routinely eriences significant vibration during starting and ruunning of the sel generator.
			CW	Clark Control Type PM 4U3-1	1C118			MV	--	--					Y	N	Panel 1C118 is mounted on the diesel engine skid which routinely experiences significant vibration during starting and ruunning of the diesel generator.
			HS-2081	GE CR2940	1C092			MV	--	--					Y	N	Two postion maintained control switch.
8013	ESW/Loop A Discharge Header Isolation Valve Solenoid SV1956A	BECH-E111<08>/11	42/b (1B3214)	Allis-Chalmers, NEMA Size 4, Model 25-114	1B32	CB	757	MCC GERS	ALL	ALL	1.50	1.00	1.18	0.15	Y	Y	
8014	ESW/Loop B Discharge Header Isolation Valve Solenoid &V1956B	BECH-E11<08B>/2 BECH-E11<08A>/2	42/b	Allis-Chalmers, NEMA Size 4, Model 25-114	1B42	CB	757	MCC GERS	ALL	ALL	1.50	1.00	1.18	0.15	Y	Y	
			43/N	--	1C388			MV	--	--					Y	N	Manual keylock transfer switch
8015	ESW/Loop A Discharge Header Isolation Valve MOV2077	BECH-E111<24>/2 FP-7884-E9-85/6	42/CS (2077)	GE SBM	1C006	CB	786	MV	--	--					Y	N	
			42-O, 42-C, 49	Allis-Chalmers, NEMA Size 1, Model 25-111	1B32	CB	757	MCC GERS	ALL	ALL	1.50	1.00	1.18	0.15	Y	Y	
			LS, TS	Limitorque SMB-000	MO2077			MV	--	--					Y	N	
			ZS1956A	Honeywell Microswitch;OPD-AR; S/N 7139	CV1956A			MV	--	--					Y	N	See evaluation for SSEL item 8013 (SV1956A) for contacts that affect valve position.
8016	ESW/LOOP B DISCHARGE HEADER ISOLATION VALVE MOV2078	BECH-E111<24>/2 FP-7884-E9-85/6	42/CS (2078)	GE SBM	1C006	CB	786	MV	--	--					Y	N	
			42-O, 42-C, 49	Allis-Chalmers, NEMA Size 1, Model 25-111	1B32	CB	757	MCC GERS	ALL	ALL	1.50	1.00	1.18	0.15	Y	Y	
			LS, TS	Limitorque SMB-000	MO2078			MV	--	--					Y	N	
			ZS1956B	Honeywell Microswitch;OPD-AR; S/N 7139	CV1956B			MV	--	--					Y	N	See evaluation for SSEL item 8014 (SV1956B) for contacts that affect valve position

Table 6-2
Duane Arnold Energy Center - Relay Evaluation

REEL NUMBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGEMENT	ENERGIZE	CAPACITY PSA	CAPACITY IPA	DEMAND PSA	DEMAND IPA	PASS	ESSENT	COMMENTS
017	ESW/LOOP A COOLING TOWER DISCHARGE ISOLATION VALVE MO1998A	BECH E111<06>/4 FP-7884-E9-85/6	42/CS (HS-1998A)	GE SBM	1C004	CB	786	MV	--	--					Y	N	
			42-O, 42-C, 49	Allis-Chalmers, NEMA Size 1, Model 25-111	1B34	RB	786	MCC GERS	ALL	ALL	1.50	1.00	0.90	0.15	Y	Y	
			LS, TS	Limitorque SMB-000	MO1998A			MV	--	--					Y	N	
018	ESW/Loop B Cooling Tower Discharge Isolation Valve MO1998B	BECH-E111<04>/4 FP-7884-E9-85/6	42/CS (HS-1998B)	GE SBM	1C004	CB	786	MV	--	--					Y	N	
			42-O, 42-C, 49	Allis-Chalmers, NEMA Size 1, Model 25-111	1B44	RB	757	MCC GERS	ALL	ALL	1.50	1.00	0.35	0.15	Y	Y	
			LS, TS	Limitorque SMB-000	MO1998B			MV	--	--					Y	N	
019	ESW/Loop A FLow Rate Transmitter FT6938A	BECH-E112<11>/11	NA	--	--			NA	--	--					Y	N	Not affected by relays. Power source for instrument loop is from lighting panel 1L60 which will not be powered following a loss-of-offsite power (LOOP).
020	ESW/Loop B FLow Rate Transmitter FT6938B	BECH-E112<11>/11	NA	--	--			NA	--	--					Y	N	Not affected by relays. Power source for instrument loop is from lighting panel 1L60 which will not be powered following a loss-of-offsite power (LOOP).
023	ESW/Loop A Flow Element DP PDI6934A	BECH M146/.4 BECH-E112<11>/11	--	--	--			NA	--	--					Y	N	Not affected by relays. Power source for instrument loop is from lighting panel 1L60 which will not be powered following a loss-of-offsite power (LOOP).
024	ESW/Loop B Flow Element DP PDI6938B	BECH-M146/44 BECH-E112<11>/11	--	--	--			NA	--	--					Y	N	Not affected by relays. Power source for instrument loop is from lighting panel 1L60 which will not be powered following a loss-of-offsite power (LOOP).
025	ESW/CB Chiller IV-CH-1A Well Water Supply Isolation MO2039A	BECH-E111<05>/4 FP-7884-E9-85/6	42/CS (HS-2039A)	GE SBM	1C004	CB	786	MV	--	--					Y	N	
			42-O, 42-C, 49	Allis-Chalmers, NEMA Size 1, Model 25-111	1B3227	CB	757	MCC G	**	ALL	1.50	1.00	1.18	0.15	Y	Y	
			LS, TS	Limitorque SMB-000	MO2039A			MV		--					Y	N	
026	ESW/CB Chiller IV-CH-1B Well Water Supply Isolation MO2039B	BECH-E111<05>/4 FP-7884-E9-85/6	42/CS (HS-2039B)	GE SBM	1C004	CB	786	MV	--	--					Y	N	
			42-O, 42-C, 49	Allis-Chalmers, NEMA Size 1, Model 25-111	1B4225	CB	757	MCC GERS	ALL	ALL	1.50	1.00	1.18	0.15	Y	Y	
			LS, TS		MO2039B			MV	--	--					Y	N	
0101	RHRSW/RHR Service Water Pump A 1P022A Breaker 152-307 (1A307)	BECH-E121<42>/8 BECH-E104<3D>/0 APED-E11-007<1>/27	152/CS (HS-4925A)	GE SBM	1C003	CB	786	MV	--	--					Y	N	Manual control switch

Table 4-2
Duane Arnold Energy Center - Relay Evaluation

SSEL NUMBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGEMENT	ENERGIZE	CAPACITY PSA	CAPACITY IPA	DEMAND PSA	DEMAND IPA	PASS	ESSENT	COMMENTS
E101			CS/CLOSE and CS/TRIP	GE SBM	1A307	CB	757	MV	--	--					Y	N	Manual control switch
			186/M	WESTINGHOUSE WL	1A307	CB	757	RELAY GERS	ALL	ALL	10.00	6.00	8.30	1.05	Y	Y	Contact chatter may cause breaker to trip.
			150/151	GE IAC66E	1A307	CB	757	RELAY GERS	NO	D	5.00	3.00	8.30	1.05	N	Y	Contact chatter may energize lockout device 186/M and cause breaker to trip.
			150G	GE PJC11A	1A307	CB	757	RELAY GERS	NO	D	5.00	3.00	8.30	1.05	N	Y	Contact chatter may energize lockout device 186/M and cause breaker to trip.
			197-31	GE HFA151A	1C031	CB	786	RELAY GERS	NO	ALL	10.00	6.00	2.24	0.66	Y	Y	Load Shed Circuit. Desired state of pump is running. Contact chatter may trip pump. See evaluation for SSEL item LDSHD 1A3 for contacts that affect relay coil. Normally-open contact only. Coil voltage 125 VDC.
			E11A-K062A	GE HFA51A	1C032	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.24	0.66	Y	Y	RHR Actuation Circuit. Desired state of pump is running. Contact chatter may trip pump. See evaluation for SSEL item RHR LOGIC for contacts that affect relay coil. Normally-open contact only. Coil voltage 125 VDC.
			194-31	GE HFA151A	1A303	CB	757	RELAY GERS	NO	ALL	10.00	6.00	8.30	1.05	Y	Y	Load Shed Circuit. Desired state of pump is running. Contact chatter may trip pump. See evaluation for SSEL item LDSHD 1A4 for contacts that affect relay coil. Normally-open contact only. Coil voltage 125 VDC.
			152H/UP 152H/DOWN 75CS/RAISE 75CS/LOWER 75/CLUTCH SW 152-CL/MS 152-SM/LS 152/IS 152/POS 152/a 152/b	--	1A307	CB	757	MV	--	--					Y	N	Contacts are mechanically actuated and are inherrantly rugged.
			152/Y	GE HMA, Cat. No. 0137A7575P001	1A307	CB	757	SWGR GERS	ALL	ALL	1.80	1.00	1.19	0.15	Y	Y	Anti-pump relay. Screened using switchgear GERS.
E102	RHRSW/RHR SERVICE WATER PUMP C 1P022C BREAKER 152-308 (1A308)	SECH-E121<42>/8 SECH-E104<3D>/0 APED-E11-007<1>/27	152/CS (HS-4925C)	GE SBM	1C003	CB	766	MV	--	--					Y	N	Manual control switch
			CS/CLOSE and CS/TRIP	GE SBM	1A308	CB	757	MV	--	--					Y	N	Manual control switch
			186/M	WESTINGHOUSE WL	1A308	CB	757	RELAY GERS	ALL	ALL	10.00	6.00	8.30	1.05	Y	Y	Contact chatter may cause breaker to trip.
			150/151	GE IAC66E	1A308	CB	757	RELAY GERS	NO	D	5.00	3.00	8.30	1.05	N	Y	Contact chatter may energize lockout device 186/M and cause breaker to trip.
			150G	GE PJC11A	1A308	CB	757	RELAY GERS	NO	D	5.00	3.00	8.30	1.05	N	Y	Contact chatter may energize lockout device 186/M and cause breaker to trip.
			197-31	GE HFA151A	1C031	CB	786	RELAY GERS	NO	ALL	10.00	6.00	2.24	0.66	Y	Y	Load Shed Circuit. Desired state of pump is running. Contact chatter may trip pump. See evaluation for SSEL item LDSHD 1A3 for contacts that affect relay coil. Normally-open contact only. Coil voltage 125 VDC.

Table 6-2
Duane Arnold Energy Center - Relay Evaluation

SSEL NUMBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGEMENT	ENERGIZE	CAPACITY PSA	CAPACITY IPA	DEMAND PSA	DEMAND IPA	PASS	ERSENT	COMMENTS
102			E11A-K042A	GE HFA51A	1C032	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.24	0.66	Y	Y	RHR Actuation Circuit. Desired state of pump is running. Contact chatter may trip pump. See evaluation for SSEL item RHR LOGIC for contacts that affect relay coil. Normally-open contact only. Coil voltage 125 VDC.
			194-31	GE HFA151A	1A303	CB	757	RELAY GERS	NO	ALL	10.00	6.00	8.30	1.05	Y	Y	Load Shed Circuit. Desired state of pump is running. Contact chatter may trip pump. See evaluation for SSEL item LDSHD 1A3 for contacts that affect relay coil. Normally-open contact only. Coil voltage 125 VDC.
			152H/UP 152H/DOWN 75CS/RAISE 75CS/LOWER 75/CLUTCH SW 153-CL/HS 153-SH/LS 152/IS 152/POS 152/a 152/b	--	1A308	CB	757	MV	--	--					Y	N	Contacts are mechanically actuated and are inherrently rugged.
			152/Y	GE HMA, Cat. No. 0137A7575P001	1A308	CB	757	SWGR GERS	ALL	ALL	1.80	1.00	1.18	0.15	Y	Y	Anti-pump relay. Screened using switchgear GERS.
103	RHRSW/RHR SERVICE WATER PUMP B 1P022B BREAKER 152-407 (1A407)	BECH-E121<42A>/3 BECH-E121<42B>/2 BECH-E121<42C>/1 BECH-E104<3G>/0 APED-E11-007<1>/27	152/CS (HS-4925B)	GE SSM	1C003	CB	786	MV	--	--					Y	N	Manual control switch
			152E/CS (HS-4925F)	GE SSM	1C388			MV	--	--					Y	N	Manual control switch
			43 (HS4925E)	GE SB1	1C388			MV	--	--					Y	N	Manual control switch
			CS/CLOSE and CS/TRIP	GE SSM	1A407	CB	757	MV	--	--					Y	N	hanual control switch
			186/M	WESTINGHOUSE ML	1A407	CB	757	RELAY GERS	ALL	ALL	10.00	6.00	8.30	1.05	Y	Y	Contact chatter may cause breaker to trip.
			150/151	GE IAC66E	1A407	CB	757	RELAY GERS	NO	D	5.00	3.00	8.30	1.05	N	Y	Contact chatter may energize lockout device 186/M and cause breaker to trip.
			150G	GE PJC11A	1A407	CB	757	RELAY GERS	NO	D	5.00	3.00	8.30	1.05	N	Y	Contact chatter may energize lockout device 186/M and cause breaker to trip.
			197-41	GE HFA151A	1C031	CB	786	RELAY GERS	NO	ALL	10.00	6.00	2.24	0.66	Y	Y	Load Shed Circuit. Desired state of pump is running. Contact chatter may trip pump. See evaluation for SSEL item LDSHD 1A4 for contacts that affect relay coil. Normally-open contact only. Coil voltage 125 VDC.
			E11A-K042B	GE HFA51A	1C033	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.24	0.66	Y	Y	RHR Actuation Circuit. Desired state of pump is running. Contact chatter may trip pump. See evaluation for SSEL item RHR LOGIC for contacts that affect relay coil. Normally-open contact only. Coil voltage 125 VDC.
			194-41	GE HFA151A	1A403	CB	757	RELAY GERS	NO	ALL	10.00	6.00	8.30	1.05	Y	Y	Load Shed Circuit. Desired state of pump is running. Contact chatter may trip pump. See evaluation for SSEL item LDSHD 1A4 for contacts that affect relay coil. Normally-open contact only. Coil voltage 125

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Duane Arnold Energy Center - Relay Evaluation

SSEL NUMBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGEMENT	ENERGIZE	CAPACITY PSA	CAPACITY IPA	DEMAND PSA	DEMAND IPA	PASS	ESSENT	COMMENTS
																	VDC.
2103			152H/UP 152H/DOWN 75CS/RAISE 75CS/LOWER 75/CLUTCH SW 152-CL/MS 152-SM/LS 152/IS 152/POS 152/a 152/b	--	1A407	CB	757	MV	--	--					Y	N	Contacts are mechanically actuated and are inherrently rugged.
			152/Y	GE HMA, Cat. No. 0137A7575P001	1A407	CB	757	SWGR GERS	ALL	ALL	1.80	1.00	1.10	0.15	Y	Y	Anti-pump relay. Screened using switchgear GERS.
2104	RHRSW/RHR SERVICE WATER PUMP D 1P012D BREAKER 152-408 (1A408)	BECH-E121<43D>/3 BECH-E131<42E>/2 BECH-E121<42C>/1 BECH-E106<3G>/0 APED-E11-007<1>/27	152/CS (HS-4925D)	GE SBM	1C003	CB	786	MV	--	--					Y	N	Manual control switch
			152E/CS (HS-4925G)	GE SBM	1C388			MV	--	--					Y	N	Manual control switch
			43 (HS4925E)	GE SB1	1C388			MV	--	--					Y	N	Manual control switch
			CB/CLOSE and C?/TRIP	GE SBM	1A408	CB	757	MV	--	--					Y	N	Manual control switch
			186/M	WESTINGHOUSE WL	1A408	CB	757	RELAY GERS	ALL	ALL	10.00	4.00	8.30	1.05	Y	Y	Contact chatter may cause breaker to trip
			150/151	GE IAC66K	1A408	CB	757	RELAY GERS	NO	D	5.00	3.00	8.30	1.05	N	Y	Contact chatter may energize lockout device 186/M and cause breaker to trip.
			150Q	GE PJC11A	1A408	CB	757	RELAY GERS	NO	D	5.00	3.00	8.30	1.05	N	Y	Contact chatter may energize lockout device 186/M and cause breaker to trip.
			197-41	GE HFA151A	1C031	CB	786	RELAY GERS	NO	ALL	10.00	4.00	2.24	0.66	Y	Y	Load Shed Circuit. Desired state of pump is running. Contact chatter may trip pump. See evaluation for SSEL item LDSHD 1A4 for contacts that affect relay coil. Normally-open contact only. Coil voltage 125 VDC.
			E11A-K062B	GE HFA51A	1C033	CB	786	RELAY GERS	NO	ALL	6.00	3.60	2.24	0.66	Y	Y	RHR Actuation Circuit. Desired state of pump is running. Contact chatter may trip pump. See evaluation for SSEL item RHR LOGIC for contacts that affect relay coil. Normally-open contact only. Coil voltage 125 VDC.
			194-41	GE HFA151A	1A403	CB	757	RELAY GERS	NO	ALL	10.00	4.00	8.30	1.05	Y	Y	Load Shed Circuit. Desired state of pump is running. Contact chatter may trip pump. See evaluation for SSEL item LDSHD 1A4 for contacts that affect relay coil. Normally-open contact only. Coil voltage 125 VDC.
			152H/UP 152H/DOWN 75CS/RAISE 75CS/LOWER 75/CLUTCH SW 152-CL/MS 152-SM/LS 152/IS 152/POS 152/a 152/b	--	1A408	CB	757	MV	--	--					Y	N	Contacts are mechanically actuated and are inherrently rugged.

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Duane Arnold Energy Center - Relay Evaluation

REEL NUMBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGEMENT	ENERGIZE	CAPACITY PSA	CAPACITY EPA	DEMAND PSA	DEMAND EPA	PASS	ESSENT	COMMENTS
8104			152/Y	GE HMA, Cat. No. 0137A7575P001	1A609	CB	757	ENGR GERS	ALL	ALL	1.80	1.00	1.18	0.15	Y	Y	Anti-pump relay. Screened using switchgear GERS.
8105	RHRSW/LOOP A RHR HEADER ISOLATION VALVE MO1941A	BECH-E121<045>/5	42/CS (HS1941A)	GE CR2940	1C003	CB	786	MV	--	--					Y	N	Manual con'rol switch
			42-O, 42-C, 49	Allis-Chalmers, NEMA Size 1, Model 25-111	1B34	RB	786	MCC GERS	ALL	ALL	1.50	1.00	0.90	0.15	Y	Y	
			LS, TS	Limitorque SMB-00	MO1941A			MV	--	--					Y	N	
8106	RHRSW/LOOP B RHR HEADER ISOLATION VALVE MO1941B	BECH-E121<045>/5	42/CS (HS1941B)	GE CR2940	1C003	CB	786	MV	--	--					Y	N	
			42-O, 42-C, 49	Allis-Chalmers, NEMA Size 1, Model 25-111	1B44	RB	757	MCC GERS	ALL	ALL	1.50	1.00	0.35	0.15	Y	Y	
			LS, TS	Limitorque SMB-00	MO1941B			MV	--	--					Y	N	
8109	RHRSW/LOOP A PRESSURE CONTROL VALVE MO2046	BECH-E121<055>/2 FP 7884-E9-85/6 APED-E11-007<3>/32 APED-E11-007<2>/26 APED-E11-007-4b>/30	HS2046	GE CR2940	1C003	CB	786	MV	--	--					Y	N	Manual control switch that affects relays K55A and K54A.
			42-O, 42-C, 49	Allis-Chalmers, NEMA Size 1, Model 25-111	1B34	RB	786	MCC GERS	ALL	ALL	1.50	1.00	0.90	0.15	Y	Y	
			LS, TS	Limitorque SMB-00	MO2046			MV	--	--					Y	N	
			E11A-K055A	GE HFA151	1C032	CB	786	CA	--	--					Y	N	The normal position of MO2046 is closed, the desired position after strong ground motion is open. Contacts from this relay affect the opening and closing coil of the starter. There are no seal-in contacts for the starter coils. In the closing circuit the K55A contact is in series with a limit switch contact (LS) from the valve operator. The LS contact is inherently rugged and open when the valve is closed. Therefore chatter of K55A will not affect the closing coil. In the opening circuit momentary chatter of the K55A contact might cause the valve to begin to open. However, without a sustained open demand from K55A, the valve will likely not even unseat.
			E11A-K054A	GE HFA151	1C032	CB	786	CA	--	--					Y	N	The normal position of MO2046 is closed, the desired position after strong ground motion is open. Contacts from this relay affect the opening and closing coil of the starter. There are no seal-in contacts for the starter coils. In the closing circuit the K54A contact is in series with a limit switch contact (LS) from the valve operator. The LS contact is inherently rugged and open when the valve is closed. Therefore chatter of K54A will not affect the closing coil. In the opening circuit momentary chatter of the K54A contact might cause the valve to begin to open. However, without a sustained open demand from K54A, the valve will likely not even unseat.
			E11A-K057A	GE HGA11	1C032	CB	786	CA	--	--					Y	N	The normal position of MO2046 is closed, the desired position after strong ground motion is open. Contacts from this relay affect the closing coil of the starter. There are no seal-in contacts for the starter coils.

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Duane Arnold Energy Center - Relay Evaluation

SSEL NUMBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGEMENT	ENERGIZE	CAPACITY PSA	CAPACITY EPA	DEMAND PSA	DEMAND EPA	PASS	ESSENT	COMMENTS
																	In the closing circuit the K57A contact is in series with a limit switch contact (LS) from the valve operator. The LS contact is inherently rugged and open when the valve is closed. Therefore chatter of K57A will not affect the closing coil.
109			E11A-K056A	GE HGA11	1C032	CB	786	CA	--	--					Y	N	The normal position of MO2044 is closed, the desired position after strong ground motion is open. Contacts from this relay affect the opening coil of the starter. There are no seal-in contacts for the starter coils. In the opening circuit momentary chatter of the K56A contact might cause the valve to begin to open. However, without a sustained open demand from K56A, the valve will likely not even unseat.
			52/b	--	1A3	CB	757	MV	--	--					Y	N	Contacts manually actuated by 4160 V switchgear breakers 1A307 and 1A308. Refer to evaluations for SSEL items 0101 and 0102 for contacts that affect breaker position.
			E11-0600A (IM2044)	--	1C019			CA	--	--					Y	N	Valve position modulator affects relays K56A and K57A There are no seal-in circuits for the valve closing and open starter coils. Momentary chatter of these contacts may cause the valve to move slightly, which is acceptable. Furthermore, there are no seal-ins or lockout which would prevent the valve from operating based on a sustained open or close demand.
110	RHRSW/LOOP A PRESSURE CONTROL VALVE MO1947	SECH-E121<055A>/1 FP 7884-E9-85/6 APED-E11-007<3>/32 APED-E11-007<2>/26 APED-E11-007<7>/21	HS1947B	GE CR2940	1C003	CB	786	MV	--	--					Y	N	Manual control switch that affects relays K55B and K54B.
			42-O, 42-C, 49	Allis-Chalmers, NEMA Size 1, Model 35-111	1B44	RB	757	MCC GERS	ALL	ALL	1.50	1.00	0.35	0.15	Y	Y	
			LS, TS	Limitorque SMB-0	MO1947			MV	--	--					Y	N	
			E11A-K055B	GE HFA151A	1C033	CB	786	CA	--	--					Y	N	The normal position of MO1947 is closed, the desired position after strong ground motion is open. Contacts from this relay affect the opening and closing coil of the starter. There are no seal-in contacts for the starter coils. In the closing circuit the K55B contact is in series with a limit switch contact (LS) from the valve operator. The LS contact is inherently rugged and open when the valve is closed. Therefore chatter of K55B will not affect the closing coil. In the opening circuit momentary chatter of the K55B contact might cause the valve to begin to open. However, without a sustained open demand from K55B, the valve will likely not even unseat.
			E11A-K054B	GE HFA151A	1C033	CB	786	CA	--	--					Y	N	The normal position of MO1947 is closed, the desired position after strong ground motion is open. Contacts from this relay affect the opening and closing coil of the starter. There are no seal-in contacts for the starter coils. In the closing circuit the K54B contact is in series with a limit switch contact (LS) from the valve operator. The LS contact is inherently rugged and open when the valve is closed. Therefore chatter of K54B will not affect the closing coil. In the opening circuit momentary chatter of the K54B contact might cause the valve to begin to open. However, without a sustained open demand

Table 6-2
Duane Arnold Energy Center - Relay Evaluation

SSEL NUMBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGEMENT	ENERGIZE	CAPACITY PSA	CAPACITY IPA	DEMAND PSA	DEMAND IPA	PASS	ESSENT	COMMENTS
																	from K54B, the valve will likely not even unseat.
110			E11A-K057B	GE HGA11A	1C033	CB	786	CA	--	--					Y	N	The normal position of MO1947 is closed, the desired position after strong ground motion is open. Contacts from this relay affect the closing coil of the starter. There are no seal-in contacts for the starter coils. In the closing circuit the K57B contact is in series with a limit switch contact (LS) from the valve operator. The LS contact is inherently rugged and open when the valve is closed. Therefore chatter of K57B will not affect the closing coil.
			E11A-K054B	GE HGA11A	1C033	CB	786	CA	--	--					Y	N	The normal position of MO1947 is closed, the desired position after strong ground motion is open. Contacts from this relay affect the opening coil of the starter. There are no seal-in contacts for the starter coils. In the opening circuit momentary chatter of the K54B contact might cause the valve to begin to open. However, without a sustained open demand from K54B, the valve will likely not even unseat.
			52/b	--	1A4	CB	757	MV	--	--					Y	N	Contacts manually actuated by 4160 V switchgear breakers 1A407 and 1A408. Refer to evaluations for SSEL items #103 and #104 for contacts that affect breaker position.
			E11-S600B (ZM1947)	--	1C019			CA	--	--					Y	N	Valve position modulator affects relays K54B and K57B There are no seal-in circuits for the valve closing and open starter coils. Momentary chatter of these contacts may cause the valve to move slightly, which is acceptable. Furthermore, there are no seal-ins or lockout which would prevent the valve from operating based on a sustained open or close demand.
111	RHRSW/Loop A Flow Rate Transmitter FT2050	APED-E11-007<10>/23	NA	--	--			NA	--	--					Y	N	Not affected by relays.
112	RHRSW/Loop B Flow Rate Transmitter FT1944	APED-E11-007<10>/23	43 (HS1971)	GE SB1	1C392			MV	--	--					Y	N	
201	RWS/River Water Supply Pump A 19117A Breaker 180901	BECH-E111<11>/14 BECH-E104<25>/14 FP-7884-E8B-013/4	42/CS (HS2907A)	GE SBM	1C006	CB	786	MV	--	--					Y	N	
			42/SS (HSS-2911A)	GE SBM	1C006	CB	786	MV	--	--					Y	N	
			K1-901	AGASTAT EGP	1C006	CB	786	RELAY GENS	ALL	ALL	3.30	1.30	2.24	0.66	Y	Y	Desired state of pump is running. Contact chatter may trip pump. Normally-open and normally-closed contacts.
			K2-901	AGASTAT EGP	1C006	CB	786	RELAY GENS	NO	ALL	9.00	5.40	2.24	0.66	Y	Y	Normally-open contacts only.
			K3-901	AGASTAT EGP	1C006	CB	786	RELAY GENS	ALL	ALL	3.30	1.30	2.24	0.66	Y	Y	Normally-open and normally-closed contacts.
			194-32	GE HFA151A	1A303	CB	757	RELAY GENS	NO	ALL	10.00	6.00	8.30	1.05	Y	Y	Load Shed Circuit. Desired state of pump is running. Contact chatter may trip pump. See evaluation for SSEL item LDSHD 1A3 for contacts that affect relay coil. Normally-open contact only. Coil voltage 125 VDC.

