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Light Water Reactor Sustainability Program

Survey of Aging and Monitoring Concerns for Cables and Splices Due to Cable Repair and Replacement

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Survey of Aging and Monitoring Concerns for Cables and Splices Due to Cable Repair and Replacement

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EXECUTIVE SUMMARY

The purpose of this report is to survey aging and monitoring concerns for electrical cable splices in nuclear power plants (NPPs) in long-term operation. As portions of existing electrical cable runs in NPPs are replaced over time due to localized events, the total number of splices in NPPs are expected to increase. Relative to electrical cables, the body of knowledge regarding aging of splices and of splices in combination with aging cables in nuclear service environments in long-term operations is low. A few reports have considered aging of cable system components other than cables (Jacobus 1990; Nelson 1998; Villaran and Lofaro 2002), but the nuclear industry has had two decades of operating experience since these were published to further enlighten this issue. Herein we discuss electrical cables and splices commonly found in U.S. NPPs, their qualification for safety-related application, and methods for monitoring their health condition. Common environmental stresses that can give rise to cable and splice failure are also discussed.

The Nuclear Regulatory Commission (NRC) Licensee Event Reports (LER) database was used to identify documented issues of electrical cable and splice failure. The trend in resultant data over time was considered to see if failures were increasing as NPPs age.

Observations and conclusions of this work include:

1. Electrical cables and splices are highly reliable components. Occurrence rates for events of interest were low and nearly constant over the last 20 years.
2. Common-cause failure for evaluated electrical cable splice events of interest was observed to primarily be associated with loose connections, which may manifest in association with workmanship issues, thermal cycling, and/or vibration.
3. Replacement of electrical cables is more common than repair of cables with a failure point, leading to an increase in the proportion of new generation cables in NPPs over time.
4. Splices on degraded electrical cables have been observed to be problematic. Due to aging NPP infrastructure, including cables, it is expected that such issues will continue to increase.
5. Condition monitoring (CM) approaches, while shown to be fruitful for electrical cables, have been shown to be insensitive to degradation of splice sleeves, which are critical to the continued performance of splices. Additional CM work is needed to evaluate methods which are sensitive to the degradation of splice components.
6. Expanded Materials Degradation Assessment (EMDA)-type knowledge gaps for electrical cables (Bernstein et al. 2014) have not been investigated for splices but may represent similar concerns such as with the accelerated aging process historically used in their environmental qualification.
7. Rejuvenation and/or mitigation techniques to renew aged cable lengths prior to splice application may improve performance relative to installation of splices on untreated, aged cables, but has not been investigated.

As with cables, aging management of splices may best be accomplished with a condition-based rather than a time-based approach. Understanding of the aging behavior of splice materials and development of effective methods to evaluate and monitor splice condition are necessary prerequisites to establishing such a condition-based aging management program with acceptance criteria that informs repair and replacement decisions based on the actual status of components in service. Development of such a program could be beneficial both for in the increasing number of splices applied in existing NPPs in long-term operation and for aging management in new reactors.

ACKNOWLEDGEMENTS

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ACRONYMS

AMP	Aging Management Program
ARENA	Accelerated and Real-Time Environmental Nodal Assessment
ASIC	application-specific integrated circuit
ASTM	American Society for Testing and Materials
CM	condition monitoring
CPE	chlorinated polyethylene
CSPE	chlorosulfonated polyethylene
DBA	design-basis accident event
DLO	diffusion limited oxidation
DOE	Department of Energy
DMA	dynamic mechanical analysis
DRE	dose-rate effects
DS	dielectric spectroscopy
DTF	distance-to-fault
EAB	elongation at break
EPR	ethylene-propylene rubber
EMDA	Expanded Materials Degradation Assessment
EPIX	Equipment Performance and Information Exchange
EPRI	Electric Power Research Institute
EQ	environmental qualification
FDR	frequency domain reflectometry
FFT	fast Fourier transform
GALL	generic aging lessons learned
IAEA	International Atomic Energy Agency
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
IM	indenter modulus
INPO	Institute of Nuclear Power Operations
IR	insulation resistance
ITE	inverse temperature effects
LER	Licensee Event Reports
LOCA	loss-of-coolant accident
LWRS	Light Water Reactor Sustainability Program

MCR	multicarrier reflectometry
MSR	mixed signal reflectometry
NDE	nondestructive evaluation
NPP	nuclear power plant
NRC	Nuclear Regulatory Commission
O&M	operation and maintenance
PD	partial discharge
PEEK	polyether ether ketone
PN	pseudo-random-noise
PNNL	Pacific Northwest National Laboratory
PVC	polyvinyl chloride
RADS	Reliability and Availability Data System
SLR	subsequent license renewal
SR	silicone rubber
SS	spread spectrum
SSTDR	spread spectrum time domain reflectometry
S/SSTDR	sequence/spread spectrum time domain reflectometry
SWR	standing wave reflectometry
TDR	time domain reflectometry
VNA	vector network analyzer
XLPE	cross-linked polyethylene
XLPO	cross-linked polyolefin

1. INTRODUCTION

This report is submitted in fulfillment of the deliverable for the LWRS milestone (M3LW-23OR0404017) of the Cable Aging and Gap Analysis task of the Materials Research Pathway. This work is part of an effort to develop a technical basis for assessing the level and impact of aging of electrical cables and their components in nuclear power plants (NPPs). In July 2012, a workshop was held at PNNL to create a research and development roadmap to address cable aging management in NPPs withs particular focus on nondestructive examination (Simmons et al. 2012). In 2014, the U.S. Department of Energy (DOE) and the Nuclear Regulatory Commission (NRC) jointly published a report (Bernstein et al. 2014) outlining several knowledge gaps related to the aging of electrical cables and cable systems during plant operation beyond 60 years. Following these activities, PNNL developed capabilities for thermal, radiation, and combined thermal and radiation aging of cables and their components to support research addressing these gaps (Fifield, Zwoster, and Murphy 2018). Furthermore, significant capabilities to test, monitor, and evaluate cable conditions have been investigated and developed (Glass et al. 2016, 2017, 2021, 2022, 2023).

1.1 Objectives of the Report

The primary goal of this work is to summarize the current state of aging and monitoring concerns for electrical cables and splices. The discussion is limited to those components that are potentially impacted due to replacement of existing cable runs. In addition, the scope of this work is focused on components that require environmental qualification (EQ) and those that are related to safety. Opportunities for future work exploring aging, condition monitoring, and mitigation are also discussed.

2. BACKGROUND

Aging, which has been defined as the "cumulative effects that occur with the passage of time to a component," (Jacobus 1990) has the potential to degrade materials in nuclear components. Polymeric materials are generally more susceptible to aging than metals (ASTM 2021) and are commonly found in electrical cables, splice kits, and other components in NPPs. Polymeric aging may lead to a loss of performance and safety function, which is a concern in NPPs (Subudhi 1996). Therefore, much work has been conducted to ensure continued performance of components, even under loss-of-coolant accident (LOCA) events (Bernstein et al. 2014), through the EQ process.

2.1 Qualification of Nuclear Power Plants

Approximately 20% of the electricity produced in the United States comes from NPPs (Joskow 2006). Originally, NPPs were designed and licensed to operate for 40 years (Subudhi 1996). As described in the foreword of the U.S. Nuclear Regulatory Commission (NRC) Expanded Materials Degradation Assessment (EMDA) Volume 5: Aging of Cables and Cable Systems (Bernstein et al. 2014), and according to Title 10 of the Code of Federal Regulations, Part 54 (10 CFR 54), Requirements for Renewal of Operating Licenses for Nuclear Power Plants, NPPs can apply for 20-year license extensions following the original 40-year operating period. While most NPPs have entered extended license periods of up to 60 years, some have applied for second license extension up to 80 years of operation. The viability of a second license renewal is dependent upon NPPs operating safely in accordance with the licensing basis established with the original 40-year license. Hence, the NRC has developed aging management program requirements to promote the safe function of NPPs over license extension periods.

2.2 Cable and Splice Qualification in Nuclear Power Plants

To promote the safe function of NPPs, Class 1E electrical equipment, which includes both cables and splices, must conform to IEEE industry standards as shown in Table 1; corresponding NRC regulatory guidelines are shown in Table 2. Generally, IEEE requires manufacturers of cables and splices to ensure products maintain performance requirements throughout their life, even after design-basis accident events (DBA) (IEEE 2015). In many cases, this requires accelerated aging of the components [e.g., applying the Arrhenius method (K. T. Gillen, Bernstein, and Celina 2015)] using either thermal, radiation, or a combination of stressors, to simulate their qualified life prior to subjecting the pre-aged components to a LOCA exposure simulation. Components that successfully perform following this process are considered to be EQ. Most currently installed EQ cables and splices have been qualified to a lifetime of at least 40 years, similar to NPPs. However, it is important to note that not all cables and splices in NPPs have been EQ – only those subject to "harsh" environments, which are susceptible to aging or other events (Villaran and Lofaro 2002). A summary of select cable and splice EQ tests are shown in Table 3.

Table 1. IEEE standards related to EQ for cables and splices.

Standard	Title	Versions
IEEE/IEC Std 60780-323	IEC/IEEE International Standard – Nuclear facilities – Electrical equipment important to safety – Qualification	1971, 1983, 2003, 2016
IEEE Std 383	IEEE Standard for Qualifying Electric Cables and Field Splices for Nuclear Facilities	1974, 2003, 2015
Note: IEEE Std 383 expanded on IEEE Std 323 to specifically focus on cables and splices.		

Table 2. Latest NRC regulatory guides related to cable aging and condition monitoring.

Year	Title	Regulatory Guide	Standard
2023	Environmental Qualification of Certain Electric Equipment Important to Safety for Nuclear Power Plants	1.89	IEC/IEEE Std 60780-323-2016
2009	Qualification of Safety-Related Cables and Field Splices for Nuclear Power Plants	1.211	IEEE Std 383-2003
2012	Condition-Monitoring Techniques for Electric Cables Used in Nuclear Power Plants	1.218	Provides Guidance
Note: Additional relevant guidance documents and industry standards can be found in Appendix 9.1.			

Table 3. Summary of cable splice qualification tests; adopted from (Villaran and Lofaro 2002).

Splice		Voltage Ratings	Cable		Comments
Manufacturer	Configurations		Insulation	Jacket	
Raychem	Splice with crimp or bolted connection	200, 600, 1000	XLPE, PEEK	None, CSPE	IEEE 323 & 383; thermal & radiation to 40, 60 years; two peak LOCA.
Okonite	T-95 & No 35 splice tapes	5000	EPR	None	IEEE 323 & 383; thermal & radiation to 40 yrs; two peak LOCA.
GE	EB-25 terminal block	-	Phenolic	-	Thermal & radiation aging; single peak LOCA; seismic test.
Raychem	Adverse service cable splice	1000	Alkane-imide/XLPO	Flam-trol	IEEE 323 & 383; simultaneous thermal & radiation; Single peak LOCA.
XLPE = cross-linked polyethylene; PEEK = polyether ether ketone; CSPE = chlorosulfonated polyethylene; EPR = ethylene-propylene rubber; XLPO = cross-linked polyolefin.					

2.3 Condition Monitoring in Nuclear Power Plants

Given the importance of the large volume of instrumentation, control, and power cables and components servicing NPPs, prevention and detection of failure during the operating the lifetime of an NPP is a vital part of aging management. As such, most NPP aging management programs implement a program of nondestructive evaluation (NDE) to determine material and component performance. While NDE techniques have seen growth and improvement in diagnostics and fault detection, practical implementation of NDE has a few limitations. First, there is no single NDE method to comprehensively evaluate cable and splice condition, and therefore a combination of multiple global and local tests is required to collectively provide a high reliability assessment of performance. Second, most of the diagnostic NDE techniques (reflectometry, dielectric spectroscopy, tan delta, etc.) require cables to be powered down and/or disconnected on at least one end to implement the test, which can contribute to high operation and maintenance costs (O&M). Consequently, to improve the efficiency and cost-effectiveness of cable and splice testing, utilities are constantly on the lookout for alternative ways to implement fewer and more robust NDE techniques for assessment. Two burgeoning initiatives that are expected to help manage time and costs are i) employment of NDE techniques that can be implemented with connections (i.e., a motor) attached and ii) online monitoring (i.e., NDE on live or energized cables). Implementing NDE tests that can be performed while leaving devices connected will help minimize disconnect and re-connect costs. Similarly, the transition to online monitoring for real-time assessment could lower costs associated with significant down time caused by de-energizing and disconnecting systems to perform testing. In this context, research studies and pilot-scale evaluations of the efficacy of nascent NDE technologies that exhibit potential for reduced costs and higher efficiency are invaluable steps towards future implementation of these technologies in NPPs as discussed below. Condition monitoring techniques applied to cables and splices are discussed in detail in Section 4.3.

2.3.1 Accelerated and Real-Time Environmental Nodal Assessment (ARENA) Test Bed

The key motivator for the establishment of the Accelerated and Real-Time Environmental Nodal Assessment (ARENA) test bed at PNNL (www.pnnl.gov/arena) is that utilities are seeking lower cost, well-characterized, and reliable test methods to evaluate cables, splices, and other components for service. Prior to implementation of any test method, it is important for utilities to verify that flaws are detected with an acceptable false-call ratio. The sheer volume of promising test methods for cable evaluation poses a major challenge for utilities to identify and commit to any given testing strategy. In response to this challenge, targeted studies towards cable and splice fault detection in a controlled environment provide a baseline understanding of the effectiveness of any given test method prior to trial examinations in the field. This fundamental investigation of test methods for identifying and assessing faults is an essential first step towards reliable fault detection in notoriously complex NPP cable systems.

To conduct rigorous and versatile studies using various test methods in a lab-scale research environment, PNNL established the ARENA test bed in 2021. The vision behind the creation of this facility was to establish a one-stop modular test facility that allows for implementation of a broad range of test methods to detect faults and anomalies in a variety of systems in a controlled environment. The goal was to assess the effectiveness of cable diagnostic and monitoring techniques safely and reliably in scenarios of interest to utilities, such as high-stress environments, elevated temperatures, electrical failures, moisture ingress, and more. As shown in Figure 2-1, the ARENA test bed features a 3-phase VAC motor, a large thermal oven to evaluate accelerated aging, a water bath to facilitate moisture ingress studies, elevated cable trays to avoid disturbances during testing, cable taps, high sensitivity ground-fault circuit breaker technology, and remote start and stop ability.

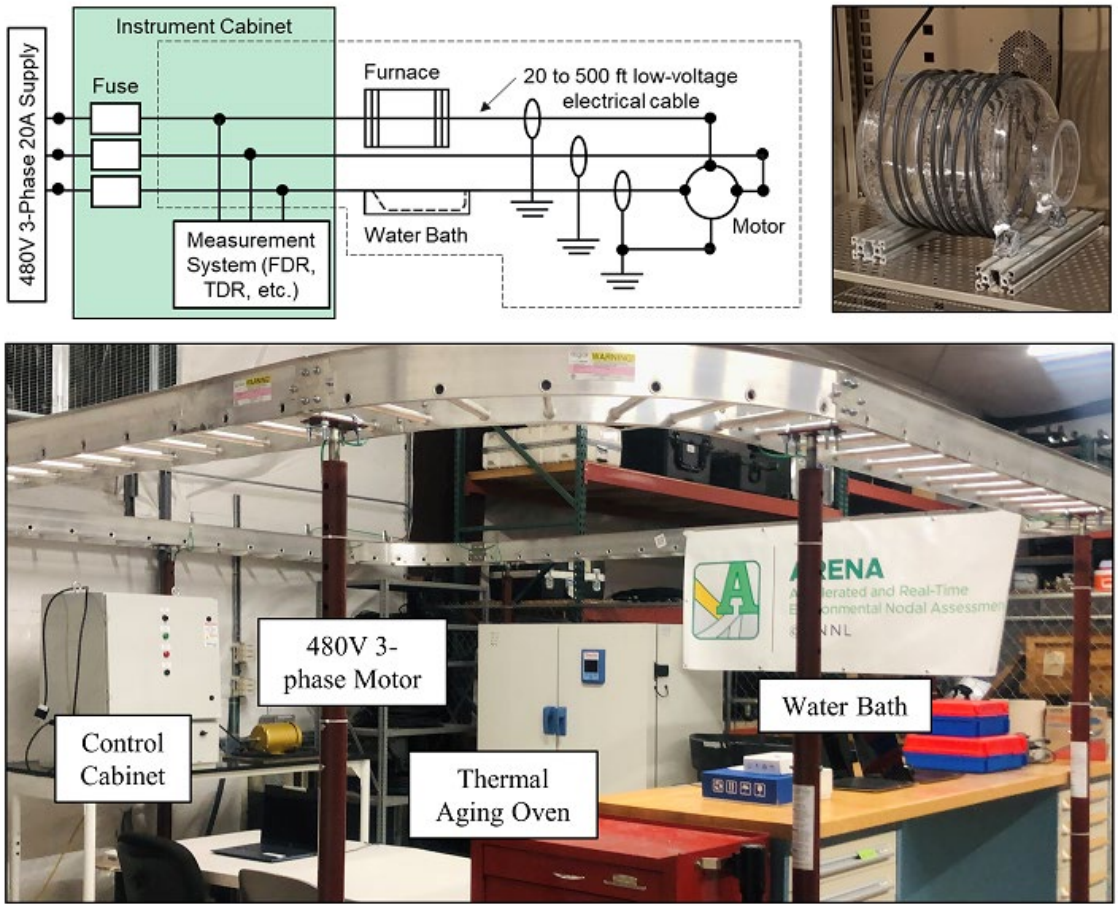

Figure 2-1. Digital image and schematic of the ARENA cable and motor test bed at PNNL.

3. COMMON ELECTRICAL CABLES AND SPLICES

Electrical cables are commonly categorized as low-, medium-, or high-voltage as shown in Table 4. Within U.S. NPPs, low-voltage electrical cables comprise more than 80% of all cables (Groeger, Brown, and Esselman 2017). Within harsh environments, such as in nuclear containment, where degradation and aging of cables may occur, the vast majority of cables are low-voltage (Jacobus 1990). Examples of circuits connected to low-voltage cables include those supplying power to motor-operated valves, controlling solenoid valves and switches, or connecting to instrumentation such as transmitters, thermocouples, or radiation monitors (Gazdzinski et al. 1996). Medium-voltage cables are commonly found in connections between medium-voltage buses and feeders, and emergency power supplies (Gazdzinski et al. 1996). In addition to electrical cables, splices and fittings are also voltage-rated depending upon application. High-voltage cables are rarely found inside U.S. NPPs.

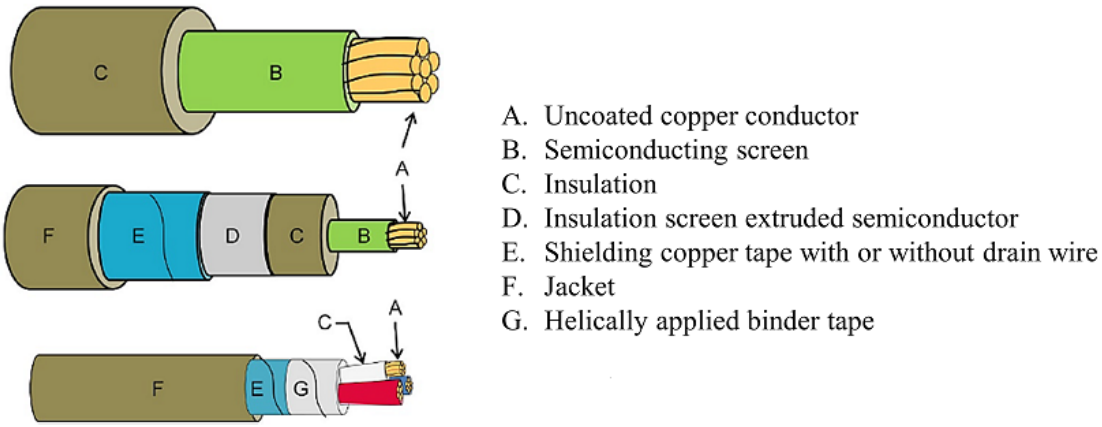

Figure 3-1. Configurations of typical cable designs used in NPPs (Glass et al. 2017).

Table 4. Common groupings of cable categories; adopted from (Glass et al. 2016).

Voltage	Application	Environment	Design
Low (< 2 kV)	Power Control Instrumentation Communication Thermocouple Specialty Configuration Safety Related (EQ) Non-Safety Related	Normal Operating Temperature High Temperature High Radiation Fire/Flame Retardant Submerged – Water Aggressive Solvents	Single/Multi-Conductor Shielded/Unshielded Coaxial Thermocouple Alloys Special Jacket
Medium (2 – 46 kV)	Power Safety Related (EQ) Non-Safety Related	Normal Operating Temperature High Temperature High Radiation Fire/Flame Retardant Submerged – Water Aggressive Solvents	Single Conductor Shielded/Unshielded Armoring
High (> 46 kV)	Power Non-Safety Related	Normal Operating Temperature High Temperature Submerged – Water Aggressive Solvents	Single Conductor Shielded

3.1 Electrical Cables

NPP cable designs typically include a conductor to carry power, instrumentation, or control signals, and an insulating cover layer to isolate the conductor (see Figure 3-1). They may include more than one insulated conductor within a bundle. Other components typically associated with the overall cable design include a semiconductor screen, a shield over each conductor and/or over all conductors, binder tape, and a jacket. While the insulation provides electrical isolation, in jacketed cable configurations the jacket mainly serves to provide mechanical protection during installation and fire or moisture resistance depending on the cable construction.

The materials for cable components are chosen based on the intended use environment, such as wet, dry, radiation, or sunlit conditions, and the application, such as for power or instrumentation. Conductors, made from copper, aluminum, or tin, are relatively insensitive to age-related damage. Cross-linked polyethylene (XLPE) and ethylene-propylene rubber (EPR) constitute the majority of insulation materials in the nuclear industry, with silicone rubber (SR) also being of interest. The most significant jacket materials are chlorosulfonated polyethylene (CSPE – also known as Hypalon® – a registered trademark of DuPont), polychloroprene, and polyvinyl chloride (PVC). While installed cables with intact insulation may well be able to continue to provide safe operation with degraded jacket material, the tendency of jacketing materials to degrade more readily than insulation materials enables their use as leading indicators for local stress prior to insulation degradation and failure.

A survey performed by Sandia in the mid-1990s established a representative distribution of insulation materials within the U.S. nuclear fleet (see Table 5). Note that over 70% of the materials are XLPE or EPR, similar to that found for common insulation materials within nuclear containment as shown in Table 6. In addition, approximately 30 different manufacturers were identified as supplying electrical cables to NPPs as shown in Table 7 (here, the top 10 manufacturers are shown).

Table 5. Common insulation material types used in U.S. NPPs (Gazdzinski et al. 1996).

Material	Percent of Total (%)	Material, cont.	Percentage of Total (%)
XLPE	36	ETFE	3
EPDM/EPR	36	Flame Resistant	3
SR	5	CSPE	2
Kerite	5	Butyl Rubber	2
Polyethylene	5	All others	Each ≤ 1%

XLPE = cross-linked polyethylene; EPDM = ethylene-propylene-diene elastomer; EPR = ethylene-propylene rubber; SR = silicone rubber; ETFE = ethylene tetrafluoroethylene; CSPE = chlorosulfonated polyethylene.

Table 6. Common insulation and jacket material types within U.S. nuclear containment (Bustard and Holzman 1994).

Material	Percent of Units (%)	Material	Percentage of Units (%)
XLPE	90	PVC	7
EPDM/EPR	75	PE	3
SR	27	Neoprene	3
CSPE	24	Polyimide	3
ETFE	15	Polyalkene	2

XLPE = cross-linked polyethylene; EPDM = ethylene-propylene-diene elastomer; EPR = ethylene-propylene rubber; SR = silicone rubber; CSPE = chlorosulfonated polyethylene; ETFE = ethylene tetrafluoroethylene; PVC = polyvinyl chloride; PE = polyethylene.

Table 7. Sort of the most common manufactures of cables found within NPPs (Bustard and Holzman 1994).

Manufacturer	Insulation	Number of Plants	Manufacturer, cont.	Insulation	Number of Plants
Rockbestos	Firewall III XLPE	61	Rockbestos	Coaxial XLPE	24
Anaconda	EPR	35	Raychem	XLPE	23
Brand-Rex	XLPE	30	Samuel Moore	EPR	19
Okonite	EPR	26	BIW	Bostrad 7E EPR	19
Kerite	HTK	25	Kerite	FR EPR	13

XLPE = cross-linked polyethylene; EPR = ethylene-propylene rubber; HTK = high-temperature Kerite.

Cable layouts in typical NPPs are not designed to facilitate access to and inspection of much of the cable length. Cable trays and conduits are engineered to protect cables from environmental stressors as well as accidental damage from workers and equipment that may be moving either inside containment, auxiliary buildings, or control buildings. While cable ends are generally accessible at termination boxes and control panels, many cables are grouped together in trays that do not necessarily follow personnel access pathways, that pass-through penetration pipes and conduits that may be buried in concrete, are buried underground, or even that pass through areas that may be flooded (see Figure 3-2).

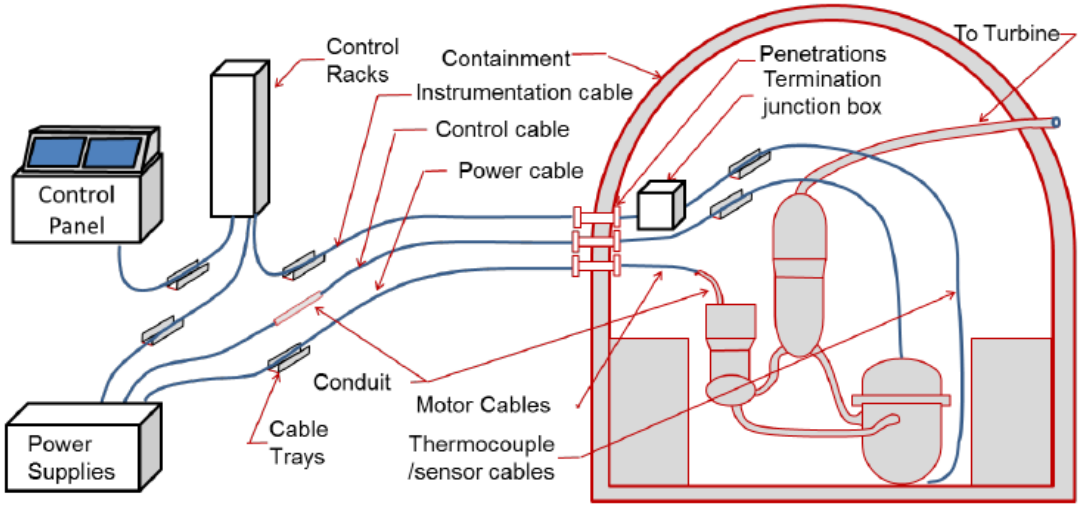

Figure 3-2. Typical cable layout allows access at control racks and termination junction boxes, but much of the cable is protected within cable trays and conduits thereby limiting access for local inspections (Glass et al. 2016).

3.2 Splices

Electrical cable splices are used to join two ends of a cable and/or termination electrically and mechanically. They must ensure electrical continuity between joining conductors and electrical isolation between other conductors in the same cable. As such, cable termination and splice kits represent sensitive sites for cable system failure. Designs include screw-clamp or crimp-clamp connections between the conductor and the solid metal portion of the splice or terminations usually coupled with an insulating shrink-wrap or tape to seal and electrically isolate the metal parts. With respect to wet or dry aging, splices and terminations are expected to have very long lives if they are applied in accordance with manufacturer recommended procedures; details regarding good workmanship practices can be found at (IEEE 2013). Applied correctly means that crimps and bolted connections have been made properly and that the tapes have been properly applied to the correct thickness and with the appropriate tension, or that heat-shrink materials have been properly applied and completely shrunk in place. Given that no voids exist, splice and

termination insulation is thicker than that of the cable and commonly has voltage ratings equal to or greater than the cable insulation. Generally, splice or termination failure occurs in medium-voltage cables due to installation or workmanship errors. Such errors include inadequate removal of semiconducting layers, cuts to the insulation under the splice, voids from inadequate taping or heat-shrink practices, and/or the presence of dirt in the splice layers. If mechanical metal-metal connections are not made properly, the connections can loosen over time thereby increasing the connection resistance due to vibration and/or corrosion-based contact-force loss. Many of these workmanship-related failures do not occur on initial energization and may take years to manifest themselves in a cable failure.

The above aspects of splice design have been studied in detail and such junctions have been subjected to aging and LOCA performance tests per EQ requirements (IEEE 2015), similar to full tests (see Section 2.2). In fact, some form of termination must be included in full cable tests. In addition, these cable terminations are subject to workmanship-based performance issues and are carefully considered as potential failure points during periodic condition monitoring activity. As a practical matter, when cables need to be de-terminated for testing, new termination kits are frequently applied. Splices may be practically necessary for long cable runs due to the physical volume of larger diameter cables and practical reel size limitations. The main concern for power connections is high-resistance connections. Local Ohmic overheating of high-resistance points can cause the insulation and connection tape or heat-shrink to degrade or the connection to burn open over time. Infrared-camera thermographic-aided visual inspections are frequently employed to determine if problems (hot spots) exist.

Table 8. Common splice insulation materials within U.S. NPPs (Villaran and Lofaro 2002).

Type	Insulation Material
Tape-wrap	EPR, EPDM, SR, PVC
Heat-shrink	Polyolefin

EPR = ethylene-propylene rubber; EPDM = ethylene-propylene-diene elastomer; SR = silicone rubber; PVC = polyvinyl chloride.

Splices are applied to both low- and medium-voltage cables, with the majority occurring for low-voltage cables in harsh environments. Due to the simplicity of low-voltage splice designs, workmanship issues as discussed above rarely occur (Villaran and Lofaro 2002). Regardless, it is critical to follow manufacturer instructions to ensure splices are installed correctly to guarantee the original design is met, especially for EQ components. For medium-voltage cables, while various splice designs are similar, care must be taken during installation to prevent electrical stress concentration, arcing, and consequent material failure. In addition to workmanship issues, degradation and aging of splices and their components predominately occurs due to thermal cycling and vibration (more details can be found in Section 5.1) (Gazdzinski et al. 1996).

Table 9. Select manufacturers of splice kits used in U.S. NPPs.

Manufacturer	Type	Covering	IEEE 383 Qualified?
Raychem	WCSF(N)	Heat-shrink	Yes
Raychem	WCSF(U)	Heat-shrink	No
Raychem	NPKC/NPKP/NPKS	Heat-shrink	Yes
Okonite	T-95	Tape	Yes
3M	QS-III	Heat/Cold-shrink	No

Splices are typically categorized as either in-line or V-type depending on the nature of the connection. An in-line splice is formed by coupling the conductors using a butt splice (see Figure 3-3), whereas a V-type is created by joining two conductors in parallel using a mechanical connection. An insulating or polymeric material (e.g., tape or sleeve, see Table 8) is typically used as a cover, extending several inches past the connectors to protect the splice, and is susceptible to aging and degradation. In some cases, a potting compound may be used prior to installation of the insulating cover to provide an environmental seal. In addition, any insulating materials used must be compatible with the connecting cable materials. It should be noted that V-type splices are generally more susceptible to moisture ingress due to the "interstitial area between the insulation of the two parallel conductors" (Gazdzinski et al. 1996). Common manufacturers of splice kits in U.S. NPPs are shown in Table 9.

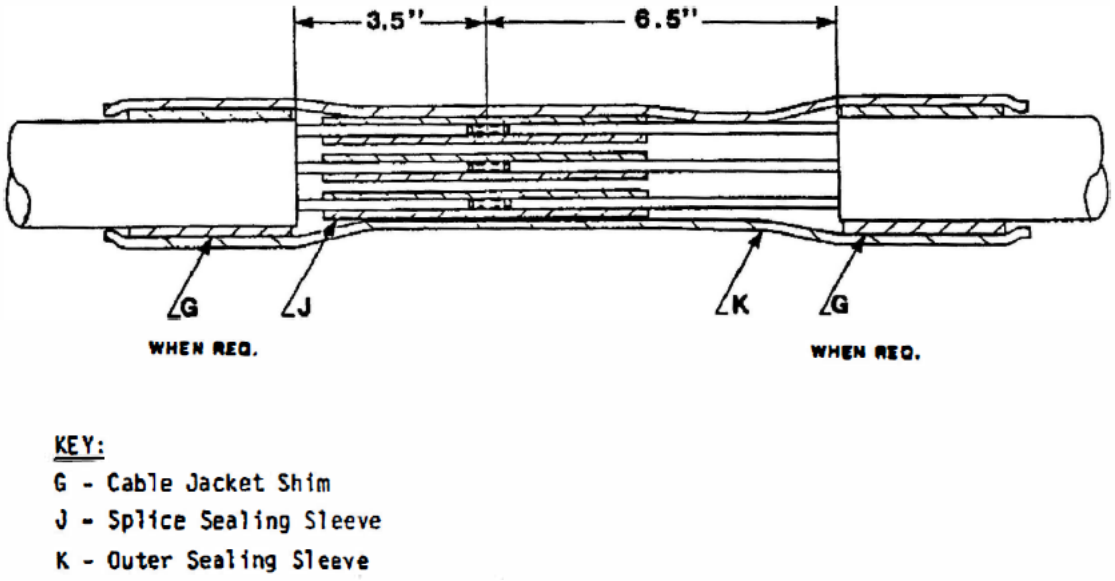

Figure 3-3. Raychem in-line splice kit (Type NPKC-3-31A); adopted from (Gazdzinski et al. 1996).

4. COMPONENT STRESSORS, AGING, AND CONDITION MONITORING IN NUCLEAR POWER PLANTS

The aging of polymer-based insulation and jacketing materials within power, control, and instrumentation cables is considered to be one of the main factors that could limit NPPs operating beyond their original licensed period. Aging and subsequent insulation degradation impairs the ability of cables to operate in harsh NPP environments. In particular, safety-related electrical cables are required to withstand design-basis accident (DBA) events and still perform their safety function. Therefore, to ensure no issues with potential DBA events, aged portions of electrical cables are commonly replaced. Condition monitoring (CM) is commonly employed to assess the quality of cables following replacement. In this section, polymeric aging within NPPs common condition monitoring strategies are discussed.

4.1 Stressors

Electrical cables and splices may be exposed to a number of stressors within NPPs, such as elevated temperature, thermal cycling, radiation, oxidation, mechanical damage, vibration, dust, moisture, humidity, workmanship, and more. Due to the wide range of stressors and their potential safety effects in cables and splices, much work has been conducted investigating their effects and qualifying component performance (see discussion in Section 2.2). A summary of common stressors, their effects on materials in cables and splices, and corresponding work reported in the literature are shown in Table 10. Among the stressors shown in Table 10, humidity, dust, and chemical attack are often neglected with regards to insulation aging management as they are believed to be insignificant (Jacobus 1990). Furthermore, EQ testing of polymeric materials is often limited to thermal and radiation aging due to the significance of these stresssors.

Table 10. Potential aging effects for some of the most common materials within cables and splices; adopted from (Gazdzinski et al. 1996; Villaran and Lofaro 2002).

Component	Material	Stressors	Aging Mechanisms	Aging Effects	Qualification Concerns
Insulation	XLPE, EPR	Thermal, radiation, fatigue, vibration, electrical transients, high voltage, moisture	Embrittlement, cracking, mechanical wear, treeing, wetting	Decrease in dielectric strength, increase in leakage currents, eventual failure	DLO, ITE, DRE, Synergistic (Bernstein et al. 2014)
Jacket	CSPE, Neoprene, PVC	(as above)	(as above), leaching of plasticizers	(as above)	(as above)
Splices	EPR, EPDM, SR, PVC, Polyolefins	(as above) workmanship, thermal cycling, vibration	(as above), electrical stress, loss of dielectric isolation, loosening connections	High resistance, eventual failure	Splices on age-embrittled cables (NRC 2009)
Connections	Copper, Aluminum	Wetting, vibration, mechanical stress, thermal cycling, electrical transients	Metal fatigue, corrosion, loosening connections	Loss of structural integrity, degraded connector contacts, increased heating	-

XLPE = cross-linked polyethylene; EPR = ethylene-propylene rubber; CSPE = chlorosulfonated polyethylene; EPDM = ethylene-propylene-diene elastomer; SR = silicone rubber; PVC = polyvinyl chloride; DLO = diffusion limited oxidation; ITE = inverse temperature effects; DRE = dose-rate effects.

4.2 Aging

Due to the above stressors, aging of polymeric materials, and consequently cables and splices, will occur. The effects of aging are potentially significant and can lead to failure of components and connected devices, plant shutdowns, electrical transients, or other issues (Villaran and Lofaro 2002). Therefore, the aging of polymers, with a focus on thermal and radiative degradation, is discussed below.

4.2.1 Thermal and Radiative Aging of Polymers

Polymers are ubiquitous in NPP infrastructure, such as in electrical cable insulation and splices. As such, their response to the harsh environments of NPPs has attracted significant interest and been the subject of many studies (Burnay 2001; Celina, Gillen, and Assink 2005; Wise, Gillen, and Clough 1997; Celina et al. 2000). There are three primary modes of chemical degradation of polymers in an NPP environment: thermal, radiative, and oxidative. Whenever thermal or radiative degradation occurs in an oxygenated environment these mechanisms become known as thermal-oxidation or photo-oxidation, and oxidative reactions dominate the degradative reaction pathways.

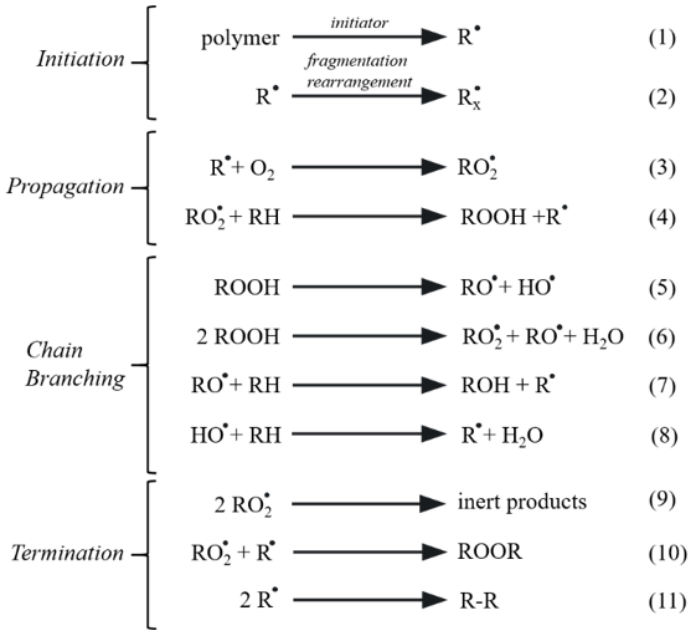

Figure 4-1. The basic auto-oxidation scheme (Gryn'ova, Hodgson, and Coote 2011).

Most polymers are thought to undergo oxidative degradation under normal conditions by an autocatalytic process known as auto-oxidation. G. Bolland et al. were first to establish the classically understood mechanism of polymer auto-oxidation that remains the contemporary theory (Gillen, Wise, and Clough 1995; Gryn'ova, Hodgson, and Coote 2011). This process is described in several steps including initiation, chain propagation, chain branching, and termination, as shown in Figure 4-1. Initiation (Scheme 1, (1)) occurs as weak C-H bonds break, leading to the formation of free radicals (R·). These free radicals can then rearrange (Scheme 1 (2)) without terminating the degradation reaction. Generated radicals quickly react with oxygen to form peroxyl radicals (RO2·) which then quickly stabilize into hydro-peroxides (ROOH) through propagation reactions (Scheme 1 (3, 4)). Generated hydro-peroxides can decompose to form RO· and HO·, which results in chain branching reactions (Scheme 1 (5-8)). Generated radicals ultimately form inactive products such as carbonyl groups or unsaturated groups through termination reactions (Scheme 1 (9-11)), which can lead to a loss of performance for the polymer in question.

4.2.1.1 Moisture Aging

In addition to thermal and radiative aging, electrical cables and splices exposed to water may experience property degradation. Reduction in the integrity of cables and splices due to moisture can affect the ability of equipment to perform its intended function. Moisture damage can result from flood waters contaminated with chemicals, sewage, oil, and other debris, which will also affect the integrity and performance of components. Degradation due to moisture and electrical stress can result in a gradual decrease of the dielectric properties of polymeric insulation, ultimately leading to complete degradation and failure. Stress leading to chemical degradation of polymers is generally promoted by initially formed voids, defects, and chemical impurities. Formed cavities will gradually propagate through polymer insulation and grow into shapes resembling the branches of a tree. Humidity, in combination with a medium-voltage AC electric field at ambient conditions, can result in the expansion of water trees (Shu and Boggs 2011). Water trees typically do not form at low-voltages, although such phenomena has been observed (Shu, Guo, and Boggs 2013). When growing water trees can no longer contain the voltage stress, an electric tree will form (Patsch and Jung 1999). Time dependent growth and expansion of water trees can significantly reduce the useful life of electrical cables. Water and electrical treeing are not the only factors responsible for failure of polymeric insulation in electrical cables exposed to moisture. Failure can occur through a combination of complex mechanisms, such as partial discharge, thermo-mechanical stress, and more.

4.2.1.2 Aging Knowledge Gaps

As discussed in Section 2.2, EQ cables and splices must be artificially aged to their qualified life prior to LOCA exposure. However, since the publication of IEEE standards 323 and 383, potential concerns regarding the applicability of accelerated aging using the Arrhenius approach have been noted. These concerns have been summarized as knowledge gaps in the Expanded Materials Degradation Assessment (EMDA) Volume 5: Aging of Cables and Cable Systems (Bernstein et al. 2014). Due to the presence of polymers, both cables and splices are susceptible to the identified concerns. For example, diffusion limited oxidation (DLO) has been identified as a knowledge gap related to the hinderance of oxygen at the material surface, which may lead to heterogenous aging and consequently overestimation of qualified life (see Figure 4-2). As another example, increased occurrence of radiation degradation at lower temperatures, refered to as inverse temperature effects (ITE), could lead to underestimation of degradation and lifetime and has been observed in semi-crystalline polymers (see Figure 4-3). More details regarding the EMDA knowledge gaps can be found in the literature (Bernstein et al. 2014; Fifield, Zwoster, and Murphy 2018). However, the consequences of many of these issues may be mitigated through CM approaches.

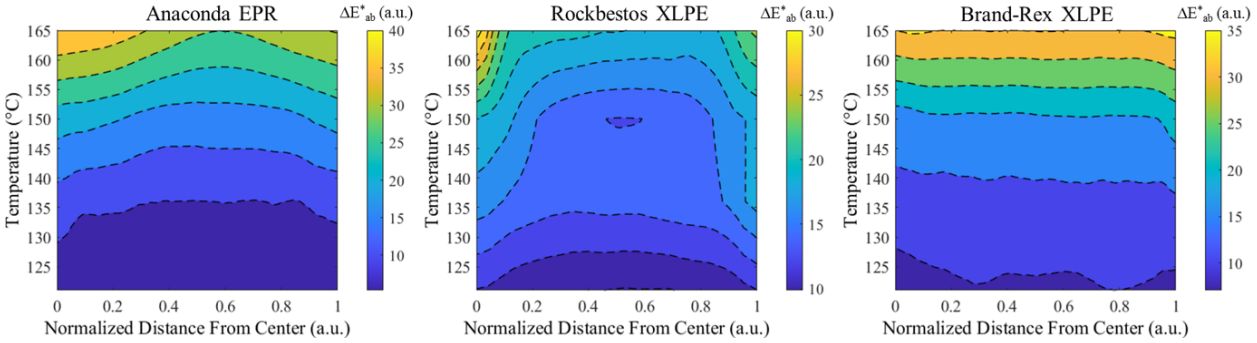

Figure 4-2. Evaluation of DLO using total color difference for three materials aged for 30 days. DLO is indicated by curvature of the contour lines (---). A normalized distance of 0 is the edge next to the conductor and a distance of 1 is the external edge (Fuchs et al. 2021).

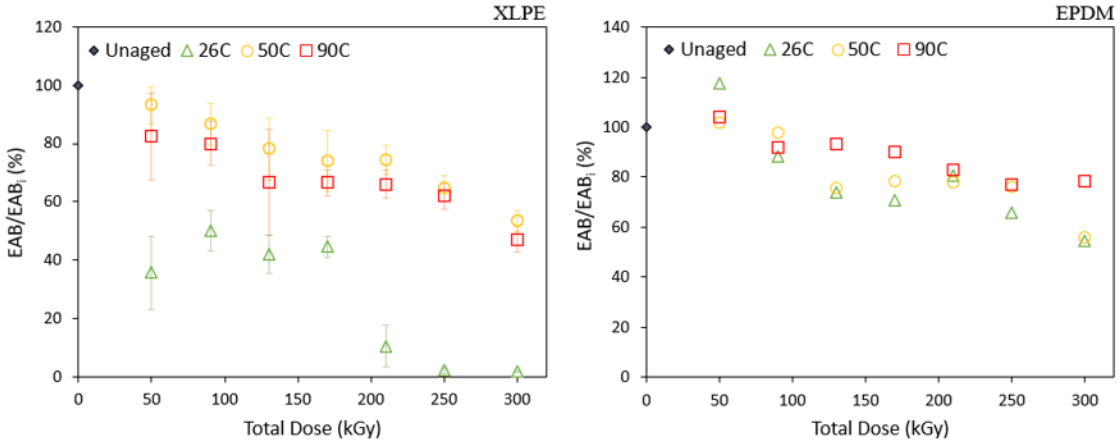

Figure 4-3. Average relative elongation at break of a (left) cross-linked polyethylene (XLPE) and (right) ethylene-propylene-diene elastomer (EPDM) cable insulation. ITE were observed with XLPE, but not EPDM (Fifield et al. 2022).

4.3 Condition Monitoring

A critical step towards the continued safe operation of NPPs during extended license periods is evaluation of how the characteristics and performance of materials installed in aging plant components changes over time. As such, most NPPs now have cable aging management programs that involve NDE or CM to assure electrical cable and splice performance. To ensure reliability of cable systems in NPPs over these license extension periods, much focus has been given to electrical cable aging-related issues and their knowledge gaps as discussed above. Understanding leading indicators for cable aging behavior enables development of technology to monitor cable condition and consider cable remaining useful life. The ability to foresee imminent cable and splice demise through accurate NDE provides the opportunity to plan for repair or replacement, or to accept the risk of failure with clear information. In addition to safety concerns, unexpected cable or splice failure can be extremely costly if it results in an unplanned power generation outage or forces redirection of resources during a busy outage schedule. With foreknowledge, costs associated with repair or replacement can be minimized. However, even with prior knowledge and an adequate planning period, many cables in an NPP are difficult to replace due their complex routing or inaccessible location. Operating experience has shown that many cable defects or failures are related not to cable material aging issues, but to workmanship issues related to application of terminations, splices, etc.

Table 11. Local measurement approaches for NDE of cables and splices (Glass et al. 2015).

