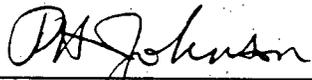


U. S. NUCLEAR REGULATORY COMMISSION  
REGION V

Report No. 50-206/91-03  
Docket No. 50-206  
License No. DPR-13  
Licensee Southern California Edison Company  
Irvine Operations Center  
23 Parker Street  
Irvine, California 92718  
Facility Name: San Onofre Unit 1  
Enforcement Conference at: Region V Office, Walnut Creek, California  
EA 91-198  
Conference Date: January 7, 1992  
Prepared by: C. W. Caldwell, Senior Resident Inspector  
D. L. Solorio, Resident Inspector

Approved by:

  
P. H. Johnson, Chief  
Reactor Projects Section 3

2/3/92  
Date Signed

Summary

An enforcement conference was held on January 7, 1992 to discuss the circumstances and apparent violations associated with (1) inoperability of the Halon fire suppression system for the 4160-volt (4 kv) switchgear room, in apparent conflict with the Unit 1 Technical Specifications (TS); (2) inaccurate or incomplete statements in a licensee event report (LER) asserting that a design basis fire in the 4 kv room would not have prevented Unit 1 from achieving and maintaining safe shutdown, in apparent conflict with 10 CFR 50.9; and (3) failure of the fire protection test program to demonstrate operability of the 4 kv room Halon system slave bottle actuators as required by the Topical Quality Assurance Manual.

A copy of presentation slides used by the licensee during the conference is included as an enclosure to this meeting report.

## DETAILS

### 1. Meeting Participants

#### Nuclear Regulatory Commission

- B. Faulkenberry, Deputy Regional Administrator, Region V
- R. Zimmerman, Director, Division of Reactor Safety and Projects, Region V
- K. Perkins, Deputy Director, Division of Reactor Safety and Projects, Region V
- F. Huey, Regional Enforcement Officer, Region V
- M. Blume, Regional Counsel, Region V
- J. Luehman, Office of Enforcement
- W. McNulty, Director, Office of Investigations, Region V
- S. Richards, Chief, Reactor Projects Branch, Region V
- P. Johnson, Chief, Reactor Projects Section 3, Region V
- J. Bradfute, NRR Project Manager, Unit 1
- C. Caldwell, Senior Resident Inspector
- D. Solorio, Resident Inspector
- D. Acker, Reactor Inspector, Region V
- W. Wagner, Reactor Inspector, Region V
- P. Qualls, Reactor Inspector, Region V
- F. Gee, Reactor Inspector, Region V

#### Southern California Edison Company

- H. Ray, Senior Vice President, Nuclear
- B. Katz, Manager, Nuclear Oversight
- R. Krieger, Station Manager
- J. Reilly, Manager, Nuclear Engineering and Construction
- L. Cash, Maintenance Manager
- R. Ornelas, Manager, Plant Licensing
- D. Brevig, Supervisor, Onsite Nuclear Licensing
- W. Zintl, Manager, Emergency Preparedness
- M. Gresho, Plant Licensing Engineer

#### Other Attendees

- K. Kammerer, San Diego Gas and Electric Company

### 2. Management Discussion

On January 7, 1992, an enforcement conference was held at the Region V office in Walnut Creek, California. The purpose of this meeting was to discuss the circumstances and apparent violations associated with (1) inoperability of the Halon fire suppression system for the 4160-volt (4 kv) switchgear room, in apparent conflict with the Unit 1 Technical Specifications (TS); (2) inaccurate or incomplete statements in a licensee event report (LER) asserting that a design basis fire in the 4 kv room would not have prevented Unit 1 from achieving and maintaining safe shutdown, in apparent conflict with 10 CFR 50.9; and (3) failure of the fire protection test program to demonstrate operability of the 4 kv room Halon system slave bottle actuators as required by the Topical Quality Assurance Manual.

The enforcement conference convened at 8:30 a.m.

Mr. Faulkenberry presented opening remarks stating that the purpose of the conference was to ensure that the facts related to the three apparent violations were accurately presented in the associated inspection report (50-206/91-36), and to allow for additional dialogue on corrective actions taken or planned by the licensee.

Mr. Ray said he would save his opening remarks until after discussion of the licensing basis for fire protection.

3. Discussion of NRC Concerns and Apparent Violations

Mr. Johnson summarized the events that resulted in the need for the enforcement conference.