Table 4-2
Dunne Arnold Energy Center - Relay Evaluation

RELAY NUMBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGEMENT	ENERGIZE	CAPACITY PSA	CAPACITY IPA	DEMAND PSA	DEMAND IPA	PASS	ESSENT	COMMENTS
-01			KY2908A	AGASTAT 7012	1C006	CB	786	CA	--	--					Y	N	Chatter cannot start or trip pump.
			L/a, L/b, LS/1, LS/2, LS/3	--	1B0901	IS	747	MV	--	--					Y	N	Mechanically actuated contacts.
			52Y	GE HFA51A	1B0901	IS	747	SWGR GERS	ALL	ALL	1.80	1.00	1.47	0.24	Y	Y	Anti-pump relay screened using switchgear GERS.
202	BWS/Bivar Water Supply Pump C 1P117C Breaker 1B0902	BECH E111<11>/14 BECH E104<25>/14 FP-7884-E8B-013/6	42/CS (HS2907C)	GE SBM	1C006	CB	786	MV	--	--					Y	N	
			43/SS (HSS2911C)	GE SBM	1C006	CB	786	MV	--	--					Y	N	
			K1-902	AGASTAT EGP	1C006	CB	786	RELAY GERS	ALL	ALL	3.30	1.30	2.24	0.66	Y	Y	Desired state of pump is running. Contact chatter may trip pump. Normally-open and normally-closed contacts.
			K2-902	AGASTAT EGP	1C006	CB	786	RELAY GERS	NO	ALL	9.00	5.40	2.24	0.66	Y	Y	Normally-open contact only.
			K3-902	AGASTAT EGP	1C006	CB	786	RELAY GERS	ALL	ALL	3.30	1.30	2.24	0.66	Y	Y	Normally-open and normally-closed contacts.
			194-32	GE HFA151A	1A303	CB	757	RELAY GERS	NO	ALL	10.00	6.00	8.30	1.05	Y	Y	Load Shed Circuit. Desired state of pump is running. Contact chatter may trip pump. See evaluation for SSEL item LDSHD 1A3 for contacts that affect relay coil. Normally-open contact only. Coil voltage 125 VDC.
			KY2908C	AGASTAT 7012	1C006	CB	786	CA	--	--					Y	N	Chatter cannot start or trip pump.
			L/a, L/b, LS/1, LS/2, LS/3	--	1B0902	IS	747	MV	--	--					Y	N	Mechanically actuated contacts.
			52Y	GE HFA51A	1B0902	IS	747	SWGR GERS	ALL	ALL	1.80	1.00	1.47	0.24	Y	Y	Anti-pump relay screened using switchgear GERS.
203	BWS/Bivar Water Supply Pump B 1P117B	BECH-E111<11A>/4 BECH-E111<11C>/1 BECH-E104<26>/15 FP-7884-E8B-013A/6 BECH-E112<31>/1 BECH-E112<33>/1	42/CS (HS2907B)	GE SBM	1C006	CB	786	MV	--	--					Y	N	
			42E/CS (HS2907F)	GE SBM	1C388			MV	--	--					Y	N	
			42/SS (HSS2911B)	GE SBM	1C006	CB	786	MV	--	--					Y	N	
			43 (HS2907E)	GE SB1	1C388			MV	--	--					Y	N	
			K1-2001	AGASTAT EGP	1C006	CB	786	RELAY GERS	ALL	ALL	3.30	1.30	2.24	0.66	Y	Y	Desired state of pump is running. Contact chatter may trip pump. Normally-open and normally-closed contacts.
			K2-2001	AGASTAT EGP	1C006	CB	786	RELAY GERS	NO	ALL	9.00	5.40	2.24	0.66	Y	Y	Normally-open contact only.
			K3-2001	AGASTAT EGP	1C006	CB	786	RELAY GERS	ALL	ALL	3.30	1.30	2.24	0.66	Y	Y	Normally-open and normally-closed contacts.
			KY-2908B	AGASTAT 7012	1C006	CB	786	CA	--	--					Y	N	Chatter cannot start or trip pump.
			194-42	GE HFA151A	1A403	CB	757	RELAY GERS	NO	ALL	10.00	6.00	8.30	1.05	Y	Y	Load Shed Circuit. Desired state of pump is running. Contact chatter may trip pump. See evaluation for SSEL item LDSHD 1A4 for contacts that affect relay coil.

Table 6-3
Duane Arnold Energy Center - Relay Evaluation

SSEL NUMBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGEMENT	ENERGIZE	CAPACITY PSA	CAPACITY EPA	DEMAND PSA	DEMAND EPA	PASS	ESSENT	COMMENTS
																	Normally-open contact only. Coil voltage 125 VDC.
203			L/a, L/b, LS/1, LS/2, LS/3	--	1B2001	IS	767	NV	--	--					Y	N	Mechanically actuated contacts.
			52Y	GE HFA51A	1B2001	IS	767	SWGR GERS	ALL	ALL	1.80	1.00	1.47	0.24	Y	Y	Anti-pump relay screened using switchgear GERS.
			43-EN206B31	--	--			CA	--	--					Y	N	Contact chatter does not affect breaker position.
			43-206	GE SB1	1C188			NV	--	--					Y	N	
204	RWS/River Water Supply Pump D 1P117F	BECH-E111<11B>/4 BECH-E111<11C>/1 BECH-E104<24>/15 FP-7884-E8B-13A	42/CS (HS2907D)	GE SBM	1C006	CB	786	NV	--	--					Y	N	
			42E/CS (HS2907Q)	GE SSM	1C188			NV	--	--					Y	N	
			42/GS (HSS2911E)	GE SBM	1C006	CB	786	NV	--	--					Y	N	
			43 (HS2907E)	GE SB1	1C188			NV	--	--					Y	N	
			X1-2002	AGASTAT EGP	1C006	CB	786	RELAY GERS	ALL	ALL	3.30	1.30	2.24	0.66	Y	Y	Desired state of pump is running. Contact chatter may trip pump. Normally-open and normally-closed contacts.
			X2-2002	AGASTAT EGP	1C006	CB	786	RELAY GERS	NO	ALL	9.00	5.40	2.24	0.66	Y	Y	Normally-open contact only.
			X3-2002	AGASTAT EGP	1C006	CB	786	RELAY GERS	ALL	ALL	3.30	1.30	2.24	0.66	Y	Y	Normally-open and normally-closed contacts.
			XY-2908B	AGASTAT 7012	1C006	CB	786	CA	--	--					Y	N	Chatter cannot start or trip pump.
			194-42	GE HFA151A	1A4	CB	757	RELAY GERS	NO	ALL	10.00	6.00	8.30	1.05	Y	Y	Load Shed Circuit. Desired state of pump is running. Contact chatter may trip pump. See evaluation for SSEL item LDSHD 1A4 for contacts that affect relay coil. Normally-open contact only. Coil voltage 125 VDC.
			L/a, L/b, LS/1, LS/2, LS/3	--	1B2001	IS	767	NV	--	--					Y	N	Mechanically actuated contacts.
			52Y	GE HFA51A	1B2001	IS	767	SWGR GERS	ALL	ALL	1.80	1.00	1.47	0.24	Y	Y	Anti-pump relay screened using switchgear GERS.
			43-EN206B31	--	--			CA	--	--					Y	N	Contact chatter does not affect breaker position.
			43-206	GE SB1	1C188			NV	--	--					Y	N	
207	RWS/Loop A Dilution Flow Line Isolation Valve Solenoid SV4910A	BECH-E111<13>/6	HS-4910A	--	1C006	CB	786	NV	--	--					Y	N	Manual control switch.
208	RWS/Loop B Dilution Flow Line Isolation Valve Solenoid SV4910B	BECH-E111<13>/6	HS-4910B	--	1C006	CB	786	NV	--	--					Y	N	
208B	RWS/CV4909 Instrument Air Supply Isolation SV4909	BECH-E111<13>/6	HS-4909A	GE SBM	1C006	CB	786	NV	--	--					Y	N	

Table 6-2
Duane Arnold Energy Center Relay Evaluation

SSEL NUMBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGE NORM	ENERGIZE	CAPACITY PSA	CAPACITY ZPA	DEMAND PSA	DEMAND ZPA	PASS	ESSENT	COMMENTS
2068			HS-6905B	--	--			NV	--	--					Y	N	
			55-803	GE CR120A	1C006	CB	786	RELAY GERS	NO	D	10.00	6.00	2.24	0.66	Y	Y	Desired state of valve is closed. Contact chatter could open valve.
211	RWS/Loop A Stilling Basin Discharge Isol Valve Pilot SV6915	2ECH-E111<13>/6	HS-6914	--	1C006	CB	786	NV	--	--					Y	N	
212	RWS/Loop B Stilling Basin Discharge Isol Valve Pilot SV6914	2ECH-E111<13>/6	HS-6915	--	1C006	CB	786	NV	--	--					Y	N	
213	RWS/Loop A Flow Rate Transmittar FT6917	FP-M155-11<1A>/B	NA	--	--			NA	--	--					Y	N	Not affected by relays.
214	RWS/Loop B Flow Rate Transmittar FT6916	FP-M155-11<1B>/B	NA	--	--			NA	--	--					Y	N	Not affectad by relays.
302	DGS/Diesel Oil Transfer Pump 1P044B	2ECH-E106<5A>/2 2ECH-E113<40B>/0	PB (HS3204)	GE CR2940	1C091			NV	--	--					Y	N	Manual push-button control switch
			42/CS (HS3202)	GE SBM	1C008	CB	786	NV	--	--					Y	N	Manual control switch
			43 (HS3202A)	GE SBM	1C189			NV	--	--					Y	N	Manual transfar switch
			42/a, 42/b, 49	--	1B42	CB	757	CA	--	--					Y	N	Chattar of thasa contacts could affact only temporarily the operation of the pump. Chattar of thasa contacts will not create any seal-ins or lockouts which would adversely affact the operation of the pump following the strong ground motion of a SSE.
			TS3227	--	--			CA	--	--					Y	N	See nota for contacts 42/a, 42/b, and 49.
			LIS3210	--	--			CA	--	--					Y	N	See nota for contacts 42/a, 42/b, and 49.
303	DGS/Diesel Oil Transfer Pump 1P044A	2ECH-E106<5>/7	PB (HS3203)	GE CR2940	1C091			NV	--	--					Y	N	Manual push-button control switch
			42/CS (HS3201)	GE SBM	1C008	CB	786	NV	--	--					Y	N	Manual control switch
			42/a, 42/b, 49	--	1B32	CB	757	CA	--	--					Y	N	Chattar of thasa contacts could affact only temporarily the operation of the pump. Chattar of thasa contacts will not create any seal-ins or lockouts which would adversely affact the operation of the pump following the strong ground motion of a SSE.
			TS3226	--	--			CA	--	--					Y	N	See nota for contacts 42/a, 42/b, and 49.
			LIS3208	--	--			CA	--	--					Y	N	See nota for contacts 42/a, 42/b, and 49.
8306	DGS/Diesel Oil Day Tank Level Switch LIS3210	--	--	--	--			CA	--	--					Y	N	This davica was avaluatad along with the diesel fuel oil transfer pumps, see SSEL line item number 8302.
8307	DGS/Diesel Oil Day Tank Level Switch LIS3208	--	--	--	--			CA	--	--					Y	N	This davica was avaluatad along with the diesel fuel oil transfer pumps, see SSEL line item number 8303.

Table 4-2
Duane Arnold Energy Center - Relay Evaluation

SSEL NUMBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGEMENT	ENERGIZE	CAPACITY PSA	CAPACITY IPA	DEMAND PSA	DEMAND IPA	PASS	EXEMPT	COMMENTS
3108	DGS/Diesel Oil Day Tank Level Low-Low Alarm LIS3209	SECH-M132/37	--	--	--			NA	--	--					Y	N	Not affected by relays.
3109	DGS/Diesel Oil Day Tank Level Low-Low Alarm LIS3207	SECH-M132/37	--	--	--			NA	--	--					Y	N	Not affected by relays.
3126	DGS/Diesel Overspeed Sensor EC3236B	FP-M015-004<1>/16	--	--	--			NV	--	--					Y	N	This contact was evaluated under SSEL line item number 6063 and was determined to be inherently rugged.
3127	DGS/Diesel Overspeed Sensor EC3236A	FP-M015-005<1>/16	--	--	--			NV	--	--					Y	N	This contact was evaluated under SSEL line item number 6015 and was determined to be inherently rugged.
8401	CRHVAC/Control Room AC Unit A 1VAC030A	SECH-E113<26>/4 FP-7884-E9-86/4	HS-6113U	GE CR2940	1N3207			NV	--	--					Y	N	
			HS-6113A	GE CR2940	1C026			NV	--	--					Y	N	
			42/a, 49	Allis-Chalmers, NEMA Size 2, Model 25-112	1B3207	CB	757	MCC GERS	ALL	ALL	1.50	1.00	1.18	0.15	Y	Y	
8402	CRHVAC/Control Room AC Unit B 1VAC030B	SECH-E113<26>/4 FP-7884-E9-86/4	HS-6113V	GE CR2940	1N4218			NV	--	--					Y	N	
			HS-6113B	GE CR2940	1C026			NV	--	--					Y	N	
			42/a, 49	Allis-Chalmers, NEMA Size 2, Model 25-112	1B4218	CB	757	MCC GERS	ALL	ALL	1.50	1.00	1.18	0.15	Y	Y	
8405	CRHVAC/Loop A AC Exhaust Damper Solenoid EV6113A	SECH-E113<26>/4	42-3207/a	--	1B32	CB	757	CA	--	--					Y	N	Contact chatter will only momentarily affect valve position. See evaluation for SSEL item 8401 for documentation that no seismically vulnerable seal-in pathways exist.
8406	CRHVAC/Loop B AC Exhaust Damper Solenoid EV6113B	SECH-E113<26>/4	42-4218/a	--	1B42	CB	757	CA	--	--					Y	N	Contact chatter will only momentarily affect valve position. See evaluation for SSEL item 8402 for contacts for documentation that no seismically-vulnerable seal-in pathways exist.
8407	CRHVAC/Exhaust Fan A 1VRF010A	SECH-E113<27>/2 FP-7884-E9-82/5	HS-6104U	GE CR2940	1N3207			NV	--	--					Y	N	
			HS-6104A	GE CR2940	1C026			NV	--	--					Y	N	
			42-3207/a	Allis-Chalmers, NEMA Size 2, Model 25-112	1B3207	CB	757	MCC GERS	ALL	ALL	1.50	1.00	1.18	0.15	Y	Y	See evaluation for SSEL item 8401 for contacts that affect breaker position.
			42/a, 49	Allis-Chalmers, NEMA Size 1, Model 25-111	1B3208	CB	757	MCC GERS	ALL	ALL	1.50	1.00	1.18	0.15	Y	Y	
8408	CRHVAC/ Exhaust Fan B 1VRF010B	SECH-E113<27>/2 FP-7884-E9-81/5	HS-6104V	GE CR2940	1N4218			NV	--	--					Y	N	
			HS-6104B	GE CR2940	1C026			NV	--	--					Y	N	
			42-4218/a	Allis-Chalmers, NEMA Size 2, Model 25-112	1B4218	CB	757	MCC GERS	ALL	ALL	1.50	1.00	1.18	0.15	Y	Y	See evaluation for SSEL item 8402 for contacts that affect breaker position.

Table 6-1
Duane Arnold Energy Center - Relay Evaluation

SSEL UMBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGE MENT	ENERGIZE	CAPACITY PSA	CAPACITY IPA	DEMAND PSA	DEMAND IPA	PASS	ESSENT	COMMENTS
08			42/a, 69	Allis-Chalmers, NEMA Size 1, Model 25-111	1B4219	CB	757	MCC GERS	ALL	ALL	1.50	1.00	1.18	0.15	Y	Y	
11	CRHVAC/Loop A Exhaust Fan Damper Solenoid SV4127A	BECH-E113<27>/2	42-3208/a	--	1B32	CB	757	CA	--	--					Y	N	Contact chatter will only momentarily affect valve position. See evaluation for SSEL item 8807 for documentation that no seismically-vulnerable seal-in pathways exist.
12	CRHVAC/Loop B Exhaust Fan Damper Solenoid SV4127B	BECH-E113<27>/2	42-4319/a	--	1B42	CB	757	CA	--	--					Y	N	Contact chatter will only momentarily affect valve position. See evaluation for SSEL item 8408 for documentation that no seismically-vulnerable seal-in pathways exist.
35	CRHVAC/Battery Room Exhaust Fan A 1VEFS30A	BECH-E113<60>/9 FP-7884-E9-82/5 BECH-E113<36>/13 BECH-E113<35>/9	HS-6132A	GE CR2940	1C026			MV	--	--					Y	N	
			LR-7315A	WESTINGHOUSE WL	1C026			OA	--	--					Y	N	Lockout relay could be screened using RELAY GERS, but capacity data is not available for contacts that control its coil. Therefore, screening as an essential relay is not beneficial. Battery room exhaust fan trouble annunciator will alert operator if lockout relay prevents exhaust fan operation. Lockout relay can be reset at 1C026. Exhaust fans are not immediately required after an A-46 event.
			LR-7315B	WESTINGHOUSE WL	1C026			OA	--	--					Y	N	Lockout relay. See discussion under relay LR-7135A.
			95-030A	GE HGA11	1C026			OA	--	--					Y	N	Normally-open contact affects lockout relay. See discussion under relay LR-7315A.
			95-030B	GE HGA11	1C026			OA	--	--					Y	N	Normally-open contact affects lockout relay. See discussion under relay LR-7315B.
			K1	Nuclear Measurement Corp. Radiation Monitor	RIM6101A			OA	--	--					Y	N	Contact affects lockout relay. See discussions under relays LR-7315A and LR-7315B.
			K3	Nuclear Measurement Corp. Radiation Monitor	RIM6101A			OA	--	--					Y	N	Contact affects lockout relay. See discussions under relays LR-7315A and LR-7315B.
			49	--	1B32	CB	757	CA	--	--					Y	N	Chatter of contact will only briefly affect fan.
836	CRHVAC/Battery Room Exhaust Fan B 1VEF030B	BECH-E113<60A>/4 BECH-E113<60B>/0 FP-7884-E9-82/5 BECH-E113<36>/13 BECH-E113<35>/9	HS-6132B	GE CR2940	1C026			MV	--	--					Y	N	
			43 (HS3202A)	GE SB1	1C388			MV	--	--					Y	N	
			LR-7315A	WESTINGHOUSE WL	1C026			OA	--	--					Y	N	Lockout relay that could be screened using RELAY GERS. However, capacity data is not available for contacts that affect relay coil. Therefore, screening as an essential relay is not beneficial. Battery room exhaust fan trouble annunciator will alert operator if lockout relay prevents exhaust fan operation. Lockout relay can be reset at 1C026. Exhaust fans are not immediately required after an A-46 event.
			LR-7315B	WESTINGHOUSE WL	1C026			OA	--	--					Y	N	Lockout relay. See discussion under LR-7135A.

Table 4-2
Duane Arnold Energy Center - Relay Evaluation

SSEL NUMBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGEMENT	ENERGIZE	CAPACITY PSA	CAPACITY IPA	DEMAND PSA	DEMAND IPA	PASS	ESSENT	COMMENTS
434			95-030A	GE HGA11	1C026			OA	--	--					Y	N	Normally-open contact affects lockout relay. See discussion under relay LR-7315A.
			95-030B	GE HGA11	1C026			OA	--	--					Y	N	Normally-open contact affects lockout relay. See discussion under relay LR-7315B.
			K1	Nuclear Measurement Corp. Radiation Monitor	RIM6101A			OA	--	--					Y	N	Contact affects lockout relay. See discussions under relays LR-7315A and LR-7315B.
			K3	Nuclear Measurement Corp. Radiation Monitor	RIM6101A			OA	--	--					Y	N	Contact affects lockout relay. See discussions under relays LR-7315A and LR-7315B.
			69	--	1B42	CB	757	CA	--	--					Y	N	Chatter of contact will only briefly affect fan.
437	CRHVAC/Battery Room Exhaust Fan C 1VEF030C	BECH-E113<60>/9 FP-7884-E9-82/5 BECH-E113<36>/13 BECH-E113<35>/9	HS-6132C	GE CR2940	1C026			MV	--	--					Y	N	
			LR-7315A	WESTINGHOUSE WL	1C026			OA	--	--					Y	N	Lockout relay could be screened using RELAY GERS. However, capacity data is not available for contacts that affect relay coil. Therefore, screening as an essential relay is not beneficial. Battery room exhaust fan trouble annunciator will alert operator if lockout relay prevents exhaust fan operation. Lockout relay can be reset at 1C026. Exhaust fans are not immediately required after an A-46 event.
			LR-7315B	WESTINGHOUSE WL	1C026			OA	--	--					Y	N	Lockout relay. See discussion under LR-7135A.
			95-030A	GE HGA11	1C026			OA	--	--					Y	N	Normally-open contact affects lockout relay. See discussion under relay LR-7315A.
			95-030B	GE HGA11	1C026			OA	--	--					Y	N	Normally-open contact affects lockout relay. See discussion under relay LR-7315B.
			K1	Nuclear Measurement Corp. Radiation Monitor	RIM6101A			OA	--	--					Y	N	Contact affects lockout relay. See discussions under relays LR-7315A and LR-7315B.
			K3	Nuclear Measurement Corp. Radiation Monitor	RIM6101A			OA	--	--					Y	N	Contact affects lockout relay. See discussions under relays LR-7315A and LR-7315B.
			69	--	1B32	CB	757	CA	--	--					Y	N	Chatter of contact will only briefly affect fan.
438	HVIA/HVAC INSTRUMENT AIR COMPRESSOR A 1K003	BECH-E113<144>/1 FP-7884-M8C-3/1	All	--	--			CA	--	--					Y	N	No seal-in or lock-out contacts in control circuit for air compressor. Chatter of contacts may start or stop compressor. However, after the period of strong ground motion, control of the compressor will return to normal (i.e., high pressure will stop the compressor, low pressor will start the compressor).
439	HVIA/HVAC INSTRUMENT AIR COMPRESSOR B 1K004	BECH-E113<144>/1 FP-7884-M86-3/1	All	--	--			CA	--	--					Y	N	No seal-in or lock-out contacts in control circuit for air compressor. Chatter of contacts may start or stop compressor. However, after the period of strong ground motion, control of the compressor will return to normal (i.e., high pressure will stop the compressor, low pressor will start the compressor).
440	HVIA/Loop A Pressure Switch PS7335A	BECH-E113<144>/1	All	--	--			--	--	--					Y	N	Contacts covered under SSEL Line Number 0439

Table 4-2
Duane Arnold Energy Center - Relay Evaluation

SSEL NUMBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGEMENT	ENERGIZE	CAPACITY PSA	CAPACITY IPA	DEMAND PSA	DEMAND IPA	PASS	ESSAC	COMMENTS
443	HVIA/Loop B Pressure Switch PS7335B	BECH-E113<144>/1	All	--	--			--	--	--					Y	N	Contacts covered under SSEL line Number 8439.
444	HVIA/Loop A Receiver Isolation Valve HV7333A	BECH-E113<144>/1 FP-7884-M86-1/1	P/ER7333A	--	--			CA	--	--					Y	N	No seal-in or lock-out contacts in control circuit for solenoid valve. Chatter of contacts may open or close valve. However, after the period of strong ground motion, control of the valve will return to normal.
445	HVIA/Loop B Receiver Isolation Valve HV7333B	BECH-E113<144>/1 FP-7884-M86-3/1	P/ER7333B	--	--			CA	--	--					Y	N	No seal-in or lock-out contacts in control circuit for solenoid valve. Chatter of contacts may open or close valve. However, after the period of strong ground motion, control of the valve will return to normal.
446	RHVAC/Control Building Chiller A 1VCM001A	BECH-E113<31>/2 FP-7884-M063-003/8 FP-7884-M63-25<1>/1	PB (Reset)	--	1N305A			MV	--	--					Y	N	
			1SS	--	1N305A			MV	--	--					Y	N	
			HS-6924U	GE CR2940	1N305A			MV	--	--					Y	N	
			HS-6924X	GE CR2940	1N305A			MV	--	--					Y	N	
			HS-6924A	GE SBM	1C026			MV	--	--					Y	N	
			[illegible]-5920A	GE CR2940	1C026			MV	--	--					Y	N	
			S	FURNAS 40JB12AA-A	1N305	RB	812	CON GERS	ALL	ALL	4.50	3.00	3.15	0.54	Y	Y	Contact chatter may cause a line-to-line fault.
			1A	FURNAS 42ED1SAP	1N305	RB	812	CON GERS	ALL	ALL	4.50	3.00	3.15	0.54	Y	Y	Contact chatter may momentarily result in an undesigned configuration of the chiller's starter.
			1M	FURNAS 14RB12AA-A	1N305	RB	812	CON GERS	ALL	ALL	4.50	3.00	3.15	0.54	Y	Y	Contact chatter may momentarily result in an undesigned configuration of the chiller's starter.
			2M	FURNAS 40RB12AA-A	1N305	RB	812	CON GERS	ALL	ALL	4.50	3.00	3.15	0.54	Y	Y	Contact chatter may momentarily result in an undesigned configuration of the chiller's starter.
			TR	FURNAS 55BA1AP	1N305	RB	812	QUALIFIED	ALL	ALL					Y	Y	It could be postulated that chatter could momentarily result in an undesigned configuration of the chiller's starter. However, Wyle Test Report 42493-1 qualified the starter panel as a whole. A separate check of the control drawing confirmed that no other equipment would be affected adversely by chatter of this device. See Appendix J.
			49	--	1N305	RB	812	OA	--	--					Y	N	Contact chatter may trip chiller. Operator action would be required at panel 1N305A to reset the chiller's control circuitry (PB-Reset). This is acceptable, because the operator has indication of the chiller's status and the chiller is not required immediately following the strong ground motion.
			Pressure, temperature and flow switches: 1PS, 4PS, 2TAS, 6TAS, 3TAS, 5TAS, 7TAS, 2FLS, 3PS	--	--			OA	--	--					Y	N	See discussion for contact 49, above.
			1CR	--	--			CA	--	--					Y	N	Master control relay. Contact chatter may momentarily affect chiller operation. After the period of strong ground motion, this device will return to normal operation. This is considered acceptable.

Table 4-1
Duane Arnold Energy Center - Relay Evaluation

SSEL MBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGE MENT	ENERGIZE	CAPACITY PSA	CAPACITY IPA	DEMAND PSA	DEMAND IPA	PASS	ESSENT	COMMENTS
46			2CR	--	--			CA	--	--					Y	N	Transfer relay. Contact chatter may momentarily affect chiller operation. After the period of strong ground motion, this device will return to normal operation. This is considered acceptable.
			3CR	--	--			CA	--	--					Y	N	Start-up relay. Contact chatter may momentarily affect chiller operation. After the period of strong ground motion, this device will return to normal operation. This is considered acceptable.
			8CR	--	--			OA	--	--					Y	N	See discussion for contact 49, above.
			1TR	--	--			OA	--	--					Y	N	See discussion for contact 49, above.
			2TR	--	--			OA	--	--					Y	N	See discussion for contact 49, above.
			4TR	--	--			CA	--	--					Y	N	Start-up time delay. Contact chatter may momentarily affect chiller operation. After the period of strong ground motion, this device will return to normal operation. This is considered acceptable.
			5TR	--	--			OA	--	--					Y	N	See discussion for contact 49, above.
			8TR	--	--			OA	--	--					Y	N	See discussion for contact 49, above.
			1C	--	--			CA	--	--					Y	N	Oil pump contactor. Contact chatter will momentarily affect oil pump operation. After the period of strong ground motion, control of the oil pump will return to normal. This is considered acceptable.
			42-3225	--	--			OA	--	--					Y	N	See discussion for contact 49, above.
16A	CRHVAC/CB HVAC Chilled Water Pump 1VCP010A	BECH-E113<32>/2 BECH-E113<31>/2	HS6924A	GE SBM	1C026			NV	--	--					Y	N	Manual control switch.
			HS6924U	GE CR2940	1N305A			NV	--	--					Y	N	Manual control switch.
			49	--	--			CA	--	--					Y	N	Chatter of contact will only briefly affect pump.
47	CRHVAC/Control Building Chiller B 1VCH001B	BECH-E113<11>/2 FP-7886-M061-002/B FP-7886-M61-25<1>/1	PB (Reset)	--	1N405A			NV	--	--					Y	N	
			1SS	--	1N405A			NV	--	--					Y	N	
			HS-6924V	GE CR2940	1N405A			NV	--	--					Y	N	
			HS-6924Y	GE CR2940	1N405A			NV	--	--					Y	N	
			HS-6924B	GE SBM	1C026			NV	--	--					Y	N	
			HS-6920B	GE CR2940	1C026			NV	--	--					Y	N	
			9	FURNAS 40JB32AA-A	1N405	RB	812	CON GERS	ALL	ALL	4.50	3.00	3.15	0.56	Y	Y	Contact chatter may cause a line-to-line fault.
			1A	FURNAS 42ED35AF	1N405	RB	812	CON GERS	ALL	ALL	4.50	3.00	3.15	0.56	Y	Y	Contact chatter may momentarily result in an undesigned configuration of the chiller's starter.

Table 4-2
Duane Arnold Energy Center - Relay Evaluation

RSEL NUMBER	SYSTEM/DISCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGEMENT	ENERGIZE	CAPACITY PSA	CAPACITY ZPA	DEMAND PSA	DEMAND ZPA	PASS	ESSENT	COMMENTS
647			1M	FURNAS 14RB32AA-A	1N405	RB	812	CON GERS	ALL	ALL	4.50	3.00	3.15	0.54	Y	Y	Contact chatter may momentarily result in an undesigned configuration of the chiller's starter.
			2M	FURNAS 40RB32AA-A	1N405	RB	812	CON GERS	ALL	ALL	4.50	3.00	3.15	0.54	Y	Y	Contact chatter may momentarily result in an undesigned configuration of the chiller's starter.
			TR	FURNAS 55BA1AF	1N405	RB	812	QUALIFIED	ALL	ALL					Y	Y	It could be postulated that contact chatter could momentarily result in an undesigned configuration of the chiller's starter. However, Wyle Test Report 42492-1 qualified the starter panel as a whole. A separate check of the control drawing confirmed that no other equipment would be affected adversely by chatter of this device. See Appendix J.
			49	--	1N405	RB	812	OA	--	--					Y	N	Contact chatter may trip chiller. Operator action at panel 1N405A would be required to reset chiller's control circuitry (PB-Reset). This is acceptable, because the operator has indication of the chiller's status and the chiller is not required immediately following the strong ground motion.
			Pressure, temperature and flow switches: 1PS, 4PS, 2TAS, 6TAS, 3TAS, 5TAS, 7TAS, 2FLS, 3PS	--	--			OA	--	--					Y	N	See discussion for contact 49, above.
			1CR	--	--			CA	--	--					Y	N	Master control relay. Contact chatter may momentarily affect chiller operation. After the period of strong ground motion, this device will return to normal operation. This is considered acceptable.
			2CR	--	--			CA	--	--					Y	N	Transfer relay. Contact chatter may momentarily affect chiller operation. After the period of strong ground motion, this device will return to normal operation. This is considered acceptable.
			3CR	--	--			CA	--	--					Y	N	Start-up relay. Contact chatter may momentarily affect chiller operation. After the period of strong ground motion, this device will return to normal operation. This is considered acceptable.
			8CR	--	--			OA	--	--					Y	N	See discussion for contact 49, above.
			1TR	--	--			OA	--	--					Y	N	See discussion for contact 49, above.
			2TR	--	--			OA	--	--					Y	N	See discussion for contact 49, above.
			4TR	--	--			CA	--	--					Y	N	Start-up time delay. Contact chatter may momentarily affect chiller operation. After the period of strong ground motion, this device will return to normal operation. This is considered acceptable.
			5TR	--	--			OA	--	--					Y	N	See discussion for contact 49, above.
			6TR	--	--			OA	--	--					Y	N	See discussion for contact 49, above.
			1C	--	--			CA	--	--					Y	N	Oil pump contactor. Contact chatter will momentarily affect oil pump operation. After the period of strong ground motion, control of the oil pump will return to normal. This is considered acceptable.

