U.S. NUCLEAR REGULATORY COMMISSION

REGION III

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Report No.:	50-237/96015; 50-249/96015
Licensee:	Commonwealth Edison Company
Facility:	Dresden Nuclear Station Units 2 and 3
Location:	6500 North Dresden Road Morris, IL 60450
Dates:	December 16-20, 1996
Inspectors:	A. Dunlop, Reactor Inspector, RIII M. Khanna, Mechanical Engineer, NRR R. Cain, INEL
Approved By:	W. Kropp, Chief Engineering Specialists Branch 1 Division of Reactor Safety

EXECUTIVE SUMMARY

Dresden Nuclear Station Units 2 and 3
NRC Inspection Report 50-237/96015; 50-249/96015

Engineering

- All significant issues related to the MOV program have been resolved; therefore, the NRC's review of GL 89-10 program will be closed. Generic Letter (GL) 89-10, "Safety-Related Motor-Operated Valve (MOV) Testing and Surveillance," program documentation and test data provided an adequate basis to conclude that all GL 89-10 program MOVs would perform the intended safety functions under design-basis conditions. (Section E1.1.b.1)

- The knowledge of MOV site engineering was considered good. There was an effective team effort between the site and corporate MOV personnel. (Section E1.1.b.1)

- Issues identified during the inspection that were adequately addressed included the following:

  1) The operability determination for several MOVs appeared to be based on probabilistic risk assessment techniques versus deterministic thrust margins. The operability determination was subsequently revised to clearly state the evaluation was based on appropriate deterministic methods that complied with the guidance of GL 91-18. (Section E1.1.b.1.8)

  2) Several valve factor assumptions were not sufficiently supported for the long-term; however, the values used were considered adequate for program closure and plans were in place to review these assumptions as part of the long-term MOV program. (Section E1.1.b.1.2)

  3) The licensee's methods for addressing load sensitive behavior did not consider the possible effects of this phenomenon for an MOV's opening stroke. (Section E1.1.b.1.5)

Safety Assessment/Quality Verification

- Self-assessments in the MOV area provided good technical findings and were beneficial in improving the MOV program. The tracking of corrective actions, however, was not a formalized process until after completion of the MOV self-assessments. (Section E7.1)

Report Details

III. Engineering

E1 Conduct of Engineering

E1.1 Generic Letter 89-10 Program Implementation

a. Inspection Scope (TI 2515/109)

This inspection evaluated the process for qualifying the design-basis capability of motor-operated valves (MOVs) and closure of NRC's review of Generic Letter (GL) 89-10. The inspection concentrated on MOVs tested under static or low differential pressure (dp) conditions. The inspectors selected MOVs that included several program closure methods used to verify design-basis capability. The inspectors reviewed design-basis documents, thrust calculations, test packages, and engineering evaluations for the following MOVs:

2-1402-24B	Core Spray (CS) Pump 2B Outboard Isolation valve
2-1501-22B	Torus Spray Loop 2 Injection valve
2-1501-27B	Loop 2 Drywell Spray Outboard Isolation valve
2-2301-35	High Pressure Coolant Injection (HPCI) Pump Suction from Torus Outboard Isolation valve
3-205-24	Reactor Head Cooling Isolation valve
3-2301-14	HPCI Pump Minimum Flow valve
3-3703	Reactor Building Closed Cooling Water to Drywell Return Outboard Isolation valve

The inspectors also reviewed other documentation used to justify program assumptions, such as stem friction coefficients and load sensitive behavior. Further, the inspectors reviewed documentation related to program issues, such as scope, periodic verification, post maintenance testing, tracking and trending, corrective actions, pressure locking/thermal binding, and program audits.

b. Observations and Findings

b.1 MOV Design-Basis Capability Verification

In general, the design-basis calculations to verify valve capability were considered adequate. Several issues were identified during the inspection and documented in the following report sections. However, program documentation and test data provided an adequate basis to conclude that all GL 89-10 program MOVs (with the exception of one valve previously declared inoperable discussed in section E1.1.b.1.9 of this report) would perform the intended safety functions under design-basis conditions. Accordingly, the NRC review of Dresden's MOV program will be considered closed.

