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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

REGARDING ENVIRONMENTAL QUALIFICATION OF ELECTRIC EQUIPMENT IMPORTANT TO SAFETY

BROWNS FERRY NUCLEAR PLANT, UNIT NOS. 1, 2 AND 3

DOCKET NOS. 50-259, 50-260 AND 50-296

INTRODUCTION

Equipment which is used to perform a necessary safety function must be demonstrated to be capable of maintaining functional operability under all service conditions postulated to occur during its installed life for the time it is required to operate. This requirement, which is embodied in General Design Criteria 1 and 4 of Appendix A and Sections III, XI, and XVII of Appendix B to 10 CFR 50, is applicable to equipment located inside as well as outside containment. More detailed requirements and guidance relating to the methods and procedures for demonstrating this capability for electrical equipment have been set forth in 10 CFR 50.49, "Environmental Qualification of Electric Equipment Important to Safety for Nuclear Power Plants," NUREG-0588, "Interim Staff Position on Environmental Qualification of Safety-Related Electrical Equipment" (which supplements IEEE Standard 323 and various NRC Regulatory Guides and industry standards), and "Guidelines for Evaluating Environmental Qualification of Class 1E Electrical Equipment in Operating Reactors" (DOR Guidelines).

BACKGROUND

On February 8, 1979, the NRC Office of Inspection and Enforcement (IE) issued to all licensees of operating plants (except those included in the systematic evaluation program (SEP)) IE Bulletin (IEB) 79-01, "Environmental qualification of Class 1E Equipment." This Bulletin, together with IE Circular 78-08 (issued on May 31, 1978), required the licensees to perform reviews to assess the adequacy of their environmental qualification programs.

On January 14, 1980, NRC issued IEB 79-01B which included the DOR Guidelines and NUREG-0588 as attachments 4 and 5, respectively. Subsequently, on May 23, 1980, Commission Memorandum and Order CLI-80-21 was issued and stated that the DOR Guidelines and portions of NUREG-0588 form the requirements that licensees must meet regarding environmental qualification of safety-related electrical equipment in order to satisfy those aspects of 10 CFR 50, Appendix A, General Design Criterion (GDC) 4. Supplements to IEB 79-01B were issued for further clarification and definition of the staff's needs. These supplements were issued on February 29, September 30, and October 24, 1980.

In addition, the staff issued orders dated August 29, 1980 (amended in September 1980) and October 24, 1980 to all licensees. The August order required that the licensees provide a report, by November 1, 1980, documenting the qualification of safety-related electrical equipment. The October order required the establishment of a central file location for the maintenance of all equipment qualification records. The central file was mandated to be established by December 1, 1980. The staff subsequently issued a Safety Evaluation (SE) on environmental qualification of safety-related electrical equipment to the licensee on June 3, 1981. This SE directed the licensee to "either provide documentation of the missing qualification information which demonstrates that safety-related equipment meets the DOR Guidelines or NUREG-0588 requirements or commit to a corrective action (requalification, replacement (etc.))." The licensee was required to respond to NRC within 90 days of receipt of the SE. In response to the staff SE issued in 1981, the licensee submitted additional information regarding the qualification of safety-related electrical equipment. This information was evaluated for the staff by the Franklin Research Center (FRC) in order to:
1) identify all cases where the licensee's response did not resolve the significant qualification issues, 2) evaluate the licensee's qualification documentation in accordance with established criteria to determine which equipment had adequate documentation and which did not, and 3) evaluate the licensee's qualification documentation for safety-related electrical equipment located in harsh environments required for TMI Lessons Learned Implementation. A Technical Evaluation Report (TER) was issued by FRC on July 26, 1982. A Safety Evaluation was subsequently issued to the Browns Ferry Nuclear Plant, Units 1, 2 and 3 on January 11, 1983, with the FRC TER as an attachment.

A final rule on environmental qualification of electric equipment important to safety for nuclear power plants became effective on February 22, 1983. This rule, Section 50.49 of 10 CFR 50, specifies the requirements of electrical equipment important to safety located in a harsh environment. In accordance with this rule, equipment for Browns Ferry Nuclear Plant (BFNP), Units 1, 2 and 3 may be qualified to the criteria specified in either the DOR Guidelines or NUREG-0588, except for replacement equipment. Replacement equipment installed subsequent to February 22, 1983 must be qualified in accordance with the provisions of 10 CFR 50.49, using the guidance of Regulatory Guide 1.89, unless there are sound reasons to the contrary.