The key points of the fire protection issue were presented as follows:

- The 4 kv room or the dedicated safe shutdown (DSD) system is required for safe shutdown; the DSD was not available for certain periods of time and the 4 kv room may not have been available if a fire had started in that room.
- The TS require an operable Halon system or a continuous fire watch in the 4 kv room; neither was available for more than 40% of the time from June 1988 to July 1991.
- Assuming a design basis fire in the 4 kv room, the DSD system was not available for safe shutdown during certain periods of time.
- LER 91-013 indicated that the DSD system would have been available for safe shutdown -- it was not available at all times.
- The Halon system problem was self-revealing

Mr. Johnson stated that the Inspection Report identified three apparent violations as follows:

1. TS 3.14.4 requires that both banks of the 4 kv room Halon system be operable. If they are not, a continuous fire watch must be initiated for the 4 kv room as a compensatory action. However, this was not done (except for times when a continuous fire watch was posted for other reasons) since the licensee did not realize that the 4 kv room Halon system was inoperable.
2. 10 CFR 50.9 requires that information provided to the NRC be complete and accurate in all respects. Two statements made in LER No. 91-013, Revision 0, did not appear to be complete and accurate. Specifically, the LER stated that a design basis fire in the 4 kv room would not have prevented the Unit from achieving and maintaining a safe shutdown condition; and in the unlikely event that a fire could not have been extinguished quickly, the DSD features of SONGS 1 would have provided the capability to achieve and maintain safe shutdown after a design basis fire.

3. The Topical Quality Assurance Manual (TQAM) for San Onofre Nuclear Generating Station (SONGS) specifies that testing is required to be conducted to determine operability of fire protection equipment. However, this testing to demonstrate operability of the 4 kv room Halon system slave bottle actuators was not performed.

Mr. Zimmerman addressed the inaccurate statements made in the LER and stated that the NRC disagreed with the conclusion in the LER that inoperability of the Halon system was of low safety significance. The NRC considered that a fire in the 4 kv room, concurrent with inoperability of the Halon and DSD systems, was significant despite the other compensatory measures available.

Mr. Ray agreed that there was reason for concern, but said that Southern California Edison (SCE) held a different point of view regarding the safety significance. The real issue was that the 4 kv room had only an hourly fire watch instead of the continuous fire watch that was required by TS. Mr. Ray then stated that in order to assess the safety significance of this event, it is important to understand the licensing basis for fire protection.

4. Summary Of Licensee Issues

The following is a summary of SCE's perception of the issues surrounding the inoperable Halon system and the potential impact on the Unit:

- a. Discussion of Licensing Basis for Fire Protection Technical Specifications

Mr. Ornelas presented SCE's position regarding the licensing basis for SONGS Unit 1. He stated that their understanding was that 10 CFR 50 Appendix R specifies plant design features for fire protection, and that TS provide the operational allowances for these features, including periods of inoperability for them as provided in the TS Limiting Conditions for Operations (LCOs). Therefore, it was their understanding that while a system is affected by the applicable LCOs (i.e., in an action statement), it is inherent to the system that it cannot survive the design basis event that the system was intended to mitigate.

Mr. Ornelas, citing NRC inspection manual Chapter 9900, contended that low safety significance with respect to DSD system inoperability could be inferred from the length of time allowed for the DSD system to be out of service, which is 60 days. He also stated that these outage times were based upon the relative likelihood of design basis events and the safety significance of the system.

Mr. Ornelas contended that SCE satisfied design requirements and that the compensatory actions for the DSD being out of service would be to provide another DSD or to preclude a fire from occurring by posting an hourly fire watch, as was done in this case.

Mr. Ornelas then stated that at the time the Unit 1 TS were written, it was recognized by SCE and the NRC that the probability of a fire

in the 4 kv room was low. In fact, Mr. Ornelas indicated that the probability of a fire was so low, it could be "reasonably precluded" during limited DSD outage times.

b. Discussion Of Adequacy of LER 91-13

Mr. Ray asserted that LER 91-013, Revision 0, was written from the perspective that they were in compliance with their TS for the DSD. Additionally, since SCE had taken the compensatory actions required with respect to the DSD being inoperable (posting of an hourly roving fire watch for the Unit), adequate protection for the plant was provided.

Mr. Ray indicated that they considered the plant to be adequately protected since the TS compensatory actions for the inoperable DSD were implemented. He stated that no one was claiming that this was of no significance; however, the positive benefits gained between having an hourly or a continuous fire watch (with fire detection available) was small in terms of safety significance. That is how SCE concluded that the inoperable Halon system was of low safety significance.