Table 4-2
Duane Arnold Energy Center - Relay Evaluation

SSEL NUMBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGEMENT	ENERGIZE	CAPACITY PSA	CAPACITY IPA	DEMAND PSA	DEMAND IPA	PASS	ESSENT	COMMENTS
9447			42-8214	--	--			OA	--	--					Y	N	See discussion for contact 49, above.
9447A	CRHVAC/CB HVAC Chilled Water Pump 1VCP010B	BECH-E113<32>/2 BECH-E113<31>/2	HS69248	GE SBM	1C026			HV	--	--					Y	N	Manual control switch.
			HS49246V	GE CR2940	1N405A			HV	--	--					Y	N	Manual control switch.
			49	--	--			CA	--	--					Y	N	Chatter of contact will only briefly affect pump.Chilled water pump contactor auxiliary contact. Contact chatter may result in the lock out of the chiller. Operator action is relied upon to reset the chiller's control circuitry, as the operator has indication of the chiller's status and as the chiller is not required immediately following the strong ground motion.
9458	CRHVAC/Non-Essential Cooling HX A Isolation Valve Solenoid SV6920A	BECH-E113<30>/5	4SR	--	--			CA	--	--					Y	N	Contact chatter may momentarily affect valve position. After the period of strong ground motion, valve control will return to normal. This is considered acceptable.
			152/301	--	1A301	CB	757	HV	--	--					Y	N	Mechanically actuated contacts off of rugged breakers.
			152/302	--	1A302	CB	757	HV	--	--					Y	N	Mechanically actuated contacts off of rugged breakers.
9459	CRHVAC/Non-Essential Cooling HX B Isolation Valve Solenoid SV6920B	BECH-E113<31>/2	4SR	--	--			CA	--	--					Y	N	Contact chatter may momentarily affect valve position. After the period of strong ground motion, valve control will return to normal. This is considered acceptable.
			152/601	--	1A401	CB	757	HV	--	--					Y	N	Mechanically actuated contacts off of rugged breakers.
			152/602	--	1A402	CB	757	HV	--	--					Y	N	Mechanically actuated contacts off of rugged breakers.
9507	HVAC/Intake Structure Vent Fan A 1VSF50	BECH-E113<63>/6	HS-7714A	GE CR2940	1C156			HV	--	--					Y	N	Manual control switch.
			52-901/a, 52-902/a	--	--			HV	--	--					Y	N	Mechanically actutated breaker auxiliary contacts. Refer to the evaluations for SSEL items 8201 and 8202 for contacts that affect breaker position.
			42, 49	Allis-Chalmers, NEMA Size 1, Model 25-111	1B91			CA	ALL	ALL					Y	N	Contact chatter will only briefly interrupt fan operation. This is considered acceptable.
9508	HVAC/Intake Structure Vent Fan B 1VSF51	BECH-E113<63>/6	HS-7714B	GE CR2940	1C15[illegible]			HV	--	--					Y	N	Manual control switch.
			52-2001/a, 52-2002/a	--	--			HV	--	--					Y	N	Mechanically-actuated breaker auxiliary contacts. Refer to evaluations for SSEL items 8203 and 8204 for contacts that affect breaker position.
			42, 49	Allis-Chalmers, NEMA Size 1, Model 25-111	1B21			CA	ALL	ALL					Y	N	Contact chatter will only briefly interrupt fan operation. This is considered acceptable.
9513	HVAC/SW Pump Room Ventilation Fan A 1VSF054A	BECH-E113<79>/6 FP-7884-E9-B5/5	HS-7538A	GE CR2940	1C160			HV	--	--					Y	N	
			95-3601	GE HGA11	1C160			CA	--	--					Y	N	Contact chatter may affect fan operation during period of strong shaking. Afterwards fan will return to normal operation.

Table 4-1
Duane Arnold Energy Center - Relay Evaluation

SSEL UMBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGEMENT	ENERGIZE	CAPACITY PSA	CAPACITY IPA	DEMAND PSA	DEMAND IPA	PASS	ESSENT	COMMENTS
13			95-3602	Agastat GPI	1C160			CA	--	--					Y	N	Contact chatter may affect fan operation during period of strong shaking. Afterwards fan will return to normal operation.
			62-3601	Agastat 2622	1C160			CA	--	--					Y	N	Contact chatter may affect fan operation during period of strong shaking. Afterwards fan will return to normal operation.
			TS-7538A TS-7538C TS-7540A TIC-7538A	--	1C160			CA	--	--					Y	N	Contact chatter may affect fan operation during period of strong shaking. Afterwards fan will return to normal operation.
			49, 62/a	--	1B36			CA	--	--					Y	N	Contact chatter may affect fan operation during period of strong shaking. Afterwards fan will return to normal operation.
14	HVAC/SW Pump Room Ventilation Fan B 1VSP056B	BECH-E113<79>/4 PP-7884-E9-86/5	HS-7538B	GE CR2940	1C161			NV	--	--					Y	N	
			95-4601	GE HGA11	1C161			CA	--	--					Y	N	Contact chatter may affect fan operation during period of strong shaking. Afterwards fan will return to normal operation.
			62-4601	Agastat 2622	1C161			CA	--	--					Y	N	Contact chatter may affect fan operation during period of strong shaking. Afterwards fan will return to normal operation.
			TS-7538B TS-7538C TS-7540B TIC-7538B	--	1C161			CA	--	--					Y	N	Contact chatter may affect fan operation during period of strong shaking. Afterwards fan will return to normal operation.
			49, 62/a	--	1B46			CA	--	--					Y	N	Contact chatter may affect fan operation during period of strong shaking. Afterwards fan will return to normal operation.
17	HVAC/SW Pump Room Vent Fan Inlet Damper A Solenoid SV7539A	BECH-E113<79>/4	HS-7538A	GE CR2940	1C160			NV	--	--					Y	N	
			62-3601/a	--	1B36			CA	--	--					Y	N	Contact chatter will only briefly affect valve position. See evaluation for SSEL item #513 for contacts that affect contactor coil.
			95-3602	Agastat GPI	1C160			CA	--	--					Y	N	Contact chatter will only briefly affect valve position. See evaluation for SSEL item #513 for contacts that affect relay coil.
518	HVAC/SW Pump Room Vent Fan Inlet Damper B Solenoid SV7539B	BECH-E113<79>/4	HS-7538B	GE CR2940	1C161			NV	--	--					Y	N	
			62-4601/a	--	1B46			CA	--	--					Y	N	Contact chatter will only briefly affect valve position. See evaluation for SSEL item #514 for contacts that affect contactor coil.
521	HVAC/SW Pump Room Vent Fan Outlet Damper A Solenoid SV7538A	BECH-E113<79>/4	62-3601/a	--	1B36			CA	--	--					Y	N	Contact chatter will only briefly affect valve position. See evaluation for SSEL item #514 for contacts that affect contactor coil.
522	HVAC/SW Pump Room Vent Fan Outlet Damper B Solenoid SV7538B	BECH-E113<79>/4	62-4601/a	--	1B46			CA	--	--					Y	N	Contact chatter will only briefly affect valve position. See evaluation for SSEL item #514 for contacts that affect contactor coil.

Table 6-2
Duane Arnold Energy Center - Relay Evaluation

SSEL NUMBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGEMENT	ENERGIZE	CAPACITY PSA	CAPACITY ZPA	DEMAND PSA	DEMAND ZPA	PASS	ESSENT	COMMENTS
8529	HVAC/SW Pump Room Exhaust Damper Solenoid SV7536	BECH-E113<79>/6	42-3601/b	--	1B36			CA	--	--					Y	N	Contact chatter will only briefly affect valve position. See evaluation for SSEL item 8511 for contactsthat affect contactor coil.
8512	HVAC/SW Pump Room Exhaust Damper Solenoid SV7537	BECH-E113<79>/6	42-4601/b	--	1B46			CA	--	--					Y	N	Contact chatter will only briefly affect valve position. See evaluation for SSEL item 8514 for contacts that affect contactor coil.
8533	HVAC/RHR & CS Room AC Unit A 1VAC011 (1M4403)	BECH-E113<147A>/2 BECH-E112<31>/1 BECH-E112<33>/1 BECH-E113<40B>/0	43-KM206B19	AGASTAT GDP	1C422B	RB	757	CA	--	--					Y	N	Chatter of this device could interupt control power to 1VAC011 only momentarily during strong ground motion. The device which affects the operating coil of 43-KM206b19 is a manual transfer switch (see BECH-E112<33>) which is inherrently rugged.
			43/E,43/H (HS7003C)	GE SB1	1C388			NV	--	--					Y	N	Manual keylock switch
			HS7114	GE CR2940	1C023			NV	--	--					Y	N	Manual switch
			42, 42/a, 42/b, 49	Allis-Chalmers, NEMA Size 1, Model 25-111	1B4403			CA	--	--					Y	N	Contact chatter could start motor if the unit was in the AUTO. The unit would continue to run only if compartment conditions were outside temperature setpoints. This is considered acceptable.
			P/ER-7116, P/ER-7136, and P/ER-7150	--	1C168			CA	--	--					Y	N	Contact chatter could start motor if the unit was in the AUTO. The unit would continue to run only if compartment conditions were outside temperature setpoints. This is considered acceptable.
8516	HVAC/RHR & CS Room AC Unit B 1VAC012 (1M3404)	BECH-E113<147>/2 BECH-E112<31>/1 BECH-E112<33>/1 BECH-E113<40B>/0	HS7119	GE CR2940	1C023			NV	--	--					Y	N	Manual switch
			42, 42/a, 42/b, 49	Allis-Chalmers, NEMA Size 1, Model 25-111	1B4403			CA	--	--					Y	N	Contact chatter could start motor if the unit was in the AUTO. The unit would continue to run only if compartment conditions were outside temperature setpoints. This is considered acceptable.
			P/ER-7119, P/ER-7138 P/ER-7151	--	1C169			CA	--	--					Y	N	Contact chatter could start motor if the unit was in the AUTO. The unit would continue to run only if compartment conditions were outside temperature setpoints. This is considered acceptable.
8543	HVAC/Emer Diesel Room Vent Inlet Damper Solenoid SV7000A	BECH-E113<52>/6	42-3213/b	--	1B3213	CB	757	CA	--	--					Y	N	Chatter will only briefly affect valve position. Contacts that affect contactor coil can chatter as discussed in evaluation for SSEL item 8551.
			CW	AGASTAT GP	1C117			NV	--	--					Y	N	Refer to note for contact ESA in the Diesel Generator Starting and Engine Shutdown Logic that is evaluated under SSEL Line Number 6015.
8544	HVAC/Emer Diesel Room Vent Inlet Damper Solenoid SV7000B	BECH-E113<52A>/2 BECH-E113<40B>/0 BECH-E112<31>/1 BECH-E112<33>/1	42-4206/b	--	1B4206	CB	757	CA	--	--					Y	N	Chatter will only briefly affect valve position. Contacts that affect contactor coil can chatter as discussed on in evaluation for SSEL item 8552.
			CW	AGASTAT GP	1C116			NV	--	--					Y	N	Refer to note for contact ESA in the Diesel Generator Starting and Engine Shutdown Logic that is evaluated under SSEL Line Number 6063.
			HS-7003C	GE SB1	1C388			NV	--	--					Y	N	
			43-KM206B17	AGASTAT GP	1C422A			CA	--	--					Y	N	Chatter will only briefly affect valve position.

Table 4-2
Duane Arnold Energy Center - Relay Evaluation

SSEL NUMBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGEMENT	ENERGIZE	CAPACITY PSA	CAPACITY IPA	DEMAND PSA	DEMAND IPA	PASS	ESSENT	COMMENTS
646			43-206	GE SB1	1C388			NV	--	--					Y	N	
647	HVAC/Emer Diesel Room Vent Inlet Damper Solenoid SV7051A	BECH E113<52>/6	--	--	--			NA	--	--					Y	N	Not affected by relays.
648	HVAC/Emer Diesel Room Vent Inlet Damper Solenoid SV7001B	BECH E113<52A>/2 BECH E113<40B>/0 BECH-E112<31>/1 BECH-E112<33>/1	HS-7003C	GE SB1	1C368			NV	--	--					Y	N	
			43-KM206B17	AGASTAT GP	1C422A			CA	--	--					Y	N	
			43-206	GE SB1	1C388			NV	--	--					Y	N	
651	HVAC/Emer Diesel Room Vent Fan 1VSF020	BECH E113<52>/6 BECH-E113<53>/9	HS-7003A	GE CR2940	1C151			NV	--	--					Y	N	
			HS-7000A	GE CR2940	1C023			NV	--	--					Y	N	
			62-3213	--	1C023			CA	--	--					Y	N	Contact chatter will only briefly affect fan operation. If fan is running in auto. If fan is running due to a manual start, chatter may stop fan. The operator has indication of fan status and annunciation of high diesel generator room temperature. Operator may restart fan after period of strong shaking.
			95-3213	--	1C023			CA	--	--					Y	N	Chatter is acceptable as discussed for contact 62-3213.
			CW	AGASTAT EGP	1C117			CA	--	--					Y	N	Refer to note for contact 52SA in the Diesel Generator Starting and Engine Shutdown Logic that is evaluated under SSEL Line Number 6015.
			42/a, 49	Allis-Chalmers, NEMA Size 2, Model 25-112	1B3213	CB	757	MCC GERS	ALL	ALL	1.50	1.00	1.18	0.15	Y	Y	
652	HVAC/Emer Diesel Room Vent Fan 1VSF021	BECH-E113<52A>/2 BECH-E113<53>/9 BECH-E113<40B>/0 BECH-E112<31>/1 BECH-E112<33>/1	HS-7003B	GE CR2940	1C152			NV	--	--					Y	N	
			HS-7000B	GE CR2940	1C023			NV	--	--					Y	N	
			HS-7003C	GE SB1	1C388			NV	--	--					Y	N	
			62-4206	--	1C023			CA	--	--					Y	N	Contact chatter will only briefly affect fan operation. If fan is running in auto. If fan is running due to a manual start, chatter may stop fan. The operator has indication of fan status and annunciation of high diesel generator room temperature. Operator may restart fan after period of strong shaking.
			95-4206	--	1C023			CA	--	--					Y	N	Chatter is acceptable as discussed for contact 62-4206.
			CW	AGASTAT EGP	1C118			NV	--	--					Y	N	Refer to note for contact 52SA in the Diesel Generator Starting and Engine Shutdown Logic that is evaluated under SSEL Line Number 6043.
			42/a, 49	Allis-Chalmers, NEMA Size 2, Model 25-112	1B4206	CB	757	MCC GERS	ALL	ALL	1.50	1.00	1.18	0.15	Y	Y	
			43-KM206B17	AGASTAT GP	1C422A			CA	--	--					Y	N	Chatter is acceptable as discussed for contact 62-4206.

Table 4-2
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SSEL NUMBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGEMENT	ENERGIZE	CAPACITY PSA	CAPACITY IPA	DEMAND PSA	DEMAND IPA	PASS	ESSENT	COMMENTS
552			43-204	GE SB1	1C388			NV	--	--					Y	N	
559	HVAC/Emer Diesel Room Vent Exhaust Damper Solenoid SV7002A	BECH-E113<52>/4	--	--	--			NA	--	--					Y	N	Not affected by relays.
560	HVAC/Emer Diesel Room Vent Exhaust Damper Solenoid SV7002B	BECH-E113<52A>/2 BECH-E113<40B>/0 BECH-E112<31>/1 BECH-E113<13>/1	HS-7003C	GE SB1	1C388			NV	--	--					Y	N	
			43-EM204E17	AGASTAT GP	1C422A			CA	--	--					Y	N	Chatter will only briefly affect valve position.
			43-204	GE SB1	1C388			NV	--	--					Y	N	
647	480VAC/SBDG 1G-31 Control Panel 1C093	--	All	--	--			--	--	--					Y	N	This panel contains the exciter for emergency diesel generator 1G-31. The contacts that affect the exciter are evaluated with the rest of the diesel generator control logic (refer to SSEL line number 6015.
648	SBDG/SBDG 1G-21 Control Panel 1C094	--	All	--	--			--	--	--					Y	N	This panel contains the exciter for emergency diesel generator 1G-21. The contacts that affect the exciter are evaluated with the rest of the diesel generator control logic (refer to SSEL line number 6063.
703	CBL/480/277V Lighting Panel 1L08 Supply Breaker 1B4223	BECH-E105<16>/19	NA	--	--			NA	--	--					Y	N	Manual breaker; not affected by relays.
E LOGIC	CORE SPRAY ACTUATION LOGIC	APED-E21-006<1>/24 APED-E21-006<2>/25	E21A-K003A	GE HGA11A DC	1C043	CB	786	RELAY GERS	NO	ALL	4.40	1.80	2.24	0.66	Y	Y	NO contacts only; Coil voltage 125 VDC
			E21A-K003B	GE HGA11A DC	1C044	CB	786	RELAY GERS	NO	ALL	4.40	1.80	2.24	0.66	Y	Y	NO contacts only; Coil voltage 125 VDC
			E21A-K004A	GE HGA11A DC	1C043	CB	786	RELAY GERS	NO	ALL	4.40	1.80	2.24	0.66	Y	Y	NO contacts only; Coil voltage 125 VDC
			E21A-K004B	GE HGA11A DC	1C044	CB	786	RELAY GERS	NO	ALL	4.40	1.80	2.24	0.66	Y	Y	NO contacts only; Coil voltage 125 VDC
			E21A-K005A	GE HFA51A	1C043	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.24	0.66	Y	Y	NO contacts only; Coil voltage 125 VDC
			E21A-K005B	GE HFA51A	1C044	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.24	0.66	Y	Y	NO contacts only; Coil voltage 125 VDC
			E21A-K006A	GE HFA51A	1C043	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.24	0.66	Y	Y	NO contacts only; Coil voltage 125 VDC
			E21A-K006B	GE HFA51A	1C044	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.24	0.66	Y	Y	NO contacts only; Coil voltage 125 VDC
			E21A-K007A	GE HFA51A	1C043	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.24	0.66	Y	Y	NO contacts only; Coil voltage 125 VDC
			E21A-K007B	GE HFA51A	1C044	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.24	0.66	Y	Y	NO contacts only; Coil voltage 125 VDC
			E21A-K008A	GE HFA51A	1C043	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.24	0.66	Y	Y	NO contacts only; Coil voltage 125 VDC
			E21A-K008B	GE HFA51A	1C044	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.24	0.66	Y	Y	NO contacts only; Coil voltage 125 VDC
			E21A-K009A	GE HGA11A DC	1C043	CB	786	RELAY GERS	NO	ALL	4.40	1.80	2.24	0.66	Y	Y	NO contacts only; Coil voltage 125 VDC
			E21A-K009B	GE HGA11A DC	1C044	CB	786	RELAY GERS	NO	ALL	4.40	1.80	2.24	0.66	Y	Y	NO contacts only; Coil voltage 125 VDC
			E21A-K010A	GE HFA51A	1C043	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.24	0.66	Y	Y	NO contacts only; Coil voltage 125 VDC

Table 4-2
Duane Arnold Energy Center - Relay Evaluation

ESEL NUMBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGEMENT	ENERGIZE	CAPACITY PSA	CAPACITY IPA	DEMAND PSA	DEMAND IPA	PASS	ESSENT	COMMENTS
B LOGIC			E21A-K010B	GE NFA51A	1C044	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.24	0.66	Y	Y	NO contacts only; Coil voltage 125 VDC
			E21A-K011A	GE NFA51A	1C043	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.24	0.66	Y	Y	NO contacts only; Coil voltage 125 VDC
			E21A-K011B	GE NFA51A	1C044	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.24	0.66	Y	Y	NO contacts only; Coil voltage 125 VDC
			E21A-K012A	GE NFA51A	1C043	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.24	0.66	Y	Y	NO contacts only; Coil voltage 125 VDC
			E21A-K012B	GE NFA51A	1C044	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.24	0.66	Y	Y	NO contacts only; Coil voltage 125 VDC
			E21A-K013A	GE NFA51A	1C043	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.24	0.66	Y	Y	NO contacts only; Coil voltage 125 VDC
			E21A-K013B	GE NFA51A	1C044	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.24	0.66	Y	Y	NO contacts only; Coil voltage 125 VDC
			E21A-K014A	GE NFA151A	1C043	CB	786	RELAY GERS	NO	ALL	10.00	6.00	2.24	0.66	Y	Y	NO contacts only; Coil voltage 125 VDC
			E21A-K014B	GE NFA151A	1C044	CB	786	RELAY GERS	NO	ALL	10.00	6.00	2.24	0.66	Y	Y	NO contacts only; Coil voltage 125 VDC
			E21A-K015A	GE NFA151A	1C043	CB	786	RELAY GERS	NO	ALL	10.00	6.00	2.24	0.66	Y	Y	NO contacts only; Coil voltage 125 VDC
			E21A-K015B	GE NFA151A	1C044	CB	786	RELAY GERS	NO	ALL	10.00	6.00	2.24	0.66	Y	Y	NO contacts only; Coil voltage 125 VDC
			E21A-K016A	AGASTAT TR	1C043	CB	786	RELAY GERS	NO	ALL	3.80	1.50	2.24	0.66	Y	Y	Coil voltage 125 VDC
			E21A-K016B	AGASTAT TR	1C044	CB	786	RELAY GERS	NO	ALL	3.80	1.50	2.24	0.66	Y	Y	Coil voltage 125 VDC
			E21A-K019A	GE HGA11A DC	1C043	CB	786	RELAY GERS	NO	ALL	4.40	1.80	2.24	0.66	Y	Y	NO contacts only; Coil voltage 125 VDC
			E21A-K019B	GE HGA11A DC	1C044	CB	786	RELAY GERS	NO	ALL	4.40	1.80	2.24	0.66	Y	Y	NO contacts only; Coil voltage 125 VDC
			E21A-K020A	GE HGA11A DC	1C043	CB	786	RELAY GERS	NO	ALL	4.40	1.80	2.24	0.66	Y	Y	NO contacts only; Coil voltage 125 VDC
			E21A-K020B	GE HGA11A DC	1C044	CB	786	RELAY GERS	NO	ALL	4.40	1.80	2.24	0.66	Y	Y	NO contacts only; Coil voltage 125 VDC
			E21A-K024A	GE NFA51A	1C043	CB	786	CA	NC	ALL					Y	N	This contact provides a permissive to start the diesel generator under LOCA conditions. A LOCA event is not relied upon to start the diesel during an A-44 event. Therefore, chatter is acceptable. Coil voltage 125 VDC.
			E21A-K024B	GE NFA51A	1C044	CB	786	CA	NC	ALL					Y	N	This contact provides a permissive to start the diesel generator under LOCA conditions. A LOCA event is not relied upon to start the diesel during an A-44 event. Therefore, chatter is acceptable. Coil voltage 125 VDC.
			E21A-K026A	AGASTAT EGP	1C043	CB	786	RELAY GERS	NO	ALL	9.00	5.40	2.24	0.66	Y	Y	NO contacts only; Coil voltage 125 VDC
			E21A-K026B	AGASTAT EGP	1C044	CB	786	RELAY GERS	NO	ALL	9.00	5.40	2.24	0.66	Y	Y	NO contacts only; Coil voltage 125 VDC
			HS2103 (S5A)	GE SBM	1C003	CB	786	MV	--	--					Y	N	
			HS2103A (S16A)	GE CR2940	1C043	CB	786	MV	--	--					Y	N	
			HS2117 (S4A)	GE SBM	1C003	CB	786	MV	--	--					Y	N	
			HS2123 (S5B)	GE SBM	1C003	CB	786	MV	--	--					Y	N	
			HS2123C (S16B)	GE CR2940	1C044	CB	786	MV	--	--					Y	N	
			HS2117 (S1B)	GE SBM	1C003	CB	786	MV	--	--					Y	N	

Table 6-2
Duane Arnold Energy Center - Relay Evaluation

SSEL NUMBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGEMENT	ENERGIZE	CAPACITY PSA	CAPACITY IPA	DEMAND PSA	DEMAND IPA	PASS	ESSENT	COMMENTS
LOGIC			HS2151A (S15A)	GE CR2940	1C003	CB	786	MV	--	--					Y	N	
			HS2151B (S15B)	GE CR2940	1C003	CB	786	MV	--	--					Y	N	
			S11A	GE CR2940	1C043	CB	786	MV	--	--					Y	N	
			S12A	GE CR2940	1C043	CB	786	MV	--	--					Y	N	
			S11B	GE CR2940	1C044	CB	786	MV	--	--					Y	N	
			S12B	GE CR2940	1C044	CB	786	MV	--	--					Y	N	
			S14A	GE CR2940	1C043	CB	786	MV	--	--					Y	N	
			S14B	GE CR2940	1C044	CB	786	MV	--	--					Y	N	
			127/31X	GE HFA151A	1C031	CB	786	RELAY GERS	NO	ALL	10.00	6.00	2.24	0.66	Y	Y	Automatic Load Shed Circuit. See evaluation for SSEL item LDHSD 1A3 for contacts that affect this device. NO contact only. Coil voltage 125 VDC.
			127/41X	GE HFA151A	1C031	CB	786	RELAY GERS	NO	ALL	10.00	6.00	2.24	0.66	Y	Y	Automatic Load Shed Circuit. See evaluation for SSEL item LDSHD 1A4 for contacts that affect this device. NO contact only. Coil voltage 125 VDC.
			B21-N031A (LIS4531)	YARWAY 4418C	1C056	RB	786	GE DATA	ALL	ALL	3.00	1.20	2.10	0.38	Y	Y	See Section 6.1.7.
			B21-N031C (LIS4533)	YARWAY 4418C	1C056	RB	786	GE DATA	ALL	ALL	3.00	1.20	2.10	0.38	Y	Y	See Section 6.1.7.
			B21-N031B (LIS4532)	YARWAY 4418C	1C055	RB	757	GE DATA	ALL	ALL	3.00	1.20	0.88	0.38	Y	Y	See Section 6.1.7.
			B21-N031D (LIS4534)	YARWAY 4418C	1C055	RB	757	GE DATA	ALL	ALL	3.00	1.20	0.88	0.38	Y	Y	See Section 6.1.7.
			LS3 (MO2100)	Limitorque SMB-00	MO2100			MV	--	--					Y	N	
			LS3 (MO2147)	Limitorque SMB-00	MO2147			MV	--	--					Y	N	
			LS3 (MO2120)	Limitorque SMB-00	MO2120			MV	--	--					Y	N	
			LS3 (MO2146)	Limitorque SMB-00	MO2146			MV	--	--					Y	N	
			E11-N011A (PS4310B)	Static O-Ring 12N	1C122	RB	757	GE DATA	ALL	ALL	3.00	1.20	0.88	0.38	Y	Y	See Section 6.1.7.
			E11-N001C (PS4312B)	Static O-Ring 12N	1C126	RB	757	GE DATA	ALL	ALL	3.00	1.20	0.88	0.38	Y	Y	See Section 6.1.7.
			B21-N021A (PS4565)	BARKSDALE B2T	1C056	RB	786	GE DATA	ALL	ALL	3.00	1.20	2.10	0.38	Y	Y	See Section 6.1.7.
			B21-N021C (PS4529)	BARTON 288	1C122	RB	757	GE DATA	ALL	ALL	3.00	1.20	0.88	0.38	Y	Y	See Section 6.1.7.
			E11-N011B (PS4311B)	Static O-Ring 12N	1C058	RB	739	GE DATA	ALL	ALL	3.00	1.20	0.88	0.38	Y	Y	See Section 6.1.7.
			E11-N011D (PS4313B)	Static O-Ring 12N	1C121	RB	757	GE DATA	ALL	ALL	3.00	1.20	0.88	0.38	Y	Y	See Section 6.1.7.
			B21-N021B (PS4568)	BARTON 288	1C055	RB	757	GE DATA	ALL	ALL	3.00	1.20	0.88	0.38	Y	Y	See Section 6.1.7.
			B21-N021D (PS4568)	BARTON 288	1C121	RB	757	GE DATA	ALL	ALL	3.00	1.20	0.88	0.38	Y	Y	See Section 6.1.7.
DEHD 1A3	Load Shed Circuit Bus 1A3	BECH-E104<25>/14 BECH-E023/21 BECH-E104<2>/9	127-3	GE HGA14AR	1A3	CB	757	CDU	NO	ALL			8.30	1.05	N	Y	NO contact affects 127-3X coil. Therefore, chatter of the NO contact is not acceptable. Coil voltage 125 VDC. Undervoltage relay.