Method	Advantages	Disadvantages
IR Spectroscopy	Sensitive to chemical changes on the jacket and outer surface (e.g., the presence of dirt, oil, etc.).	May over-predict jacket or surface damage not indicative of bulk condition. Also sensitive to surface condition.
Visual Walk-downs	Simple and low-cost test method.	Not quantitative and subjective.
EAB	Strongest direct indication of aging damage and classically used in EQ.	Destructive method.
IM	Simple test that is broadly accepted.	Issues when testing some materials, such as XLPE.
DMA	Promising technique and potential for broader application than indenter.	Currently used in laboratory settings.

EAB = elongation at break; IM = indenter modulus; DMA = dynamic mechanical analysis.

Generally, CM approaches can be separated into local (see Table 11) and bulk (see Table 12) measurement techniques. With bulk or global measurement, electrical characteristics that are tied to function can be tested non-destructively. In addition, bulk techniques evaluate the entire cable assembly, and some can identify damage locations. On the other hand, local measurement techniques can provide quantitative information regarding the status of health but are limited to physically accessible cable portions. For this work, the focus is on non-destructive bulk electrical CM approaches as these methods are generally applied for in-situ evaluation of cables and correspondingly splices since splices are considered an integral part of the overall cable system (Villaran and Lofaro 2002).

Table 12. Bulk measurement approaches for NDE of cables and splices (Glass et al. 2015).

Method	Advantages	Disadvantages
TDR	Commonly used for locating defects in instrumentation, control, and power cables where full-length cables are relatively inaccessible. Test uses low voltages and is completely nondestructive.	Intrusive – requires disconnecting at least one end of the cable to perform the test. Not particularly sensitive to insulation damage.
FDR	Low voltage, tests full cable including insulation, can identify flaw location. More sensitive than TDR.	Intrusive – requires disconnect. Data interpretation can be challenging.
PD	Stepped high-voltage test that identifies cable weakness up to the point of insulation break-down.	May damage weak or compromised cables and potentially can cause noise and damage in near-by circuits. Also does not locate discharge location.
IR	Commonly performed in industry to determine the condition of the cable insulation – primarily as a screening for other tests.	Inconsistent readings weaken broad acceptance of this test.
Tan δ	Determines changes in insulation (dielectric) properties by measuring change in dielectric loss angle. Can measure aging effects over entire cable length.	Intrusive, requires decoupling both ends. Only suitable for shielded cable and no information regarding degradation location. Loss angle may be trended; however, single measurement insufficient to estimate remaining life.
DS	Provides tan δ information across a broad frequency band.	Requires more equipment and time than a simple tan δ test. Guidance on acceptance criteria can be unclear.

TDR = time-domain reflectometry; FDR = frequency-domain reflectometry; PD = partial discharge; IR = insulation resistance; DS = dielectric spectroscopy.

4.3.1 Electrical Approaches to Condition Monitoring

Electrical reflectometry techniques are non-destructive methods based on the reflection of electromagnetic waves at electrical discontinuities and can be used to locate changes and characterize insulation status. Within the realm of material characterization, reflectometry techniques may be applied to non-destructively conduct distance-to-fault (DTF) measurements on electrical cables and components. Based on the type of input signal used and the method for analysis of the reflected signal, reflectometry techniques applied for cable and splice evaluations may be broadly categorized as frequency domain reflectometry (FDR) or time domain reflectometry (TDR). For FDR measurements, the steady-state amplitude and phase of the reflected signal is composed of numerous discrete frequencies, while for TDR signals, the reflected signal is measured at discrete moments in time. A study performed in 2006 (Furse et al. 2006) compared several types of reflectometry systems focusing on aircraft wiring networks. The systems reviewed are summarized below in Table 13.

In addition to electrical reflectometry, electrical approaches to CM include partial discharge (PD), insulation resistance (IR), dielectric spectroscopy (DS), and tan δ as discussed below.

Table 13. Comparison of offline and online reflectometry methods (Glass et al. 2021).

Wire Fault Sensor	Accuracy (in)	Min. Length (in)	Max. Length (ft)	Computation	Network Topology Recognition
TDR (Megger. 2020)	6-12	5	100+	Edge Identification	Yes
FDR (Furse et al. 2003)	2	4	50+	FFT; Peak Identification	Yes
SSTDR (Furse et al. 2005)	1	4	70+	Peak Identification	Yes
Capacitance (Chung, Amarnath, and Furse 2009)	1	1	100+	Linear Curve Fit	No

TDR = time domain reflectometry; FDR = frequency domain reflectometry; SSTDR = spread-spectrum time domain reflectometry; FFT = fast Fourier transform.

4.3.2 Offline Condition Monitoring

Offline CM refers to NDE approaches which require the evaluated cable to be disconnected and powered down or de-energized during testing, which can lead to significant down time. Common offline electrical CM approaches include TDR, FDR, PD, IR, DS, and tan δ.

4.3.2.1 Time Domain Reflectometry (TDR)

TDR measures reflections of a stepped or impulse signal along a single conductor to detect and locate any changes in the conductor or insulation impedance. A TDR pulse is usually less than 10 volts and is primarily in the higher frequency range (> 1 kHz), so the pulse has little or no effect on low frequency signals or on 50/60 Hz power excitation. TDR transmits an incident signal into the conductor and listens for signal reflections. If the conductor is a uniform impedance network and is terminated to a matching impedance, then there will be no reflections and the transmitted signal will be completely absorbed at the far end by the termination. Instead, if there are impedance variations such as a short or open circuit at the cable end, a damaged or reduced cross-sectional area, or a splice with a higher resistance along the conductor, then some fraction of the incident signal will be reflected to the source. The polarity of the reflection contains information about the reflector. An open cable end will reflect “in-phase” with the excitation and a short will reflect as an inverted signal. This reflected signal is measured at a point in time on the TDR instrument that is proportional to the signal propagation velocity in the cable and the distance along the cable, thereby allowing assessment of the location of any reflector observed. The amplitude of the reflected signal coupled with the inherent cable attenuation characteristics also allows an estimate of the magnitude of the impedance change. An example TDR plot is shown in Figure 4-4.

Several enhancements to the traditional TDR measurement are available today for locating electrical faults based on reflectometry concepts. These include standing wave reflectometry (SWR), mixed signal reflectometry (MSR) (Tsai et al. 2005), multicarrier reflectometry (MCR) (Naik, Furse, and Farhang-Boroujeny 2006) and sequence/spread spectrum time domain reflectometry (S/SSTDR). For online applications, S/SSTDR has been most fully exploited in the aircraft industry and the rail industry where low-cost ASIC-based instruments have been developed for online monitoring of control and power circuits up to 1000 volts.

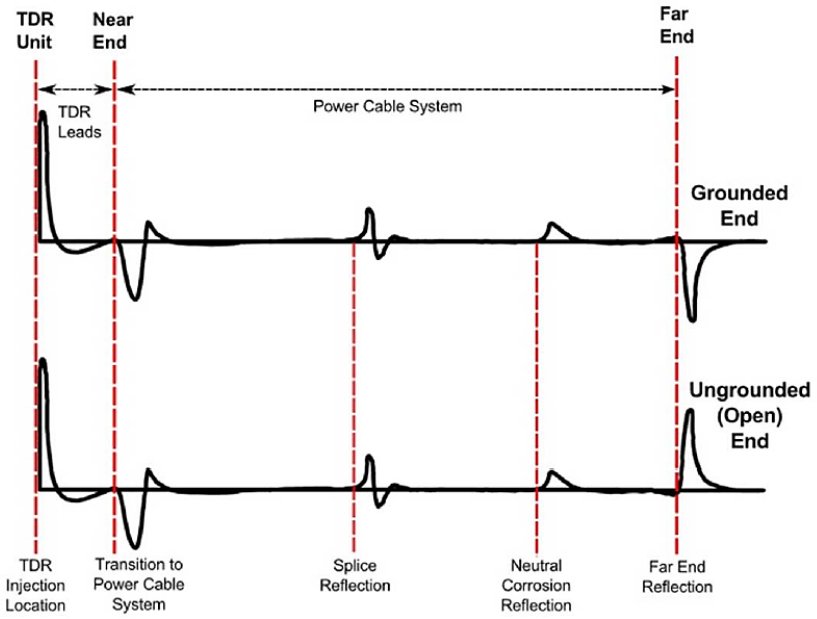

Figure 4-4. Typical test plot of TDR applied to a cable with a splice (Hernandez-Mejia 2016). The effect of grounding the cable is also shown.

4.3.2.2 Frequency Domain Reflectometry (FDR)

FDR is a nondestructive electrical inspection technique used to detect, localize, and characterize subtle impedance changes in power and communication system conductors and insulation materials along the length of a cable from a single connection point. FDR is based on the interaction of electromagnetic waves with conductors and dielectric materials as the waves propagate along the cable, similar to TDR. The technique uses the principles of transmission line theory to locate and quantify impedance changes in the cable circuit. These impedance changes can result from connections, faults in the conductors, or degradation in polymeric materials.

For an FDR measurement, two conductors in the cable system are treated as the transmission line through which a low-voltage swept-frequency waveform is propagated. A linearly increasing "chirp" sinusoidal waveform is the typical excitation signal used in the FDR technique. The excitation signal can be generated for transmission into the cable using an analog circuit, such as a voltage-controlled oscillator, or using a digital circuit such as a direct digital synthesizer. As the excitation signal is swept over the frequency range and the associated electromagnetic wave travels down the cable, the impedance response, or more specifically the reflected complex voltage, is recorded at each frequency to characterize wave interaction with the conductors and surrounding dielectric materials. The remote end of the cable can be terminated in an arbitrary impedance different from the cable characteristic impedance but is often grounded or open-circuited during testing. Because the applied signal is low-voltage, the test is nondestructive and poses no special safety concerns to operators assuming that routine electrical safety procedures are followed. The distance-to-fault of a typical FDR plot is shown in Figure 4-5.

The FDR technique can potentially yield better sensitivity to cable degradations than traditional TDR, which is better suited for identifying open and short circuit conditions in the conductors. For example, FDR is less susceptible to electrical noise and interference due to the availability of filtering and noise-lowering algorithms in the frequency domain, which can lead to increased sensitivity and accuracy. In addition, TDR pulses may have difficulty continuing in the forward direction after several significant reflections or multiple reflections. This may complicate the correlation between the impedance change and the corresponding location on the reflectometry waveform. Conversely, FDR has a high dynamic range and is better suited for identifying and characterizing a series of multiple degradations in long cables, although there can be issues with discriminating multiple, close proximity degradations.

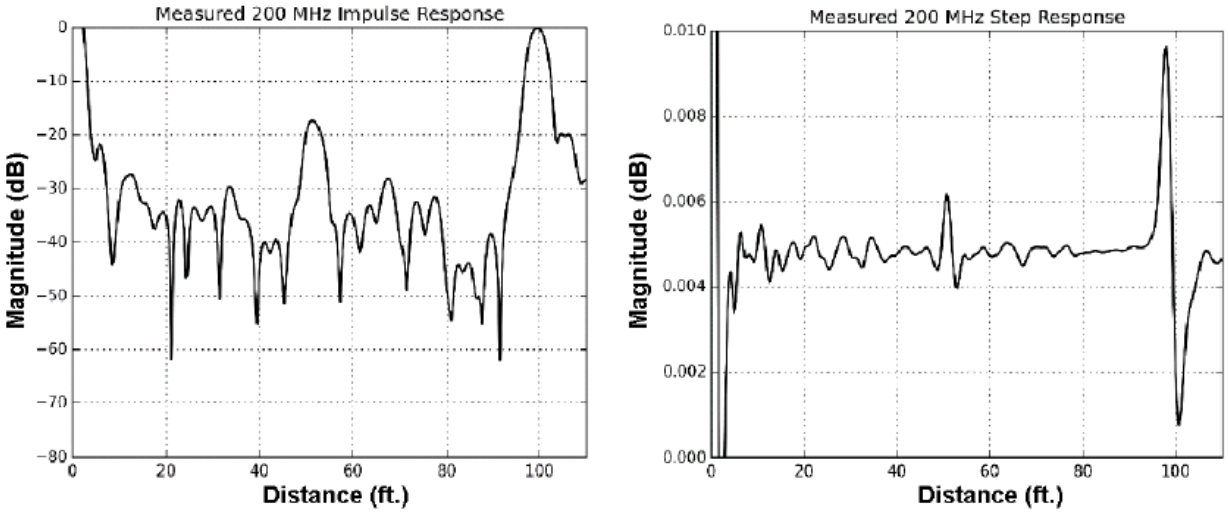

Figure 4-5. Measured FDR response for a shielded triad cable with mechanically damaged defect at mid-point: (left) impulse response and (right) step response (Glass et al. 2016).

4.3.2.3 Partial Discharge (PD)

PD are electrical discharges that can take place in gaseous inclusions, which may accidentally occur in solid insulation. PDs do not bridge the whole insulation (i.e., they do not extend from conductor to ground) but can lead to material failure. A PD takes place in a nanosecond and causes high-frequency currents, which are measurable by PD detection equipment. After a discharge, both positive and negative charges are deposited on the surfaces of the voids or tree channels. These charges change the localized electric field, thereby controlling the time when the next PD will take place along with changes in the applied sinusoidal voltage. The net result is a pattern of PDs of various magnitudes, repetition rates, and phase angles relative to the applied voltage. During testing in which the voltage is slowly raised, the voltage at which discharges are observed in each cycle are known as the PD inception voltage. On decreasing the voltage slowly from above the PD inception voltage value, the voltage at which PD ceases to occur is referred to as the PD extinction voltage. PD will often become intermittent before complete extinction occurs. Because of the deposition of charges on the surfaces of the voids caused by PD, the PD extinction voltage can theoretically be as low as 50 percent of the inception voltage. In practice, the difference is between 10 and 25 percent. To ensure that a cable is discharge-free at the operating voltage, it is necessary to test for PD at levels up to twice the operating voltage. Decreases in the PD inception voltage are an indication of significant degradation of the insulation material. A cable that has PD at operating voltage or within 1.5 times the operating voltage is generally significantly deteriorated and may fail in the near future. Cables that have no significant PD at levels up to twice the operating voltage have no immediate expectation of failure from PD and will operate satisfactorily for a significant period of time. An example PD plot is shown in Figure 4-6.

Modern PD detection equipment can provide three-dimensional plots showing the phase, magnitude, and number of PD events. From the characteristics of these plots, it may be possible to identify the source of the PD (e.g., from spherical or flat cavities or voids, electrical trees, or interfaces). The PD test is potentially damaging because the discharges induced can cause degradation of the insulation over a period of time from localized overheating. This test has limitations for use in the field because it requires relatively high voltages to be applied to the cable, which would be a concern due to the potential for damaging the cable or surrounding equipment. Additionally, nearby operating electrical equipment in a plant environment could interfere with the test because of noise interference. PD is typically performed onmedium-voltage cables in which electrical breakdown failure is of greater concern.

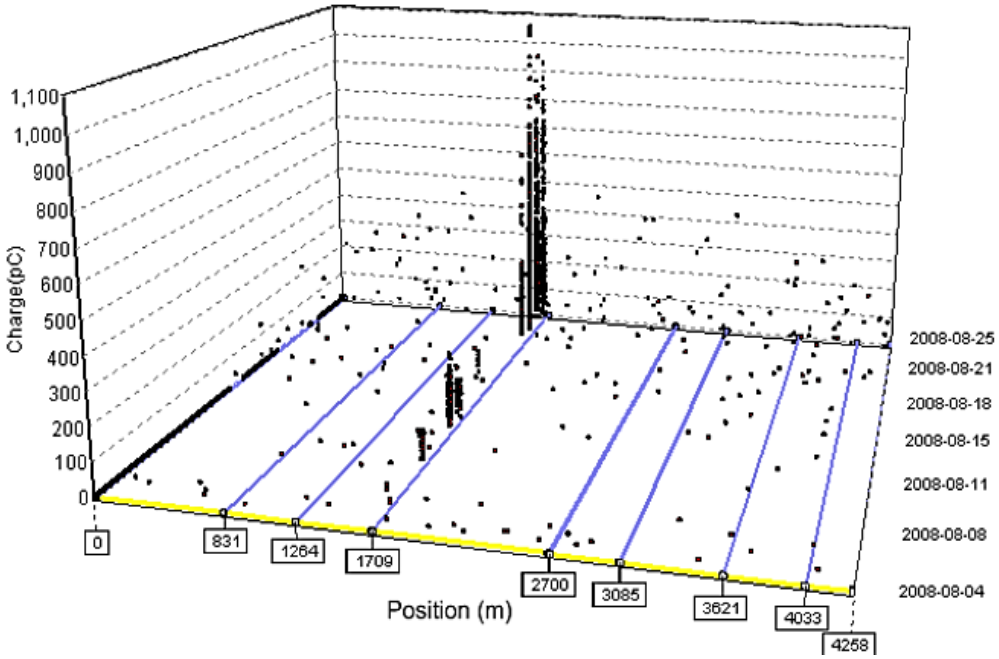

Figure 4-6. 3D plot of online developing PDs in a flawed joint with a crimped connector running hot at 1678 m (Cuppen, Steennis, and van der Wielen 2010).

4.3.2.4 Insulation Resistance (IR)

Arguably the most straight forward bulk CM technique, IR measures the resistance of insulation within cable systems. In many cases, IR can be measured using a simple multimeter. As polymers are typically electrical insulations, IR can be used to identify phases which have failed or are faulty. With damage and aging, IR readings typically trend downward over time. While IR cannot be used to identify the location of damage, it is commonly used as a starting point to identify anomalies. However, while IR is useful for cable insulation materials, it has been shown to be insensitive to degradation of splice coverings. Typical IR plots are shown in Figure 4-7.

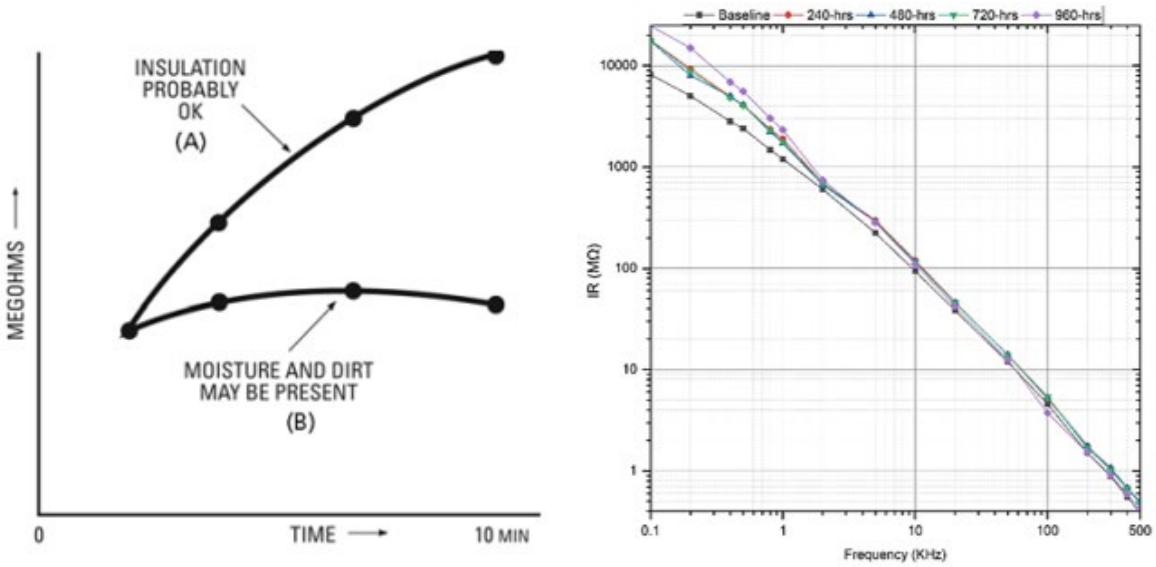

Figure 4-7. IR response for (left) moisture or contaminated insulation (Megger 2006) and (right) aging of an XLPO insulation within a photovoltaic system (Afia, Mustafa, and Tamus 2020).

4.3.2.5 Tan Delta (Tan δ)

The tan delta technique or tan δ can be derived from one of the four Maxwell equations, which relates the magnetic field intensity to the electric field intensity. The tangent of the angle δ between the imaginary and real portion of permittivity is the ratio of two vector quantities and is also a measure of the ratio of energy from the applied electric field that is stored in a specific material to the amount dissipated or lost. This quantity is also known as the loss tangent. The cable to be tested must be de-energized and each end disconnected and isolated. Using a very low frequency (0.1 to 1 Hz), a test voltage is applied to the cable while the tan δ controller takes measurements. Typically, the applied test voltage is raised in steps, with measurements first taken up to the normal line-to-ground operating voltage. If the tan δ numbers indicate a good cable system, the test voltage is raised up to one and a half or two times the ground operating voltage. The tan δ numbers at the higher voltages are then compared to those at lower voltages and an analysis is made. Tan delta testing is becoming widely used in NPPs—particularly for medium-voltage shielded cable. Such tests have been shown to be particularly sensitive to water tree degradation in medium-voltage cables. A typical tan δ plot is shown in Figure 4-8.

One limitation of tan δ testing is that with a marginal or damaged cable there is a possibility for cable failure because the voltage potential is elevated above normal line voltage; however, cables typically have a comfortable safety factor well above the test voltage. Tan δ tests are not considered destructive and certainly pose less stress on the cable than withstand tests or partial discharge tests. EPRI and manufacturers have developed recommended guidance for acceptance thresholds for some cables, but sensitivity and reliability are best if used as a regular periodic test where results can be compared to baseline data and trended.

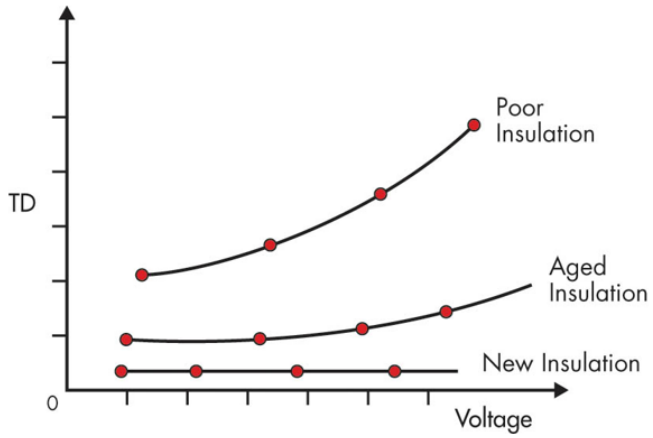

Figure 4-8. Typical tan delta response for an aged or degraded cable (Youngblood 2020).

4.3.2.6 Dielectric Spectroscopy (DS)

DS is similar to tan δ (discussed above) where both the applied voltage and frequency are varied in the test steps. The test is applied across the conductor and a shield or between unshielded conductors in a multiconductor cable configuration. The test series is performed at different frequencies varying from 0.01 Hz to approximately 10 Hz, although much higher frequencies have been used in the laboratory as shown in Figure 4-9. At each frequency, a number of voltage steps are applied, and tan delta is measured at each step. One embodiment of this method—the broadband impedance spectroscopy (BIS)—has been developed by Boeing for condition monitoring of aircraft wiring. Extension of this technology was further explored for nuclear applications under an NRC program (Rogovin and Lofaro 2006). This effort included claims of usage of BIS to determine location of degradation to within 10% of the overall cable length. To date, DS has not had broad acceptance within the power industry; however, it has attracted attention as a promising technique particularly for medium-voltage water-tree detection (Werelius et al. 2001). A typical DS test plot is shown in Figure 4-9.

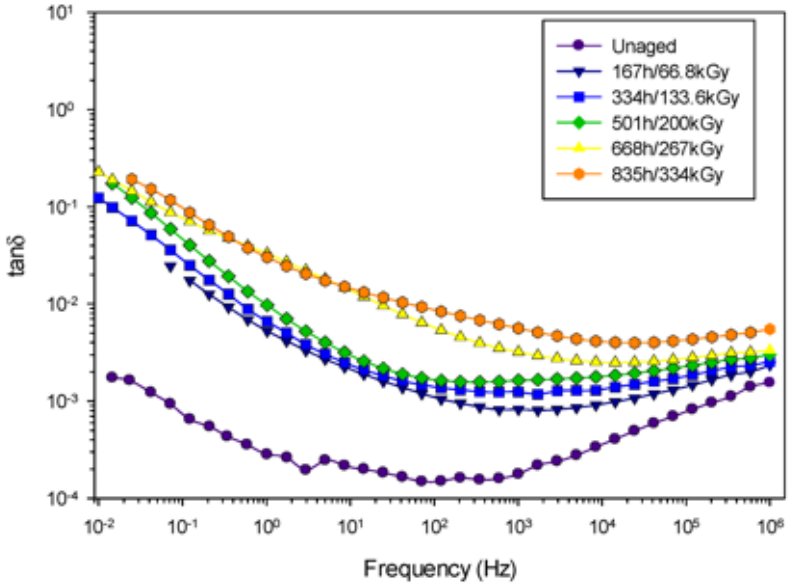

Figure 4-9. DS response for a twisted pair cable undergoing radiation aging at different aging time points (Suraci, Li, and Fabiani 2022). Note that the frequency range is generally much higher for DS compared to typical tan δ.

4.3.3 Online Condition Monitoring

Online CM refers to NDE approaches where the evaluated cable is connected and energized – the cable does not need to be disconnected, which can lead to significant cost savings. In addition, online methods enable capturing of transients, which may enable improved detection and forensics of events of interest. Online CM is a relatively new approach to NDE within NPPs, with SSTDR being a technology that is currently being investigated (Glass et al. 2022).

4.3.3.1 Spread-Spectrum Time Domain Reflectometry (SSTDR)

SSTDR is a combination of spread spectrum (SS) and TDR techniques. While TDR is a widely used technology for fault detection in cables and wires, spread spectrum finds extensive application in cellular technology. SSTDR is one of several enhancements to the traditional TDR measurement that are available for locating electrical faults based on reflectometry concepts. For online applications, S/SSTDR has been most fully exploited in the aircraft industry and the rail industry where low-cost ASIC-based instruments have been developed for online monitoring of control and power circuits up to 1000 volts.

SSTDR, in particular, shows promise as a robust online cable monitoring technique owing to its unique ability to operate on energized cable systems. This feature is in sharp contrast with traditional reflectometry methods that require cables to be de-energized and de-terminated prior to testing. Similar to conventional reflectometry, SSTDR sends an excitation signal down the length of the cable and an analysis of the reflected signal is carried out to identify impedance discontinuities in the cable corresponding to faults and anomalies. The key difference lies in the type of signal used in SSTDR testing. SSTDR uses a high frequency pseudo-random-noise (PN) coded excitation signal which reflects off impedance discontinuities in the cable. The PN code effectively distributes the energy of the input signal across a broad spectrum (hence the name, spread spectrum) resulting in the signal traveling through the cable with little to no interference at any individual frequency in an energized cable. The reflected signal is then cross-correlated with the input signal to produce a reflectometry spectrum. While SSTDR has found application in aircraft and railway industry, the technology is in the developmental stages for application in the NPP industry. Evaluation of SSTDR performance against trusted cable monitoring technologies, including evaluation of splices and other components, is critical for further development and eventual application of SSTDR to monitor energized cables in service in NPPs. A typical SSTDR test plot is shown in Figure 4-10.

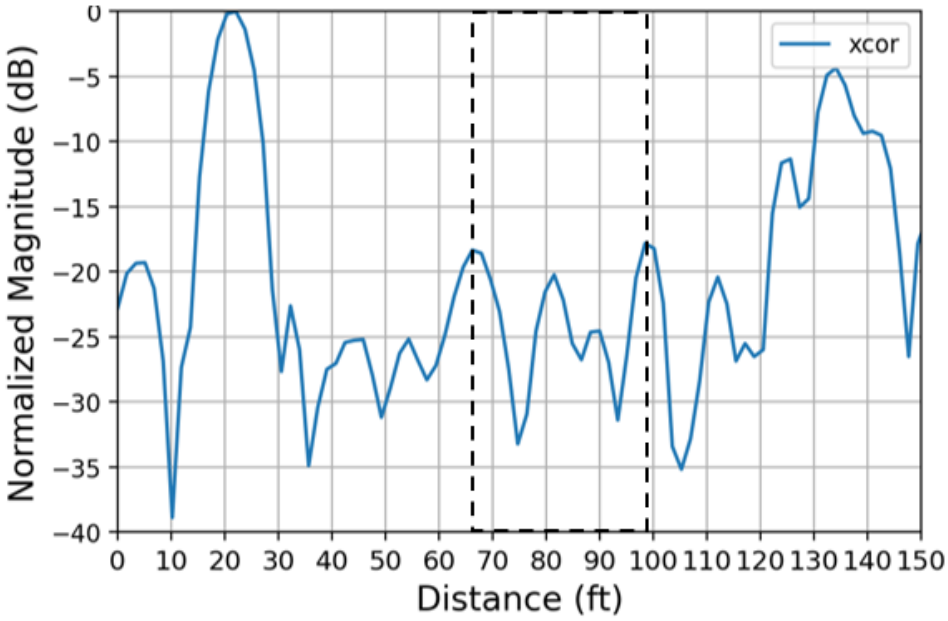

Figure 4-10. SSTDR response for an electrical cable thermally aged at 140°C for 62 days.

5. ELECTRICAL CABLE COMPONENT FAILURE

Electrical cables and splices can fail due to aging of their material components and due to workmanship issues. To ensure their continued performance, components within harsh environments in NPPs are EQ. To evaluate the propensity of failure of cables and splices, previous work has investigated and summarized their relevant failure events as shown in Table 14. However, these documents are at least two decades old (last document in 2002 for NUREG/CR-6788) and may not capture recent cable and splice events of interest. Therefore, this section reviews failure data in terms of cables, splices, connectors, fittings, terminations, joints, and lugs with a focus towards potential issues with cable repair and replacement, and long-term aging of splices. Note that within the scope of this work, workmanship issues, which commonly manifest within 10 years of installation, are not considered long-term aging.

This work incorporates Licensee Event Reports (LERs). LERs are issued whenever failures or other events meet the reporting requirements in 10 CRF 50.73. However, LERs do not directly address aging of components. Furthermore, events that require LERs are those in which plant safety may be affected and therefore events with little to no impact on plant safety may not be captured. Regardless, analysis of LER data has been shown to produce useful information regarding issues with component failure (Villaran and Lofaro 2002; Jacobus 1990). In addition to LERs, other available information includes the Reliability and Availability Data System (RADS), the Equipment Performance and Information Exchange (EPIX), or other databases controlled by the Institute of Nuclear Power Operations (INPO).

Table 14. Aging management guidelines and EQ publications for cables, splices, and other electrical components.

Publication Year	Title	Report Number	Reference
1990	Aging of Cables, Connections, and Electrical Penetration Assemblies Used in Nuclear Power Plants	NUREG/CR-5461 SAND89-2369	(Jacobus 1990)
1992	Aging, Condition Monitoring, and Loss-of-Coolant Accident (LOCA) Tests of Class 1E Electrical Cables	NUREG/CR-5772 SAND91-1766/2	(Jacobus 1992)
1994	Low-Voltage Environmentally Qualified Cable License Renewal Industry Report	TR-103841	(Bustard and Holzman 1994)
1996	Aging Management Guideline for Commercial Nuclear Power Plants – Electrical Cable and Terminations	SAND96-0344	(Gazdzinski et al. 1996)
1998	Aging and Loss-of-Coolant Accident (LOCA) Testing of Electrical Connections	NUREG/CR-6412	(Nelson 1998)
2001	Assessment of Environmental Qualification Practices and Condition Monitoring Techniques for Low-Voltage Electric Cables	NUREG/CR-6704	(Lofaro et al. 2001)
2002	Evaluation of Aging and Environmental Qualification Practices for Power Cables Used in Nuclear Power Plants	NUREG/CR-6794 BNL-NUREG-52673	(Villaran and Lofaro 2003)
2002	Evaluation of Aging and Qualification Practices for Cable Splices Used in Nuclear Power Plants	NUREG/CR-6788 BNL-NUREG-52677	(Villaran and Lofaro 2002)
2010	Generic Aging Lessons Learned (GALL) Report	NUREG-1801, Rev2	(NRC 2010)
2010	Essential Elements of an Electric Cable Condition Monitoring Program	NUREG/CR-7000 BNL-NUREG-90f318	(Villaran and Lofaro 2010)

5.1 LER Electrical Cable and Splice Search

An LER search (https://lersearch.inl.gov/) was conducted to evaluate failure data for cables and splices (see Appendix 9.2). Here, a title and abstract search was conducted to capture information of interest. Specifically, the terms searched are shown in Table 15 (note that the keyword search is not case sensitive). Additional search terms of *fitting*, *connector*, *termination*, and *joint* were also evaluated as these components may be associated with cables and/or splices. The logical operators OR and AND enable evaluation of a combination of keywords, such as *cable* or *cables*.

Table 15. LER search terms to investigate failure events associated with electrical cables and corresponding number of events.

Keyword	Number of Events
Cable OR *Cables*	1794
Splice OR *Splices*	114
Fitting OR *Fittings*	333
Connector OR *Connectors*	553
Termination OR *Terminations*	319
Joint OR *Joints*	293
(*Cable* OR *Cables*) AND (*Splice* OR *Splices*)	54
(*Cable* OR *Cables*) AND (*Fitting* OR *Fittings*)	12
(*Cable* OR *Cables*) AND (*Connector* OR *Connectors*)	207
(*Cable* OR *Cables*) AND (*Termination* OR *Terminations*)	57
(*Cable* OR *Cables*) AND (*Joint* OR *Joints*)	3
(*Cable* OR *Cables*) AND *Replacement*	97
(*Cable* OR *Cables*) AND *Repair*	92

All reported LER events for cables, splices, connectors, fittings, terminations, and joints are shown in Figure 5-1; the events for non-cable associated components (i.e., *cable* or *cables* was not included in the title or abstract of the event) were estimated by subtracting the combined cable and component events [e.g., (*Cable* OR *Cables*) AND (*Splice* OR *Splices*)] from the reported LER events for the component alone (e.g., *Splice* OR *Splices*). In addition, cable events including the components are also reported in Figure 5-1. From the figure, of all LER events, approximately 3.3% are cable related. In addition, most cable events (approximately 81%) were not keyword-associated with splices, connectors, fittings, terminations, or joints. Of the events that correspond to the components of interest, approximately 12% were due to connectors, 3% were due to terminations, 3% were due to splices, 1% were due to fittings, and less than 1% were due to joints.

To evaluate trending of the events, the events per year are shown in Figure 5-1 and Figure 5-2. As shown in the figures, reported events peaked shortly after recording of LER events begun. Specifically, it is hypothesized that due to new LER reporting requirements around 1980, a significant increase in reportable events occurred as NPP operators moved to ensure they were meeting regulations. Thus, to evaluate events without bias of initial reporting, and since the last published NRC report on splices was conducted in 2002 (see Table 14), reported events since 2000 are also shown. Since 2000, reported events for cable splices, connectors, fittings, terminations, and joints were nearly constant with reported splice events at approximately one per year. Interestingly, reported cable events overall seem to have reduced over the 2019 to 2022 timeframe, potentially due to COVID restrictions.

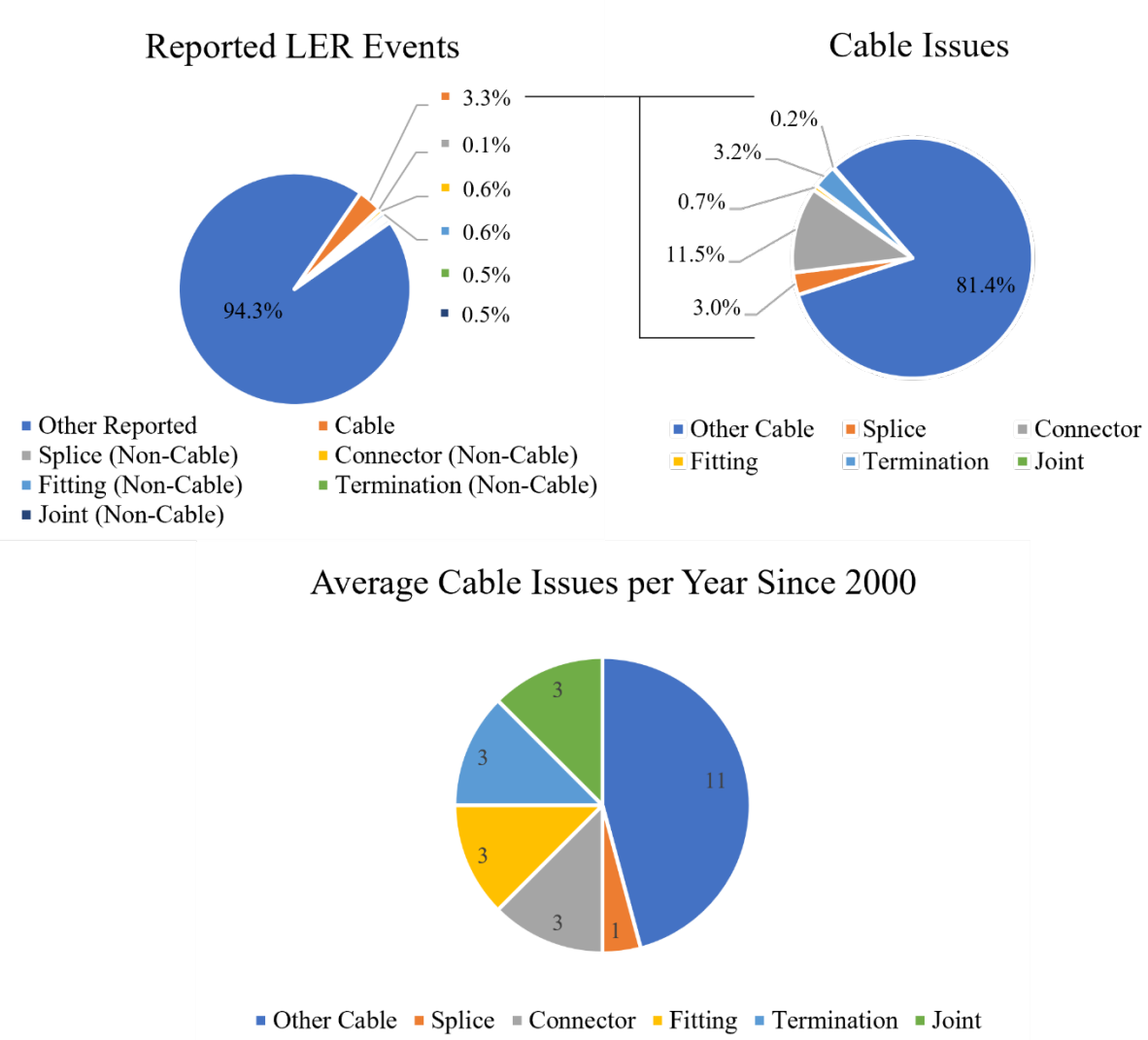

Figure 5-1. (Top) reported LER events for cables, splices, and other components and (bottom) the average number of reported issues since 2000.

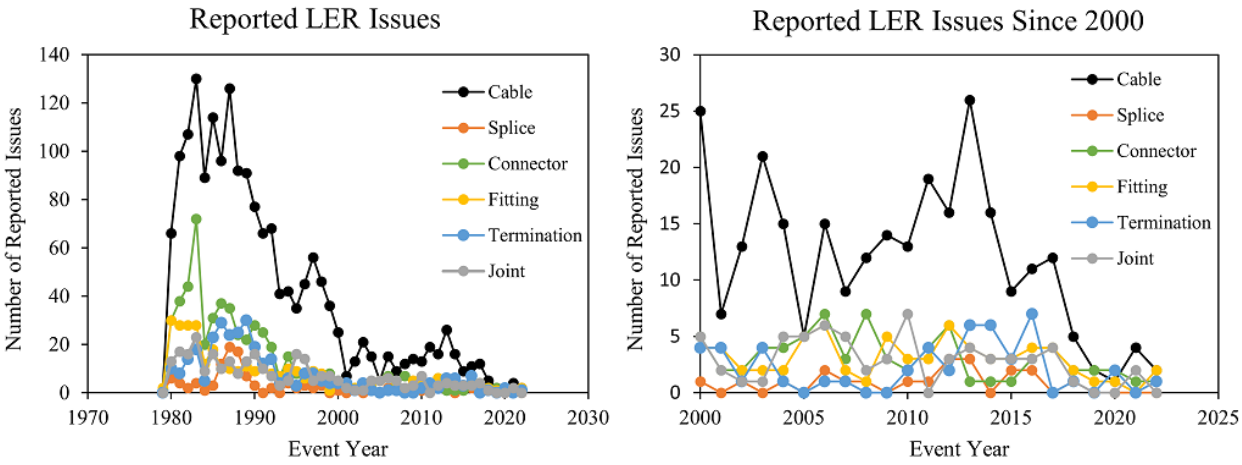

Figure 5-2. Reported LER cable events against event year.

Reported splice and termination LER events are shown in Figure 5-3. Contrary to the other components shown in Figure 5-2, splice and termination events demonstrated a peak near 1988. It is hypothesized that this was due to new reporting requirements for splices (i.e., non-qualified splices were upgraded to qualified splices) (NRC 1987).

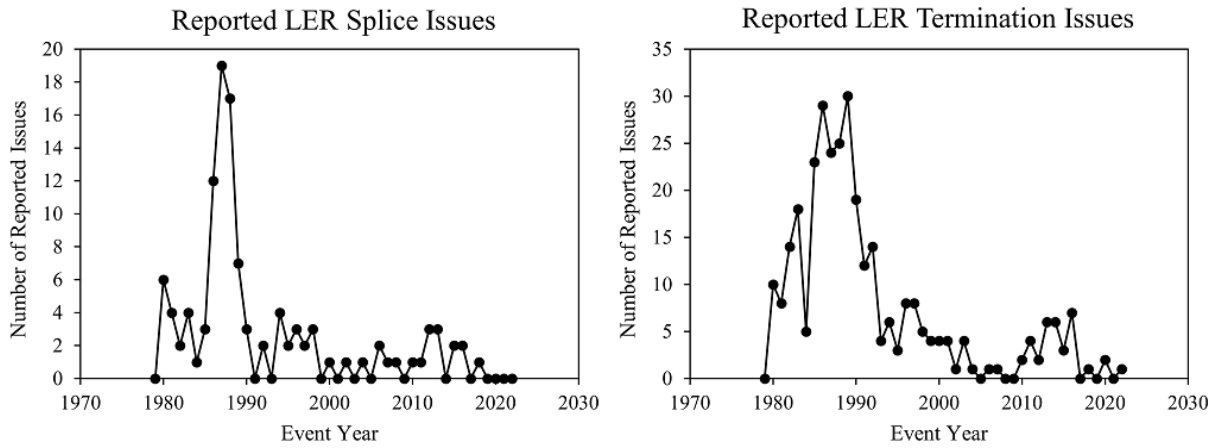

Figure 5-3. Reported LER cable (left) splice and (right) termination events against event year.

As reported in NUREG/CR-5461, cables, connectors, splices, and other components were concluded to be highly reliable devices under normal plant operating conditions, disregarding workmanship issues, with no evidence of significant failure relating to aging of these components (Jacobus 1990). Similarly, in this work the relative number of LER events for cables, splices and other components was small, with no increasing trend over time. It is expected that most cable events may not be reported due to their low-tendency to be elevated to safety-level LER events. In addition, a Sandia National Laboratory-based report also confirmed very few failures occurred in terms of cable splices, but their data was limited to plants less than 20 years old (Gazdzinski et al. 1996).

LER events related to cable repair or replacement are shown in Figure 5-4 and Figure 5-5. From the former figure, approximately 5.4% and 5.1% of cable events are correlated to cable replacement or repair, respectively. In addition, since 2000, cable replacement has been approximately 50% more common than cable repair, which is within expectations as cables have historically been replaced, as opposed to repaired, when issues were observed (IAEA 2012). In addition, replacement can effectively assist with NPP life extension as many of the cable types of interest have been EQ tested and newer cables can supply improved performance, such as flame retardancy, halogen-free materials, and reduced degradation.

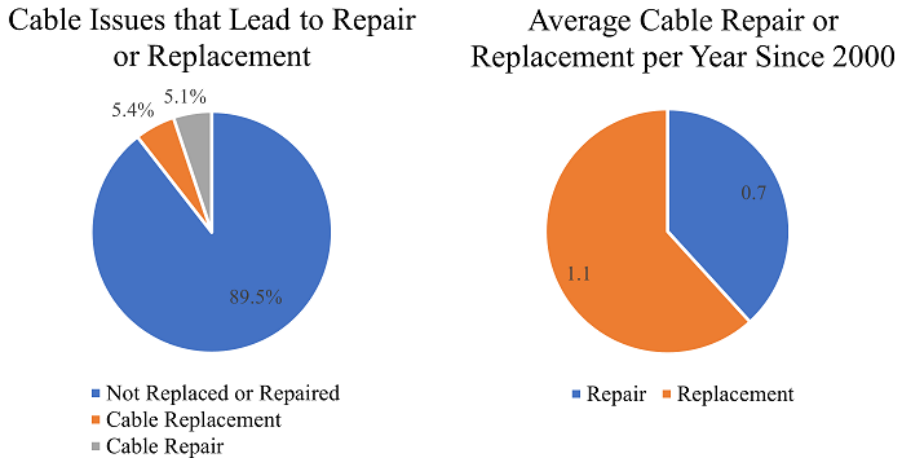

Figure 5-4. Reported LER cable events for repair and replacement.

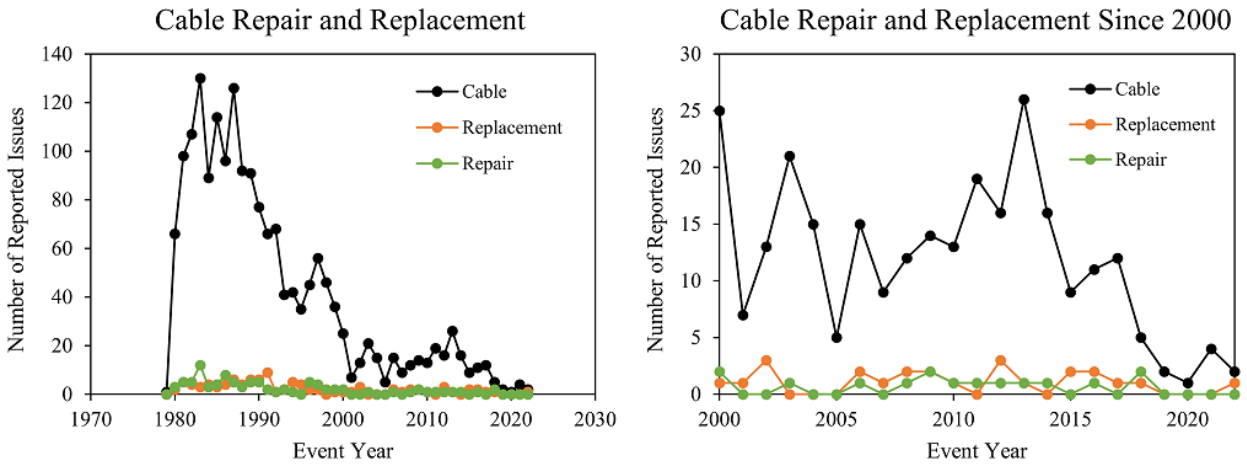

Figure 5-5. Reported LER cable repair and replacement events against event year.