Mr. Ray stated that he was surprised that LER 91-13, Revision 0, was being considered as a violation of 10 CFR 50.9, because when he reviewed the LER, he naturally assumed that there were periods of time while the Halon suppression system was inoperable when the DSD was also inoperable. However, he also knew that compensatory actions had been taken while the DSD was out of service.

Mr. Ray stated that with the compensatory measures (i.e., an hourly fire watch) in place, a design basis fire was precluded. He also indicated that all the caveats for the event should have been included in the LER.

Mr. Ray restated that the discussion so far was directed towards explaining how SCE reached the conclusions written in the LER that was submitted to the NRC. Furthermore, he stated that SCE was not attempting to discuss the safety significance, but rather their thought process for arriving at the conclusions they presented in the LER.

c. Significance Of Halon Inoperability

Further discussion ensued between the NRC and SCE about the relationship between the Halon and DSD TSs. Both parties agreed that a design basis fire in the 4 kv room would have prevented safe shutdown during inoperability of the Halon and DSD systems. However, the licensee indicated that the TS allows for outage times of up to 60 days with an hourly fire watch patrol for compensatory action. In addition, both parties acknowledged that it was possible that a lesser fire disabling both trains of normal shutdown equipment could also have prevented safe shutdown. However, the licensee indicated that they believed that a fire of the magnitude necessary to damage redundant trains of equipment was not credible

based upon other fire protection features such as procedural controls for combustibles and the dedicated SONGS fire department.

Mr. Krieger stated that they considered the inoperability of the DSD system to require an hourly fire watch, which he believed to be independent of the Halon TS requirements, and that having the DSD out of service was not impacted by the Halon system's being out of service.

Mr. Ray said that the continuous fire watches are posted to prevent the entry of flammable sources into the 4 kv room, and that there are also procedures that limit the amounts of flammable sources in the room. In addition, the fire detection system was operable at all times, or a continuous fire watch was posted in that room when it was not. There may be a few cases where the fire detectors would respond slower than a continuous fire watch, but they are generally as effective if not more so.

Mr. Ray said the real issue was the difference between having an hourly fire watch in the 4 kv room versus a continuous fire watch, which was required by the TS for inoperability of the Halon system. From SCE's perspective, the safety significance was only the difference between the benefits of a continuous versus an hourly fire watch, and that small difference was the basis for their contention in the LER that concurrent DSD and Halon suppression system inoperability was not a significant safety concern. Mr. Ray also disputed that a continuous fire watch would have provided quicker response from the fire department than an hourly fire watch, considering that the fire detection system was operable (or a continuous fire watch was posted), and considering that fire watch personnel are not qualified to fight fires. Mr. Ray stated that Mr. Katz would give a presentation using probabilistic risk assessment (PRA) techniques to quantify in terms of risk the difference between an hourly and a continuous fire watch.

Mr. Katz stated that, assuming the automatic halon suppression system is inoperable, the fire department has a probability of success for manually extinguishing a fire in the 4 kv room of 90 percent with a continuous fire watch present. Assuming an hourly fire watch in the 4 kv room, that probability of success decreases to 80 percent. The success rate is based upon not damaging both trains of normal safe shutdown equipment.

Mr. Katz emphasized that the core melt probability based on PRA analysis was increased by one and a half percent by having an hourly fire watch versus an continuous fire watch. Mr. Katz stated that this information supported their assessment that the safety significance was low.

Mr. Ray restated that they were attempting to quantify the net effect between a continuous and an hourly fire watch and what the impact would be on plant safety.

d. Response of Firefighting Personnel and Other Compensatory Actions

Mr. Zintl stated that concurrent with the initial response by a control room operator and the duty member of the SONGS fire department, remaining members of the fire department would organize to respond to the fire in force, and would go to the location of the fire as soon as they were ready. Additionally, the initial member of the fire department that arrived at the fire location would use any manual suppression equipment available to fight the fire if he thought it was within his capability.

Mr. Zintl stated that there are plant areas where the fire department automatically responds to alarms without waiting for confirmation from the initial respondents to the alarm. He stated that the 4 kv room is one of those areas.

Mr. Ray stated that it was a universal truth that being in a TS action statement is a less safe condition. He also stated that in writing the original LER, SCE based the safety significance on the difference of implementing an hourly fire watch as required or a continuous fire watch. Mr. Ray also asserted that in ensuring safety, SCE does not stop at TS compliance.