A meeting was held with each licensee of plants for which a TER had been prepared for the staff by FRC in order to discuss all remaining open issues regarding environmental qualification, including acceptability of the environmental conditions for equipment qualification purposes, if this issue had not yet been resolved. On May 24, 1984, a meeting was held to discuss Tennessee Valley Authority's (TVA, the licensee) proposed method to resolve the environmental qualification deficiencies identified in the January 11, 1983 SE and July 26, 1982 FRC TER. Discussions also included TVA's general methodology for compliance with 10 CFR 50.49, and justification for continued operation for those equipment items for which environmental qualification is not yet completed. The minutes of the meeting and proposed method of resolution for each of the environmental qualification deficiencies are documented in a January 29, 1985 submittal from the licensee. Additional documentation was provided by letters of January 11 and March 15, 1985, with an additional meeting held on February 28, 1985 to further clarify TVA's approach to equipment qualification.

EVALUATION

The evaluation of the acceptability of the licensee's electrical equipment environmental qualification program is based on the results of an audit review performed by the staff of: (1) the licensee's proposed resolutions of the environmental qualification deficiencies identified in the January 11, 1983 SE and July 26, 1982 FRC TER; (2) compliance with the requirements of 10 CFR 50.49; and (3) justification for continued operation (JCO) for those equipment items for which the environmental qualification is not yet completed.

Proposed Resolutions of Identified Deficiencies

The proposed resolutions for the equipment environmental qualification deficiencies, identified in the January 11, 1983 SE, and the FRC TER enclosed with it, are described in the licensee's January 29, 1985 submittal. During the May 24, 1984 meeting with the licensee, the staff discussed the proposed resolution of each deficiency for each equipment item identified in the FRC TER and found the licensee's approach for resolving the identified environmental qualification deficiencies acceptable. The majority of deficiencies identified were documentation, similarity, aging, qualified life and replacement schedule. All open items identified in the SE dated January 11, 1983 were also discussed and the resolution of these items has been found acceptable by the staff.

The approach described by the licensee for addressing and resolving the identified deficiencies includes replacing equipment, performing additional analyses, utilizing additional qualification documentation beyond that reviewed by FRC, obtaining additional qualification documentation and determining that some equipment is outside the scope of 10 CFR 50.49, and therefore not required to be environmentally qualified, e.g., located in a mild environment. We discussed the proposed resolutions in detail on an item by item basis with the licensee during the May 24, 1984 meeting. Replacing or exempting equipment, for an acceptable reason, are clearly acceptable methods for resolving environmental qualification deficiencies. The more lengthy discussions with the licensee concerned the use of additional analyses or documentation. Although we did not review the additional analyses or documentation, we discussed how analysis was being used to resolve deficiencies identified in the FRC TER, and the content of the additional documentation in order to determine the acceptability of these methods. The licensee's equipment environmental qualification files will be audited by the staff during follow-up inspections to be performed by Region II, with assistance from IE Headquarters and NRR staff as necessary.

Since a significant amount of documentation has already been reviewed by the staff and Franklin Research Center, the primary objective of the file audit

will be to verify that they contain the appropriate analyses and other necessary documentation to support the licensee's conclusion that the equipment is qualified. The inspections will verify that the licensee's program for surveillance and maintenance of environmentally qualified equipment is adequate to assure that this equipment is maintained in the as analyzed or tested condition. The method used for tracking periodic replacement parts, and implementation of the licensee's commitments and actions, e.g., regarding replacement of equipment, will also be verified.

Based on our discussions with the licensee and our review of its submittal, we find the licensee's approach for resolving the identified environmental qualification deficiencies acceptable.

Compliance With 10 CFR 50.49

In its January 29, 1985 submittal, the licensee has described the approach used to identify equipment within the scope of paragraph (b)(1) of 10 CFR 50.49, equipment relied upon to remain functional during and following design basis events. The licensee states that it has identified all equipment whose functioning is required to mitigate any design basis event (DBE), as defined in 10 CFR 50.49(b)(1), for the Browns Ferry Nuclear Plant, Units 1, 2 and 3 which causes a harsh environment for that equipment. This equipment was determined by identifying all the systems upon which the safety analyses in the Final Safety Analysis Report (FSAR) are dependent. Further, any other systems or equipment necessary to support these systems were also identified.