The knowledge of MOV site engineering was considered good. There was an effective team effort between the site and corporate MOV personnel.

b.1.1 MOV Sizing and Switch Settings

Calculations utilized the industry's standard equations to determine thrust requirements for rising stem gate and globe valves. For rising stem MOVs that have been dynamically tested, measured valve factors were used. Non-dynamically tested gate valves relied on the application of test data that was obtained from testing performed at Dresden, other Commonwealth Edison (ComEd) facilities, and the Electric Power Research Institute (EPRI) in limited cases. Statistical methods were used to evaluate the effect of MOV performance uncertainties on the available margin. For each MOV, total uncertainty for the valve was compared to the available margin to determine the expected reliability.

b.1.2 Valve Factors (VF)

Measured VFs were used for dynamically tested rising stem MOVs. To account for measurement inaccuracies and future valve degradation, a two standard deviation (2-sigma) VF was also used by the margin analysis, based on increasing the measured VF by 28%. A VF based on 2-sigma for globe valves was determined by using the larger of a 1.2 VF, or the measured VF increased by 10%. For some non-dynamically tested gate valves, White Paper (WP) 160, "Crane Valve Factors," Revision 0, and WP 164, "Anchor/Darling Double-Disk Gate Valve Factors," Revision 1, provided the basis for the nominal and bounding VFs in the reliability margin analysis. Each WP contained regression analysis charts. Two exceptions were taken to WP 160 that reanalyzed the Crane-Aloyco gate VFs in non-blowdown applications. No concerns were identified with respect to the use of the WPs' regression charts or the noted exceptions.

The following issues concerning selected VFs were noted by the inspectors:

- WPs 160 and 164 contained special tables that were used for high temperature and steam blowdown fluid conditions. These tables were not based on the use of a regression analysis because there was insufficient data available to develop the regression curves. The inspectors had the following concerns with the use of these tables:

  (1) WP 160 Figure 5, "Seating Valve Factors (Nominal)," and Figure 6, "Flow Isolation Valve Factors (Nominal)," were used to determine VFs for Crane gate valves that would need to operate under steam blowdown conditions. The inspectors' concerns were associated with the use of flow isolation VFs obtained from Figure 6. WP 160 allowed the unrestricted use of these VFs. While the use of flow isolation VFs may be acceptable for operability assessments when adequately justified, the inspectors did not consider the use of VFs from Figure 6 to be acceptable for GL 89-10 program closure without specific justification for each valve. Flow isolation VFs were typically less conservative as compared to seating VFs, and were very specific to the valve being tested. Flow isolation VFs were also subject to interpretation of test results and could be unreliable. The licensee noted that all MOVs that used flow isolation VFs have been included in the margin improvement plan which would allow the use of seating

VFs. In the interim, the inspectors considered that the applied VFs were reasonable for the valves in question and no operability concerns were identified. Based on the current thrust margins, a review of the best available test data for the affected Crane valves, and the intent to run the EPRI Performance Prediction Methodology (PPM) for select MOVs, the inspectors considered the current settings to be adequate for program closure.

(2) WP 164 Figure 5, "Anchor/Darling Double Disk Gate Valve High Temperature Test Data," was used to support the guidance for high temperature VF determination. The Figure 5 results were taken from testing performed on a single EPRI test valve and from a single in-situ industry test. The licensee agreed that this limited data was insufficient to fully justify the VF guidance. The licensee further stated that the EPRI separate effects friction coefficient testing for stellite on stellite under high temperature conditions also supported the VF guidance contained in this WP. However, the NRC's approval of the method to predict thrust requirements for Anchor/Darling valves, including separate effects data, was based on the total approach as documented in NRC's Safety Evaluation, dated March 15, 1996. The inspectors noted that this type of laboratory testing would not reveal any concerns that may exist for Anchor/Darling double disk gate valves to exhibit non-predictable behavior under steam blowdown conditions. Although the VFs used for the Anchor/Darling valves were considered adequate for GL 89-10 program closure, as part of the long-term MOV program, the licensee would monitor industry testing efforts on potential non-predictability concerns or obtain other additional information to justify the VF.

- Calculation MPR-1769, Revision 0, was performed by MPR Associates Incorporated engineers to provide thrust requirements for Crane 28" flex-wedge gate valves 2-202-05A/B and 3-202-05A/B. This calculation used the friction factor developed from the EPRI algorithm for Stellite 6 on Stellite 6, flat on flat. The friction factor was used with the valve seating angle in a standard industry equation to calculate the required thrust for these MOVs. From the required thrust, a VF of 0.56 was back-calculated and used to set-up these MOVs. The inspectors did not consider this use of laboratory friction testing to be directly applicable to MOVs at Dresden. However, due to the lack of available industry information for large Crane gate valves and because the VF calculated was reasonable, the inspectors considered the MPR calculation results to be the best available data at this time. Based on the available margin and the use of the MPR calculation thrust requirements, the inspectors considered the current settings to be adequate for program closure. The licensee intended to establish an adequate long-term basis for these MOVs by obtaining additional information (e.g., justify use of the MPR calculation or apply other applicable industry data) to justify the VF as part of the long-term MOV program.