Mr. Ray stated that there was obvious disagreement between SCE and the NRC regarding perceptions of the safety significance of concurrent inoperability of the Halon suppression system and the DSD. Furthermore, he contended that the TS may need to be changed to accurately reflect the safety significance of those systems and components required by Appendix R.

e. Cable Fire Propagation

Discussions then centered on the usefulness of the Electric Power Research Institute (EPRI) studies on cable fires, as applied to this issue, since these show that if a fire had initiated there could be significant damage incurred by cabling in cable trays.

Mr. Ray stated that the EPRI tests are not appropriate for this issue and should not be applied to fires in the 4 kv room cable trays.

Mr. Reilly further elaborated on this point. He stated that, first, the EPRI tests assume the fire has already occurred and do not accurately model ignition of a fire. Furthermore, the fire source used in the EPRI tests was five times greater than that used to qualify cable to IEEE standards. Mr. Reilly also acknowledged that not all cabling in the 4 kv room is qualified to the IEEE standards. Mr. Reilly stated that the EPRI tests could not be applied to any situation or configuration without considering test configuration differences.

Mr. Reilly also stated that liquid flammables are controlled in special containers to preclude ignition of the sources.

Mr. Ray responded that there were a few areas which SCE thought needed clarification, and that these would be discussed further following the meeting.

5. Summary Of NRC Issues

The following is a brief summary of the NRC's perception of the issues surrounding the inoperable Halon system and the potential impact on the Unit:

a. Discussion Of Licensing Basis For Fire Protection Technical Specifications

Mr. Zimmerman commented that the licensee's assumption that this event was of low significance due to the 60 days allowed out-of-service time for the DSD was not correct. He indicated that the TS-allowed outage time for equipment was only one factor in determining the safety significance of a system or component of the system.

Mr. Zimmerman stated that the NRC wanted to go beyond the TS and look at the "real world" implications of having the DSD and Halon systems out of service concurrently -- thus, looking at the issue more broadly.

b. Discussion Of the Adequacy Of LER 91-13, Revision 0

Mr. Zimmerman stated that if the LER had indicated that there were periods of time when the DSD was inoperable, a violation of 10 CFR 50.9 would not have been considered.

Mr. Richards commented that the authors of the LER incorrectly assumed that the NRC would make the same assumption -- that there were periods of time when the DSD was inoperable concurrent with inoperability of the Halon system. Mr. Richards stated that the statements in the LER of concern were worded in a manner normally seen in a Final Safety Analysis Report, where a design is described, whereas LERs are intended to describe a specific event and to accurately relate the actual status of associated plant equipment at the time of the event.

c. Significance Of Halon Inoperability

Mr. Richards stated that Appendix R (to 10 CFR 50) assumes that a fire has started, and that this was the reason for providing the DSD system originally.

Mr. Richards also responded to the licensee's position that the only benefit of a continuous fire watch was to prevent introducing fire sources into the 4 kv room. He indicated that other potential problems need to be considered. For example, people do not always follow procedures and accidents happen. In cases such as those, the continuous fire watch could be of benefit in ensuring that procedures are followed and that the potential for accidents is reduced.

Mr. Richards also questioned the functionality of the equipment in the 4 kv room after the fire has been put out using manual suppression, since use of water could cause shorts or grounds.

Mr. Perkins asked whether the PRA analysis discussed by SCE had been performed prior to the first version of the LER (91-013). Mr. Katz said no, and that it had performed it just recently.

Mr. Faulkenberry further discussed with SCE the differences in safety benefit between a continuous and an hourly fire watch. Mr. Faulkenberry stated that he considered a continuous fire watch to be more beneficial in aiding the fire department response in the event of a fire in the 4 kv room. This was due in part to the fact that the response time could be reduced by better communications as a result of having someone at the scene of the fire when it started, and that there would also be more immediate control of fire sources entering the 4 kv room.

Mr. Zimmerman restated that the more conservative direction would be to employ a continuous rather than an hourly fire watch. He stated that the TS are not the exclusive guide in operating the plant. He also agreed with SCE's position that a TS change might be necessary. He then stated that the NRC considered that there was an increase in the degree of safety with a continuous fire watch.

