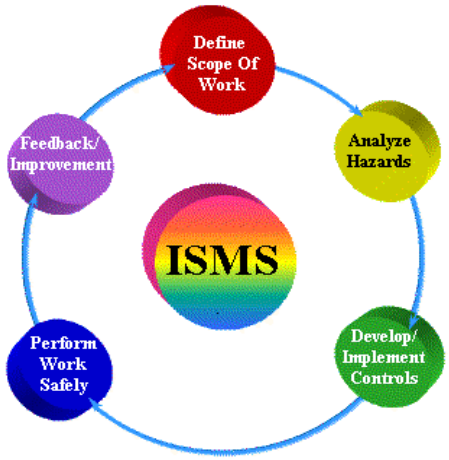
Work Planning & Control for R&D Activities – Lessons Learned



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2007 ISM Workshop – Brookhaven National Lab

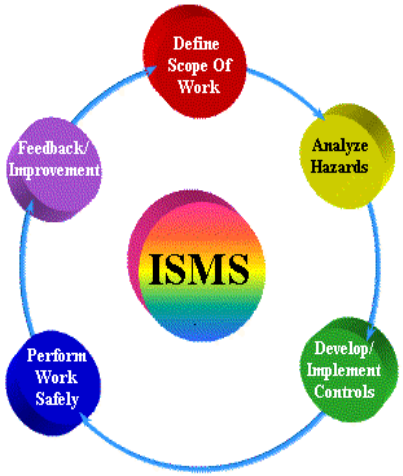
John Miller
Manager, SRNL Safety Programs

Lori Chandler
Manager, Analytical Development Directorate

November 28, 2007

Work Planning & Control for R&D Activities – Lessons Learned

- Presentation Outline
  - SRNL – Who We Are
  - Safety System Improvements at SRNL
    - Integrated Safety Management (ISM)
    - Work Planning and Control (WP&C)
  - Lessons Learned
    - General
    - Scope of Work
    - Analyze the Hazards
    - Develop and Implement Controls
    - Confirmation of Readiness to Work
    - Perform Work
    - Feedback
    - Other Recommendations
    - Summary
  - Q&A



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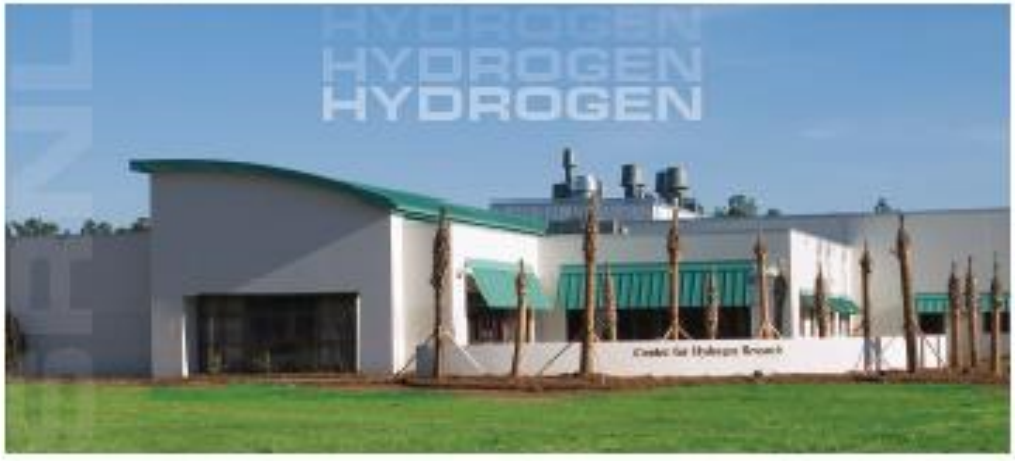

SRNL Research Emphasis Areas

National Security

- Tritium Technology
- Plutonium Technology
- Homeland Security Support
- Non-Proliferation Technology

Energy Security

- Hydrogen Storage Technology
- Thermochemical Production of Hydrogen
- Global Nuclear Energy Partnership
- Biofuels

Environmental and Chemical Process Technology

- Materials Stabilization and Disposition
- Cleanup and Remediation Technologies
- Characterization, Analysis and Closure Technologies