To further evaluate potential common-cause issues for the LER events, additional full report LER searches were conducted using the following search terms:

- (*Cable* OR *Cables*) AND "*Loose Connection*" [54 events]
- (*Cable* OR *Cables*) AND "*Bad Connection*" [2 events]
- (*Cable* OR *Cables*) AND "*Shorted Connected*" [1 event]

The results for the additional search terms are shown in Figure 5-6. Of the investigated events, a majority of them (approximately 94%) were related to loose connections. A loose connection may occur due to workmanship but may also occur due to thermal cycling (Gazdzinski et al. 1996). More specifically, thermal cycling will lead to expansion and contraction of the components and may lead to issues with contact pressure and correspondingly contact between interfaces. Such thermal fatigue may eventually cause failure of the splice or component through ingress of moisture, for example. In addition to thermal cycling, vibration may also lead to loosening connections and interface issues, particularly over 30 to 40 years. Based upon these events, thermal cycling fatigue and vibration are of potential concern for long-term aging of splices but are not currently considered in cable and splice EQ (IEEE 2015).

Lastly, another point of concern for long-term aging of splices is replacing portions of cables which have been in service for 40 years or more. In an experimental study performed by Brookhaven National Laboratory (Lofaro et al. 2001), leads of ten-foot low-voltage aged test cables were connected to data acquisition equipment using Raychem splices. The outer cable jackets were embrittled and cracked due to the pre-aging. Subsequent testing under simulated accident steam conditions was performed on the pre-aged cables connected with splices and high leakage currents were exhibited. The cables failed post-accident submerged dielectric withstand test due to moisture intrusion into the splices through cracked cable outer jackets. It was concluded that potential problems arise on using splices in degraded cables.

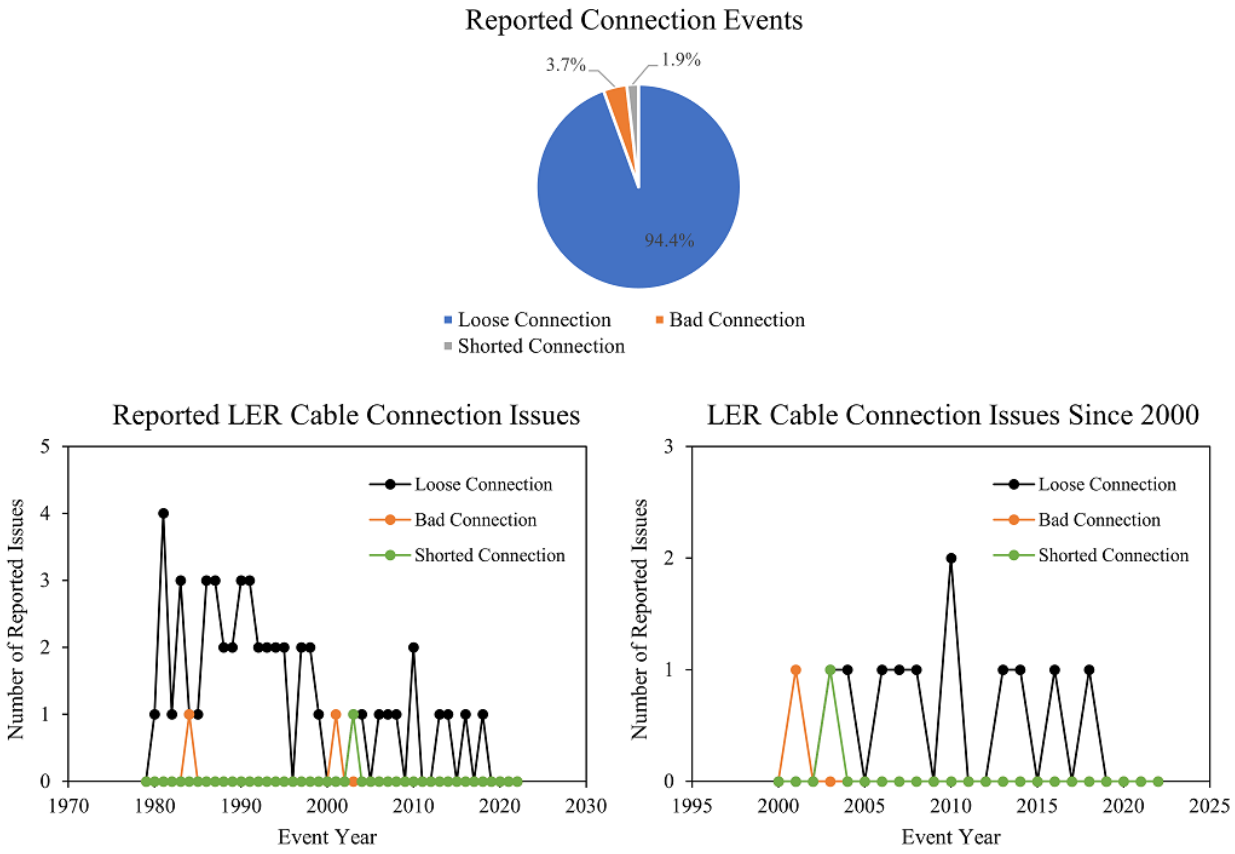

Figure 5-6. (Top) reported LER cable connection events and (bottom) events reported against event year.

6. FUTURE WORK

The long-term aging of splices and components due to cable repair and/or replacement is a concern due to NPPs operating beyond their original design life of 40 years. As such, additional work is needed to provide assurances of the continued function of electrical cables, splices, and other components in a DBA event. Based upon the findings of this work, additional areas of research beneficial to the evaluation of long-term aging of splices include:

- Accelerated aging including thermal cycling and vibration, which is not incorporated into current test standards but is expected to be primarily responsible for the long-term aging of splices and components.
- Evaluation of lifetime for splices installed onto aged components (e.g., accelerated aged to at least 40 years), which is not currently incorporated into current test standards.
- Detection of damage to splice and their components, such as the sleeve or tape, using online monitoring approaches, which is currently difficult to do using offline electrical methods.
- Investigation into sensitive measures of aging for splices and other components to detect potential anomaly events far in advance of failure. For example, as shown in Figure 6-1, electrical reflectometry techniques are potentially more sensitive to certain degradation events than EAB.

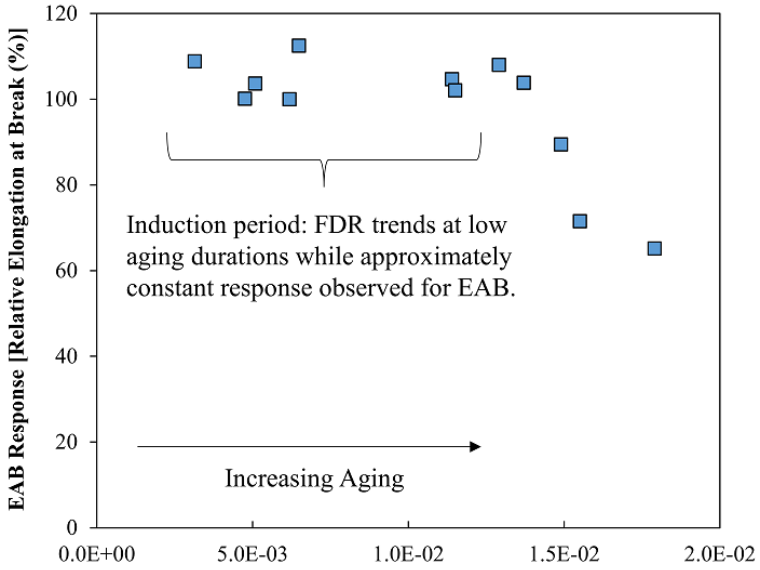

Figure 6-1. Low-voltage electrical cable aged at 140°C for up to 62-days; aging increases along the positive x-axis. EAB response approximately constant at low-to-medium aging durations (induction period < 37-days). FDR response increases for aging time points > 7-days.

- Cable aging knowledge gaps [EMDA Vol. 5 (Bernstein et al. 2014)] may be applicable to splices and other components due to their incorporation of polymeric components. These knowledge gaps have not been investigated for splices.
- Study on the effects of rejuvenation or mitigation techniques applied to splices and/or on pre-aged cables prior to installation of splices and components. Cable rejuvenation or mitigation is the concept of treating a degraded cable to return it to new or like-new condition. If condition monitoring identifies degradation in NPPs cables or splices, rejuvenation may be a way to eliminate or significantly postpone the need for cable replacement or assist with cable repair. Cable

rejuvenation has been widely and successfully applied to millions of miles of underground commercial electrical cables to extend cable insulation lifetimes by 20 years or more. The use of rejuvenation fluids has been shown to reverse the effects of water and electrical treeing, restore dielectric properties to their original response, and prevent partial discharge. Rejuvenation in the past has commonly included silane injection but could also include self-healing materials or inclusion of reactive nanoparticles (Nune, Spencer, and Fifield 2020).

7. SUMMARY

The object of this work is to survey aging and monitoring concerns for cables and splices with a focus towards their long-term aging (here, defined as non-workmanship issues). As portions of electrical cables are replaced, there has been concern regarding the aging of these components and their continued performance, particularly as NPPs are operating beyond their original design life of 40 years. Herein, evaluation of long-term cable and splice issues was conducted through LER searches. Furthermore, to support potential future research, additional discussion on components of cables and splices, their stressors and aging mechanisms, and state-of-the-art CM approaches were discussed. Observations and conclusions of this work include:

1. Cables and splices are highly reliable components. Evaluation of event data for the last 20 years was nearly constant for the events of interest. However, this does not necessarily account for expected long-term aging stressors such as thermal cycling of these components.
2. Common-cause failure for evaluated cable events of interest was observed to primarily be associated with loose connections, which may manifest associated with workmanship issues, thermal cycling, and/or vibration. However, both thermal cycling fatigue and vibration (non-seismic) are not currently included in EQ of cables and splices.
3. Replacement of cables is more common than repair, which may assist with NPP life extension as newer cables can supply improved performance and reduced degradation.
4. Splices on degraded cables have been observed to be problematic. Due to aging NPP infrastructure, including electrical cables, it is expected that such issues will continue to increase.
5. Condition monitoring approaches, while shown to be fruitful for electrical cables, have been shown to be insensitive to degradation of splice sleeves, which are critical to the continued performance of splices. Additional CM work is needed to evaluate methods which are sensitive to the degradation of splice components.
6. EMDA-type knowledge gaps for electrical cables have not been investigated for splices but may represent similar concerns such with the accelerated aging process historically used in their EQ.
7. Rejuvenation and/or mitigation techniques to renew aged cable lengths prior to splice application may improve performance relative to installation of splices on untreated, aged cables, but has not been investigated.

As with cables, aging management of splices may best be accomplished with a condition-based rather than a time-based approach. Understanding of the aging behavior of splice materials and development of effective methods to evaluate and monitor splice condition are necessary prerequisites to establishing such a condition-based aging management program with acceptance criteria that informs repair and replacement decisions based on the actual status of components in service. Development of such a program could be beneficial both for in the increasing number of splices applied in existing NPPs in long-term operation and for aging management in new reactors.

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9. APPENDIX

9.1 List of Guidance Documents

9.1.1 NRC Regulatory Guides, and Generic Letters

- Regulatory Guide 1.32: Criteria for Power Systems for Nuclear Power Plants, 2004, ML040680488
- Regulatory Guide 1.63: Electric Penetration Assemblies in Containment Structures for Nuclear Power Plants, 1987, ML03740219
- Regulatory Guide 1.89: Environmental Qualification of Certain Electric Equipment Important to Safety for Nuclear Power Plants, 2023, ML22272A602 (1974,1984)
- Regulatory Guide 1.156: Qualification of Connection Assemblies for Production and Utilization Facilities, 2023, ML22255A125
- Regulatory Guide 1.160: Monitoring the Effectiveness of Maintenance at Nuclear Power Plants, 2018, ML18220B281
- Regulatory Guide 1.211: Qualification of Safety-Related Cables and Field Splices for Nuclear Power Plants, 2009, ML082530205
- Regulatory Guide 1.218: Condition-Monitoring Techniques for Electric Cables Used in Nuclear Power Plants, 2012, ML103510447
- Generic Letter 2007-01, "Inaccessible or Underground Power Cable Failures That Disable Accident Mitigation Systems or Cause Plant Transients," U.S. Nuclear Regulatory Commission, Washington DC, February 7, 2007, ML070360665

9.1.2 IEEE and ASTM Standards (Latest Versions)

- IEEE Std 308-2020 - IEEE Standard Criteria for Class 1E Power Systems for Nuclear Power Generating Stations
- IEEE Std 317-2013 - IEEE Standard for Electric Penetration Assemblies in Containment Structures for Nuclear Power Generating Stations
- IEEE Std 323-2003 - IEEE Standard for Qualifying Class 1E Equipment for Nuclear Power Generating Stations
- IEEE Std 383-2015 - IEEE Standard for Qualifying Electric Cables and Splices for Nuclear Facilities
- IEEE Std 1205-2014 - IEEE Guide for Assessing, Monitoring, and Mitigating Aging Effects on Electrical Equipment Used in Nuclear Power Generating Stations and Other Nuclear Facilities
- IEEE Std. 400-2023 - IEEE Approved Draft Guide for Field Testing and Evaluation of the Insulation of Shielded Power Cable Systems Rated 5 kV and Above
- IEEE Std. 404-2012 - IEEE Standard for Extruded and Laminated Dielectric Shielded Cable Joints Rated 2.5 kV to 500 kV
- IEEE Std. 572-2019 - IEEE Standard for Qualification of Class 1E Connection Assemblies for Nuclear Power Generating Stations and Other Nuclear Facilities

- IEEE Std. 1682-2011 - IEEE Standard for Qualifying Fiber Optic Cables, Connections, and Optical Fiber Splices for Use in Safety Systems in Nuclear Power Generating Stations
- ASTM Standard D150-18 - Standard Test Methods for AC Loss Characteristics and Permittivity (Dielectric Constant) of Solid Electrical Insulation
- ASTM Standard D257-14(2021) - Standard Test Methods for DC Resistance or Conductance of Insulating Materials
- ASTM Standard D470-21 - Standard Test Methods for Crosslinked Insulations and Jackets for Wire and Cable
- ASTM Standard D2633-21 - Standard Test Methods for Thermoplastic Insulations and Jackets for Wire and Cable
- ASTM Standard D412-16(2021) - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers—Tension

9.1.3 EPRI and Other Industry Guides

- EPRI TR-103834-P1-2 “Effects of Moisture on the Life of Power Plant Cables.”
- EPRI TR-109619, “Guideline for the Management of Adverse Localized Equipment Environments.”
- EPRI TR-101245, “Effect of DC Testing on Extruded Cross-Linked Polyethylene Insulated Cables,” Volumes 1 and 2
- Plant Support Engineering: Aging Management Program Development Guidance for AC and DC Low Voltage Power Cable Systems for Nuclear Power Plants, 1020804
- Plant Support Engineering: Aging Management Program Guidance for Medium-Voltage Cable Systems for Nuclear Power Plants, 1020805
- IAEA TECDOC 1188, “Assessment and Management of Aging of Major Nuclear Power Plant
- Components Important to Safety: In-Containment Instrumentation and Control Cables,” Volumes 1 and 2.

9.2 LER Event Data

9.2.1 Cable Event Data

Table 16. LER search results for cable OR cables.

LER Number	Event Year	Partial Title (First 60 Characters)
3522022001	2022	Unit 1 HPCI Inoperable due to Inadvertent Isolation Signal
4452022001	2022	Reactor Trip due to Turbine Trip Greater Than 50% Power
3872021004	2021	Loss of 1B RHRSW Pump due to Cable Damage During Excavation
2802021001	2021	Unanalyzed Condition due to Appendix R Concern Identified wi
3332021001	2021	Inadequate Protection Devices for DC Motor Field Shunt Cable
3382021002	2021	Unanalyzed Condition due to Acpp R Concern Identified with Ca
3332020002	2020	Unanalyzed Condition due to Unprotected Control Circuits Run
3162020001	2019	Failure of Source Range Nuclear Instrumentation Resulting in
5292019001	2019	Automatic Actuation of the Reactor Protection System Resulti
2802018003	2018	Auto-Start of Emergency Diesel Generators due to Pilot Wire
2782018003	2018	Automatic Reactor Scram due to Loss of Two Condensate Pumps
4142018002	2018	Condition Prohibited by Technical Specifications (TS) due to
2692018001	2018	Unit 1 Manual Reactor Trip due to Main Feedwater Flow Contro
2772018001	2018	Fire Safe Shutdown Requirements Not Met for Spurious Operati
4162017007	2017	Engineered Safety Features System Actuations due to the Loss
3642017005	2017	Power Range Nuclear Instrument Inoperable due to Poor Connec
2962017002	2017	4kV Shutdown Board Potential Transformer Primary Fuses Do No
2592017004	2017	Safety System Functional Failures due to the Inoperability o
4832017002	2017	Tornado Missile Vulnerabilities Result in Condition Prohibit
4612017006	2017	Secondary Containment Inoperable During Mode Change due to D
3272017002	2017	Automatic Actuation of Emergency Diesel Generators Due to Lo
3212017005	2017	Automatic Scram due to Intermediate Range Monitors Spiking U
3682017001	2017	Inadequate Protection from Tornado Missiles Identified due t
2602017003	2017	Manual Reactor Scram Initiated During Startup due to Multipl
3212017001	2017	Unanalyzed Conditions for a Postulated Fire Discovered Durin
2772017001	2017	Emergency Diesel Generator Exhaust Stacks Nonconforming Desi
4402016004	2016	Loss of Safety Function due to Two Inoperable Standby Liquid
3482016004	2016	Unapproved Environmental Qualification Material Caused Inope
3252016005	2016	Drywell High Range Radiation Monitors Inoperable due to Ther
4002016003	2016	Containment High-Range Radiation Monitors Declared Inoperabl
2632016002	2016	Inadequate Appendix R Fire Barrier Impacts Safe Shutdown Cap
3252016004	2016	Tornado Missile Vulnerability Results in Condition Prohibite
4162016006	2016	Multiple Valid Engineered Safety Feature Actuations
4452016001	2016	Safety Chiller Inoperable for Longer than Allowed by Technic
3352016001	2016	Inadequate Legacy Evaluation for Containment High Range Radi
3882016004	2016	Unit 2 Experienced an Electrical Transient Resulting in a Ma
3252016001	2016	Electrical Bus Fault Results in Lockout of Startup Auxiliary

2822016001	2015	Unanalyzed Condition due to Non-Compliant Fire Protection Ma
2852015006	2015	Unanalyzed Fire Vulnerability due to Inadequate Design
2932015010	2015	Motor-Operated Valve Control Circuit Vulnerability to Inform
4542015004	2015	Unanalyzed Condition due to a Design Deficiency with Pressur
4562015003	2015	Unanalyzed Condition due to a Design Deficiency with Pressur
3272015002	2015	Automatic Reactor Trips due to Improper Wire Termination in
3282015001	2015	Automatic Reactor Trip due to Failure of Main Generator C-ph
4162015001	2015	Automatic Actuation of the Reactor Protection System (RPS) d
2372015001	2015	Unit 2 Scram due to Feedwater Level Control Issues
4832014006	2014	Main Generator Excitation Transformer Faulted to Ground, Cau
2822014004	2014	Unanalyzed Condition due to Lack of Appropriate Fuse Protect
4402014003	2014	Unanalyzed Condition Resulting From Unfused Direct Current C
4002014002	2014	Inadequate DC Cable Protection Could Adversely Affect Safe S
2772014001	2014	Unanalyzed Condition due to Broken Wires in Breakers Used fo
2202014002	2014	Unanalyzed Condition due to Unfused Motor Operated Valve Con
3342014004	2014	Unanalyzed Condition Resulting from Unfused Direct Current C
2892014001	2014	Unfused DC Motor Control Circuits
3362014004	2014	Foreign Material Found in a Motor Lead Rendered a Motor Driv
2652014002	2014	Cable Tray Fire Caused by Non-Conforming Cable Routing
2692014001	2014	Unanalyzed condition associated with the 13.8kV emergency po
3212014001	2014	Unfused DC Ammeter Circuits Result in an Unanalyzed Conditio
3972014003	2014	Degraded Tornado Missile Barrier
3972014002	2014	Unnanalyzed Condition Resulting from Direct Current (DC) Amm
3112014002	2014	Manual Reactor Trip due to a Partially Dropped Rod
4452014001	2014	Unit 1 Automatic Reactor Trip due to Generator Lockout Relay
2592013008	2013	Fire Damage to Cables in Fire Areas Could Cause Residual Hea
3482013004	2013	Unfused DC Ammeter Circuits Result in an Unanalyzed Conditio
4452013003	2013	Auto Start of Both Units' Auxiliary Feedwater Pumps and Emer
3902013005	2013	Postulated Fire Induced Failure of Chemical and Volume Contr
2552013004	2013	Discovery of Latent Design Deficiency Results in Non-Complia
3342013003	2013	Beaver Valley Unit 1 Turbine Trip and Subsequent Manual Reac
3332013003	2013	Unfused DC Ammeter Circuits Result in Unanalyzed Condition
4982013003	2013	Unanalyzed Condition - Direct Current Ammeter Circuits witho
3362013003	2013	Postulated DC Ammeter Circuit Hot Shorts
2202013002	2013	Unanalyzed Condition Caused by Unfused Control Room DC Ammet
4102013003	2013	Unanalyzed Condition Caused by Unfused Control Room DC Ammet
3172013002	2013	Unfused Ammeter Circuits Result in Appendix R Unanalyzed Con
3952013005	2013	Unfused Direct Current (DC) Ammeter Circuits in Control Room
4822013009	2013	Post-Fire Safe Shutdown Design Issue May Impact Ability to A
4832013009	2013	Appendix R Unanalyzed Condition - Direct Current Ammeter Ci
4452013002	2013	Unanalyzed Condition Under 10cfr50 Appendix R, Secondary Fir
5282013003	2013	Appendix R Unanalyzed Condition - Direct Current Ammeter Cir
2442013003	2013	Unanalyzed Condition for Potential Floodwater Intrusion into

3662013004	2013	Postulated Inter-cable Fault Vulnerability for RHR Shutdown
4832013008	2013	Arcing in isophase bus results in a generator trip, turbine
3152013002	2013	System Actuation of the Unit 1 CD Emergency Diesel Generator
4832013004	2013	Control Building Envelope (CBE) Boundary Door Open During Mo
2852013009	2013	Tornado Missile Vulnerabilities
3232013002	2013	Two Source Range Nuclear Instruments Inoperable While in Mod
4612013001	2013	Inadequate Risk Identification Results in Loss of Safety Fun
4462013001	2013	Unit 2 Hot Shutdown Panel Transfer Switch Inoperable due to
2592012009	2012	480 Volt Shutdown Board Breaker Actions in Safe Shutdown Ins
2602012005	2012	Unanalyzed Conditions Discovered During National Fire Protec
3522012009	2012	Unanalyzed Condition Due to a Fire Safe Shutdown Analysis Er
3412012004	2012	Operation or Condition Prohibited by Technical Specification
3152012002	2012	Unit 1 Exceeded Technical Specification Time Limit to Shutdo
3522012005	2012	Valid Actuation of the Reactor Protection System with the Re
3352012005	2012	Unit 1 Reactor Trip on Turbine Trip
2592012007	2012	Cable Routing Errors Found in the Appendix R Separation Anal
4582012002	2012	Automatic Reactor Scram due to Low Main Condenser Vacuum Res
3052012003	2012	Nuclear Instruments Inoperable for Longer Period Than Allowe
3252012003	2012	Valid Emergency Diesel Generator Actuation
4132012001	2012	Unit 1 Automatic Reactor Trip due to Faulted Reactor Coolant
2592012004	2012	Fire Damage to Cables in Fire Areas Could Cause a Residual H
4452012001	2012	Unanalyzed Condition Discovered for the Normally Open Batter
3052012001	2012	Pressurizer PORV and Reactor Coolant System Vent Valves Appe
3952012001	2012	Core Exit Thermocouples & Reactor Water Level Indication Sys
2592012005	2011	Combustible Materials Not in Compliance with the 20-Foot Exc
4612011007	2011	Unfused DC Ammeter Circuits Result in Unanalyzed Condition
2592011010	2011	DC Ammeter Cables Not Adequately Isolated
3662011003	2011	Manual Reactor Scram During Startup due to Too Few Operable
2632011008	2011	Reactor Scram due to Loss of Normal Offsite Power
2782011004	2011	HPCI Cable Routing Error Results in Degraded Post Fire Safe
2592011007	2011	Multiple Containment System Isolations from Loss of RPS M-G
5282011002	2011	Nonconforming Condition Renders the Qualified Safety Paramet
3112011004	2011	Automatic Reactor Trip due to Trip of the 23 Reactor Coolant
2692011005	2011	Reactor Protection System Overpower Flux/Flow/Imbalance Chan
3902011004	2011	Reactor / Turbine Trip due to Loss of Main Generator Excitat
2962011002	2011	Reactor Scram due to Scram Discharge Volume High Water Level
3952011001	2011	Failure to Maintain One Train of Safe Shutdown Systems in Ac
3952011002	2011	Failure to Maintain One Train of Safe Shutdown Systems in Ac
3702011002	2011	Unit 2 Reactor Manually Tripped When Control Rod Did Not Res
5282011001	2011	Unit 1 and Unit 3 Emergency Diesel Generator Actuation on Lo
4612011001	2011	Postulated Spurious High Pressure Core Spray Initiation Resu
2552011002	2011	Automatic Reactor Trip and Auxiliary Feedwater System Actuat
2722011001	2011	Service Water Loop Inoperable for Time Greater Than Allowed

4992010004	2010	Loss of the Train A Essential Cooling Water (ECW) System due
2552010003	2010	Unanalyzed Condition Discovered due to Non-Compliance with 1
5292010002	2010	Inoperable Emergency Diesel Generator Due to Fuel Oil Transf
2702010001	2010	Operation Prohibited by TS due to Removal of West Penetratio
3522010001	2010	Valid Actuation of the Reactor Protection System with the Re
3352010006	2010	Unit 1 Manual Reactor Trip due to Two Dropped Control Rods
2802010002	2010	Use of Aluminum Conduits for Cable Penetrations Degrades Fir
2592012001	2010	Unanalyzed Conditions Discovered During NFPA 805 Transition
2852010004	2010	Acoustic Monitor Failure Due to Inadequate Barriers for Prot
3152010001	2010	1lAB EDG Fuel Oil Transfer Pumps Inoperable
2852010002	2010	Failed Feeder Cable due to Inadequate Procedure Causes Stati
2612010002	2010	Plant Trip due to Electrical Fault
3482010002	2010	Two Auxiliary Feedwater Pumps Inoperable
2822009008	2009	Unanalyzed Condition due to an Inadequate Fire Barrier
4462009001	2009	Unit 2 Gamma-Metrics Calibration Impact on Containment Press
4402009003	2009	Completion of Technical Specifications Required Shutdown due
2822009007	2009	Unanalyzed Condition due to a Breached Fire Barrier
2782009005	2009	Common Cause Failure of 'C' and 'E' Wide Range Neutron Monit
2862009006	2009	Automatic Reactor Trip due to a Turbine-Generator Trip Cause
4402009002	2009	Diesel Generator CO2 Fire Suppression Control Panel Miswirin
3282009001	2009	Unit 2 Automatic Reactor Trip Following a Power Range Negati
2822009005	2009	Reactor Trip Due to 12 Circulating Water Pump Trip Caused by
3212009004	2009	IRM Signal Spike Caused by Electrical Noise Results in React
3542009003	2009	Traversing In-core Probe (TIP) Containment Isolation Valves
5292009001	2009	Emergency Diesel Generator Fuel Oil Transfer Pump Failure
3612009005	2009	Wiring Error in Diesel Generator Circuit Results in Loss of
3272009001	2009	Appendix R Unanalyzed Condition Affecting Safety Related Shu
4572008002	2008	Reactor Trip on Unit Auxiliary Transformer 241-1 Sudden Pres
3522008004	2008	Remote Shutdown Procedure Error
3282008002	2008	Indications of a Dropped Control Rod During Startup
3692008003	2008	Unit 1 Manual Reactor Trip Taken to Mitigate Control Rod Dro
2632008005	2008	Reactor Scram due to Loss of Normal Offsite Power
3052008001	2008	Pressurizer PORV and Reactor Coolant System Vent Valves Appe
2662008003	2008	Appendix R Fire Scenario Resulting In Safe Shutdown Required
3892008003	2008	Unit 2 Condensate Pump Failure Resulting in Manual Reactor T
3252008002	2008	Loss of Two Control Room Air Conditioning (AC) Subsystems
4822008003	2008	Manual Reactor Trip due to Loss of Steam Generator Level
3152008002	2008	250 Volt DC Cable Separation Criteria For 10 CFR 50 Appendix
4162008001	2008	Manual Reactor SCRAM due to Loss of Main Electrical Output T
3352007003	2007	Floor Penetration Seals Outside Appendix R Design Basis
4232007003	2007	Reactor Head Vent Valve Circuits Not Isolated from Control R
2662007006	2007	Fire Inspection Analysis of Pressurizer Power-Operated Relie
3612007006	2007	Loose Electrical Connection Results in One Train of Emergenc

2502007002	2007	Completion of Shutdown Required by Technical Specifications
3392007002	2007	Automatic Start of 2H EDG on Loss of B Reserve Station Servi
2552007003	2007	Potential for Reduced Component Cooling Water Cooling Capabi
3312007002	2007	Loss of Control of Control Building Boundary
3022007001	2007	Design Oversight Results In 10 CFR 50, Appendix R, Cable Sep
2892006003	2006	Automatic Reactor Trip due to a Design Application Deficienc
3062006002	2006	Unit 2 Event Monitoring Instrument Inoperable Longer than Al
3312006005	2006	Reactor Scram During Main Turbine Testing
5282006006	2006	Reactor Trip due to Core Protection Calculator Generated Low
4252006003	2006	Unit 2 Reactor Coolant Pump #4 Tripped, Resulting in an Auto
3412006004	2006	Emergency Diesel Generators Out of Service due to Undersized
2862006001	2006	Reactor Trip as a Result of a Main Generator Trip due to Sho
4822006002	2006	Potential for Fire-Induced Damage to Class 1E Electrical Equ
2442006001	2006	Potential Failure of Charging Pumps due to Unevaluated Fire
3522006003	2006	Accident Monitoring Instrument Channel Inoperable for Longer
3872006002	2006	Missed Technical Specification Surveillance Requirement
2472006001	2006	Manual Reactor Trip due to Multiple Dropped Control Rods Cau
4822006001	2006	Potential for Fire-Induced Damage to Motor Operated Valves D
3902006002	2006	Potential Loss of Cooling to the Chemical and Volume Control
4432006003	2006	Voluntary LER for Deficient Hydrostatic Barriers
3412005006	2005	Potential Fire Scenario Affecting Opposite Division Emergenc
2662005002	2005	UNANALYZED CONDITION DUE TO DEFICIENCY IN APPENDIX R SAFE SH
3412005003	2005	Design and Operating Procedure Deficiencies Related to Appen
2632005001	2005	Single Failure Identified that Could Prevent Energizing Buse
4822005001	2005	Corrective Action to Fire Wrap Raceway for Valve EMHV8803A N
2502004005	2004	Heat-Damaged Cables Cause Potential Inoperability of 2 of 3
2502004004	2004	Plant Shutdowns Due to Drop of Shutdown Bank Rod E-11 During
4462004003	2004	Containment Pressure Channel Inoperable Due to a Secondary G
4432004003	2004	Fire Scenario Results in Unanalyzed Condition Potential Loss
3242004003	2004	Unanalyzed Condition due to Missing One-Hour Rated Fire Barr
4822004006	2004	Automatic Start of "B" Emergency Diesel Generator Due to Sta
4612004006	2004	Small Amount of Special Nuclear Material in Unirradiated Nuc
4002004004	2004	Unanalyzed Condition Due to Inadequate Separation of Associa
2632004002	2004	Cable Separation Issue Discovered During Appendix R Re-analy
4132004003	2004	Unanalyzed Condition Due To Inadequate Evaluation of Fire In
2192004003	2004	Actuation of Reactor Protection System due to Spurious Hi-Hi
3642004001	2004	Technical Specification 3.7.8 Violation due to Operation wit
4612004001	2004	Generator Over-Voltage / Lockout Leads to Reactor Scram
3272004001	2004	Automatic Reactor Trip with main feedwater isolation and aux
4822004003	2004	Automatic Start of "B" Emergency Diesel Generator Due To Sta
2612003003	2003	Discovery of Two New Appendix R Safe Shutdown Vulnerabilitie
2982003006	2003	Manual Reactor Scram Initiated Due To Transmission Line Stru

2372003003	2003	Unit 2 Reactor Feedwater Pump Trip and Automatic Reactor Scr
3352003003	2003	Fire Seals Inoperable Due to Inadequate Qualification Testin
2722003002	2003	Reactor Trip Due to Turbine Trip Caused by a 500KV Switchyar
3062003002	2003	Automatic Actuation of Unit 2 Emergency AC 4KV Bus 26 Load S
2602003004	2003	Cable Separations Design Error Related to Appendix R Require
3972003007	2003	Automatic Reactor Scram Due To A Main Transformer Differenti
3212003001	2003	Broken Reactor Protection System (RPS) Neutral Bolt Results
2692003001	2003	Design Oversight Results in Appendix R Control Cable Separat
2192003002	2003	Completion of Reactor Shutdown Required by Tech Specs Due to
2782003001	2003	Loss of Capability of the Unit 3 10CFR 50 Appendix R Alterna
3692003003	2003	Both Trains of Hydrogen Mitigation System Inoperable Due to
2552003003	2003	Loss of Shutdown Cooling and Emergency Diesel Generator Star
4582003003	2003	Primary Containment Airlock Breach Due to Door Interlock Mal
3342003003	2003	Automatic Actuation of Emergency Diesel Generator Following
2472003001	2003	Plant in an Unanalyzed Condition Due to Cable Routing - Non-
3342003002	2003	Potential Overpressurization of Unit 1 Cable Vaults if a CO2
3282003002	2003	Limiting Conditions for Operation 3.0.3 Was Entered When Two
2862003001	2003	Manual Reactor Trip Due to High Differential Pressure Betwee
3742003001	2003	Manual Scram Due to Lowering Reactor Water Level as a Result
2852002004	2002	Inadequate Procedural Guidance Resulting in Noncompliance wi
2852002003	2002	Inadequate Cable Separation Resulting in Noncompliance with
2192002003	2002	Insufficient Appendix R Electrical Separation due to Void in
2662002002	2002	Unit 1 A-Train Reactor Protection Cable-Routed in B-Train Ca
3172002004	2002	Post-Accident Monitoring Instrumentation Not Seismically Con
3232002003	2002	Technical Specification 3.7.7 Not Met due to Cable Fault
3902002003	2002	Automatic Turbine/Reactor Trip Due to Main Transformer Prote
4832002010	2002	Potential for fire-induced common cause failure
3022002001	2002	Automatic Start of an Emergency Diesel Generator Due to Loss
4822002004	2002	Cable Separation Issue That Could Potentially Affect Post-Fi
4832002006	2002	Hot short issue reveals potential for draining RWST to Conta
3972002003	2002	Water Leakage Paths Through Fire Rated Floor Assemblies
2692002002	2002	Potential for Fire to Indirectly Damage Mitigation Component
2192001001	2001	Completion of Reactor Shutdown Required by Technical Specifi
3172001002	2001	Appendix R Steam Generator Dry-Out Calculation Omited Blowdo
3822001005	2001	Potential For Loss of Both EDG Fuel Oil Transfer Pumps By a
4122001001	2001	Automatic Reactor Trip Due to Loss of Condensate Pump
2632001006	2001	Alternate Shutdown System Design Deficiencies Result in Vuln
3052001002	2001	Non-Rated Fire Barrier Separating Redundant Appendix R Safe
3622001001	2001	Fire and RPS/ESF Actuations Caused by the Failure of a Non-S
2372000005	2000	Recirculation Loop Temperature Failure Causes Shutdown Cooli
4162000007	2000	Plant Outside of its Design Basis with Respect to Appendix R
2512000004	2000	Loss of Offsite Power and Actuation of Safety Injection Whil
4232000003	2000	Cable Routing for 3CHS*P3B Does Not Meet Fire Safe Shutdown

3212000010	2000	Personnel Error Results in a Condition Prohibited by the Pla
2442000002	2000	Assumed Plant Fire May Cause Multiple Shorts and Result in L
3822000009	2000	Potential for Loss of Safe Shutdown Equipment by a Fire in E
3662000008	2000	Trip of 600-Volt Supply Breaker Causes Loss of RPS Power Sup
2602000002	2000	Failure to Meet Appendix R Criteria Resulting in a Condition
2192000007	2000	Plant Operation Outside of the Technical Specifications due
2802000002	2000	Effect of Ventilation Fans on Control Room Boundary Results
2862000008	2000	Automatic Reactor Trip as a Result of Direct Trip from the B
4002000004	2000	Technical Specifications violation due to inoperable Power R
3062000002	2000	Discovery that PORV/Block Valve Cable in Containment Does No
3012000002	2000	Redundant Channels of Steam Generator Pressure Indication an
3392000001	2000	Automatic Reactor Trip Due To Loss of the Station Service Tr
2472000002	2000	Failure of Cable Spreading Room Fire Dampers To Close During
4582000003	2000	Inoperable Division 3 Battery Caused by an Incorrectly Assem
2632000007	2000	Procedural Adherence Error Results in Missed Periodic Fire W
3412000002	2000	Damaged Terminal Blocks for Division 1 Core Spray Test Line
2662000004	2000	Potential Loss of Process Monitoring Instrumentation Due to
2662000003	2000	Inadequate Control of Cable Spreading Room High Energy Line
3612000001	2000	Inadequate Design-SWC Pump Control Circuits Do Not Meet Fire
2982000002	2000	Appendix R Safe Shutdown Analysis Vulnerability due to Poten
3822000001	2000	An Appendix R Non-Compliance Outside Design Basis Condition
3951999014	1999	Kaowool Fire Barriers Outside 10CFR50 Appendix R Design Basi
2471999020	1999	Failure of Cable Spreading Room Fire Dampers to Close During
4581999014	1999	Automatic Reactor Scram Due to Inappropriate Work Activities
2721999011	1999	125 VDC Control Power Circuits for 4KV Breakers Do Not Meet
3151999026	1999	High Energy Line Break Programmatic Inadequacies Result in U
3331999010	1999	Main Turbine Trip and Reactor Scram Due to Degraded Cable in
2661999009	1999	Design Basis For Control Room/Cable Spreading Room Fire Barr
2801999007	1999	Undervoltage Actuation Due to a Loss of Reverse Station Serv
2721999009	1999	Pressurizer PORV and Block Valves Do Not Meet the Requiremen
3821999016	1999	An Appendix R Non-Compliance Outside Design Basis Condition
3351999005	1999	Pressurizer Pressure Instrumentation Cable Separation Outsid
2661999008	1999	Postulated Fire Could Lead To Loss of Redundanta Trains of C
3161999003	1999	Fuses Not Installed for Cable Passing through Containment Pe
2931999011	1999	Postulated Fire in Cable Spreading Room Potentially Affectin
3271999002	1999	Diesel generator start as a result of a cable being damaged
4401999004	1999	Loss of Safety Function Results In Technical Specification 3
2661999007	1999	Cable Tray Fire Stops Do Not Meet Appendix R Exemption Requi
3611999005	1999	Loss of Physical Separation in the Control Room
3821999009	1999	An Appendix R Non-Compliance Condition Involving Inadequate
2661999006	1999	Postulated Fire and Inability to Isolate PORV Outside Append
3151999019	1999	Victoreen Containment High Range Radiation Monitors Not Envi
2801999004	1999	TS Violation Due to Non-Safety Related Fans' Effect on Contr

3111999008	1999	Fire Program Deficiency - Limit Switch Cables Subject to Mul
3871999002	1999	Failure to Maintain Environmental Qualification - Acoustic M
2721999004	1999	Unplanned Reactor Trip Due To Negative Flux Rate Trip.
2661999004	1999	Fuel Oil Transfer Pump Cable in the AFW Pump Room Outside Ap
2191999003	1999	Cable Trays Did Not Meet Criteria due to Inadequate Engineer
2191999002	1999	Fire Protection Deluge System Isolation Valve Found out of P
3011999002	1999	Red Channel of Steam Generator Pressure Indication Passes Th
4251999001	1999	Reactor Trip When Installing Clearances in Wrong Unit
3901999003	1999	Fire Barrier Breach Involving Removal of Fire Wrap
2471999004	1999	EEQ Deficiency in Acoustic Monitors
3061999001	1999	Technical Specification-required Reactor Protection Logic Te
3661999003	1999	Simultaneous Grounds in the DC Power Supply System Result in
3531999001	1999	Unavailabilities of Safe Shutdown Equipement in the Event of
4231999002	1999	Inadvertent Carbon Dioxide Fire Suppression System Actuation
2691998016	1998	Three Interpretations Did Not Meet Technical Specifications
2441998005	1998	Loss of 34.5 KV Offsite Power Circuit 751, Due to Faulted Ca
4431998011	1998	Inoperable Containment Penetration Overcurrent Protective De
2701998007	1998	Reactor Trip On Loss Of Main Feedwater Pumps Due To A False
2821998016	1998	Negative flux rate reactor trip upon control rod insertion f
4161998006	1998	Deck Grating Potentially Affecting HPCS Suction Strainer
3891998007	1998	Fire Protection SSA Re-Verification Identified Potential POR
3521998018	1998	Potential Loss of Emergency Diesel Generator Control in the
4561998003	1998	Loss of Offsite Power Event due to an Electrical Fault cause
3151998040	1998	ESF Actuation and Start of Emergency Diesel Generators 1 CD
2821998014	1998	Fire Area 32 Appendix R Safe Shutdown Analysis Issues
2821998012	1998	Fire Areas 58/73 Appendix R Safe Shutdown Analysis Issues
3361998018	1998	Spatial Separation of Redundant Cable System and Isolation o
3111998009	1998	Failure to Post Continuous Firewatch as required by Fire Pro
4131998011	1998	Condition Prohibited by Technical Specifications - Two Refue
2661998020	1998	Unprotected Cables In Cable Spreading Room
2471998008	1998	Missing Radiant Energy Shields for Alternate Safe Shutdown S
2931998013	1998	Inconclusive Fire Barrier Test Data
3531998002	1998	Automatic Isolation of Reactor Water Cleanup Suction Valve,
2711998014	1998	Inadequate Configuration Control Methods Result In Plant Ope
2931998012	1998	Incomplete Installation Of Fire Barrier In The Cable Spreadi
2491998005	1998	Unit 3 Reactor Pressure Boundary Leakage In Excess of Techni
2191998009	1998	Fire Program Required Testing missed due to Inadequately Tra
3331998003	1998	A Design Condition and Assumed Single Failure Results in Los
2131998002	1998	18 Month Visual Inspection of Fire Sprinkler System Not Perf
4551998005	1998	Inadequate Administrative Controls Lead to Operation Outside
3151998023	1998	Potential Single Failure Due to Cross Train Routing of Non-S
2701998002	1998	Emergency Start of Keowee Hydro Units Due To Unknown Cause
2711998008	1998	Technical Specification Fire Barrier Penetration Seal Materi

4121998005	1998	Inadequate Fire Protection Safe Shutdown Analysis for Boric
3641998001	1998	Manual Reactor Trip Due to Dropped Control Rod K-2 and F-10
3151998016	1998	Retraction of Report on Non-Safety Related Cables Routed
3521998004	1998	Missing Fire Dampers in Safe Shutdown Barriers
2691998007	1998	Potential Operation Outside Design Basis For Appendix R Fire
2691998006	1998	Inadequate Safety Evaluation Results In Operating Outside Th
4251998002	1998	Seismic Qualification Inadequate For RHR Pump Electrical Con
3611998008	1998	4160 VAC Supply Cable Exceeds Ampacity Rating
3351998005	1998	Conditions Identified Outside Appendix R Design Bases
4541998008	1998	Manual Reactor Trip due to Loss of Communication During Rod
2861998001	1998	Potential Failure or Inadvertent Operation of Fire Protectio
2891998003	1998	Missing Thermo-Lag Fire Barrier
2801998004	1998	Fire Watch Released Prematurely Resulting in Violation of TS
3891998001	1998	High/Low Pressure Shutdown Cooling Interface Outside Appendi
4611998006	1998	Incorrect Calculation in Diesel Generator Control Circuitry
2821998003	1998	Routing of Containment Dome Fan Coil Unit Exhaust Dampers' C
2801998001	1998	Deficient Test Due to Faulty Test Equipment Results in Tech
3521997014	1997	Residual Heat Removal Service Water System Pump Trip On High
3021997046	1997	A Design Error Resulted in a Potential for the Emergency Die
2931997029	1997	Shutdown Cooling (SDC) Suction Valves Vulnerable to Damage f
3461997015	1997	Emergency Diesel Generator Tachometer Circuit Outside 10CFR5
2631997013	1997	Manual Scram Inserted Due to Loss of Condenser Vacuum Caused
3361997035	1997	Shutdown Cooling System Isolation Valve Does Not Comply With
3151997028	1997	Failure to Comply with 10CFR50, Appendix R Requirements Resu
2931997022	1997	Temporary Power Cables and Extension Cords Draped or Tie Wra
2661997041	1997	Potential Common Mode Failure in Auxiliary Feedwater System
3231997004	1997	Auxiliary Saltwater System was outside its design basis beca
3021997035	1997	A Design Error Resulted in the Inability to Provide Reactor
3161997006	1997	Equipment in Containment Rendered Inoperable Due to Faulted
3411997014	1997	Turbine Building and Auxiliary Building Mezzanine Not Fully
1551997005	1997	Violation of Facility Operating License
2711997021	1997	Division SI Powered and SII Powered Cables Located in Same M
3901997014	1997	APPENDIX R CONDITIONS
4231997051	1997	Design Deficiency for 4.16 Kilovolt Feeder Fault Clearing Ti
3021997031	1997	Inadequate Cable Sizing Due to Nonconservative De-rating Fac
3021997029	1997	Failure to Perform a Field Validation Resulted in a Deviatio
3151997024	1997	Material Discovered in Containment Degrades Containment Reci
4231997059	1997	Spurious Operation of Auxiliary Feedwater Pump Turbine Exhau
2951997020	1997	Main Steam Instrument Cabling Routed Through Main Steam Tunn
3691997009	1997	Reactor Trip On Both Units Due To An Equipment Failure And O
4001997020	1997	Inadequate fire protection provided for safety-related EDG F
3171997006	1997	Cable Spreading Room Halon System Out-of-Service - Missed Ac
2601997003	1997	Field measurements of the HPCI Turbine speed indicated speed