Mr. Zimmerman asked if anyone believed that there was equivalency between the DSD in pieces and an hourly fire watch. The licensee did not consider that equivalency could be directly credited.

d. Compensatory Actions For Fire Watches For Halon Inoperability

Mr. Johnson questioned whether the initial respondents (an operator and a member of the SONGS fire department) to a fire alarm signal received from the 4 kv room would be capable of using equipment for fire suppression.

Mr. Caldwell agreed that it was possible that the first fire department responder could fight the fire. However, that individual was not equipped with an air pack or equipment other than portable extinguishers. Thus, his effectiveness in fighting a fire could be limited.

e. Cable Fire Propagation

Mr. Johnson stated that the EPRI studies were accurate in identifying that cable fires may spread rapidly and that the key factor to consider when determining the safety significance of concurrently inoperable systems was the response time of the fire department. The EPRI studies show that in the time it takes for the fire department to arrive at the scene, there can be significant damage to cable from a fire if the heat source is large enough.

Mr. Huey stated that there was a potential for flammable materials to exist in the 4 kv room that could generate flame sources compar-

able to those used in the EPRI tests. Spilling and igniting a container could be enough to expose cabling to heat sources comparable to those used in EPRI tests.

Mr. Caldwell stated that the EPRI test results did show that once the fire started it propagated rapidly, which was not previously considered. Mr. Caldwell also stated that, although the EPRI tests are not used in determining the design basis conditions for treating cable fires, they do show that cable fires can spread very rapidly given a sufficient heat source, which did not appear to have been previously considered by SCE.

## 6. Conclusions

Mr. Richards indicated that all the aforementioned systems are part of the defense-in-depth concept. The lack of the DSD, the Halon system, and a continuous fire watch cut into the plant's safety margin.

Mr. Faulkenberry suggested that in the future, SCE should consider verifying operability of redundant equipment when taking one fire protection component out of service. Mr. Ray agreed and suggested that SCE would evaluate ways to develop compensatory measures for ensuring Halon suppression system operability.

Mr. Zimmerman restated that inoperability of the DSD should have been addressed in the LER, but, that he had also had acquired an appreciation for why SCE had not included such statements and would take SCE's reasoning into consideration.

Mr. Ray stated that SCE did not care to discuss the maintenance deficiencies which contributed to inoperability of the Halon suppression system, since corrective actions were as previously discussed during the management meeting in October 1991 and as stated in their LER. However, Mr. Cash did have one maintenance program enhancement to discuss. In particular, one additional action -- to perform an assessment of maintenance planner workload and staffing -- had been identified by the Nuclear Oversight investigation of this event. This will be performed early in 1992.

Mr. Huey asked if SCE was familiar with the NRC enforcement policy. The licensee acknowledged that they were.

Mr. Zimmerman stated that he understood that SCE based the conclusions stated in the LER on their perspective at the time. However, he also stated that the NRC had a very different perspective on the significance of the events described in the LER. Additionally, Mr. Zimmerman stated that SCE addressed the concurrent inoperability of the Halon and the DSD systems too narrowly, and their assessment of safety significance should have been broader.

Mr. Faulkenberry stated that the NRC had a better understanding of SCE's thinking on these issues and that the licensee's position would be taken into consideration. He then asked that SCE pay more attention in ensuring that there are no ambiguities in communications between SCE and

the NRC. Mr. Faulkenberry stated that SCE's manner of reviewing systems out of service should consider the interface of the DSD and Halon systems. He encouraged SCE to look at issues more broadly, also.

Mr. Ray acknowledged Mr. Faulkenberry's concerns.

7. Clarifications To Inspection Report 206/91-36

Mr. Zimmerman asked SCE if there were any statements in NRC inspection report 50-206/91-36 (documenting the Halon system inoperability) that should be clarified before the NRC made final determinations as to the nature of the enforcement actions that would be taken.

The licensee responded with the following:

- Areas Inspected paragraph (Inspection Report Cover Page) - The number of apparent violations was incorrectly identified as four. The correct number was three apparent violations.
- General Conclusions and Specific Findings Paragraph (page 2) - The licensee indicated that they had acknowledged in the LER that a continuous fire watch was not posted. However, they also pointed out that backup fire suppression was not necessary with the 4 kv room Halon system inoperable.
- Paragraph 3.a (page 3) - The licensee indicated that conduit entering switchgear and electrical cabinets have seals to prevent dripping water from entering the cabinets. In some cases, those seals are hard to see.
- Paragraph 6.b (page 11) - A limited fire would not necessarily have resulted in the inability to achieve and maintain safe shutdown of Unit 1. However, it may have resulted in inability if it could not have been extinguished quickly enough by manual suppression activities.
- Paragraph 7.b.(5) (page 17) - The licensee indicated that the existence of a continuous fire watch in the 4 kv room would not have decreased the response time of fire department personnel. In addition, when the fire detectors were inoperable, a continuous fire watch was established in the 4 kv room.

