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#NRCRIC2026

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# 50 YEARS AFTER THE BROWNS FERRY FIRE:

A Legacy of Safety



# THE BROWNS FERRY PLANT

## ATHENS, ALABAMA

Located on the Tennessee River, Browns Ferry was the Tennessee Valley Authority's first and largest nuclear power plant and, at the time, the largest nuclear power plant in the world.

Construction began in September 1966. Unit 1 came online in August 1974, Unit 2 in March 1975, and Unit 3 in March 1977.

All three units are General Electric BWR-4s with Mark I containments.

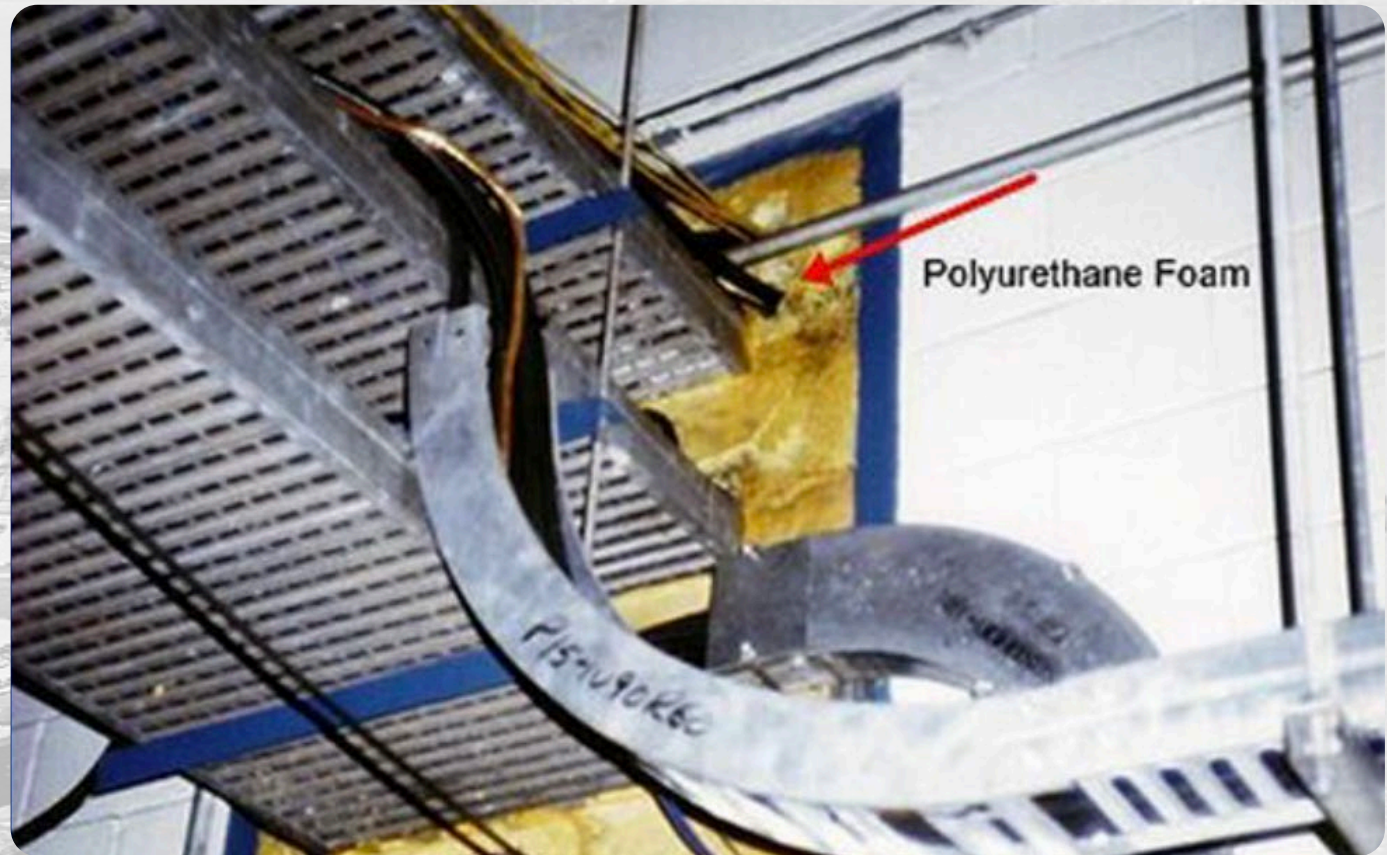


# BEGINNING OF THE FIRE

MARCH 22, 1975  
Unit 1

Tests indicated significant air leakage into the reactor building. Plant staff observed a hole several inches wide in a penetration seal between the cable spreading room and the reactor building.