Table 6-2
Duane Arnold Energy Center - Relay Evaluation

SSEL NUMBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGEMENT	ENERGIZE	CAPACITY PSA	CAPACITY EPA	DEMAND PSA	DEMAND EPA	PASS PSA	PASS ESSENT	COMMENTS
		BECH-E104<25A>/3 APED-E21-006<2>/25															
LDSHD 1A3			127-3X	GE HFA151A	1A302	CB	757	RELAY GERS	NC	ALL	3.00	1.80	8.30	1.05	N	Y	Relay has 5 NC contacts. Addendum 2 to EPRI NP-7147-SL provides capacity data for HFA151A relays with more than 3 NC contacts. Coil voltage 125 VDC. Contact chatter is not acceptable for either the energized or deenergized state. Refer to discussion on this relay under SSEL item number 6001 (Feeder Breaker From Diesel Generator).
			196-31	GE HFA151A	1A3	CB	757	RELAY GERS	NO	ALL	10.00	6.00	8.30	1.05	Y	Y	NO contact only. Coil voltage 125 VDC.
			196-32	GE HFA151A	1A3	CB	757	RELAY GERS	NO	ALL	10.00	6.00	8.30	1.05	Y	Y	NO contact only. Coil voltage 125 VDC.
			197-31	GE HFA151A	1C031	CB	786	RELAY GERS	NO	ALL	10.00	6.00	2.24	0.66	Y	Y	NO contact only. Coil voltage 125 VDC.
			195-3	GE HFA151A	1C031	CB	786	RELAY GERS	NO	ALL	10.00	6.00	2.24	0.66	Y	Y	NO contact only. Coil voltage 125 VDC.
			194-3	GE HFA151A	1C031	CB	786	RELAY GERS	ALL	ALL	3.00	1.80	2.24	0.66	Y	Y	NO and NC contacts Coil voltage 125 VDC.
			142-3	AGASTAT 2412	1C031	CB	786	RELAY GERS	ALL	ALL	12.50	5.00	2.24	0.66	Y	Y	
			K21A-K011A	GE HFA51A	1C043	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.24	0.66	Y	Y	Core Spray Actuation Logic. Refer to evaluation for SSEL item CS LOGIC for contacts that affect relay coil. NO contact only. Coil voltage 125 VDC.
			127X/ST11	GE HFA151A	1C031	CB	786	RELAY GERS	NO	ALL	10.00	6.00	2.24	0.66	Y	Y	NO contact only. Coil voltage 125 VDC.
			127/ST11	GE NGV11C	1C031	CB	786	RELAY GERS	ALL	ALL	8.00	3.20	2.24	0.66	Y	Y	
			127/SB11	GE NGV11C	1C031	CB	786	RELAY GERS	ALL	ALL	8.00	3.20	2.24	0.66	Y	Y	
			HS127X/32	GE CR2940	1C351	CB	757	MV	--	--					Y	N	Manual control switch
			127X/32	GE HFA151A	1C351	CB	757	RELAY GERS	NO	ALL	10.00	6.00	5.31	0.68	Y	Y	Coil voltage 125 VDC
			127/31	GE NGV11C	1C031	CB	786	RELAY GERS	ALL	ALL	8.00	3.20	2.24	0.66	Y	Y	
			127-31X	GE HFA151A	1C031	CB	786	RELAY GERS	NO	ALL	10.00	6.00	2.24	0.66	Y	Y	NO contacts only. Coil voltage 125 VDC.
			127-32	ITE 27D	1C351	CB	757	RELAY GERS	ALL	ALL	15.00	6.00	5.31	0.68	Y	Y	
			62-127X32	AGASTAT E7012	1C351	CB	757	RELAY GERS	ALL	ALL	12.50	7.00	5.31	0.68	Y	Y	
			152a-301	Aux. contact off of breaker	1A3	CB	757	MV	--	--					Y	N	Auxiliary contact off of a rugged breaker. Opening of the breaker due to chatter is acceptable, as the load shed circuitry will function as designed.
			152a-302	Aux. contact off of breaker	1A3	CB	757	MV	--	--					Y	N	Auxiliary contact off of a rugged breaker. Opening of the breaker due to chatter is acceptable, as the load shed circuitry will function as designed.
			PB	--	1C008	CB	786	MV	--	--					Y	N	Manual control switch.
LDSHD 1A4	Load Shed Circuit Bus 1A4	BECH-E104<26>/15 BECH-E023/21 BECH-E104<3>/9 BECH-E104<36A>/4 BECH-E023A/2 APED-E21-006<2>/25	127-4	GE NGA14AR	1A4	CB	757	CDU	NO	ALL			8.30	1.05	N	Y	NO contact affects 127-4X coil. Therefore, chatter of NO contact is not acceptable. Coil voltage 125 VDC. Undervoltage relay.

Table 4-2
Duane Arnold Energy Center - Relay Evaluation

REEL NUMBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGEMENT	ENERGIZE	CAPACITY PSA	CAPACITY IPA	DEMAND PSA	DEMAND IPA	S...	ESSENT	COMMENTS
GRND 1A4			127-4X	GE HFA151A	1A402	CB	757	RELAY GERS	ALL	ALL	3.00	1.80	8.30	1.05	N	Y	Relay has 5 NC contacts. Addendum 2 to EPRI NP-7147-SL provides capacity data for HFA151A relays with more than 3 NC contacts. Coil voltage 125 VDC. Contact chatter is not acceptable for either the energized or deenergized state. Refer to discussion on this relay in SSEL item number 6050 (Feeder Breaker From Diesel Generator).
			194-41	GE HFA151A	1A4	CB	757	RELAY GERS	NO	ALL	10.00	6.00	8.30	1.05	Y	Y	NO contacts only. Coil voltage 125 VDC.
			194-42	GE HFA151A	1A4	CB	757	RELAY GERS	NO	ALL	10.00	6.00	8.30	1.05	Y	Y	NO contacts only. Coil voltage 125 VDC.
			197-41	GE HFA151A	1C031	CB	786	RELAY GERS	NO	ALL	10.00	6.00	2.24	0.66	Y	Y	NO contacts only. Coil voltage 125 VDC.
			195-4	GE HFA151A	1C031	CB	786	RELAY GERS	NO	ALL	10.00	6.00	2.24	0.66	Y	Y	NO contacts only. Coil voltage 125 VDC.
			196-4	GE HFA151A	1C031	CB	786	RELAY GERS	ALL	ALL	3.00	1.80	2.24	0.66	Y	Y	NO and NC contacts. Coil voltage 125 VDC.
			142-4	AGASTAT 2412	1C031	CS	786	RELAY GERS	ALL	ALL	12.50	5.00	2.24	0.66	Y	Y	
			E21A-K011B	GE HFA51A	1C044	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.24	0.66	Y	Y	Core Spray Actuation Logic. Refer to evaluation for SSEL item CS LOGIC for contacts that affect relay coil. NO contact only. Coil voltage 125 VDC.
			127X/ST12	GE HFA151A	1C031	CB	786	RELAY GERS	NO	ALL	10.00	6.00	2.24	0.66	Y	Y	NO contacts only. Coil voltage 125 VDC.
			127/ST12	GE MGV11C	1C031	CB	786	RELAY GERS	ALL	ALL	8.00	3.20	2.24	0.66	Y	Y	
			127/SB12	GE MGV11C	1C031	CB	786	RELAY GERS	ALL	ALL	8.00	3.20	2.24	0.66	Y	Y	
			HS127X/42	GE CR2940	1C352	CB	757	MV	--	--					Y	N	Manual control switch
			127X/42	GE HFA151A	1C352	CB	757	RELAY GERS	NO	ALL	10.00	6.00	5.31	0.68	Y	Y	Coil voltage 125 VDC.
			127/41	GE MGV11C	1C031	CB	786	RELAY GERS	ALL	ALL	8.00	3.20	2.24	0.66	Y	Y	
			127-41X	GE HFA151A	1C031	CB	786	RELAY GERS	NO	ALL	10.00	6.00	2.24	0.66	Y	Y	NC contacts only. Coil voltage 125 VDC.
			127-42	ITE 27D	1C352	CB	757	RELAY GERS	ALL	ALL	15.00	6.00	5.31	0.68	Y	Y	
			42-127X42	AGASTAT E7012	1C352	CB	757	RELAY GERS	ALL	ALL	12.50	7.00	5.31	0.68	Y	Y	
			152a-401	Aux. contact off of 1A4 breaker		CB	757	MV	--	--					Y	N	Auxiliary contact off of a rugged breaker. Opening of the breaker due to chatter is acceptable, as the load shed circuitry will function as designed.
			152a-402	Aux. contact off of 1A4 breaker		CB	757	MV	--	--					Y	N	Auxiliary contact off of a rugged breaker. Opening of the breaker due to chatter is acceptable, as the load shed circuitry will function as designed.
			41 (143-1A4/SS)	GE SB1	1C168			MV	--	--					Y	N	
HR LOGIC RHR ACTUATION LOGIC		APED-A71-003<1>/42 APED-A71-003<5>/31 APED-A71-003<6>/35 APED-A71-003<7>/20 APED-A71-003<9>/15	A71B-K005A	GE HFA151A	1C015	CB	786	RELAY GERS	NO	ALL	10.00	6.00	2.24	0.66	Y	Y	NO contacts only. Coil voltage 120 VAC.

Table 4-2
Duane Arnold Energy Center - Relay Evaluation

REEL NUMBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGEMENT	ENERGIZE	CAPACITY PSA	CAPACITY IPA	DEMAND PSA	DEMAND IPA	PASS	ESSENT	COMMENTS
R LOGIC		APED-C71-004<4>/21 APED-C71-004<6>/22 APED-C71-004<7>/25	A71B-K005B	GE HFA151A	1C017	CB	786	RELAY GERS	NO	ALL	10.00	6.00	2.24	0.66	Y	Y	NO contacts only. Coil voltage 120 VAC.
		APED-E11-007<1>/27 APED-E11-007<2>/24 APED-E11-007<3>/32	A71B-K005C	GE HFA151A	1C015	CB	786	RELAY GERS	NO	ALL	10.00	6.00	2.24	0.66	Y	Y	NO contacts only. Coil voltage 120 VAC.
		APED-E11-007<4>/23 APED-E11-007<5>/25 APED-E11-007<6>/20	A71B-K005D	GE HFA151A	1C017	CB	786	RELAY GERS	NO	ALL	10.00	6.00	2.24	0.66	Y	Y	NO contacts only. Coil voltage 120 VAC.
		APED-E11-007<7>/31 APED-E11-007<8>/22 APED-E11-007<9>/20	A71B-K017	GE CR120A	1C041	CB	786	RELAY GERS	NO	ALL	10.00	6.00	2.24	0.66	Y	Y	NO contact only. Coil voltage 120 VAC.
			A71B-K018	GE CR120A	1C042	CB	786	RELAY GERS	NO	ALL	10.00	6.00	2.24	0.66	Y	Y	NO contact only. Coil voltage 120 VAC.
			A71B-K047	GE CR120A	1C041	CB	786	RELAY GERS	NO	ALL	10.00	6.00	2.24	0.66	Y	Y	NO contact only. Coil voltage 120 VAC.
			A71B-K048	GE CR120A	1C042	CB	786	RELAY GERS	NO	ALL	10.00	6.00	2.24	0.66	Y	Y	NO contact only. Coil voltage 120 VAC.
			A71B-K059	GE CR120A	1C041	CB	786	RELAY GERS	ALL	ALL	9.00	5.40	2.24	0.66	Y	Y	NO and NC contacts. Coil voltage 120 VAC.
			A71B-K060	GE CR120A	1C042	CB	786	RELAY GERS	ALL	ALL	9.00	5.40	2.24	0.66	Y	Y	NO and NC contacts. Coil voltage 120 VAC.
			C71A-K004A	GE HFA151A	1C015	CB	786	RELAY GERS	NO	ALL	10.00	6.00	2.24	0.66	Y	Y	NO contacts only. Coil voltage 120 VAC.
			C71A-K004B	GE HFA151A	1C017	CB	786	RELAY GERS	NO	ALL	10.00	6.00	2.24	0.66	Y	Y	NO contacts only. Coil voltage 120 VAC.
			C71A-K004C	GE HFA151A	1C015	CB	786	RELAY GERS	NO	ALL	10.00	6.00	2.24	0.66	Y	Y	NO contacts only. Coil voltage 120 VAC.
			C71A-K004D	GE HFA151A	1C017	CB	786	RELAY GERS	NO	ALL	10.00	6.00	2.24	0.66	Y	Y	NO contacts only. Coil voltage 120 VAC.
			C71A-K006A	GE HFA151A	1C015	CB	786	RELAY GERS	NO	ALL	10.00	6.00	2.24	0.66	Y	Y	NO contacts only. Coil voltage 120 VAC.
			C71A-K006B	GE HFA151A	1C017	CB	786	RELAY GERS	NO	ALL	10.00	6.00	2.24	0.66	Y	Y	NO contacts only. Coil voltage 120 VAC.
			C71A-K006C	GE HFA151A	1C015	CB	786	RELAY GERS	NO	ALL	10.00	6.00	2.24	0.66	Y	Y	NO contacts only. Coil voltage 120 VAC.
			C71A-K006D	GE HFA151A	1C017	CB	786	RELAY GERS	NO	ALL	10.00	6.00	2.24	0.66	Y	Y	NO contacts only. Coil voltage 120 VAC.
			E11A-K003A	GE HGA11A DC	1C032	CB	786	RELAY GERS	NO	ALL	4.40	1.80	2.24	0.66	Y	Y	NO contacts only; Coil voltage 125 VDC
			E11A-K003B	GE HGA11A DC	1C033	CB	786	RELAY GERS	NO	ALL	4.40	1.80	2.24	0.66	Y	Y	NO contacts only; Coil voltage 125 VDC
			E11A-K004A	GE HGA11A DC	1C032	CB	786	RELAY GERS	NO	ALL	4.40	1.80	2.24	0.66	Y	Y	NO contacts only; Coil voltage 125 VDC
			E11A-K004B	GE HGA11A DC	1C033	CB	786	RELAY GERS	NO	ALL	4.40	1.80	2.24	0.66	Y	Y	NO contacts only; Coil voltage 125 VDC
			E11A-K005A	GE HFA51A	1C032	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.24	0.66	Y	Y	NO contacts only; Coil voltage 125 VDC
			E11A-K005B	GE HFA51A	1C033	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.24	0.66	Y	Y	NO contacts only; Coil voltage 125 VDC
			E11A-K006A	GE HFA51A	1C032	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.24	0.66	Y	Y	NO contacts only; Coil voltage 125 VDC
			E11A-K006B	GE HFA51A	1C033	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.24	0.66	Y	Y	NO contacts only; Coil voltage 125 VDC
			E11A-K007A	GE HFA51A	1C032	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.24	0.66	Y	Y	NO contacts only; Coil voltage 125 VDC
			E11A-K007B	GE HFA51A	1C033	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.24	0.66	Y	Y	NO contacts only; Coil voltage 125 VDC

Table 6-2
Duane Arnold Energy Center - Relay Evaluation

SSEL NUMBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGEMENT	ENERGIZE	CAPACITY PSA	CAPACITY ZPA	DEMAND PSA	DEMAND ZPA	PASS	ESSENT	COMMENTS
NB LOGIC			E11A-K008A	GE HFA51A	1C032	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.24	0.66	Y	Y	NO contacts only; Coil voltage 125 VDC
			E11A-K008B	GE HFA51A	1C033	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.24	0.66	Y	Y	NO contacts only; Coil voltage 125 VDC
			E11A-K009A	GE HFA51A	1C032	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.24	0.66	Y	Y	NO contacts only; Coil voltage 125 VDC
			E11A-K009B	GE HFA51A	1C033	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.24	0.66	Y	Y	NO contacts only; Coil voltage 125 VDC
			E11A-K010A	GE HFA51A	1C032	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.24	0.66	Y	Y	NO contacts only; Coil voltage 125 VDC
			E11A-K010B	GE HFA51A	1C033	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.24	0.66	Y	Y	NO contacts only; Coil voltage 125 VDC
			E11A-K011A	GE HFA51A	1C032	CB	786	CA	NC	ALL					Y	N	Chatter will not cause or prevent system actuation. Coil voltage 125 VDC.
			E11A-K011B	GE HFA51A	1C033	CB	786	CA	NC	ALL					Y	N	Chatter will not cause or prevent system actuation. Coil voltage 125 VDC.
			E11A-K014A	GE HFA151A	1C032	CB	786	RELAY GERS	NO	ALL	10.00	6.00	2.24	0.66	Y	Y	NO contacts only; Coil voltage 125 VDC
			E11A-K014B	GE HFA151A	1C033	CB	786	RELAY GERS	NO	ALL	10.00	6.00	2.24	0.66	Y	Y	NO contacts only; Coil voltage 125 VDC
			E11A-K015A	GE HFA151A	1C032	CB	786	RELAY GERS	NO	ALL	10.00	6.00	2.24	0.66	Y	Y	NO contacts only; Coil voltage 125 VDC
			E11A-K015B	GE HFA51A	1C033	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.24	0.66	Y	Y	NO contacts only; Coil voltage 125 VDC
			E11A-K016A	GE HFA51A	1C032	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.24	0.66	Y	Y	NO contacts only; Coil voltage 125 VDC
			E11A-K016B	GE HFA51A	1C033	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.24	0.66	Y	Y	NO contacts only; Coil voltage 125 VDC
			E11A-K018A	GE HFA51A	1C032	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.24	0.66	Y	Y	NO contacts only. Coil voltage 125 VDC.
			E11A-K018B	GE HFA51A	1C033	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.24	0.66	Y	Y	NO contacts only. Coil voltage 125 VDC.
			E11A-K019A	GE HFA51A	1C032	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.24	0.66	Y	Y	NO contacts only. Coil voltage 125 VDC.
			E11A-K019B	GE HFA51A	1C033	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.24	0.66	Y	Y	NO contacts only. Coil voltage 125 VDC.
			E11A-K021A	GE HFA51A	1C032	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.24	0.66	Y	Y	NO contacts only. Coil voltage 125 VDC.
			E11A-K021B	GE HFA51A	1C033	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.24	0.66	Y	Y	NO contacts only. Coil voltage 125 VDC.
			E11A-K022A	GE HFA51A	1C032	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.24	0.66	Y	Y	NO contacts only. Coil voltage 125 VDC.
			E11A-K022B	GE HFA51A	1C033	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.24	0.66	Y	Y	NO contacts only. Coil voltage 125 VDC.
			E11A-K023A	GE HGA11A DC	1C032	CB	786	RELAY GERS	NO	ALL	4.40	1.80	2.24	0.66	Y	Y	Coil voltage 125 VDC
			E11A-K023B	GE HGA11A DC	1C033	CB	786	RELAY GERS	NO	ALL	4.40	1.80	2.24	0.66	Y	Y	Coil voltage 125 VDC
			E11A-K024A	GE HGA11A DC	1C032	CB	786	RELAY GERS	NO	ALL	4.40	1.80	2.24	0.66	Y	Y	Coil voltage 125 VDC
			E11A-K024B	GE HGA11A DC	1C033	CB	786	RELAY GERS	NO	ALL	4.40	1.80	2.24	0.66	Y	Y	Coil voltage 125 VDC
			E11A-K025A	GE HGA11A DC	1C032	CB	786	RELAY GERS	NO	ALL	4.40	1.80	2.24	0.66	Y	Y	Coil voltage 125 VDC

Table 4-2
Duane Arnold Energy Center - Relay Evaluation

SSEL NUMBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGEMENT	ENERGIZE	CAPACITY PSA	CAPACITY ZPA	DEMAND PSA	DEMAND ZPA	PASS	ESSENT	COMMENTS
RHR LOGIC			E11A-K025B	GE NGA11A DC	1C033	CB	786	RELAY GERS	NO	ALL	4.40	1.80	2.24	0.66	Y	Y	Coil voltage 125 VDC
			E11A-K026A	GE NGA11A DC	1C032	CB	786	RELAY GERS	NO	ALL	4.40	1.80	2.24	0.66	Y	Y	Coil voltage 125 VDC
			E11A-K026B	GE NGA11A DC	1C033	CB	786	RELAY GERS	NO	ALL	4.40	1.80	2.24	0.66	Y	Y	Coil voltage 125 VDC
			E11A-K027A	GE HFA151A	1C032	CB	786	RELAY GERS	ALL	ALL	3.00	1.80	2.24	0.66	Y	Y	Coil voltage 125 VDC
			E11A-K027B	GE HFA151A	1C033	CB	786	RELAY GERS	ALL	ALL	3.00	1.80	2.24	0.66	Y	Y	Coil voltage 125 VDC
			E11A-K028A	AGASTAT TR	1C032	CB	786	RELAY GERS	ALL	ALL	3.80	1.50	2.24	0.66	Y	Y	
			E11A-K028B	AGASTAT TR	1C033	CB	786	RELAY GERS	ALL	ALL	3.80	1.50	2.24	0.66	Y	Y	
			E11A-K031A	GE NGA11A DC	1C032	CB	786	RELAY GERS	NO	ALL	4.40	1.80	2.24	0.66	Y	Y	NO contacts only; Coil voltage 125 VDC
			E11A-K031B	GE NGA11A DC	1C033	CB	786	RELAY GERS	NO	ALL	4.40	1.80	2.24	0.66	Y	Y	NO contacts only; Coil voltage 125 VDC
			E11A-K032A	GE NGA11A DC	1C032	CB	786	RELAY GERS	NO	ALL	4.40	1.80	2.24	0.66	Y	Y	NO contacts only; Coil voltage 125 VDC
			E11A-K032B	GE NGA11A DC	1C033	CB	786	RELAY GERS	NO	ALL	4.40	1.80	2.24	0.66	Y	Y	NO contacts only; Coil voltage 125 VDC
			E11A-K033A	GE NGA11A DC	1C032	CB	786	RELAY GERS	NO	ALL	4.40	1.80	2.24	0.66	Y	Y	NO contacts only; Coil voltage 125 VDC
			E11A-K033B	GE NGA11A DC	1C033	CB	786	RELAY GERS	NO	ALL	4.40	1.80	2.24	0.66	Y	Y	NO contacts only; Coil voltage 125 VDC
			E11A-K034A	AGASTAT TR	1C032	CB	786	RELAY GERS	ALL	ALL	3.80	1.50	2.24	0.66	Y	Y	Coil voltage 125 VDC
			E11A-K034B	AGASTAT TR	1C033	CB	786	RELAY GERS	ALL	ALL	3.80	1.50	2.24	0.66	Y	Y	Coil voltage 125 VDC
			E11A-K035A	GE NGA11A DC	1C032	CB	786	RELAY GERS	NO	ALL	4.40	1.80	2.24	0.66	Y	Y	Coil voltage 125 VDC.
			E11A-K035B	GE NGA11A DC	1C033	CB	786	RELAY GERS	NO	ALL	4.40	1.80	2.24	0.66	Y	Y	Coil voltage 125 VDC.
			E11A-K036A	GE NGA11A DC	1C032	CB	786	RELAY GERS	NO	ALL	4.40	1.80	2.24	0.66	Y	Y	Coil voltage 125 VDC.
			E11A-K036B	GE NGA11A DC	1C033	CB	786	RELAY GERS	NO	ALL	4.40	1.80	2.24	0.66	Y	Y	Coil voltage 125 VDC.
			E11A-K037A	GE HFA51A	1C032	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.24	0.66	Y	Y	Chatter of NC contacts is acceptable as they are in series with normally-open, seismically-adequate contacts. Coil voltage 125 VDC.
			E11A-K037B	GE HFA11A	1C033	CB	786	RELAY GERS	NO	ALL	8.00	4.80	2.24	0.66	Y	Y	Chatter of NC contacts is acceptable as they are in series with normally-open, seismically-adequate contacts. Coil voltage 125 VDC.
			E11A-K039A	GE HFA51A	1C032	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.24	0.66	Y	Y	NO contacts only; Coil voltage 125 VDC
			E11A-K039B	GE HFA11A	1C033	CB	786	RELAY GERS	NO	ALL	8.00	4.80	2.24	0.66	Y	Y	NO contacts only; Coil voltage 125 VDC
			E11A-K040A	AGASTAT TR	1C032	CB	786	RELAY GERS	ALL	ALL	3.80	1.50	2.24	0.66	Y	Y	Coil voltage 125 VDC

Table 6-2
Duane Arnold Energy Center - Relay Evaluation

ESSEL NUMBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGEMENT	ENERGIZE	CAPACITY PSA	CAPACITY ZPA	DEMAND PSA	DEMAND ZPA	PASS	ESSENT	COMMENTS
HR LOGIC			E11A-K040B	AGASTAT TR	1C033	CB	786	RELAY GERS	ALL	ALL	3.80	1.50	2.24	0.66	Y	Y	Coil voltage 125 VDC
			E11A-K043A	GE HFA51A	1C032	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.24	0.66	Y	Y	Chatter of NC contacts is acceptable as they are in series with normally-open, seismically-adequate contacts. Coil voltage 125 VDC.
			E11A-K043B	GE HFA11A	1C033	CB	786	RELAY GERS	NO	ALL	8.00	4.80	2.24	0.66	Y	Y	Chatter of NC contacts is acceptable as they are in series with normally-open, seismically-adequate contacts. Coil voltage 125 VDC.
			E11A-K044A	GE HFA51A	1C032	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.24	0.66	Y	Y	NO contacts only; Coil voltage 125 VDC
			E11A-K044B	GE HFA11A	1C033	CB	786	RELAY GERS	NO	ALL	8.00	4.80	2.24	0.66	Y	Y	NO contacts only; Coil voltage 125 VDC
			E11A-K045A	GE CR120ET (time delay)	1C032	CB	786	RELAY GERS	NO	ALL	12.00	4.80	2.24	0.66	Y	Y	NO and NC contacts; Coil voltage 125 VDC
			E11A-K045B	GE CR120ET (time delay)	1C033	CB	786	RELAY GERS	ALL	ALL	12.00	4.80	2.24	0.66	Y	Y	NO and NC contacts; Coil voltage 125 VDC
			E11A-K054A	GE HFA151A	1C032	CB	786	RELAY GERS	ALL	ALL	3.00	1.80	2.24	0.66	Y	Y	NO and NC contacts. Coil Voltage 125 VDC
			E11A-K054B	GE HFA151A	1C033	CB	786	RELAY GERS	ALL	ALL	3.00	1.80	2.24	0.66	Y	Y	NO and NC contacts. Coil Voltage 125 VDC
			E11A-K055A	GE HFA151A	1C032	CB	786	RELAY GERS	ALL	ALL	3.00	1.80	2.24	0.66	Y	Y	NO and NC contacts. Coil Voltage 125 VDC
			E11A-K055B	GE HFA151A	1C033	CB	786	RELAY GERS	ALL	ALL	3.00	1.80	2.24	0.66	Y	Y	NO and NC contacts. Coil Voltage 125 VDC
			E11A-K061A	GE HFA51A	1C032	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.24	0.66	Y	Y	NC contacts affect control of valves only. Evaluation of valve control logic concluded that chatter of NC contacts is acceptable. Coil voltage 125 VDC
			E11A-K061B	GE HFA51A	1C033	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.24	0.66	Y	Y	NC contacts affect control of valves only. Evaluation of valve control logic concluded that chatter of NC contacts is acceptable. Coil voltage 125 VDC
			E11A-K062A	GE HFA51A	1C032	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.24	0.66	Y	Y	NO contacts only. Coil voltage 125 VDC.
			E11A-K062B	GE HFA51A	1C033	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.24	0.66	Y	Y	NO contacts only. Coil voltage 125 VDC.
			E11A-K063A	GE HFA51A	1C032	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.24	0.66	Y	Y	Chatter of NC contact would only momentarily affect opening of MO1003 and MO1905. This is considered acceptable. Coil voltage 125 VDC
			E11A-K063B	GE HFA51A	1C033	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.24	0.66	Y	Y	Chatter of NC contact would only briefly affect opening of MO2003 and MO1905. This is considered acceptable. Coil voltage 125 VDC
			E11A-K065A	GE HGA11A DC	1C032	CB	786	RELAY GERS	NO	ALL	4.40	1.80	2.24	0.66	Y	Y	NO contacts only; Coil voltage 125 VDC
			E11A-K065B	GE HGA11A DC	1C033	CB	786	RELAY GERS	NO	ALL	4.40	1.80	2.24	0.66	Y	Y	NO contacts only; Coil voltage 125 VDC
			E11A-K066A	GE HFA151A	1C032	CB	786	RELAY GERS	ALL	ALL	3.00	1.80	2.24	0.66	Y	Y	NO and NC contacts. Coil Voltage 125 VDC
			E11A-K066B	GE HGA11A DC	1C033	CB	786	RELAY GERS	NO	ALL	4.40	1.80	2.24	0.66	Y	Y	NO contacts only. Coil Voltage 125 VDC.