The fire detection system in the 4 kv room consists of two detection loops. One loop has nine detectors, the other has eight. If one detector in either loop alarms, a fire department investigator and a control operator will respond. If one detector in each of the two loops alarms (indicating a condition which will automatically actuate the Halon system), these people will respond and the fire department will also respond with fire trucks. In addition to these alarms, another alarm will activate if the Halon system discharges. This alarm will also result in fire truck response.

As was indicated in the LER, the control operator and the fire department response individual arrived at the 4 kv room within four

minutes of the alarm. Fire drills have demonstrated that the fire trucks can respond in approximately eight to ten minutes for fires in the vicinity of the 4 kv room.

8. Closing Remarks

Mr. Faulkenberry thanked SCE for their cooperation and adjourned the meeting at 11:10 a.m.

Attachment: Copy of slides used during the licensee's discussions.

## REGULATORY BACKGROUND

- 10CFR50 Appendix R, specifies plant design features which "shall be provided." Comparable to the General Design Criteria (10CFR50, Appendix A), or any other similar regulation, it controls plant design.
- Technical Specifications (TS) allow periods of inoperability for the features required by the regulations (for testing, maintenance, etc.) by providing ACTION statements in the LCO's.
- Inherently the plant cannot cope with design basis events when in TS action statements.
- This is recognized in NRC Inspection Manual Chapter 9900.
- Allowed out-of-service times in the T. S. are based on relative likelihood of Design Basis events, and safety significance of system.
  - This is reflected in the NRC Inspection Manual Chapter 9900 which states that out of service time allowed by the TS for components can be used as an indication of their safety significance.

## FIRE PROTECTION BACKGROUND/LICENSING REQUIREMENTS

- The design basis fire is a theoretical event that assumes complete combustion of all combustibles in the fire area.
- By definition, a design basis fire would have prevented safe shutdown during inoperability of the DSD system independent of halon system status.
- Lesser fires disabling both trains can also prevent safe shutdown during inoperability of the DSD.
- Consistent with the Basis of TS 3.14.8, fires in the 4kV Switchgear Room are "precluded" (not credible) during the allowed periods of DSD inoperability when compensatory measures are implemented.
- The NRC agreed that an hourly fire watch patrol would be the means to reasonably preclude a fire in the 4kV Room.

## LER SAFETY SIGNIFICANCE

- Safety Significance is assessed recognizing the Licensing Basis
- The Licensing Basis is composed of 2 parts
  - Design Requirements prescribed in Appendix R (Detection, Suppression and DSD for 4kV Room)
  - Operation Requirements prescribed in the Technical Specification (allowing for the inoperability of the fire protection features)
- The Tech Specs action requirements for these features are:
  - Detection inoperable, an hourly fire watch patrol
  - Suppression (Halon) inoperable, a continuous fire watch
  - DSD inoperable, equivalent shutdown capability provided by an hourly fire watch patrol to reasonably preclude a fire (no requirement to verify operability of detection/suppression)
- Halon Inoperable/DSD Operable
  - Discussed in LER, Low Safety Significance

## LER SAFETY SIGNIFICANCE

(continued)

- Halon / DSD Inoperable
  - Hourly fire watch ensures Fire Protection Program implementation
  - By the regulatory ground rules, during TS allowed time, a fire in 4kV Room is so unlikely it can "reasonably be precluded" (TS 3.14.8 Basis)
  - Low safety significance
  
- Means by which fires are precluded
  - Low probability of an ignition source (Internal or External)
  - Procedural control of transient combustibles.
  - Flammable liquids contained in safety cans (non-open containers)
  - Open flame permits
  - Hourly patrols to ensure compliance with these practices during DSD outages.

## SAFETY SIGNIFICANCE COMPARISON

<b>Halon</b>	<b>DSD</b>	<b>Fire Watch Frequency</b>	<b>Safety Significance</b>
Out	In	Continuous	<b>None</b> - within TS operating requirement
Out	In	None	<b>Low</b> - operability of DSD minimizes the safety significance
Out	Out	Hourly	<b>Low</b> - plant within DSD TS requirements.  - hourly fire watch ensures compliance with F.P. prevention measures.  - probability of a fire so low that it can be "reasonably precluded" during limited DSD outage time.  - F.P. prevention measures.