Plant staff stuffed two pieces of sheet polyurethane into the hole to seal it and tested the leakage path with a candle. At approximately 12:20 PM, the flame was pulled into the penetration seal, which ignited.





# FIRE SPREAD

## AND PLANT RESPONSE



### FIRE SUPPRESSION ATTEMPTS

After 15 minutes of unsuccessful attempts to suppress the fire with portable extinguishers, staff notified a security guard of the fire, who then informed the shift supervisor.



### FIRE SPREAD

By this time, the fire had progressed into the reactor building and emerged in the lowest tray of a stack of several trays.



### MALFUNCTIONS START

At approximately 12:40, the emergency core cooling system actuated. Operators shut the system down, but it started again. This time, operators were unable to stop the pumps. Electrical panels in the control room lost power, and partial control of the reactor protection system and safety relief valves (SRVs) was lost.

# FIRE SUPPRESSION EFFORTS STALL



- **CABLE SPREADING ROOM CARDOX SYSTEM**  
The automatic carbon dioxide (CO<sub>2</sub>) system had been disabled for the protection of the workers in the cable spreading room. Manual operation of the system was hindered by construction plates placed over the control panels. When it was finally actuated, the system failed to extinguish the fire and instead pushed smoke into the control room.
- **OPERATORS ATTEMPT TO SHUT DOWN THE REACTOR**  
A controlled shutdown attempt failed when recirculation pumps stopped working. The reactor was manually scrammed at 12:51.
- **LOSS OF POWER AND PRESSURE RISE**  
After control rods were confirmed in, the 120-volt preferred power was lost. With the closure of the main steam isolation valves, reactor pressure began to rise rapidly.



# OPERATORS ATTEMPT TO REGAIN CONTROL

- **REACTOR DEPRESSURIZATION WITH SRVS**  
At 13:30, operators opened the four SRVs they still had control over. This blowdown transferred significant amounts of heat to the torus; however, residual heat removal pumps remained unavailable for cooling.
- **WATER SUPPLY TO THE REACTOR ESTABLISHED**  
At 13:45, reactor pressure had decreased to 350 psi. This allowed a condensate booster pump to start injecting with the feed pump bypass valve open.
- **A NEW EMERGENCY DEVELOPS**  
A melted solder joint disabled the SRVs, and reactor pressure began to rise. With little equipment left to lose, plant staff and the Athens fire department finally put water on the fire. The fire was confirmed out at 19:45.



# PLANT RECOVERY

## AND THE AFTERMATH

- **REACTOR DEPRESSURIZED AND COOLING INITIATED**  
At 21:50, operators regained control of the relief valves and depressurized the reactor. The residual heat removal system was restored and cooling initiated at 01:30. By 09:30, the reactor was in cold shutdown.
- **THE FIRE BURNED FOR OVER 7 HOURS**  
In total, 117 conduits, 26 cable trays, and 1,611 cables were damaged, costing an estimated \$10 million to repair.
- **UNITS 1 AND 2 SHUT DOWN**  
Both Units 1 and 2 were defueled and remained shut down until September 1976, costing an additional \$10 million per month.

# IN CASE OF FIRE

SOUND THE ALARM  
CALL THE FIRE DEPARTMENT  
EVACUATE AREA  
USE FIRE EXTINGUISHER IF SAFE TO DO SO  
CLOSE DOORS BEHIND YOU  
ASSEMBLE AT DESIGNATED AREA

# EMERGENCY OPERATIONS

## LESSONS LEARNED PROCEDURES

- **QUALITY ASSURANCE**  
The penetration seal did not have the flame-proof coating applied, and the temporary sealant was highly flammable.
- **AIR LEAK TEST PROCEDURE**  
Despite knowledge that the seals were possibly flammable and a near-miss days before, staff continued to use candles.
- **NOTIFICATION OF FIRE**  
Staff fought the fire for 15 minutes before notifying the control room, which should have happened immediately.
- **PLANT COMMUNICATION SYSTEM**  
There were discrepancies as to which extension to dial in the event of a fire, as well as isolated parts of the PAX network that would not have functioned.



# LESSONS LEARNED

## FIREFIGHTING



### TRAINING

Lack of training with the local fire department and emergency response procedures complicated response.



### EQUIPMENT

Breathing apparatus failures and limitations, lack of firefighting gear, disabled suppression systems, and broken fire extinguishers hampered firefighting efforts.



### USE OF WATER

When non-water-based fire suppressants don't work, use water!



# LESSONS LEARNED PLANT DESIGN

## SEPARATION CRITERIA

Conduits separating independent systems did not adequately protect cables.

## FIRE HAZARD ANALYSIS

Potential hazards and interconnections between safety equipment and non-safety circuits were not recognized.

## FIRE PROTECTION SYSTEMS

Automatic detection and suppression systems could have prevented significant damage.