2661997033	1997	Non-Exempt Power Cables Do not Meet Appendix R Separation Cr
3021997017	1997	Personnel Error Caused Inadequate Electrical Separation of t
2851997009	1997	Potential Loss of Remote Shutdown Capability Due to Fire Ind
4611997016	1997	Failure to Provide Emergency Lighting for Safe Shutdown Equi
3891997004	1997	Incorrect Original Cable Tray Fire Stop Assembly Installatio
2821997009	1997	Unavoidable Momentary Non-compliance with Technical Specific
4401997005	1997	Automatic Reactor Scram Following Auxiliary Transformer Trip
3821997020	1997	Potential Safety Related Static Uninterruptible Power Supply
4001999008	1997	Control Room Emergency Filtration System Technical Specifica
2821997008	1997	Unit 1 Reactor Trip Caused by Electrical Ground in Rod Contr
2611997006	1997	CONDITION OUTSIDE DESIGN BASIS DUE TO DESIGN INSTALLATION ER
4581997001	1997	Manual Reactor Scram on Lowering Vessel Level due to Cut Cab
2851997004	1997	Diesel Generator Outside of Design Basis due to a Violation
2891997006	1997	Reactor Building Fan Motor's Unqualified Cable Termination d
2951997011	1997	Main Steam Instruments Declared Inoperable Due To Calculatio
3341997010	1997	Failure to Perform Gaseous Waste Disposal System Oxygen Test
3361997013	1997	Surveillance Procedure Bypasses Wrong Radiation Monitor Annu
3271997007	1997	Diesel generator starts that resulted from cutting a cable w
2711997006	1997	Use of an inadequate design implementation document During i
4241997004	1997	UNQUALIFIED CABLING RENDERS ATMOSPHERIC RELIEF VALVES INOPER
2451997015	1997	Inadvertent Actuation of Group Six Containment Isolation
2541997005	1997	The High Pressure Coolant Injection Subsystem was Made Inope
3731997010	1997	Unit 1 Division 2 Equipment Inoperable Due to Failure to Ins
4001997006	1997	Breach in Reactor Auxiliary Building 3-hour rated fire barri
2931997004	1997	Loss of Preferred Off-Site Power and Oil Spill Due to Main T
2451997013	1997	Evaluation of Impact Load of the MP1 Refueling Platform Fuel
4231997014	1997	Both Trains of Control Room Envelope Pressurization System I
4611997003	1997	Failure to Recognize the Impact of Disconnecting Division 1
2661997006	1997	Potential Refueling Cavity Drain Failure Could Affect Accide
3091997001	1997	CABLE SEPARATION II
4231996049	1996	Class 1E to non-Class 1E Electrical Cable Separation Noncomp
3091996038	1996	CABLE SEPARATION
2551996014	1996	CLASS 1E RAYCHEM CABLE SPICES INSTALLED INCORRECTLY - SUPPLE
3021996022	1996	Design Error Regarding Hot Shorts Results in Operation Outsi
2551996013	1996	LICENSEE EVENT REPORT 96-013, DC BREAKER FAILURE DURING TEST
2191996009	1996	Actuation of Engineered Safety Features Caused by a Loss of
3311996006	1996	Non-conservative APRM 15% Scram Setpoint Due to Inadequate P
3091996034	1996	Inadequate Cable Separation for Post Accident Hydrogen Monit
3871996014	1996	Technical Specification Required Shutdown
2711996028	1996	Inadequate field labeling of safety class wiring and drawing
2131996027	1996	Boron Injection Flow Path Below Minimum Required Temperature

3211996012	1996	Ground on 600-Volt Bus Causes Loss of RPS Power Supply and U
2711996026	1996	Inadequate design implementation and subsequent inadequate d
4611997034	1996	Incorrect Cable Resistance and Brake Horsepower Data Used in
3521996018	1996	Loose Speed Signal Cable Connector Renders the Single Train
2721996030	1996	Alignment of Back-Up Pressurizer Heaters for Emergency Power
2711996020	1996	Inadequate vender design activity and Licensee design verifi
4231996030	1996	Nuclear Instrument Channels Not Tested in Accordance with FS
2711996018	1996	Inadequate Installation and Inspection of Fire Protection Wr
3251996010	1996	Emergency Diesel Generator #1 DC Control Power Breaker Cable
4231996027	1996	Noncompliance of Tornado Missile Protection for Manhole Cove
3171996004	1996	Two ASI Channels OOS Due to Reserved Nuclear Instrumentation
2821996013	1996	Cable Tray Separation Discrepancies
3351996010	1996	Operation Prohibited by Technical Specifications due to Line
3091996026	1996	EQ of Cables/Connectors Inside CTMT may not meet requirement
3091996024	1996	High Energy Line Break Potential in Unprotected Cable Tray R
2551996009	1996	Licensee Event Report 96-009, Penetration Seal Deficiency on
3361996028	1996	Potential Loss of Service Water Strainer Function Resulting
3611996005	1996	Containment High Range Radiation Monitors Not Environmentall
2541996009	1996	During a postulated Loss of Coolant Accident (with Off- site
4241996005	1996	UNQUALIFIED CABLING USED IN CONTAINMENT SUMP LEVEL TRANSMITT
3411996008	1996	Auxiliary Building Basement Not Fully Meeting 10CFR50, Appen
2711996013	1996	Two Fire Suppression Systems Do Not Meet Design Requirements
3021996015	1996	Personnel Errors Cause Cable Separation/Isolation Concerns R
3311996002	1996	PCIS Half Group III Isolation Due to Blown Fuse During Maint
2711996009	1996	Combustion Material in Building Joints between Turbine, Radw
3731996003	1996	Unit One Reactor Scram due to Spurious Spike of H Intermedia
3361996019	1996	EEQ SOV Circuits in Containment Not Fully Qualified
2551996007	1996	Licensee Event Report 96-007, Inadequate Emergency Lighting
3361996016	1996	Non-Functional Circulating Water Pump Trip Function of the C
2601996001	1996	10 CFR Part 50 Appendix R Noncompliance Results in The Plant
1551996005	1996	FIRE BARRIER BREACH
2551996002	1996	Licensee Event Report 96-002-01, Initiation of Technical Spe
2551996004	1996	Licensee Event Report 96-004 - Safety Injection System Disab
3021996001	1996	Personnel Error by Contractor Results in Operation Outside 1
2491995023	1995	Unsupported Cable in Panel 903-33 Could Have Rendered Safety
2551995015	1995	Licensee Event Report 95-015 - Appendix "R" Scenario Results
4241995007	1995	Hydrogen Recombiner Inadequate Post-Maintenance Functional T
3641995009	1995	Entry Into Specified Condition With A Intermediate Range Neu
2551995013	1995	Licensee Event Report 95-013 - Circuit Fuse Coordination Def
3251995020	1995	Control Building Emergency Air Filtration System (CBEAF) Una
3091995014	1995	CARDOX Zone 1 Activation Wiring Defect
2771995006	1995	Group III Half Isolations on Both Units on a loss of one Off

2501995007	1995	Manual Reactor Trip Following Drop of Four Control Rods
4561995013	1995	Fire Protection Appendix R Design Discrepancies Due to Inade
2651995006	1995	Motor Control Center 29-2 Main Feed Breaker Tripped Due To I
3731995015	1995	Missed Technical Specification Fire Protection Valve Surveil
2551995007	1995	Licensee Event Report 95-007-Exposed Kapton Cable Insulation
4821995003	1995	Failure to Implement Proper Isolation And Separation Of Temp
3271995011	1995	Power Range Neutron Flux Monitor Inoperable Longer than Allo
2551995004	1995	Licensee Event Report 95-004 - Redundant Diesel Generator Ci
3541995015	1995	Reactor Shutdown to Comply with Technical Specification 3.7.
2551995012	1995	LICENSEE EVENT REPORT 95-012, UNQUALIFIED ELECTRICAL CONNECT
3361995025	1995	Fire Watch Not Established
5291995003	1995	TS 3.0.3 For Loss of Both Trains of Essential Cooling Water
3821995002	1995	Reactor Trip and Non-Safety Related Switchgear Fire. Watch 9
3331995009	1995	Partial Invalid Isolation of Reactor Building Ventilation
2801995003	1995	Automatic Actuation of Auxiliary Feedwater on Low-Low Steam
2631995003	1995	Equipment Supports Connected to Steel Shoring Plates
3151995001	1995	Fire Stops Found Not Installed in Several Unit 1 Containment
3361995013	1995	SPEC 200 Cabinet Electrical Separation not Maintained
3881995007	1995	Condition Prohibited By The Plant's Technical Specifications
2131995008	1995	Main Steam Line Break Reanalysis Resulted in Higher Containm
3871995001	1995	Fire Barrier Penetration Not Sealed; Fire Watch Not Performe
2711995003	1995	Failure To Provide Required Emergency Lighting In An Area In
2951995002	1995	Inadequacy of the Emergency Diesel Generator (EDG) Room Vent
3881995001	1995	Operation Prohibited By The Technical Specification (Inopera
3181995002	1995	Unit 2 Trip Due to Steam Generator Low Levels After SGIS Act
2801995002	1995	Missed Smoke Detector Surveillance Due to Administrative Pro
2931995001	1995	Reactor Building-to-Torus Train 'B' Vacuum Relief System Act
2861994012	1994	The Design And Evaluation Of Central Control Room Emergency
3151994013	1994	Fire Protection in Zone 29G Found Outside Design Basis
3361994041	1994	Turbine Building 45'-6" Cable Vault Floor Leak to 31'-6" 416
2611994023	1994	Condition Prohibited By TS Due To Degraded Reactor Trip Inst
4461994022	1994	Labeling Error Leading To Inoperability Of The Power Range I
3971994021	1994	Holes Cut In Main Control Room Floor Penetration 5016 Preclu
2471994004	1994	Inadequate Mounting of Control Rod Drive Fan (CRDF)
3331994008	1994	Relay Room Vent System Isolation Valve Cable and Design Docu
3011994005	1994	TS Violation - Overtemperature DELTA T Minimum Degree of Red
2961994002	1994	A Deficiency Regarding Raychem Tubing Used For Environmental
4581994025	1994	ADS Valve Inoperable Because Fire Wrap Not Replaced After Ma
3411994006	1994	Core Alterations with Inoperable Source Range and Intermedia
2771994006	1994	Technical Specification Violation due to a Missed Firewatch
2981994016	1994	Noncompliance With 10CFR50 Appendix R, Inadequate Isolation
3541994011	1994	Reactor Protection System actuation - Reactor Scram During r

4541994007	1994	1B Wide Range Hot Leg RTD Indication Spiked Low And Could No
2131994020	1994	RCP Motor Platforms Determined to be Non-Seismic
2631994008	1994	Structural Beam Connections Associated With the Cable Spread
2981994014	1994	Inoperable Control Room Emergency Filter System due to Unant
2951994011	1994	Violation of the 10CFR50 Appendix R Analysis Separation Crit
2951994010	1994	Unit 1 Reactor Trip Due to a Generator/Bus Duct Fire
4461994010	1994	Reactor Trip/Turbine Trip Due To A Short In The Current Tran
2631994007	1994	Appendix R Fire Protection Program and Subsequent Surveillan
2661994006	1994	Incorrect Operability Determination Following Spurious Halon
4991994005	1994	Inadvertent Test-Mode Starts of Standby Diesel Generators
2551994015	1994	Discovery Of Cable Lacking Qualification In An Environmental
5291994002	1994	Reactor Trip Caused By Personnel Error
2471996006	1994	Inoperability of Both Electric Tunnel Exhaust Fans During Su
2611994012	1994	CVCS Heat Trace Channel Inoperability Requires TS 3.0 Entry
3881994007	1994	Fuel Loaded in Reactor Core Quadrant With Inoperable Source
2851994004	1994	Inoperability of Halon Gas Fire Suppression System due to In
2601994002	1994	Noncompliance with 10 CFR 50 Appendix R Results in Plant Bei
2981994006	1994	Inoperable Control Room Emergency Filter System
3971994006	1994	Broken HPCS-B1-DG3 Battery Flag Terminal Weld
3091994005	1994	Reg Guide 1.97 Containment Hydrogen Monitoring Instrumentati
3211994001	1994	Slight Movement in Cable Lug Connection Results in Unplanned
3681994001	1994	Technical Specifications Requirements For Logarithmic Power
4161994002	1994	Supplements to LER 94-002 "ESF Switchgear Room Temperature C
4551994001	1994	Room Temperature Reading Taken At Wrong Location Causing A M
2551994005	1994	Lack Of Physical Separation Between The Redundant Channels O
4821994002	1994	Shutdown Required by Tech. Specs. Due to Control Rod M- 12
4581994001	1994	Fire Barrier Separation Design Analysis Deficiencies in Fire
3181993004	1993	Axial Shape Index Channel Error Due to Insufficient Troubles
3011993005	1993	Molded Case Circuit Breakers Fail Trip Tests Due To Grease S
2821993014	1993	Cable Separation at Main Control Board
2951993010	1993	Autostart of the 1A Residual Heat Removal Pump
4101993007	1993	Violation of Technical Specifications Found During a Verific
3971993030	1993	Missing Cable Tray Covers Discovered During The Electrical P
4121993011	1993	Containment Closure Defficiency During Refueling
2851993012	1993	Inadequately Sized Motor Operated Valve Power Cables
3331993019	1993	Potential Design Inadequacies in the Control Room Ventilatio
4581993021	1993	Associated Circuits, Common Enclosure Concern Identified Wit
3521993011	1993	Partial Loss of Offsite Power that Resulted in a Unit 1 SCRA
3391993004	1993	Inoperable Reactor Coolant Pump Trip Circuit Due to a Potent
3361993023	1993	Leakage Through Letdown Valves 2-CH-089 and 2-CH-515
4821993013	1993	Incorrect Wiring of the 10-60 Meter Differential Temperature
3521993010	1993	Actuation of the PCRVICS, an ESF, after a Reactor Enclosure
4581993019	1993	Equipment Qualification Lifetime of a Hydrogen Igniter Cable

3531993007	1993	Spurious Closure of a Traversing Incore Probe system explosi
2861993025	1993	Violation of the Cable Channelization Criteria in the Low Pr
3691993005	1993	Unit 1 Experienced A Manual Reactor Trip As A Result Of An E
2931993014	1993	Automatic Scram Resulting From Operation of Auxiliary Transf
4001993008	1993	Technical Specification violation due to improper wiring in
3891993007	1993	Manual Reactor Trip After Simultaneous Dropping of Control E
2801993008	1993	Fire Watch Inadvertently Discontinued as a Result of Inadequ
4431993007	1993	Protective Devices Not Analyzed to Function During Environme
3361993008	1993	Charging Pumps Inoperable Due to Low Control Power Voltage
2981993016	1993	Design Change Installation D ficiency Resulting in Control R
3161993005	1993	10CFR50 Appendix R Cable Routing and Compliance Strategy Con
3051993009	1993	Facility Outside Design Basis Due to the Unavailability of a
3021993002	1993	Switchyard Cable Failure Caused Degraded Voltage of Class 1E
3381993010	1993	Engineered Safety Feature Actuation During Reactor Protectio
3391993001	1993	Inoperable power range nuclear instrument due to personnel e
2981993004	1993	Failure to Properly Establish a Fire Seal Penetration Barrie
2471993005	1993	Cable Spreading Room and Electrical Tunnel Ventilation Singl
3251993006	1993	Inoperable Fire Barrier Penetration Seals
3731993009	1993	Fire Barrier Inoperable Greater Than Seven Days Due To Coreb
2851993004	1993	Inoperability of Power Range Nuclear Instrumentation Safety
2961993001	1993	Unexpected Auto-Start of Unit 3 Diesel Generators.
3241993002	1993	Inadvertent ESF Actuation During Surveillance Testing When A
3731993003	1993	Reactor Core Isolation Cooling System Barometric Condenser C
2861993006	1993	Low Pressure Steam Dump System Inoperability Due to Violatio
3331993001	1993	Identification of Inadequate Breaker Coordination Affecting
3311992020	1992	Installation of Seismically Qualified Vent Assembly Results
2711993001	1992	Degraded Vital Fire Barriers due to inadequate documentation
5281992015	1992	Loss of Turbine Driven AFW Pump due to a Fire in Fire Zone 7
2861992018	1992	Potential compromise of redundant circuit separation caused
2551992039	1992	Automatic Reactor Trip On Loss Of Load Resulting From Unstab
2631992015	1992	Control Room Ventilation and Emergency Filtration System Ope
2771992026	1992	Outside the Appendix R Design Basis due to an Emergency Serv
3331992044	1992	Identification of Non-Conformance to the FSAR Design Criteri
2981992016	1992	Noncompliance With 10CFR50 Appendix R, Inadequate Isolation
2611992020	1992	Alert Declaration Due To Unplanned Release Of Toxic Gas In V
2801992011	1992	Incomplete Low Pressure Carbon Dioxide Fire Protection Syste
2591992004	1992	Unplanned Engineered Safety Feature Actuation Due to a High
3441992027	1992	Condensate Pump Trip on Ground Fault Causes Automatic Main F
2131992021	1992	Missed Hourly Fire Watch Patrol
3891992006	1992	Manual Reactor Trip Due to a Fire in the 2C Condensate Pump
2201992009	1992	Reactor Scram Due to Failure of LPRM Detector
3311992012	1992	Potential Degradation of Control Room Habitability Due to La
2771992011	1992	Plant Being Outside Its Design Basis Due to Unqualified Fire

3041992003	1992	Failure to Provide One-hour Fire Barrier per Appendix R
3871992012	1992	Fire Barrier Installations Inoperable - Condition Outside De
2851992022	1992	Inadequately Sized Heater Drain Pump Cables
2131992018	1992	Invalidated Manufacturer Testing Renders Fire Wrap Inoperabl
3281992008	1992	Reactor Trip as a Result of One Protection Channel (RTD Loop
3521992014	1992	Thermo-Lag Fire Rated Barriers Inoperable Resulting in a Tec
2981992011	1992	Inoperability Of Thermo-Lag Barriers Based Upon The Results
2821992008	1992	Inoperability of Thermo-Lag 330 Fire Barriers on Cable Trays
5291992004	1992	Unit 2 and Unit 3 Loss of Power (LOP) ESFAS
4451992011	1992	Failure Of Thermo-Lag Fire Barrier Endurance Tests Results I
3971992028	1992	Diesel Room Normal Air Handling Fans Do Not Automatically Re
3521992011	1992	Inoperability of channel 'B' of the Main Steam Line Radiatio
2861992006	1992	125VDC System Lack of Coordination
3251992016	1992	Fire Seals Around Diesel Generator Pedestals Outside Technic
2451992021	1992	Breach of Fire Barrier With No Fire Watch Posted
3641992006	1992	Reactor Trip Caused By Blown Control Power Fuses In Two Of F
1551992008	1992	Loss Of #1 Station Power 125 VDC System
2491992013	1992	Pressure Suppression System Torus Vacuum Relief Valve 3-1601
2781992003	1992	Intermediate Range Monitor Spike which resulted in a Reactor
3441992011	1992	Degraded Fire Barriers Due to Personnel Errors in Barrier De
3971992019	1992	Automatic Depressurization System (ADS) Potentially Inoperab
3021992004	1992	Emergency Feedwater Block Valves Fail To Close Due To Degrad
4161992006	1992	RPS Actuation During CRDM Changeout Activities
3971992016	1992	Reactor Core Isolation Cooling System Not Adequately Transfe
3311992006	1992	Emergency Safety Feature Actuation During Modification Accep
2611992007	1992	Alert Declaration Due To Unplanned Release Of Toxic Gas In V
2551992033	1992	Informational Licensee Event Report 92-033 Inoperable Contro
4121992005	1992	Improperly Sealed Containment Penetration During Fuel Moveme
2551992031	1992	License Event Report 92-031-01 - Inadvertent Engineered Safe
2551992028	1992	Potential Inability To Maintain Diesel Generator Room Temper
4401992007	1992	Full Scram Signals Received from a Combination of Half Scram
3091992003	1992	NNS Interconnection With Wide Range Nuclear Instrumentation
3311992004	1992	Cable Spreading Room Fire Suppression Test Results in Excess
2721992007	1992	2 ESF Signal Actuations - Rad Monitor Channel Spikes
4401992002	1992	Pre-Modification Activities Result in Loss of Control Room E
2551992009	1992	Inadvertent Actuation Of The Control Room HVAC System Due To
2551992011	1992	Inadequate Electrical Isolation Of Class 1E Pressurizer Pres
3311992003	1992	Fire Barrier Degraded as a Result of an Unsealed Penetration
3871992002	1992	Opening Found Through Fire Rated Barrier
2371992005	1992	Violation of Technical Specification Limit for Intermediate
3311992002	1992	Missed Fire Watch due to Procedural Inadequacies
2851992006	1992	Inoperable Alarm Function on Radioactive Waste Building Stac
2701992001	1992	Breaches Of Firewalls Due To A Management Deficiency Results

3531992002	1992	Refuel Floor isolation due to failed Geiger Mueller tube in
2551992005	1992	Class 1E Pressurizer Level Indicator Cable Connected To The
2721992003	1992	ESF Signal Actuation: Control Rm Vent. Switch Due To 1R1B R
3331992004	1992	Automatic Fire Suppression Systems in Safety-Related Cable T
1551992004	1992	Arcing Cable Observed In Recirculating Pump Room Cable Tray
4131992001	1992	Technical Specification Violation Due To Improperly Performe
3111992002	1992	Lack Of Secondary Overcurrent Protection Device On Cont. Ele
1551991011	1991	Failure To Establish Air Lock Interlock Required For Contain
3011991006	1991	Reactor Trip During Modification Work on D11
2551992003	1991	Inadvertent Start Of Both Diesel Generators Due To Undervolt
2701991004	1991	Breach of Fire Barrier due to Unknown Cause Results In Techn
3051991012	1991	Unmarked Steam Exclusion Doors to Turbine Driven Auxiliary F
3331991029	1991	Spurious Trips of Primary Containment Vent and Purge Isolati
2371991042	1991	Cable Separation Criteria Not Met Due to Original Constructi
2721991035	1991	Engineered Safety Feature signal initiated from the Radiatio
2721991034	1991	2 ESF Signal Actuations; 1R11A Channel Spikes Due To Equipme
2371991037	1991	Reactor Scram on Spurious Intermediate Range Monitor Hi-Hi S
3731991016	1991	Division 3 125 VDC Battery Inoperable Due to a Loose Connect
1551991012	1991	Spent Fuel Bundle Drop In The Big Rock Spent Fuel Pool
4981991023	1991	Residual Heat Removal Motor Lead Cracking at Epoxy Interface
4131991027	1991	Vital Battery 1EBB Inoperable Due To Resistance Reading Exce
2491991013	1991	250 Volt DC Battery Discharge Voltage Decreased Below Design
4231991027	1991	Source Range Reactor Trip Due to Interference Caused by Malf
2501991011	1991	10 CFR 50 Appendix R Safe Shutdown Analysis Design Inadequac
3331991023	1991	Both Trains of Safe Shutdown Equipment Potentially Inoperabl
4401991020	1991	Cable Tray Raceways Found to be Impaired as a Fire Barrier,
3151991009	1991	Inoperable Fire Damper Not Properly Compensated for Due to P
2501991007	1991	Unit 3 Entered Mode 2 With One Of Two Intermediate Range Nuc
2771991032	1991	Engineered Safety Feature Actuations of the Control Room Eme
3251991024	1991	Outside Technical Specifications - LPCI "B" Loop Inoperable
2551991018	1991	Unidentified Cable Penetrations In The Control Room
3741991010	1991	Manual Scram Due to Electro-Hydraulic Control Leak
2781991014	1991	High Pressure Coolant Injection System Being Inoperable Due
3391991008	1991	Failure To Replace Fuses With Resistance Measurements Outsid
2541991015	1991	Unit One Cable Tunnel Flow Switch OOS For Greater Than 14 Da
2501991004	1991	Inadvertent Start Of 3A Emergency Diesel Generator
4821991013	1991	Inoperability Of Certain Safety Related Equipment Due To The
3481991009	1991	Reactor Trip Caused By Lightning Induced Deenergization Of 1
3311991009	1991	Reactor Water Cleanup System Isolation Due to a Blown Fuse i
3641991005	1991	Reactor Trip Caused By Lightning Induced Transient In the Ro
2131991015	1991	Potential for Heating Steam Pipe Break in Cable Spreading Ar
2651991008	1991	Closure of AO-2-220-45 Due To Defective Connections in the C
2801991013	1991	MCC Room Fire Suppression System Inoperable Due To Personnel

3331991012	1991	Fire Door Blocked Open Due To Personnel Error
2371991018	1991	Reactor Scram on Intermediate Range Monitor Hi-Hi Due to Sys
2861991008	1991	Cable Separation Barrier Construction Installation Inadequac
2491991004	1991	Unplanned SBGTS Auto-start During Area Radiation Monitor Cal
2201991007	1991	Engineered Safety Feature Actuation due to a Damaged Cable
2551991011	1991	Seismic Qualification Of Qualified Incore Detector Electrica
3331991008	1991	Fire Barrier Manway Open Without Fire Watch Caused by Human
2691991008	1991	Inappropriate Actions Cause Breach of Fire Barriers Resultin
3271991012	1991	Inadvertent breach of the main control room and cable spread
2771991015	1991	Primary Containment Isolation System Actuation During Survei
4101991009	1991	Engineered Safety Feature Actuation due to a Spurious High R
2631991009	1991	Inadequate Control of Construction Activities Causes Failure
2451991014	1991	High Energy Line Break Interaction with Closed Cooling Water
2771991009	1991	Primary Containment Isolation System Isolation Due to a Fail
4581991008	1991	Fire Hazards Analysis Deficiencies Including Lack Of Fire Wr
2451991009	1991	LLRT Failure
2601991006	1991	Unplanned Reactor Protection System Actuation Resulting From
3971991004	1991	Inadequate Fire Protection (Thermolag) Of Division Ii Safe S
2601991004	1991	Reactor Protection System Actuation as a Result of Exceeding
2721991012	1991	ESF Actuation Signal: 1R1B RMS Channel Spike Resulted In Co
3331991002	1991	New Three-Inch Telephone Cable Conduit Sleeve Fire Wall Pene
3111991006	1991	ESF Actuation: Auto Switch of Control Rm Vent. To Emer. Mod
2451991006	1991	Unjacketed Cable Resulting in Loss of Environmental Qualific
2551991006	1991	Failure To Compensate For Open Fire Barrier Penetration Seal
2771991006	1991	Scram As A Result Of De-energizing The 'C' IRM Due To Failur
3111991004	1991	ESF Actuation Signal for Cont. Vent. Isol. Due To Equipment
2721991008	1991	Rx Protection System Trip Signal Actuation Due To Personnel
3871991003	1991	Fire Damper Not Installed in Fire Rated Barrier
4231991003	1991	Spurious Control Building Isolation Signals Due to Deficient
2931991001	1991	Automatic Closing of the Primary Containment System Group 5
2551991002	1990	Non-Qualified Cable Splices Inside Containment
4581990048	1990	Equipment Qualification Lifetimes of Two Hydrogen Igniters L
2751990018	1990	Fire Damper Cardox Actuation Fusible Link Assembly Incorrect
2371990017	1990	Reactor Scram on Intermediate Range Monitor Hi-Hi Due to Unk
3111990043	1990	Tech. Spec. 3.0.3 Entry - All Analog Rod Control Indication
3441990046	1990	Inadvertant Actuation of Cable Spreading Room Deluge System
3521990033	1990	This LER reports a condition that resulted in isolations ass
3521990032	1990	This LER reports a condition that resulted in the isolation
3251990026	1990	Secondary Containment Manual Isolation During A Drywell Fire
3521990027	1990	Reactor Protection System (RPS) Actuation When an Intermedia
2721990037	1990	ESF Signal Actuation; 1R41C Failed Low Due To Design Concer
3441990045	1990	Wiring Design Error and Inadequate Post Installation Testing
4161990024	1990	Standby Fresh Air Unit Actuation Due To Inadequate Test Inst

3271990028	1990	A main control room isolation occurred as a result of a spur
3011990004	1990	Actuation Of The Containment Fan Coolers Service Water Valve
4581990034	1990	Reactor Protection System Actuation due to Shorting in the C
4581990035	1990	Loss of Shutdown Cooling due an Engineer Failing to Recogniz
2061990020	1990	Station Battery Terminal Connection Resistance Measurement M
2981990011	1990	Unplanned Automatic Reactor Scram and ESF Actuations Due to
3521990024	1990	Inoperability of the RCIC System Due to a Physical Separatio
2661990012	1990	Potential Single Failure In B03-B01 And B04-B02 Control Circ
3871990021	1990	Division II Zone III Isolated and SGTS Started During Restor
2721990034	1990	ESF; Containment Ventilation Isolation Signal; 1R11A RMS Cha
4821990021	1990	Seismic Questions Concerning The Governor Speed Control Cond
3281990015	1990	Fire watch failed to follow procedures and survey an area on
3251990015	1990	Incorrect LPRM Assignment Due to Reversed Cables
3041990011	1990	2W Main Transformer Failure
2541990020	1990	Continuous Fire Watches Being Performed On A Twenty Minute R
4451990030	1990	Reactor Trip Resulting From Improper Routing Of Heater Drain
3241990014	1990	ESF Actuation - RWCU Isolation when Fuse Blew in Power Suppl
2591991009	1990	Fire Penetration Discovered Open Without Fire Watch in Place
2711990011	1990	Full Reactor Protection System Actuation From Spike in a Sha
3151990010	1990	10CFR50 Appendix R Deficiencies Resulting in Potential Loss
3311990012	1990	Reactor Protection System Trips During Routine Maintenance W
3131990009	1990	Inadvertent Actuation of the Control Room Emergency Ventilat
2771990019	1990	Control Room Emergency Ventilation System Actuations Due to
2981990010	1990	Update On Two Local Power Range Monitor (LPRM) Detector Outp
3041990009	1990	Inadvertant Auto-Closure of the 2B Diesel Generator Output a
2771990018	1990	Control Room Emergency Ventilation System Actuation Due to a
3311990009	1990	Inadequate Fire Barrier Seal
4161990013	1990	Neutron Monitoring System Causes Scram Due To Personnel Erro
2771990016	1990	Control Room Emergency Ventilation System Actuations Due to
3171990021	1990	Appendix R Cable Separation for Emergency Diesel Generators
2771990015	1990	Control Room Emergency Ventilation System Actuation Due to a
3441990030	1990	Containment Ventilation Isolation from an Electronic Signal
2691990011	1990	Boron Dilution Systems Do Not Meet Single Failure Design Cri
4981990013	1990	Technical Specification Violation Due to Two Inoperable Chan
2611990009	1990	Service Water Booster Pumps Control Cable Separation
3441990021	1990	Incomplete Surveillance Test on EDG Decouple Circuitry Due t
4231990019	1990	Reactor Trip Due to Dropped Rod Due to Broken Cable to Stati
2601990004	1990	Unplanned Engineered Safety Feature Actuation Caused by a De
3151990008	1990	10 CFR Appendix R Deficiencies Resulting in Potential for Lo
2061990012	1990	Voluntary Entry Into Technical Specification 3.0.3 During DC
2711990008	1990	Failure to Meet Separation Criteria for Power Cables to Regu
3171990018	1990	Axial Shape Index Not Continuously Monitored as Required by
2501990010	1990	Technical Specification Violation Due to Entering Mode 3 Wit

2551990009	1990	Automatic Initiation of Auxiliary Feedwater Actuation Signal
2061990007	1990	Reactor Trip On A Spurious Low Reactor Coolant System Flow S
2721990015	1990	ESF Actuation: Control Room Vent. Switch to emer. mode: Chan
2591990006	1990	Unplanned Engineered Safety Features Actuation-Automatic Die
3521990012	1990	Inoperability of Residual Heat Removal System Modes Due to P
2191990005	1990	Technical Specification Required Shutdown Because Of Loss Of
3691990007	1990	Improper Screw Were Installed In the Bottom of Ice Condenser
3011990001	1990	Inadvertent Auxiliary Feed Pump Start
2551990004	1990	Failed Heater Cable Results in Inoperability of Concentrated
2931990006	1990	Position of Primary Containment Isolation Valve not Recorded
4981990005	1990	Reactor Trip on Low Steam Generator Level Due to a Feedwater
3171990003	1990	Personnel Error During Performance of Surveillance Test Proc
3971990006	1990	10CFR50 Appendix "R" Cable Fire Protection
4001990005	1990	Engineered Safety System Feature Actuation Due To A Radiatio
2131990002	1990	Fire Barrier With Temporary Seal Determined Inoperable
2651990004	1990	Loss of Emergency Bus 23-1 Due to a Shorted 2 Conductor Cabl
3481990001	1990	Fire Watch Not Established Within The Required Time Period D
4581990003	1990	Inadequate Thermo-Lag Fire Barrier Envelopes Surrounding Saf
2191990001	1990	Failure to Set Continuous Fire Watch Due to Inadequate Proce
2061990001	1990	Voluntary Entry Into Technical Specification 3.0.3 During Dc
4131990002	1990	Technical Specification Violation For Containment Air Return
2131989023	1989	Inoperable Fire Barrier Switchgear Room and Cable Spreading
4611989038	1989	Error in Transcribing Design Calculation into Field Drawings
4001989018	1989	Manual Rx Trip Due To Cable Failure On Digital Rod Position
2931989037	1989	Primary Containment/Traversing In-Core Probe (TIP) Ball Valv
2601989027	1989	Failure To Meet Technical Specifications Due To Loss Of Sump
2611989013	1989	EQ Conduit Seal Deficiency Due to Inadequate Wire Use Range
3011989008	1989	Instruments Bus Ground Fault Causes Spurious Safeguards Actu
3351989006	1989	Technical Specification Effluent Monitor Inoperable Due To P
5281989017	1989	Four Penetrations into Seismic Gap area Between Diesel Gener
4251989028	1989	Arcing Power Cable Leads To Containment Ventilation Isolatio
4101989022	1989	Engineered Safety Feature Initiation Due To Electrical Fault
3011989005	1989	Intermediate Range High Flux Trip Signal
3681989017	1989	Personnel Error Results in Less than the Required Technical
2511989012	1989	"A" Loop of Wide Range Containment Water Level Indication De
2371989026	1989	Radiation Monitor Connection
2851989019	1989	Manual Unit Trip due to High Indicated RCP Motor Bearing Tem
4981989018	1989	Voluntary Licensee Event Report 89-018 Regarding Improper In
2771989020	1989	Environmental Qualification Non-compliance Resulting in Inop
2821989017	1989	Discovery That the Present Position of the Transfer Switch f
3971989039	1989	Inadequate Electrical Separation and Non-Failsafe Design of
2951989014	1989	Fire Doors to Cable Spreading Rooms Found Open Without a Fir
2671989015	1989	Region 19 Control Rod Drive Failed to Fully Insert on Scram

2671989013	1989	12 Cable Trays Found Overfilled
3521996015	1989	Failure to Maintain Equipment Needed for Operator Actions to
3971989034	1989	Technical Specification Required Shutdown Completed as a Res
2061989021	1989	Reactor Trip On Low Flow Due To Instrument Cable Degradation
2201989009	1989	Improper Installation of Penetration Plug Assembly Due to Po
3331989013	1989	Primary Containment Purge Valves Isolated by Accidental Grou
2131989012	1989	Surveillance Frequency Exceeded for CO sub 2 Fire Suppressio
2591989019	1989	Unplanned Engineered Safety Feature Actuation Caused By Fail
2711989021	1989	Failure of RM-16-19-1B Primary Containment High Range Radiat
3691989015	1989	The Control Room Ventilation System Did Not Meet The Require
3531989002	1989	Inoperability of Plant Systems Due to Unacceptable Physical
2591989018	1989	Low Flow Through Area Coolers Due To Inadequate Surveillance
2201989011	1989	Automatic Initiation Of Reactor Building Emergency Ventilati
3051989012	1989	Failure to Satisfy Safeguard Cable Separation Requirements R
2821989008	1989	Auto-Start of Train A of Auxiliary Building Special Ventilat
2491989008	1989	Fire Damper Discovered Obstructed by Welding Equipment Due t
2851989015	1989	Plant Emergency Lighting Outside Design Basis
4581989029	1989	Two ESFs Due to Shorted Leads While Replacing Transformer an
2701989005	1989	Unit 2 Reactor Coolant Sample Isolation Valves Failed to Mee
2551989013	1989	Inadequate Separation Between Circuits For Redundant Safety
3461989005	1989	Reactor Trip From Full Power Due To Main Turbine Trip On Los
2601989015	1989	Reverse Rotation Of 2c Residual Heat Removal Pump Cooler Fan
2691989008	1989	Declared Cable and Equipment Rooms Fire Suppression Sprinkle
3641989007	1989	Reactor Trip Caused by a Loose Electrical Connector on the 2
2851989014	1989	Auxiliary Feedwater Panel Instrumentation Outside Design Bas
2801989020	1989	Potentially Inoperable Reactor Protection Channel Due to Hig
3971989014	1989	Reactor Protection System Actuation Caused by Average Power
3171989006	1989	Containment Iodine Filters Outside Design Basis Due to Equip
3281989006	1989	NIS Intermediate Range Reactor Trip Setpoints Were Nonconnse
3021989016	1989	Administrative Problems Caused Deficiencies In The Environme
2451989008	1989	LLRT Failures
4161989003	1989	Fire Barrier Nonconformance Due to Early Construction Work
4611989018	1989	Recessed Connector Center Pin Cause Intermittent Pin Contact
2711989018	1989	Discovery Of Open Locked High Radiation Area Doors
3051989010	1989	Improper Detector Installation and a Loose Electrical Connec
4121989009	1989	Degraded High Energy Line Break (HELB) Temperature Elements
2491989005	1989	HPCI System Declared Inoperable Due to Discovery of Cable Te
2601989009	1989	Unplanned Scram and Main Stream Line Isolation Due to Spurio
3091989003	1989	Plant Trip Due to Inadvertent Actuation of Generator Protect
3521989025	1989	Inoperability of Plant Systems Due to Unacceptable Physical
3021989010	1989	Inadequate Instructions Lead to Improper Cable Splice Instal
3521989022	1989	Inoperability of Plant Systems Due to Unacceptable Physical
4401989010	1989	Insufficient Refueling Bellows Insulation Results in Heat Da

2601989007	1989	Cable Deterioration Causes Inoperability Of Neutron Monitori
2191989010	1989	Design Deficiency Causes Non-Compliance with 10CFR50 Appendi
4581989009	1989	Inadequate Thermo Lag Covering as Fire Barriers Per TS 7.7.7
3161989008	1989	Reactor Cable Tunnel CO sub 2 for Quadrants 1, 3, and 4 Inop
2191989007	1989	Design Deficiency Causes Standby Gas Treatment System Initia
2691989006	1989	Single Component Failure Could Render Emergency Power Switch
4831989002	1989	Two Engineered Safety Features Actuation Events Due To High
2711989011	1989	Inadvertent Primary Containment Isolation System Actuation D
4131989004	1989	Automatic Alignment of Nuclear Service Water System to Stand
2931989010	1989	Loss of Preferred Offsite Power Due to Failed Feeder Cable
2801989004	1989	Cable Tray Covers Not Properly Installed for Compliance with
3521989012	1989	Plant in Non-Compliance with Fire Protection Evaluation Repo
3091989002	1989	Environmental Qualification Discrepancies Identified In Cont
4581989005	1989	Fire Seal Penetration 1C2W19 Inadequate Due to Poor Applicat
3251989002	1989	Spurious IRM Upscale Trips With Shorting Links Removed Due t
2371989004	1989	Unexpected Reactor Scram During Bus Undervoltage Test Due to
3361989001	1989	Fire Barrier Penetration Seals Inoperable
2801989003	1989	Degraded IRSP Motor Power Feeder Cables and Motor Leads
3521989008	1989	Inoperability of Plant Systems Due to Unacceptable Physical
2691989004	1989	Deviation from FSAR Cable Separation Criteria Due to Design
4611989007	1989	Incorrect Operability Determination due to Insufficient Revi
1551989001	1989	Coordination Deficiency on Alternate Shutdown Battery Scheme
3381989003	1989	Void In Fill Material Of Fire Barrier Penetration
2801989002	1989	Gamma-Metrics Excore Neutron Flux Detector Not Qualified Due
4611989004	1989	Licensed Operators Error of Withdrawing a Control Rod and Si
3521989002	1989	Unavalability of the Reactor Cor Isolation Cooling System du
2821988011	1988	Auto-Start of Train A of Auxiliary Building Special Ventilat
2191988033	1988	Containment High Range Radiation Monitor Causes Partial Cont
3521988042	1988	Inoperability of Plant Systems Due to Unacceptable Physical
3021988028	1988	Deficiency in Environmental Equipment Upgrade Program Method
3521988039	1988	A Diesel Generator Cable Associated with Safe Shutdown Was I
4821988027	1988	Manufacturing And/Or Installation Process Deficiencies Cause
3521988037	1988	Inoperability of North Stack Wide Range Accident Monitor Due
3311988019	1988	External Chloride Contamination Results in Transgranular Str
2201988020	1988	Plant Potentially Operated Outside Design Basis Due To Desig
4401988044	1988	Cable Trays Missing Fire Wrap Results In Incomplete Division
4241988036	1988	Improper Cable Splice Leads to Plant Operation Outside Of Te
2371988022	1988	Heat Damage to Upper Elevation Drywell Components Due to Clo
3691988035	1988	A Fire Barrier Was Compromised for an Unknown Period of Time
3091988009	1988	Degraded Excore Flux Monitor Environmental Qualification
2771988028	1988	Initiation of a Low Pressure Coolant Injection During a Surv
2611988024	1988	Inoperable Containment Fan Coolers Due To Lack Of Environmen
4101988059	1988	Engineered Safety Feature Actuation Caused by Power Source S

3611988024	1988	Spurious Actuation Of Control Room Isolation Due To Spike On
4431988007	1988	Post-Accident Nuclear Instrumentation Cable Separation
2861988007	1988	Manual Reactor Shutdown Due to 2 Gallon Per Minute Steam Gen
3151988010	1988	Unit Shutdown To Inspect Environmental Qualification Configu
4821988018	1988	Engineered Safety Features Actuation Caused by Failed Radiat
2611988023	1988	Potential For Overcurrent Conditions On Two Motor Control Ce
2191988022	1988	Actuation of Engineered Safeguards Functions due to Loss of
2711988012	1988	Overloaded Power Supply in Vital Fire Protection Control Pan
2471988014	1988	Potentially Degraded Refueling Water Storage Tank
3691988031	1988	The Standby Shutdown Facility Was Inoperable Because Require
2801988037	1988	Fire Watch Not Posted at Improperly Sealed Penetration withi
2591988032	1988	Electrical Separation Requirements Violated Due To Inadequat
2611988020	1988	Reactor Vessel Heat Vent System Not Environmentally Qualifie
4401988035	1988	Failure Of The Mechanical Interlock Cable Result In Both Doo
3461988019	1988	Improper Crimps on Safety Related Electrical Cable Lugs
2201988017	1988	Automatic Initiation Of Reactor Building Emergency Ventilati
3661988022	1988	High Pressure Coolant Injection Isolation Due To Broken Wire
2611988018	1988	Inoperable Cable Tray Penetration Seals Due to Inadequate In
4981988050	1988	Engineered Safety Features Actuations Due to Failure of Radi
2981988021	1988	Reactor Scram and Main Steam Isolation Valve Closure Due to
4161988012	1988	Reactor Scram Induced by Lighting Strikes Affecting Neutron
2691988012	1988	Incorrect Routing of SSF Incore Thermocouple Cables Due to a
3271988030	1988	Inadvertent Grounding of a Unit 1 Radiation Monitor Input to
3151988006	1988	Isolation of CO2 Fire Protection System, Without Compensator
2711988010	1988	Failure to Identify Fire Protection System Inoperable and Es
3411988029	1988	Group 2 Control Rod Receive Scram Signal Due to Contactor Te
3701988008	1988	Manual Reactor Trip when Main Feedwater Control Valve Failed
3271988028	1988	High Airborne Activity Level in the Auxiliary Building Resul
3441988024	1988	Both Trains of Control Room Emergency Ventilation System Ino
3461988016	1988	Electrical Circuit Bridging in Safety Related Systems
3151988005	1988	Isolation of CO2 Fire Protection System, Without Compensator
3251988017	1988	Inoperability of High Pressure Coolant Injection (HPCI) Syst
2771988015	1988	Failure to Continuously Implement the LCO of Technical Speci
2611988015	1988	Inadequate Pump Motor and Power Cable Environmental Qualific
4141988024	1988	Turbine Driven Auxiliary Feedwater Pump Automatic Start Caus
3971988022	1988	Technical Specification Violation of Cable Spreading Room Fi
2781988005	1988	Reactor Water Cleanup Isolation due to Moving a Cable with W
3171988004	1988	Containment Penetration Splice Connection Found Not Environm
2491988013	1988	Loss of 3A Reactor Protection System Bus and Subsequent ESF
4241988016	1988	Water Leakage Into Control Room/Potential Exists For A Safet
2771988013	1988	Smoke Detectors in the Cable Spreading Room Exceeding Survei
3311988005	1988	Premature Termination of Fire Watch Due to Inadequate Post-M
3701988002	1988	Both Trains of the Annulus Ventilation System Were Made Inop

2691988007	1988	Technical Specification Violation Due To Missed Firewatches
2551988009	1988	Failure to Maintain Continuous Fire Watch as Required by Tec
3971988016	1988	Reactor Protection System Actuation Caused By An Average Pow
4981988031	1988	Cable Assemblies For Neutron Flux Monitoring Which Failed Qu
2651988009	1988	Unit Two 125 Volt Battery Discharge Test Failure Due To Appa
3971988012	1988	Potential Unmonitored Effluent Release Path Due To Design Er
3021988012	1988	Design Error Leads to Inadequate Isolation Between Instrumen
3481988014	1988	Special Report: Fire Barrier Inoperable For More Than Seven
3681988006	1988	Cable Spreading Room Fire Water System Removed From Service
3241988009	1988	Full Reactor Protection System (RPS) Trip While Selecting a
3521988008	1988	Non-Compliance with Technical Specifications due to Missing
2131988009	1988	Zero Power Reactor Trip Due to Spurious High Startup Rate (I
2651988005	1988	Unit Two Reactor Scram Due to Feedwater Regulating Valve Pac
2721988006	1988	10CFR 50 Appendix R Cable Design Deficiency Due To Design Er
2201988007	1988	Automatic Initiation Of Reactor Building Emergency Ventilati
3611988004	1988	Spurious Control Room Isolation System Actuation Due To Spik
2931988009	1988	Missed Surveillance for "B" Diesel Generator
2771988005	1988	Failure of Control Panels to Meet Original Seismic Qualifica
3271988012	1988	Engineered Safety Feature Actuation Containment Ventilation
4611988006	1988	Inadequate Access and Visibility During Radiation Detector A
2131988005	1988	Leak Path Renders Cable Vault CO2 System Inoperable
2131988006	1988	Leak Path Identified In Cable Vault Flood Barrier
3231988001	1988	Spurious Actuation of the Fuel Handling Building Ventilation
4231988008	1988	Fire Detection Zones Improperly Wired During Construction
3871988004	1988	Reactor Building Ventilation Boundary Door Blocked Open
4981988008	1988	Safety - Related Electrical Cable Splices
4131988003	1988	Wide Range Temperature Monitoring Instrumentation Technicall
4561988003	1988	Loss of Pulses to Fuel Handling Incident Monitor ORT-ARO56 f
3271988004	1988	50 Amp Circuit Breakers May Not Preclude Auto-Ignition of As
2131988002	1988	Fire Detection Subsystem Declared Inoperable Due to Damaged
3441988001	1988	Reactor Trip Due to Failed Overpower Delta Temperature Chann
4161988001	1988	RPS Actuation Due to Inadvertent Grounding of a Power Supply
3411987056	1987	Reactor Scram Due to Personnel Error and Subsequent Reactor
4821987058	1987	Technical Specification Violation Due To Error In Design Doc
3361987013	1987	Fire Watch Violations Under Limiting Conditions For Operatio
3611987031	1987	Manual Reactor Trip Due To Feedwater Isolation Valve Failing
3541987051	1987	Reactor Scram Caused By A Spurious Spike In A Main Steam Lin
3611987028	1987	Containment Purge Isolation System (CPIS) Actuation Due To N
3281987009	1987	Electromagnetic Interference Caused Spurious High Radiation
2691987011	1987	Cable Room Sprinkler Systems Inoperable Due To Design Defici
3281987008	1987	Electromagnetic Interference Caused A Spurious High Radiatio
4611987067	1987	Overly Restrictive Design Setpoint Trip Tolerance for Temper
3201987011	1987	Failure To Comply With Technical Specifications 3.7.10.2 Due