From the safety systems identified above, a survey of the safety-related equipment within the harsh environment area of the DBEs was conducted. This survey was conducted using electrical instrument tabulations, mechanical piping drawings, mechanical heating and ventilation drawings, conduit and grounding drawings, technical specifications, FSAR, and Emergency Operating Procedures to identify the safety-related components. Verification of the equipment qualification has been accomplished by a field survey of the installed components to certify proper correlation between the qualification documents and the "in-situ" equipment.

The flooding and environmental effects resulting from all postulated design basis events documented in Chapter 14 and Appendices G and M of the BFNP Final Safety Analysis Report (FSAR), including the Loss of Coolant Accident (LOCA) and the Main Steam Line Break Accident (MSLBA) inside and outside the primary containment, were considered in the identification of safety-related electrical equipment to be environmentally qualified.

Flooding and environmental effects outside primary containment resulting from High Energy Line Breaks (HELBs) and other sources are documented in TVA Report DED-TM-PF2 dated March 1, 1974. Certain protective measures, such as the sealing of devices, equipment mounting pads and building drains preclude adverse flooding effects on safety-related equipment outside containment.

In summary, all design basis events including accidents at BFNP were considered in the identification of electrical equipment within the scope of Paragraph (b)(1) of 10 CFR 50.49.

The licensee's approach for identifying equipment within the scope of paragraph (b)(1) is in accordance with the requirements of that paragraph, and therefore acceptable.

The method used by the licensee for identification of electrical equipment within the scope of paragraph (b)(2) of 10 CFR 50.49, nonsafety-related electric equipment whose failure under postulated environmental conditions could prevent satisfactory accomplishment of safety functions, is summarized below:

1. A list of safety-related electrical equipment as defined in paragraph 10 CFR 50.49 paragraph (b)(1) was developed as previously described.

2. The electrical and instrument and control diagrams of the safety-related electrical equipment identified in Step 1 were reviewed to identify any nonsafety-related electrical devices electrically connected directly into the control or power circuitry of the safety-related equipment whose failure due to postulated environmental conditions could prevent required operation of the safety-related equipment.

3. The operation of the safety-related systems and equipment were reviewed to identify any mechanically connected nonsafety-related systems with electrical components whose failure could prevent the required operation of the safety-related systems or equipment. This involved the review of flow and control diagrams, component technical manuals, and systems descriptions in the FSAR.

4. Physical and electrical independence features were implemented in the Browns Ferry design to prevent unacceptable interactions between the electrical circuits of nonsafety-related and safety-related systems and components. TVA's provisions for physical independence were presented in the Browns Ferry Final Safety Analysis Report Section 8.9 and were accepted by the staff in Section 7.2.3 of the BFNP Safety Evaluation (SE) issued June 26, 1972, and SE Supplement No. 1, Section 7.2.3, issued December 21, 1972. Any deviations from these design features have been analyzed and resolved through a nonconformance report (NCR) process.

The licensee states that the results of the above review indicated that no additional electrical equipment was identified which was not previously included on that "Master List." Therefore, the list of electrical equipment provided in its January 29, 1985 submittal is judged by the licensee to address all electrical equipment within the scope of paragraph (b)(2) of 10 CFR 50.49.

We find the methodology being used by the licensee is acceptable since it provides reasonable assurance that equipment within the scope of paragraph (b)(2) of 10 CFR 50.49 has been identified.

With regard to paragraph (b)(3) of 10 CFR 50.49, the licensee refers to its April 30, 1984 letter for identification of instrumentation and sampling equipment which requires environmental qualification to meet the intent of Regulatory Guide 1.97. The staff has not yet completed its review for conformance to Regulatory Guide 1.97. In its April 30, 1984 letter, the licensee specifies exceptions to the guidance, justifications, proposed modifications and the schedule for the upgrade. The staff will determine the

acceptability of these justifications as part of its review for conformance with Regulatory Guide 1.97. This further staff review for Regulatory Guide 1.97 conformance may result in the licensee being required to include additional equipment in its environmental qualification program. However, the licensee has included in its environmental qualification program certain post-accident monitoring equipment using the guidance of Regulatory Guide 1.97.

