The MNR Power Excursion:

the event and beyond

by

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MNR description

- history
- layout
- control

MNR Operation

- **organization**
- **activities**
  - **research**
  - **education**
  - **NAA**
  - **irradiations**
  - **I-125**
- **funding**

The Incident

- **Sequence of Subsequent events**
  - **Incident late in the day, Jan 4**
  - **Manager notified**
  - **Manager notified Director of incident**
  - **Reactor put back in service**
  - **Director does not inform senior management**
  - **AECB notified by phone Jan 5 AM**
  - **AECB makes a written note of phone call**
  - **AECB is to follow up in 14 days**
  - **MNR experiences difficulties in analysis and doesn't submit a follow-up report till April**
  - **AECB personnel shift caused them to miss on their follow-up action.**

- **AECB conducts a site visit in April**
- **Incident discussed at AECB Board meeting in late June**
- **Press picks up the story just as McMaster President receives "show cause" letter**
- **Given till July 15 to show cause**

AECB actions

- **Technical report**
- **Analyze other transients**
- **Incident report (root cause analysis)**
- **Procedures**
- **Operating Policy & Principles**
- **Fuel Monitoring**
- **Training**

McMaster response

- **Analysis**
  - **reactor physics**
  - **heat transfer**
- **Incident report**
  - **Root cause analysis**
- **Procedures**
  - **pre-task planning**
- **OP&P**
  - **organization**
  - **ROCC**
- **Incident reporting**
- **Compliance**
- **Fuel**
- **Training**

- **Root Cause Analysis**
  - **What (aka Inappropriate Act)**
  - **How (aka Behavioral Factor)**
  - **Why (aka Causal Factor)**

- **What: 1/count vs. mass not plotted**
- **How: Overconfidence**
- **Why: Inadequate pre-job briefing**

- **What: Rods not to Safeguard Position**
- **How: Overconfidence / time pressures**
- **Why:**
  - **Inadequate pre-job briefing**
  - **Lack of check list**
  - **Operator did not challenge order**

- **What: Log N bypass left on**
- **How: Frustration**
- **Why:**
  - **Lack of check list**
  - **Assistant left**
  - **Lack of effective communication**

- **What: Restart soon after incident**
- **How: Procedures do not prevent it**
- **Why:**
  - **Shock --> cloudy judgement**
  - **Overconfidence**
  - **Time pressures**

ISSUES

1. **Lack of safety culture.**

2. **Organization**
   Lack of clear lines of
   - **mandate**
   - **roles**
   - **responsibilities**
   - **authority**

3. **Deficiencies in reporting procedures**

4. **Deficiencies in operating procedures**

5. **Deficiencies in monitoring and compliance**

6. **Lack of communication, understanding, respect and trust**

7. **Lack of training**

8. **Commercialization**

9. **Analysis**

1. Lack of safety culture.

Reinforce by word and by example

No retribution

Frequent review of policy and procedures

Lack of compliance subject to graduated response

If you know of or suspect a safety issue and ignore it, that constitutes a lack of compliance

Safeguards are a backup, not a first line of defense

Must be proactive

Empowerment - safety culture cannot become a reality without it

2. Organization
Lack of clear lines of
- **mandate**
- **roles**
- **responsibilities**
- **authority**

Reorganization underway - by President's committee

Whatever the structure, it should
- **be clear and transparent**
- **be simple (KISS)**
- **empower**

There should be no guessing as to who reports to whom and why

Restructuring process needs more input from below

3. Deficiencies in reporting procedures

AECB reporting
incident report format defined

Reporting up the ladder
more tightly defined

OP&P's revised to reflect the changes

4. Deficiencies in operating procedures

Under review

QA added

OP&P's revised

5. Deficiencies in monitoring and compliance

Check lists

Pre-task planning

Proactive ROCC

Empowerment

6. Lack of communication, understanding, respect and trust

I-125 meetings

ROCC meetings

Meetings with individuals
- **people are talented**
- **people are working hard**
- **people are rational**
- **people are frustrated**

Openness

Festering is forbidden

My goal is to empower the individual

7. Lack of training

Upgrade

Recertify

Safety culture

Quality management

Root cause analysis

Human Factors

8. Commercialization

Has contributed to operational problems
- **I-125 leaks**
- **operational staff used for I-125 production**
  - **--> increased operator errors**

9. Analysis

Need tools

Need people

EMPOWERMENT

mandate

roles

responsibilities

authority

means

time

protection