- OVERVIEW OF MAINTENANCE PROGRAM
- HALON SYSTEM INOPERABILITY
- VENDOR MANUALS

## MAINTENANCE PROGRAM ACTIONS

- Inspection Report Statement:

"Inoperability of the 4160 (4KV) switchgear room halon system resulted from weaknesses in the maintenance program in 1988. More recent inspection findings have indicated that these weaknesses continue to exist in 1991".
- Weaknesses were recognized and corrective actions initiated:
  - Upgrade of the Quality of Mechanical and Electrical Procedures
  - Maintenance Supervisor Training
  - Planner Training Program
  - Enhancement of Craft Training Programs
  - Self Verification Program
  - "Partners for Success"
- Corrective actions identified in IR 91-36 and LER 91-13
- Nuclear Oversight Division assessments of maintenance 1991
- Continue to closely monitor maintenance activities

Show slides of Halon installation.

Discuss actuation line connections.

## VENDOR MANUAL USE/CONTROL

- Control of vendor manuals is an industry issue
- Expansion of Vendor Technical Information System
- Halon Vendor Manuals
- Potential for Earlier Detection
- Procedures have been revised and the slave actuators for the 4KV room Halon system have been tested
- Use of Manuals at SONGS

- CONCERNED ABOUT MAINTENANCE PROGRAM WEAKNESSES
- INITIATED IMPROVEMENT ACTIONS 1990 & 1991
- HALON EVENT CONFIRMED MAJOR IMPROVEMENT INITIATIVES
- MONITOR EFFECTIVENESS

