

May 14, 1997

APPLICANT: Westinghouse Electric Corporation

FACILITY: AP600

SUBJECT: SUMMARY OF MEETING TO DISCUSS WESTINGHOUSE AP600 FIRE PROTECTION ANALYSIS

The subject meeting was held at the Nuclear Regulatory Commission (NRC) office in Rockville, Maryland on May 5, 1997, between representatives of Westinghouse Electric Corporation (the applicant) and the NRC staff. The purpose of the meeting was to discuss the status of the review of standard safety analysis report (SSAR) Section 9.5.1 and 9A. Attachment 1 is a list of meeting participants.

The April 7, 1997, meeting handout, listing the staff's currently identified review issues, was used as a guide for continued discussion. For Numbers 7 and 8, the applicant requested the staff to review draft examples of SSAR markups that Westinghouse believes will resolve the issues if the changes are made to all of the fire areas. A telephone conference call was tentatively scheduled for the week of May 12, 1997, to provide the applicant feedback on its draft examples. Attachment 2 is draft SSAR markups provided to the staff in the meeting.

The staff issued its position letter on May 5, 1997. The next meeting is tentatively scheduled for May 19, 1997, in Rockville, Maryland.

original signed by:

Diane T. Jackson, Project Manager
Standardization Project Directorate
Division of Reactor Program Management
Office of Nuclear Reactor Regulation

Docket No. 52-003

Attachments: As stated

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Docket No. 52-003

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WESTINGHOUSE/NRC AP600 MEETING

FIRE PROTECTION

MAY 5, 1997

MEETING PARTICIPANTS

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DIANE JACKSON	NRR/DRPM/PDST
TAD MARSH	NRR/DSSA/SPLB
STEVE WEST	NRR/DSSA/SPLB
ED CUMMINS	WESTINGHOUSE
DON HUTCHINGS	WESTINGHOUSE
JIM WINTERS	WESTINGHOUSE

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The fire resistance of the boundaries c as shown in Table 9A-3. Thus, the fire suppression.

The recirculation type ventilation system of combustion to other fire areas.

Fire Protection System Interlocks

Post-it Fax Note 7671

Date 5/2/97	# of pages 6
To DON HUTCHINGS	From STEVE P.
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Item 7 - Fire Area 1250 AF 01

Combustible materials in this fire area primarily consist of electrical cable insulation for cables feeding the various fans and pumps within this fire area. The cable raceways are fairly evenly distributed within the fire area, but there are concentrations in the middle of the fire area and adjacent to the west wall.

The equivalent fire duration for this fire area is less than one hour, as shown in Table 9A-3. Minimum three-hour fire barrier separation from adjacent fire areas is conservatively provided to protect the high value equipment in this fire area and meet the requirements for protection of adjacent safety-related fire areas. Thus, the fire is contained within the fire area with or without active fire suppression.

A fire in this fire area would most likely originate within the fan or pump motors, and can be expected to propagate slowly because of the nonvolatile nature of cable insulation and the low combustible loading. For this reason, an automatic suppression system is not warranted for this fire area.

9A.3.1.2.7.4 Fire Area 1250 AF 01

This fire area is comprised of the following room(s):

Room No.

12501

Nuclear island nonradioactive ventilation system main control room/division A and C equipment room

There are no systems in this fire area which normally contain radioactive material.



Fire Detection and Suppression Features

- Fire detectors
- Hose station(s)
- Portable fire extinguishers

Smoke Control Features

Fire dampers close automatically in response to a smoke detector signal or high temperature to control the spread of fire and combustion products. Smoke and hot gases are subsequently removed from the fire area by using portable exhaust fans and flexible ductwork.

Fire Protection Adequacy Evaluation

A fire in this fire area is detected by a fire detector, which produces an audible alarm locally and both visual and audible alarms in the main control room and the security central alarm station. A fire in the fire area is extinguished manually using hose streams or portable extinguishers.