- For globe valves, the licensee applied the larger of a 1.2 VF or the measured VF increased by 10%. This was determined to be adequate by the licensee

based on in plant and industry test results. However, the inspectors noted that this study was not formalized. Although the inspectors did not identify any operability concerns with globe valves, the licensee agreed to formalize the globe valve program assumptions.

b.1.3 Load Sensitive Behavior (LSB)

MOVs that were dynamically tested used the measured LSB value. Non-dynamically tested MOVs relied on analysis of Dresden's LSB data, which determined the mean and the standard deviation of the available test results. Based on the use of Fel-Pro N-5000 stem lubricant, a bias LSB of 5% was used, and a random 2-sigma confidence value of 12.6% was combined with other uncertainties in a square root sum of the squares methodology. The inspectors found the licensee's assumptions for LSB to be adequate.

The inspectors noted that the WPs did not provide specific guidance for the selection of LSB assumptions to be used by the Rising Stem MOV Data Sheets (RSMDS) for non-dynamically tested MOVs. The licensee stated that WP 107, "Guidelines for Determining Target Thrust Windows," Revision 2, will be revised to include guidance for selecting the correct LSB values from WP 124, "Rate of Loading," Revision 1. The inspectors considered this to be adequate.

b.1.4 Stem Friction Coefficient (SFC)

The margin analysis typically used a SFC of 0.15 for the nominal case and 0.20 for the bounding case. This was supported by data that showed an average SFC of 0.116 and a 95% confidence value of 0.178. The licensee's application of the SFC uncertainty was discussed in section E1.1.b.1.9. The inspectors found the assumptions for SFC to be adequate.

b.1.5 Open Unseating Forces

The inspectors noted that the methods for addressing LSB did not consider the possible effects of this phenomenon for an MOV's opening stroke. Under dynamic conditions, the SFC may increase as compared to what was measured under static test conditions. This would be of concern for the open direction because the determination of an available open thrust margin relied directly on the reliability of the assumed SFC. To address this concern, the licensee analyzed the SFC performance under dynamic test conditions for several MOVs where adequate torque data existed. This review was done to demonstrate that the open SFC assumptions in the calculations were conservative, relative to the values measured during dynamic tests. All open thrust margins were screened using an assumed SFC of 0.2 with the exception of 2 MOVs (2-1501-22A/B), which used a dynamically tested SFC of 0.175. No margin concerns were identified for MOVs with an open safety function. The licensee stated that the program will be revised to account for open LSB concerns. The inspectors considered the actions to address this concern to be adequate.

b.1.6 Torque Switch Repeatability

The licensee used guidance from Limitorque Maintenance Update 92-02 to obtain values for torque switch repeatability. These values were combined with other random uncertainties in a square root sum of the squares methodology. The licensee's methodology to account for torque switch repeatability was acceptable for program review closure.

b.1.7 Linear Extrapolation

The inspectors reviewed WP 108, "Differential Pressure Testing of Motor-Operated Valves," Revision 2. Based on a review of EPRI's MOV Performance Prediction Program data and data compiled at other ComEd power plants, the licensee concluded that the following 3 conditions must be present for a dp test to be extrapolated to design-basis conditions for gate and globe valves. These conditions were: 1) a minimum dp load of $\geq$ 2000 pounds, 2) test pressure must be $\geq$ 30% of design-basis dp, and 3) the dp load must be greater than the force at seat contact during the static test. The inspectors considered the methodology for linear extrapolation to design-basis dp to be adequate for program closure.

b.1.8 Operability of the Loop Drywell Spray Inboard/Outboard Isolation Valves

On December 11, 1996, three MOVs were declared inoperable based on a deterministic calculation of thrust margin. These were the loop drywell spray inboard and outboard isolation valves 3-1501-27B, -28A, and -28B. The valves have a safety function to open and close. On December 14, 1996, the 10 CFR 50.72 report was rescinded and the valves declared operable. It appeared that the operability determination was based on valve reliability or probabilistic risk assessment (PRA) techniques. As discussed previously, the use of PRA techniques to determine operability was not acceptable as stated in GL 91-18.

