NOTES AND REFERENCES

Module 8

OPERATING POLICIES AND PRINCIPLES

OBJECTIVES:

After completing this module you will be able to:

CRO	8.1	State the purpose of the Operating Policies & Principles (OP&P).	⇔ *Page 2*
CRO	8.2	List and briefly describe <u>three</u> types of operating boundaries defined by OP&P.	⇔ *Page 2*
	8.3	Briefly describe the SS's responsibility with respect to OP&P, and how the SS exercises that responsibility.	⇔ *Page 3*
CRO	8.4	Explain why OP&P must never be violated intentionally, and describe the possible consequences of violating OP&P.	⇔ *Page 3*
CRO	8.5	Describe the action required if operating conditions are discovered to be in violation of OP&P.	⇔ *Page 4*

PURPOSE AND DERIVATION OF OP&P

Before constructing and operating a NPP, the Utility demonstrates that the proposed plant will be acceptably safe—i.e., will meet licensing criteria, by doing a comprehensive safety analysis. This analysis is documented in the Safety Report and related submissions to the AECB. The validity of the analysis rests on numerous assumptions about how the plant will be designed, constructed, operated and maintained. Only when *all* the assumptions in the safety analysis are met can one be confident that the plant is in a safe state.

Some assumptions are generic, such as the following:

- independence is maintained between safety system channels
- safety equipment is environmentally qualified

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- system design conforms to applicable codes and standards

Other safety analysis assumptions captured in OP&P pertain to specified operating states and design limits, such as the following:

- the maximum time for a specified valve to open
- a specified valve's designated position with the reactor at power
- the response time of a specified instrument
- the frequency at which a specified component will be tested

Obj. 8.1 ⇔ The generic assumptions and specific operating and design constraints together define the ***safe operating envelope***. The OP&P **define the boundaries within which a NPP must be operated, maintained and modified, in order to keep the risk to workers, the public and the environment acceptably low**.

Obj. 8.2 ⇔ The following types of operating boundaries are prescribed by the OP&P:

1. ***Operation within safe operating envelope.*** The OP&P mandate compliance with safety analysis assumptions about how the station will be operated and maintained. In other words, the OP&P mandate plant operation within the safe operating envelope.

2. ***Limits on authority of authorized positions.*** The OP&P limit the authority of the CRO, SS and Operations Manager positions. In general, the more critical the proposed change or O&M activity, the greater the required depth of review before execution.

3. ***Mandatory good operating practices.*** The OP&P mandate compliance with some recognized good operating practices based on sound nuclear safety principles and industry operating experience.

Strategies to Preserve the Integrity of the Safety Analysis

How does a Utility ensure that the safety analysis assumptions remain valid throughout a NPP's operating life—i.e., that changes to plant configuration and O&M activities don't invalidate these assumptions? First, the Utility carefully documents these assumptions in the station OP&P. The content of this document is negotiated with the AECB, and strict adherence to the station OP&P becomes a condition of the operating license. Additional programs and strategies to preserve the integrity of the safety analysis include the following:

- Flagging operating instructions impacted by OP&P, to alert staff to their critical importance to nuclear safety

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- Strict control of O&M activities by authorized personnel trained in the significance of the OP&P
- Mandatory compliance with approved O&M procedures
- Use of properly qualified staff to do work
- Implementation of various programs to ensure equipment reliability, good configuration management, and quality operations. The following programs are described in greater detail in subsequent modules of this course:

  ⇒ change control procedures, to ensure that proposed changes get appropriate review before implementation, and that the physical plant remains consistent with the 'paper plant'—i.e., the plant as described in the Safety Report, design manuals, data bases, and flow sheets.

  ⇒ Technical and Operational surveillance, including periodic inspection and testing of equipment

  ⇒ Compliance monitoring

  ⇒ Preventive maintenance

  ⇒ Quality Assurance, including audits

  ⇒ Root cause investigation of significant events and corrective action follow-up

SS's Responsibility with respect to OP&P

⇔ *Obj. 8.3*

The Shift Supervisor is responsible to ensure strict compliance with the conditions of the Operating License and OP&P. To exercise this responsibility effectively, the Shift Supervisor does the following:

- Communicates his expectations regarding OP&P compliance clearly to the crew, confirms compliance via personal surveillance of operations and maintenance activities, and takes effective corrective action in the event of non compliance to prevent recurrence
- Personally authorizes changes and critical operations and maintenance
- Ensures that plant design features credited in the safety analysis and required by OP&P are disabled only when AECB approved compensating safeguards are put in place.

⇔ *Obj. 8.4*

Possible Consequences of OP&P Violations

- Violating a safety analysis assumption could place the plant in an unanalyzed, and hence potentially unsafe, state. Transients might then develop into accident conditions, and/or the capability to mitigate accident consequences might be impaired.

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- Violating the limitations on the authority of authorized positions decreases defense in depth. It increases the risk of poor decisions to implement changes or critical O&M activities without adequate nuclear safety review
- Deviating from good operating practices mandated by the OP&P—i.e., use of inferior operating practices, diminishes nuclear safety.

Obj. 8.5 ⇔ When operating conditions conflict with the OP&P, the SS must ensure that the affected systems are placed in the normal configuration, or other known safe state, following procedures approved by the Operations Manager, or that the affected reactors are placed in a safe shutdown state. This action itself is an OP&P requirement.

No one in a Utility has the authority to approve deviations from OP&P.

SUMMARY OF THE KEY CONCEPTS

- The OP&P define the boundaries within which a NPP must be operated maintained, and modified, in order to keep nuclear safety risks acceptably low.
- The OP&P mandate the following operating boundaries:
  1. Operation within the envelope defined by the safety analysis assumptions
  2. Compliance with prescribed limits of authority on authorized positions
  3. Use of good operating practices based on industry operating experience
- Various strategies were discussed for ensuring the continued integrity of the safety analysis throughout a NPP's operating lifetime.
- The Shift Supervisor discharges his responsibility to ensure strict adherence to OP&P by various methods described in the text.
- When a plant is in an unanalyzed state, transients could develop into accident conditions, and/or the capability to mitigate accident consequences could be impaired.
- If operating conditions are found to be violating OP&P, the SS must ensure that the affected systems are placed in a known safe state, using procedures approved by the Operations Manager, or that the affected reactors are placed in a safe shutdown state.

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ASSIGNMENT

1. Carefully prepare detailed answers for the Module 8 learning objectives.

2. Explain how a Utility ensures that the safety analysis remains valid over a NPP's operating lifetime.

3. Briefly explain the possible nuclear safety consequences of OP&P non-compliance, and state in general terms what actions are required if an OP&P limit is exceeded.

4. The OP&P for a large CANDU plant stipulate that adjuster rods must be inserted and withdrawn in a sequence that is consistent with the design intent. Briefly explain the reason for this requirement.