This fire area contains two charcoal adsorbers, located in the nuclear island nonradioactive ventilation system supplemental air filtration units. Fixed fire suppression systems are not required for these adsorbers because of the high charcoal ignition temperature. The normal temperature of the air flowing through the charcoal adsorbers is well below 200°F, while the minimum charcoal ignition temperature is greater than 600°F. Two independent temperature sensors interface with the fire detection system, providing charcoal temperature indication and high and high-high temperature alarms. The filtration unit fan trips at the high temperature alarm setpoint. The setpoints of both alarms are well below the charcoal ignition temperature, allowing the operator time to investigate and take corrective action. In the unlikely event of a fire in the adsorber, the filtration unit can be manually isolated and sprayed with water from a nearby hose station to cool the charcoal and extinguish the fire.

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'A'

~~The fire resistance of the boundaries of this fire area is greater than the equivalent fire duration, as shown in Table 9A-2. Thus, the fire is contained within the fire area with or without active fire suppression.~~

The ventilation system does not contribute to the spread of the fire or products of combustion to other fire areas because fire dampers isolate the fire area.

Fire Protection System Integrity

An evaluation of the consequences of inadvertent operation of an automatic suppression system is not required because there are no such systems in this fire area. See Section 3.4 for a discussion of the consequences of a break in a fire protection line in this fire area.



Combustible materials in this fire area consist of modest quantities of electrical cable insulation and ordinary combustibles, but significant concentrations of volatile chemicals are also likely to be present.

The equivalent fire duration for this fire area is less than one hour, as shown in Table 9A-3. Because significant concentrations of volatile chemicals are likely to be present three-hour fire barrier separation from adjacent fire areas is conservatively provided. Because the growth of a chemical fire is rapid, an automatic fire suppression system is also provided. Fire suppression activities prevent the fire from propagating beyond the nonrated building exterior wall.

9A.3.2.10 Fire Area 2043 AF 01

This fire area is comprised of the following room(s):

Room No.
20401

Secondary sampling laboratory

There are no systems in this fire area which contain radioactive material.

Fire Detection and Suppression Features

- Fire detectors
- Wet pipe sprinklers
- Hose station(s)
- Portable fire extinguishers

Smoke Control Features

Fire dampers close automatically on high temperature to control the spread of fire and combustion products. Smoke and hot gases are removed from the fire area using portable exhaust fans and flexible ductwork.

Fire Protection Adequacy Evaluation

A fire in this area is detected by a fire detector which produces an audible alarm locally with both visual and audible alarms in the main control room and security central alarm station. The fire is extinguished by the automatic suppression system or manually, using hose streams or portable extinguishers.

The fire resistance of the boundaries of this fire area is greater than the equivalent fire duration, shown in Table 9A-3, except for the exterior walls of the turbine building. Fire suppression activities prevent the fire from propagating beyond the fire area.

The ventilation system does not contribute to the spread of the fire or products of combustion to other fire areas. Fire area boundaries are equipped with fire dampers to prevent the propagation of fire between fire areas.

9A.3.4.18 Fire Area 4042 AF 01

This fire area is comprised of the following room(s):

Room No.

40413

Electrical switchgear room 1

This annex building fire area contains the non-Class 1E switchgear for one train, and two motor generator sets and power cabinet. There are no systems in this fire area which normally contain radioactive material.

Fire Detection and Suppression Features

- Fire detectors
- Hose station(s)
- Portable fire extinguishers

Smoke Control Features

Fire dampers close automatically on high temperature to control the spread of fire and combustion products. Smoke and hot gases are removed from the fire area by reopening the fire dampers after a fire. The return fans of the ventilation system serving the area are manually aligned to the smoke purge mode to exhaust smoke and hot gases to the atmosphere.

Fire Protection Adequacy Evaluation

A fire in this fire area is detected by a fire detector which produces an audible alarm locally and both visual and audible alarms in the main control room and the security central alarm station. The fire is extinguished manually using hose streams or portable extinguishers.

