Principles of Nuclear Safety

Module 18

INVESTIGATING
&
REPORTING

Slide 1

Purposes of Performance Reporting

- Permits Regulator to assess quality of nuclear safety management
  - shows license terms & conditions met
  - vindicates safety analysis assumptions
- Operating experience feedback to Designers
  - provides data on equipment failure rates for reliability/availability calculations

Reporting is a condition of the PROL

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R-99 Reporting Requirements

- Event reports
- Quarterly reports
- Safety Report updates
- Annual radiological environmental monitoring
- Annual research & development report
- Periodic inspection report
- Annual reliability report
- Fissionable and fertile substances report

SS Role in Reporting

- Ensures routine reports completed to acceptable standard by shift crew
  - eg, logs, work reports, deficiency reports
- Personally reports safety & production issues
  - via SER/ER and SS Shift Summary
- Immediate verbal reports on high-profile events to the Operations Manager
  - License violations, major process failures, etc.
- Manager informs AECB

Policy of Open, Honest Reporting

- Builds trust with peers, Management, Regulator, and Public
- Readily acknowledge responsibility for errors
  - making excuses, trying to rationalize errors, and blaming "the system" generates distrust

Nuclear Safety Advantages of Properly Investigating & Reporting Incidents

1. **Find and correct root causes**
2. **Lesson transfer to other sites**
3. **Increased public confidence**
4. **Reassures Regulator**

Root Cause Analysis

Definition: A *Root Cause* is one which, if corrected, would prevent recurrence.

Steps to *Root Cause Analysis:*

1) Define problem
2) Find Root Cause(s)
3) Identify corrective action(s)
4) Implement corrective action(s)
5) Follow up to ensure problem solved

Barrier Analysis--Definition

A *barrier* is a physical, administrative or people-based safeguard used to detect, prevent, discourage, terminate, or to compensate for, unsafe conditions, equipment failure, or inappropriate human action.

Examples of Barriers

- Physical (engineered) barriers
  - eg, access-controlled areas, plastic suits, *interlocks and handrails*
- Administrative (procedural) barriers
  - eg, work protection code, operating manual, jumper record, work plans
- People-based barriers
  - eg, skills training, experience on the job, good supervision

What type of barriers is the most effective? Least?

How do we compensate for unreliable barriers?

Barrier Analysis Steps

1) Identify incident or problem
2) Identify barriers to incident or problem
3) Determine how barriers failed
4) Determine why barriers failed
5) Develop and implement corrective action
6) Follow up to ensure problem solved

Human Performance Enhancement System

The goal is to improve nuclear safety by improving human reliability. Human error cannot be eliminated, but it can be managed

Human Performance Enhancement System

1) Identify the problem
1) Identify inappropriate human action contributing to problem
2) Identify how action occurred
3) Identify why action occurred
4) Develop and implement corrective action to prevent recurrence
5) Follow up to ensure problem solved

Change Analysis

Useful where a problem occurs after a history of success, or where success is ongoing in similar applications.

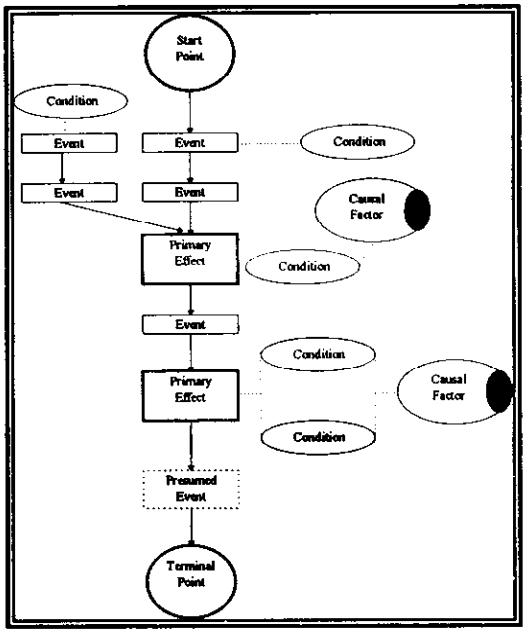
Change Analysis Steps

1) Identify problem or incident
2) List all changes relative to successful experience
3) Identify harmful change
4) Develop & implement corrective action
5) Follow up to ensure problem is solved

Event and Causal Factor Charting

- Shows sequence of events and causal factors leading to incident
- Effective way to summarize information
- Chart may suggest contributing causes not otherwise obvious

Generic Event & Causal Factors Chart



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Operating Experience

- lessons learned from investigating incidents
- good operating practices derived from successful operation
- For the benefit of the nuclear industry as a whole

Slide 18

COG Operating Experience

- CANDU Owners' Group (COG) operates a communications network linking CANDU sites
- also links with other NPP information networks world wide
- shares lessons learned from incidents
- proactive sharing of successful operating practices also

Corporate OE Group

- Analyzes reports on network for lessons relevant to Corporation's NPPs
- Liaises with both internal and external NPPs
  - lessons from incident investigations
  - *good operating practices*

Site OE Group

- Scrutinizes OE reports for lessons relevant to site
- Distributes reports to site contacts
- Routes internal & external information requests and replies
- Reports on site reactor safety performance to Management