3821987026	1987	Containment Electric Penetration Backup Protection Inoperabl
3161987015	1987	Entry Into Technical Specification 3.0.3 Due To Corrective M
3441987035	1987	Fire Doors Made Inoperable Due to Personnel Error
2771987032	1987	Failure to Comply with Cable Routing and Separation Criteria
2541987022	1987	Reactor Scram While Shutdown - Neutron Monitor Spiked High H
4091987007	1987	Degraded Fire Barrier
4131987043	1987	Technical Specification Violation Due To Inoperable Reactor
4241987063	1987	Reactor Trip Following Turbine Trip Caused By Vibration Moni
2721987016	1987	Power Operated Relief Stop Valve Cabling Found Degraded - In
2931987009	1987	Class I Conduit Routed Through Class II Area of Circulating
2771988007	1987	Technical Specification Fire Barrier Deficiencies and Failur
2771987023	1987	Blown Logic Fuse of Unknown Cause Resulting in High Pressure
3481987018	1987	Drawing Error Leads to Both Containment Hydrogen Recombiners
3341987017	1987	Inoperable Fire Barriers
4831987028	1987	Failure to Maintain Continuous Firewatch for Blocked Open Fi
3221987032	1987	Okonite Tape Insulated 'Back to Back' Splices in Primary Con
3521987055	1987	Non-conformance with Fire Safe Shutdown Requirements of LGS
4611987059	1987	Reactor Core Isolation Cooling Isolation Resulting From Cont
4821987043	1987	Surveillances Of Power Range Low Setpoint And P-8, P-9 and P
2191987035	1987	Reactor Scram with Reactor Shutdown Due to Degraded Electric
4561987053	1987	Containment Isolation From Loss of Power To Radiation Monito
2801987024	1987	Reactor Trip on Low RCS Flow Due to Reactor Coolant Pump Tri
3151987020	1987	Lack of Isolation Between Balance of Plant and Essential Saf
3971987029	1987	Plant Technical Specification Fire-Rated Floor Penetration I
3271987062	1987	Unplanned Loss Of Manhole 7B Missile Protection For B Train
3681987007	1987	Reactor Trip on High Reactor Coolant System Pressure Caused
4541987020	1987	Temporary Lack Of Continuous Fire Watch Due To Cognitive Per
3701987014	1987	Both Trains of Containment Spray Were Declared Inoperable Wh
3271987061	1987	Associated Circuits That Share A Common Power Supply With Ap
3221987028	1987	Meteorological Wind Direction Monitoring Instrumentation Ino
3151987018	1987	Fire Rated Assemblies and Dampers Inoperable Due to Incorrec
4831987020	1987	Tech Spec Violation When Transposition Error Results In Miss
3271987057	1987	During Performance Of A Special Test Instruction A Control R
3271987054	1987	Technical Specification Action Requirement Not Met On Contro
3211987014	1987	Equipment Failure And Instrument Drift Cause Monitor Activat
3611987011	1987	Containment Purge Isolation System (CPIS) Spurious Actuation
3201987007	1987	Low Pressure in the Cable Room and Transformer Room Halon Sy
3521987041	1987	Nuclear Steam Supply Shutoff System Isolations Due to a Loos
2131987013	1987	Inoperable Fire Suppression System Due to Personnel Error
2501987022	1987	Reactor Trip Breakers Open on Unit 3 While at Cold Shutdown
3361987010	1987	Fire Protection for Raceway Supports Not Adequately Protecte
2451987031	1987	Reactor Scram From IRM Hi-Hi Noise Spike
3271987044	1987	Inadequate Communication Between Design Organizations Result

3731987027	1987	Emergency Core Cooling Pump System Terminations
3731987026	1987	Residual Heat Removal Pump Motor Terminations Found to be No
2511987019	1987	Turbine Runback Caused By Spurious Spiking In The Rod Positi
3391987007	1987	Missed Surveillance - Low Pressure CO2 System
2651987008	1987	Unit Two Cable Tunnel Sprinkler Systems Out of Service For E
2061987010	1987	Containment Isolation System Actuation Due To Loose Power Su
2671987015	1987	Loop Shutdown Upon Movement Of Interlock Sequence Switch Fro
4561987030	1987	Containment Purge Isolation Signal Due to Radiation Monitor
3611987007	1987	Containment Purge Isolation System (CPIS) Spurious Actuation
2451987015	1987	Local Leak Rate Test Failures
4561987025	1987	Inadvertent Opening of Main Steam Isolation Valve During Mai
2371987019	1987	Improperly Located Fire Break Near Cable Tray Routing Point
2721987009	1987	T. S. 3.7.11 Non-Compliance - Impaired Fire Barrier Penetrat
2061987008	1987	Kapton Insulation Damage on Containment Penetration Cables
2541987009	1987	Cable Spreading Room And Unit One Cable Tunnel Sprinkler Sys
3091987005	1987	Reactor Coolant System Loop RTD Environmental Qualification
3231987012	1987	Personnel Error Results In Failure To Meet Technical Specifi
3231987009	1987	Containment Ventilation Isolation Initiation Due To Inadvert
2611987007	1987	Environmental Qualification Documentation Deficiencies Due T
3521987014	1987	Engineered Safety Feature Actuation due to Unknown Cause
2751987006	1987	Turbine Trip And Reactor Trip Caused By A Main Transformer B
4821987019	1987	Engineered Safety Features Actuation - Containment Purge Iso
4241987023	1987	RHR System Minimum Flow Requirement Potentially Not Met Due
4831987008	1987	Personnel Errors Result in Missed Continuous Firewatch For B
2951987011	1987	Unit 1 Reactor Trip As A Result Of Source Range 1N31 High Fl
2191987022	1987	Plant Shutdown Required By Inoperable Acoustic Monitor Due T
2131987007	1987	Ground Water Inleakage into Containment Cable Vault Due to I
3271987048	1987	Failure Of Silicone Rubber Insulated Cables During Testing
2631987011	1987	Fire Barrier Penetration Found Inoperable due to Inadequate
3441987017	1987	Leakage Through Control Room Floor Cable Penetrations - Insu
3741987010	1987	Scram While Defueled Due to Management Deficiency in Schedul
1551987006	1987	Information LER - EEQ Cable Documentation Deficiency
2611987003	1987	EQ Cable Splice Deficiencies
3821987013	1987	Fire Wrap Not Installed Due to Inadequate Modification Imple
2541987007	1987	1/2B Diesel Fire Pump Inoperable Due To Protective Relaying
3611987005	1987	Containment Purge-Isolation System (CPIS) Spurious Actuation
2591987007	1987	Radiation Monitor Connection Faults Cause Control Room Emerg
2131987004	1987	Fire Barrier Declared Inoperable Due to Engineering Evaluati
3221987005	1987	Meteorological Air Temperature Monitoring Instrumentation In
2671987010	1987	Reactor Scram Actuations on Neutron Flux Rate of Change High
3971987003	1987	Breach of Secondary Containment Due to Personnel Error
5281987011	1987	Fire Watch Patrol Missed Due to Personnel Error
2491987006	1987	Reactor Scram During Power Operation Due to a Load Reject Si

2801987010	1987	Improper Routing of Appendix 'B' Related Cables
4581987006	1987	Inadequate Tornado Missile Protection For Class 1E Power Cab
3121987026	1987	Unacceptable Intermixing of Power/Control and Instrumentatio
3521987009	1987	Control Room Emergency Fresh Air Supply Actuation due to Chl
3121987024	1987	Overweight Cable Trays
4231987010	1987	Loose Part Detection System Inoperable Channel for Unknown R
2591987004	1987	Accidental Bump of Radiation Monitor Output Cable Initiates
3281987004	1987	Containment Penetration Did Not Have Redundant Overcurrent P
2501987008	1987	Process Radiation Monitor Spike Cause Control Room Ventilati
2491987001	1987	An Hourly Inspection for the East End of the Unit 2/3 Cable
3121987015	1987	Carbon Dioxide Protected Fire Zones CO(2) Deluge Systems Lef
3121987016	1987	Cables Pulled Into Energized Safety-Related Breaker Cubicles
3121987013	1987	Redundant Instrument Cables Routed Through the Same Fire Are
3521987005	1987	Postulated Loss of ECCS Systems Due to Channel Separation Vi
4561987008	1987	Reactor Trip Caused by Deenergizing the Nuclear Instrumentat
4141987002	1987	Reactor Trip Due To Accidental Shorting Of Test Cable And Au
2591987001	1987	Personnel Errors Cause Fire-Watch Violations
2691987002	1987	Appendix R Review With Respect To Valve Operability
4401987004	1987	Inadvertent Bumping of IRM Cables Causes Reactor Protection
3731987007	1987	Personnel Error Causes ESF Actuation Due to Deenergizing Pow
2551987002	1987	Automatic Actuation Of Reactor Protection System
3121987006	1987	Motor Operated Valves
4551987001	1987	Reactor Trip Due to 2 Out of 4 Logic on Over Temperature Cha
4561987005	1987	Incorrect Wiring of Digital Rod Position Indication System c
2191987003	1987	Standby Gas Treatment System Initiation Caused By Power Supp
2541987002	1987	Missed Hourly Fire Watch in Cable Spreading Room Due to Pers
4561987002	1987	Containment Ventilation Isolation for Train A Due to a Loss
3271987001	1987	Trip Setpoints For ACBs On Shutdown Boards That Feed Control
3621987009	1987	Containment Purge Isolation System (CPIS) Actuation
3251986031	1986	Automatic Isolation of Reactor Building Ventilation System a
3361987001	1986	Fire Detection/Protection Systems Out of Service
2191986033	1986	Standby Gas Treatment Initiation Caused By Ground on Arm Rib
2511986030	1986	Process Radiation Monitor Spike Cause Control Room Ventilati
3521986055	1986	Reactor Core Isolation Cooling Cables Fire Protection Defici
4561986010	1986	Reactor Trip caused by damage to Source Range Cable due to p
2491986024	1986	Unit Shut Down for Repair of Environmentally Qualified Cable
3971986042	1986	Missed Fire Door Surveillance due to Inadvertent Omission fr
3971986037	1986	Plant Shutdown Caused by an Unqualified Component Due to Ina
3411986045	1986	Overpressurization and Rupture of CST Piping Caused by Inade
2451986025	1986	FWCI RELAYS FAILURE TO MEET SEISMIC QUALIFICATION
4101986004	1986	Reactor Scrams Due to APRM Upscale Trip
2821986007	1986	Deficiencies in Raychem Splice Installations Due to Inadequa
4821986062	1986	Control Room Ventilation Isolation Signal - Power Removed Fr

4401986074	1986	DEFICIENT WORK PACKAGE FOR CHANGING TRANSFORMER GROUNDING RE
3111986010	1986	S.3.7.11 Non-Compliance - Fire Barrier Penetration Discovere
3971986033	1986	10CFR Part 21 Report - Incorrect Sizing of Cables
2931986024	1986	Non-fire Resistant Coated Structural Steel
3011986006	1986	Reactor Trip Signal Generations Due to Work Activities Durin
4821986054	1986	Moderate Loss of Physical Security Effectiveness Caused By C
3331986017	1986	Reactor Scrams While Shutdown Due to Disturbing Neutron Moni
4541986027	1986	Reactor Trip Due to Damaged Test Cable Caused by Personnel E
2951986037	1986	Technical Specification Fire Watch Not Posted Due to Personn
4611997035	1986	Divisions 1 and 2 Battery Chargers Incapable of Supplying Fu
4611998013	1986	Remote Shutdown Panel Operation of Reactor Core Isolation Co
4611998026	1986	Incorrect Supplier Design Results in Inoperable Electric Pow
2441986007	1986	Fire Detection Surveillance Interval Exceeded Due to Schedul
2801986025	1986	Manual Reactor Trip Due to Second Dropped Rod
3351986009	1986	MANUAL REACTOR TRIP DUE TO ISOPHASE BUS PROBLEMS AND AUTOMAT
3881986013	1986	Intermediate Range Monitor Spikes During Refueling Cause Scr
4831986034	1986	Personnel Errors Resu ted in Missed Continuous Firewatch
4821986046	1986	Error During Surveillance Testing Causes Control Room Ventil
3971986027	1986	10CFR PART 21 REPORT - DEFECTIVE CABLE/CONDUIT WEIGHT ENGINE
3621986012	1986	Fuel Handling Isolation System (FHIS) Spurious Actuations
3681986013	1986	Inoperable Containment Building Pressure Transmitter
3411986021	1986	Reactor Water Cleanup Isolations
3271986032	1986	PERSONNEL ERROR RESULTED IN FIRE BARRIER BREACHES GREATER TH
3161986022	1986	Two Power Range Nuclear Instrumentation Channels Inoperable
3461986030	1986	Fire Protection Deviations, License Condition 2.C(4).
3481986008	1986	Short in Containment Penetration Module Causes Reactor Trip
1551986005	1986	NEUTRON MONITORING SYSTEM CABLE FAILURE RESULTING IN REACTOR
2711986013	1986	High Flux Signal Scram Resulting From Crossed Cables and Ino
3821986013	1986	Improper Connection of Control Assembly Resulted in Reactor
3041986016	1986	REACTOR TRIP DUE TO LIGHTNING STRIKE
3741986012	1986	Improper Terminations at Environmentally Qualified Equipment
2491986008	1986	DRYWELL RADIATION MONITOR FAILURE CAUSED BY PERSONNEL ERROR
3251986017	1986	LATE PERFORMANCE OF REQUIRED HOURLY FIRE WATCHES
2491986007	1986	AUTOMATIC INITIATION OF STANDBY GAS TREATMENT AND ISOLATION
3131986005	1986	Unsealed Fire Barrier Penetrations Between Yard Area Manhole
3381986012	1986	FIRE DETECTION SYSTEM OUT OF SERVICE GREATER THAN 14 DAYS
2601986008	1986	CONTAINMENT ISOLATION INITIATION FROM PCIS POWER LOSS
2721986012	1986	REACTOR TRIP FROM 100% - MAIN GENERATOR PROTECTION (APT DIFF

4231986038	1986	PRESSURE BOUNDARY VIOLATION WITHOUT PROPER NOTIFICATION
2491986006	1986	Group II and Group III Primary Containment Isolation Due to
2951986024	1986	INOPERABLE FIRE BARRIER
3341986004	1986	INADEQUATE FIRE PROTECTION SYSTEM SURVEILLANCE TEST
3121986010	1986	Redundant Cabling in the Same Fire Area
4161986019	1986	FIRE RATED PENETRATIONS NOT PROPERLY SEALED
2711986006	1986	UNANTICIPATED SCRAM DURING LPRM CABLE TESTING/ TROUBLESHOOTI
3641986006	1986	Technical Specification Action Statement Requirements Not Me
4581986039	1986	Reactor Scram On Turbine Trip Due To High Vibration Signal
3971986013	1986	Reactor Protective Trip Due to Spurious High Neutron Signal
4091986017	1986	DEGRADED FIRE BARRIER
3161986017	1986	Degraded Fire Seal Caused by Personnel Error
2191986009	1986	SCRAM SIGNAL RECEIVED DUE TO NEUTRON INSTRUMENTATION NOISE
2471986013	1986	ELECTRICALLY UNQUALIFIED PENETRATION DURING POSTULATED SUBME
3161986016	1986	ESF Actuation Signal From Shorted Wiring
3241986014	1986	Spurious IRM Signal Causes RPS Actuation
3541986009	1986	Inadvertent RPS "A" Trip System Initiation During Surveillan
4141986008	1986	Termination of Containment Air Release Due to A Spurious Rad
2891986009	1986	Environmental Qualification of Reactor Bldg. Emergency Cooli
4401986006	1986	Neutron Monitoring System Spikes Result In Manuel and Automa
0291986003	1986	Failure to Comply With A Technical Specification Action Stat
3541986003	1986	Bumped IRM Cable Causes RPS Actuation
3241986012	1986	Maintenance Error Causes Automatic Isolation of Reactor Wate
3461986018	1986	Breaching a Fire/Nega ive Pressure Barrier by Personnel
3871986011	1986	IRM/SRM SPIKES WITH SHORTING LINKS REMOVED
4401986001	1986	ELECTRICAL NOISE CAUSED SPIKES ON IRMS RESULTING IN RPS ACTU
2541986018	1986	COINCIDENTAL SPIKE OF IRMS WHILE PERFORMING A 4KV UNDERVOLTA
3611986035	1986	Containment Purge Isolation System (CPIS) Actuations
2131986016	1986	INOPERABLE CO2 SYSTEM
4831986004	1986	RPS ACTUATION DUE TO SPURIOUS SOURCE RANGE HI FLUX SIGNAL
3481986004	1986	SHORT IN CONTAINMENT PENETRATION MODULE CAUSES REACTOR TRIP
2601986003	1986	Inadvertent Containment Isolation and Half Scram Signals Whe
2951986006	1986	OBSTRUCTION OF FIRE DAMPER IN CABLE PENETRATION VAULT
2591986007	1986	CONTROL ROD DRIVE INSERT AND WITHDRAW LINES NOT SEISMICALLY
3701986005	1986	FIRE WATCH PATROLS WERE NOT PERFORMED DUE TO A PERSONNEL ERR
2931986003	1986	480 V Safety Related Bus Inadvertently De-energenized During
3231986003	1986	PERSONNEL ERROR RESULTS IN FAILURE TO MEET THE LIMITING COND

3161986004	1986	INOPERABLE FIRE BARRIERS
2541986006	1986	UNIT ONE RX BLDG. VENTILATION ISOLATION DUE TO 1B RX BLDG. V
3041986006	1986	MIS-WIRING OF REACTOR TRIP SWITCHGEAR DURING MODIFICATION
2541986005	1986	1B FUEL POOL RADIATION MONITOR SPIKED UPSCALE CAUSING STANDB
4231986002	1986	REACTOR TRIP DUE TO SOURCE RANGE CHANNEL A
2591986003	1986	Cable Fault Results in Shutdown Bus Transfer
2811986001	1986	Auto Start of #2 EDG from Loss of E Transfer Bus
2771985028	1985	Feedwater Transient Caused Low Level Level Scram and Contain
5281985096	1985	Unanalyzed Fire Areas Due to Engineering Oversight
2781985030	1985	Reactor Scram Signal Due to False IRM High Flux Signal
2371985044	1985	Unit 2 and 2/3 Diesel Generators (D/C) Inoperable Due to Dam
2601985019	1985	Inadvertent Containment Isolation
2541985020	1985	Auto-Start Signal Sent to Standby Gas Treatment System Due t
2851985012	1985	Failure to Post Continuous Firewatch During Halon System Ino
3151985070	1985	Inoperable Fire Doors
4581985053	1985	Reactor Water Cleanup (RWCU) Isolation
3221985055	1985	Environmental Qualification of Electrical Equipment
3351985010	1985	Control Room Ceiling Support Structure Outside of its Design
2541985018	1985	Failure to Maintain Separation Between Division I & II and N
2131985028	1985	High Steam Flow Reactor Trips
3521985087	1985	Reactor Core Isolation Cooling Cables Not Encapsulated
2451985023	1985	LLRT Failures
2781985017	1985	Reactor Scram Signal Due to False IBM High Flux Signal
2771985022	1985	Actuation of RPS, ECCS, and PCIS Due to Loss of Feedwater
4831985045	1985	Technical Specification 3.7.10.2 Violation Due to Personnel
2201985019	1985	Potential Condition of Not Meeting Tech. Spec. Closure Time
3041985021	1985	Inadvertent Trip of tPurge Due to Spurious 2RIA-PR40 High Ra
3251985054	1985	Automatic Actuation of Control Building Emergnecy Air Filtra
4831985043	1985	T/S Hourly Firewatch Patrol Missed
3171985012	1985	Main Turbine Trip Due to a Grounded Feedwater Heater Level C
3481985016	1985	Shorts in Containment Low Voltage Control Penetration Module
2591985051	1985	Deteriorated Cable in Reactor Protection System
3251985051	1985	Reactor Protection System Actuation During Unit 1 Refueling/
3341985016	1985	OT-Delta-T/OP-Delta-T Reactor Trip
2201985015	1985	Discovery of Cable Separation Discrepancies
2541985016	1985	Refuel Floor Monitor Spike and Start of Standby Gas Treatmen
2781985021	1985	Nine Reactor Scram Signals Due to False IRM High Flux Signal
3951985021	1985	Missed Hourly Fire Watch
3251985045	1985	Reactor Protection System Actuation During Unit 1 Refueling/
3521985070	1985	Ineffective Fire Seals
2131985022	1985	Inoperable Fire Barrier

3121985016	1985	Spurious Closure of DHR Dropline Isolation Valve
3971985054	1985	Failure To Conduct Fire Tour
4161985030	1985	Reactor Scram Due to Main Generator Trip
4541985078	1985	Reactor Trip
2131985021	1985	Inoperable Fire Barrier Penetration
2751985027	1985	Containment Ventilation Isolation
2751985025	1985	Containment Ventilation Isolation
3971985050	1985	Fire Protection System Inoperable In Cable Spreading Room
4131985046	1985	Inoperable Fire Barrier Penetration
3481985013	1985	Reactor Trip
3611985038	1985	Improper Cancellation of a Continuous Fire Watch
1551985006	1985	Partial Loss of Offsite Communications
4541985068	1985	Reactor Trip on High Negative Flux Rate
3691985023	1985	Electrical Channel Separation Requirements Violated by Tempo
2591985026	1985	Cable Tray Loading
2771985006	1985	Inadvertent Scram On High Neutron Flux
3481985012	1985	Reactor Trip
2862000006	1985	Plant Outside Design Basis Because Cable Separation Criteria
3971985043	1985	Missing Reactor Building Thermolagging for Cable Tray Fire P
3951985017	1985	Separation of Vital Power Cable Trays
3971985041	1985	Feedwater System/Main Turbine Trip Input Logic
3151985028	1985	Inoperable Fire Barriers
3251985035	1985	Failure to Verify Setpoint of Slack Cable Cutoff for Refueli
3521985057	1985	Reactor Core Isolation Cooling Cables Not Encapsulated
3411985022	1985	RPS Actuation During Surveillance Testing
3151985056	1985	Inoperable Fire Barrier
3271985023	1985	Auxiliary Building Ventilation Isolations
3691985019	1985	Missed Eighteen Month Surveillance on Cable Transits
3381985007	1985	Fire Barrier Penetration Left Unsealed Without Fire Watch
3701985016	1985	Safety Train "B" Electray Disconnected and in Contact With T
3971985033	1985	Spurious Reactor Protection System Actuation
3251985031	1985	Reactor Protection System (RPS) Trip During Testing
3121985008	1985	Surveillance Procedure Scheduling Error
3211985017	1985	Possible Cable Tray Seismic Overloading in an Earthquake
3251985019	1985	Automatic Initiations of Control Building Emergency Air Filt
2811985005	1985	CO2 System Lockout
3111985009	1985	Reactor Trip from 100% Dropped Control Rod
3741985022	1985	Unit 2 Reactor Scram
3221985018	1985	ESF Actuation Caused by False High Flux Signal on IRM
2751985041	1985	Emergency Borate Flow Channel Inoperable Due To A Wiring Err
2821985009	1985	Reactor Trip Caused by Broken Air Line
3151985024	1985	Use of Incorrect Sample Point in Obtaining Technical Specifi
3741985021	1985	RCIC Temperature Leak Detection Miswired

2501985012	1985	Engineered Safety Features (ESF) Actuation Emergency Diesel
3151985020	1985	Inadvertent Isolation of Low Pressure Carbon Dioxide System
3411985010	1985	APRM Scrams
3411985008	1985	Reactor Scram Due to False Upscale Trips of IRM H
2201985007	1985	Initiation of Reactor Building Emergency Ventilation Due to
4091985010	1985	Degraded Fire Barrier Penetration
2591985013	1985	Temporary Startup Test Panel Installation
2631985008	1985	Scram Resulting From Offsite Transformer Grounding
4821985010	1985	Technical Specifications Violation - Pre-Action Sprinkler Sy
2781985010	1985	Automatic Start of E-1 and E-3 Diesel Generators
3661985012	1985	Unplanned Actuation Of RPS Logic Channels
3871985015	1985	Fire Wrap Not Installed
2591985012	1985	Design Error in Standby Gas Treatment Cable Routing
3251985015	1985	Automatic Initiations and Manually Initiated Isolations of t
3821985012	1985	Fire Protection Configuration in Fire Zone 27C
3251985011	1985	Reactor Protection System Actuation During Unit 1 Refueling/
3521985036	1985	Fire Barrier Penetration Seal Inoperability
2131985008	1985	Containment Cable Vault Fire Protection System Test
3611985012	1985	Precautionary Evacuation of Fire Watch
2801985008	1985	Lockout of Auto CO2
3971985023	1985	10CFR50 Appendix "R" Cable Fire Protection and Electrical Se
3311985009	1985	RPS Trip Due to Spurious IRM Upscale Trip
4131985020	1985	Reactor Trip Caused By A Loose Power Range Detector Cable
2441985003	1985	Inoperable Fire Detection System
3251985012	1985	Automatic Initations of Control Building Emergency Air Filtr
3481985001	1985	Unsealed Gaps Above Masonry Fire Walls
3051985004	1985	Inadvertent Start of Reactor Coolant Pump
3161985006	1985	Inoperable Fire Barrier
3311985004	1985	APRM RPS Trip While in Shutdown
3641985006	1985	Inoperable Containment Sump Level Recorder
3271985009	1985	Inoperability of Rod Position Indication (RPI) System
2201985001	1985	Automatic Initiation of Reactor Building Emergency Ventilati
3521985015	1985	Failure to Establish Fire Watches
2771985023	1985	Failure to Comply With Cable Separation Criteria In FSAR
2961985002	1985	Manual Scram of Unit 3
2751985004	1985	Thirty (30) Days Reporting Period Exceeded
3611985002	1985	Toxic Gas Isolation System (TGIS) Actuation From Loss of Ins
2631984032	1984	Scram Due to IRM Spike During Surveillance Testing
4131984032	1984	Inoperable Fire Barrier Penetrations
3381984025	1984	Inoperable Fire Detection System In The Unit 1 Emergency Swi
4541984023	1984	Misaligned Rods
3251984034	1984	Automatic Reactor Scrams Due to Spurious Upscale Trips of In
4541984020	1984	Source Range Channel Spiking

3701984031	1984	Reactor Trip on Overtemperature-Differential Temperature
3151984028	1984	Missed Hourly Inspection of an Inoperable Fire Door
3521984021	1984	Reactor Water Cleanup Isolation Valves
3151984027	1984	Missed Hourly Inspection of an Inoperable Fire Door
2131984021	1984	Reactor Trip Due to Spurious High Setup Rate
4161984050	1984	Fire Barriers Omitted From Safe-Shutdown Related Cables
3521984002	1984	Engineered Safety Feature Actuation Full Scram Signal
2131984022	1984	Inoperable Fire Barrier Penetration
2801984021	1984	Inoperable CO2
2471984020	1984	Inoperable Fans in Cable Tunnel
2851984022	1984	Non-Functional Fire Barriers
3611984062	1984	CPIS Train A Actuation Due to 2RE 7804C Failure
3251984029	1984	Automatic Actuation of Control Building Emergency Air Filtra
3091984013	1984	Unsealed Cable Penetration in Control Room
3021984019	1984	Failure to Verify Operability of Cable Tunnel Sump Pump
4831984047	1984	Unplanned Reactor Trip
2131984017	1984	Degraded Wiring of Reactor Protection and Control Instrument
3311984037	1984	IRM Scram
3161984027	1984	Cardox Fire Protection System Isolated without a Fire Watch
4831984042	1984	Unplanned Reactor Trip and Feedwater Isolation Signal
2471984013	1984	Deficient Fire Dampers
3051984016	1984	Inadvertent Actuation of Train "B" Zone SV
2631984027	1984	Start of Emergency Diesel Generators Due to Loss of Voltage
4091984016	1984	Reactor Scram During Maintenance on Nuclear Instrumentation
3951984039	1984	Degraded Fire Barriers
2441984010	1984	Inoperable Fire Suppression System
3621984034	1984	Missing Conduit Fire Wrapping
2801984018	1984	Fire Door Open
3151984020	1984	Obstruction Of Fire Dampers
3871984046	1984	Fire Barrier Penetration Not Sealed
3161984026	1984	Inoperable Fire Damper
3461984012	1984	Inoperable Fire Barrier Penetration Into Channel 2 Cabinet o
3241984008	1984	Reactor Protection System Actuation During Unit 2 Refueling/
3611984041	1984	Fire Protection Program Discrepancies
3211984005	1984	Cable Separation, Unlanded Cables, and Open Links
3331984017	1984	Missed Fire Watch
2771984014	1984	Cable Spreading Room Cardox System Out-of-Service Without Co
4831984014	1984	Manual Reactor Protection System Actuation
3681984017	1984	Degraded Fire Barrier
2471984007	1984	Failure to Maintain Continuous Fire Watch
3151984013	1984	Failure to Maintain Fire Watch
2551984010	1984	Thermal Degradation of Cable Insulation
2771984012	1984	Inoperable Fire Damper at PBAPS Cable Spreading Room

3971984064	1984	Reactor Protection System - Channel 'B' Circuit Breaker Trip
3611984034	1984	Failure to Establish Fire Watch
2201984011	1984	Reactor Scram When Putting Mode Switch to Shutdown
2541984009	1984	Reactor Scram
2801984010	1984	Appendix R Review
3731984026	1984	Electrical Cable Penetrations Inoperable
2591984021	1984	Failure to Meet Design Basis for Cable Separation
3251984005	1984	Automatic Actuation of Control Room Emergency Filtration Tra
3611984024	1984	Fire Protection Program Deficiencies
3731984024	1984	Electrical Cable Penetrations Inoperable
2451984005	1984	Local Leak Rate Test Failure
3971984031	1984	10CFR56 Appendix 'R' Cable Fire Protection
3971984037	1984	Loose Parts Detection Channel 6 Failure
3161984009	1984	Improperly Isolated Cardox Fire Protection System
3881984002	1984	Core Alterations Performed with SRM Channel 'A' Inoperable
3951984021	1984	Damaged Kaowool Fire Barrier
3161984022	1984	Improperly Isolated Cardox Fire Protection System
3331984011	1984	Failure of Redundant Radiation Monitors
2501984011	1984	Engineered Safety Feature Actuation - Turbine Runback
3871984021	1984	Raceway Fire Barriers not Installed
2631984013	1984	Emergency Diesel Generator Auto Start Due to Fault on No. 1A
3731984018	1984	Butt Splices in Control Cables
3611984015	1984	Fire Protection Program Deficiencies
3481984008	1984	Fire Barrier Penetration Not Properly Sealed
3871984011	1984	Unintentional Initiations of CREOASS and SBGT
2201984019	1984	Failure to Submit Special Fire Report
3731984009	1984	Noncoincident Scram
3731984010	1984	RPS Activation from A IRM
3731984008	1984	IRM Cable Bumped
3481984019	1984	Unsealed Interior of a Conduit in a Fire Barrier Penetration
3871984007	1984	Transverse Incore Probe Explosive Shear Valve Closure Cuts T
3311984007	1984	1/2 Group III Isolation
3971984004	1984	Reactor Shutdown - IRM Failures
2801984002	1984	Reactor Trip
3361984004	1984	Neutron Detector Wiring Problem
3951984004	1984	Degraded Fire Barriers
3741984002	1984	Reactor Scram
3611984001	1984	Fire Protection Program Deficiencies
3741984001	1984	"E" IRM Unit 2 Scram
2651984001	1984	Unit Scram While 'A' RPS Bus Was Out of Service
2541983048	1983	Stack Radiation Monitor Inoperable
3281983191	1983	Rod Position Indicator Declared Inoperable due to Erractic B
3971983001	1983	Fuel Handling Interlocks Inoperable

2601983082	1983	Recirculation Pump Trip
3691983120	1983	Fire Barrier Penetration Declared Inoperable
2891983047	1983	Fire Seals Missing
3701983088	1983	Invalid Fire Alarm Recieved for Fire Detection Zone
3151983123	1983	Cable for Acoustic Valve Monitor Accelerator Inadvertently C
3211983124	1983	TIP Detector Cable can not be Withdrawn
2891983046	1983	Update on Imroperly Routed Instrument Cables
3381983086	1983	Penetration in a Fire Wall Found Open
3361983030	1983	Enclosure Fuel Building Filtration System Train Declared Ino
3251983061	1983	IRM Control Rod Block Function Inoperable
3891983075	1983	Fire Doors Found Open
2201983040	1983	Main Steam Radiation Monitor Fails
3161983114	1983	Carbon Dioxide Fire Protection System
3661983130	1983	RWCU System Differential Flow Indicator Indicates Erraticall
3461983065	1983	Essential Conduit Improperly Supported
3021983054	1983	Emergency FW Flow Indicator Inoperable
2891983044	1983	AFW Circuit Cables Routed in Same Cable Bundle
3251983051	1983	Two Source Range Monitors Inoperable
3871983156	1983	Update on Safety Relief Valve Acoustic Monitor Trip
3161983106	1983	Testing Analog Rod Position Indication, Channel Declared In
2821983030	1983	Inoperability of Diesel Cooling Water Pump No. 22
3161983104	1983	Fire Door Fails to Latch
3271983152	1983	Nitrogen Supply Valve to Reactor Coolant Drain Tank Inoperab
3181983060	1983	Flooding in Control Rooom Affects CEA Electrical Equipment
3661983115	1983	Reactor Water Cleanup System Indicator Fails Downscale
3611983097	1983	Spurious Fire Protection System Deluge Actuation Occurs
3891983068	1983	Numerous Fire Doors Left Open
3341983025	1983	Nuclear Instrumentation Power Range Channel Fails Twice
2691983017	1983	Possible Water Leakage Into Safety Conduit
2551983068	1983	Failure to Complete Hourly Fire Tours
3691983096	1983	Steam Relief Radiation Monitor Fails
3331983044	1983	Update on Two Inoperable Drywell Particulate Monitors
3691983085	1983	Steam Generator Blowndown Valve Limit Switch Fails
3701983050	1983	Steam Generator Blowdown Valve Limit Switch Fails
3701983051	1983	Rod Posiiton Indication Lost
3891983058	1983	Fire Doors Found Open
3161983088	1983	Discovery of a Non-Functional Fire Seal
4161983144	1983	Standby Service Water Loop "A" Radiation Monitor Inoperable
2541983034	1983	Recirculation Pump Discharge Valve Inoperable
3691983077	1983	Loose Parts Monitor Declared Inoperable
3621983065	1983	Containment Radiation Monitor Fails Low
2801983036	1983	Low Pressure CO2 System Inoperable
3621983059	1983	Main Steam Line Radiation Monitor Has Loose High Voltage Con

3161983083	1983	Five Doors Exceeded the Maximum Initial Opening Force Specif
3891983046	1983	Fire Doors Found Open
3311983031	1983	Torous Level Recorder Input Cable Breaks
2671983030	1983	Reactor Experiencing Impedance Variations.
3681983035	1983	Update on Safety Equipment Subject to Flooding
4161983115	1983	Incorrect Volatage Applied to Division I Control Circuits
3681983033	1983	Update Inadequate Fire Door
4161983111	1983	Unexpected Isolation of Shutdown Cooling and Control Room Fr
3621983047	1983	Deluge Spray System Inadvertently Activated
4161983091	1983	Operator Terminates LCO Prematurely
2541983031	1983	Two Open Fire Barriers
3251983031	1983	Four Intermediate Range Monitors Fail
3461983041	1983	Fire Dampers Inoperable and Fire Barrier Missing
3151983074	1983	Four KV Breaker Cable Suffer Insulator Damage
3111983039	1983	Control Rod Inoperable
3021983025	1983	Cable Tray Could Potentionlly be Overloaded
2201983016	1983	Two Steam LIne Radiation Monitors Inoperable
2931983042	1983	Numerous Finre Barriers Missing
3161983068	1983	Fire Door No. 386 Improperly Latched
3681983032	1983	Unsealed Fire Barrier Penetration
3611983091	1983	Cable Riser Fire Seals Missing
3461983031	1983	Tornado Could Cause Cholorine Detector Failure
2771983020	1983	Numerous Inadequate Fire Barriers
3681983026	1983	Deficient Fire Barriers
3161983062	1983	Fire Dectector Failures
3381983031	1983	Fire Door Would not Latch
3171983031	1983	Automatic Trips for Reactor Protection Systems Inoperable
2551983039	1983	Recombiners Causes Potential Overload
3871983076	1983	Control Structure Door in Support Unit Battery Testing
2871983007	1983	Update Online in Control Cable to Letdown Valve
3251983020	1983	2 IRM Channels Inoperable
2931983027	1983	Fire Door Nor Completely Operable
2371983040	1983	Main Steam Line Fuse 590-702E Found Blown
3701983016	1983	Steam Relief Radiation Monitors Declared Inoperable
3611983045	1983	Reactor Trip Breaker Trips Open
3701983013	1983	Spurious Operation of Several Fire Alarms on Different Occas
2931983025	1983	Fire Door Sticks Open
3281983059	1983	Eratic Operator of Rod Position Indicator
2691983012	1983	Update on CCW Emergency Discharge System Inoperable
3161983036	1983	The Cable Vault Halon System Failed
3951983036	1983	PZR Safety Valve Performance Failed to Open
3951983034	1983	Update on RHR Pump Motor Failure
3151983031	1983	The Outer Door of the Pesonnel Airlock Failed to Open

2511983002	1983	Update on Spent Fuel Assembly Drops
3151983025	1983	The Cable Vault Halon System Declared Inoperable
3621983035	1983	Cable Gallery Fire Spray System Spuriously Actuates
3621983033	1983	Cable Riser Fire Spray System Spuriously Activates
3211983038	1983	Torous Room Steel Beam Supported by Clamps
3211983036	1983	Conduit Supports of RHR LPCI System Damaged
3661983014	1983	Diesel Generator Room Fire Door Blocked Open
2541983013	1983	MSIV Air PIlot Valve Loses Temperature Indication
3151983019	1983	Containment Air Lock Interlock Fails to Operate
3951983024	1983	Main Steamlinew Radiation Monitor Experienced Spurious Alarm
3951983022	1983	Conduit Containing Smoke Detector Ciruits Cut During Core Dr
3701983002	1983	Rope Dropped Into the Reactor Vessel and Became Wrapped Arou
3151983021	1983	Containment Airlock Interlock was Found Inoperable
3611983020	1983	Two Train's Control Room Emergency Air Cleanup Systems Decla
3621983030	1983	Cable Tunnel Spray System Spuriously Actuates
3621983038	1983	Update on Deluge Panel Internals from Cable Tunnel Spray Sys
3211983019	1983	Erroneous Signal from 3 IRM's in the B Trip System
3681983010	1983	Update on Startup Transfer Connectors Fires
2721983016	1983	Containment Air Particulate Monitor Inoperable
3161983024	1983	Control Air to Containment Isolation Valve was Closed and De
3241983023	1983	Two Intermediate Range Monitor Inoperable
3271983019	1983	Rod Position Indicator Declared Inoperable
2891983002	1983	Three Radiation Monitors Deenergized
4161983043	1983	Smoke Detectors Alarmed Spuriously
3251983009	1983	APRMs have too Few Inputs
3131983003	1983	Update on Zero Drift of Reactor Building Pressure Transmitte
2191983002	1983	Startup Transformer Removed from Service
3621983012	1983	Hot Leg Temperature Indicator Fails Surveillance
3251983010	1983	Rainwater Leaks to Reactor Building Through Penetration Fire
3161983010	1983	North Ventilation Damper Failed to Close
3161983019	1983	The Auxiliary Cable Vault Experienced an Inadequate CO2 Disc
3621983004	1983	Wrong Connector Installed on Primary Coolant Temperature Ind
3251983003	1983	Average Power Range Monitors E and F Rendered Inoperable
3161983015	1983	Area Vacated Due to Proper Number of Firewatces
4161983030	1983	Trouble Alarm on Halon Fire Control Panel
4161983001	1983	Update on Two Open Electrical Penetrations
3681983002	1983	Intake Structure Exhaust Fan Inoperable
4161983010	1983	Update on Deficient Cable Fire Protection
4161983011	1983	Update on Numerous Open tire Barriers
3341983001	1983	Firre Barrier Penetration Discovered Unsealed
3181983002	1983	Update on RHR Pressure Indicator Failure
3161982114	1982	An Inoperable Penetration Fire Barrier
2891982016	1982	Void Found in Fire Barrier

3731982174	1982	No Determination for the High Voltage Cable Leading to IRM
4161982178	1982	Update on Open Fire Barriers in Control Room
3621982011	1982	Fire Dectectors Removed to Repair Cables
4161982168	1982	Fire Doors Blocked Open
4161982176	1982	The Fire Barriers were Broken iN Order to Pull Cables Throug
4161982165	1982	Division I and II Diesels were Declared Inoperable
4161982172	1982	Update on Penetration Opened for Maintenance Activity
3331982053	1982	The LPCI "B" Side Battery was Removed from Service
3241982131	1982	Update on Radiation Monitor Failure
3611982155	1982	Two Fire Spray Systems Inoperable to Repair Leaking Valve
4161982166	1982	Update on Open Fire Barriers in Control Building
3211982100	1982	Vandals Cut Newly Installed Cables
2551982044	1982	Feeder Breakers Overloaded
3641982050	1982	Source Channel was Declared Inoperable
4161982150	1982	Update on Five Open Penetrations
2801982113	1982	RR-175 Malfunction
3381982077	1982	A Loose Calbe Connection at the Motor Operator of MOV-1536
4161982142	1982	Fire Barriers were Broken in the Control Room to Allow Cable
3871982043	1982	Failure to Provide Adequate Design for the Penetration Circu
4161982138	1982	Udate on Missing Duct Covers
3151982111	1982	The Unit 2 Auxiliary Cable Vault (zone 11) Experienced an In
3161982092	1982	A Pyralarm Detector Alarming for no Apparent Reason
3151982098	1982	Cause Misinterpretation of Tech Spec Requirements
4161982106	1982	Update on Fire Barriers Incompleted Installed
4161982122	1982	Update on Improper Removal of Hatch Cover
2891982015	1982	Fire Penetration Seal Which Degraded During Plant Modificati
3951982034	1982	The Radiation Monitor (Main Steam Line C Monitor) Failed tot
3021982068	1982	Insuffcient Clearance for the Coaxial Cable in the Transmitt
3161982089	1982	The CO2 Fire Protection System in the Auxiliary Cable Vault,
3361982045	1982	Power was Lost from Facility One Control Room Air Conditioni
4161982126	1982	Update on Open Fire Barriers in Control Room
3171982065	1982	The Radioactivity Monitoring System was De-energized Renderi
3251982113	1982	SRM System Channel Functional Test
2441982025	1982	Fire System Inoperable Greater Than 14 Days
3161982084	1982	The Isolation Switch for the Low Pressure CO2 System was in
4161982102	1982	The Fire Barrier was Broken to Perform Maintenance
2601982030	1982	A Pinhole Leak in a 3-inch Fire Protection Line Caused by a
3251982102	1982	Srm A was Rendered Inoperable Due to a Broken Detector Cable
2781982019	1982	Gap Found in Fire Barrier
3951982012	1982	The Reactor Building High Range Randiation Monitor Experienc
3871982028	1982	The Fire was the Result of Accidental Grounding of a Live Bu
2601982029	1982	A Pinhole Leak in a 3-inch Fire Protection Line Caused by a
3681982029	1982	Update on Inoperabillty Battery Room of Fire Curtain

4161982085	1982	Three Secondary Containment Penetrations Were Opened for Cab
4161982075	1982	The Steam Tunnel Dire Door Was Open With No Fire Watch Avail
3391982060	1982	The Fire Door was Found Blocked
3391982062	1982	The Emergency Switchgear Room and Cable Vault were Installed
3871982021	1982	The Light Failed to Function as Result of One 28V Conductor
4161982060	1982	Update on Missing Detectors in Aux Building Stairwell
3871982018	1982	The SRM's were Inoperable Due to Inadvertent Stressing of th
4161982063	1982	The Seals were Broken in Order to Route Additional Cable
2511982012	1982	Boric Acid Flowpath Heat Tracing Circuit
3381982050	1982	Several Fire Doors bit Included in Periodic Testing
2591982064	1982	Update on Cable Tray Fire Situation Failures
3391982053	1982	The RSS was Deenergized to Remove Oil which it had Sprayed
3951982003	1982	An Isolation Valve in the Fire Service System was Found Clos
3121982024	1982	A Class I Cable Tray had Two Supports Cut ack and Replaced w
3171982048	1982	WRNI Channel B was Declared Inoperable
4161982049	1982	Inspection Revealed Some 27 Barriers not Intact
4161982048	1982	The Unsealed Fire Barrier was Due to Construction Oversight
2961982034	1982	Inoperablility of Automatic Initiation Logic for one Fire Pr
3151982065	1982	Fuel Assembly Became Hung up on the Containment Upender Cabl
4161982038	1982	Malfunctioning Hardware Associated with the Security/Fire Pr
4161982036	1982	The Zone 1-23 Smoke Detector in the Upper Cable Spreading Ro
3151982062	1982	Fire Door #415 would not Fully Close on Two Occassions
3341982026	1982	Accident Monitoring Instrumentation - Subcooling Margin Moni
2771982018	1982	The Failure of a Fire Damper to Close
3461982035	1982	A Degradation of Insulation in the NI-1 Signal Lead Containm
3871982026	1982	It was Determined that Certain Cables Specified in a Deficie
4161982007	1982	The System Design did Not Include Fire Detectors for the Ide
3341982023	1982	Power Range Excore Detector Inoperable
2191982040	1982	Signal Input Disconnected
3251982077	1982	The Erractic Output Showed Characteristics of a Detector Sea
3691982060	1982	Water Leaking into the Data Gathering Panel (DGP) Causing th
3641982029	1982	River Water Pump was Declared Inoperable when it's Motor Tri
2811982026	1982	Improperly Sealed Electrical Penetration
3381982045	1982	The Emergency Switchgear Room and Cable Vault was found Bloc
3351982025	1982	Pressurizer Safety Valve Acoustic Flow Position Indicator
3731982054	1982	The Reactor Ventilation Process Radiation Monitor
3181982029	1982	Containment Radiation Monitoring System reading Low Thus Dec
3611982014	1982	Refractory to Fire Barrier Joint Seals Missing Required Mast
3271982068	1982	The Condenser Vacuum Exhaust Radiationi Monitor was Declared
3151982045	1982	The CO(sub 2) System was Apparently Left Isolated
2891982010	1982	Failure of ESAS Channel RC5A
3731982001	1982	Diesel Fire Pump Tripped After # Minutes of Running
3211982019	1982	Penetration Seals found Breached in Unit 1 and Unit 2