~~The fire resistance of the boundaries of this fire area is greater than the equivalent fire duration, as shown in Table 9A-3, except for the building exterior wall. Fire suppression activities prevent the fire from propagating beyond the fire area.~~

ADP → Combustible materials in this fire area primarily consist of electrical cable insulation within electrical equipment, cabinets and raceways. These components are fairly evenly distributed within the fire area. There is a concentration of cables adjacent to the building exterior wall.

from adjacent fire areas
The equivalent fire duration for this fire area is less than one hour, as shown in Table 9A-3. Minimum two-hour fire barrier separation is conservatively provided to protect the high value equipment in this fire area. Fire suppression activities prevent the fire from propagating beyond the nonrated building exterior wall.

A fire in this fire area would most likely originate within the electrical equipment or cabinets, and can be expected to propagate slowly because of the nonvolatile nature of cable insulation and the low combustible loading. For this reason, an automatic suppression system is not warranted for this fire area.

The ventilation system does not contribute to the spread of the fire or products of combustion to other fire areas because fire dampers isolate the area.

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The quantity of combustible materials in this fire zone is very low, consisting primarily of cable insulation related to the instrumentation in this zone. Although it is unlikely that all of the components would be damaged, a fire in this fire zone is conservatively assumed --

This fire zone is physically separated from other fire zones by structural barriers consisting of concrete walls, floor and ceiling with minimum nominal thicknesses of two feet, except for an access hatchway adjacent to the refueling cavity which is covered with steel grating. A fire does not propagate to or from this fire zone.

9A.3.1.1.3 Fire Zone 1100 AF 11206

This fire zone is comprised of the following room(s):

Room No.

11206

Passive core cooling system valve/accumulator room A

Safe Shutdown Evaluation

Table 9A-2 lists the safe shutdown components contained in this fire zone. ~~This compartment is physically separated from other fire zones by structural barriers such that a fire does not propagate to or from this fire zone.~~

The quantity of combustible materials in this fire zone is very low, consisting primarily of cable insulation related to the valves located in this fire zone. A fire in this fire zone is conservatively assumed to disable control of all of the valves and instrumentation in this fire zone. The passive core cooling system safe shutdown components located in fire zones 1100 AF 11207 and 1100 AF 11300B are redundant to those in this fire zone, and are sufficient to perform applicable functions to achieve and maintain safe shutdown. The spent fuel pool cooling system containment isolation valve located outside the containment fire area is redundant to the containment isolation valve inside containment in this fire zone and is sufficient to maintain containment integrity.

Redundant reactor coolant hot leg instruments in fire zone 1100 AF 11204 provide the operator with information required to take corrective action during reduced inventory operation.

Smoke and hot gases from a fire in this fire zone rise through the access hatchway and spread through the large maintenance floor air space (fire zones 1100 AF 11300A and B) where they are cooled by mixing with the air and by contact with structural surfaces. Smoke and hot gases thus do not cause propagation of the fire beyond this fire zone. Safe shutdown components listed in Table 9A-2 for the adjacent fire zones are not susceptible to damage by the diluted and cooled smoke and gases from this fire zone.

Safe Shutdown Evaluation

Revision: 11
February 28, 1997

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The redundant steam line pressure instruments located in area 1201 AF 05 for steam generator 1 and in area 1201 AF 06 for steam generator 2 are sufficient to perform the applicable functions to achieve and maintain safe shutdown.

9A.3.1.1.9 Fire Zone 1100 AF 11300C

This fire zone is physically separated from other fire zones (except fire zone 1100 AF 11500) by structural barriers or partial barriers. The bottom of this fire zone is the solid concrete floor of the steam generator compartment. From here to an elevation about 13 feet above the operating deck the fire zone is enclosed by concrete walls with a nominal thickness of three feet, except for access passageways to and from the pressurizer compartment (fire zone 1100 AF 11303) and the adjoining portion of the vertical access area (fire zone 1100 AF 11204), and the floor grating interface between the vertical access area and the steam generator access compartment (fire zone 1100 AF 11303). Above the top of these concrete walls, the fire zone is open to the large air space above the operating deck (fire zone 1100 AF 11500).