We find the licensee's approach to identifying equipment within the scope of paragraph (b)(3) of 10 CFR 50.49 acceptable since it is in accordance with the requirements of that paragraph.

Justification for Continued Operation

On January 11, 1985, TVA filed a timely request for an extension to the schedular requirements of 10 CFR 50.49(g) for Browns Ferry, Units 1, 2 and 3 to complete the environmental qualifications of certain equipment that could not be completed by March 31, 1985. The requested extension was until November 30, 1985 for all three units. By letter dated February 26, 1985, TVA modified the request of January 11, 1985 to request an extension for Unit 1 only until July 12, 1985 (vs November 30, 1985), which at the time was the projected end of Cycle 6.

In its March 15, 1985 submittal, TVA provided justification for continued operation of Unit 1 beyond March 31, 1985, addressing each item of equipment for which environmental qualification had not yet been completed. The staff reviewed these JCOs and found them acceptable. On March 19, 1985, Unit 1 was shutdown to repair some valves that had not passed a local leak rate test. By letter dated March 27, 1985, TVA informed us that they had decided to keep Unit 1 in shutdown until all environmental qualification work required by 10 CFR 50.49 is completed. This letter also withdrew TVA's extension request of February 26, 1985 to operate Unit 1 until July 12, 1985. Therefore, JCOs were not necessary for Browns Ferry, Unit 1.

Browns Ferry, Unit 2 shut down for refueling and modifications on September 15, 1984. In the letter of January 11, 1985 and reconfirmed in

the March 15, 1985 submittal, TVA stated that it plans to qualify all components presently identified as needing qualification before Unit 2 startup. Completion of these modifications has extended the projected startup date to at least September 1985. In TVA's March 15, 1985, letter, and reconfirmed in the March 27, 1985 letter, it stated that, since Unit 2 was shut down (and would be shut down on March 31, 1985) and since TVA plans to qualify all equipment prior to startup in Cycle 6, no extension to the schedular requirements of 10 CFR 50.49(g) was needed. The March 27, 1985 letter stated that TVA has committed to complete all environmental qualification work on Unit 2 prior to returning the Unit to service even if this results in an extension beyond the scheduled return to service date of September 3, 1985. Therefore, JCOs were not necessary for Browns Ferry, Unit 2.

Browns Ferry, Unit 3 started up in Cycle 6 on November 19, 1984 and could operate until at least April 30, 1986. However, TVA has committed to shut down Unit 3 on November 30, 1985 - part way through the fuel cycle - and to complete all remaining qualification work before restarting Unit 3 for the remainder of Cycle 6. TVA stated that the extension from March 31, 1985 to November 30, 1985 was needed to permit operation of Browns Ferry Unit 3 during this period. During the requested extension period, both Units 1 and 2 will be simultaneously shut down during the peak summer load period. For Browns Ferry Unit 3, TVA submitted 83 JCOs, covering 231 items of equipment. TVA addressed each item of equipment for which the environmental qualification had not been completed. The specific items are listed in the enclosed table.

We have reviewed each JCO provided by the licensee for Unit 3 in its March 15, 1985, submittal and find them acceptable since they are based on essentially the same criteria that were used by the staff and its contractor to review JCO's previously submitted by licensees. These criteria, listed below, are also essentially the same as those contained in 10 CFR 50.49(i).

a. The safety function can be accomplished by some other designated equipment that is qualified, and failure of the principal equipment as a

result of the harsh environment will not degrade other safety functions or mislead the operator.

b. Partial test data that does not demonstrate full qualification, but provides a basis for concluding the equipment will perform its function. If it cannot be concluded from the available data that the equipment will not fail after completion of its safety function, then that failure must not result in significant degradation of any safety function or provide misleading information to the operator.

c. Limited use of administrative controls over equipment that has not been demonstrated to be fully qualified. For any equipment assumed to fail as a result of the accident environment, that failure must not result in significant degradation of any safety function or provide misleading information to the operator.

CONCLUSIONS

Based on the above evaluation, we conclude the following with regard to the qualification of electric equipment important to safety within the scope of 10 CFR 50.49.