Table 6-2
Duane Arnold Energy Center - Relay Evaluation

RELAY NUMBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGEMENT	ENERGIZE	CAPACITY PSA	CAPACITY IPA	DEMAND PSA	DEMAND IPA	PASS	ESSENT	COMMENTS
HR LOGIC			E11A-K047A	GE HGA11A DC	1C032	CB	786	RELAY GERS	NO	ALL	4.40	1.80	2.24	0.66	Y	Y	NO contacts only. Coil voltage 125 VDC.
			E11A-K047B	GE HFA151A	1C033	CB	786	RELAY GERS	ALL	ALL	3.00	1.80	2.24	0.66	Y	Y	NO and NC contacts. Coil Voltage 125 VDC
			E11A-K049A	GE HGA11A DC	1C032	CB	786	RELAY GERS	NO	ALL	4.40	1.80	2.24	0.66	Y	Y	NO contacts only; Coil voltage 125 VDC
			E11A-K049B	GE HGA11A DC	1C033	CB	786	RELAY GERS	NO	ALL	4.40	1.80	2.24	0.66	Y	Y	NO contacts only; Coil voltage 125 VDC
			E11A-K070A	AGASTAT TR	1C032	CB	786	RELAY GERS	ALL	ALL	3.80	1.50	2.24	0.66	Y	Y	
			E11A-K070B	AGASTAT TR	1C033	CB	786	RELAY GERS	ALL	ALL	3.80	1.50	2.24	0.66	Y	Y	
			E11A-K072A	GE HFA151A	1C032	CB	786	RELAY GERS	ALL	ALL	3.00	1.80	2.24	0.66	Y	Y	NO and NC contacts; Coil voltage 125 VDC
			E11A-K072B	GE HFA151A	1C033	CB	786	RELAY GERS	ALL	ALL	3.00	1.80	2.24	0.66	Y	Y	NO and NC contacts; Coil voltage 125 VDC
			E11A-K073A	GE HFA51A	1C032	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.24	0.66	Y	Y	NO contacts only; Coil voltage 125 VDC
			E11A-K073B	GE HFA51A	1C033	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.24	0.66	Y	Y	NO contacts only; Coil voltage 125 VDC
			E11A-K075A	AGASTAT TR	1C032	CB	786	RELAY GERS	ALL	ALL	3.80	1.50	2.24	0.66	Y	Y	
			E11A-K075B	AGASTAT TR	1C033	CB	786	RELAY GERS	ALL	ALL	3.80	1.50	2.24	0.66	Y	Y	
			E11A-K076A	GE HFA151A	1C032	CB	786	RELAY GERS	ALL	ALL	3.00	1.80	2.24	0.66	Y	Y	NO and NC contacts; Coil voltage 125 VDC
			E11A-K076B	GE HFA151A	1C033	CB	786	RELAY GERS	ALL	ALL	3.00	1.80	2.24	0.66	Y	Y	NO and NC contacts; Coil voltage 125 VDC
			E11A-K077A	GE HFA51A	1C032	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.24	0.66	Y	Y	Coil voltage 125 VDC.
			E11A-K077B	GE HFA51A	1C033	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.24	0.66	Y	Y	Coil voltage 125 VDC.
			E11A-K078A	GE HGA11A DC	1C032	CB	786	RELAY GERS	NO	ALL	4.40	1.80	2.24	0.66	Y	Y	NO contacts only; Coil voltage 125 VDC
			E11A-K078B	GE HGA11A DC	1C033	CB	786	RELAY GERS	NO	ALL	4.40	1.80	2.24	0.66	Y	Y	NO contacts only. Coil voltage 125 VDC
			E11A-K079A	GE HFA51A	1C032	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.24	0.66	Y	Y	NO contacts only; Coil voltage 125 VDC
			E11A-K079B	GE HFA51A	1C033	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.24	0.66	Y	Y	NO contacts only; Coil voltage 125 VDC
			E11A-K080A	GE HFA51A	1C032	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.24	0.66	Y	Y	NO contacts only; Coil voltage 125 VDC
			E11A-K080B	GE HFA51A	1C033	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.24	0.66	Y	Y	NO contacts only; Coil voltage 125 VDC
			E11A-K081A	AGASTAT 2412	1C032	CB	786	RELAY GERS	NC	ALL	12.50	5.00	2.24	0.66	Y	Y	NC contacts only. Coil voltage 125 VDC.
			E11A-K081B	AGASTAT 2412	1C033	CB	786	RELAY GERS	NC	ALL	12.50	5.00	2.24	0.66	Y	Y	NC contacts only. Coil voltage 125 VDC.
			E11A-K086A	AGASTAT 2412	1C032	CB	786	RELAY GERS	NC	ALL	12.50	5.00	2.24	0.66	Y	Y	NC contacts only. Coil voltage 125 VDC.
			E11A-K086B	AGASTAT 2412	1C033	CB	786	RELAY GERS	NC	ALL	12.50	5.00	2.24	0.66	Y	Y	NC contacts only. Coil voltage 125 VDC.
			E11A-K087A	GE HGA11A DC	1C032	CB	786	RELAY GERS	NO	ALL	4.40	1.80	2.24	0.66	Y	Y	NO contacts only. Coil voltage 125 VDC.
			E11A-K087B	GE HGA11A DC	1C033	CB	786	RELAY GERS	NO	ALL	4.40	1.80	2.24	0.66	Y	Y	NO contacts only. Coil voltage 125 VDC.
			E11A-K088A	GE HGA11A DC	1C032	CB	786	RELAY GERS	NO	ALL	4.40	1.80	2.24	0.66	Y	Y	NO contacts only. Coil voltage 125 VDC.

Table 4-2
Duane Arnold Energy Center - Relay Evaluation

SSEL NUMBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGEMENT	ENERGIZE	CAPACITY PSA	CAPACITY IPA	DEMAND PSA	DEMAND IPA	PASS	ESSENT	COMMENTS
HR LOGIC			E11A-K088B	GE HGA11A DC	1C033	CB	786	RELAY GERS	NO	ALL	4.40	1.80	2.24	0.66	Y	Y	NO contacts only. Coil voltage 125 VDC.
			F11A-K090A	GE HFA51A	1C032	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.24	0.66	Y	Y	NO contacts only; Coil voltage 125 VDC
			E11A-K090B	GE HFA51A	1C033	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.24	0.66	Y	Y	NO contacts only; Coil voltage 125 VDC
			E11A-K093A	AGASTAT TR	1C032	CB	786	RELAY GERS	ALL	ALL	3.80	1.50	2.24	0.66	Y	Y	
			E11A-K093B	AGASTAT TR	1C033	CB	786	RELAY GERS	ALL	ALL	3.80	1.50	2.24	0.66	Y	Y	
			E11A-K094A	GE HFA51A	1C032	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.24	0.66	Y	Y	NO contacts only; Coil voltage 125 VDC
			E11A-K094B	GE HFA51A	1C033	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.24	0.66	Y	Y	NO contacts only; Coil voltage 125 VDC
			E11A-K095A	GE HGA11A DC	1C032	CB	786	RELAY GERS	ALL	ALL	4.40	1.80	2.24	0.66	Y	Y	NO and NC contacts. Coil Voltage 125 VDC
			E11A-K095B	GE HGA11A DC	1C033	CB	786	RELAY GERS	ALL	ALL	4.40	1.80	2.24	0.66	Y	Y	NO and NC contacts. Coil voltage 125 VDC
			E11A-K097A	GE HGA11A DC	1C03?	CB	786	RELAY GERS	NO	ALL	4.40	1.80	2.24	0.66	Y	Y	NO contacts only; Coil voltage 125 VDC
			E11A-K097B	GE HGA11A DC	1C033	CB	786	RELAY GERS	NO	ALL	4.40	1.80	2.24	0.66	Y	Y	NO contacts only; Coil voltage 125 VDC
			E11A-K099A	GE HFA51A	1C032	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.24	0.66	Y	Y	NC contacts do not affect SSEL equipment. Coil voltage 125 VDC
			E11A-K099B	GE HFA51A	1C033	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.24	0.66	Y	Y	NC contacts do not affect SSEL equipment. Coil voltage 125 VDC
			E11A-K100A	GE HFA51A	1C032	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.24	0.66	Y	Y	NO contacts only; Coil voltage 125 VDC
			E11A-K100B	GE HFA51A	1C033	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.24	0.66	Y	Y	NO contacts only; Coil voltage 125 VDC
			E11A-K101A	GE HGA11A DC	1C032	CB	786	RELAY GERS	NO	ALL	4.40	1.80	2.24	0.66	Y	Y	NO contacts only. Coil voltage 125 VDC.
			E11A-K101B	GE HGA11A DC	1C033	CB	786	RELAY GERS	NO	ALL	4.40	1.80	2.24	0.66	Y	Y	NO contacts only. Coil voltage 125 VDC.
			E11A-K102A	GE HGA11A DC	1C032	CB	786	RELAY GERS	NO	ALL	4.40	1.80	2.24	0.66	Y	Y	NO contacts only. Coil voltage 125 VDC.
			E11A-K102B	GE HGA11A DC	1C033	CB	786	RELAY GERS	NO	ALL	4.40	1.80	2.24	0.66	Y	Y	NO contacts only. Coil voltage 125 VDC.
			K11A-K105A	GE HFA51A	1C032	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.24	0.66	Y	Y	NO contacts only; Coil voltage 125 VDC
			E11A-K105B	GE HFA51A	1C033	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.24	0.66	Y	Y	NO contacts only; Coil voltage 125 VDC
			E21A-K007A	GE HFA51A	1C043	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.24	0.66	Y	Y	Core Spray Actuation Circuit. See evaluation for SSEL item CS LOGIC for avaluation of contacts which affect this device NO contact only. Coil voltage 125 VDC.
			E21A-K007B	GE HFA51A	1C044	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.24	0.66	Y	Y	Core Spray Actuation Circuit. See evaluation for SSEL item CS LOGIC for avaluation of contacts which affect this device. NO contact only. Coil voltage 125 VDC.
			E21A-K008A	GE HFA51A	1C043	CB	786	RELAY GERS	NO	ALL	6.00	2.40	2.24	0.66	Y	Y	Core Spray Actuation Circuit. See evaluation for SSEL item CS LOGIC for contacts that affect this device. NO contact only. Coil voltage 125 VDC.

Table 6-1
Duane Arnold Energy Center - Relay Evaluation

SSEL NUMBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGEMENT	ENERGIZE	CAPACITY PSA	CAPACITY EPA	DEMAND PSA	DEMAND EPA	PASS	ESSENT	COMMENTS
RHR LOGIC			E11A-K608B	GE HFA51A	1C044	CB	786	RELAY GERR	NO	ALL	6.00	2.40	2.24	0.66	Y	Y	Core Spray Actuation Circuit. See evaluation for SSEL item RHR LOGIC for contacts that affect this device. NO contact only. Coil voltage 125 VDC.
			B21-N017A (LIS4592A)	BARTON 288	1C056	RB	786	GE DATA	ALL	ALL	3.00	1.20	2.10	0.36	Y	Y	See Section 6.1.7.
			B21-N017B (LIS4592B)	BARTON 288	1C056	RB	786	GE DATA	ALL	ALL	3.00	1.20	2.10	0.36	Y	Y	See Section 6.1.7.
			B21-N017C (LIS4592C)	BARTON 288	1C055	RB	757	GE DATA	ALL	ALL	3.00	1.20	0.88	0.36	Y	Y	See Section 6.1.7.
			B21-N017D (LIS4592D)	BARTON 288	1C055	RB	757	GE DATA	ALL	ALL	3.00	1.20	0.88	0.36	Y	Y	See Section 6.1.7.
			B21-N021C (PS4529)	BARTON 288	1C122	RB	757	GE DATA	ALL	ALL	3.00	1.20	0.88	0.36	Y	Y	See Section 6.1.7.
			B21-N021A (PS4545)	BARKSDALE B2T	1C056	RB	786	GE DATA	ALL	ALL	3.00	1.20	2.10	0.36	Y	Y	See Section 6.1.7.
			B21-N021B (PS4548)	BARTON 288	1C055	RB	757	GE DATA	ALL	ALL	3.00	1.20	0.88	0.36	Y	Y	See Section 6.1.7.
			B21-N021D (PS4530)	BARTON 288	1C121	RB	757	GE DATA	ALL	ALL	3.00	1.20	0.88	0.36	Y	Y	See Section 6.1.7.
			B21-N031A (LIS4531)	YARWAY 6418C	1C056	RB	786	GE DATA	ALL	ALL	3.00	1.20	2.10	0.36	Y	Y	See Section 6.1.7.
			B21-N031B (LIS4532)	YARWAY 4418C	1C055	RB	757	GE DATA	ALL	ALL	3.00	1.20	0.88	0.36	Y	Y	See Section 6.1.7.
			B21-N031C (LIS4533)	YARWAY 4418C	1C056	RB	786	GE DATA	ALL	ALL	3.00	1.20	2.10	0.36	Y	Y	See Section 6.1.7.
			B21-N039A (PS4555)	BARKSDALE B2T	1C056	RB	786	GE DATA	ALL	ALL	3.00	1.20	2.10	0.36	Y	Y	See Section 6.1.7.
			B21-N039B (PS4556)	BARKSDALE B2T	1C055	RB	757	GE DATA	ALL	ALL	3.00	1.20	0.88	0.36	Y	Y	See Section 6.1.7.
			B21-N039C (PS4557)	BARKSDALE B2T	1C056	RB	786	GE DATA	ALL	ALL	3.00	1.20	2.10	0.36	Y	Y	See Section 6.1.7.
			B21-N039D (PS4558)	BARKSDALE B2T	1C055	RB	757	GE DATA	ALL	ALL	3.00	1.20	0.88	0.36	Y	Y	See Section 6.1.7.
			B31-N014A (PDIS4641)	BARTON 288	1C122	RB	757	GE DATA	ALL	ALL	3.00	1.20	0.88	0.36	Y	Y	See Section 6.1.7.
			B31-N014C (PDIS4643)	BARTON 288	1C122	RB	757	GE DATA	ALL	ALL	3.00	1.20	0.88	0.36	Y	Y	See Section 6.1.7.
			B31-N014B (PDIS4642)	BARTON 288	1C121	RB	757	GE DATA	ALL	ALL	3.00	1.20	0.88	0.36	Y	Y	See Section 6.1.7.
			B31-N014D (PDIS4644)	BARTON 288	1C121	RB	757	GE DATA	ALL	ALL	3.00	1.20	0.88	0.36	Y	Y	See Section 6.1.7.
			B31-N018A (PS4637)	BARKSDALE P1H	1C122	RB	757	GE DATA	ALL	ALL	3.00	1.20	0.88	0.36	Y	Y	See Section 6.1.7.
			B31-N018B (PS4638A)	BARKSDALE P1H	1C058	RF	739	GE DATA	ALL	ALL	3.00	1.20	0.88	0.36	Y	Y	See Section 6.1.7.
			B31-N019A (PDIS4625A)	BARTON 288	1C057	RB	738	GE DATA	ALL	ALL	3.00	1.20	0.88	0.36	Y	Y	See Section 6.1.7.
			B31-N019B (PDIS4626A)	BARTON 288	1C058	RB	739	GE DATA	ALL	ALL	3.00	1.20	0.88	0.36	Y	Y	See Section 6.1.7.
			B31-N020A (PDIS4625B)	BARTON 288	1C057	RB	738	GE DATA	ALL	ALL	3.00	1.20	0.88	0.36	Y	Y	See Section 6.1.7.
			B31-N020B (PDIS4626B)	BARTON 288	1C058	RB	739	GE DATA	ALL	ALL	3.00	1.20	0.88	0.36	Y	Y	See Section 6.1.7.
			B31-N021A (PDIS4625C)	BARTON 288	1C057	RB	738	GE DATA	ALL	ALL	3.00	1.20	0.88	0.36	Y	Y	See Section 6.1.7.
			B31-N021B (PDIS4626C)	BARTON 288	1C058	RB	739	GE DATA	ALL	ALL	3.00	1.20	0.88	0.36	Y	Y	See Section 6.1.7.

Table 6-2
Duane Arnold Energy Center - Relay Evaluation

ESEL NUMBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGEMENT	ENERGIZE	CAPACITY PSA	CAPACITY EPA	DEMAND PSA	DEMAND EPA	PASS	ESSENT	COMMENTS
RHR LOGIC			B31-N022B (PDIS4624C)	BARTON 288	1C058	RB	739	GE DATA	ALL	ALL	3.00	1.20	0.88	0.38	Y	Y	See Section 6.1.7.
			B31-N022A (PDIS4625D)	BARTON 288	1C057	RB	738	GE DATA	ALL	ALL	3.00	1.20	0.88	0.38	Y	Y	See Section 6.1.7.
			C71-N003A (PS4315A)	Static O-Ring 12N	1C122	RB	757	GE DATA	ALL	ALL	3.00	1.20	0.88	0.38	Y	Y	See Section 6.1.7.
			C71-N003B (PS4315B)	Static O-Ring 12N	1C058	RB	739	GE DATA	ALL	ALL	3.00	1.20	0.88	0.38	Y	Y	See Section 6.1.7.
			C71-N003C (PS4315C)	Static O-Ring 12N	1C126	RB	757	GE DATA	ALL	ALL	3.00	1.20	0.88	0.38	Y	Y	See Section 6.1.7.
			C71-N003D (PS4315D)	Static O-Ring 12N	1C122	RB	757	GE DATA	ALL	ALL	3.00	1.20	0.88	0.38	Y	Y	See Section 6.1.7.
			E11-N011A (PS4310B)	Static O-Ring 12N	1C122	RB	757	GE DATA	ALL	ALL	3.00	1.20	0.88	0.38	Y	Y	See Section 6.1.7.
			E11-N011B (PS4311B)	Static O-Ring 12N	1C058	RB	739	GE DATA	ALL	ALL	3.00	1.20	0.88	0.38	Y	Y	See Section 6.1.7.
			E11-N011C (PS4312B)	Static O-Ring 12N	1C126	RB	757	GE DATA	ALL	ALL	3.00	1.20	0.88	0.38	Y	Y	See Section 6.1.7.
			E11-N011D (PS4313B)	Static O-Ring 12N	1C121	RB	757	GE DATA	ALL	ALL	3.00	1.20	0.88	0.38	Y	Y	See Section 6.1.7.
			E11-N014A (PS2023B)	Static O-Ring 5N6	1C129A	RB	718	GE DATA	ALL	ALL	3.00	1.20	0.88	0.38	Y	Y	See Section 6.1.7.
			E11-N014B (PS1917B)	Static O-Ring 5N6	1C129B	RB	718	GE DATA	ALL	ALL	3.00	1.20	0.88	0.38	Y	Y	See Section 6.1.7.
			E11-N014C (PS2026B)	Static O-Ring 5N6	1C129A	RB	718	GE DATA	ALL	ALL	3.00	1.20	0.88	0.38	Y	Y	See Section 6.1.7.
			E11-N014D (PS1925B)	Static O-Ring 5N6	1C129B	RB	718	GE DATA	ALL	ALL	3.00	1.20	0.88	0.38	Y	Y	See Section 6.1.7.
			E11-N020A (PS2023A)	Static O-Ring 5N6	1C129A	RB	718	GE DATA	ALL	ALL	3.00	1.20	0.88	0.38	Y	Y	See Section 6.1.7.
			E11-N020B (PS1917A)	Static O-Ring 5N6	1C129B	RB	718	GE DATA	ALL	ALL	3.00	1.20	0.88	0.38	Y	Y	See Section 6.1.7.
			E11-N020C (PS2024A)	Static O-Ring 5N6	1C129A	RB	718	GE DATA	ALL	ALL	3.00	1.20	0.88	0.38	Y	Y	See Section 6.1.7.
			E11-N020D (PS1925A)	Static O-Ring 5N6	1C129B	RB	718	GE DATA	ALL	ALL	3.00	1.20	0.88	0.38	Y	Y	See Section 6.1.7.
			E11-N021A (PDIS1971A)	BARTON 289	1C129A	RB	718	GE DATA	ALL	ALL	3.00	1.20	0.88	0.38	Y	Y	See Section 6.1.7.
			E11-N021B (PSIS1971B)	BARTON 289	1C129B	RB	718	GE DATA	ALL	ALL	3.00	1.20	0.88	0.38	Y	Y	See Section 6.1.7.
			LSY-4565A	FOXBORO N-2A0-L2C-R	1C003	CB	786	QUALIFIED	ALL	ALL					Y	Y	Seismically qualified per Foxboro Company Type Test Report Q0AAB58 Rev. A (see APED-B21-140).
			LSY-4565B	FOXBORO N-2A0-L2C-R	1C003	CB	786	QUALIFIED	ALL	ALL					Y	Y	Seismically qualified per Foxboro Company Type Test Report Q0AAB58 Rev. A (see APED-B21-140).
			LSY-4565C	FOXBORO N-2A0-L2C-R	1C003	CB	786	QUALIFIED	ALL	ALL					Y	Y	Seismically qualified per Foxboro Company Type Test Report Q0AAB58 Rev. A (see APED-B21-140).
			LSY-4565D	FOXBORO N-2A0-L2C-R	1C003	CB	786	QUALIFIED	ALL	ALL					Y	Y	Seismically qualified per Foxboro Company Type Test Report Q0AAB58 Rev. A (see APED-B21-140).
			LS11, LS15	Limitorque SMB	M01909			MV	--	--					Y	N	Mechanically actuated contact.
			LS11, LS3	Limitorque SMB-0	M01989			MV	--	--					Y	N	Mechanically actuated contact.
			LS11, LS15	Limitorque SB-2	M01908			MV	--	--					Y	N	Mechanically actuated contact.
			LS15	Limitorque SMB-2	M01908			MV	--	--					Y	N	Mechanically actuated contact.
			LS1, LS11	Limitorque SMB-0	M02069			MV	--	--					Y	N	Mechanically actuated contact.

Table 4-3
Duane Arnold Energy Center - Relay Evaluation

SSEL NUMBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	BLDG	ELEV	DISP	CONTACT ARRANGEMENT	ENERGIZE	CAPACITY PSA	CAPACITY IPA	DEMAND PSA	DEMAND EPA	PASS	ESSENT	COMMENTS
RHR LOGIC			LS3	Limitorque SMB-00	M01920			NV	--	--					Y	N	Mechanically actuated contact.
			LS3	Limitorque SMB-00	M01921			NV	--	--					Y	N	Mechanically actuated contact.
			LS3	Limitorque SMB-00	M01912			NV	--	--					Y	N	Mechanically actuated contact.
			LS3	Limitorque SMB-00	M01913			NV	--	--					Y	N	Mechanically actuated contact.
			LS3	Limitorque SMB-00	M02014			NV	--	--					Y	N	Mechanically actuated contact.
			LS3	Limitorque SMB-00	M02015			NV	--	--					Y	N	Mechanically actuated contact.
			LS3	Limitorque SMB-00	M01611			NV	--	--					Y	N	Mechanically actuated contact.
			LS3	Limitorque SMB-00	M02012			NV	--	--					Y	N	Mechanically actuated contact.
			127/41X	GE HFA151A	1C031	CB	786	RELAY GERS	NO	ALL	10.00	6.00	3.24	0.66	Y	Y	Automatic Load Shed Circuit. See evaluation for SSEL item LDSHD 1A4 for contacts that affect this device. NO contact only. Coil voltage 125 VDC.
			127/31X	GE HFA151A	1C031	CB	786	RELAY GERS	NO	ALL	10.00	6.00	3.24	0.66	Y	Y	Automatic Load Shed Circuit. See evaluation for SSEL item LDSHD 1A1 for contacts that affect this device. NO contact only. Coil voltage 125 VDC.
			52b	--	1A407	CB	757	NV	--	--					Y	N	Mechanically actuated contact on 4160 V switchgear breaker
			52b	--	1A307	CB	757	NV	--	--					Y	N	Mechanically actuated contact on 4160 V switchgear breaker
			52b	--	1A408	CB	757	NV	--	--					Y	N	Mechanically actuated contact on 4160 V switchgear breaker
			52b	--	1A308	CB	757	NV	--	--					Y	N	Mechanically actuated contact on 4160 V switchgear breaker
			HS1947B	GE CR2940	1C003	CB	786	NV	--	--					Y	N	Manual control switch
			HS2044	GE CR2940	1C003	CB	786	NV	--	--					Y	N	Manual control switch
			S22A (A71)	GE CR2940	--			NV	--	--					Y	N	Manual control switch
			S22B (A71)	GE CR2940	--			NV	--	--					Y	N	Manual control switch
			S22C (A71)	GE CR2940	--			NV	--	--					Y	N	Manual control switch
			S22D (A71)	GE CR2940	--			NV	--	--					Y	N	Manual control switch
			S32 (A71)	GE CR2940	--			NV	--	--					Y	N	Manual control switch.
			S33 (A71)	GE CR2940	--			NV	--	--					Y	N	Manual control switch.
			S1A (HS3058)	GE CR2940	1C003	CB	786	NV	--	--					Y	N	Manual control switch
			S1B (HS1958)	GE CR2940	1C003	CB	786	NV	--	--					Y	N	Manual control switch
			S3A (HS2014)	GE SBM	1C003	CB	786	NV	--	--					Y	N	Manual control switch

Table 6-2
Duane Arnold Energy Center - Relay Evaluation

ESEL NUMBER	SYSTEM/DESCRIPTION	DRAWING	CONTACT ID	RELAY TYPE	PANEL	[illegible]	ELEV	DISP	CONTACT ARRANGEMENT	ENERGIZE	CAPACITY PSA	CAPACITY IPA	DEMAND PSA	DEMAND IPA	PASS	ESSENT	COMMENTS
RHR LOGIC			S3B (HS1915)	GE SBM	1C003	CB	786	NV	--	--					Y	N	Manual control switch
			S3C (HS2018)	GE SBM	1C003	CB	786	NV	--	--					Y	N	Manual control switch
			S3D (HS1923)	GE SBM	1C003	CB	786	NV	--	--					Y	N	Manual control switch
			S17A (HS2001C)	GE CR2940	1C003	CB	786	NV	--	--					Y	N	Manual control switch
			S17B (HS1903C)	GE CR2940	1C003	CB	786	NV	--	--					Y	N	Manual control switch
			S18A (HS2001B)	GE CR2940	1C003	CB	786	NV	--	--					Y	N	Manual control switch
			S18B (HS1903B)	GE CR2940	1C003	CB	786	NV	--	--					Y	N	Manual control switch
			S19A (HS2059)	GE CR2940	1C003	CB	786	NV	--	--					Y	N	Manual control switch
			S19B (HS2059)	GE CR2940	1C003	CB	786	NV	--	--					Y	N	Manual control switch
			S32A (HS2003B)	GE CR2940	1C003	CB	786	NV	--	--					Y	N	Manual control switch
			S32B (HS1905B)	GE CR2940	1C003	CB	786	NV	--	--					Y	N	Manual control switch
			S44A	GE CR2940	1C032	CB	786	NV	--	--					Y	N	Manual control switch
			S44B	GE CR2940	--			NV	--	--					Y	N	Manual control switch
			S45A	GE CR2940	1C032	CB	786	NV	--	--					Y	N	Manual control switch
			S45B	GE CR2940	--			NV	--	--					Y	N	Manual control switch
			S46A	GE CR2940	--			NV	--	--					Y	N	Manual control switch
			S46B	GE CR2940	--			NV	--	--					Y	N	Manual control switch
			S47A	GE CR2940	--			NV	--	--					Y	N	Manual control switch
			S47B	GE CR2940	--			NV	--	--					Y	N	Manual control switch
			S51A (HS1943A)	GE CR2940	--			NV	--	--					Y	N	Manual control switch
			S51B (HS1943B)	GE CR2940	--			NV	--	--					Y	N	Manual control switch
			S51D (HS1923)	GE SBM	1C003	CB	786	NV	--	--					Y	N	Manual control switch
			S55 (HS1942)	GE CR2940	--			NV	--	--					Y	N	Manual control switch
			S56A (HS2041)	GE CR2940	1C003	CB	786	NV	--	--					Y	N	Manual control switch
			S56B (HS1941)	GE CR2940	1C003	CB	786	NV	--	--					Y	N	Manual control switch
			B21-N031D (LIS4534)	YARWAY 4418C	1C055	RB	757	GE DATA	ALL	ALL	3.00	1.20	0.88	0.38	Y	Y	See Section 6.1.7.

Table 6-3

Summary of Operator Actions

SSEL Item Number	Description	Contact or Contact Group	Potential Adverse Effect	Operator Action	Justification
8435	CRHVAC/Battery Room Exhaust Fan A 1VEF030A	LR-7315A, LR-7315B, 95-030A, 95-030B, K1, K3	Turn off and lock-out fan.	Reset lockout relay from control room.	Battery room exhaust fan trouble annunciator will alert operator if lockout relay prevents exhaust fan operation. Lockout relay can be reset from control room. Exhaust fans are not immediately required after an A-46 event.
8436	CRHVAC/Battery Room Exhaust Fan B 1VEF030B	LR-7315A, LR-7315B, 95-030A, 95-030B, K1, K3	Turn off and lock-out fan.	Reset lockout relay from control room.	See above.
8437	CRHVAC/Battery Room Exhaust Fan C 1VEF030C	LR-7315A, LR-7315B, 95-030A, 95-030B, K1, K3	Turn off and lock-out fan.	Reset lockout relay from control room.	See above.
8446	CRHVAC/Control Building Chiller A 1VCH001A	49, 8CR, 1TR, 2TR, 5TR, 8TR, 42-3225 Pressure, temperature and flow switches:1PS, 4PS, 2TAS, 6TAS, 3TAS, 5TAS, 7TAS, 2FLS, 3PS	Turn off and lock-out chiller.	Reset chiller at local control panel.	Contact chatter may trip chiller. Operator action would be required at local panel to reset the chiller's control circuitry (PB-Reset). This is acceptable, because the operator has indication of the chiller's status and the chiller is not required immediately following the strong ground motion.
8447	CRHVAC/Control Building Chiller B 1VCH001B	49, 8CR, 1TR, 2TR, 5TR, 8TR, 42-4214 Pressure, temperature and flow switches:1PS, 4PS, 2TAS, 6TAS, 3TAS, 5TAS, 7TAS, 2FLS, 3PS	Turn off and lock-out chiller.	Reset chiller at local control panel.	See above.