As a result, the inspectors requested the licensee to reassess the operability of these MOVs using a deterministic method. The following were the results of the reassessment:

- The original deterministic margin review for MOV 3-1501-28A had a -4.2% thrust margin in the close direction. With Unit 3 shutdown, the licensee increased the overall gear ratio for MOV 3-1501-28A, which increased the thrust margin to a positive 15%.

- The original deterministic margin review for MOV 3-1501-27B had a -2.8% thrust margin in the open direction. The licensee reviewed the calculation and took credit for the piston effect in the open direction. This showed that MOV 3-1501-27B had 2.0% thrust margin in the open direction using a deterministic methodology.

- The original deterministic margin review for MOV 3-1501-28B had a 0.6% margin in the close direction. The licensee reviewed the as-left static test traces and revised the values applied for valve packing load and valve

conditioning load. These adjustments increased the calculated deterministic thrust margin to 2.3%.

The inspectors considered the reassessment of operability for these MOVs to be adequate. After further discussions between the licensee, the inspectors, and the Office of Nuclear Reactor Regulation (NRR) Mechanical Engineering staff, it was concluded that the initial operability determination was based on an adequate deterministic method (i.e., confidence level) and not PRA techniques. The operability determination, however, needed to be revised to reflect that the operability call was based on a deterministic method versus PRA, which was subsequently accomplished.

b.1.9 Margin Assessment

A method for margin assessment was developed that reviewed the specific testing of a given MOV and used statistical methods to account for all uncertainties associated with MOV performance. Each source of uncertainty was evaluated based on whether the uncertainty was bias error, a random error, or a combination of both. Using this concept, a nominal scenario was developed based on bias errors, and a bounding scenario based on random errors for each MOV. Each source of random error was individually evaluated to determine its effect on the margin associated with the nominal scenario. These individual results were then combined using the square root sum of the squares method to arrive at a margin needed for a 2-sigma confidence level. This result was compared to the MOV's nominal margin, and a reliability value was determined. This reliability value was combined with the valve's safety significance. As discussed in GL 91-18, "Information to Licensees Regarding Two NRC Inspection Manual Sections on Resolution of Degraded and Nonconforming Conditions and on Operability," the safety-related component (in this case, MOV) must be capable of performing its specified function. GL 91-18 also states that probabilistic risk assessments and probabilities of the occurrence of accidents or external events were not acceptable for making operability decisions

For completing the response to GL 89-10, thrust margins also were calculated for MOVs using a more deterministic method. These calculations were adjusted to account for diagnostic equipment uncertainty, torque switch repeatability, and load sensitive behavior. Based on these calculations, MOVs with less than 10% thrust margins were reviewed. This review identified four MOVs with potential operability concerns. The most marginal valve (3-0205-24) had a -11.5% deterministic thrust margin. This MOV had previously been declared inoperable and was placed in its closed safety position with electrical power removed. The inspector considered this to be adequate. The valve was scheduled for a gear change modification to improve motor capability and return the valve to service. The remaining three MOVs with operability concerns were discussed in section E1.1.b.1.8.

A margin improvement plan was established to improve the capability of a number of low margin valves. Based on the issue identified in paragraph E1.1.b.1.2(2), the licensee added all GL 89-10, Supplement 3, MOVs that must operate under blowdown scenarios to the list.

b.2 Program Scope Changes

Twelve valves were removed from the program since the Part 2 inspection. Six were removed based on the valves not having an active safety-function. Two valves were removed from the plant by a modification and the remaining four valves had the motor operators electrically disconnected. With the removal of these valves, the program scope for both units consisted of 150 MOVs consisting of 117 gate and 33 globe valves. From this scope, 55 valves were able to be dynamically tested.

The NRC Independent Safety Inspection (ISI) team identified a concern with the removal of the HPCI return to condensate storage tank isolation valve, 2(3)-2301-15. The valve was normally open and would close upon initiation of the HPCI system to isolate the condensate storage tank (CST) from the HPCI test line and the HPCI pump cooling water line. The valve provided a redundant function, since 2(3)-2301-10 was the test line isolation valve and 2(3)-2301-49 was the cooling water isolation valve. Both of these valves were included in the GL 89-10 and inservice test (IST) programs with a closed safety function. The inspectors, in conjunction with NRR reactor systems staff, concluded that the valve could be removed from the GL 89-10 program based on the valve not having a safety-function. The 2(3)-2301-15 valve, however, remained in the augmented IST program to ensure the valve would operate, although not under design-basis conditions.

b.3 Periodic Verification of Design-Basis Capability

Based on existing margin reliability and risk evaluations, the licensee planned to perform static diagnostic testing as follows:

- 1 MOV every refueling outage
- 88 MOVs every three refueling cycles
- 61 MOVs every six refueling outages.