3461982018	1982	Loss of One Source Range Indication Due to a Cut Cable
2801982038	1982	Nuclear Instrumentation 41 Failure
2591982017	1982	Details Concerning Reactor Water Indicator Reading 0 Inches
3021982017	1982	Water Leaking in the Transmitter
3611982007	1982	Cable Riser Shaft Water Spray Fire Protection System Activat
3461982013	1982	A Broken Wire in the Cable Connector in Penetration Box
3181982005	1982	Failure to Completely Install the Barrier Prior to Mode 3
3021982010	1982	Leaks in the Roof
3341982005	1982	Penetration Fire Barriers
3341982044	1982	Penetration Fire Barriers
3691982014	1982	The Process Radiation Monitoring System-Containment Gas Moni
3341982004	1982	Unkown Cable Failure
2801982013	1982	Inoperable Control Rod and Power Tilt > 2%
3691982010	1982	Continuing Failure of Digital Rod Position Indication
2811982008	1982	Loss of "B" Reserve Station Service Transformer
3241982015	1982	IRM "C" Previously Declared Inoperable Due to Erractic Indic
3691982001	1982	Non-Seismic Piping Located Above Nuclear Safety Related Equi
3241982001	1982	The Isolation Valve Failed in the Open Position
3461982002	1982	A Fabrication Error in Attaching the Cable Wire to the Conne
3271981154	1981	One Refueling Water Storage Tank Level Transmitter was Decla
2691981023	1981	Control Cables to Valve 1HP-26 do not Meet Separation Criter
3391981087	1981	Failure of the Automatic Closure Mechanism
3461981078	1981	Fire Door 308B Blocked Open
3481981071	1981	Fire Barrier Cable Penetration not Sealed
3691981185	1981	Automatic Valve Closure Causing Loss of Shutdown Decay Heat
3341981101	1981	Reactor Trip System Instrumentation
2801981068	1981	Open Fire Barrier
3281981138	1981	A High Thrust Bearing Temperature was Indicated on Reactor C
3461981072	1981	Failure to Seal Core Bores Through the Control Room Floor
2811981068	1981	Unsealed Penetrations
2191981055	1981	A Broken Cable and the Accelerometer Malfunction
2931981058	1981	The Cable Spreading Room CO(2) System was Declared Inoperabl
3251981072	1981	The Receipt of an Inoperative Trip Circuit Actuation
3691981170	1981	Reactor Coolant Pump 1C was Tripped Due to an Indication of
3391981081	1981	Failed Detector; Faulty Connections
2721981100	1981	Intermediate Range Nuclear Instrumentation - Channel 1 -
2891981011	1981	Seismic
2501981014	1981	The Non-Intact Electrical Penetration Fire Barrier was Incom
2551981046	1981	Inoperable Fire Protection System Annuciator Panel
3021981070	1981	Various Source Range Neutron Flux Monitoring Requirements no
2551981045	1981	Fire Protection System Annunciator Panel Power Supply
2551981043	1981	Inoperable Refueling Radiation Monitor
3111981104	1981	Noncompliance with Facility Operating License DPR-75

3241981107	1981	The Recorder Input Signal Terminal Causing the Downscale Ind
3681981036	1981	A Hole Which was Discovered in a Congested Area of a Wall Be
2931981056	1981	Fire Watch
3691981161	1981	The Rockbestos Coaxial Cable used with Containment High Radi
3151981046	1981	A Cable for the Acoustic Monitoring System, Safety Valve Pos
2751981003	1981	Radwaste Effluent Line Radiation Monitor Failure
3341981079	1981	Reactor Coolant System Leakage Detection Systems
2721981088	1981	No. 2 Fire Pump - Inoperable
2811981061	1981	Open Fire Barrier
3381981074	1981	A Cable Termination Problem at the T-cold RTD
3151981041	1981	The Heaters were Deenergized and Declared Inoperable
3111981085	1981	Noncompliance With Facility Operating License DPR-75
3021981051	1981	Reclassification of the Floor in 1978
2771981038	1981	A Design Error
3161981042	1981	Malfunction of the Interlock was Due to a Cable Being Out of
3151981031	1981	The Elevation Containment Inner Airlock Door Interlock Found
3381981061	1981	A Defective Reaction Chamber Gas Temperature Controller and
3681981029	1981	Two Fire Watches which were not Properly Maintained
2801981034	1981	Fire Barrier penetrations not Sealed
3241981075	1981	Point 1 Inoperable Due of an Open
2601981036	1981	A Alarm for Smoke Detectors in the Relay Room was Received a
2371981045	1981	Power Loss Due to Loose Connection in the Power Supply Cable
3251981055	1981	RTGB Position Indication at Notch Positions
3391981055	1981	A Reactor Trip Occurred Due to a Fault in B Phase Main Trans
2801981017	1981	Fire Barrier Penetrations not Sealed
2801981024	1981	Unsealed Conduit with no Fire Watch
2771981034	1981	Four Safeguards Power Supply Cables were Designated as Non-S
2931981024	1981	Shutdown Transformer
3171981045	1981	Channel "A" Power Rage Istrument was Faulty
3151981013	1981	Both Source Range NI Channels Declared Inoperable
3351981026	1981	CEA-30 Reed Switch Position Indication
3171981026	1981	The Acoustic Flow Indicator for Pressurizer Safety Valve was
2771981032	1981	A Design Error
3681981020	1981	A Sudden Increase of the Neutron Flux Monitor Signals During
2371981026	1981	Failure of Temperature Element Due to an Open Thermocouple
2961981024	1981	High-Pressure Coolant Injection Turbine which Tripped
2691981008	1981	Loss of Automatic Operability for CCW-8 valve
2591981023	1981	A Heat Detector Cable was Damaged, Rendering TE 39-44C Inope
2501981011	1981	Two Electrical Penetration Fire Barriers were Found to be No
3111981014	1981	Incorrect Cable Routing (Fire Protection)
2851981003	1981	The Main Steam Isolation Valves
3691981046	1981	Inspection/Leak Detection Program Considered Applicable to L
2871981008	1981	Reach of Fire Barrier Between Turbine Building and Ventilati

3341981040	1981	A Bad Resistor in the Timer was found Responsible for its Fa
3381981031	1981	Failure of Fire Damper Shutting
3691981049	1981	The Containment Sump Level and Flow Monitoring System was De
3181981020	1981	The Containment Atmosphere Particulate Radioactivity Detecto
3661981026	1981	Due to Inadequate Procedures , Procedure Revised
3361981016	1981	Unreliable Signals from the Linear Power Nuclear Instrumenta
3251981042	1981	A Design Deficiency in the Isolation Ball
2651981008	1981	Two Penetrations Out of 21 Associated with a Plant Modificat
3351981015	1981	PORV Flow Monitor Failure
3691981025	1981	Electrical Cable Tray Hangers Insufficient Seismic Bracing a
3151981006	1981	Cable was Damaged Near the Termination at the Motor Operator
3171981023	1981	Failure of Cable Spreadsing Room not Shutting
3181981016	1981	Circuit Breaker Ground Sensor was Tripped.
2541981007	1981	The Breaker for the Valve Motor was Found Tripped and could
3271981026	1981	Primary Containment Airlock Electrical Penetrations
2801981004	1981	Radiation Monitor Recorder (RR-175) Malfuction
2711981008	1981	An Electrical Connector Accicently Detached from the EGR
3151981003	1981	Requirements of Fire Watch by Personnel Involved With Penetr
3681981010	1981	The CEAC #2 Malfunctioned
2891981003	1981	Wall Penetration Seal Which Was Breached When Core Boring a
2201981004	1981	The Subject Radiation Monitor Signal had been Fluctuating Su
2721981016	1981	Rod Position Indicator Inoperative (2D1)
2721981015	1981	od Position Indicator Inoperative (2D1)
3391981017	1981	The Post Accident Hydrogen Recombiner 2-HC-HC-1 was Started
3211981007	1981	The Cable Spread Room Sprinkler Systems had been Inoperable
3271981011	1981	Cable B30I was Cut While Core Drilling.
2551981006	1981	The Southwest Cable Penetration Room Fire Sprinkler Supply L
2771981006	1981	The 'D' Main Steam Line (MSL) Rad Monitor Failed in the Trip
3181981001	1981	The Upper Subchannel Detector's Field Cable Connector was Fo
3381981005	1981	A Failure of personnel to Follow Porcedures
3681981002	1981	Failure of Masonary Wall would Result in Loss of Cables
3381980106	1980	The Door Failed to Close Properly Due to a Misalignment in t
3211980122	1980	Improper Installation of Hangers Installed Under the Origina
2961980056	1980	Open Wire in Cable Caused Relay to be Dropped Out
3161980035	1980	Rod Position Indication for Rod N-9 did not Respond Properly
2371980046	1980	During a Reactor Scram, Failed to get Alarm 902 -4, F-21 "SD
3241980105	1980	The 'A' TIP Ball Valve was Declared Inoperable
2811980035	1980	Momentary Loss of Emergency Bus
3181980053	1980	The Containment Atmosphere Particulate Monitor Failed and Al
2721980059	1980	Loss of Audio Count Rate Signal
2491980041	1980	Group I Isolation Valve Failure
3331980081	1980	A Wire Physically Preventing Proper Operation of the Carbon
3361980036	1980	Local Power Density and Thermal Margin/Low Pressure Were Dec

2471980013	1980	Model No. Wl-23686, became Defective Due to Moisture within
3361980035	1980	The Cable Spreading Room and East Containment Electrical Pen
3241980054	1980	The Fast Closure Relay Failed to De-energize
2191980044	1980	Actuation caused wet motor leads
3361980033	1980	Two Channels of Wide Range Neutron Flux Instrumentation (NI)
2501980017	1980	Nuclear Instrumentation System Channel N-43
2541980023	1980	Two 4 1/2 inch Fire Barrier Penetrations not Sealed in the F
3241980068	1980	The HPCI System Turbine Control Valve, Would Not Open with t
2691980028	1980	Loss of Power to Elevated Water Storage Tank Level Sensing S
3271980088	1980	The Insulated Control Cable Failed to Meet Environmental Qui
2931980066	1980	The Diesel Fire Pump was Declared Inoperable
2721980047	1980	A penetration fire barrier was open without a fire watch bei
3661980119	1980	A Fire Barrier Penetration Seal Extending through the Floor
2611980014	1980	The Apparent PVC Electric Cable 'Pigtails' used on Eight Pen
3241980047	1980	Pigtails on the Solenoids were Brittle and that During Norma
3241980046	1980	Pigtail Leads for Valves not Enviromentally Qualified
3461980045	1980	Audible Source Range Indication (NIMBINS) inoperable in the
2191980020	1980	The Fire Barriers Protecting Safety Related Areas were not I
3161980025	1980	Failure of the Insulation on the Wiring in the Connection Bo
3211980060	1980	Hanger Modification Sketches Transmitted by the AE to Correc
3211980054	1980	A Cable Separation Problem Exists Relating to the Containmen
3251980037	1980	Several Barrier Pipe and Cable Penetrations and the Main Ste
3111980001	1980	Lack of Fire Barrier
2811980004	1980	Overpressure Imitigating System
3271980055	1980	The Loop 2 Hot leg RTD was found to be Reading about 3F in E
3241980037	1980	IRM H was Inoperable Due to a Power Supply Problem
2851980007	1980	Cable Splices Lacking Documentation
3311980015	1980	The Cable Spreading Room Cardox System Inoperable
2501980007	1980	Fire Stop Surveillance
3241980040	1980	IRM A had Failed Upscale
3661980066	1980	The RCIC Valve 2E51-F045 was Operated Causing a Spurious HPC
2551980012	1980	The Barrier for Fire Penetration HO-12 was Missing
2771980008	1980	A Guillotine Failure of HPCI Steam Supply Piping
3661980052	1980	The Power Cables to the Heaters and Fans were Discovered to
3461980025	1980	Fluctuating Indication on the Absolute Position Indication
3271980018	1980	Reevaluation of Post-LOCA Dose Levels Inside Containment
2631980015	1980	Unqualified Splices Found in MSIV Control Cables
2691980007	1980	Breach Discovered in Penetration Fire Barrier
3171980020	1980	A Fire Barrier Penetration Between U-1 Cable Spreading Room
3361980010	1980	CEA 29 Exhibited Erratic Position Indication and was Declar
2631980007	1980	HPCI-ADS Cable Separation
2721980014	1980	Loss of Off-Site Power Source
3211980022	1980	Lack of Electronic Annunciation on the 112' Elevation West C

3461980015	1980	Control rod 5-11 Absolute Position Indication (API) was Decl
3331980021	1980	IRM 'B' was made Inoperable to Repair a Signal Cable Connect
3311980002	1980	The CO-2 System Tagged Out to Permit Maintenance in the Cabl
2871980001	1980	BWST Level Channel 2 Failed High when Level Transmitter 3LT-
2771980005	1980	Failure of the Diesel Driven Fire Pump
2931980002	1980	Notice No. 79-32 has Revealed a Cable Separation Inadequacy.
2691980003	1980	Breach in Fire Barrier Discovered
3211980008	1980	The Cause of this Event was Desion Deficiency
2691980002	1980	HPSW Pump B was Declared Inoperable
3461980004	1980	Control Rod 5-11 Absolute Position Indication (API) was Decl
3051980001	1980	Aux. Bldg. Special Ventilation Zone (ASV) Boundary Door was
2961980001	1979	The Bus Tie Board was Deenergized

9.2.2 Splice Event Data

Table 17. LER search results for splice OR splices.

LER Number	Event Year	Partial Title (First 60 Characters)
2802018003	2018	Auto-Start of Emergency Diesel Generators due to Pilot Wire
3482016004	2016	Unapproved Environmental Qualification Material Caused Inope
4162016006	2016	Multiple Valid Engineered Safety Feature Actuations
3282015001	2015	Automatic Reactor Trip due to Failure of Main Generator C-ph
3902015001	2015	Manual Reactor Trip Initiated due to Rapid Loss of Main Cond
2612013001	2013	Non-Environmentally-Qualified Splice Rendered Post Accident
2602013002	2013	High Pressure Coolant Injection System Declared Inoperable d
3892013003	2013	2A Emergency Diesel Generator Failed to Start
3882012003	2012	Unit 2 Automatic Reactor Scram While Performing Turbine Cont
3152012002	2012	Unit 1 Exceeded Technical Specification Time Limit to Shutdo
4582012002	2012	Automatic Reactor Scram due to Low Main Condenser Vacuum Res
5282011001	2011	Unit 1 and Unit 3 Emergency Diesel Generator Actuation on Lo
2202010001	2010	Reactor Scram due to Inadequate Post Maintenance Testing
2632008005	2008	Reactor Scram due to Loss of Normal Offsite Power
2502007002	2007	Completion of Shutdown Required by Technical Specifications
2892006003	2006	Automatic Reactor Trip due to a Design Application Deficienc
3062006002	2006	Unit 2 Event Monitoring Instrument Inoperable Longer than Al
3642004001	2004	Technical Specification 3.7.8 Violation due to Operation wit
3902002003	2002	Automatic Turbine/Reactor Trip Due to Main Transformer Prote
2982000008	2000	Non-conservative Drywell Temperature Profile Places Plant in
2441998005	1998	Loss of 34.5 KV Offsite Power Circuit 751, Due to Faulted Ca
3231998003	1998	Technical Specification 3.6.2.3. Not Met Due to Inadequate S
3151998013	1998	Improper Splice Configurations for Power Operated Relief Val
3461997014	1997	Pressurizer Pilot-Operated Relief Valve Setpoint Less Than A
4241997004	1997	UNQUALIFIED CABLING RENDERS ATMOSPHERIC RELIEF VALVES INOPER
2631996014	1996	Unqualified Electrical Splice Found in Train B of the Standb
2551996014	1996	CLASS 1E RAYCHEM CABLE SPICES INSTALLED INCORRECTLY - SUPPLE
4241996005	1996	UNQUALIFIED CABLING USED IN CONTAINMENT SUMP LEVEL TRANSMITT
5281995010	1995	Equipment Qualification Of Air Handling Unit Causes Essentia
2551995007	1995	Licensee Event Report 95-007-Exposed Kapton Cable Insulation
2961994002	1994	A Deficiency Regarding Raychem Tubing Used For Environmental
4541994007	1994	1B Wide Range Hot Leg RTD Indication Spiked Low And Could No
2491994016	1994	Unplanned Partial Group II Primary Containment Isolation Due
5281994003	1994	Raychem Heat Shrinkable 5kV Motor Splice Kit Installation In
2691992017	1992	Inadequate Seismic Support Of Vital Instrumentation And Cont
2551992019	1992	Electrical Connections Not Environmentally Qualified In Posi
2551991002	1990	Non-Qualified Cable Splices Inside Containment

2131990025	1990	Auxiliary Feedwater Flow Instrumentation Potentially Unquali
2951990015	1990	Incorrect Containment Flood Level is Specified in UFSAR
4981989018	1989	Voluntary Licensee Event Report 89-018 Regarding Improper In
2771989020	1989	Environmental Qualification Non-compliance Resulting in Inop
3461989005	1989	Reactor Trip From Full Power Due To Main Turbine Trip On Los
3021989016	1989	Administrative Problems Caused Deficiencies In The Environme
2491989005	1989	HPCI System Declared Inoperable Due to Discovery of Cable Te
3021989010	1989	Inadequate Instructions Lead to Improper Cable Splice Instal
3881989001	1989	MSIV - LCS Valves Inoperable Due to Environmental Qualificat
3021988028	1988	Deficiency in Environmental Equipment Upgrade Program Method
4611988032	1988	Inoperable Containment Isolation Valves Due to Incorrect Doc
4241988036	1988	Improper Cable Splice Leads to Plant Operation Outside Of Te
2371988022	1988	Heat Damage to Upper Elevation Drywell Components Due to Clo
4831988013	1988	Instrument & Control Termination Splices Fail to Meet Enviro
2611988024	1988	Inoperable Containment Fan Coolers Due To Lack Of Environmen
3821988027	1988	Environmental Qualification of Electrical Splices not adequa
2611988020	1988	Reactor Vessel Heat Vent System Not Environmentally Qualifie
3241988012	1988	Inability of High Pressure Coolant Injection System Auxiliar
3121988021	1988	Potential Loss of Equipment Necessary to Mitigate the Conseq
2541988010	1988	Drywell Atmosphere Thermocouples Splices Found Not Qualified
2781988005	1988	Reactor Water Cleanup Isolation due to Moving a Cable with W
3171988004	1988	Containment Penetration Splice Connection Found Not Environm
3281988022	1988	10 CFR 50.49 Unqualified Butt Splice Found On A Steam Genera
2801988008	1988	Low Head Safety Injection Pump Inoperable Due To Failed Moto
4131988005	1988	Cold Leg Accumulator Discharge Isolation Valve Motor Operato
4981988008	1988	Safety - Related Electrical Cable Splices
2471987020	1987	Environmental Qualification of Resistance Temperature Detect
2471987017	1987	Environmental Qualification of Electrical Splices
4821987052	1987	Instrument Termination Splices Installed Which Fail To Meet
4131987043	1987	Technical Specification Violation Due To Inoperable Reactor
3951987025	1987	Environmental Qualification of 600 Volt Taped Wiring Splices
3221987032	1987	Okonite Tape Insulated 'Back to Back' Splices in Primary Con
3481987012	1987	Environmental Qualification of Wiring Splices and Terminatio
3731987027	1987	Emergency Core Cooling Pump System Terminations
3731987026	1987	Residual Heat Removal Pump Motor Terminations Found to be No
1551987008	1987	Non-Qualified EEQ Splices
3091987005	1987	Reactor Coolant System Loop RTD Environmental Qualification
2061987006	1987	Non-Environmentally Qualified Splice Connectors
2611987007	1987	Environmental Qualification Documentation Deficiencies Due T
3091987003	1987	Environmentally Qualified Instrumentation with Questionable
2191987022	1987	Plant Shutdown Required By Inoperable Acoustic Monitor Due T
3441987009	1987	Raychem Splices Improperly Installed
2611987003	1987	EQ Cable Splice Deficiencies

3171987007	1987	Environmental Qualification Discrepancies Requiring Shutdown
4551987001	1987	Reactor Trip Due to 2 Out of 4 Logic on Over Temperature Cha
2801986035	1986	Improperly Installed Raychem Splices on EQ Equipment Due to
2491986024	1986	Unit Shut Down for Repair of Environmentally Qualified Cable
2541986037	1986	DRYWELL PENETRTION BUTT SPLICES FAILED TO REMAIN INTACT WHIL
4611986021	1986	REACTOR WATER CLEANUP PUMP ROOM A HIGH TEMPERATURE TRIP DUE
2811986018	1986	Improperly Installed Raychem Splices on EQ Equipment Due to
2821986007	1986	Deficiencies in Raychem Splice Installations Due to Inadequa
2951986040	1986	Improperly Terminated Instrument Leads on Environmentally Qu
2721986015	1986	Environmental Qualification of Raychem Heat Shrinkable Tubin
3971986019	1986	LIMITORQUE INC. MOTOR OPERATED VALVE EQUIPMENT QUALIFICATION
3461986021	1986	Inadequacies in Raychem Installations
2891986009	1986	Environmental Qualification of Reactor Bldg. Emergency Cooli
2551986003	1986	INADEQUATE ENVIRONMENTALLY QUALIFIED VALVE MOTOR OPERATOR
2551985027	1985	Terminal Block in RPS Circuit
5281985074	1985	Automatic Actuation of Engineered Safety Features Due to Bus
4541985086	1985	Environmentally Unqualified Terminal Strips in MSIV's
3731984018	1984	Butt Splices in Control Cables
2501983015	1983	Heat Tracing Circuit Inoperable
3151983053	1983	Performance of Train B of the Boron Injection Tank Inlet Pip
2811983013	1983	Heat Tracing Failure
3131983003	1983	Update on Zero Drift of Reactor Building Pressure Transmitte
2811982041	1982	Unreliable Steam Generator Level Instrumentation
2191982025	1982	Wire Junction Failed Due to a Combination of Corrosion and
2611981022	1981	The Secondary Channel of Heat Tracing Circuit #70 had Failed
2551981039	1981	Electrical and Environmental Qualification
2801981030	1981	Heat Tracing Failure
2511981002	1981	Boric Acid Flow Could not be Established
3241980070	1980	A Broken Valve Solenoid coil Wire
3241980047	1980	Pigtails on the Solenoids were Brittle and that During Norma
3241980046	1980	Pigtail Leads for Valves not Enviromentally Qualified
3271980055	1980	The Loop 2 Hot leg RTD was found to be Reading about 3F in E
2851980007	1980	Cable Splices Lacking Documentation
2631980015	1980	Unqualified Splices Found in MSIV Control Cables

9.2.3 Connector Event Data

Table 18. LER search results for connector OR connectors.

LER Number	Event Year	Partial Title (First 60 Characters)
3522022001	2022	Unit 1 HPCI Inoperable due to Inadvertent Isolation Signal
3212021002	2021	Low Pressure Coolant Injection Inoperable Longer than the Al
3522020001	2020	Valid Automatic Actuation of the Reactor Protection System w
4432020001	2020	Manual Reactor Trips due to Control Rod Bank Unexpectedly In
3162020001	2019	Failure of Source Range Nuclear Instrumentation Resulting in
3642019002	2019	Manual Reactor Trip due to Misaligned Rod during Low Power P
2932018006	2018	Automatic Reactor Scram due to Feedwater Regulating Valve Ma
2692018001	2018	Unit 1 Manual Reactor Trip due to Main Feedwater Flow Contro
3912017006	2017	Manual Reactor Trip in Response to Indication of Multiple Dr
3642017005	2017	Power Range Nuclear Instrument Inoperable due to Poor Connec
2192017005	2017	Failure of the Emergency Diesel Generator #2 During Surveill
3212017005	2017	Automatic Scram due to Intermediate Range Monitors Spiking U
4402016004	2016	Loss of Safety Function due to Two Inoperable Standby Liquid
3482016004	2016	Unapproved Environmental Qualification Material Caused Inope
3412016001	2016	Turbine Stop Valve Closure and Turbine Control Valve Fast Cl
3272015001	2015	Automatic Reactor Trip due to Negative Rate Trip as a Result
3642014001	2014	Inoperable B-Train Solid State Protection System Results in
4612013001	2013	Inadequate Risk Identification Results in Loss of Safety Fun
3412012004	2012	Operation or Condition Prohibited by Technical Specification
3352012005	2012	Unit 1 Reactor Trip on Turbine Trip
3052012003	2012	Nuclear Instruments Inoperable for Longer Period Than Allowe
2852012002	2012	Inadequate Qualifications for Containment Penetrations Rende
3872012001	2012	Both Control Structure Chillers Inoperable
4232012001	2012	Main Steam Line Pressure Transmitters Declared Inoperable
3662011003	2011	Manual Reactor Scram During Startup due to Too Few Operable
2552011007	2011	Direct Current Electrical System Fault Causes Reactor Trip a
3172011001	2011	Reactor Trip due to a Phase-to-Phase Short Circuit on Main T
2592011007	2011	Multiple Containment System Isolations from Loss of RPS M-G
2202010001	2010	Reactor Scram due to Inadequate Post Maintenance Testing
2512010006	2010	Automatic Reactor Trip due to Spurious High Pressurizer Pres
2602009009	2009	Inadvertent Isolation of the High Pressure Coolant Injection
4562009002	2009	Safety Injection System Containment Sump Isolation Valve 1SI
4402010001	2009	Invalid Isolation Signal Results in Shutdown Cooling Interru
3282008002	2008	Indications of a Dropped Control Rod During Startup
3692008003	2008	Unit 1 Manual Reactor Trip Taken to Mitigate Control Rod Dro
3822008004	2008	Loose Intercell Connecting Bolts on 125 vdc Station Battery
3252008003	2008	Reactor Building Crane Design Inadequacy
4822008003	2008	Manual Reactor Trip due to Loss of Steam Generator Level
4582008002	2008	Automatic Reactor Scram due to Malfunction of Main Turbine C

4402008001	2008	Condition Prohibited by Technical Specifications due to Unre
4002007004	2007	Bare Conductors on 'B' Steam Generator Wide Range Level Bart
2502007002	2007	Completion of Shutdown Required by Technical Specifications
4832007002	2007	Manual Reactor Trip at Reduced Power due to Inadequate Feedw
3172006004	2006	Reactor Trip due to Loose Wire During Maintenance on Turbine
3062006002	2006	Unit 2 Event Monitoring Instrument Inoperable Longer than Al
5282006006	2006	Reactor Trip due to Core Protection Calculator Generated Low
3342006002	2006	Unit Shutdown Completed as Required by Plant Technical Speci
4242006001	2006	Manual Reactor Trip due to Loop 3 Main Feed Regulating Valve
3522006003	2006	Accident Monitoring Instrument Channel Inoperable for Longer
2632006001	2006	Unplanned LCO due to Emergency Filter Flexible Connector Fai
2202005004	2005	Operation Prohibited by Technical Specifications due to Unre
3332005006	2005	Inoperable 115 kV Line in Excess of Technical Specification
3532005003	2005	Operation Exceeding License Maximum Power Level
2372005002	2005	Unit 2 Group 1 Isolation and Resulting Scram
4242005001	2005	Automatic Reactor Trip due to Broken Wire Connector
2502004004	2004	Plant Shutdowns Due to Drop of Shutdown Bank Rod E-11 During
4612004006	2004	Small Amount of Special Nuclear Material in Unirradiated Nuc
2712004003	2004	Automatic Reactor Scram due to a Main Generator Trip as a Re
3542004001	2004	Manual Reactor Scram following Isolation of Primary Containm
2802003003	2003	Control Rod Electrical Connector Pin Defect Results in Manua
3972003003	2003	Shutdown Cooling Isolation Caused by Deenergization of Wrong
2602003002	2003	High Pressure Coolant Injection (HPCI) Inoperability Due to
3902003001	2003	Automatic Reactor Trip Due to Moisture Intrusion into an Ele
4232003001	2002	Reactor Trip Caused by Generator Backup Protection Fault
3172002004	2002	Post-Accident Monitoring Instrumentation Not Seismically Con
5292001002	2001	Reactor Trip Due to Unexpected Closure of Main Steam Isolati
3742001002	2001	Reactor Scram Due to High Turbine Vibration During Testing
2372000005	2000	Recirculation Loop Temperature Failure Causes Shutdown Cooli
4462000003	2000	Core Alterations Had Continued While a Required Technical Sp
2192000007	2000	Plant Operation Outside of the Technical Specifications due
4002000004	2000	Technical Specifications violation due to inoperable Power R
4132000001	2000	Reactor Trip Caused by a Pin to Pin Short Circuit within an
3311999007	1999	Safety Relief Valve Opened During 125VDC Ground Troubleshoot
2721999010	1999	Subcritical Manual Reactor Trip Due To Rod Control System Fa
2861999013	1999	Automatic Actuation of an Emergency Diesel Generator as a Re
2441999011	1999	Small Breach in Ventilation System Results in Plant Being Ou
3151999019	1999	Victoreen Containment High Range Radiation Monitors Not Envi
3871999002	1999	Failure to Maintain Environmental Qualification - Acoustic M
2471999004	1999	EEQ Deficiency in Acoustic Monitors
3681999002	1999	Station Battery Cell-to-Cell and Terminal Connection Tightne
4101998028	1998	Inadvertent Isolation of RCIC and SDC Due to Spurious Trip o
5281998008	1998	Equipment Qualification of Electrical Connectors May Not Be

3871998006	1998	Loss Of Continuous Vent Sampling - Unit 1 Reactor Building
3881998006	1998	Loss Of Continuous Vent Sampling - Unit 2 Tubing Building
3641998001	1998	Manual Reactor Trip Due to Dropped Control Rod K-2 and F-10
3171998006	1998	Action Time Exceeded Due to Failed Diesel Generator Govenor
3881998002	1998	Loss of Continuous Ventl Sampling - Unit 2 Turbine Building
4581997005	1997	Reactor Scram Due To Failure Of A Connector To The Electrica
4831997006	1997	Loss of Annunciators and Unusual Event Declaration Due to Li
2821997008	1997	Unit 1 Reactor Trip Caused by Electrical Ground in Rod Contr
3901997010	1997	Reactor Trip due to Operation of a Generator Protective Rela
4611997003	1997	Failure to Recognize the Impact of Disconnecting Division 1
2501997001	1997	MISSED SURVEILLANCE ON CONTROL ROD POSITION VERIFICATION DUE
4831996004	1996	Manual Reactor Trip During Rod Drop Testing Due to Digital R
3871996014	1996	Technical Specification Required Shutdown
3521996018	1996	Loose Speed Signal Cable Connector Renders the Single Train
3091996026	1996	EQ of Cables/Connectors Inside CTMT may not meet requirement
3611996005	1996	Containment High Range Radiation Monitors Not Environmentall
3731996003	1996	Unit One Reactor Scram due to Spurious Spike of H Intermedia
2751995015	1995	Manual Reactor Trip Due to Loss of Feedwater Due to Design D
3881995014	1995	Technical Specification Required Shutdown
3681995006	1995	Radwaste Area Gaseous Effluent Flowpath Not Continuously Mon
2931995006	1995	Reactor Core Isolation System Made Inoperable Due to a Turbi
5291995003	1995	TS 3.0.3 For Loss of Both Trains of Essential Cooling Water
3331995009	1995	Partial Invalid Isolation of Reactor Building Ventilation
2711995009	1995	ECCS Initiation Signal Received Due To Improperly Seated Ros
4981995005	1995	Failure to Meet the Requirements of Technical Specifications
3411994011	1994	Loss Holddown Screws in the SRM and IRM Instrument Drawers
3741994008	1994	Reactor Scram Due to Electro-hydraulic Control Line Break
4461994014	1994	Manual Reactor Trip Initiated Due To A Digital Rod Position
4551994002	1994	Rod Drive 2bd Power Cabinet Urgent Failures And Subsequent R
4581994025	1994	ADS Valve Inoperable Because Fire Wrap Not Replaced After Ma
3361994027	1994	Channel "B" Linear Range NI Inoperable
3411994006	1994	Core Alterations with Inoperable Source Range and Intermedia
3741994006	1994	Reactor Scram Due to Spurious Opening of Main Turbine Bypass
3541994011	1994	Reactor Protection System actuation - Reactor Scram During r
2201994005	1994	Reactor Scram on High Neutron Flux Caused by an Electrical P
4581994015	1994	ESF Actuation Caused By Pin Failure In Test Equipment Patch
3881994007	1994	Fuel Loaded in Reactor Core Quadrant With Inoperable Source
2751994002	1994	Loss Of Temporary Control Room Annunciator Due To Personnel
3681994001	1994	Technical Specifications Requirements For Logarithmic Power
4821994002	1994	Shutdown Required by Tech. Specs. Due to Control Rod M- 12
3181993004	1993	Axial Shape Index Channel Error Due to Insufficient Troubles
3541993010	1993	Condition Prohibited by Plant Technical Specifications, Entr

3521993010	1993	Actuation of the PCRVICS, an ESF, after a Reactor Enclosure
3111993008	1993	Rod Control System Design Basis Concern (both Salem Units).
3971993007	1993	Reactor Scram And High Pressure Core Spray (HPCS) System Suc
2721993001	1993	Inoperability of Analog Rod Position Indication for Maintena
2771992020	1992	Main Control Room Emergency Ventilation System Actuation due
2201992009	1992	Reactor Scram Due to Failure of LPRM Detector
4451992016	1992	High Winds Damage Transformer Causing An Engineered Safety F
3211992015	1992	Component Failure Results In Group 5 Primary Containment Iso
2721992011	1992	ESF Signal Actuations: Control Rm Vent. Switch To Emer. Mod
1331992003	1992	Violation Of Technical Specification V.A.3 Due To Design Def
2691992003	1992	Reactor Trip Results From Electrical Generator Lockout After
2781992003	1992	Intermediate Range Monitor Spike which resulted in a Reactor
3971992019	1992	Automatic Depressurization System (ADS) Potentially Inoperab
2751992005	1992	Containment Ventilation Isolation Due To Spurious High Radia
4161992006	1992	RPS Actuation During CRDM Changeout Activities
2601992003	1992	Inadvertent Group 4 Isolation During Performance of the High
4401992007	1992	Full Scram Signals Received from a Combination of Half Scram
4611992004	1992	Failure to Prepare a System Impact Matrix Identifying Potent
2551992018	1992	Lack Of Environmental Qualification For Containment Electric
3281992001	1992	Automatic reactor trip precipitated by a turbine trip at pow
2371992005	1992	Violation of Technical Specification Limit for Intermediate
3531992002	1992	Refuel Floor isolation due to failed Geiger Mueller tube in
2721992003	1992	ESF Signal Actuation: Control Rm Vent. Switch Due To 1R1B R
3311991012	1991	Reactor Water Cleanup System Isolation Due to Deformed Conne
2721991035	1991	Engineered Safety Feature signal initiated from the Radiatio
2721991034	1991	2 ESF Signal Actuations; 1R11A Channel Spikes Due To Equipme
4131991027	1991	Vital Battery 1EBB Inoperable Due To Resistance Reading Exce
2691991011	1991	Reactor Trip Results From Electrical Generator Lockout After
4131991021	1991	Turbine/Reactor Trip Due To Installation Deficiency
2501991007	1991	Unit 3 Entered Mode 2 With One Of Two Intermediate Range Nuc
2771991032	1991	Engineered Safety Feature Actuations of the Control Room Eme
2981991009	1991	Spurious Secondary Containment Isolations Caused By Actuatio
3611991012	1991	Environmental Qualification Deficiencies of Containment High
3311991009	1991	Reactor Water Cleanup System Isolation Due to a Blown Fuse i
3331991013	1991	Both Standby Liquid Control Systems Made Inoperable Due to L
4431991009	1991	Reactor Trip Due to Reactor Coolant System Low Flow
3351991005	1991	Reactor Trip from 100% Power on Low Steam Generator Water Le
3021991007	1991	Control Air Tubing Failure Causes Entry Into Technical Speci
2551991011	1991	Seismic Qualification Of Qualified Incore Detector Electrica
2471991009	1991	Improper Installation of CONAX Connectors
3181991005	1991	Reactor Protective System Actuation and Plant Trip Due to a
2721991018	1991	Inop. of Several Components Required For Feedwater Isolation
3521991009	1991	Reactor SCRAM resulting from a Spurious Loss of the DC Elect

3111991006	1991	ESF Actuation: Auto Switch of Control Rm Vent. To Emer. Mod
0291991001	1991	Inadequate Quality Controls Result in Defective Wire Crimps
3111991004	1991	ESF Actuation Signal for Cont. Vent. Isol. Due To Equipment
2721991004	1991	Reactor Protection System actuation: Turbine runback on over
2721991001	1991	ESF Actuation Signal: Containment Vent. Isol. Due To Equipm
2551991002	1990	Non-Qualified Cable Splices Inside Containment
3521990027	1990	Reactor Protection System (RPS) Actuation When an Intermedia
3531990019	1990	Half-scram and various isolations resulting from a loss of p
4581990034	1990	Reactor Protection System Actuation due to Shorting in the C
3091990008	1990	Failure of Environmentally Qualified Limit Switch
2721990034	1990	ESF; Containment Ventilation Isolation Signal; 1R11A RMS Cha
3541990021	1990	Environmental Qualification Concerns With Source Range And I
4981990023	1990	Manual Reactor Trip Due to Full Closure of a Feedwater Isola
2711990011	1990	Full Reactor Protection System Actuation From Spike in a Sha
3311990012	1990	Reactor Protection System Trips During Routine Maintenance W
3131990009	1990	Inadvertent Actuation of the Control Room Emergency Ventilat
2771990019	1990	Control Room Emergency Ventilation System Actuations Due to
4611990015	1990	Inadvertent Shorting of Circuit Card Edge Connectors During
2981990010	1990	Update On Two Local Power Range Monitor (LPRM) Detector Outp
2771990018	1990	Control Room Emergency Ventilation System Actuation Due to a
2771990016	1990	Control Room Emergency Ventilation System Actuations Due to
2771990015	1990	Control Room Emergency Ventilation System Actuation Due to a
3441990030	1990	Containment Ventilation Isolation from an Electronic Signal
4231990019	1990	Reactor Trip Due to Dropped Rod Due to Broken Cable to Stati
3171990018	1990	Axial Shape Index Not Continuously Monitored as Required by
3111990021	1990	ESF Actuations: Cont. Vent. Isol. Due to RMS Equip/Design Co
2721990013	1990	ESF Signal Actuation: Cont. Vent. Isolation On 1R12A Ch. Sp
3821990002	1990	Reactor Trip Caused by Dropped Control Element Assemblies
2601990001	1990	Unplanned Engineered Safety Feature Actuation Due to a Faile
4001990005	1990	Engineered Safety System Feature Actuation Due To A Radiatio
3091990001	1990	Failure Of Environmentally Qualified Limit Switch
3971990002	1990	Automatic Depressurization System (ADS) Inoperable Due To An
2721990001	1990	ESF Actuation; Containment Vent. Isolation -Due To System Eq
2721989036	1989	No. 13 S/G Blowdown Automatic Isolation Due To Failure of Th
4561989017	1989	Control Room Ventilation Actuations Due to Failed Radiation
3331989019	1989	High Pressure Coolant Injection Turbine Due to ELectrical Gr
4001989020	1989	Limitorque Operator Gear Boxes Were Overfilled With Grease R
3681989017	1989	Personnel Error Results in Less than the Required Technical
4991989021	1989	Reactor Trip Due to a Defective feedwater Pump Speed Control
3231989008	1989	Manual Reactor Trip Due To Reactor Coolant Pump Electrical F
2371989021	1989	Inadvertent Group V Primary Containment Isolation to due Wir
3441989017	1989	Reactor Trip on Over Temperature Delta Temperature Signal
3331989013	1989	Primary Containment Purge Valves Isolated by Accidental Grou

3271989020	1989	Failure to perform a proper monthly channel check for the re
3641989007	1989	Reactor Trip Caused by a Loose Electrical Connector on the 2
3111989010	1989	ESF Actuation Signal; Containment Vent. Isol. Due to a Desig
2981989017	1989	Failure of Standby Liquid Control System Squib Valve to Func
2721989018	1989	SSPS Cabinet Connection Unsatisfactory Due To Inadequate Ini
0291989007	1989	Dropped Control Rods Result in Reactor Scram on Low Main Coo
3331989006	1989	Both Standby Liquid Control Systems Made Inoperable Due to L
3281989004	1989	Operational Mode Change Made Without Exception To Limiting C
4611989018	1989	Recessed Connector Center Pin Cause Intermittent Pin Contact
2191989007	1989	Design Deficiency Causes Standby Gas Treatment System Initia
4831989002	1989	Two Engineered Safety Features Actuation Events Due To High
3091989002	1989	Environmental Qualification Discrepancies Identified In Cont
4821988018	1988	Engineered Safety Features Actuation Caused by Failed Radiat
3251988020	1988	Reactor Core Isolation Cooling (RCIC) System (E51) Isolation
3621988008	1988	Fuel Handling Isolation System Train "A" Actuation Due to Fa
3461988019	1988	Improper Crimps on Safety Related Electrical Cable Lugs
2201988017	1988	Automatic Initiation Of Reactor Building Emergency Ventilati
4001988019	1988	Both Source Range Neutron Flux Detectors Inoperable Requirin
4241988024	1988	Failed Connector On Transmission Line Disconnect Leads to Re
3231988008	1988	Reactor Trip and Subsequent Safety Injection Following an El
2541988011	1988	Reactor Core Isolation Cooling System Declared Inoperable Du
4401988019	1988	Failure of Chiller Linkage and Fan Power Supply Causes Loss
3051988006	1988	Spurious Over Temperature Delta Temperature Trip Signal in C
3171988002	1988	Inadvertent Engineered Safety Features Actuation Due to Modi
4101988022	1988	Design Rated Reactor Core Flow Exceed due to Poor Electrical
2981988011	1988	Unplanned Actuation of an Engineered Safety Feature During P
3281988017	1988	Inadvertent Reactor Trip Signal Caused By Manipulation Of A
3241988009	1988	Full Reactor Protection System (RPS) Trip While Selecting a
3231988003	1988	CVI and FHB Ventilation Mode Change due to a Power Supply Tr
3611988006	1988	Spurious Control Room Isolation System Actuations Due To Int
3611988001	1988	Spurious Control Room Isolation System Actuations (3) Due To
2441988001	1988	Higher Than Normal Count Rate on Source Range NIS Due to Fau
4831988003	1988	Containment High Range Radiation Monitors Declared Inoperabl
2501988001	1988	Turbine Runback Due to Dropped Control Rod and Subsequent Ma
4981988004	1988	A Loose or Corroded Toxic Gas Monitor Computer Board Electri
3441988001	1988	Reactor Trip Due to Failed Overpower Delta Temperature Chann
4821987058	1987	Technical Specification Violation Due To Error In Design Doc
3611987031	1987	Manual Reactor Trip Due To Feedwater Isolation Valve Failing
2501987031	1987	Control Room Ventilation Isolation Due to Loss of Power to C
3541987051	1987	Reactor Scram Caused By A Spurious Spike In A Main Steam Lin
4821987054	1987	Engineered Safety Features Actuation Caused By Moisture Indu
3381987023	1987	Kaman Process Vent Normal Range Radiation Monitor Exceeded T
3161987015	1987	Entry Into Technical Specification 3.0.3 Due To Corrective M

2541987022	1987	Reactor Scram While Shutdown - Neutron Monitor Spiked High H
4611987059	1987	Reactor Core Isolation Cooling Isolation Resulting From Cont
2191987035	1987	Reactor Scram with Reactor Shutdown Due to Degraded Electric
3121987042	1987	Amphenol Blue Ribbon Connector Failures Due to Non-Conductiv
3701987016	1987	Reactor Trip Due To Overcurrent Faults In An Instrument Air
3221987028	1987	Meteorological Wind Direction Monitoring Instrumentation Ino
2501987022	1987	Reactor Trip Breakers Open on Unit 3 While at Cold Shutdown
4131987032	1987	Both Trains Of Vital Batteries Inoperable Due To Missed Rese
4611987043	1987	Automatic Actuation of the Reactor Protection System Due to
3951987016	1987	Control Room Ventilation Aligns to Emergency Recirc Mode
2511987019	1987	Turbine Runback Caused By Spurious Spiking In The Rod Positi
2931987010	1987	Full Reactor Scram Signal Due to Spurious Trip of Average Po
2061987010	1987	Containment Isolation System Actuation Due To Loose Power Su
2441987005	1987	Inadvertent Containment Ventilation Isolation During Perform
2061987006	1987	Non-Environmentally Qualified Splice Connectors
2611987007	1987	Environmental Qualification Documentation Deficiencies Due T
4821987019	1987	Engineered Safety Features Actuation - Containment Purge Iso
2951987011	1987	Unit 1 Reactor Trip As A Result Of Source Range 1N31 High Fl
2191987022	1987	Plant Shutdown Required By Inoperable Acoustic Monitor Due T
3611987005	1987	Containment Purge-Isolation System (CPIS) Spurious Actuation
2591987007	1987	Radiation Monitor Connection Faults Cause Control Room Emerg
3221987005	1987	Meteorological Air Temperature Monitoring Instrumentation In
2191987013	1987	SGTS Initiation Caused by Improperly Installed Wire Connecto
4231987010	1987	Loose Part Detection System Inoperable Channel for Unknown R
4611987003	1987	Main Control Room Ventilation System Train "B" Shifted to th
2551987002	1987	Automatic Actuation Of Reactor Protection System
4001987001	1987	Reactor Trip/Digital Rod Position Indication System
3621987009	1987	Containment Purge Isolation System (CPIS) Actuation
3971986037	1986	Plant Shutdown Caused by an Unqualified Component Due to Ina
2061986017	1986	Startup Rate Trip Signal Generated While Shutdown
4141986049	1986	SAFETY INJECTION ON SPURIOUS LOW STEAM LINE PRESSURE SIGNAL
4611986019	1986	Engineered Safety Feature Actuation Due to a Spurious High O
3331986017	1986	Reactor Scrams While Shutdown Due to Disturbing Neutron Moni
3871986034	1986	'A' Drywell Hydrogen Analyzer Channel Inoperable Due to Ampl
2801986025	1986	Manual Reactor Trip Due to Second Dropped Rod
3881986013	1986	Intermediate Range Monitor Spikes During Refueling Cause Scr
3681986013	1986	Inoperable Containment Building Pressure Transmitter
3621986008	1986	Containment Purge Isolation System (CPIS) Actuation
3821986014	1986	Due to Inadequate Work Instructions, Maintenance Personnel I
2721986015	1986	Environmental Qualification of Raychem Heat Shrinkable Tubin
3731986030	1986	Control Room Ventilation Actuation Due to Spurious Radiation
3821986013	1986	Improper Connection of Control Assembly Resulted in Reactor