Section 7

RESULTS OF RELAY WALKDOWNS

7.1 PURPOSE OF WALKDOWN

The Generic Implementation Procedure (GIP) for resolution of Unresolved Safety Issue (USI) A-46, requires, in part, a plant walkdown of relays and their enclosures. The purpose of this walkdown is to:

1. Obtain, as necessary, information needed to determine cabinet types and cabinet specific in-cabinet amplification factors for seismic capacity screening;

2. Verify the seismic adequacy of cabinets or enclosures which contain essential relays;

3. Spot check mounting of essential relays to determine if they are in accordance with manufacturers' recommendations; and

4. Confirm relay types and locations are consistent with documentation sources used to establish relay types and locations during the relay circuit relays.

On September 1 - 3, 1993 a plant walkdown was conducted at the Duane Arnold Energy Center to perform: (1) spot checks of mounting of essential relays and (2) spot checks of relay types and locations. Under the USI A-46 program, relay mounting are assumed to be in accordance with manufacturers' recommendations and plant documentation of relay types and locations is assumed to be accurate. The objective of the spot checks made during the relay walkdown was to confirm on a sample basis these assumptions. Other plant walkdowns, performed by the seismic capability engineers, collected the information needed to determine cabinet types for seismic capacity screening of relays and verify the seismic adequacy of the cabinets and enclosures which support essential relays.

The USI A-46 walkdowns at Duane Arnold were performed in accordance with a walkdown procedure. The following summarizes the approach and results of the relay walkdown conducted to spot check relay mountings, types and locations.

7.2 WALKDOWN APPROACH

Prior to the relay walkdown, the Lead Relay Reviewer prepared a list of equipment to be included in the relay walkdown. This list contained a subset of the cabinets and enclosures containing essential relays. It also included other electrical equipment that contained

relays, switches, or other contact devices which are part of the USI A-46 relay review. Table 7-1 contains the list of equipment included in the relay walkdown. For each cabinet and enclosure included in the walkdown, the following was recorded on the walkdown data sheets:

1. A sample of the relay manufacturers and model numbers which could be identified without intrusive inspection;

2. Any labelling information which could later help associate these devices with the nomenclature found on plant schematic drawings; and

3. Results of spot checks of mountings.

Relay outliers that were identified during the walkdown were documented in accordance with MPR Procedure OER-7809-1, "Evaluation and Reporting of GIP Outliers Identified During USI A-46 Walkdowns"

7.3 WALKDOWN RESULTS

The results of the walkdown indicate, with the exception of the three specific instances discussed below, that the relays and other contact devices were mounted adequately and in accordance with manufacturers' recommendations. Comparisons between the relay type and labelling data collected during the walkdown and corresponding data found in the CHAMPS database and on the electrical drawings found the as-built installations to match the design documentation used in the relay evaluation.

The following summarizes the three outliers identified during the relay walkdown:

1. One loose mounting screw was identified on two overcurrent (150/151) relays in 4160 Volt essential switchgear 1A4. The relays involved were the phase 3 150/151 relay on breaker compartment 1A408 and the phase 3 150/151 relay on breaker compartment 1A404. The loose screw on the 1A408 relay was tightened on-the-spot by a craft electrician. The other screw appeared cross-threaded and could not be tightened on-the-spot.

2. One mounting screw was found missing on relay 127/B1, which is located in 1C352 - Essential Bus 1A4 Degraded Voltage Detector Cabinet.

3. A spot check of relay mountings on 4160 Volt essential switchgear 1A3 identified one loose screw on the phase 1 150/151 relay on breaker compartment 1A306 and the phase 3 150/151 relay on breaker compartment 1A306.

Maintenance Action Request (MAR) number A18163 was initiated to inspect and repair, as necessary, the mounting screws for the relays in essential switchgear 1A4. MAR A19358

was initiated to address the missing screw on relay 127/B1 located in cabinet 1C352. MAR A18162 was initiated to inspect and repair, as necessary, the mounting screws for the relays in essential switchgear 1A3.

The outliers identified during the walkdown were considered to be minor in nature and isolated to the specific enclosures in which they were found. The results of the mounting spot checks indicate that the general population of relays at DAEC are mounted properly. Socket type relays (e.g. Agastat GP) were secured firmly with spring clips or straps. Spot checks of manual operated control switches were found to meet criteria of mechanically actuated switches which are inherently rugged.

Table 7-1

Safe Shutdown Equipment Included In Relay Walkdown

Equipment ID	Description	Location	
		Building	Elevation
1A3	4160V AC Essential Switchgear	CB	757
1B04	480V AC Control Building Load Center	CB	757
1A4	4160V Essential Switchgear	CB	757
1C352	Essential BUS 1A4 Undervoltage Detector	CB	757
1D22	125VDC (Division 2) 1D2 Main Battery Charger	CB	757
1C157	Supply Fan 1V-SF-51 Control Panel	IS	767
1C156	Supply Fan 1V-SF-50 Control Panel	IS	767
1B20	480V AC Load Center Intake Structure	IS	767
1B21	480V AC Intake Structure MCC Allis Chalmers Valve Line Control Center	IS	767
1C003	Control Panel - Main Control Room	CB	786
1B44	480V MCC (Allis Chalmers)	RB	757
1B44A	RB 480V MCC (Allis Chalmers)	RB	757
1D11	125 V DC Division 1 Distribution Panel A	CB	757
1D13	125V DC Division 1 Distribution Panel C	CB	757
1D10	125V DC Division 1 Distribution Panel	CB	757
1D40	250V DC Distribution Panel	CB	757
1L08	Control Building 277V AC Lighting Panel	CB	757
1B42	480V Motor Control Center	CB	757
1C351	Essential 1A3 Degraded Voltage Detector	CB	757
1B46	Pump House 480V AC MCC	PH	761
1C31	Generator and Plant Relays	CB	786
1C033	Division II RHR, Core Spray & Auto Blowdown Relay Cabinet	CB	786

Table 7-1 (Continued)

Safe Shutdown Equipment Included In Relay Walkdown

Equipment ID	Description	Location	
		Building	Elevation
1C42	Outboard Primary Containment Isol. Valve Relay	CB	786
1C43	Core Spray Division 1	CB	786
1C45	Auto Blowdown Relay Vertical Board	CB	786
1C094	SBDG/SBDG 1G-21 Control Panel	CB	800
1C92	SBDG 1G-21 Gaug Board	TB	757
1C118	SBDG/Diesel Gen 1G-21 Control Relay and Terminal Panel	TB	757
1C422B	RSD/Remote Shutdown Fuse Panel	RB	757

REFERENCES

1. US NRC Generic Letter 87-02; Verification of Seismic Adequacy of Mechanical and Electrical Equipment In Operating Reactors, Unresolved Safety Issues (USI), A-46; February 19, 1987.

2. Use of Seismic Experience and Test Data to Show Ruggedness of Equipment in Nuclear Power Plants; R. Kennedy, W. Von Riesemann, P. Ibanez, A. Schiff, L.A. Wylie; prepared for the SQUG and in cooperation with the Office of Nuclear Reactor Regulation - US NRC; Revision 4.0; SAND-92-0140 UC 52; February 28, 1991.

3. Generic Implementation Procedure (GIP) For Seismic Verification of Nuclear Plant Equipment; February 1992; copyright Seismic Qualification Utility Group; Revision 2 Corrected February 14, 1992.

4. US NRC Generic Letter 87-02; Supplement No. 1 to Generic Letter (GL) 87-02 That Transmits Supplemental Safety Evaluation Report No. 2 (SSER No. 2) On SQUG Generic Implementation Procedure, Revision 2, As Corrected on February 14, 1992 (GIP-2).

5. IELP Letter (J. F. Franz, Jr.) to US NRC (Dr. T. E. Murley) NG-92-3961; dated September 21, 1992; DAEC Response to Supplement 1 to Generic Letter 87-02 on SQUG Resolution to USI A-46.

6. US NRC Letter (R. M. Pulsifer) to IELP (L. Liu); dated November 25, 1992; Evaluation of Duane Arnold Energy Center, 120 Day Response to Supplement No. 1 to Generic Letter 87-02 (TAC No. M69444).

7. EPRI NP-7148-SL; Procedure For Evaluating Nuclear Power Plant Relay Seismic Functionality; Electric Power Research Institute; December 1990.

8. EPRI NP-7147-SL; Seismic Ruggedness of Relays; Electric Power Research Institute; August 1991.

9. EPRI NP-5223-SL; Generic Seismic Ruggedness of Power Plant Equipment; Revision 1; Electric Power Research Institute; August 1991.

10. Not Used.

11. EPRI NP-7148-SL; "Procedure for Evaluating Nuclear Power Plant Relay Seismic Functionality Volume 2: Addendum; September 1993.

12. DAEC UFSAR Section 3.10.1.1.

MPR ASSOCIATES INC ENGINEERS

Appendix A

Essential Relay List

Table A-1

List of Essential Relays

Essential Relay Enclosure			Essential Relay		Screening Results (Note 2)		SSEL Item Number
Panel	Bldg.	Elev.	Relay Type	Contact ID	Disposition	Pass	
1A3	CB	757	GE HGA14AR	127-3	CDU	N	LDSHD 1A3
1A3	CB	757	AGASTAT 7012	102-301	RELAY GERS	Y	6001
1A3	CB	757	GE HFA151A	194-31	RELAY GERS	Y	LDSHD 1A3
1A3	CB	757	GE HFA151A	194-31	RELAY GERS	Y	3109
1A3	CB	757	GE HFA151A	194-32	RELAY GERS	Y	LDSHD 1A3
1A3	CB	757	GE IAC66K	150/151	RELAY GERS	N	3109
1A3	CB	757	GE PJC11A	150G	RELAY GERS	N	3109
1A3	CB	757	WESTINGHOUSE WL	186/M	RELAY GERS	Y	3109
1A3	CB	757	WESTINGHOUSE WL	186/3	RELAY GERS	Y	6001
1A3	CB	757	GE HGA14AK	102-311	SWGR GERS	Y	6001
1A3	CB	757	GE HMA, Cat. No. 0137A7575P001	152Y	SWGR GERS	Y	6003
1A3	CB	757	GE HMA, Cat. No. 0137A7575P001	152Y	SWGR GERS	Y	3109
1A3	CB	757	GE HMA, Cat. No. 0137A7575P001	152Y	SWGR GERS	Y	6006
1A3	CB	757	GE IAC66B	150/151-312	SWGR GERS	Y	6003
1A3	CB	757	GE IAC66B	150/151-303	SWGR GERS	Y	6006
1A3	CB	757	GE PJC11A	150G-303	SWGR GERS	Y	6006
1A3	CB	757	GE PJC11A	150G-312	SWGR GERS	Y	6003
1A301	CB	757	GE IAC53A	151-301	RELAY GERS	N	6001
1A302	CB	757	GE HFA151A	127-3X	RELAY GERS	N	6001,LDSHD 1A3
1A302	CB	757	GE IAC53A	151-302	RELAY GERS	N	6001
1A302	CB	757	GE IAC53A	151N-302	RELAY GERS	N	6001
1A303	CB	757	GE HFA151A	194-31	RELAY GERS	Y	4008
1A303	CB	757	GE HFA151A	194-31	RELAY GERS	Y	8101
1A303	CB	757	GE HFA151A	194-31	RELAY GERS	Y	8102
1A303	CB	757	GE HFA151A	194-31	RELAY GERS	Y	4005

Table A-1 (Continued)

List of Essential Relays

Essential Relay Enclosure			Essential Relay		Screening Results (Note 2)		SSEL Item Number
Panel	Bldg.	Elev.	Relay Type	Contact ID	Disposition	Pass	
1A303	CB	757	GE HFA151A	194-32	RELAY GERS	Y	8202
1A303	CB	757	GE HFA151A	194-32	RELAY GERS	Y	8201
1A305	CB	757	GE IAC66K	150/151	RELAY GERS	N	4005
1A305	CB	757	GE PJC11A	150G	RELAY GERS	N	4005
1A305	CB	757	WESTINGHOUSE WL	186/M	RELAY GERS	Y	4005
1A305	CB	757	GE HMA, Cat. No. 0137A7575P001	152Y	SWGR GERS	Y	4005
1A306	CB	757	GE IAC66K	150/151	RELAY GERS	N	4008
1A306	CB	757	GE PJC11A	150G	RELAY GERS	N	4008
1A306	CB	757	WESTINGHOUSE WL	186/M	RELAY GERS	Y	4008
1A306	CB	757	GE HMA, Cat. No. 0137A7575P001	152Y	SWGR GERS	Y	4008
1A307	CB	757	GE IAC66K	150/151	RELAY GERS	N	8101
1A307	CB	757	GE PJC11A	150G	RELAY GERS	N	8101
1A307	CB	757	WESTINGHOUSE WL	186/M	RELAY GERS	Y	8101
1A307	CB	757	GE HMA, Cat. No. 0137A7575P001	152/Y	SWGR GERS	Y	8101
1A308	CB	757	GE IAC66K	150/151	RELAY GERS	N	8102
1A308	CB	757	GE PJC11A	150G	RELAY GERS	N	8102
1A308	CB	757	WESTINGHOUSE WL	186/M	RELAY GERS	Y	8102
1A308	CB	757	GE HMA, Cat. No. 0137A7575P001	152/Y	SWGR GERS	Y	8102
1A311	CB	757	GE ICW51A	132/DG1	CDU	N	6001
1A311	CB	757	GE IJCV51A	151V/DG1	RELAY GERS	N	6001
1A311	CB	757	WESTINGHOUSE WL	186/DG1	RELAY GERS	Y	6001
1A311	CB	757	GE NGV11C	159/DG1	SWGR GERS	Y	6001
1A4	CB	757	GE HGA14AR	127-4	CDU	N	LDSHD 1A4

Table A-1 (Continued)

List of Essential Relays

Essential Relay Enclosure			Essential Relay		Screening Results (Note 2)		SSEL Item Number
Panel	Bldg.	Elev.	Relay Type	Contact ID	Disposition	Pass	
1A4	CB	757	AGASTAT 7012	102-401	RELAY GERS	Y	6050
1A4	CB	757	GE HFA151A	194-41	RELAY GERS	Y	LDSHD 1A4
1A4	CB	757	GE HFA151A	194-41	RELAY GERS	Y	3119
1A4	CB	757	GE HFA151A	194-42	RELAY GERS	Y	8204
1A4	CB	757	GE HFA151A	194-42	RELAY GERS	Y	LDSHD 1A4
1A4	CB	757	GE IAC66K	150/151	RELAY GERS	N	3119
1A4	CB	757	GE PJC11A	150G	RELAY GERS	N	3119
1A4	CB	757	WESTINGHOUSE WL	186/M	RELAY GERS	Y	3119
1A4	CB	757	WESTINGHOUSE WL	186/4	RELAY GERS	Y	6050
1A4	CB	757	GE HGA14AK	102-411	SWGR GERS	Y	6050
1A4	CB	757	GE HMA, Cat. No. 0137A7575P001	152Y	SWGR GERS	Y	6050
1A4	CB	757	GE HMA, Cat. No. 0137A7575P001	152Y	SWGR GERS	Y	6050
1A4	CB	757	GE HMA, Cat. No. 0137A7575P001	152Y	SWGR GERS	Y	6050
1A4	CB	757	GE HMA, Cat. No. 0137A7575P001	152Y	SWGR GERS	Y	6001
1A4	CB	757	GE HMA, Cat. No. 0137A7575P001	152Y	SWGR GERS	Y	6001
1A4	CB	757	GE HMA, Cat. No. 0137A7575P001	152Y	SWGR GERS	Y	6001
1A4	CB	757	GE HMA, Cat. No. 0137A7575P001	152Y	SWGR GERS	Y	3119
1A4	CB	757	GE HMA, Cat. No. 0137A7575P001	152Y	SWGR GERS	Y	6052
1A4	CB	757	GE HMA, Cat. No. 0137A7575P001	152Y	SWGR GERS	Y	6055
1A4	CB	757	GE IAC66B	150/151-412	SWGR GERS	Y	6052
1A4	CB	757	GE IAC66B	150/151-403	SWGR GERS	Y	6055
1A4	CB	757	GE PJC11A	150G-403	SWGR GERS	Y	6055

Table A-1 (Continued)

List of Essential Relays

Essential Relay Enclosure			Essential Relay		Screening Results (Note 2)		SSEL Item Number
Panel	Bldg.	Elev.	Relay Type	Contact ID	Disposition	Pass	
1A4	CB	757	GE PJC11A	150G-412	SWGR GERS	Y	6052
1A401	CB	757	GE IAC53A	151-401	RELAY GERS	N	6050
1A402	CB	757	GE HFA151A	127-4X	RELAY GERS	N	6050,LDSHD 1A4
1A402	CB	757	GE IAC53A	151-402	RELAY GERS	N	6050
1A402	CB	757	GE IAC53A	151N-402	RELAY GERS	N	6050
1A403	CB	757	GE HFA151A	194-41	RELAY GERS	Y	4025
1A403	CB	757	GE HFA151A	194-41	RELAY GERS	Y	8103
1A403	CB	757	GE HFA151A	194-41	RELAY GERS	Y	8104
1A403	CB	757	GE HFA151A	194-41	RELAY GERS	Y	4028
1A403	CB	757	GE HFA151A	194-42	RELAY GERS	Y	8203
1A405	CB	757	GE IAC66K	150/151	RELAY GERS	N	4025
1A405	CB	757	GE PJC11A	150G	RELAY GERS	N	4025
1A405	CB	757	WESTINGHOUSE WL	186/M	RELAY GERS	Y	4025
1A405	CB	757	GE HMA, Cat. No. 0137A7575P001	152Y	SWGR GERS	Y	4025
1A406	CB	757	GE IAC66K	150/151	RELAY GERS	N	4028
1A406	CB	757	GE PJC11A	150G	RELAY GERS	N	4028
1A406	CB	757	WESTINGHOUSE WL	186/M	RELAY GERS	Y	4028
1A406	CB	757	GE HMA, Cat. No. 0137A7575P001	152Y	SWGR GERS	Y	4028
1A407	CB	757	GE IAC66K	150/151	RELAY GERS	N	8103
1A407	CB	757	GE PJC11A	150G	RELAY GERS	N	8103
1A407	CB	757	WESTINGHOUSE WL	186/M	RELAY GERS	Y	8103
1A407	CB	757	GE HMA, Cat. No. 0137A7575P001	152/Y	SWGR GERS	Y	8103
1A408	CB	757	GE IAC66K	150/151	RELAY GERS	N	8104
1A408	CB	757	GE PJC11A	150G	RELAY GERS	N	8104

Table A-1 (Continued)

List of Essential Relays

Essential Relay Enclosure			Essential Relay		Screening Results (Note 2)		SSEL Item Number
Panel	Bldg.	Elev.	Relay Type	Contact ID	Disposition	Pass	
1A408	CB	757	WESTINGHOUSE WL	186/M	RELAY GERS	Y	8104
1A408	CB	757	GE HMA, Cat. No. 0137A7575P001	152/Y	SWGR GERS	Y	8104
1A411	CB	757	GE ICW51A	132/DG2	CDU	N	6050
1A411	CB	757	GE IJCV51A	151V/DG2	RELAY GERS	N	6050
1A411	CB	757	WESTINGHOUSE WL	186/DG2	RELAY GERS	Y	6050
1A411	CB	757	GE NGV11C	159/DG2	SWGR GERS	Y	6050
1B03	CB	757	GE HFA51A	Y	SWGR GERS	Y	6007
1B03	CB	757	GE HFA51A	Y	SWGR GERS	Y	6009
1B04	CB	757	GE HFA51A	Y	SWGR GERS	Y	6056
1B04	CB	757	GE HFA51A	Y	SWGR GERS	Y	6058
1B0901	IS	767	GE HFA51A	52Y	SWGR GERS	Y	8201
1B0902	IS	767	GE HFA51A	52Y	SWGR GERS	Y	8202
1B0903	IS	767	GE HFA51A	Y	SWGR GERS	Y	6004
1B2001	IS	767	GE HFA51A	52Y	SWGR GERS	Y	8203
1B2001	IS	767	GE HFA51A	52Y	SWGR GERS	Y	8204
1B2003	IS	767	GE HFA51A	Y	SWGR GERS	Y	6053
1B32	CB	757	Allis-Chalmers, NEMA Size 1, Model 25-111	42/C, 42/O and 49	MCC GERS	Y	3101
1B32	CB	757	Allis-Chalmers, NEMA Size 4, Model 25-114	42 and 49 (OL)	MCC GERS	Y	8001
1B32	CB	757	Allis-Chalmers, NEMA Size 4, Model 25-114	42/b (1B3214)	MCC GERS	Y	8013
1B32	CB	757	Allis-Chalmers, NEMA Size 1, Model 25-111	42-O, 42-C, 49	MCC GERS	Y	8015
1B32	CB	757	Allis-Chalmers, NEMA Size 1, Model 25-111	42-O, 42-C, 49	MCC GERS	Y	8016

Table A-1 (Continued)

List of Essential Relays

Essential Relay Enclosure			Essential Relay		Screening Results (Note 2)		SSEL Item Number
Panel	Bldg.	Elev.	Relay Type	Contact ID	Disposition	Pass	
1B32	CB	757	Allis-Chalmers, NEMA Size 1, Model 25-111	42-O, 42-C, 49	MCC GERS	Y	3139
1B3207	CB	757	Allis-Chalmers, NEMA Size 2, Model 25-112	42/a, 49	MCC GERS	Y	8401
1B3207	CB	757	Allis-Chalmers, NEMA Size 2, Model 25-112	42-3207/a	MCC GERS	Y	8407
1B3208	CB	757	Allis-Chalmers, NEMA Size 1, Model 25-111	42/a, 49	MCC GERS	Y	8407
1B3213	CB	757	Allis-Chalmers, NEMA Size 2, Model 25-112	42/a, 49	MCC GERS	Y	8551
1B3227	CB	757	Allis-Chalmers, NEMA Size 1, Model 25-111	42-O, 42-C, 49	MCC GERS	Y	8025
1B34	RB	786	Allis-Chalmers, NEMA Size 1, Model 25-111	42-0, 42-C, 49	MCC GERS	Y	3112
1B34	RB	786	Allis-Chalmers, NEMA Size 1, Model 25-111	42-0,42-C,49	MCC GERS	Y	3114
1B34	RB	786	Allis-Chalmers, NEMA Size 1, Model 25-111	42-0, 42-C, 49	MCC GERS	Y	3113
1B34	RB	786	Allis-Chalmers, NEMA Size 1, Model 25-111	42-0, 42-C, 49	MCC GERS	Y	3105
1B34	RB	786	Allis-Chalmers, NEMA Size 1, Model 25-111	42-0, 42-C, 49	MCC GERS	Y	3106
1B34	RB	786	Allis-Chalmers, NEMA Size 1, Model 25-111	42-0, 42-C, 49	MCC GERS	Y	3110
1B34	RB	786	Allis-Chalmers, NEMA Size 1, Model 25-111	42-C, 42-O, 49	MCC GERS	Y	4004

Table A-1 (Continued)

List of Essential Relays

Essential Relay Enclosure			Essential Relay		Screening Results (Note 2)		SSEL Item Number
Panel	Bldg.	Elev.	Relay Type	Contact ID	Disposition	Pass	
1B34	RB	786	Allis-Chalmers, NEMA Size 1, Model 25-111	42-O, 42-C, 49	MCC GERS	Y	8105
1B34	RB	786	Allis-Chalmers, NEMA Size 1, Model 25-111	42-O, 42-C, 49	MCC GERS	Y	8109
1B34	RB	786	Allis-Chalmers, NEMA Size 1, Model 25-111	42-O, 42-C, 49	MCC GERS	Y	3161
1B34	RB	786	Allis-Chalmers, NEMA Size 1, Model 25-111	42-O, 42-C, 49	MCC GERS	Y	3170
1B34	RB	786	Allis-Chalmers, NEMA Size 1, Model 25-111	42-O, 42-C, 49	MCC GERS	Y	4002
1B34	RB	786	Allis-Chalmers, NEMA Size 1, Model 25-111	42-O, 42-C, 49	MCC GERS	Y	4003
1B34	RB	786	Allis-Chalmers, NEMA Size 1, Model 25-111	42-O, 42-C, 49	MCC GERS	Y	8017
1B34	RB	786	Allis-Chalmers, NEMA Size 1, Model 25-111	42-O, 42-C, 49	MCC GERS	Y	4006
1B34	RB	786	Allis-Chalmers, NEMA Size 1, Model 25-111	42-O, 42-C, 49	MCC GERS	Y	4007
1B34	RB	786	Allis-Chalmers, NEMA Size 1, Model 25-111	42-O, 42-C, 49	MCC GERS	Y	4008A
1B34	RB	786	Allis-Chalmers, NEMA Size 2, Model 25-112	42-O, 42-C, 49	MCC GERS	Y	4009
1B34	RB	786	Allis-Chalmers, NEMA Size 1, Model 25-111	42-O, 42-C, 49	MCC GERS	Y	4010
1B34	RB	786	Allis-Chalmers, NEMA Size 1, Model 25-111	42-O, 42-C, 49	MCC GERS	Y	4011A

Table A-1 (Continued)

List of Essential Relays

Essential Relay Enclosure			Essential Relay		Screening Results (Note 2)		SSEL Item Number
Panel	Bldg.	Elev.	Relay Type	Contact ID	Disposition	Pass	
1B34	RB	786	Allis-Chalmers, NEMA Size 1, Model 25-111	42-O, 42-C, 49	MCC GERS	Y	4014
1B34	RB	786	Allis-Chalmers, NEMA Size 1, Model 25-111	42-O, 42-C, 49	MCC GERS	Y	4016
1B34	RB	786	Allis-Chalmers, NEMA Size 1, Model 25-111	42-O, 42-C, 49	MCC GERS	Y	4016A
1B34	RB	786	Allis-Chalmers, NEMA Size 1, Model 25-111	42-O, 42-C, 49	MCC GERS	Y	4017
1B34	RB	786	Allis-Chalmers, NEMA Size 1, Model 25-111	42-O, 42-C, 49	MCC GERS	Y	4020
1B34	RB	786	Allis-Chalmers, NEMA Size 1, Model 25-111	42-O, 42-C, 49	MCC GERS	Y	4021
1B34	RB	786	Allis-Chalmers, NEMA Size 1, Model 25-111	42-O, 42-C, 49	MCC GERS	Y	4046
1B34	RB	786	GE HFA51A	Y	SWGR GERS	Y	6010
1B34A	RB	786	Allis-Chalmers, NEMA Size 3, Model 25-113	42-O, 42-C, 49	MCC GERS	Y	4019
1B34A	RB	786	Allis-Chalmers, NEMA Size 4, Model 25-114	42-O, 42-C, 49	MCC GERS	Y	4018
1B34A	RB	786	AGASTAT E7022	62-2004	RELAY GERS	Y	4018
1B37	RB	786	Allis-Chalmers, NEMA Size 1, Model 25-111	42-O, 42-C, 49	MCC GERS	Y	3171
1B37	RB	786	Allis-Chalmers, NEMA Size 1, Model 25-111	42-O, 42-C, 49	MCC GERS	Y	3172
1B37	RB	786	Allis-Chalmers, NEMA Size 1, Model 25-111	42-O, 42-C, 49	MCC GERS	Y	3173

Table A-1 (Continued)

List of Essential Relays

Essential Relay Enclosure			Essential Relay		Screening Results (Note 2)		SSEL Item Number
Panel	Bldg.	Elev.	Relay Type	Contact ID	Disposition	Pass	
1B37	RB	786	Allis-Chalmers, NEMA Size 1, Model 25-111	42-O, 42-C, 49	MCC GERS	Y	3174
1B42	CB	757	Allis-Chalmers, NEMA Size 4, Model 25-114	42 and 49 (OL)	MCC GERS	Y	8002
1B42	CB	757	Allis-Chalmers, NEMA Size 4, Model 25-114	42/b	MCC GERS	Y	8014
1B42	CB	757	Allis-Chalmers, NEMA Size 1, Model 25-111	42-O, 42-C, 49	MCC GERS	Y	3158
1B4206	CB	757	Allis-Chalmers, NEMA Size 2, Model 25-112	42/a, 49	MCC GERS	Y	8552
1B4218	CB	757	Allis-Chalmers, NEMA Size 2, Model 25-112	42/a, 49	MCC GERS	Y	8402
1B4218	CB	757	Allis-Chalmers, NEMA Size 2, Model 25-112	42-4218/a	MCC GERS	Y	8408
1B4219	CB	757	Allis-Chalmers, NEMA Size 1, Model 25-111	42/a, 49	MCC GERS	Y	8408
1B4225	CB	757	Allis-Chalmers, NEMA Size 1, Model 25-111	42-O, 42-C, 49	MCC GERS	Y	8026
1B44	RB	757	Allis-Chalmers, NEMA Size 1, Model 25-111	42-0, 42-C, 49	MCC GERS	Y	3124
1B44	RB	757	Allis-Chalmers, NEMA Size 1, Model 25-111	42-0, 42-C, 49	MCC GERS	Y	3123
1B44	RB	757	Allis-Chalmers, NEMA Size 1, Model 25-111	42-0,42-C, 49	MCC GERS	Y	3115
1B44	RB	757	Allis-Chalmers, NEMA Size 1, Model 25-111	42-0, 42-C, 49	MCC GERS	Y	3116

Table A-1 (Continued)