Test frequencies and methods were based on risk considerations, design function reliability, and motor gearing capability margin reliability to provide assurance of MOV operability over the test interval. The diagnostic testing plans included static testing with and without the VOTES torque cartridge, dynamic testing, and future use of motor power monitoring testing. Currently, nine valves were scheduled for dynamic testing as part of the periodic verification program.

The NRC staff will review the periodic verification program in greater detail following the submittal in response to GL 96-05, "Periodic Verification of Design-Basis Capability of Safety-Related Motor-Operated Valves," including the intent to test some valves every six refueling outages where GL 96-05 discussed testing every five years. As stated in GL 96-05, the licensee should consider the benefits (such as identification of decreased thrust output and increased thrust requirements) and potential adverse effects (such as accelerated aging or valve

damage) when determining the appropriate type of periodic verification testing for each program MOV.

b.4 Post-Maintenance Verification/Testing (PMT)

PMT requirements documented in WP-135, "GL 89-10, Post Maintenance Verification Recommendations," Revision 0, DAP 15-10, "Post Maintenance Testing Program," Revision 5, and DTI WMP-4.0, "Work Planning Desktop Instruction," were acceptable for program closure. The guidance and requirements specified were consistent with the licensee's commitments to GL 89-10 and appropriately established static and/or dynamic test requirements following valve and actuator maintenance and modifications including packing adjustments. PMT requirements for MOV-related activities at Dresden were considered detailed and well-organized.

b.5 MOV Trending and Corrective Actions

The inspectors determined that the trending program appeared capable of tracking and evaluating data to maintain MOV design-basis capability. The tracking and trending of MOV failures were controlled by WP-000, "MOV Program Technical Guidance," Revision 3, and station guidelines, "MOV Dresden Station Motor-Operated Valve Tracking and Trending Guideline," dated July 1996, which described the scope and criteria for tracking and trending of GL 89-10 MOV data. The guideline stated that all valves within the GL 89-10 scope will be tracked and trended on significant MOV performance parameters, such as diagnostic test results and maintenance/failure activities. The MOV databases were adequately maintained as required by the guidelines to effectively track and trend MOV failures and maintenance concerns.

The inspectors reviewed selected MOV-related performance improvement forms (PIFs) and action requests (ARs) generated since the Part 2 inspection and determined the subsequent corrective actions to those MOV failures were adequate. The licensee was thorough in the identification of MOV failures. Subsequent root cause determinations and corrective actions appeared effective to preclude repetition of the failures. In addition, the licensee periodically performed reviews of MOV-related PIFs and ARs to identify adverse trends. This included reviewing the MOV databases to identify situations where the frequency or the combined significance of events may identify an adverse trend.

b.6 Pressure Locking and Thermal Binding (PL/TB)

The inspectors reviewed the licensee's responses to GL 95-07, "Pressure Locking/Thermal Binding of Safety-Related Power-Operated Gate Valves." In a submittal dated February 13, 1996, 10 valves were identified as susceptible to pressure locking. The licensee indicated that based on its calculations and the modifications completed to date, the valves have sufficient capability to perform the open design-basis function. Currently, the licensee has drilled a hole in the discs of 8 valves. The licensee intended to drill a hole in the discs of the remaining two valves (HPCI injection isolation valves - 2(3)2301-8) susceptible to pressure locking, during the next scheduled refueling outage for Units 2 and 3, respectively.

The inspectors reviewed the operability determination for the 2(3)2301-8 valves and did not identify any immediate concerns.

The licensee identified 2 isolation condenser condensate return outboard isolation valves (2(3)-1301-3) that were susceptible to thermal binding. The scenario where thermal binding may occur in these normally closed valves would be after the initiation of the isolation condenser system while the reactor remains at power. This condition would only occur during the 5-year isolation condenser test. Although these valves have always cycled during the quarterly surveillance, following the 5-year test, the inspectors were still concerned with the potential of thermal binding under these conditions. The licensee indicated that an action item was in place to revise the existing procedures to include a cycling frequency for the subject valves, based on a cooldown curve, in order to minimize the potential for a thermal binding condition to occur during the 5-year isolation condenser test. This approach appeared acceptable to the inspectors.