3951986011	1986	Reactor Trip Due to Inadvertent Feedwater Isolation Valve Cl
4401986027	1986	Personnel Errors During Design Change Installation Cause RWC
3521986029	1986	ESF Actuation Caused by an Incomplete Connection on a Logic
2591986019	1986	Inadvertent Secondary Containment Isolation From Radiation M
3731986021	1986	Control Room Ventilation Actuation Due to Spurious Radiation
2601986008	1986	CONTAINMENT ISOLATION INITIATION FROM PCIS POWER LOSS
4581986039	1986	Reactor Scram On Turbine Trip Due To High Vibration Signal
2191986009	1986	SCRAM SIGNAL RECEIVED DUE TO NEUTRON INSTRUMENTATION NOISE
3161986016	1986	ESF Actuation Signal From Shorted Wiring
3241986014	1986	Spurious IRM Signal Causes RPS Actuation
5291986011	1986	PIN CONNECTORS OF INSUFFICIENT LENGTH RENDER BOTH TRAINS OF
4581986032	1986	Reactor Scram on Reactor Water Level 8
4401986006	1986	Neutron Monitoring System Spikes Result In Manuel and Automa
2721986007	1986	Environmental Qualification Discrepancies
4831986006	1986	ESF ACTUATIONS DUE TO SPURIOUS RADIATION MONITOR SIGNALS
2821986002	1986	Core Exit Thermocouple Connectors Found Assembled Incorrectl
3161986008	1986	ESF Actuation Signal From Shorted Wiring
4831986002	1986	UPDATE ON ENVIRONMENTAL QUALIFICATION FOR HEAD VENT VALVES A
4541986007	1986	Auto Start of Train 'B' Control Room Ventilation Make Up Fan
3231986004	1986	INADVERTENT ACTUATION OF THE FUEL HANDLING BUILDING VENTILAT
4541986002	1986	CONTROL ROOM VENTILATION ACTUATION DUE TO RADIATION MONITOR
2551986007	1986	INADVERTENT SAFETY INJECTION SIGNAL ACTUATION
2611986003	1986	REACTOR TRIP - HIGH S/G LEVEL CAUSED BY INSTRUMENT BUS SPIKE
4541985099	1985	ACTUATION OF THE MAIN CONTROL ROOM VENTILATION SYSTEM DUE TO
3271985050	1985	Containment Ventilation Isolation
3021985028	1985	Failure of 6900 Volt Bus Causes Loss of 2 Reactor Coolant Pu
2771985022	1985	Actuation of RPS, ECCS, and PCIS Due to Loss of Feedwater
2371985036	1985	Reactor Building Ventilation Isolation from Fuel Pool Monito
3271985034	1985	Diesel Generator Inoperability
3521985071	1985	Engineered Safety Feature Actuation RWCU Isolations
3251985045	1985	Reactor Protection System Actuation During Unit 1 Refueling/
3411985049	1985	Emergency Diesel Generator Auto Start
4161985030	1985	Reactor Scram Due to Main Generator Trip
2751985027	1985	Containment Ventilation Isolation
2751985025	1985	Containment Ventilation Isolation
3441985009	1985	Reactor Trip Resulting From Unit Auxiliary Transformer Cooli
3181985006	1985	Inoperable Diesel Generators
3111985009	1985	Reactor Trip from 100% Dropped Control Rod

3281985009	1985	Reactor Trip From Loss of Main Generator Stator Cooling Wate
2811985004	1985	Discrepancies With EQ Components
2201985007	1985	Initiation of Reactor Building Emergency Ventilation Due to
2691985005	1985	Reactor Trip on High RCS Pressure Due to EHC Electrical Conn
2781985010	1985	Automatic Start of E-1 and E-3 Diesel Generators
3661985012	1985	Unplanned Actuation Of RPS Logic Channels
3681985009	1985	Inadvertent ES Actuations During Design Change Modifications
2931985008	1985	High Pressure Coolant Injection System Inoperable
2951985011	1985	NMC Radiation Monitors Loss of Power
4131985020	1985	Reactor Trip Caused By A Loose Power Range Detector Cable
3351985002	1985	Inoperable Containment Isolation Valve
3661985007	1985	ESF Actuation
3681985004	1985	Reactor Trip Due To Turbine Trip Caused By Loss Of Generator
3311985004	1985	APRM RPS Trip While in Shutdown
4541985016	1985	Reactor Trip From Train A of the Solid State Protection Sys
2201985001	1985	Automatic Initiation of Reactor Building Emergency Ventilati
3251984034	1984	Automatic Reactor Scrams Due to Spurious Upscale Trips of In
2691984006	1984	Anticipatory Reactor Trip Caused by Generator Field Breaker
2511984025	1984	Engineered Safety Feature Actuation - Reactor Trip
3701984031	1984	Reactor Trip on Overtemperature-Differential Temperature
2821984011	1984	Reactor Trip on Startup
3521984002	1984	Engineered Safety Feature Actuation Full Scram Signal
3611984062	1984	CPIS Train A Actuation Due to 2RE 7804C Failure
2441984011	1984	Loss of Control Rod Position Indication System
3331984020	1984	Rector Scram While Shutdown
2821984005	1984	Reactor Trip
2851984011	1984	Radiation Monitor Disconnected
4831984014	1984	Manual Reactor Protection System Actuation
3051984014	1984	Reactor Trip Due to a Loss of Power on Instrument Bus IV
2591984024	1984	Reactor Scram From Turbine Generator Trip
3881984006	1984	Reactor Shutdown Due to Inoperabilty of the 'B' Loop of Low
3331984011	1984	Failure of Redundant Radiation Monitors
2501984011	1984	Engineered Safety Feature Actuation - Turbine Runback
2591984016	1984	Reactor Scrammed From Worker Vibrating Panel
3741984002	1984	Reactor Scram
3741984001	1984	"E" IRM Unit 2 Scram
3341983041	1983	Subcooling Monitor Declared Inoperable
2721983071	1983	Containment Fan Coil Unit Removed From Service
3281983188	1983	DG Loses Enitire Load
3311983043	1983	Torous Level Transmitter is Electric
3251983056	1983	Control Rods Lose Position Indication
2201983040	1983	Main Steam Radiation Monitor Fails
3021983054	1983	Emergency FW Flow Indicator Inoperable

3251983021	1983	Update on Control Rod Position Indication Problems
3161983106	1983	Testing Analog Rod Position Indication, Channel Declared In
4161983171	1983	Update Report - Diesel Generator 11 Declared Inoperable Afte
2931983054	1983	Offgas Monitor 1705-3A
2801983045	1983	Core Cooling Monitor Fails
3341983025	1983	Nuclear Instrumentation Power Range Channel Fails Twice
2371983070	1983	Loss if 2A Negative 24/4B Volt Battery Charger
2371983068	1983	High Pressure Coolant Injection Valve Fails to Open
3691983096	1983	Steam Relief Radiation Monitor Fails
3331983044	1983	Update on Two Inoperable Drywell Particulate Monitors
3871983142	1983	loss of Radiation Monitor and Ventilation System Isolation
2751983021	1983	Environmental Differential Air Temperature Sensing Instrumen
3341983024	1983	Subcooling Monitor Reads Erroneously
3611983124	1983	Control Element Assembly Calculator Inoperable because of Sp
2471983034	1983	Containment Gas and Particulate Monitors Read Downscale
3311983037	1983	Rod Block Monitor Fails to Give Rod Block Signal
3251983042	1983	Control Rod Full-Out Position Indication Fails to Work
3681983041	1983	Update on Failed Core Protection Calculation
3331983029	1983	Snubber Fails to Lockup
3621983064	1983	Update on Failed Connectors Cause Inoperable Safety Channels
3251983032	1983	Several Control Rodf Position Indications Lost
3621983059	1983	Main Steam Line Radiation Monitor Has Loose High Voltage Con
3661983057	1983	Rod Block Monitor Fails
3151983082	1983	Containment Airborne Monitor Fails
3251983038	1983	Four Control Rods Have Position Indication Problems
3241983075	1983	Update on Drywell Drain Flow Integrator Fails
3611983090	1983	Coolant Element Assembly Misaligned
4161983111	1983	Unexpected Isolation of Shutdown Cooling and Control Room Fr
3251983031	1983	Four Intermediate Range Monitors Fail
3151983074	1983	Four KV Breaker Cable Suffer Insulator Damage
3111983039	1983	Control Rod Inoperable
3021983030	1983	Update on Failure of Steam Generator Level Recorder
2201983016	1983	Two Steam LIne Radiation Monitors Inoperable
3311983016	1983	Update on Diesel Generator Failure to Reset
3951983078	1983	Subcooling Margin Monitor Fails
3281983095	1983	Subcooling Margin Monitor Fails
3871983101	1983	Both RCS Gaseous Monitoring Channels Ioperable
3251983020	1983	2 IRM Channels Inoperable
3341983012	1983	Core Cooling Monitor Fails Several Times
3701983016	1983	Steam Relief Radiation Monitors Declared Inoperable
2771983013	1983	RCS Leakage Detection Monitors in Error
2771983004	1983	Refueling Floor Ventilation Radiation Mointor RE2-17-432D Ex
2931983023	1983	Diesel Generator Fuel Pump Belt Breaks Twice

3021983019	1983	Loss of Experienced Safeguards Bus
3251983014	1983	Update on Control Rod Position Lost
3871983055	1983	Safety Relief Valve Acoustic Monitor Inoperable
3271983045	1983	Steam Generator Wide Range Level Channel Falils
2931983014	1983	Update on Drywell Leak Detector Channel Failure
3251983017	1983	Update on Control Rods having Position Indications
3351983024	1983	Update on Wide Range Nuclear Instrumentation Reduced Sensiti
3251983012	1983	Rod Position Indications Lost
3271983031	1983	Two Rod Position Indicators Declared Inoperable
3211983019	1983	Erroneous Signal from 3 IRM's in the B Trip System
3681983010	1983	Update on Startup Transfer Connectors Fires
4161983059	1983	Stanby Gas Treatment Subsystem has Low Flow
2721983016	1983	Containment Air Particulate Monitor Inoperable
3241983023	1983	Two Intermediate Range Monitor Inoperable
3271983019	1983	Rod Position Indicator Declared Inoperable
3021983005	1983	Update Setpoint of Meterological System Surveillance
3621983004	1983	Wrong Connector Installed on Primary Coolant Temperature Ind
3251983003	1983	Average Power Range Monitors E and F Rendered Inoperable
3181983003	1983	Disconnnection of the Instrument Air Line
3951983002	1983	Main Plant Vent Exhaust System Floe Rate Indication Failed L
3481983001	1983	Reactor Coolant System Subcooling Monitor Declared Inoperabl
3171983001	1983	Several Cold Solder Connections found at Input Connector Plu
3681982052	1982	Notification of a Simultaneous Actuation of all Engineered S
3461982067	1982	The Internal Connector was Bad
2961982064	1982	Update on Disconnected Continuous Air Monitor
3641982048	1982	Source Range Channel was Declared Inoperable Due to a Faul
3641982050	1982	Source Channel was Declared Inoperable
3681982041	1982	A Steam Leak was Discovered Coming from a Fitting on an Emer
3251982119	1982	APRM F Declared Inoperable Due to an Erractic Output Signal
3611982138	1982	RCS Temperature Drop Violates Limiting Condition
3951982034	1982	The Radiation Monitor (Main Steam Line C Monitor) Failed tot
3951982031	1982	The Event Occurred Dur to Loose Connection on DB Volatge Att
3461982055	1982	The Safety Features Actuation System (SFAS) Channel 4 Radiat
3251982102	1982	Srm A was Rendered Inoperable Due to a Broken Detector Cable
3951982006	1982	Moisture Penetrated the Seal of the Dtector Preamp Connector
3171982052	1982	Failure on Loose Connector on Speed Switch
3391982052	1982	A Loose Connector on a Printed Circuit Board
3171982048	1982	WRNI Channel B was Declared Inoperable
3681982027	1982	Incoming RSPT Voltage had Spikes at Random Intervals
2541982021	1982	Residual Heat Removal System (RHRS) Service Water Pump Remov
3341982026	1982	Accident Monitoring Instrumentation - Subcooling Margin Moni
3341982023	1982	Power Range Excore Detector Inoperable
3251982077	1982	The Erractic Output Showed Characteristics of a Detector Sea

3241982081	1982	Performing Friction Testing of Control Rods
3611982034	1982	Discrepancies Found in RCP Shaft Speed and Control Element A
3251982054	1982	Failure of the RCIC EGM and EGR Units
3731982054	1982	The Reactor Ventilation Process Radiation Monitor
2541982011	1982	Number Four Control Valve Failed to Fast Close
3181982029	1982	Containment Radiation Monitoring System reading Low Thus Dec
2961982022	1982	Drywell Temperature Indicator Observed Reading Downscale
2671982020	1982	Speed Switch Module Pin Connector was Loose
3691982034	1982	Loss of Nitrogen Pressure Which Opens the Halon Cylinder Val
3271982048	1982	The Automatic Control Valve in the Auxiliary Feedwater Syste
2371982008	1982	Channel A Refuel Floor Radiation Monitor Inoperable
3461982013	1982	A Broken Wire in the Cable Connector in Penetration Box
3281982032	1982	Rod Position on Control Bank D was Declared Inoperable
3181982012	1982	Channel D Wide Range Nuclear Instrument was Spiking High
3021982010	1982	Leaks in the Roof
2811982014	1982	Nuclear Instrumentation 41 Failure
3691982014	1982	The Process Radiation Monitoring System-Containment Gas Moni
3181982003	1982	CTMT Atmosphere Gaseous Radioactivity Monitor Declared Inope
3691982010	1982	Continuing Failure of Digital Rod Position Indication
3381982002	1982	The Containment Particulate Activity Detector (RM-159) Faile
3271982007	1982	A Defective Indicator was Recalibrated
3241982001	1982	The Isolation Valve Failed in the Open Position
3461982002	1982	A Fabrication Error in Attaching the Cable Wire to the Conne
2801981082	1981	Control Rod Inoperable
3661981131	1981	The Refueling Floor Vent Exhaust Rad Monitor Inoperable
3211981137	1981	The Failure was Due to a High Voltage Connector that was Dir
3661981118	1981	The Cause was A Loose Umbilical Power Connector
2601981062	1981	The Main Steam Line Radiation Monitors
3251981072	1981	The Receipt of an Inoperative Trip Circuit Actuation
2721981100	1981	Intermediate Range Nuclear Instrumentation - Channel 1 -
3691981168	1981	The Increased Resistance Between Cells in the Battery
2721981095	1981	Reactor Coolant Leak Detection System - Inoperable
2751981003	1981	Radwaste Effluent Line Radiation Monitor Failure
3361981031	1981	The Failure to Start is Unknown
2471981020	1981	The Vent Plug Needle Valve on control Rod H-2 was Leaking
3151981037	1981	The Bistables Tripped
3331981063	1981	IRM 'G' Became Erratic with Upscale Spikes Causing Half-Scra
3251981055	1981	RTGB Position Indication at Notch Positions
3171981045	1981	Channel "A" Power Rage Istrument was Faulty
3151981013	1981	Both Source Range NI Channels Declared Inoperable
3111981022	1981	Movable Control Assemblies - Rod 2D4 Dropped
3681981020	1981	A Sudden Increase of the Neutron Flux Monitor Signals During
2961981024	1981	High-Pressure Coolant Injection Turbine which Tripped

3351981025	1981	RPS Trip Unit Failure
3181981020	1981	The Containment Atmosphere Particulate Radioactivity Detecto
3481981013	1981	The Rod Failed to Move Because of a Connector Problem on the
2611981010	1981	A Problem with Control Rod N-9 was Discovered
3641981003	1981	Fuel Storage Pool Area was Declared Inoperable
3661981010	1981	RCIC Auto Flow Control Problems
2711981008	1981	An Electrical Connector Accicently Detached from the EGR
2691981004	1981	Loss of EWST Level Indication
3681981010	1981	The CEAC #2 Malfunctioned
2201981004	1981	The Subject Radiation Monitor Signal had been Fluctuating Su
2721981016	1981	Rod Position Indicator Inoperative (2D1)
2721981015	1981	od Position Indicator Inoperative (2D1)
3211981003	1981	The HPCI System Isolated on A High DP Trip
3311981006	1981	Containment Pressure Recorder-PR 4384A had Failed Upscale
2691981002	1981	DID Inverter Input Fuse Blown
3181981005	1981	A Pressure Transmitter Failed High Causing Power Relief valv
3241981004	1981	During a Normal Reactor Startup, IRM "A" did not Respond to
3181981001	1981	The Upper Subchannel Detector's Field Cable Connector was Fo
3161980035	1980	Rod Position Indication for Rod N-9 did not Respond Properly
3461980085	1980	afety Features Actuation System (SEAS) Channel 2
2771980027	1980	The Number Three Main Steam Bypass Valve Exhibited Erratic O
3271980186	1980	The Failure of Rod Position Indicator E-13
3181980053	1980	The Containment Atmosphere Particulate Monitor Failed and Al
2591980079	1980	An Electrical Ground Occurred at the HPCI EGR Actuator
2471980013	1980	Model No. Wl-23686, became Defective Due to Moisture within
3181980045	1980	A Failure of the CTMT Particulate Radioactivity Detector
3241980054	1980	The Fast Closure Relay Failed to De-energize
3681980077	1980	The Failure was Determined to be Water Damage to Connectors
3171980055	1980	The Containment Atmosphere Particulate RMS Detector Failed
3361980033	1980	Two Channels of Wide Range Neutron Flux Instrumentation (NI)
3241980068	1980	The HPCI System Turbine Control Valve, Would Not Open with t
2931980062	1980	The A-Diesel Generator was Declared Inoperable
2691980027	1980	CRD Group 7 Dropped Rod
2961980032	1980	Personnel Performing Test Accidentally Stepped on the Lead W
3311980044	1980	The "B" Rod Block Monitor Indicatiing Downscale
3311980041	1980	Control Building Exhaust Isolation Damper would not Close
3311980036	1980	The "B" Rod Block Monitor (RBM) Failed
3251980056	1980	APRM's B and F were Determined Inoperative
3251980054	1980	The Position '30' Reed Switch for Rod 46-11 was found Defect
3241980044	1980	The Erratic Indications of SRM D were the Result of Moisture
3171980028	1980	#13 Diesel Generator (DG) Failed to Reach Rated Speed in Les
3181980027	1980	Channel B Axial Flux Offset was not Indicating Properly
3241980037	1980	IRM H was Inoperable Due to a Power Supply Problem

3241980040	1980	IRM A had Failed Upscale
3251980039	1980	The Wire Connector had a Loose Retainer Screw
3361980010	1980	CEA 29 Exhibited Erratic Position Indication and was Declar
3331980021	1980	IRM 'B' was made Inoperable to Repair a Signal Cable Connect
3481980008	1980	Component Cooling Water Snubber CW4-R121 was Declared Inoper

9.2.4 Fitting Event Data

Table 19. LER search results for fitting OR fittings.

LER Number	Event Year	Partial Title (First 60 Characters)
2692022002	2022	Reactor Coolant System Pressure Boundary Leak on Reactor Coo
3362022001	2022	Structural Integrity of Reactor Building Component Cooling W
3522020001	2020	Valid Automatic Actuation of the Reactor Protection System w
3252019002	2019	Degraded Principal Safety Barrier, Technical Specification S
3132018003	2018	Manual Trip due to Turbine Bypass Valve Failing Open
4562018004	2018	1A Emergency Diesel Generator Output Breaker Opened During a
2782017001	2017	Reactor Pressure Boundary Leakage due to Weld Failure in One
2542017003	2017	Control Room Emergency Ventilation Air Conditioning Piping R
5282017001	2017	Essential Chiller B Inoperable due to Refrigerant Leak Resul
4582017003	2017	Manual Reactor Scram Initiated in Response to Increase in St
2472016010	2016	Safety System Functional Failure due to an Inoperable Contai
3912016007	2016	Manual Reactor Trip due to Loss of Main Feedwater
4002016002	2016	'A' Essential Services Chilled Water Chiller Trip due to Oil
2932016001	2016	Both Emergency Diesel Generators Inoperable
2472015004	2015	Safety System Functional Failure due to an Inoperable Contai
5302015004	2015	Condition Prohibited by Technical Specifications 3.0.4 and 3
3522015001	2015	Valid Automatic Actuation of the Reactor Protection System w
4462014005	2014	Centrifugal Charging Pump Inoperable for Longer than Allowed
4402014002	2014	Division 2 Diesel Generator Inoperability Results in Loss of
3462014002	2014	Manual Initiation of the Reactor Protection System due to Di
3352013002	2013	Unplanned Manual Reactor Trip Due to Digital-Electro-Hydraul
4562013001	2013	Inadequate Operability Determination Procedure Guidance Resu
2502013008	2013	Through-Wall Leak in 3A CCW Pump Threaded Fitting Caused Pum
2542013003	2013	Reactor Vessel Head Vent Line Leak due to Weld Defect
4462012002	2012	Unit 2 Automatic Reactor Trip due to Low Steam Generator Wat
5292012002	2012	Condition Prohibited by Technical Specification due to Low P
2892012002	2012	Missing Seals in Air Intake Tunnel Conduits
2852012016	2012	Unanalyzed Charging System Socket Welds to the Reactor Coola
2472012003	2012	Technical Specification (TS) Prohibited Condition Caused by
2802012001	2012	Oil Foaming in Speed Increaser Results in Inoperable Chargin
4552011002	2011	Containment Pressure Not within Limits Longer than Allowed b
2202011001	2011	Turbine Trip due to Oil Pressure Fluctuations to the Turbine
4122011001	2011	Defective Fuel Injection Pump Supply Lines Provided by the D
3702010002	2010	Unit 2 Nuclear Service Water System "A" Train Past Inoperabl
3212010004	2010	Emergency Diesel Generator 1A Excess Fuel Oil Return Tubing
3822010002	2010	Main Feedwater Isolation Valve B exceeded allowed outage tim
2982009004	2009	Manual Reactor Scram for Digital Electro-Hydraulic Fluid Lea
2982009002	2009	Manual Scram on Low Water Level Caused by Turbine Trip from
2862009007	2009	Automatic Reactor Trip Due to a Turbine Trip As a Result of

3212009002	2009	MSIV Closed Outside of the Allowable Time due to Loss of Oil
2472009002	2009	Manual Reactor Trip due to Decreasing Steam Generator Levels
3972008001	2008	Reactor Scram due to Failed Compression Fitting
2592007007	2007	Automatic Reactor Scram from a Neutron Monitoring Trip Signa
2552007002	2007	Inoperable Containment due to Containment Air Cooler Through
4402006006	2006	Primary Containment Airlock Door Inoperability Results in Op
2552006008	2006	Inoperable Containment due to Containment Air Cooler Through
2372006005	2006	Units 2 and 3 Control Room Emergency Ventilation Air Conditi
3052006009	2006	Fuel oil leak on Swedgelock fitting renders Emergency Diesel
2372006004	2006	Unit 2 Reactor Scram due to Main Steam Isolation Valve Closu
3612006001	2006	Both Trains of Shutdown Cooling Declared Inoperable due to t
2802005003	2005	Fuel Leak Into Engine Oil Causes Emergency Service Water Pum
2932005003	2005	Target Rock Relief Valves' Test Pressures Exceeded Technical
3112005002	2005	Reactor Coolant Instrument Line Through-Wall Leak
4232005001	2005	Hydrogen Recombiners Out of Service
2502005002	2005	Missed As-found Local Leak Rate Test
2932004003	2004	Target Rock Relief Valves' Test Pressures Exceeding Technica
2692004001	2004	Unit Shutdown due to Reactor Coolant Leak Above Technical Sp
3412003004	2003	EDG 12 Lube Oil Pressure Low
2542003001	2003	Reactor Shutdown Due to Reactor Heat Vent Steam Leak Constit
4232003001	2002	Reactor Trip Caused by Generator Backup Protection Fault
3362002004	2002	Reactor Shutdown Due to Entry into Technical Specification 3
3312001007	2001	Unplanned High Pressure Coolant Injection System Inoperabili
2472001006	2001	Pipe Erosion Results in Service Water System Leakage in Cont
2712001005	2001	Primary Containment Breach Due to Broken Tubing at Hydrogen/
4162001002	2001	Containment Air Lock Leakage in Excess of Technical Specific
3332000010	2000	Departure From Technical Specifications to Facilitate Contro
4232000002	2000	Technical Specification 3.0.3 Entry with both Hydrogen Recom
2612000001	2000	Manual Reactor Trip Due to Turbine Electro-Hydraulic Control
2692000002	2000	TS 3.0.3 Entry Due to Control Room Cooling Chiller Refrigera
2491999003	1999	Supplement to Reactor Recirculation B Loop, High Pressure Fl
2871998001	1998	Missed Surveillance Due to Inappropriate Actions
2931998019	1998	Inoperable Standby Liquid Control Subsystem B
4131998010	1998	Pinhole Leak in Auxiliary Feedwater Nozzle Tempering Line Ca
3971998010	1998	Technical Specification Required Shutdown due to Inoperabili
3871998006	1998	Loss Of Continuous Vent Sampling - Unit 1 Reactor Building
3881998006	1998	Loss Of Continuous Vent Sampling - Unit 2 Tubing Building
3881998002	1998	Loss of Continuous Ventl Sampling - Unit 2 Turbine Building
2872000004	1998	Missed Leak Rate Test Due to Planning Process Weakness
4401997016	1997	Vibration-Induced Turbine Electro-Hydraulic Control System F
2491997012	1997	Reactor Recirculation B Loop, High Pressure Flow Element Ven
4161997005	1997	Inadequate Retest of Containment Airlock Air Seal System
2451997036	1997	Fire Pump Room Flooding Through Floor Drain During a Hurrica

5281997003	1997	Construction Design Deficiency Resulted In Inadequate Protec
3541997011	1997	Technical Specification Prohibited Condition - Failure To Co
3171997005	1997	Reactor Coolant System Leak Due to Failed Compression Fittin
2871997003	1997	High Pressure Injection System Inoperable Due to Design Defi
2541997010	1997	Train "B" of Control Room HVAC System Inoperable Due to Loss
4611996020	1996	Failure of Control Rod Drive Hydraulic Control Unit Air Line
3901996024	1996	Maintenance activity renders Train B of the Auxiliary Feedwa
3521996017	1996	Inoperability of four Emergency Diesel Generators that Resul
2811996005	1996	Manual Reactor Trip Due To Loss Of Electro Hydraulic Control
4541996011	1996	Manual Reactor Trip Due to Loss of Instrument Air to Feedwat
2981996001	1996	Potential Inoperability Of Emergency Diesel Generators Due T
3271995017	1995	Manual Reactor Trip Initiated as a Result of Failed Air Line
2551995010	1995	Licensee Event Report 95-010-01-Engineered Safety Feature Ac
3151995003	1995	Reactor Trip Due to Turbine Trip On Loss Of Condenser Vacuum
3641995005	1995	Manual Reactor Trips Following a Loss of Electro- Hydraulic
5291995002	1995	TS 3.0.3 Entry Due to Loss of Charging Pumps and Boration Fl
3361995023	1995	Degradation of Boric Acid System Piping and Fittings
4401995004	1995	Potential for Containment Airlock Leakage to Exceed Design L
2891995001	1995	Reactor Coolant Leak Caused By Failure Of A Parker Hannifin
3271995002	1995	Reactor Coolant System (RCS) Leak as a Result of a Fitting n
3611994005	1994	Voluntary Tech Spec 3.0.3 Entry Due to Declaring Both Trains
2651994005	1994	Unit Two Electro Hydraulic Control (ECH) Fluid Leak and Subs
2631994005	1994	One Automatic Depressurization Valve Found Inoperable During
3381994003	1994	Containment Hydrogen Analyzer Inoperable Due To A Failed Tub
1331994001	1994	Thermoluminescent Dosimeter Missing From Onsite Radiation Mo
3521994006	1994	Isolation of a PCIV, an ESF actuation, after an incorrectly
2511994002	1994	Plant Shutdown Required Due To Reactor Coolant System Pressu
3871994005	1994	Unit 1 Turbine Building SPING Alternate Sampling Became Disc
2821994001	1994	Auto-start of No. 121 Cooling Water Pump on Low Header Press
2781994001	1994	High Pressure Coolant Injection System being inoperable due
3691993008	1993	The Decay Heat Removal System Was Past Inoperable Due To A P
3881993004	1993	Operability Testing Following Instrument Leak Repair Require
3411993007	1993	Reactor Trip on Intermediate Range Monitor Upscale During Re
3701993003	1993	A Manual Actuation of an ECCS Pump Due to a Leak on the Char
3891993004	1993	Pressurizer Instrument Nozzle Leakage Due to Primary Water S
2491993005	1993	Failure of the Drywell Vent Valve 3-1601-63 Due to a Degrade
3871993002	1993	Instrument Fitting Leak Repair Required Entry into LCO 3.0.3
2811992008	1992	Reactor Coolant System Leak Rate Greater Than 10 GPM Due to
2501992014	1992	Reactor Coolant System Pressure Boundary Leakage; Pipe Cap O
2931992013	1992	Automatic Closing of Group I Containment Isolation Valves du
2551992037	1992	Reactor Trip Caused By Low Steam Generator Level Resulting F
3091992007	1992	Erosion/Corrosion Failure of Moisture Separator Reheater Sca
2721992014	1992	Steam Generator feedwater piping linear indications.

3971992019	1992	Automatic Depressurization System (ADS) Potentially Inoperab
2771992005	1992	Plant Shutdown Required by Technical Specifications due to I
2871991008	1991	Excessive Reactor Coolant Leak, Reactor Trip, And Inadverten
2191991006	1991	Degradation of Instrument Response Due to Inadequate Design
3331991013	1991	Both Standby Liquid Control Systems Made Inoperable Due to L
4131991015	1991	Reactor Trip on Turbine Trip Due to Loss of Both Main Feedwa
2371991015	1991	Orderly Unit Shutdown Due to Leakage Through Primary Contain
2931991015	1991	Technical Specification Fire Barrier Found Breached in Intak
3341991019	1991	Missed Weld Examinations Determined After Mode Escalations R
3251991013	1991	Coincident HPCI/RCIC Inoperability Due To RCIC Instrumentati
3971991012	1991	Manual Initiation Of Reactor Protection System Due To Low Sc
3641991002	1991	Reactor Manually Tripped Following Loss of Steam Generator F
2371991005	1991	Orderly Unit Shutdown Due to Leakage Through Primary Contain
3151990016	1990	Failure of two pressurizer safety valves to meet Technical S
2131990029	1990	Leak on Sensing Line to Reactor Coolant Flow Transmitters Du
4431990025	1990	Reactor Trip Due To Steam Generator Low-Low Level Signal
3541990024	1990	Reactor Scram On High Average Power Range Monitor Flux Level
4821990021	1990	Seismic Questions Concerning The Governor Speed Control Cond
3311990015	1990	Manual Scram Following Loss of Air System Pressure Due to Po
2631990012	1990	Leak From Threaded Fitting Fatigue Crack Requires Manual Iso
3531990011	1990	Reactor Enclosure Secondary Containment Isolation or Low dif
2491990005	1990	Unit 3 Reactor Scram Due to MSIV 3-203-3A Pilot Solenoid Air
3271989034	1989	Increased airborne activity in the auxiliary building result
3881989011	1989	Instrument Air Leak Due to an Improperly Madeup Fitting Resu
3871989023	1989	Plant Shutdown Completed When Vacuum Relief Valves Declared
2931989019	1989	Reactor Core Isolation Cooling System Made Inoperable Per Te
2701989005	1989	Unit 2 Reactor Coolant Sample Isolation Valves Failed to Mee
3131989016	1989	Emergency Diesel Generator Fire Suppression System Rendered
2851989007	1989	Inadequate Analysis for Feedwater Regulating Valves
2981989003	1989	Control Air System Leak Due to Replacement Pipe Fitting Fail
3611989002	1989	Entry into Technical Specification (TS) 3.0.3 During Feedwat
3311989003	1989	Reactor Scram Due to Excessive Hydrogen Injection into Feedw
3131989004	1989	Inadequate Design Change Process Results in the Design Tempe
3521988034	1988	Reactor Enclosure Secondary Containment Isolation on Low Dif
4231988022	1988	Failure To Monitor An Inoperable Fire Assembly
5291988009	1988	Condenser Evacuation Effluent Monitor Sample Filter Improper
4101988028	1988	Reactor Scram due to Electrohydraulic Control Fluid Leak
3411988023	1988	Manual Isolation of Reactor Water Cleanup Due to an Instrume
3681988010	1988	Leak in the Common Reference Leg for Safety Injection Tank "
3681988008	1988	Loss of Reactor Coolant System Normal Makeup/Emergency Borat
4981988028	1988	Leakage of Aluminum-Bronze Essential Cooling Water System
3281988018	1988	Containment Integrity Was Not Properly Maintained Resulting
3201987007	1987	Low Pressure in the Cable Room and Transformer Room Halon Sy

2511987014	1987	Auxiliary Feedwater Train Inoperability Due to Small Steam S
4821987027	1987	Reactor Trip Resulting From Personnel Error In Not Correctly
4561987025	1987	Inadvertent Opening of Main Steam Isolation Valve During Mai
4101987026	1987	Reactor Water Clean Up System Isolation While Troubleshootin
4831987004	1987	ESF Actuations on High Containment Rad Levels When Temporary
3821987005	1987	Safety Injection Tank Level Below Technical Specification Du
4131987002	1987	Unit Shutdown Due To Unidentified Leakage From Improperly In
3691987001	1987	Control Area Ventilation/Chilled Water System Inoperable Due
2751987001	1987	Unit Trip, Turbine Trip, and Subsequent Reactor Trip Due to
2191986030	1986	Isolation Condenser "A" Isolation On Spurious High Flow Sign
3521986045	1986	NSSSS Isolations Due to personnel Error and Equipment Proble
3361986006	1986	Auto Rx Trip on Low Steam Generator Level Resulting From Los
3681986013	1986	Inoperable Containment Building Pressure Transmitter
3181986005	1986	Flex Hose Fitting Failure on 21A RCP Required Unit Shutdown
4091986018	1986	REACTOR SCRAM DUE TO RELAY MALFUNCTION/LINE SEPARATION AT RE
3691986008	1986	Unit 1 Unidentified Reactor Coolant System Leakage in Excess
3051986002	1986	LOCAL LEAK RATE TEST RESULTS EXCEED TECH SPEC LIMIT DUE TO D
2611986007	1986	STEAM GENERATOR SNUBBERS
2651986001	1986	UNIT 2 REACTOR SCRAM DUE TO A SPURIOUS GROUP I ISOLATION CAU
3201986001	1985	Inoperability of Emergency Diesel Generator DF-X-1B
4131985059	1985	Unit Shutdown Required Due to Unidentified Reactor Coolant L
3151985044	1985	ESF Actuation - Steam Line Isolation Signal
3341985015	1985	Safety Injection/Reactor Trip Due to Loss of Station Instrum
3311985029	1985	Fire Hose Stations Inoperable Longer than Technical Specific
3111985014	1985	2B Diesel Generator Test Failure Due to Oil Leak
3621985021	1985	Fuel Handling Isolation System (FHIS) Actuation
2711985006	1985	Loss of Primary Containment Due to Break in Tubing in Contai
3331985011	1985	Inoperable Snubbers Found as a Result of Functional Testing
3521985046	1985	Reactor Full Scram in Cold Shutdown Condition
2511985008	1985	Technical Specification Containment Integrity
3621985013	1985	Actuation Of Reactor Protection System
2491985008	1985	2/3 Diesel Generator Auto Start
2491985007	1985	Torus Water Sample Line Found Open
3021985002	1985	Auto Start of Emergency Diesel Generator
3611985020	1985	Toxic Gas Isolation System (TGIS) Hydrocarbon Analyzer Flame
2491985009	1985	Torus Primary Upper Sight Glass Isolation Valve
3521985023	1985	Reactor Enclosure HVAC Isolation
2801984027	1984	#3 EDG Fire
3311984044	1984	Fire Hose Inoperability
3341984014	1984	Inoperable Hydraulic Snubber
3731984069	1984	Leak in Narrow Range Level Indication Variable Leg

4131984018	1984	Incore Thermocouple Tube Leakage
3441984014	1984	Identified Leakage in Excess of 10 GPM from Incore Flux Dect
3281984015	1984	Reactor Trip Following A Turbine Generator Trip Due To A EHC
3021984015	1984	Auto Start of Emergency Diesel Generator
3691984009	1984	Inadequate Control of Containment Integrity
2951984005	1984	In Core Instrumentation Seal Table High Pressure Seal Failur
3741984002	1984	Reactor Scram
3311984004	1984	Control Room Air Treatment System - SFU Initiation Failures
3111983067	1983	DG has Fuel Oil Leak on Cylinder Injector
3181983072	1983	Main Steam Isolation Valve Inadvertently Shuts
3381983086	1983	Penetration in a Fire Wall Found Open
3481983081	1983	River Water Pump Bearing Lube Water Supply Line Breaks
3661983134	1983	Update on Hydrogen/Oxygen Analyzers found inoperable
3021983051	1983	EDG Fails
3161983107	1983	Emergency Diesel Generator Removed From Service
3271983155	1983	Feedwater Flow Transmitter Fails
4161983171	1983	Update Report - Diesel Generator 11 Declared Inoperable Afte
3701983068	1983	Pressurizer Level Channel Declared Inoperable
3621983095	1983	Pressurizer Level Transmitter Fails High
2691983017	1983	Possible Water Leakage Into Safety Conduit
3691983085	1983	Steam Generator Blowndown Valve Limit Switch Fails
3701983050	1983	Steam Generator Blowdown Valve Limit Switch Fails
2801983044	1983	Inoperable Snubbers
3701983045	1983	Containment Sump Level Recorder Reads High
2611983015	1983	RCS Leakage Exceeds Limit
2441983025	1983	Leak on Upstream Side of V-956E, Pressurizer Liquid Sample M
3701983021	1983	S/G Wide Range Level Recorder Indicator was Incorrect
2441983016	1983	Boric Acid Transfer System Leakage
3731983041	1983	Defective Welds Leak Steam
3271983035	1983	Feedwater Flow Channel Declared Inoperable
3151983017	1983	Excessive Leakage Rate on Both the Upper and Lower Containme
3951983016	1983	Sodium Hydroxide Level Indicators Declared Inoperable
3341983005	1983	Loss of Air to Main Steam Trip Valve Causes Safety Injection
3621983016	1983	Update on Instrument Line Fails on Auxiliary Feedwater Pump
3161983010	1983	North Ventilation Damper Failed to Close
3151983005	1983	CD Diesel Engine Declared Inoperable
3681982050	1982	The "A" Control Room Emergency Chiller Failed it's Monthly S
3731982172	1982	A Leaky Fitting on Line 1NB56A-1/2"
2811982074	1982	Inoperable Snubbers
3061982027	1982	Inoperability of a Unit 2 Containment
3161982107	1982	Diesel Generator Inoperable
3731982168	1982	A Steam Leak Due to Failure of a Compression Fitting on the
3681982041	1982	A Steam Leak was Discovered Coming from a Fitting on an Emer

2961982053	1982	Inoperable Turbine Building Continuous Air Monitor
2441982027	1982	Boric Acid Transfer System Leakage
3051982030	1982	Six Safety Related Containment Pressure Transmitters were fo
3271982121	1982	The Auxiliary Feedwater Automatic Valve not Operating Correc
2541982029	1982	Stresss Corrosion Cracking
2371982039	1982	A0-2-16-1-56 Valve Failed to Close
2591982060	1982	Continuous Air Monitor Which Became Inopeable
2601982026	1982	Update on Recirculation System Snubber found Low on Fluid
3691982061	1982	Failure of the Small Seal on the Lower Personnel Airlock Rea
3181982035	1982	Saltwater Loop was Removed From Service
3281982081	1982	The Auxiliary Feedwater System Declared Inoperable Due to Fa
3691982055	1982	Leaks in the Capillary Line Between the Bellows Level Sensor
2191982034	1982	A Unmonitored Release of Radioactive Water to the Environs O
2811982032	1982	Low Emergency Air Pressure to Steam Driven Auxiliary Feed Pu
2811982029	1982	FR-GW-100 Malfunction
2721982021	1982	No. 12 Steam Generator Steam Flow Channel 2 Inoperable
3691982027	1982	Reactor Coolant System Inoperable Due to a Crack in the Sock
2851982007	1982	A Leak in the Copper Tubing Vent Line
3331982010	1982	Primary Containment Hydrogen and Oxygen Monitor 'A' was foun
3021982021	1982	Failure of the Feedwater Valve to Meet Surveillance Criteria
2801982001	1982	A Piece of Telflon Tape Prevented Operation of the Three Wat
3281981136	1981	An Operator Discovered a Leak in Instrument Tubing
3351981057	1981	SI and CVCS System were Contaminated by Grease
3681981040	1981	The Failure of Control Room Emergency Chiller While in Mode
3691981171	1981	Upper Head Injection (UHI) Acculator Declared Inoperable Dut
3691981169	1981	Malfunctioning of the Flow Transmitter (Veritrak, Model 59 D
3341981092	1981	The Leakage was Caused by Foreign Particle Deposits Between
2651981016	1981	A Leaky Fitting on the Oil Line to the Inboard Bearing on th
2701981015	1981	A Small Leak on the Low Pressure Leg Impulse Fitting of RC F
3691981138	1981	The Tubing was Leaking Because One of the Fittings was not S
2981981020	1981	The Control Air Line Fitting Failed because the Air Line Bro
2981981021	1981	Failure of Fuel Injector Supply Line
3691981124	1981	Two Steam Generator Feedwater Containment Isolation Valves w
3111981063	1981	Reactor Trip System Instrumentation
3691981112	1981	The Radioactive Liquid Effluent Monitoring Instrumentation C
2551981028	1981	Pressure Switch Isolation Valve as a handhold/foothold when
2711981016	1981	A Small Leak in a Socket Weld reducing Fitting
3361981020	1981	The Valves were Rated with Respect to an Inlet Pipe ID of 2-
3171981042	1981	Pipe Fittings Upstream of Safety Valve do not have Reduced I
3181981028	1981	RCS Code Safety Valves do not Have a Proper ID.
3211981047	1981	The RCIC Turbine Bearing Oil Low Pressure Annunciator Alarme
2471981012	1981	The "Swaglog" Union in the Remote Reactor Head Vent Line Par
2711981011	1981	A Small Leak in the Socket Weld Reducing

3641981013	1981	Diesel Generator 2B was Declared Inoperable Due to a Lube Oi
2441981011	1981	A Small Leak Found in Fitting of the Pump Seal
3171981014	1981	#12 Diesel Generator Started Automatically for No Apparent R
3391981026	1981	Each Train of the Quench Spray Subsystem was Removed from Se
3251981008	1981	Primary Containment Leak Rate Testing of Personnel Airlock I
3271981001	1981	An Improperly Tightened Compression Fitting
2711980041	1980	Water Leaking from the 4 inch Reactor Water Cleanup Line Bet
3181980055	1980	While Testing, #12 Emergency Diesel generator developed a fu
2821980037	1980	Lessons Learned Item 2.1.3.a Position Indication-Relief and
2501980019	1980	Cracking in the Feedwater Nozzle to Pipe Weld area on Feedwa
2661980012	1980	Improper Reinstallation of the Pressure Control Valve Follow
2631980029	1980	Main Steam Drain Line Leak
3181980042	1980	Safety Injection System Hydraulic Snubbers were Removed and
2721980049	1980	Inoperable ECCS Subsystem - 12 Centrifugal Charging Pump
2811980021	1980	Low Nitrogen Pressure on "B" Accumulator
2671980045	1980	Failure of the Hydraulic Oil Line on a Reheat Steam Bypass V
3361980027	1980	A Crack Due to Long Term Fatigue Attributed to Vibration
2671980042	1980	The Plant was Operated with Two Inoperable Reserve Shutdown
3171980036	1980	#11 Diesel Generator had no Speed or Voltage Control
2711980023	1980	RR-78 Failed Due to Fluid Leakage at Lenz Tubing Connection
3271980098	1980	The Filure of a "Tea" Fitting on the Pressurizer Pressure Se
3391980023	1980	The 'A' ECCS Subsystem was Rendered Inoperable
2671980027	1980	Three Separate Instances of Reactor Operation Took Place
2951980028	1980	Diesel Generator Loading Test on 1B DG
2511980008	1980	Indications of Cracking in the Feedwater Nozzle to Pipe Weld
3271980057	1980	PT-68-322 was Out-of-Service for Maintenance
3661980062	1980	The Drywell was Vented hru the Drywell to Torus Vacuum Break
2631980018	1980	Moisture Separator Level Switch Fitting Crack
3211980036	1980	The Fire Main Piping Separated at an Underground Fitting
2951980017	1980	Auxiliary Power System in Degraded Condition
2801980021	1980	Low Ffluid LevelinN SNUBBER 1-WAPD-HSS-148
3021980019	1980	A Crack was Discovered while Inspecting Fuel Assembly
3381980029	1980	The Leak Occurred Because a Temporary Pressure Gauge
3311980003	1980	A Small Leak was Discovered on a One-half-inch Nipple Pipe F
3171980008	1980	Sensing Line had a Through-the-Wall Leak
3131980003	1980	Cracks in the Reactor Building Spray Pipe
2551980006	1979	Purge Valves had Leaks Primarily through Fittings and Valve
2551980002	1979	Snubber No. S-6, Located on Main Steam Line, Failed

9.2.5 Termination Event Data

Table 20. LER search results for termination OR terminations.

