

UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR REACTOR REGULATION
WASHINGTON, D.C. 20555-0001

September 23, 1997

**NRC INFORMATION NOTICE 97-73: FIRE HAZARD IN THE USE OF A
LEAK SEALANT**

Addressees

All holders of operating licenses for nuclear power reactors except those who have permanently ceased operations and have certified that fuel has been permanently removed from the reactor vessel.

Purpose

The U.S. Nuclear Regulatory Commission (NRC) is issuing this information notice to alert addressees to a potential fire hazard in the use of a leak sealant. It is expected that recipients will review the information for applicability to their facilities and consider actions, as appropriate, to avoid similar problems. However, suggestions contained in this information notice are not NRC requirements; therefore, no specific action or written response is required.

Description of Circumstances

Discussion

On July 15, 1997 a steam leak in a main steam isolation valve (MSIV) at Unit 2 of the South Texas Project plant was being repaired by injecting a leak sealant. The people performing the work had reached a stopping point to let the injected compounds firm up to create the seal. The work team left the cubicle in which the work was being performed in order to cool off, the temperature in the cubicle being too high to allow them to stay there. A patrolling security guard entered the cubicle and noticed a small flame on the valve. Appropriate personnel were notified and the flame was put out with a fire extinguisher.

The compounds used to seal the leak were approved products for the application and are in common use in the industry. Mineral oil is one of the material components of the compound. When the compound is injected under pressure and gets hot, the mineral oil tends to separate from the rest of the compound, becoming more fluid and starting to leak out wherever it can find a path. The leakage may be either as a liquid or as a vapor (smoke) due to the high temperature.

In this event, the mineral oil leaked out from the sealant-retaining clamp as a liquid and soaked into the fiberglass insulation around the valve. The "wicking" effect from the penetration into the insulation caused the auto-ignition temperature of the mineral oil to be

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updated on 10/3/97



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lowered sufficiently to ignite the oil and produce small flames on the insulation pad. Porous materials, such as blanket-type insulation, exhibit a wicking effect when exposed to a combustible liquid. When the impregnated insulation is exposed to elevated temperatures, the combustible liquid (in this case mineral oil) may spontaneously ignite even though the temperature is below the published auto-ignition temperature of the combustible liquid. An outside ignition source is not required for combustion to occur in oil-soaked insulation.

Auto-ignition temperature is the temperature at which combustion will occur without an outside ignition source. The flash point is the lowest temperature at which the vapor of a combustible liquid can be made to ignite momentarily in air; i.e., will burn as long as an open flame is present and will not continue to burn if the flame is removed. Wicking action actually lowers the surrounding vapor pressure which results in the lowering of the auto ignition temperature.

Spontaneous ignition of oil-soaked insulation can occur under the following conditions:

- the liquid is insufficiently volatile to evaporate rapidly,
- the insulation is sufficiently porous to allow oxygen to diffuse to the surface of the absorbed liquid, and
- the oil leak is slow enough that the pores of the insulation are not blocked so that oxygen is not excluded from the high-temperature region.

The South Texas Project licensee has taken steps to preclude repetition of this event. Revisions to engineering standards incorporate information about sealing compounds with greater-than-minimal percentage of mineral oil and appropriate temperature limitations. Work instructions related to on-line leak repair activities contain requirements to:

- ensure that insulation and other materials that may cause a wicking effect are removed from the work area,
- ensure that a fire watch is established during work activities and for an hour after work is complete, and
- provide adequate ventilation to assist in disbursement of vapors.

This information notice requires no specific action or written response. If you have any questions about the information in this notice, please contact one of the technical contacts listed below or the appropriate Office of Nuclear Reactor Regulation (NRR) project manager.


for Jack W. Roe, Acting Director
Division of Reactor Program Management
Office of Nuclear Reactor Regulation

Technical contacts: Geoffrey P. Hornseth, NRR
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Attachment: List of Recently Issued NRC Information Notices

Attachment filed in Jacket

LIST OF RECENTLY ISSUED
NRC INFORMATION NOTICES

Information Notice No.	Subject	Date of Issuance	Issued to
97-72	Potential for Failure of the Omega Series Sprinkler Heads	09/22/97	All holders of OLs or CPs for nuclear power reactors and fuel cycle facilities
97-71	Inappropriate Use of 10 CFR 50.59 Regarding Reduced Seismic Criteria for Temporary Conditions	09/22/97	All holders of OLs for nuclear power reactors except those who have permanently ceased operations and have certified that fuel has been permanently removed from the reactor vessel
97-70	Potential Problems with Fire Barrier Penetration Seals	09/19/97	All holders of OLs for nuclear power reactors except those who have permanently ceased operations and have certified that fuel has been permanently removed from the reactor vessel
97-69	Reactor Trip Breakers and Surveillance Testing of Auxiliary Contacts	09/19/97	All holders of OLs for pressurized water reactors except those who have permanently ceased operations and have certified that fuel has been permanently removed from the reactor vessel

OL = Operating License
CP = Construction Permit

lowered sufficiently to ignite the oil and produce small flames on the insulation pad. Porous materials, such as blanket-type insulation, exhibit a wicking effect when exposed to a combustible liquid. When the impregnated insulation is exposed to elevated temperatures, the combustible liquid (in this case mineral oil) may spontaneously ignite even though the temperature is below the published auto-ignition temperature of the combustible liquid. An outside ignition source is not required for combustion to occur in oil-soaked insulation.

Auto-ignition temperature is the temperature at which combustion will occur without an outside ignition source. The flash point is the lowest temperature at which the vapor of a combustible liquid can be made to ignite momentarily in air; i.e., will burn as long as an open flame is present and will not continue to burn if the flame is removed. Wicking action actually lowers the surrounding vapor pressure which results in the lowering of the auto-ignition temperature.

Spontaneous ignition of oil-soaked insulation can occur under the following conditions:

- the liquid is insufficiently volatile to evaporate rapidly,
- the insulation is sufficiently porous to allow oxygen to diffuse to the surface of the absorbed liquid, and
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The South Texas Project licensee has taken steps to preclude repetition of this event. Revisions to engineering standards incorporate information about sealing compounds with greater-than-minimal percentage of mineral oil and appropriate temperature limitations. Work instructions related to on-line leak repair activities contain requirements to:

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Attachment: List of Recently Issued NRC Information Notices

DOCUMENT NAME: G:\RAB1\SEALFIRE.IN

*SEE PREVIOUS CONCURRENCES

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NAME	RBenedict* GHomseth* JTapia*	JStrosnider*	RDennig*	JRoe
DATE	08/28/97	09/03/97	09/08/97	1 / 97

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 9/12/97

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OFC	PECB:DRPM	C:EMCB/DE	(A)C:PECB	(A)D:DRPM
NAME	RBenedict GHornseth JTapia	JStroszper EJ	RDennig	JRoe
DATE	8/12/97	9/13/97	9/18/97	1/197

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