List of Essential Relays

Essential Relay Enclosure			Essential Relay		Screening Results (Note 2)		SSEL Item Number
Panel	Bldg.	Elev.	Relay Type	Contact ID	Disposition	Pass	
1B44	RB	757	Allis-Chalmers, NEMA Size 1, Model 25-111	42-0, 42-C, 49	MCC GERS	Y	3120
1B44	RB	757	Allis-Chalmers, NEMA Size 1, Model 25-111	42-0, 42-C, 49	MCC GERS	Y	3122
1B44	RB	757	Allis-Chalmers, NEMA Size 1, Model 25-111	42-O, 42-C, 49	MCC GERS	Y	8110
1B44	RB	757	Allis-Chalmers, NEMA Size 1, Model 25-111	42-O, 42-C, 49	MCC GERS	Y	8106
1B44	RB	757	Allis-Chalmers, NEMA Size 1, Model 25-111	42-O, 42-C, 49	MCC GERS	Y	4022
1B44	RB	757	Allis-Chalmers, NEMA Size 1, Model 25-111	42-O, 42-C, 49	MCC GERS	Y	4023
1B44	RB	757	Allis-Chalmers, NEMA Size 1, Model 25-111	42-O, 42-C, 49	MCC GERS	Y	4024
1B44	RB	757	Allis-Chalmers, NEMA Size 1, Model 25-111	42-O, 42-C, 49	MCC GERS	Y	4026
1B44	RB	757	Allis-Chalmers, NEMA Size 1, Model 25-111	42-O, 42-C, 49	MCC GERS	Y	4027
1B44	RB	757	Allis-Chalmers, NEMA Size 1, Model 25-111	42-O, 42-C, 49	MCC GERS	Y	4028A
1B44	RB	757	Allis-Chalmers, NEMA Size 2, Model 25-112	42-O, 42-C, 49	MCC GERS	Y	4029
1B44	RB	757	Allis-Chalmers, NEMA Size 1, Model 25-111	42-O, 42-C, 49	MCC GERS	Y	4030
1B44	RB	757	Allis-Chalmers, NEMA Size 1, Model 25-111	42-O, 42-C, 49	MCC GERS	Y	4031A

Table A-1 (Continued)

List of Essential Relays

Essential Relay Enclosure			Essential Relay		Screening Results (Note 2)		SSEL Item Number
Panel	Bldg.	Elev.	Relay Type	Contact ID	Disposition	Pass	
1B44	RB	757	Allis-Chalmers, NEMA Size 1, Model 25-111	42-O, 42-C, 49	MCC GERS	Y	4034
1B44	RB	757	Allis-Chalmers, NEMA Size 1, Model 25-111	42-O, 42-C, 49	MCC GERS	Y	4036
1B44	RB	757	Allis-Chalmers, NEMA Size 1, Model 25-111	42-O, 42-C, 49	MCC GERS	Y	4036A
1B44	RB	757	Allis-Chalmers, NEMA Size 1, Model 25-111	42-O, 42-C, 49	MCC GERS	Y	4037
1B44	RB	757	Allis-Chalmers, NEMA Size 1, Model 25-111	42-O, 42-C, 49	MCC GERS	Y	4040
1B44	RB	757	Allis-Chalmers, NEMA Size 1, Model 25-111	42-O, 42-C, 49	MCC GERS	Y	4041
1B44	RB	757	Allis-Chalmers, NEMA Size 1, Model 25-111	42-O, 42-C, 49	MCC GERS	Y	8018
1B44	RB	757	GE HFA51A	Y	SWGR GERS	Y	6059
1B44A	RB	757	Allis-Chalmers, NEMA Size 3, Model 25-113	42-O, 42-C, 49	MCC GERS	Y	4039
1B44A	RB	757	Allis-Chalmers, NEMA Size 4, Model 25-114	42-O, 42-C, 49	MCC GERS	Y	4038
1C003	CB	786	EAGLE TIMER HP52	K4400A, K4400B	QUALIFIED	Y	2007
1C003	CB	786	EAGLE TIMER HP52	K4400A, K4400B	QUALIFIED	Y	2009
1C003	CB	786	EAGLE TIMER HP52	K4400A, K4400B	QUALIFIED	Y	2010
1C003	CB	786	EAGLE TIMER HP52	K4400A, K4400B	QUALIFIED	Y	2011
1C003	CB	786	FOXBORO N-2A0-L2C-R	LSY-4565A	QUALIFIED	Y	RHR LOGIC

Table A-1 (Continued)

List of Essential Relays

Essential Relay Enclosure			Essential Relay		Screening Results (Note 2)		SSEL Item Number
Panel	Bldg.	Elev.	Relay Type	Contact ID	Disposition	Pass	
1C003	CB	786	FOXBORO N-2A0-L2C-R	LSY-4565B	QUALIFIED	Y	RHR LOGIC
1C003	CB	786	FOXBORO N-2A0-L2C-R	LSY-4565C	QUALIFIED	Y	RHR LOGIC
1C003	CB	786	FOXBORO N-2A0-L2C-R	LSY-4565D	QUALIFIED	Y	RHR LOGIC
1C006	CB	786	AGASTAT EGP	K1-2001	RELAY GERS	Y	8203
1C006	CB	786	AGASTAT EGP	K1-2002	RELAY GERS	Y	8204
1C006	CB	786	AGASTAT EGP	K1-901	RELAY GERS	Y	8201
1C006	CB	786	AGASTAT EGP	K1-902	RELAY GERS	Y	8202
1C006	CB	786	AGASTAT EGP	K2-2001	RELAY GERS	Y	8203
1C006	CB	786	AGASTAT EGP	K2-2002	RELAY GERS	Y	8204
1C006	CB	786	AGASTAT EGP	K2-901	RELAY GERS	Y	8201
1C006	CB	786	AGASTAT EGP	K2-902	RELAY GERS	Y	8202
1C006	CB	786	AGASTAT EGP	K3-2001	RELAY GERS	Y	8203
1C006	CB	786	AGASTAT EGP	K3-2002	RELAY GERS	Y	8204
1C006	CB	786	AGASTAT EGP	K3-901	RELAY GERS	Y	8201
1C006	CB	786	AGASTAT EGP	K3-902	RELAY GERS	Y	8202
1C006	CB	786	GE CR120A	95-R03	RELAY GERS	Y	8208B
1C008	CB	786	GE HGA11J DC	103-301	RELAY GERS	Y	6001
1C008	CB	786	GE HGA11J DC	103-401	RELAY GERS	Y	6050
1C015	CB	786	GE HFA151A	A71B-K005A	RELAY GERS	Y	RHR LOGIC
1C015	CB	786	GE HFA151A	A71B-K005C	RELAY GERS	Y	RHR LOGIC
1C015	CB	786	GE HFA151A	C71A-K004A	RELAY GERS	Y	RHR LOGIC
1C015	CB	786	GE HFA151A	C71A-K004C	RELAY GERS	Y	RHR LOGIC
1C015	CB	786	GE HFA151A	C71A-K006A	RELAY GERS	Y	RHR LOGIC
1C015	CB	786	GE HFA151A	C71A-K006C	RELAY GERS	Y	RHR LOGIC
1C017	CB	786	GE HFA151A	A71B-K005B	RELAY GERS	Y	RHR LOGIC
1C017	CB	786	GE HFA151A	A71B-K005D	RELAY GERS	Y	RHR LOGIC

Table A-1 (Continued)

List of Essential Relays

Essential Relay Enclosure			Essential Relay		Screening Results (Note 2)		SSEL Item Number
Panel	Bldg.	Elev.	Relay Type	Contact ID	Disposition	Pass	
1C017	CB	786	GE HFA151A	C71A-K004B	RELAY GERS	Y	RHR LOGIC
1C017	CB	786	GE HFA151A	C71A-K004D	RELAY GERS	Y	RHR LOGIC
1C017	CB	786	GE HFA151A	C71A-K006B	RELAY GERS	Y	RHR LOGIC
1C017	CB	786	GE HFA151A	C71A-K006D	RELAY GERS	Y	RHR LOGIC
1C031	CB	786	AGASTAT 2412	162-3	RELAY GERS	Y	LDSHD 1A3
1C031	CB	786	AGASTAT 2412	162-4	RELAY GERS	Y	LDSHD 1A4
1C031	CB	786	GE HFA151A	127/41X	RELAY GERS	Y	CS LOGIC
1C031	CB	786	GE HFA151A	127/41X	RELAY GERS	Y	RHR LOGIC
1C031	CB	786	GE HFA151A	127/31X	RELAY GERS	Y	CS LOGIC
1C031	CB	786	GE HFA151A	127/31X	RELAY GERS	Y	RHR LOGIC
1C031	CB	786	GE HFA151A	127-31X	RELAY GERS	Y	LDSHD 1A3
1C031	CB	786	GE HFA151A	127-41X	RELAY GERS	Y	LDSHD 1A4
1C031	CB	786	GE HFA151A	127X/ST12	RELAY GERS	Y	LDSHD 1A4
1C031	CB	786	GE HFA151A	127X/ST11	RELAY GERS	Y	LDSHD 1A3
1C031	CB	786	GE HFA151A	195-3	RELAY GERS	Y	LDSHD 1A3
1C031	CB	786	GE HFA151A	195-4	RELAY GERS	Y	LDSHD 1A4
1C031	CB	786	GE HFA151A	196-3	RELAY GERS	Y	LDSHD 1A3
1C031	CB	786	GE HFA151A	196-4	RELAY GERS	Y	LDSHD 1A4
1C031	CB	786	GE HFA151A	197-31	RELAY GERS	Y	8102
1C031	CB	786	GE HFA151A	197-31	RELAY GERS	Y	LDSHD 1A3
1C031	CB	786	GE HFA151A	197-31	RELAY GERS	Y	8101
1C031	CB	786	GE HFA151A	197-41	RELAY GERS	Y	LDSHD 1A4
1C031	CB	786	GE HFA151A	197-41	RELAY GERS	Y	8104
1C031	CB	786	GE HFA151A	197-41	RELAY GERS	Y	8103
1C031	CB	786	GE NGV11C	127/ST11	RELAY GERS	Y	LDSHD 1A3
1C031	CB	786	GE NGV11C	127/SB11	RELAY GERS	Y	LDSHD 1A3
1C031	CB	786	GE NGV11C	127/31	RELAY GERS	Y	LDSHD 1A3
1C031	CB	786	GE NGV11C	127/ST12	RELAY GERS	Y	LDSHD 1A4

Table A-1 (Continued)

List of Essential Relays

Essential Relay Enclosure			Essential Relay		Screening Results (Note 2)		SSEL Item Number
Panel	Bldg.	Elev.	Relay Type	Contact ID	Disposition	Pass	
1C031	CB	786	GE NGV11C	127/SB12	RELAY GERS	Y	LDSHD 1A4
1C031	CB	786	GE NGV11C	127/41	RELAY GERS	Y	LDSHD 1A4
1C031	CB	786	WESTINGHOUSE WL	386/ST	RELAY GERS	Y	6001
1C031	CB	786	WESTINGHOUSE WL	386/ST	RELAY GERS	Y	6050
1C032	CB	786	AGASTAT 2412	E11A-K081A	RELAY GERS	Y	RHR LOGIC
1C032	CB	786	AGASTAT 2412	E11A-K086A	RELAY GERS	Y	RHR LOGIC
1C032	CB	786	AGASTAT TR	E11A-K028A	RELAY GERS	Y	RHR LOGIC
1C032	CB	786	AGASTAT TR	E11A-K034A	RELAY GERS	Y	RHR LOGIC
1C032	CB	786	AGASTAT TR	E11A-K040A	RELAY GERS	Y	RHR LOGIC
1C032	CB	786	AGASTAT TR	E11A-K070A	RELAY GERS	Y	RHR LOGIC
1C032	CB	786	AGASTAT TR	E11A-K075A	RELAY GERS	Y	RHR LOGIC
1C032	CB	786	AGASTAT TR	E11A-K093A	RELAY GERS	Y	RHR LOGIC
1C032	CB	786	GE CR120KT (time delay)	E11A-K045A	RELAY GERS	Y	RHR LOGIC
1C032	CB	786	GE HFA151A	E11A-K014A	RELAY GERS	Y	RHR LOGIC
1C032	CB	786	GE HFA151A	E11A-K015A	RELAY GERS	Y	RHR LOGIC
1C032	CB	786	GE HFA151A	E11A-K027A	RELAY GERS	Y	RHR LOGIC
1C032	CB	786	GE HFA151A	E11A-K054A	RELAY GERS	Y	RHR LOGIC
1C032	CB	786	GE HFA151A	E11A-K055A	RELAY GERS	Y	RHR LOGIC
1C032	CB	786	GE HFA151A	E11A-K066A	RELAY GERS	Y	4019,RHR LOGIC
1C032	CB	786	GE HFA151A	E11A-K072A	RELAY GERS	Y	RHR LOGIC
1C032	CB	786	GE HFA151A	E11A-K076A	RELAY GERS	Y	RHR LOGIC
1C032	CB	786	GE HFA51A	E11A-K005A	RELAY GERS	Y	RHR LOGIC
1C032	CB	786	GE HFA51A	E11A-K006A	RELAY GERS	Y	RHR LOGIC
1C032	CB	786	GE HFA51A	E11A-K007A	RELAY GERS	Y	RHR LOGIC
1C032	CB	786	GE HFA51A	E11A-K008A	RELAY GERS	Y	RHR LOGIC
1C032	CB	786	GE HFA51A	E11A-K009A	RELAY GERS	Y	RHR LOGIC

Table A-1 (Continued)

List of Essential Relays

Essential Relay Enclosure			Essential Relay		Screening Results (Note 2)		SSEL Item Number
Panel	Bldg.	Elev.	Relay Type	Contact ID	Disposition	Pass	
1C032	CB	786	GE HFA51A	E11A-K010A	RELAY GERS	Y	RHR LOGIC
1C032	CB	786	GE HFA51A	E11A-K016A	RELAY GERS	Y	RHR LOGIC
1C032	CB	786	GE HFA51A	E11A-K018A	RELAY GERS	Y	4005,RHR LOGIC
1C032	CB	786	GE HFA51A	E11A-K019A	RELAY GERS	Y	4005,RHR LOGIC
1C032	CB	786	GE HFA51A	E11A-K021A	RELAY GERS	Y	4008,RHR LOGIC
1C032	CB	786	GE HFA51A	E11A-K022A	RELAY GERS	Y	4008,RHR LOGIC
1C032	CB	786	GE HFA51A	E11A-K037A	RELAY GERS	Y	RHR LOGIC
1C032	CB	786	GE HFA51A	E11A-K039A	RELAY GERS	Y	RHR LOGIC
1C032	CB	786	GE HFA51A	E11A-K043A	RELAY GERS	Y	RHR LOGIC
1C032	CB	786	GE HFA51A	E11A-K044A	RELAY GERS	Y	RHR LOGIC
1C032	CB	786	GE HFA51A	E11A-K046A	RELAY GERS	Y	4018
1C032	CB	786	GE HFA51A	E11A-K047A	RELAY GERS	Y	4038
1C032	CB	786	GE HFA51A	E11A-K058A	RELAY GERS	Y	4017
1C032	CB	786	GE HFA51A	E11A-K061A	RELAY GERS	Y	4017,RHR LOGIC
1C032	CB	786	GE HFA51A	E11A-K062A	RELAY GERS	Y	8101,8102,RHR LOGIC
1C032	CB	786	GE HFA51A	E11A-K063A	RELAY GERS	Y	RHR LOGIC
1C032	CB	786	GE HFA51A	E11A-K073A	RELAY GERS	Y	RHR LOGIC
1C032	CB	786	GE HFA51A	E11A-K077A	RELAY GERS	Y	RHR LOGIC
1C032	CB	786	GE HFA51A	E11A-K079A	RELAY GERS	Y	RHR LOGIC
1C032	CB	786	GE HFA51A	E11A-K080A	RELAY GERS	Y	RHR LOGIC
1C032	CB	786	GE HFA51A	E11A-K090A	RELAY GERS	Y	RHR LOGIC
1C032	CB	786	GE HFA51A	E11A-K094A	RELAY GERS	Y	RHR LOGIC
1C032	CB	786	GE HFA51A	E11A-K099A	RELAY GERS	Y	RHR LOGIC
1C032	CB	786	GE HFA51A	E11A-K100A	RELAY GERS	Y	RHR LOGIC
1C032	CB	786	GE HFA51A	E11A-K105A	RELAY GERS	Y	RHR LOGIC
1C032	CB	786	GE HGA11A DC	E11A-K003A	RELAY GERS	Y	RHR LOGIC
1C032	CB	786	GE HGA11A DC	E11A-K004A	RELAY GERS	Y	RHR LOGIC

Table A-1 (Continued)

List of Essential Relays

Essential Relay Enclosure			Essential Relay		Screening Results (Note 2)		SSEL Item Number
Panel	Bldg.	Elev.	Relay Type	Contact ID	Disposition	Pass	
1C032	CB	786	GE HGA11A DC	E11A-K023A	RELAY GERS	Y	RHR LOGIC
1C032	CB	786	GE HGA11A DC	E11A-K024A	RELAY GERS	Y	RHR LOGIC
1C032	CB	786	GE HGA11A DC	E11A-K025A	RELAY GERS	Y	RHR LOGIC
1C032	CB	786	GE HGA11A DC	E11A-K026A	RELAY GERS	Y	RHR LOGIC
1C032	CB	786	GE HGA11A DC	E11A-K031A	RELAY GERS	Y	RHR LOGIC
1C032	CB	786	GE HGA11A DC	E11A-K032A	RELAY GERS	Y	RHR LOGIC
1C032	CB	786	GE HGA11A DC	E11A-K033A	RELAY GERS	Y	RHR LOGIC
1C032	CB	786	GE HGA11A DC	E11A-K035A	RELAY GERS	Y	RHR LOGIC
1C032	CB	786	GE HGA11A DC	E11A-K036A	RELAY GERS	Y	RHR LOGIC
1C032	CB	786	GE HGA11A DC	E11A-K065A	RELAY GERS	Y	RHR LOGIC
1C032	CB	786	GE HGA11A DC	E11A-K067A	RELAY GERS	Y	4039,RHR LOGIC
1C032	CB	786	GE HGA11A DC	E11A-K069A	RELAY GERS	Y	RHR LOGIC
1C032	CB	786	GE HGA11A DC	E11A-K078A	RELAY GERS	Y	RHR LOGIC
1C032	CB	786	GE HGA11A DC	E11A-K087A	RELAY GERS	Y	4018,RHR LOGIC
1C032	CB	786	GE HGA11A DC	E11A-K088A	RELAY GERS	Y	4038,4039,RHR LOGIC
1C032	CB	786	GE HGA11A DC	E11A-K095A	RELAY GERS	Y	RHR LOGIC
1C032	CB	786	GE HGA11A DC	E11A-K097A	RELAY GERS	Y	RHR LOGIC
1C032	CB	786	GE HGA11A DC	E11A-K101A	RELAY GERS	Y	RHR LOGIC
1C032	CB	786	GE HGA11A DC	E11A-K102A	RELAY GERS	Y	RHR LOGIC
1C033	CB	786	AGASTAT 2412	E11A-K081B	RELAY GERS	Y	RHR LOGIC
1C033	CB	786	AGASTAT 2412	E11A-K086B	RELAY GERS	Y	RHR LOGIC
1C033	CB	786	AGASTAT TR	E11A-K028B	RELAY GERS	Y	RHR LOGIC
1C033	CB	786	AGASTAT TR	E11A-K034B	RELAY GERS	Y	RHR LOGIC
1C033	CB	786	AGASTAT TR	E11A-K040B	RELAY GERS	Y	RHR LOGIC
1C033	CB	786	AGASTAT TR	E11A-K070B	RELAY GERS	Y	RHR LOGIC
1C033	CB	786	AGASTAT TR	E11A-K075B	RELAY GERS	Y	RHR LOGIC
1C033	CB	786	AGASTAT TR	E11A-K093B	RELAY GERS	Y	RHR LOGIC

Table A-1 (Continued)

List of Essential Relays

Essential Relay Enclosure			Essential Relay		Screening Results (Note 2)		SSEL Item Number
Panel	Bldg.	Elev.	Relay Type	Contact ID	Disposition	Pass	
1C033	CB	786	GE CR120KT (time delay)	E11A-K045B	RELAY GERS	Y	RHR LOGIC
1C033	CB	786	GE HFA11A	E11A-K037B	RELAY GERS	Y	RHR LOGIC
1C033	CB	786	GE HFA11A	E11A-K039B	RELAY GERS	Y	RHR LOGIC
1C033	CB	786	GE HFA11A	E11A-K043B	RELAY GERS	Y	RHR LOGIC
1C033	CB	786	GE HFA11A	E11A-K044B	RELAY GERS	Y	RHR LOGIC
1C033	CB	786	GE HFA11A	E11A-K046B	RELAY GERS	Y	4018
1C033	CB	786	GE HFA11A	E11A-K047B	RELAY GERS	Y	4038
1C033	CB	786	GE HFA151A	E11A-K014B	RELAY GERS	Y	RHR LOGIC
1C033	CB	786	GE HFA151A	E11A-K027B	RELAY GERS	Y	RHR LOGIC
1C033	CB	786	GE HFA151A	E11A-K054B	RELAY GERS	Y	RHR LOGIC
1C033	CB	786	GE HFA151A	E11A-K055B	RELAY GERS	Y	RHR LOGIC
1C033	CB	786	GE HFA151A	E11A-K067B	RELAY GERS	Y	4039,RHR LOGIC
1C033	CB	786	GE HFA151A	E11A-K072B	RELAY GERS	Y	RHR LOGIC
1C033	CB	786	GE HFA151A	E11A-K076B	RELAY GERS	Y	RHR LOGIC
1C033	CB	786	GE HFA51A	E11A-K005B	RELAY GERS	Y	RHR LOGIC
1C033	CB	786	GE HFA51A	E11A-K006B	RELAY GERS	Y	RHR LOGIC
1C033	CB	786	GE HFA51A	E11A-K007B	RELAY GERS	Y	RHR LOGIC
1C033	CB	786	GE HFA51A	E11A-K008B	RELAY GERS	Y	RHR LOGIC
1C033	CB	786	GE HFA51A	E11A-K009B	RELAY GERS	Y	RHR LOGIC
1C033	CB	786	GE HFA51A	E11A-K010B	RELAY GERS	Y	RHR LOGIC
1C033	CB	786	GE HFA51A	E11A-K015B	RELAY GERS	Y	RHR LOGIC
1C033	CB	786	GE HFA51A	E11A-K016B	RELAY GERS	Y	RHR LOGIC
1C033	CB	786	GE HFA51A	E11A-K018B	RELAY GERS	Y	4025,RHR LOGIC
1C033	CB	786	GE HFA51A	E11A-K019B	RELAY GERS	Y	4025,RHR LOGIC
1C033	CB	786	GE HFA51A	E11A-K021B	RELAY GERS	Y	4028,RHR LOGIC
1C033	CB	786	GE HFA51A	E11A-K022B	RELAY GERS	Y	4028,RHR LOGIC
1C033	CB	786	GE HFA51A	E11A-K058B	RELAY GERS	Y	4041

Table A-1 (Continued)

List of Essential Relays

Essential Relay Enclosure			Essential Relay		Screening Results (Note 2)		SSEL Item Number
Panel	Bldg.	Elev.	Relay Type	Contact ID	Disposition	Pass	
1C033	CB	786	GE HFA51A	E11A-K061B	RELAY GERS	Y	4037,RHR LOGIC
1C033	CB	786	GE HFA51A	E11A-K062B	RELAY GERS	Y	8103,8104,RHR LOGIC
1C033	CB	786	GE HFA51A	E11A-K063B	RELAY GERS	Y	4039,RHR LOGIC
1C033	CB	786	GE HFA51A	E11A-K073B	RELAY GERS	Y	RHR LOGIC
1C033	CB	786	GE HFA51A	E11A-K077B	RELAY GERS	Y	RHR LOGIC
1C033	CB	786	GE HFA51A	E11A-K079B	RELAY GERS	Y	RHR LOGIC
1C033	CB	786	GE HFA51A	E11A-K080B	RELAY GERS	Y	RHR LOGIC
1C033	CB	786	GE HFA51A	E11A-K090B	RELAY GERS	Y	RHR LOGIC
1C033	CB	786	GE HFA51A	E11A-K094B	RELAY GERS	Y	RHR LOGIC
1C033	CB	786	GE HFA51A	E11A-K099B	RELAY GERS	Y	RHR LOGIC
1C033	CB	786	GE HFA51A	E11A-K100B	RELAY GERS	Y	RHR LOGIC
1C033	CB	786	GE HFA51A	E11A-K105B	RELAY GERS	Y	RHR LOGIC
1C033	CB	786	GE HGA11A DC	E11A-K003B	RELAY GERS	Y	RHR LOGIC
1C033	CB	786	GE HGA11A DC	E11A-K004B	RELAY GERS	Y	RHR LOGIC
1C033	CB	786	GE HGA11A DC	E11A-K023B	RELAY GERS	Y	RHR LOGIC
1C033	CB	786	GE HGA11A DC	E11A-K024B	RELAY GERS	Y	RHR LOGIC
1C033	CB	786	GE HGA11A DC	E11A-K025B	RELAY GERS	Y	RHR LOGIC
1C033	CB	786	GE HGA11A DC	E11A-K026B	RELAY GERS	Y	RHR LOGIC
1C033	CB	786	GE HGA11A DC	E11A-K031B	RELAY GERS	Y	RHR LOGIC
1C033	CB	786	GE HGA11A DC	E11A-K032B	RELAY GERS	Y	RHR LOGIC
1C033	CB	786	GE HGA11A DC	E11A-K033B	RELAY GERS	Y	RHR LOGIC
1C033	CB	786	GE HGA11A DC	E11A-K035B	RELAY GERS	Y	RHR LOGIC
1C033	CB	786	GE HGA11A DC	E11A-K036B	RELAY GERS	Y	RHR LOGIC
1C033	CB	786	GE HGA11A DC	E11A-K065B	RELAY GERS	Y	RHR LOGIC
1C033	CB	786	GE HGA11A DC	E11A-K066B	RELAY GERS	Y	4019,RHR LOGIC
1C033	CB	786	GE HGA11A DC	E11A-K069B	RELAY GERS	Y	RHR LOGIC
1C033	CB	786	GE HGA11A DC	E11A-K078B	RELAY GERS	Y	RHR LOGIC

Table A-1 (Continued)

List of Essential Relays

Essential Relay Enclosure			Essential Relay		Screening Results (Note 2)		SSEL Item Number
Panel	Bldg.	Elev.	Relay Type	Contact ID	Disposition	Pass	
1C033	CB	786	GE HGA11A DC	E11A-K087B	RELAY GERS	Y	4018,RHR LOGIC
1C033	CB	786	GE HGA11A DC	E11A-K088B	RELAY GERS	Y	4038,4039,RHR LOGIC
1C033	CB	786	GE HGA11A DC	E11A-K095B	RELAY GERS	Y	RHR LOGIC
1C033	CB	786	GE HGA11A DC	E11A-K097B	RELAY GERS	Y	RHR LOGIC
1C033	CB	786	GE HGA11A DC	E11A-K101B	RELAY GERS	Y	RHR LOGIC
1C033	CB	786	GE HGA11A DC	E11A-K102B	RELAY GERS	Y	RHR LOGIC
1C041	CB	786	AGASTAT GP	A71B-K1804A	RELAY GERS	Y	3150
1C041	CB	786	AGASTAT GP	A71B-K2051	RELAY GERS	Y	4013A
1C041	CB	786	GE CR120A	A71B-K017	RELAY GERS	Y	RHR LOGIC
1C041	CB	786	GE CR120A	A71B-K047	RELAY GERS	Y	RHR LOGIC
1C041	CB	786	GE CR120A	A71B-K059	RELAY GERS	Y	RHR LOGIC
1C042	CB	786	AGASTAT GP	A71B-K1804B	RELAY GERS	Y	3151
1C042	CB	786	AGASTAT GP	A71B-K1972	RELAY GERS	Y	4033A
1C042	CB	786	GE CR120A	A71B-K018	RELAY GERS	Y	RHR LOGIC
1C042	CB	786	GE CR120A	A71B-K048	RELAY GERS	Y	RHR LOGIC
1C042	CB	786	GE CR120A	A71B-K060	RELAY GERS	Y	RHR LOGIC
1C043	CB	786	AGASTAT EGP	E21A-K026A	RELAY GERS	Y	CS LOGIC
1C043	CB	786	AGASTAT EGP	E21A-K026A	RELAY GERS	Y	3109
1C043	CB	786	AGASTAT TR	E21A-K016A	RELAY GERS	Y	CS LOGIC
1C043	CB	786	GE HFA151A	E21A-K014A	RELAY GERS	Y	CS LOGIC
1C043	CB	786	GE HFA151A	E21A-K015A	RELAY GERS	Y	CS LOGIC
1C043	CB	786	GE HFA51A	E21A-K005A	RELAY GERS	Y	CS LOGIC
1C043	CB	786	GE HFA51A	E21A-K006A	RELAY GERS	Y	CS LOGIC
1C043	CB	786	GE HFA51A	E21A-K007A	RELAY GERS	Y	RHR LOGIC,CS LOGIC
1C043	CB	786	GE HFA51A	E21A-K008A	RELAY GERS	Y	RHR LOGIC,CS LOGIC
1C043	CB	786	GE HFA51A	E21A-K010A	RELAY GERS	Y	CS LOGIC

Table A-1 (Continued)