LER Number	Event Year	Partial Title (First 60 Characters)
3152022003	2022	Automatic Reactor Trip on Loss of Flow due to Reactor Coolan
4432020002	2020	Remote Shutdown System Indicator Exceeded Allowable Value fo
4432020001	2020	Manual Reactor Trips due to Control Rod Bank Unexpectedly In
3112018001	2018	Manual Reactor Trip due to Elevated 21 Reactor Coolant Pump
4822016002	2016	Loss of Switchyard Bus Results in Emergency Diesel Generator
2812016001	2016	Unit 2 Reactor Trip due to Generator Differential Lockout
3972016002	2016	Valve Closure Results in Momentary Increase in Secondary Con
3112016006	2016	Automatic Reactor Trip due to Trip of the 21 Reactor Coolant
4452016001	2016	Safety Chiller Inoperable for Longer than Allowed by Technic
2592016001	2016	Failure of 4kV Shutdown Board Normal Feeder Breaker Results
3112016003	2016	Automatic Reactor Trip due to Main Generator Protection Trip
2632015006	2015	Reactor Scram due to Group 1 Isolation from Foreign Material
3272015004	2015	Manual Reactor Trip due to Main Steam Isolation Valve Drifti
3272015002	2015	Automatic Reactor Trips due to Improper Wire Termination in
4832014006	2014	Main Generator Excitation Transformer Faulted to Ground, Cau
2812014002	2014	Reactor Trip due to Loose Termination on Reactor Trip Relay
2502014004	2014	Ultimate Heat Sink Temperature Limit Exceeded Due to Environ
4832014003	2014	Inverter NN11 Inadvertantly Transferred to its Alternate AC
2722014004	2014	Reactor Trip due to Actuation of Generator Protection
2722014003	2014	Reactor Trip due to Actuation of Generator Protection
2612013003	2013	Reactor Trip on 4KV Bus Undervoltage During Load Transfer
2722013003	2013	1 Hour Security Event Report for Individual's Termination of
2752013006	2013	Emergency Diesel Generators Valid Start Signal Due to Loss o
3462013001	2013	Reactor Trip Due to Reactor Coolant Pump Motor Faulty Electr
4832013003	2013	Inoperability of CREVS 'B' train
4462013001	2013	Unit 2 Hot Shutdown Panel Transfer Switch Inoperable due to
3522012005	2012	Valid Actuation of the Reactor Protection System with the Re
3212012002	2012	Failure of 1C EDG Output Breaker to Close Results in Conditi
5282011002	2011	Nonconforming Condition Renders the Qualified Safety Paramet
3112011004	2011	Automatic Reactor Trip due to Trip of the 23 Reactor Coolant
4572011001	2011	Asiatic Clam Shells in Essential Service Water Supply Piping
4822011004	2011	Automatic Safety Injection Actuation due to Operating Crew F
4992010004	2010	Loss of the Train A Essential Cooling Water (ECW) System due
5292010002	2010	Inoperable Emergency Diesel Generator Due to Fuel Oil Transf
2722007001	2007	ESF Actuation of Auxiliary Feedwater Pumps in Mode 3.
4612006001	2006	Failure to Tighten Terminal Screw Causes Turbine/Generator T
3172005001	2004	Main Feedwater Isolation Valve Inoperability Due to Handswit
4002004001	2003	"A" Containment Hydrogen Analyzer Inoperable
5282003004	2003	Cracks in Contact Block of Main Control Room Handswitches Re

3062003002	2003	Automatic Actuation of Unit 2 Emergency AC 4KV Bus 26 Load S
3742003001	2003	Manual Scram Due to Lowering Reactor Water Level as a Result
4242002001	2002	Improperly Wired Interlock Affects ECCS Recirculation Valve
4122001003	2001	Condition Inadvertently Exceeds Technical Specification Allo
2722001006	2001	Reactor Trip Due to a Degraded Termination on Phase "A" Neut
2372001002	2001	Manual Reactor Scram Due to Reactor Recirculation Pump Trip
3242001001	2001	EHC System Malfunction Results in Specified System Actuation
3332000009	2000	HPCI and A&B Core Spray Systems Inoperable Due to Lack of Pr
3882000002	2000	Inadvertent Valve Closure In Containment Radiation Monitor S
4832000004	2000	Design Error Results in Containment Isolation Valve Inoperab
2662000005	2000	Termination Criteria for Containment Spray in Emergency Oper
4581999014	1999	Automatic Reactor Scram Due to Inappropriate Work Activities
4832000001	1999	Technical Specification 4.6.4.2.b Violation - 'A' Hydrogen r
4581999008	1999	Unplanned Automatic Closure of Division III Diesel Generator
5301999001	1999	Loss of Automatic Closure for Containment Isolation Valve
4231998046	1998	Reactor Trip Due to Difference In Indicated And Demand Rod P
3151998039	1998	Retraction - Emergency Operating Procedure Step Conflicts wi
2771998003	1998	This LER reports the failure to meet the technical specifica
4101998004	1998	Missed Technical Specification Required LSFT of Level 8 Trip
5291998003	1998	Refueling water tank level channel failure due to water intr
4231997063	1997	Inadequate Operator Response Time for Inadvertent Safety Inj
4541997023	1997	1B Diesel Generator Control Power Wiring Discrepancy due to
2551997010	1997	Licensee Event Report 97-010-Inadequacy In Appendix R Analys
2601997003	1997	Field measurements of the HPCI Turbine speed indicated speed
4101997005	1997	High Pressure Core Spray System Inoperable due to Failed Uni
4401997005	1997	Automatic Reactor Scram Following Auxiliary Transformer Trip
5301997002	1997	Reactor Trip Following Spurious Opening of All Four Reactor
2891997006	1997	Reactor Building Fan Motor's Unqualified Cable Termination d
3901996024	1996	Maintenance activity renders Train B of the Auxiliary Feedwa
2471996022	1996	Turbine Runback During Jumper Removal
2611996004	1996	MANUAL INITIATION OF REACTOR PROTECTION SYSTEM (RPS) DUE TO
2711996019	1996	Half scram and group III containment isolation caused by loo
3251996010	1996	Emergency Diesel Generator #1 DC Control Power Breaker Cable
4611996008	1996	Loosened Terminal Connection Causes Reactor Recirculation Pu
2591996003	1996	All Eight Plant Emergency Diesel Generators Unexpectedly Aut
3361996019	1996	EEQ SOV Circuits in Containment Not Fully Qualified
4001995011	1995	Reactor Trip/Safety Injection During Solid State Protection
3691995005	1995	A Unit Manual Reactor Trip Was Initiated As A Result Of An E
2471995007	1995	Failure of Containment Isolation Valves to Close
2611994023	1994	Condition Prohibited By TS Due To Degraded Reactor Trip Inst
3691994009	1994	Boron Dilution Of The Unit 1 Volume Control Tank Due To Proc
5291994002	1994	Reactor Trip Caused By Personnel Error

3661994003	1994	Fuse Actuation Results in ESF Actuation and Interruption in
2861994002	1994	Failure of RCS Overpressurization Trip Alarm To Annunciate,
4611994001	1994	Unexpected Automatic Isolation of Reactor Core Isolation Coo
2691993010	1993	Equipment Failure Causes Low Generator Water Level Resulting
4131993009	1993	Technical Specification 3.0.3 Involving Control Room Ventila
3691993001	1993	Technical Specification Required Surveillances Were Not Perf
2631993002	1993	Closure of Primary Containment Isolation Valves Caused by Re
2611992023	1992	Failure Of ERFIS Processing Function Results In Inoperabilit
2611992020	1992	Alert Declaration Due To Unplanned Release Of Toxic Gas In V
3331992042	1992	Fire Watch Posts Not Maintained Due to Personnel Errors Made
2931992010	1992	Reactor Core Isolation Cooling System Made Inoperable Per Te
3891992006	1992	Manual Reactor Trip Due to a Fire in the 2C Condensate Pump
2861992011	1992	No. 33 Emergency Diesel Generator Inoperable at Cold Shutdow
2931992007	1992	Reactor Core Isolation Cooling System Made Inoperable Per Te
3411992004	1992	Emergency Equipment Service Water Pump Start Due to Shorting
2611992007	1992	Alert Declaration Due To Unplanned Release Of Toxic Gas In V
2611992006	1992	Unusual Event Due To Loss Of Both Emergency Diesel Generator
4431992003	1992	Missed Technical Specification Surveillance Requirements
3151992003	1992	Liquid Release To Unrestricted Area In Violation Of Technica
2851992006	1992	Inoperable Alarm Function on Radioactive Waste Building Stac
2551992005	1992	Class 1E Pressurizer Level Indicator Cable Connected To The
3011991006	1991	Reactor Trip During Modification Work on D11
4141991015	1991	Technical Specification Violation Due To Lack Of A Boration
3331991025	1991	Suppression Pool Bulk Temperature Monitor Inoperable Due to
2651991008	1991	Closure of AO-2-220-45 Due To Defective Connections in the C
4581991012	1991	ESF Actuations Caused by the Loss of the Division II RPS Bus
3541991014	1991	Engineered Safety Features Actuation: Various Channel "B" Em
2061991010	1991	Manual Reactor Trip Following Dropped Control Rods Due To An
3341991008	1991	Underrated Motor Termination Leads on Low Head Safety Inject
2451991006	1991	Unjacketed Cable Resulting in Loss of Environmental Qualific
0291991001	1991	Inadequate Quality Controls Result in Defective Wire Crimps
3871991002	1991	HPCI System Declared Inoperable Due to Failure of Outboard S
2981991001	1991	Unplanned Actuation of Group VI Isolation During Surveillanc
4451990041	1990	Technical Specification Shutdown Due To Failed Protection Se
3521990025	1990	Spurious LOCA Signal Causes Engineered Safety Feature Actuat
4581990038	1990	Division I Balance-of-Plant Isolation due to an Error by Des
4581990033	1990	RWCU Isolation During Modifications To Power Supply Wiring I
3021990016	1990	Improper Wire Termination Causes Inadvertent De-energizing o
2131990025	1990	Auxiliary Feedwater Flow Instrumentation Potentially Unquali
3281990014	1990	Containment ventilation isolation event resulting from an in
2951990020	1990	Inadvertent Autostart of 1A AFW Pump
3311990011	1990	Two Primary Containment Isolation Actuations During Outage-
3211990012	1990	Manual Scram And Notification Of Unusual Event Due To Fire I

3271990008	1990	Two Control room isolations occurred as a result of spurious
2601990003	1990	Unplanned Engineered Safety Features Actuation Caused by Per
3521990012	1990	Inoperability of Residual Heat Removal System Modes Due to P
3951990006	1990	Diesel Generator Actuation Due to Personnel Error in Termina
3411990003	1990	Relay Failur Causes Loss of RPS Power and MSIV Closure
3051990004	1990	Temporary Change to Procedure to Causes the Generator Main O
4451990004	1990	Safety Injection Caused by a Failed Blocking Diode
2851990008	1990	Inadvertent Actuation of Pressurizer Pressure Low Signal
3881990002	1990	Unplanned ESF Actuation - Generator Load Reject and Reactor
4831989014	1989	Two Engineered Safety Features Actuations Due To Spurious Si
3241989019	1989	Group 6 Isolation and SBGT Auto Start During The Performance
2631989032	1989	Partial Primary Containment Isolation Due to Loose Terminal
2631989027	1989	Inadequate Review of Circuit Isolation Results in Reactor Wa
3611989023	1989	Delinquent Hourly Firewatch Due To Personnel Error
3441989024	1989	Personnel Error in Connecting a Process Effluent Radiation M
2771989020	1989	Environmental Qualification Non-compliance Resulting in Inop
3231989008	1989	Manual Reactor Trip Due To Reactor Coolant Pump Electrical F
3441989017	1989	Reactor Trip on Over Temperature Delta Temperature Signal
4231989018	1989	Inoperable Waste Neutralization Sump Effluent Radiation Moni
3661989003	1989	Analysis On Liquid Effluent Not Performed Per Technical Spec
0291989011	1989	Inadvertent Deenergization of 480V Emergency Bus No. 1
4251989023	1989	ESF Actuation Results When Transferring Offsite Power Source
3271989019	1989	A spurious containment ventilation isolation occurred During
2591989018	1989	Low Flow Through Area Coolers Due To Inadequate Surveillance
3871989020	1989	Unplanned ESF Actuations as a Result of Circuit Breaker Term
4581989029	1989	Two ESFs Due to Shorted Leads While Replacing Transformer an
2061989012	1989	Auxiliary Feedwater System Actuation Caused by Decalibration
4611989020	1989	Failure to Investigate the Consequences of Inadvertent Short
3051989010	1989	Improper Detector Installation and a Loose Electrical Connec
3051989009	1989	A Disconnected Jumper Causes a Spurious Actuation of Partial
4251989006	1989	Operation of Incorrect Handswitch Results in Safety Injectio
2801989007	1989	Failure to Initiate Alternate Radiological Sampling of Venti
3951989004	1989	Personnel Error Resulting in an Engineered Safety Feature Ac
4131989004	1989	Automatic Alignment of Nuclear Service Water System to Stand
3271989005	1989	Reactor trip signal resulting from the closure of the main f
4241989006	1989	Inadequate Functional Test Leads To Improper Termination Of
4821989004	1989	Loose Terminal Connections Cause Main Steam Isolation Valve
4611989005	1989	Failure to Brief Personnel Following a Previous Non-Reportab
2931989001	1989	Rod Block Not Occurring During Testing Due to Original Const
4431988010	1988	Meteorological Monitoring Tower Instrument Power Failure
3541988034	1988	Reactor Water Cleanup System Isolation And Unexpected Power
3951988012	1988	Potential Inadvertent Operation of Safety-Related Solenoids
3281988039	1988	Incorrect Connection Of Test Equipment Caused By Incomplete

4831988013	1988	Instrument & Control Termination Splices Fail to Meet Enviro
4101988059	1988	Engineered Safety Feature Actuation Caused by Power Source S
2751988028	1988	Entry Into Technical Specification 3.0.3 When Two Of Four Ma
3271988043	1988	Inadequate Fire Watch Patrol Resulted in a Noncompliance wit
3461988019	1988	Improper Crimps on Safety Related Electrical Cable Lugs
4581988021	1988	Grounding Transformer Fault Causing Generator Trip with Reac
2661988008	1988	Steam Line Break with Continued Feedwater Addition
3411988029	1988	Group 2 Control Rod Receive Scram Signal Due to Contactor Te
3241988012	1988	Inability of High Pressure Coolant Injection System Auxiliar
3441988022	1988	Train "A" Safety Injection Due to Spurious Electronic Spike
3131988030	1988	Piping Support Discrepancies Caused by Use of an Unacceptabl
3741988008	1988	Low Pressure Core Spray and Reactor Core Isolation Cooling I
3311988005	1988	Premature Termination of Fire Watch Due to Inadequate Post-M
3121988008	1988	Automatic Reactor Trip Due To High Reactor Coolant System Pr
3641988005	1988	Personnel Error Results In Termination Of The Wrong Fire Wat
3461988011	1988	Incorrect Termination of a Continuous Fire Watch Following M
3461988009	1988	Incorrect Termination of a Continuous Fire Watch
3121988004	1988	Inoperative Radiation Monitors Due to an Inadequate Surveill
2131988006	1988	Leak Path Identified In Cable Vault Flood Barrier
4581988006	1988	Reactor Shutdown Required by Technical Specifications Due to
4831988003	1988	Containment High Range Radiation Monitors Declared Inoperabl
4821987058	1987	Technical Specification Violation Due To Error In Design Doc
4821987052	1987	Instrument Termination Splices Installed Which Fail To Meet
4131987043	1987	Technical Specification Violation Due To Inoperable Reactor
3241987010	1987	Inoperability of Reactor Building Fire Hose Station 2-RB-23
3161987011	1987	ESF Actuation Caused By Personnel Error - Blocks Not Reinsta
2801987024	1987	Reactor Trip on Low RCS Flow Due to Reactor Coolant Pump Tri
4541987020	1987	Temporary Lack Of Continuous Fire Watch Due To Cognitive Per
3411987046	1987	Deficiencies in Raychem Installations Potentially Impact Acc
2651987009	1987	Scram Caused By TB Load Mismatch Due to a Main Transformer "
3481987012	1987	Environmental Qualification of Wiring Splices and Terminatio
3731987027	1987	Emergency Core Cooling Pump System Terminations
4611987038	1987	Violation of the Plant's Technical Specifications Due to Per
3731987026	1987	Residual Heat Removal Pump Motor Terminations Found to be No
2611987019	1987	Inoperable Loop Delta T
3951987010	1987	Failure of Engineered Safety Features Loading Sequencer
2931987021	1987	Automatic Start of "A" Emergency Diesel Generator Due to Pro
3411987013	1987	Material Failure of Terminal Box Adaptors on Reactor Buildin
4611987016	1987	Automatic Actuation of Containment Isolation Valve 1E51-F063
3151987003	1987	Failure to Restore Heat Trace Circuit Required by Technical
2191987014	1987	Drywell Isolation Caused by Incorrectly Lifting a Lead Due t
2191987011	1987	High RPV Level Trip/Scram Caused By Lost Feedwater Flow Sign
4141987006	1987	Containment Air Release Terminated Due To Installation Defic

3121987016	1987	Cables Pulled Into Energized Safety-Related Breaker Cubicles
3221987001	1987	RBSVS Initiation Caused (Word Illegible) I&C Technician Duri
3411986046	1986	Personnel Error Results in Reversed Thermocouple Leads and I
4141986054	1986	Termination Of A Containment Air Release Due To A Spurious R
3251986030	1986	Tripping of Units 1 and 2 Reactor Protection System Division
4141986050	1986	Termination Of Containment Air Release Due To Conservative R
4141986047	1986	Termination Of Containment Air Release Due To Installation D
4581986063	1986	RHR Isolation Due to a Grounded Lead
2951986040	1986	Improperly Terminated Instrument Leads on Environmentally Qu
4611986011	1986	AUTO INITIATION OF SHUTDOWN SERVICE WATER DUE TO INADEQUATE
3241986023	1986	Primary Containment Group 4 Isolations of High Pressure Cool
4611986002	1986	Secondary Containment Negative Pressure Lost Due to Defeatin
2751986010	1986	REACTOR TRIP DURING TESTING OF THE REACTOR TRIP SWITCHGEAR
4141986037	1986	Containment Air Release Termination Due to a Defective Proce
3411986025	1986	Design Error Prevents Proper Closure of Four Isolation Valve
3741986013	1986	Unqualified Electrical Terminations Using Okonite Tape on As
3741986014	1986	TERMINATIONS AT EQ EQUIPMENT LACK COMPATIBILITY DOCUMENTATIO
4231986042	1986	SAFETY INJECTION ACTUATION CAUSED BY INTERMITTENT RESETTING
3681986010	1986	Fire Watch Personnel Found Asleep
4131986038	1986	UNIT VENT RADIATION MONITOR INOPERABLE DUE TO PERSONNEL ERRO
4141986027	1986	Containment Air Release Termination Due To Installation Defi
3741986012	1986	Improper Terminations at Environmentally Qualified Equipment
3461986021	1986	Inadequacies in Raychem Installations
3231986014	1986	Diesel Generator Start and Loading Due to an Incorrectly Ter
4141986008	1986	Termination of Containment Air Release Due to A Spurious Rad
3121986011	1986	Voluntary Report on Loose Conductor/Lug Assemblies in Manufa
3241986012	1986	Maintenance Error Causes Automatic Isolation of Reactor Wate
4141986002	1986	Termination of Containment Release Due to Spurious Radiation
4131986013	1986	Termination of Containment Release Due to Spurious Radiation
3621986004	1986	UNANALYZED PURGE SAMPLE
5291986005	1986	ESF ACTUATION DUE TO INADEQUATE CONTROL OF A MODIFICATION ON
3621985036	1985	Shutdown Cooling System Valves Partially Open
3231985022	1985	Reactor Trip Resulting From a Feedwater Regulating Vavle Clo
5291985005	1985	Control Room Ventilation Recirculation Discontinued Due to O
5281985092	1985	Personnel Error Results in Termination of Continuous Fire Wa
5281985051	1985	Inoperable Charging Flow Paths
3111985022	1985	Reactor Trip/Safety Injection Voltage Spike on 2C Vital Inst
3131985011	1985	Manual Reactor Trip on Inadvertent Closure of a Main Steam B
4581985010	1985	Inoperable Standby Liquid Control
2751985030	1985	Low Low Steam Generator Level Reactor Trip

3661985029	1985	Missed Tech. Specs. Settlement Surveillance On Main Stack
3051985016	1985	Inadvertent Actuation of ESF Component
3121985015	1985	Personnel Inadvertently Trip Nuclear Services Bus
3441985008	1985	Inadvertent Safety Injection
3021985006	1985	Unplanned Automatic Actuation of an Emergency Diesel Generat
3701985017	1985	Feedwater Isolation/Unit Trip from Apparent Grounding on Dog
3881985018	1985	ESF Actuations (CB8B Breaker Trips)
3441985004	1985	Inadvertent Safety Injection
2751985015	1985	Reactor Trip and Safety Injection
3251985029	1985	Primary Containment Group I Isolation Signal During Refuelin
4161985016	1985	Reactor Scram Due to Main Steam Line Isolation
4131985012	1985	Safety Injection Caused By A Static Inverter Failure
2541985001	1985	HPCI Turbine Could Not Be Reset
3641985004	1985	Continuous Fire Watch Not Maintained as Required
3111984026	1984	Radioactive Liquid Release Not Continuously Recorded
2471984015	1984	Spurious Safety Injection Signal
2131984014	1984	Total Loss of Offsite Power/Diesel Generator Breaker Auto Cl
3211984005	1984	Cable Separation, Unlanded Cables, and Open Links
2631984013	1984	Emergency Diesel Generator Auto Start Due to Fault on No. 1A
3171983075	1983	Rps Channel for High Power and Thermal Margin/Low pressure I
2751983034	1983	Improper Wiring - RHR Pump Control Circuit
3951983129	1983	Fire Dampers Fail to Close
3131983022	1983	Failure of Station Battery D07
4161983131	1983	Radwaste Sample Improperly Analyzed
3131983021	1983	Fire Sprinker System Inoperable in 4 Zones of Reactor Buildi
3951983105	1983	Refueling Water Storage Tank Level Transmitter Shorts
3891983037	1983	Diesel Generator Fails to Load its Bus
3171983031	1983	Automatic Trips for Reactor Protection Systems Inoperable
3611983060	1983	Fire Watch Secured Prematurely
3691983030	1983	Containment Pressure Control System ailed Requirements
3701983019	1983	Inadequate Surveillance Performed on Containment Pressure Co
3611983040	1983	Safety Injection Drain Valve Found Open
3951983034	1983	Update on RHR Pump Motor Failure
2891983007	1983	Automatic Termination of Liquid Effluent Release Inoperable
2671983014	1983	ID Emergency Diesel of 1B Emergency set Tripped During the P
2191983002	1983	Startup Transformer Removed from Service
3621983004	1983	Wrong Connector Installed on Primary Coolant Temperature Ind
2191982061	1982	Offgas Isolation Valve Failed to Close
3871982065	1982	Update on Flash-over in the Electric Auxiliary Boilers
3871982042	1982	Grab Samples were not Taken at the Required Frequency
4161982063	1982	The Seals were Broken in Order to Route Additional Cable
3691982066	1982	Ventilation Unit Condensate Drain Tank Flow Totalizer Failer
3691982063	1982	The Wllace and Tierman Flow Switch was Found to be Sticking

2961982016	1982	Wire Termination Error Made on a Relay Associated with Energ
3211982037	1982	Detection Devices Alarm and a Weapon was Discovered
3341982010	1982	Update on Potential Instrument Inaccuracy Problem
3681982010	1982	Both "A" Reactor Coolant Pump (RCP) Differential Pressure In
3271982043	1982	High Energy Line Break Environment Exhibit Ambiguities in th
2721982016	1982	Containment/Plant Vent Monitors - Improper Alignment
3241982023	1982	A Hole Constituted a Breech of Fire Barrier and Secondary Co
2801982026	1982	Unsampled Liquid Waste Release
3281981158	1981	The Turbine-Driven Auxiliary Feedwater Pump was Declared Ino
3341981094	1981	The Failure of the Midnight Shift Chemical Analyst to Log Pl
2551981039	1981	Electrical and Environmental Qualification
3381981074	1981	A Cable Termination Problem at the T-cold RTD
3171981067	1981	An Intermittent High Resistance Connection at a Signal-Devel
3171981051	1981	Containment Radiation Monitoring System Pump Tripped
2801981009	1981	VCT Level System Design Problem
3151981006	1981	Cable was Damaged Near the Termination at the Motor Operator
3271980193	1980	A Review of the Surveillance Requirements for Radiation Moni
3181980045	1980	A Failure of the CTMT Particulate Radioactivity Detector
3241980070	1980	A Broken Valve Solenoid coil Wire
3241980064	1980	The Reactor Low Water Level Initiation Annunciator Alarmed
2801980036	1980	insufficient Flow to Charging Pumps
3381980042	1980	The Pump Recirculation Line Isolation Valves Automatically C
2591980034	1980	The Relay Coil Failed Causing Isolation Valves to Close
2961980011	1980	FCV 69 -2 Valve which Failed to Close with the Motor.
3661980048	1980	The Overheating was Caused by a Loose Connection in the Over
3331980016	1980	Condensation was Trapped Inside of Valve Operator Terminal B

9.2.6 Joint Event Data

Table 21. LER search results for joint OR joints.

LER Number	Event Year	Partial Title (First 60 Characters)
4122021002	2021	Unit 2 Automatic Reactor Trip and Automatic Actuation of the
3162021002	2021	Manual Reactor Trip due to an Unisolable Steam Leak
2862018002	2018	Manual Reactor Shutdown due to Weld Leak in Safety Injection
2662017003	2017	Degraded Condition
2542017003	2017	Control Room Emergency Ventilation Air Conditioning Piping R
2862017002	2017	Manual Isolation of Chemical and Volume Control System Norma
3352017001	2017	Reactor Coolant Pressure Boundary Leak on the 1B2 Reactor Co
2862016001	2016	Safety System Functional Failure due to an Inoperable Contai
3162016001	2016	Manual Reactor Trip due to Moisture Separator Heater Expansi
2472016002	2016	Automatic Actuation of Emergency Diesel Generators (EDGs) du
2472015001	2015	Technical Specification (TS) Prohibited Condition due to an
3242015003	2015	Oil Leak Renders Residual Heat Removal Service Water System
3902015001	2015	Manual Reactor Trip Initiated due to Rapid Loss of Main Cond
2192014001	2014	Manual Scram due to Lowering Vacuum
2652014002	2014	Cable Tray Fire Caused by Non-Conforming Cable Routing
3872014003	2014	Loss of Secondary Containment During Technical Specification
2192013002	2013	Manual Scram due to Lowering Vacuum
2472013003	2013	Manual Reactor Trip Due to Decreasing Steam Generator Water
2862013004	2013	Technical Specification Prohibited Condition due to a Leak i
2502013004	2013	Safety Injection Flow Path Not Isolated due to Manual Valve
3252012006	2012	Operation Prohibited by Technical Specifications due to Oper
2472012003	2012	Technical Specification (TS) Prohibited Condition Caused by
3872012001	2012	Both Control Structure Chillers Inoperable
3972010002	2010	LPCS Minimum Flow Valve Failed to Open due to Premature Fuse
4552011001	2010	Unit 2 Emergency Diesel Generator Inoperable for Longer than
3872010003	2010	Unit 1 Manual Reactor Scram due to Leakage from the Unit 1 C
3692010003	2010	Dropped Control Rods Resulting in Completion of a Technical
3612010002	2010	Non-qualified Part in Turbine Driven Auxiliary Feedwater Pum
2782011002	2010	Residual Heat Removal Leaking Relief Valve Results in Condit
4132010002	2010	Discovery of Reactor Coolant System Pressure Boundary Leak a
2982009002	2009	Manual Scram on Low Water Level Caused by Turbine Trip from
2372009004	2009	Unit 2 Shutdown Cooling System Isolation During Cooldown due
4242009001	2009	Ultimate Heat Sink Inoperable Longer than Allowed by Technic
5282008003	2008	Technical Specification Required Shutdown - Safety Injection
3462008001	2008	Pressure Boundary Leak Found During Decay Heat Removal Drop
2502007004	2007	Reactor Coolant System Boundary Leakage
3112007003	2007	Reactor Trip due to Spurious Feedwater Interlock Signal
3612007002	2007	Operator Error Results in a Missed Shutdown Margin Verificat
3612007001	2007	Instrument Air System Failure Results in Manual Reactor Trip

4162007002	2007	Reactor Scram due to Turbine Trip Caused by Loss of Condense
4402006005	2006	Decreasing Instrument Air Pressure Results in Manual Reactor
4822006003	2006	Indications Discovered on Pressurizer During Preplanned In-s
4612006003	2006	High Reactor Water Level Scram Result of Bad Inverter Circui
3662006003	2006	High Pressure Coolant Injection Inoperable due to Leaking Ch
3462006002	2006	Ultrasonic Examination Identifies Axial Flaw Indication in R
3362006002	2006	Manual Reactor Trip due to Trip of Both Feed Pumps following
2782005003	2005	Residual Heat Removal System Small Bore Piping Leak due to W
2862005004	2005	Manual Reactor Trip Due to a Service Water Leak Inside the M
4822005002	2005	Reactor Coolant System Pressure Boundary Leakage due to Smal
3882005001	2005	Degradation of Primary Coolant Pressure Boundary due to Reci
4992005001	2005	Shutdown of STP Unit 2 due to Reactor Coolant System Pressur
2502004007	2004	Manual Reactor Trip due to Main Generator Exciter Turbine Co
2512004004	2004	Manual Reactor Trip due to Lowering Condenser Vacuum
4232004002	2004	Inoperable Motor Driven Auxiliary Feedwater Pump Resulting F
4612004001	2004	Generator Over-Voltage / Lockout Leads to Reactor Scram
2772004001	2004	Manual Scram Resulting from Low Condenser Vacuum due to a Fa
3362003002	2003	Reactor Trip While Performing RPS Matrix Testing
4232003001	2002	Reactor Trip Caused by Generator Backup Protection Fault
3352001006	2001	Degraded EDG Radiator Lead to Operation of Facility Prohibit
4122001001	2001	Automatic Reactor Trip Due to Loss of Condensate Pump
2542000010	2000	Automatic Reactor Scram from Low Reactor Vessel Level
3642000004	2000	Reactor Trip Due to Degraded Main Feedwater Regulating Valve
3332000010	2000	Departure From Technical Specifications to Facilitate Contro
5282000002	2000	Degraded Solder Joint Causes Inoperability of Channel D Plan
3132000003	2000	Reactor Coolant System (RCS) Hot Leg Level Instrument Nozzle
3821999014	1999	Reactor Shutdown Due to Loss of Controlled Bleed-Off Flow Ca
3531999005	1999	PCIV Isolation, ESF Actuation due to a Failed Fuse (cold sol
3131999002	1999	Technical Specification Allowable Outage Time For One Emerge
2501999001	1999	Manual Reactor Trip from 100% Power Following Multiple Contr
2701999004	1999	Reactor Coolant Pump Lube Oil collection System OUtside Desi
2491999003	1999	Supplement to Reactor Recirculation B Loop, High Pressure Fl
4161999003	1999	Manual Reactor Scram Due to Decreasing Condenser Vacuum
2551998014	1998	Control Rod Drive Seal Housing Leak
3271998003	1998	Reactor Trip Resulting From a Failure of a Vital Inverter an
3051998015	1998	Intergranular Attack & Intergranular Stress Corrosion Cracki
2891998006	1998	LER 98-006-00 Thermo-Lag Fire Barrier Found Installed Outsid
2711998004	1998	Seven Day Diesel Generator LCO Exceeded due to Inadequate In
3351998003	1998	Manual Reactor Trip Due to a Digital Electro-Hydraulic (DEH)
3741998001	1998	Unit 2 "B" Reactor Protection System Motor-Generator (MG) Se
2491997012	1997	Reactor Recirculation B Loop, High Pressure Flow Element Ven
2861997014	1997	Lack of Weld Channel and Containment Penetration Pressurizat
2511997001	1997	Emergency Core Cooling System Recirculation Loop Leakage Fou

4231997021	1997	Defective Design of RSS Expansion Jiont Tie Rod Assembly
3051997002	1997	Potential Defect in the Process Used to Perform a Laser Weld
3531996009	1996	Unit 2 SCRAM, a Reactor Protection System Actuation, Due to
3531996006	1996	Inadvertent Start of the D21 Emergency Diesel Generator, an
3051996006	1996	Intergranular Attack & Intergranular Stress Corrosion Cracki
3131996007	1996	Automatic Reactor Trip And Emergency Feedwater System Actuat
2811996005	1996	Manual Reactor Trip Due To Loss Of Electro Hydraulic Control
4541996011	1996	Manual Reactor Trip Due to Loss of Instrument Air to Feedwat
3361997001	1996	Inadequate Fire Seal Material Installed Between Some Appendi
3091996012	1996	Water Intrusion of Turbine Driven Auxiliary Feedwater Pump L
2781996001	1996	High Pressure Coolant Injection System Declared Inoperable D
2821996011	1996	Degraded steam generator tube sleeves
4241996006	1996	RX TRIP DUE TO BLOWN FUSE IN MAIN FEEDWATER ISOLATION VALVE
2711996009	1996	Combustion Material in Building Joints between Turbine, Radw
2471996004	1996	Potential Path for Unfiltered Air Inleakage to the Central C
3881996001	1996	Unplanned ESF Actuation of Isolation Valve Due to Loss of Po
3251995022	1995	High Pressure Coolant Injection System Discharge Flow Elemen
3341995010	1995	Station Shutdown for Replacement of Rubber Expansion Joints
3891995005	1995	2A Emergency Diesel Generator Relay Socket Failures Due To H
3091995017	1995	LSI-S-63 Leaking From Inlet Flange
2721995022	1995	Condition Prohibited by the Plant Technical Specifications:
2541995005	1995	B Control Room HVAC System Inoperable Due to Refrigerant Lea
4231995015	1995	Missed ASME Inspections Due to Programmatic Oversight
3151995003	1995	Reactor Trip Due to Turbine Trip On Loss Of Condenser Vacuum
4161995008	1995	Inadvertent Reactor SCRAM Due to Turbine Trip on Loss of Con
3051995001	1995	Intergranular Attack and Intergranular Stress Corrosion Crac
3181995004	1995	Fire in Wall Expansion Joint
3611995007	1995	Incorrect Rod Shadowing Factors in the Core Protection Calcu
2451995007	1995	Incorrect Stud Material on 1-CU-3
3111995003	1995	Failure to perform type C local rate testing following pipin
3011995003	1995	Reactor Trip Due to Turbine Generator EH Control System Oil
4231995001	1995	Service Water System Train "B" Expansion Joint Inoperable Du
2601994011	1994	Failure Of a Motor With a Magnesium Alloy Rotor on a Reactor
4581994015	1994	ESF Actuation Caused By Pin Failure In Test Equipment Patch
2451994018	1994	Turbine Building Secondary Closed Cooling Water (TBSCCW)
3051994004	1994	Intergranular Attack And Intergranular Stress Corrosion Crac
3871994007	1994	Inoperable Fire Barrier - Condition Prohibited by Technical
3691993003	1993	Train B Of The Control Room Ventilation System Was Past Inop
3361993006	1993	Structural Integrity of Service Water Supply Piping to the W
2821993005	1993	Unit 1 Reactor Trip Due to Inadvertent Relay Operation Which
2851992026	1992	Incore Detector Alarm Limits Non-conservative for Monitoring
4001992007	1992	Reactor Trip due to failure of the Low Pressure Turbine Exha

3181992003	1992	Manual Reactor and Main Turbine Trip Due to Failed Expansion
2751992009	1992	Dose Limits Potentially Exceeded From Chemical And Volume Co
3251992016	1992	Fire Seals Around Diesel Generator Pedestals Outside Technic
3381992006	1992	Manual Reactor Trip During Startup When Four Rods Dropped In
4991992003	1992	Manual Reactor Trip on February 24, 1992
3131991012	1991	Automatic Actuation of the Control Room Emergency Ventilatio
2371991039	1991	Vent and Purge System Exhaust Ductwork Seperation Due to Con
2601991017	1991	Failed Soldered Connection on Air Supply Line to Steam Packi
3311991005	1991	Automatic Reactor Scram Following Main Steam Isolation Valve
3161991005	1991	Bolts Removed from Pressurized Essential Service Water Line
3341991015	1991	Control Room Ventilation System Outside Air Exhaust Dampers
3271991010	1991	Failure to conduct visual inspection of expansion joint seal
2951991007	1991	Control Room HVAC Envelope Unfiltered Inleakage Found to be
2591991005	1991	Potential Failure of Residual Heat Removal Service Water and
3311991001	1991	Manual Scram Shutdown of Plant Due to Steam Leak in the Heat
4161990028	1990	Automatic Scram Due To Instrument Air System Piping Joint Fa
2851990026	1990	Manual Reactor Trip Due To Loss Of Instrument Air Pressure
3051990011	1990	Actuation of the Containment Vent Isolation System Due to Ag
3891990005	1990	Component Cooling Water Heater Exchanger Pinhole Leak Due To
3541990025	1990	Recirculation System Instrument Line Crack At Welded Joint D
3441990043	1990	Lack of Adequate Administrative Controls Results in Some Mis
3131990010	1990	Inoperable Control Room Habitability Systems Due to Leakage
3311990015	1990	Manual Scram Following Loss of Air System Pressure Due to Po
2131990018	1990	Manual Plant Trip Due to Feedwater Control Valve Failing Ope
2601990004	1990	Unplanned Engineered Safety Feature Actuation Caused by a De
4101990010	1990	Surveillance Tests Not Performed Due to Poor Work Practices
3621990005	1990	Steam Generator Feedwater Sparger Damage
4611990010	1990	Removal of Tie-Rods from Shutdown Service Water Piping Expan
3691990006	1990	Corrosion Occurred on the Steel Containment Vessel Because o
2061990001	1990	Voluntary Entry Into Technical Specification 3.0.3 During Dc
3111990005	1990	Tech. Spec. 3.0.3 Entry; Two ECCS Subsystems Inoperable
3541989026	1989	Reactor Recirculation System Instrument Line Leakage Results
2061989029	1989	Potential Refueling Water Storage Tank (RWST) Diversion Flow
3881989011	1989	Instrument Air Leak Due to an Improperly Madeup Fitting Resu
2631989023	1989	Fabrication Flaws Discovered in HPIC Line Welds
3541989017	1989	Reactor Scram Caused By Failure Of Soldered Scram Valve Pilo
4161989012	1989	Reactor Scram Due to Condenser Expansion Joint Failure
4611989029	1989	Mechanical Failure of Rubber Expansion Joint Between the "A"
3021989011	1989	Personnel Error Results in Operation Outside the Design Basi
2601989008	1989	Electrical Fault On Transformer Causes Engineered Safety Fea
3241989004	1989	RCIC Inboard Steam Supply Valve Isolation
4401989005	1989	Deficient Design Installation Torque Valve Results In Drywel
4121989006	1989	Expansion Joint Liner Failures for Component Cooling Pumps

2801989002	1989	Gamma-Metrics Excore Neutron Flux Detector Not Qualified Due
2131988021	1988	Failure of Pipe Nipple Results in a Degraded Containment Bou
3211988016	1988	Torus Weld Shrinkage Causes Rock Bolt Deflection
3281988040	1988	Loss Of Power To Radiation Monitor Results In A Containment
4561988025	1988	Manual Reactor Trips due to approaching Low Low Steam Genera
3691988033	1988	Multiple Unit 1 Diesel Generator Failures Caused By A Manufa
3441988042	1988	Instrument Air Line Joint Failure Causes Containment Pressur
3271988022	1988	Reactor Trip Signals Generated From Electromagnetic Interfer
4981988031	1988	Cable Assemblies For Neutron Flux Monitoring Which Failed Qu
3641987010	1987	Unit Shut Down Due To Pressure Boundary Leakage
2661987005	1987	Reactor Trip with Safety Injection Due to Spray Valve Failur
3661987017	1987	Equipment Aging Causes Defective Amplifier Resulting In Loss
2691987010	1987	Manual Reactor Trip Due to a Component Failure During Startu
3011987004	1987	Degradation of Steam Generator Tubes
3351987014	1987	Unidentified Reactor Coolant System Leakage Greater Than Tec
2751987016	1987	Entry Into Technical Specification 3.0.3 Due To Four Shutdow
2501987026	1987	Inadequate Testing Of The Hydrogen Recombiner Line After Pip
2191987035	1987	Reactor Scram with Reactor Shutdown Due to Degraded Electric
4121987007	1987	Inoperable Control Room Pressurization System
2511987019	1987	Turbine Runback Caused By Spurious Spiking In The Rod Positi
4551987009	1987	Manual Reactor Trip In Response To Decreasing Steam Generato
3701987007	1987	Inoperable Auxiliary Building Fire Barrier Due to a Wall Sec
2191986034	1986	Manual Scram Due to Inability to Maintain Condenser Vacuum C
2501986039	1986	Manual Reactor Trip Following Loss of Plant Electrical Load
2511986029	1986	Process Radiation Monitor Spikes Cause Control Room Ventilat
2511986027	1986	Failed Process Radiation Monitor Causes Control Room Ventila
3251986030	1986	Tripping of Units 1 and 2 Reactor Protection System Division
3611986027	1986	Reactor Trip Caused by Failed CEA Position Indication
3681986013	1986	Inoperable Containment Building Pressure Transmitter
2811986006	1986	Service Water Leak in Unit 2 Containment
2891986008	1986	PARTIAL LOSS OF OFFSITE POWER
2981986005	1986	HIGH PRESSURE COOLANT INJECTION TURBINE GLAND SEAL STEAM CON
2591986004	1985	RESIDUAL HEAT REMOVAL SYSTEM HEAT EXCHANGER GASKET LEAK
3011985004	1985	Failure of Fuel Assembly L56 & L59 Cladding (Positions M6 an
3021985024	1985	Broken Pipe Restraint Reveals Error in Piping Analysis
2371985035	1985	Unit 2 Low Condenser Vacuum Scram
3251985052	1985	Primary Containment Group 6 Isolation During Investigation o
2591985031	1985	Seismically Unqualified Flanged Joints
3611985036	1985	CPIS Train 'A' Actuation Due to 2RT - 7856 Failure
2591985025	1985	Failure of Fuel Pool Cooling Pump Discharge Flange
3131985004	1985	Reactor Trip After Intercept Valves Closure and Subsequent F
3731985045	1985	Manual Scram Due to Loss of Circulating Water

2661985002	1985	Failed Fuel Rod in Assembly H14
2821985009	1985	Reactor Trip Caused by Broken Air Line
4831985023	1985	Inadvertent Engineered Safety Features Actuation
4831985021	1985	Inadequate Seismic Qualification of Class IE Batteries
2591985016	1985	Automatic Reactor Scram Due to Loss of Feedwater
2651985003	1985	Reactor Scram Caused by the Loss of Condenser Vacuum
3891984017	1984	2A1 Sit Check Valve Excessive Leakage
2851984023	1984	VIAS Actuation
3331984021	1984	Recirculation System Pipe Cracks
2501984027	1984	Reactor Trip Breakers
2981984005	1984	Primary Coolant Pipe Weld Failure
2191984005	1984	Isolation Condenser Piping Leak Near Weld Joint
3731984011	1984	Reactor Scram Resulting From Loss of Vacuum
2721984006	1984	Service Water Leak Inside Containment
3731984005	1984	Rx Scram/Loss of Main Condenser
2721983071	1983	Containment Fan Coil Unit Removed From Service
3251983050	1983	RHR Flow Instrument Reads Erractically
3021983060	1983	Update Failed Discharge Temperature Indicator on RHR Cooler
3681983048	1983	Startup Channel Fails
3211983111	1983	RCIC Manual Control Fails
2371983070	1983	Loss if 2A Negative 24/4B Volt Battery Charger
2491983035	1983	Leakage from "A" Recirc Pump Bowl Drain LIne
3691983096	1983	Steam Relief Radiation Monitor Fails
3161983082	1983	The East Train was Removed from Service to Repair Leak
3241983069	1983	Update on Two RHR Room Cooler Failures
3241983075	1983	Update on Drywell Drain Flow Integrator Fails
3701983040	1983	Steam Line Radiation Monitor Fails
3691983060	1983	RTD Return Isolation Valve on RCS Cold Leg Leaks
3731983070	1983	Radioactive Waste Pipe Develops Pin-Hole
3111983032	1983	Service Water Pump Bay Flooded by Leak
2861983002	1983	Residual Heat Removal (RHR) Minflow Line Leaks at Weld Join
2471983018	1983	RHR Containment Isolation Valve Binds
2631983008	1983	Feedwater Extraction Steam Line Leaks
3311983008	1983	Snubbers Declared Inoperable
3341983005	1983	Loss of Air to Main Steam Trip Valve Causes Safety Injection
3481983005	1983	Fuel Cladding Damage Visually Observed on 11 Cycle 4 Baffle
3161983012	1983	Engine Declared Inoperable Due to an Exhaust Leak
2591983004	1983	Recirculation Pump Tripped
3121982034	1982	A Leak was Observed in a Weld Near a One-inch Valve
2721982091	1982	Plant Systems Weld Degradation on No. 12 Component Cooling h
3111982110	1982	100' Elevation Containment Air Lock - Inoperable
2661982015	1982	A High Stress Low Cycle Failure of a Lap Joint Flange Stub p
4161982042	1982	A Defective Solder Joint in the Air Conditioner Which Caused

2201982011	1982	Oil Leak a Result of a Defective Braze Joint
3111982049	1982	Nos. 21 and 25 Containment Fan Coil Units - Inopera
3281982077	1982	Ice Condenser Deck Door Frozen Shut
2981982014	1982	Update on Reactor Water Cleanup Weld Defects
3611982014	1982	Refractory to Fire Barrier Joint Seals Missing Required Mast
3341982019	1982	A Filure of a Pinhole Leak from the Expansion Joint
3241982068	1982	A Bad Solder Joint in the Alarm Actuation Potentiometer Circ
3361982005	1982	Seal Leak Between the Body and Bonnet
2691982004	1982	Reactor Coolant System Normal Makeup Line Weld Radiography T
3251982006	1982	Secondary Containment Integrity Verification
3021982004	1982	Reactor Coolant Pump Leaks
3271981155	1981	A Bad Solder Joint on the Speed Control Motor Plug on the Hy
3241981131	1981	Erroneous Indications were Found to be Exhibited by the 1263
2371981066	1981	Crack in 2D1 Feedwater Heater Emergency Spill Line
2961981064	1981	Weld Joint on Gas Divider Broke.
2821981020	1981	Failure of Several NEED Relays
2551981038	1981	Containment Isolation System
3241981073	1981	The Indication for the RCIC System Steam Line Area Ambient T
3241981083	1981	The RCIC System Automatically Isolated Due to the Receipt of
3111981064	1981	Containment Fan Coil Unit - Service Water Leak
2601981031	1981	The 3-A Residual Heat Removal Pump Room Cooler
3381981044	1981	One of Two Safeguards Area Ventilation Systems (SAVS) was De
2631981011	1981	The Turbine Exhaust Line Check was Leaking in Excess of Tech
3051981013	1981	Inspection of the Cracked Weld Showed Poor Weld Penetration
3161981010	1981	Inspection of Inaccessible Hydraulic Snubbers found Inopera
3361981008	1981	Failure at the Joint would have Resulted in a Non-isolable R
2201981007	1981	Small Oil Weep at a Coupling to Tubing Weld Joint on the Eng
3251981004	1981	A Loose Solder Joint in the Rod Select Switch Occurred as a
3111980031	1980	Diesel Camshaft Failure
3391980104	1980	Water was Found Leaking from a Weld Joint
3381980092	1980	Water Found Leaking from a Weld Joint that Connects Drain Va
2551980035	1980	PORV Failure
2811980022	1980	Flow Indicator FI 2474 Failure
3461980052	1980	Emergency Diesel Generators Under-designed Exhaust Pipe Supp
2851980010	1980	Damage to the Closure Studs
2591980031	1980	Bus 2 Transfer a Fault on the Normal Feeder Bus from TS1B to
3211980033	1980	A Review of the Design Drawing Detailed a Seal that was not
2601980015	1980	Rod Block Monitor 'A' was bypassed for more than 24-hours in
2631980004	1980	Failure of Nine Containment Isolation Valves
2861980001	1980	An Abnormal Degradation of the CVCS
2611980002	1980	The Engine Driven Fire Pump was Rendered Inoperable