9A.3.1.1.10 Fire Zone 1100 AF 11301

This fire zone is comprised of the following room(s):

Room No.	
11201	Steam generator compartment 1
11301	Steam generator 1 lower manway area
11401	Steam generator 1 tubesheet area
11501	Steam generator 1 operating deck
11601	Steam generator 1 feedwater nozzle area
11701	Steam generator 1 upper manway area

Safe Shutdown Evaluation

Table 9A-2 lists the safe shutdown components located in this fire zone. ~~This fire zone is physically separated from other fire zones (except fire zone 1100 AF 11500) by structural barriers or labyrinths such that a fire does not propagate to or from this fire zone. This fire zone borders fire zone 1100 AF 11500 at the top of the steam generator compartment, which is open to the air space above the operating deck. The quantity and arrangement of combustible materials in this fire zone are such that a fire which damages safe shutdown components in this fire zone does not propagate to the extent that it damages redundant safe shutdown components outside this fire zone.~~

The quantity of combustible materials in this fire zone is very low, consisting primarily of cable insulation related to the components in this fire zone and the reactor coolant pump motors. Although the consequences of a fire are expected to be very limited, a fire in this fire zone is conservatively assumed to disable all of the safe shutdown components in this fire zone.



The redundant reactor coolant system fourth stage automatic depressurization system valves and hot leg/cold leg instrumentation located in fire zone 1100 AF 11302, and redundant reactor coolant system pressurizer and steam generator system steam generator level instrumentation located in 1100 AF 11300B are sufficient to perform applicable functions to achieve and maintain safe shutdown.

The four divisions of reactor coolant system/reactor coolant pump bearing water temperature instrumentation are assumed to be disabled and would not be available to detect and provide a trip signal on a loss of component cooling water to the pump. If the fire in this fire zone does not disable the pump, the component cooling water flow to the pump will be unaffected by the fire and will continue to provide cooling water to the pump bearings until the pump is tripped by other means.

The reactor coolant system reactor coolant pump shaft speed instruments are conservatively assumed to be disabled. The redundant reactor coolant system cold leg flow instrumentation located in fire zones 1100 AF 11300A and 1100 AF 11300B is sufficient to perform applicable functions to achieve and maintain safe shutdown.

The four reactor coolant system reactor head vent valves are assumed to be disabled. If power is lost while in the closed position, the head vent valves will maintain reactor coolant pressure boundary integrity. Refer to subsection 9A.3.7 1.1 for a discussion on spurious actuation of reactor coolant system reactor head vent valves.

Depending on fire location, smoke and hot gases from a fire in this fire zone rise through the annular space surrounding the steam generator or through the pressurizer compartment (fire zone 1100 AF 11303) and into the air space in the upper portion of the containment (fire zone 1100 AF 11500) where they are cooled by mixing with the surrounding air and by contact with structural surfaces. Smoke and hot gases thus do not cause propagation of the fire beyond this fire zone. Safe shutdown components listed in Table 9A-2 for the adjacent fire zones are not susceptible to damage by the diluted and cooled smoke and gases from this fire zone.

11302

Steam generator 2 upper manway area

Safe Shutdown Evaluation

Table 9A-2 lists the safe shutdown components located in this fire zone. This fire zone is physically separated from other fire zones (except fire zone 1100 AF 11500) by structural barriers or labyrinths such that a fire does not propagate to or from this fire zone. This fire zone borders fire zone 1100 AF 11500 at the top of the steam generator compartment, which is open to the air space above the operating deck. The quantity and arrangement of combustible materials in this fire zone are such that a fire which damages safe shutdown components in this fire zone does not propagate to the extent that it damages redundant safe shutdown components outside this fire zone.



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