List of Essential Relays

Essential Relay Enclosure			Essential Relay		Screening Results (Note 2)		SSEL Item Number
Panel	Bldg.	Elev.	Relay Type	Contact ID	Disposition	Pass	
1C043	CB	786	GE HFA51A	E21A-K011A	RELAY GERS	Y	CS LOGIC,LDSHD 1A3
1C043	CB	786	GE HFA51A	E21A-K012A	RELAY GERS	Y	CS LOGIC
1C043	CB	786	GE HFA51A	E21A-K012A	RELAY GERS	Y	3109
1C043	CB	786	GE HFA51A	E21A-K013A	RELAY GERS	Y	CS LOGIC
1C043	CB	786	GE HGA11A DC	E21A-K003A	RELAY GERS	Y	CS LOGIC
1C043	CB	786	GE HGA11A DC	E21A-K004A	RELAY GERS	Y	CS LOGIC
1C043	CB	786	GE HGA11A DC	E21A-K009A	RELAY GERS	Y	CS LOGIC
1C043	CB	786	GE HGA11A DC	E21A-K019A	RELAY GERS	Y	CS LOGIC
1C043	CB	786	GE HGA11A DC	E21A-K020A	RELAY GERS	Y	CS LOGIC
1C044	CB	786	AGASTAT EGP	E21A-K026B	RELAY GERS	Y	CS LOGIC
1C044	CB	786	AGASTAT EGP	E21A-K26B	RELAY GERS	Y	3119
1C044	CB	786	AGASTAT TR	E21A-K016B	RELAY GERS	Y	CS LOGIC
1C044	CB	786	GE HFA151A	E21A-K014B	RELAY GERS	Y	CS LOGIC
1C044	CB	786	GE HFA151A	E21A-K015B	RELAY GERS	Y	CS LOGIC
1C044	CB	786	GE HFA51A	E21A-K005B	RELAY GERS	Y	CS LOGIC
1C044	CB	786	GE HFA51A	E21A-K006B	RELAY GERS	Y	CS LOGIC
1C044	CB	786	GE HFA51A	E21A-K007B	RELAY GERS	Y	RHR LOGIC,CS LOGIC
1C044	CB	786	GE HFA51A	E21A-K008B	RELAY GERS	Y	RHR LOGIC,CS LOGIC
1C044	CB	786	GE HFA51A	E21A-K010B	RELAY GERS	Y	CS LOGIC
1C044	CB	786	GE HFA51A	E21A-K011B	RELAY GERS	Y	CS LOGIC,LDSHD 1A4
1C044	CB	786	GE HFA51A	E21A-K012B	RELAY GERS	Y	CS LOGIC
1C044	CB	786	GE HFA51A	E21A-K013B	RELAY GERS	Y	CS LOGIC
1C044	CB	786	GE HFA51A	E21A-K013B	RELAY GERS	Y	3124
1C044	CB	786	GE HFA51A	E21A-K12B	RELAY GERS	Y	3119
1C044	CB	786	GE HGA11A DC	E21A-K003B	RELAY GERS	Y	CS LOGIC

Table A-1 (Continued)

List of Essential Relays

Essential Relay Enclosure			Essential Relay		Screening Results (Note 2)		SSEL Item Number
Panel	Bldg.	Elev.	Relay Type	Contact ID	Disposition	Pass	
1C044	CB	786	GE HGA11A DC	E21A-K004B	RELAY GERS	Y	CS LOGIC
1C044	CB	786	GE HGA11A DC	E21A-K009B	RELAY GERS	Y	CS LOGIC
1C044	CB	786	GE HGA11A DC	E21A-K019B	RELAY GERS	Y	CS LOGIC
1C044	CB	786	GE HGA11A DC	E21A-K020B	RELAY GERS	Y	CS LOGIC
1C045	CB	786	GE HFA151A	B21C-K002A	RELAY GERS	Y	2007,2009,2010,2011
1C045	CB	786	GE HFA151A	B21C-K002B	RELAY GERS	Y	2007,2009,2010,2011
1C045	CB	786	GE HFA151A	B21C-K006A	RELAY GERS	Y	2007,2009,2010,2011
1C045	CB	786	GE HFA151A	B21C-K006B	RELAY GERS	Y	2007,2009,2010,2011
1C055	RB	757	BARKSDALE B2T	B21-N039B (PS4556)	GE DATA	Y	RHR LOGIC
1C055	RB	757	BARKSDALE B2T	B21-N039D (PS4558)	GE DATA	Y	RHR LOGIC
1C055	RB	757	BARTON 288	B21-N017C (LIS4592C)	GE DATA	Y	RHR LOGIC
1C055	RB	757	BARTON 288	B21-N017D (LIS4592D)	GE DATA	Y	RHR LOGIC
1C055	RB	757	BARTON 288	B21-N021B (PS4548)	GE DATA	Y	RHR LOGIC,CS LOGIC
1C055	RB	757	YARWAY 4418C	B21-N031B (LIS4532)	GE DATA	Y	RHR LOGIC,CS LOGIC
1C055	RB	757	YARWAY 4418C	B21-N031D (LIS4534)	GE DATA	Y	CS LOGIC,RHR LOGIC
1C056	RB	786	BARKSDALE B2T	B21-N021A (PS4545)	GE DATA	Y	RHR LOGIC,CS LOGIC
1C056	RB	786	BARKSDALE B2T	B21-N039A (PS4555)	GE DATA	Y	RHR LOGIC
1C056	RB	786	BARKSDALE B2T	B21-N039C (PS4557)	GE DATA	Y	RHR LOGIC
1C056	RB	786	BARTON 288	B21-N017A (LIS4592A)	GE DATA	Y	RHR LOGIC
1C056	RB	786	BARTON 288	B21-N017B (LIS4592B)	GE DATA	Y	RHR LOGIC

Table A-1 (Continued)

List of Essential Relays

Essential Relay Enclosure			Essential Relay		Screening Results (Note 2)		SSEL Item Number
Panel	Bldg.	Elev.	Relay Type	Contact ID	Disposition	Pass	
1C056	RB	786	YARWAY 4418C	B21-N031A (LIS4531)	GE DATA	Y	RHR LOGIC,CS LOGIC
1C056	RB	786	YARWAY 4418C	B21-N031C (LIS4533)	GE DATA	Y	RHR LOGIC,CS LOGIC
1C057	RB	738	BARTON 288	B31-N019A (PDIS4625A)	GE DATA	Y	RHR LOGIC
1C057	RB	738	BARTON 288	B31-N020A (PDIS4625B)	GE DATA	Y	RHR LOGIC
1C057	RB	738	BARTON 288	B31-N021A (PDIS4625C)	GE DATA	Y	RHR LOGIC
1C057	RB	738	BARTON 288	B31-N022A (PDIS4625D)	GE DATA	Y	RHR LOGIC
1C058	RB	739	BARKSDALE P1H	B31-N018B (PS4638A)	GE DATA	Y	RHR LOGIC
1C058	RB	739	BARTON 288	B31-N019B (PDIS4626A)	GE DATA	Y	RHR LOGIC
1C058	RB	739	BARTON 288	B31-N020B (PDIS4626B)	GE DATA	Y	RHR LOGIC
1C058	RB	739	BARTON 288	B31-N021B (PDIS4626C)	GE DATA	Y	RHR LOGIC
1C058	RB	739	BARTON 288	B31-N022B (PDIS4626C)	GE DATA	Y	RHR LOGIC
1C058	RB	739	Static O-Ring 12N	C71-N002B (PS4315B)	GE DATA	Y	RHR LOGIC
1C058	RB	739	Static O-Ring 12N	E11-N011B (PS4311B)	GE DATA	Y	RHR LOGIC,CS LOGIC
1C093	TB	757	ITE A133D (Lighting Contactor)	K2	CON GERS	Y	6015
1C093	TB	757	ITE A143D (Lighting Contactor)	K1B3	CON GERS	Y	6001,6015
1C093	TB	757	ROWAN 2190	K3	LEVEL 1	Y	6015
1C093	TB	757	ROWAN 2190	K4	LEVEL 1	Y	6015
1C094	TB	757	ITE A133D (Lighting Contactor)	K2	CON GERS	Y	6063
1C094	TB	757	ITE A143D (Lighting Contactor)	K1B3	CON GERS	Y	6050,6063

Table A-1 (Continued)

List of Essential Relays

Essential Relay Enclosure			Essential Relay		Screening Results (Note 2)		SSEL Item Number
Panel	Bldg.	Elev.	Relay Type	Contact ID	Disposition	Pass	
1C094	TB	757	ROWAN 2190	K3	LEVEL 1	Y	6063
1C094	TB	757	ROWAN 2190	K4	LEVEL 1	Y	6063
1C121	RB	757	BARTON 288	B21-N021D (PS4530)	GE DATA	Y	RHR LOGIC
1C121	RB	757	BARTON 288	B21-N021D (PS4548)	GE DATA	Y	CS LOGIC
1C121	RB	757	BARTON 288	B31-N016B (PDIS4642)	GE DATA	Y	RHR LOGIC
1C121	RB	757	BARTON 288	B31-N016D (PDIS4644)	GE DATA	Y	RHR LOGIC
1C121	RB	757	Static O-Ring 12N	E11-N011D (PS4313B)	GE DATA	Y	RHR LOGIC,CS LOGIC
1C122	RB	757	BARKSDALE P1H	B31-N018A (PS4637)	GE DATA	Y	RHR LOGIC
1C122	RB	757	BARTON 288	B21-N021C (PS4529)	GE DATA	Y	RHR LOGIC,CS LOGIC
1C122	RB	757	BARTON 288	B31-N016A (PDIS4641)	GE DATA	Y	RHR LOGIC
1C122	RB	757	BARTON 288	B31-N016C (PDIS4643)	GE DATA	Y	RHR LOGIC
1C122	RB	757	Static O-Ring 12N	C71-N002A (PS4315A)	GE DATA	Y	RHR LOGIC
1C122	RB	757	Static O-Ring 12N	C71-N002D (PS4315D)	GE DATA	Y	RHR LOGIC
1C122	RB	757	Static O-Ring 12N	E11-N011A (PS4310B)	GE DATA	Y	RHR LOGIC,CS LOGIC
1C126	RB	757	Static O-Ring 12N	C71-N002C (PS4315C)	GE DATA	Y	RHR LOGIC
1C126	RB	757	Static O-Ring 12N	E11-N001C (PS4312B)	GE DATA	Y	CS LOGIC
1C126	RB	757	Static O-Ring 12N	E11-N011C (PS4312B)	GE DATA	Y	RHR LOGIC
1C129A	RB	718	BARTON 289	E11-N021A (PDIS1971A)	GE DATA	Y	RHR LOGIC
1C129A	RB	718	Static O-Ring 5N6	E11-N016A (PS2023B)	GE DATA	Y	RHR LOGIC

Table A-1 (Continued)

List of Essential Relays

Essential Relay Enclosure			Essential Relay		Screening Results (Note 2)		SSEL Item Number
Panel	Bldg.	Elev.	Relay Type	Contact ID	Disposition	Pass	
1C129A	RB	718	Static O-Ring 5N6	E11-N016C (PS2024B)	GE DATA	Y	RHR LOGIC
1C129A	RB	718	Static O-Ring 5N6	E11-N020A (PS2023A)	GE DATA	Y	RHR LOGIC
1C129A	RB	718	Static O-Ring 5N6	E11-N020C (PS2024A)	GE DATA	Y	RHR LOGIC
1C129B	RB	718	BARTON 289	E11-N021B (PSIS1971B)	GE DATA	Y	RHR LOGIC
1C129B	RB	718	Static O-Ring 5N6	E11-N016B (PS1917B)	GE DATA	Y	RHR LOGIC
1C129B	RB	718	Static O-Ring 5N6	E11-N016D (PS1925B)	GE DATA	Y	RHR LOGIC
1C129B	RB	718	Static O-Ring 5N6	E11-N020B (PS1917A)	GE DATA	Y	RHR LOGIC
1C129B	RB	718	Static O-Ring 5N6	E11-N020D (PS1925A)	GE DATA	Y	RHR LOGIC
1C351	CB	757	AGASTAT E7012	62-127X32	RELAY GERS	Y	LDSHD 1A3
1C351	CB	757	GE HFA151A	127X/32	RELAY GERS	Y	LDSHD 1A3
1C351	CB	757	ITE 27D	127-32	RELAY GERS	Y	LDSHD 1A3
1C352	CB	757	AGASTAT E7012	62-127X42	RELAY GERS	Y	LDSHD 1A4
1C352	CB	757	GE HFA151A	127X/42	RELAY GERS	Y	LDSHD 1A4
1C352	CB	757	ITE 27D	127-42	RELAY GERS	Y	LDSHD 1A4
1C422B	RB	757	AGASTAT GP	43-KM206B21	RELAY GERS	Y	4041
1C422B	RB	757	AGASTAT GP	43-KM206B22	RELAY GERS	Y	4028A
1C422B	RB	757	AGASTAT GP	43-KM206B23	RELAY GERS	Y	4039
1C422B	RB	757	AGASTAT GP	43-KM206B24	RELAY GERS	Y	4038
1D14	RB	786	ITE Class A21, Reversing, NEMA Size 1	42-O, 42-C, 49	MCC GERS	Y	3159
1D14	RB	786	ITE Class A21, Reversing, NEMA Size 2	42-O, 42-C, 49	MCC GERS	Y	3159A
1D14	RB	786	ITE J13P20	42X/C, 42X/O	MCC GERS	Y	3159

Table A-1 (Continued)

List of Essential Relays

Essential Relay Enclosure			Essential Relay		Screening Results (Note 2)		SSEL Item Number
Panel	Bldg.	Elev.	Relay Type	Contact ID	Disposition	Pass	
1D14	RB	786	ITE J13P20	42X-O, 42X-C	MCC GERS	Y	3159A
1D15	CB	757	--	ALL	QUALIFIED	Y	6306
1D25	CB	757	--	ALL	QUALIFIED	Y	6301
1D41	RB	757	ITE Class A21, Reversing, NEMA Size 2	42-O, 42-C, 49	MCC GERS	Y	3162
1D42	RB	757	ITE Class A21, Reversing, NEMA Size 1	42-O, 42-C, 49	MCC GERS	Y	3102
1D42	RB	757	ITE Class A21, Reversing, NEMA Size 1	42-O, 42-C, 49, ;42X-0	MCC GERS	Y	4046A
1D42	RB	757	ITE J13P20	42X-C and 42X-O	MCC GERS	Y	3102
1N305	RB	812	FURNAS 42ED3SAF	1A	CON GERS	Y	8446
1N305	RB	812	FURNAS 14RB32AA-A	1M	CON GERS	Y	8446
1N305	RB	812	FURNAS 40RB32AA-A	2M	CON GERS	Y	8446
1N305	RB	812	FURNAS 40JB32AA-A	S	CON GERS	Y	8446
1N305	RB	812	FURNAS SSBA1AF	TR	QUALIFIED	Y	8446
1N405	RB	812	FURNAS 42ED3SAF	1A	CON GERS	Y	8447
1N405	RB	812	FURNAS 14RB32AA-A	1M	CON GERS	Y	8447
1N405	RB	812	FURNAS 40RB32AA-A	2M	CON GERS	Y	8447
1N405	RB	812	FURNAS 40JB32AA-A	S	CON GERS	Y	8447
1N405	RB	812	FURNAS SSBA1AF	TR	QUALIFIED	Y	8447
1Y004	CB	757	--	ALL	QUALIFIED	Y	6402
1Y022	CB	757	ITE B2021F24P1	E	CON GERS	Y	6401
1Y022	CB	757	ITE B2021F24P1	N	CON GERS	Y	6401

Table A-1 (Continued)

List of Essential Relays

Essential Relay Enclosure			Essential Relay		Screening Results (Note 2)		SSEL Item Number
Panel	Bldg.	Elev.	Relay Type	Contact ID	Disposition	Pass	
1Y1A	CB	757	--	ALL	QUALIFIED	Y	6308
1Y2A	CB	757	--	ALL	QUALIFIED	Y	6303

Notes:

1. There are 536 essential relay contact groups in the above table.
2. Screening Results Disposition:

   - CDU - seismic capacity data unavailable,
   - GERS - seismic capacity of device estableished based on Generic Equipment Ruggedness Spectra,
   - LEVEL 1 - Level 1 screening (GIP Section II.6.4.2),
   - Qualified - Seismic capacity established based on formal qualification data,
   - GE Data - Seismic capacity establish from General Electric qualification data.

Table B-1

Essential Relays Screened Using Switchgear GERS

Essential Relay Enclosure			Essential Relay		Screening Results		SSEL Item Number
Panel	Bldg.	Elev.	Relay Type	Contact ID	Disposition	Seismically Adequate	
1A3	CB	757	GE HGA14AK	102-311	SWGR GERS	Y	6001
1A3	CB	757	GE HMA, Cat. No. 0137A7575P001	152Y	SWGR GERS	Y	6003
1A3	CB	757	GE HMA, Cat. No. 0137A7575P001	152Y	SWGR GERS	Y	3109
1A3	CB	757	GE HMA, Cat. No. 0137A7575P001	152Y	SWGR GERS	Y	6006
1A3	CB	757	GE IAC66B	150/151-303	SWGR GERS	Y	6006
1A3	CB	757	GE IAC66B	150/151-312	SWGR GERS	Y	6003
1A3	CB	757	GE PJC11A	150G-303	SWGR GERS	Y	6006
1A3	CB	757	GE PJC11A	150G-312	SWGR GERS	Y	6003
1A305	CB	757	GE HMA, Cat. No. 0137A7575P001	152Y	SWGR GERS	Y	4005
1A306	CB	757	GE HMA, Cat. No. 0137A7575P001	152Y	SWGR GERS	Y	4008
1A307	CB	757	GE HMA, Cat. No. 0137A7575P001	152/Y	SWGR GERS	Y	8101
1A308	CB	757	GE HMA, Cat. No. 0137A7575P001	152/Y	SWGR GERS	Y	8102
1A311	CB	757	GE NGV11C	159/DG1	SWGR GERS	Y	6001
1A4	CB	757	GE HGA14AK	102-411	SWGR GERS	Y	6050
1A4	CB	757	GE HMA, Cat. No. 0137A7575P001	152Y	SWGR GERS	Y	6001
1A4	CB	757	GE HMA, Cat. No. 0137A7575P001	152Y	SWGR GERS	Y	3119

Table B-1 (Continued)

Essential Relays Screened Using Switchgear GERS

Essential Relay Enclosure			Essential Relay		Screening Results		SSEL Item Number
Panel	Bldg.	Elev.	Relay Type	Contact ID	Disposition	Seismically Adequate	
1A4	CB	757	GE HMA, Cat. No. 0137A7575P001	152Y	SWGR GERS	Y	6055
1A4	CB	757	GE HMA, Cat. No. 0137A7575P001	152Y	SWGR GERS	Y	6052
1A4	CB	757	GE HMA, Cat. No. 0137A7575P001	152Y	SWGR GERS	Y	6050
1A4	CB	757	GE HMA, Cat. No. 0137A7575P001	152Y	SWGR GERS	Y	6050
1A4	CB	757	GE HMA, Cat. No. 0137A7575P001	152Y	SWGR GERS	Y	6050
1A4	CB	757	GE HMA, Cat. No. 0137A7575P001	152Y	SWGR GERS	Y	6001
1A4	CB	757	GE HMA, Cat. No. 0137A7575P001	152Y	SWGR GERS	Y	6001
1A4	CB	757	GE IAC66B	150/151-403	SWGR GERS	Y	6055
1A4	CB	757	GE IAC66B	150/151-412	SWGR GERS	Y	6052
1A4	CB	757	GE PJC11A	150G-403	SWGR GERS	Y	6055
1A4	CB	757	GE PJC11A	150G-412	SWGR GERS	Y	6052
1A405	CB	757	GE HMA, Cat. No. 0137A7575P001	152Y	SWGR GERS	Y	4025
1A406	CB	757	GE HMA, Cat. No. 0137A7575P001	152Y	SWGR GERS	Y	4028
1A407	CB	757	GE HMA, Cat. No. 0137A7575P001	152/Y	SWGR GERS	Y	8103
1A408	CB	757	GE HMA, Cat. No. 0137A7575P001	152/Y	SWGR GERS	Y	8104
1A411	CB	757	GE NGV11C	159/DG2	SWGR GERS	Y	6050

Table B-1 (Continued)

Essential Relays Screened Using Switchgear GERS

Essential Relay Enclosure			Essential Relay		Screening Results		SSEL Item Number
Panel	Bldg.	Elev.	Relay Type	Contact ID	Disposition	Seismically Adequate	
1B03	CB	757	GE HFA51A	Y	SWGR GERS	Y	6007
1B03	CB	757	GE HFA51A	Y	SWGR GERS	Y	6009
1B04	CB	757	GE HFA51A	Y	SWGR GERS	Y	6056
1B04	CB	757	GE HFA51A	Y	SWGR GERS	Y	6058
1B0901	IS	767	GE HFA51A	52Y	SWGR GERS	Y	8201
1B0902	IS	767	GE HFA51A	52Y	SWGR GERS	Y	8202
1B0903	IS	767	GE HFA51A	Y	SWGR GERS	Y	6004
1B2001	IS	767	GE HFA51A	52Y	SWGR GERS	Y	8203
1B2001	IS	767	GE HFA51A	52Y	SWGR GERS	Y	8204
1B2003	IS	767	GE HFA51A	Y	SWGR GERS	Y	6053
1B34	RB	786	GE HFA51A	Y	SWGR GERS	Y	6010
1B44	RB	757	GE HFA51A	Y	SWGR GERS	Y	6059

Notes:

1. The above table identifies 44 relays that were screened using switchgear GERS.

MPR ASSOCIATES INC. ENGINEERS

Appendix C

Enclosures Containing Essential Relays

Table C-1

Enclosures Containing Essential Relays

Panel	Description	Bldg.	Elev.
1A3	4160 VAC Essential Switchgear	CB	757
1A4	4160 VAC Essential Switchgear	CB	757
1B03	Control Building 480 VAC Load Center	CB	757
1B04	Control Building 480 VAC Load Center	CB	757
1B09	Intake Structure 480 VAC Load Center	IS	767
1B20	Intake Structure 480 VAC Load Center	IS	767
1B32	Control Building 480 VAC Essential MCC	CB	757
1B34A	Reactor Building 480 VAC MCC	RB	786
1B34	Reactor Building 480 VAC MCC	RB	786
1B37	Reactor Bilding 480 VAC MCC	RB	786
1B42	Control Building 480 VAC MCC	CB	757
1B44	Reactor Building 480 VAC MCC	RB	757
1B44A	Reactor Building 480 VAC MCC	RB	757
1C003	RB & DW Cooling & Isolation Control Panel	CB	786
1C006	Feedwater And Condensate Control Panel	CB	786
1C008	Generator And Aux Power Panel	CB	786
1C015	Chan A Primary Isol & Rx Protection Vertical Brd	CB	786
1C017	Chan B Primary Isol & Rx Protection Vertical Brd	CB	786
1C031	Turbine Generator Relay Panel	CB	786
1C032	Div I RHR, Core Spray, & Auto Blowdown Relay Panel	CB	786
1C033	DivII RHR, Core Spray, & Auto Blowdown Relay Panel	CB	786
1C041	Inboard Pri Cntmnt Isol Valve Relay Panel	CB	786
1C042	Outboard Pri Cntmnt Isol Valve Relay Panel	CB	786

Table C-1

Enclosures Containing Essential Relays

Panel	Description	Bldg.	Elev.
1C043	Division I Core Spray Relay Vertical Board	CB	786
1C044	Division II Core Spray Relay Vertical Board	CB	786
1C045	Auto Blowdown Relay Vertical Board	CB	786
1C055	RPS Rx Vessel Level And Press Instrument Panel	RB	757
1C056	RPS Rx Vessel Level And Press Instrument Panel	RB	786
1C057	Rx Recirc Pump IP-201A Instrument Rack	RB	738
1C058	Rx Recirc Pump IP-201B Instrument Rack	RB	739
1C093	SBDG 1G-31 Gauge Board	TB	757
1C094	SBDG 1G-21 Gauge Board	TB	757
1C121	Jet Pump Instrument Rack	RB	757
1C122	RB Instrument Rack	RB	757
1C126	Main Steam Instrument Rack	RB	757
1C129A	RHR Loop A Instrument Rack	RB	718
1C129B	RHR Loop B Instrument Rack	RB	718
1C351	Essential Bus 1A3 Degraded Voltage Detector	CB	757
1C352	Essential Bus 1A4 Degraded Voltage Detector	CB	757
1C422B	Remote Shutdown Fuse Panel	RB	757
1D14	RCIC System 125 VDC MCC	RB	786
1D15	120 Volt Instrument AC Power Supply	CB	757
1D25	120 Volt Instrument AC Power Supply	CB	757
1D41	HPCI System 250 VDC MCC	RB	757
1D42	Reactor Building 250 VDC MCC	RB	757
1N305	Chiller 1V-CH-1A Star-Delta Local Starter	RB	812

Table C-1 (Cont'd)

Enclosures Containing Essential Relays

Panel	Description	Bldg.	Elev.
1N405	Chiller 1V-CH-1B Star-Delta Local Starter	RB	812
1Y004	Regulating Transformer	CB	757
1Y022	1Y002 To 1Y023 Automatic Transfer Switch	CB	757
1Y1A	Regulating Transformer	CB	757
1Y2A	Regulating Transformer	CB	757

Notes:

51 Enclosures Listed.

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Appendix D

Essential Relay Outliers

Table D-1

Essential Relay Outliers

Essential Relay Enclosure			Essential Relay		Screening Results (Note 2)		Affected SSEL Item Number
Panel	Bldg.	Elev.	Relay Type	Contact ID	Disposition	Seismically Adequate	
1A3	CB	757	GE HGA14AR	127-3	CDU	N	LDSHD 1A3
1A3	CB	757	GE IAC66K	150/151	RELAY GERS	N (Note 3)	3109
1A3	CB	757	GE PJC11A	150G	RELAY GERS	N (Note 3)	3109
1A301	CB	757	GE IAC53A	151-301	RELAY GERS	N (Note 3)	6001
1A302	CB	757	GE HFA151A	127-3X	RELAY GERS	N	6001, LDSHD 1A3
1A302	CB	757	GE IAC53A	151-302	RELAY GERS	N (Note 3)	6001
1A302	CB	757	GE IAC53A	151N-302	RELAY GERS	N (Note 3)	6001
1A305	CB	757	GE IAC66K	150/151	RELAY GERS	N (Note 3)	4005
1A305	CB	757	GE PJC11A	150G	RELAY GERS	N (Note 3)	4005
1A306	CB	757	GE IAC66K	150/151	RELAY GERS	N (Note 3)	4008
1A306	CB	757	GE PJC11A	150G	RELAY GERS	N (Note 3)	4008
1A307	CB	757	GE IAC66K	150/151	RELAY GERS	N (Note 3)	8101
1A307	CB	757	GE PJC11A	150G	RELAY GERS	N (Note 3)	8101
1A308	CB	757	GE IAC66K	150/151	RELAY GERS	N (Note 3)	8102
1A308	CB	757	GE PJC11A	150G	RELAY GERS	N (Note 3)	8102
1A311	CB	757	GE ICW51A	132/DG1	CDU	N	6001
1A311	CB	757	GE IJCV51A	151V/DG1	RELAY GERS	N (Note 3)	6001
1A4	CB	757	GE HGA14AR	127-4	CDU	N	LDSHD 1A4
1A4	CB	757	GE IAC66K	150/151	RELAY GERS	N (Note 3)	3119
1A4	CB	757	GE PJC11A	150G	RELAY GERS	N (Note 3)	3119
1A401	CB	757	GE IAC53A	151-401	RELAY GERS	N (Note 3)	6050
1A402	CB	757	GE HFA151A	127-4X	RELAY GERS	N	6050, LDSHD 1A4
1A402	CB	757	GE IAC53A	151-402	RELAY GERS	N (Note 3)	6050
1A402	CB	757	GE IAC53A	151N-402	RELAY GERS	N (Note 3)	6050
1A405	CB	757	GE IAC66K	150/151	RELAY GERS	N (Note 3)	4025
1A405	CB	757	GE PJC11A	150G	RELAY GERS	N (Note 3)	4025
1A406	CB	757	GE IAC66K	150/151	RELAY GERS	N (Note 3)	4028
1A406	CB	757	GE PJC11A	150G	RELAY GERS	N (Note 3)	4028

Table D-1 (Continued)

Essential Relay Outliers

Essential Relay Enclosure			Essential Relay		Screening Results (Note 2)		Affected SSEL Item Number
Panel	Bldg.	Elev.	Relay Type	Contact ID	Disposition	Seismically Adequate	
1A407	CB	757	GE IAC66K	150/151	RELAY GERS	N (Note 3)	8103
1A407	CB	757	GE PJC11A	150G	RELAY GERS	N (Note 3)	8103
1A408	CB	757	GE IAC66K	150/151	RELAY GERS	N (Note 3)	8104
1A408	CB	757	GE PJC11A	150G	RELAY GERS	N (Note 3)	8104
1A411	CB	757	GE ICW51A	132/DG2	CDU	N	6050
1A411	CB	757	GE IJCV51A	151V/DG2	RELAY GERS	N (Note 3)	6050

Notes:

1. There are 34 essential relay contact groups identified as outliers in the above table.
2. Screening Results Disposition:
   - CDU - seismic capacity data unavailable;
   - GERS - seismic capacity of device estableished based on Generic Equipment Ruggedness Spectra,
3. These devices are considered seismically adequate based on a reassessment of the seismic demand -- see Section 6.3.

MPR ASSOCIATES INC ENGINEERS

Appendix E

Résumé of Lead Relay Reviewer

SQUG

Certificate of Achievement

This is to Certify that

Robert M. Carritte

has Completed the
SQUG Relay Evaluation Training Course
Held March 22-24, 1993

Jess O. Betlack

Jess O. Betlack, MPR Associates