## EPRI TEST

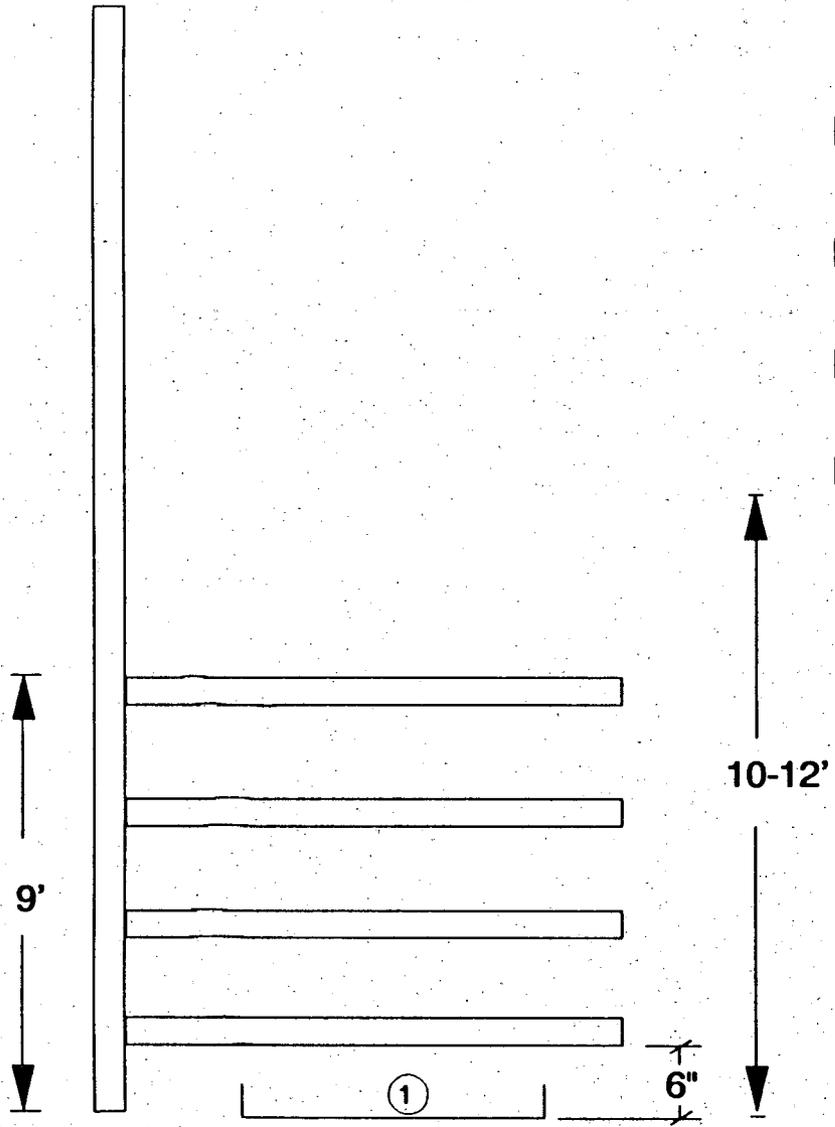
### Purpose

- Evaluate the behavior of cable tray fires
- Evaluate the adequacy of auto sprinkler and detection system

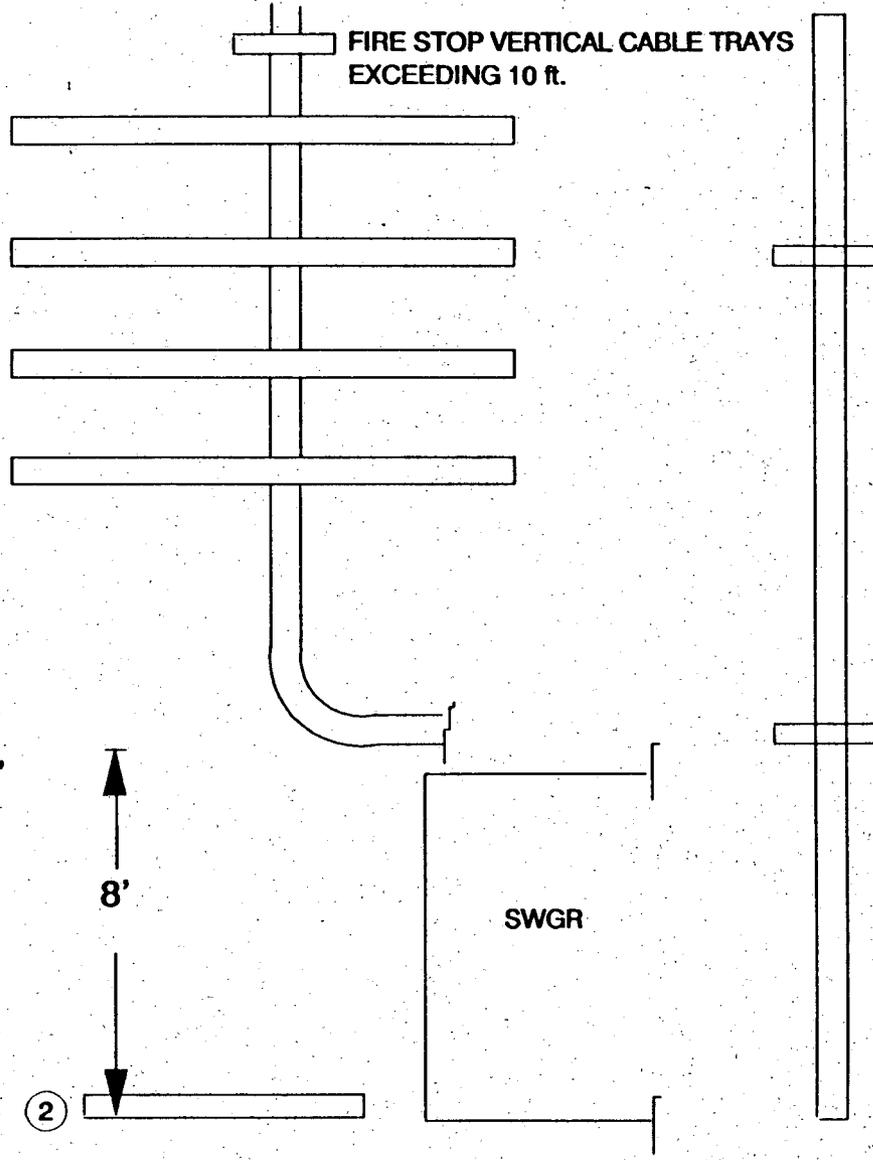
### Test Method

- Used extremely large ignition source
  - Approximately five times larger than standard IEEE-383 ignition source
- Configuration design to insure a fully involved self sustaining cable tray fire

- ① OPEN PAN FLAME
- ② CLOSED & "APPROVED" STORAGE CONTAINER



EPRI TEST CONFIGURATION



PLANT CONFIGURATION