

**Fire protection
at nuclear installations**

Topic of interest:

Ventilation management in case of fire

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Aspects to be discussed



1. Issue of ventilation system and fire dampers automatization (approach, solutions)



2. Operators' action on certain ventilation systems in case of fire

Expected outcome of discussion

- Overview of practices regarding the management of the ventilation (automatic actions, manual actions)
- Better insights from national approaches to share experience and identify potential good practices or challenges

Ventilation management in case of fire

1. Issue of ventilation system and fire dampers automatization (approach, solutions)

Approaches reported in NARs for NPP:

In most of the NPP, the **closure of the fire dampers and the shutdown of ventilation system related are automatically triggered** by the automatic fire detection system. Fire dampers can be also triggered if a high temperature threshold is reached (thermal fuse).

Other approaches have been noticed:

- German NPP: fire dampers are actuated **automatically** with the thermal fuse or **manually**.
- Slovenian NPP: fire dampers are actuated **automatically** with thermal fuse. The shutdown of certain part of the ventilation system is **manual**.
- Czech NPP: in case of fire in **area with low fire loads**, smoke is extracted as long as possible by means of operating air ventilation system.

The management of the dedicated smoke extraction system in specific area (when existing) is performed automatically for some countries (Belgium: KCD3, Finland: Loviisa 1&2, Sweden: Oskarshamn 3).

Ventilation management in case of fire

1. Issue of ventilation system and fire dampers automatization (approach, solutions)

Approaches reported in NARs for RR:

Different approaches were noted:

- In most of the RRs equipped with fire dampers, the **closure of the fire dampers is automatically generated** if a high temperature threshold is reached,
- For some RRs, a manual closure of the fire dampers by the operator could be required (Germany: FRMII).

The management of a certain (part of) ventilation system is mainly performed manually.

For one Triga Mark II reactor (Italy), there is **an automatic shutdown of the ventilation** in case of fire detection.

Other type of facilities:

The level of detail provided in the NARs for ventilation management in case of fire does not allow to compare the approach of the different operators.



1. Issue of ventilation system and fire dampers automatization (approach, solutions)

Questions on ventilation system and fire dampers automatization :



1. What approaches are used for ventilation management automatization in the event of a fire?
 - For example scale of automatization or way of triggering etc...
2. What are the limits of automatization for ventilation system in case of fire?
3. What are pros and cons of automatization for smoke extraction system?

Ventilation management in case of fire

2. Operators' action on certain ventilation systems in case of fire

Approaches reported in NARs for NPP:

Different approaches have been noticed related to manual actions related to ventilation in case of fire:

- German NPP: fire dampers are **actuated manually** or with the thermal fuse.
- Slovenian NPP: fire dampers are actuated automatically with thermal fuse. **The shutdown of certain part of the ventilation system is manual.**
- Czech NPP: in case of fire in **area with low fire loads**, smoke is extracted as long as possible by means of operating air ventilation system.
- **Manual actuation of dedicated smoke extraction system** in specific area (France, Slovenia, Spain, Sweden: Forsmark 2, Ringhals 3) on specific criteria or by decision of the fire brigade.

Ventilation management in case of fire

2. Operators' action on certain ventilation systems in case of fire

Approaches reported in NARs for RR:

Different approaches have been noticed related to manual actions related to ventilation in case of fire:

- a **manual closure of the fire dampers** by the operator could be required (Germany: FRMII).
- the **ventilation is kept in service as long as deemed safe** in case of fire in order to maintain the pressure gradients throughout the installation (Austria: Triga mark II, Belgium: BR2),
- the **shutdown of the ventilation is performed in case of fire** (Hungary: BME OR, Netherlands: HOR; Poland: Maria research reactor, Romania: Triga research reactor, Turkiye: Triga mark II reactor).

Other type of facilities

The level of detail provided in the NARs for ventilation management in case of fire does not allow to compare the approach of the different operators.



2. Operators' action on certain ventilation systems in case of fire

Questions on operators' action on ventilation systems in case of fire :



1. Which criteria (for example the temperature, filter clogging, fire or smoke detection...) can lead to a partial or total shutdown of the ventilation system?
2. How these criteria are accessible to the operator for a fast-decision making? (availability of these key parameters in the control room...).
3. What are your procedures for ventilation management in case of fire ?
4. Availability of the operators to implement these procedures?



Additional question on both issues:



How do the ventilation system automatization and operators' actions impact safety and safety related equipment (I&C, electrical, etc.)?

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Thank you for your participation and contributions !