- Tennessee Valley Authority's Browns Ferry Nuclear Plant, Units 1, 2 and 3 electrical equipment environmental qualification program complies with the requirements of 10 CFR 50.49.

- The proposed resolutions for each of the environmental qualification deficiencies identified in the January 11, 1983 SE and FRC TER are acceptable.

- For Browns Ferry Unit 3, continued operation will not present undue risk to the public health and safety.

Principal Contributor: Paul Shemanski

Dated:

Browns Ferry 3

Justification for Continued Operation Equipment List

Browns Ferry 3 Tag No.	NRC TER No.	Description
PDS-64-15	3	Dwyer Pressure Switch
PDM-64-16	4	Honeywell DP Modifier
PDIC-64-16	5	Fisher and Porter DP
PDT-64-16	6	Fisher and Porter DP Transmitter
TE-64-52A TE-64-52C	8	PYCO Temperature Element
FSV-1-14B FSV-1-14C FSV-1-26B FSV-1-26C FSV-1-37B FSV-1-37C FSV-1-51B FSV-1-51C	23	Automatic Valve Corporation Solenoid Valve
FSV-1-15B FSV-1-15C FSV-1-27B FSV-1-27C FSV-1-38B FSV-1-38C FSV-1-52B FSV-1-52C	24	Automatic Valve Corporation Solenoid Valve
PS-3-74A	27	Barksdale Pressure Switch
LITS-3-46A LITS-3-46B LIS-3-56A LIS-3-56B LIS-3-56C LIS-3-56D LIS-3-58A LIS-3-58C LIS-3-58B LITS-3-58D LIS-3-184 LIS-3-185	29	Yarway Level Switch

Browns Ferry 1 Tag No.	NRC TER No.	Description
PS-3-74B	30	Barton Pressure Switch
PS-68-96 PDIS-71-1A PDIS-71-1B	31	Barton Pressure Switch
LIS-3-203A LIS-3-203B LIS-3-203C LIS-3-203D LIS-3-208A LIS-3-208B LIS-3-208C LIS-3-208D	32	Barton Pressure Switch
PDIS-73-1A PDIS-73-1B	33	Barton Pressure Switch
FCV-73-36	35	Limitorque Valve Operator
FT-73-33	36	General Electric Flow Transmitter
PDIS-64-20 PDIS-64-21	45	Barton Pressure Switch
PT-64-50	47	Foxboro Pressure Transmitter
PS-64-56A PS-64-56B PS-64-56C PS-64-56D PS-64-57A PS-64-57B PS-64-57C PS-64-57D PS-64-58A PS-64-58B PS-64-58C PS-64-58D	51	Static O-Ring Pressure Switch
FIS-74-64	64	Barton Pressure Switch
FIS-75-49	65	Barton Pressure Switch
FSV-77-2A FSV-77-2B FSV-77-15A FSV-77-15B	69	Versa Solenoid Valve

Browns Ferry 1 Tag No.	NRC TER No.	Description
FCV-74-52 FCV-74-66	75	Limitorque Valve Operator
FCV-74-53 FCV-74-67	77	Limitorque Valve Operator
FCV-73-34 FCV-73-35 FCV-73-44	79	Limitorque Valve Operator
FCV-68-3 FCV-68-79	95	Limitorque Valve Operator
FIS-74-50	108	Barton Pressure Switch
FIS-75-21	109	Barton Pressure Switch
FSV-85-70A FSV-85-70B	112	ASCO Solenoid Valve
FSV-64-20 FSV-64-31 FSV-64-34 FSV-64-21	122	ASCO Solenoid Valve
FCV-69-1	129	Limitorque Valve Operator
FCV-69-2	131	Limitorque Valve Operator
FCV-74-58 FCV-74-72	132	Limitorque Valve Operator
FCV-71-3	133	Limitorque Valve Operator
FCV-71-2	137	Limitorque Valve Operator
FCV-74-61	138	Limitorque Valve Operator
FCV-1-55	139	Limitorque Valve Operator
FCV-1-56	142	Limitorque Valve Operator
FCV-73-2	147	Limitorque Valve Operator
FCV-74-57 FCV-74-59 FCV-74-73 FCV-74-71	151	Limitorque Valve Operator