The inspectors also reviewed several additional issues such as; thermal binding of MOVs due to stem growth and the basis for the temperature criterion that was used for evaluating if valves were susceptible to thermal binding. These issues appeared to be adequately addressed, however, these and the other PL/TB issues will continue to be reviewed and closed-out under the guidance of GL 95-07.

c. Conclusions

All significant issues related to the MOV program have been resolved; therefore, the NRC's review of GL 89-10 program will be closed. Program documentation and test data provided an adequate basis to conclude that all GL 89-10 program MOVs would perform the intended safety functions under worst-case design-basis conditions.

Issues identified during the inspection that were adequately addressed included the following:

- The operability determination for several MOVs appeared to be based on PRA techniques versus deterministic thrust margins.
- Several VF assumptions were not sufficiently supported for the long-term.
- The licensee's methods for addressing LSB did not consider the possible effects of this phenomenon for an MOV's opening stroke.

E7 Quality Assurance in Engineering Activities

E7.1 Licensee Self-Assessment Activities

The inspectors reviewed two recent MOV self-assessments performed by outside MOV experts, which were considered beneficial to providing additional insights into improving the MOV program. The self-assessments identified a number of good technical issues for which actions have been taken or planned. However, there did not appear to be a formal process to ensure issues identified were reviewed and/or

implemented, but left to the discretion of the group being audited. Subsequent to the assessments, administrative procedure DAP 2-38, "Station Self-Assessment," was issued to formally track corrective actions from the self-assessments. The licensee stated the procedure was not sufficiently concise and was under revision to be made more user friendly. The procedure required nuclear tracking system (NTS) item for findings that required corrective actions, however, program enhancements were not formally tracked, which may be beneficial to ensure all self-assessment issues were addressed.

E9 Updated Final Safety Analysis Report (UFSAR) Commitments

E9.1 Review of UFSAR Commitments

The inspectors reviewed the applicable sections of the UFSAR that related to the inspection areas discussed in this report. The inspectors verified that the UFSAR wording was consistent with the observed plant practices, procedures and/or parameters.

V. Management Meetings

X1 Exit Meeting Summary

The inspectors presented the inspection results to members of licensee management at the conclusion of the inspection on December 20, 1996. The licensee acknowledged the findings presented. The inspectors asked the licensee whether any materials examined during the inspection should be considered proprietary. No proprietary information was identified.

PARTIAL LIST OF PERSONS CONTACTED

Licensee

* B. Bunte, Corporate MOV Peer Group Leader
* E. Carroll, Regulatory Assurance
* R. Freeman, Site Engineering Manager
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* P. Hajovy, MOV Engineer
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NRC

* J. Hansen, Resident Inspector
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INSPECTION PROCEDURES USED

Temporary Instruction 2515/109: Inspection Requirements for Generic Letter 89-10, Safety-Related Motor-Operated Valve Testing and Surveillance

LIST OF ACRONYMS USED

AR	Action Request
COF	Coefficient of Friction
ComEd	Commonwealth Edison Company
CS	Core Spray
CST	Condensate Storage Tank
DAP	Dresden Administrative Procedure
dp	Differential Pressure
EPRI	Electric Power Research Institute
GL	Generic Letter
HPCI	High Pressure Coolant Injection
IFI	Inspection Followup Item
IN	Information Notice
INEL	Idaho National Engineering Laboratory
ISI	Independent Safety Inspection
IST	Inservice Testing
LPCI	Low Pressure Coolant Injection
LSB	Load Sensitive Behavior
MOV	Motor-Operated Valve
NRC	Nuclear Regulatory Commission
NRR	Office of Nuclear Reactor Regulation
NST	Nuclear Tracking System
PDR	Public Document Room
PIF	Performance Improvement Form
PL/TB	Pressure Locking and Thermal Binding
PMT	Post Maintenance Testing
PPM	Performance Prediction Methodology
PRA	Probabilistic Risk Assessment
RHR	Residual Heat Removal
ROL	Rate of Loading
RSMDS	Rising Stem MOV Data Sheets
SE	Safety Evaluation
SFC	Stem Friction Coefficient
SQV	Site Quality Verification
TI	Temporary Instruction
TS	Technical Specification
UFSAR	Updated Final Safety Analysis Report
URI	Unresolved Item
VF	Valve Factor
VOTES	Valve Operational Test Equipment System
WP	White Paper