Browns Ferry 1 Tag No.	NRC TER No.	Description
FCV-75-23 FCV-75-25	152	Limitorque Valve Operator
FCV-74-74 FCV-74-75	153	Limitorque Valve Operator
PS-73-29-1	156	Static O-Ring Pressure Switch
FCV-73-26	158	Limitorque Valve Operator
LS-73-56A LS-73-56B	161	Robertshaw Level Switch
	JCO NUMBER	
PS-85-35A1 PS-85-35A2 PS-85-35B1 PS-85-35B2	EEB-4	ASCO Pressure Switch
FSV-76-53 FSV-76-54 FSV-76-64 FSV-76-59 FSV-76-61	EEB-5	Valcor Solenoid Valve
FSV-76-56		Target Rock Solenoid Valve
LT-64-159A LT-64-159B PT-64-160A PT-64-160B	EEB-6	Rosemount Transmitter
FT-84-19	EEB-7	Rosemount Transmitter
TE-64-161A-H TE-64-162A-H	EEB-8	Weed Temperature Element
FSV-76-49 FSV-76-51 FSV-76-55 FSV-76-57 FSV-76-58 FSV-76-60 FSV-76-62 FSV-76-63 FSV-76-65 FSV-76-66 FSV-76-67 FSV-76-68	EEB-10	Valcor Solenoid Valve
FSV-84-8A FSV-84-8B FSV-84-8C FSV-84-8D	EEB-11	Target Rock Solenoid Valve

Browns Ferry 1 Tag No.	NRC TER No.	Description
FM-84-19B FM-84-20B	EEB-12	Fisher Controls Electro-pneumatic Transducer
PS-73-20A PS-73-20B PS-73-20C PS-73-20D PS-73-22A PS-73-22B	EEB-15	ASCO Pressure Switch
LS-73-57A LS-73-57B	EEB-16	Magnetrol Level Switch
FSV-64-141	EEB-17	ASCO Solenoid Valve
LS-85-45C LS-85-45D LS-85-45E LS-85-45F	EEB-18	Magnetrol Level Switch
FSV-76-50 FSV-76-52	EEB-19	Valcor Solenoid Valve
FSV-84-19 FSV-84-20	EEB-20	ASCO Solenoid Valve
FSV-76-24	EEB-21	ASCO Solenoid Valve
FSV-64-29 FSV-64-32	EEB-22	ASCO Solenoid Valve
FSV-75-57 FSV-75-58	EEB-23	ASCO Solenoid Valve
MTR-64RHR Pump MTR 3-A 3-B, 3-C, 3-D, Cooler Fan MTR MTR 64 Core Spray Pump 3-A, 3-B, 3-C, 3-D Cooler Fan MTR	MEB-1	Lincoln Motors
Shutdown Board Room Emergency Cooling Units EL-593 Shutdown Board Room Emergency Cooling Units EL-621	MEB-2	Carrier Cooling Unit
FCO-31-122A FCO-31-122B FCO-31-123A FCO-31-123B FCO-31-123C	MEB-3	Honeywell Damper Operator Motor

Browns Ferry 1 Tag No.	NRC TER No.	Description
PSV-1-18	NEB-1	Target Rock Solenoid Valve
LITS-3-52 LITS-3-62	NEB-2	Yarway Level Switch
PX-64-50 PX-64-51	NEB-5	General Electric Power Supply
PT-64-51	NEB-6	Foxboro Pressure Transmitter
PS-64-58E PS-64-58F PS-64-58G PS-64-58H	NEB-7	Static O-Ring Pressure Switch
PT-64-67	NEB-8	Foxboro Transmitter
PS-68-95	NEB-9	Barksdale Pressure Switch
FCV-74-48	NEB-13	Limitorque Valve Operator
FCV-75-51	NEB-15	Limitorque Valve Operator
FCV-75-53	NEB-16	Limitorque Valve Operator
PNL-71-25-31	NEB-18	General Electric Relay
FSV-76-17 FSV-76-18 FSV-76-19	NEB-41	ASCO Solenoid Valves
FSV-43-14	NEB-43	ASCO Solenoid Valve
480-V Reactor MOV BD 3D 480-V Reactor MOV BD 3E	TER-81	International Switchboard Company Motor Control Center
PSV-1-5 PSV-1-19 PSV-1-22 PSV-1-31 PSV-1-34 PSV-1-41	TER-41	Target Rock Solenoid Valves