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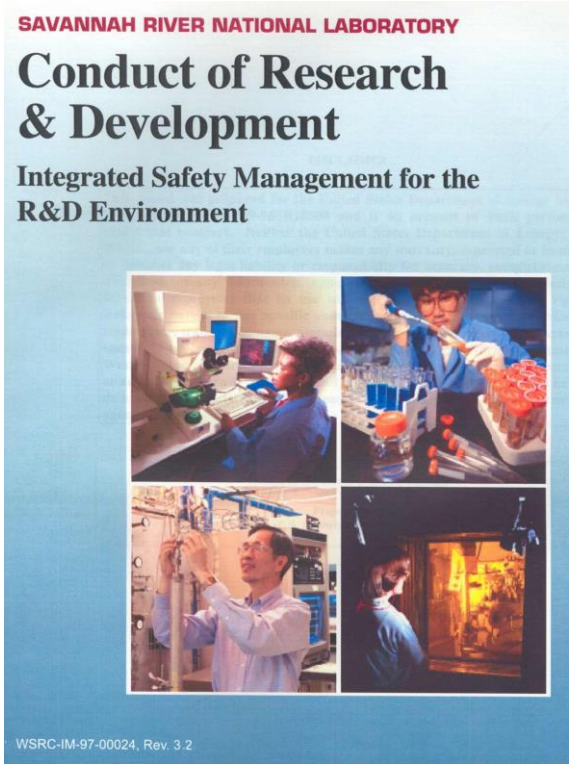
Safety System Improvements – Integrated Safety Management (ISM)

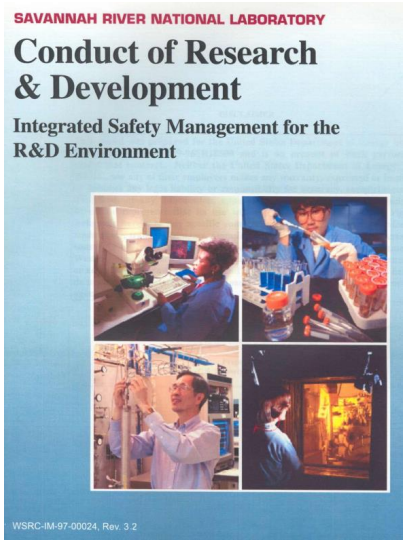
- Developed safety management system for R&D work (1998)
  - Alternative to *Conduct of Operations*
    - R&D attempt to implement Con Ops was a challenge
- *Conduct of Research & Development*
  - Roadmap for applying safety requirements to R&D work
  - Consistent with DOE ISM process
  - Component of WSRC ISM Description



WSRC – Washington Savannah River Co.
ISM – Integrated Safety Management
R&D – Research and Development

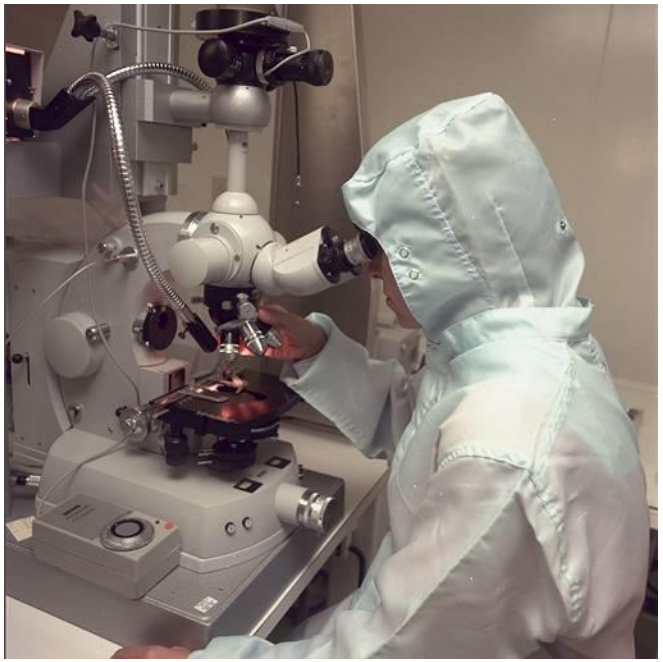
Approach to Development of *Conduct of R&D*

- Built on existing SRS safety systems and culture
- Co-developed by R&D, operations, and ES&H personnel
- Provides consistent approach to hazard identification and control
- Enabling tool for researchers
  - Process designed to facilitate ease of use
    - On-line user interface designed by R&D
  - Easily adaptable no matter what the discipline
  - Easily modifiable as SRNL develops work portfolio



Safety System Improvements – Work Planning & Control

- **Enhanced R&D WP&C process in response to DNFSB 2004-1, Commitment 23**
  - **Conducted assessment (gap analysis) of existing practices against CRAD for Work Planning/Work Control**
  - **Identified opportunities for improvement**
    - **Scopes of work**
    - **Work control documentation**
    - **Performance of work using "skill-of-the-craft"**



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DNFSB – Defense Nuclear Facilities Safety Board
WP&C – Work Planning and Control
CRAD – Criteria and Review Approach Document

R&D Work Planning & Control Improvements

- Phase 1 (2006)
  - Placed requirements in existing procedures
  - Concentrated on Work Control documentation
  - Eliminated use of “skill-of-the-craft”
- Phase 2 (2007)
  - Developed comprehensive R&D WP&C document
  - WP&C integrated into ISM Core Functions
  - Process map developed
- Retraining for R&D staff and management team scheduled for first quarter 2008

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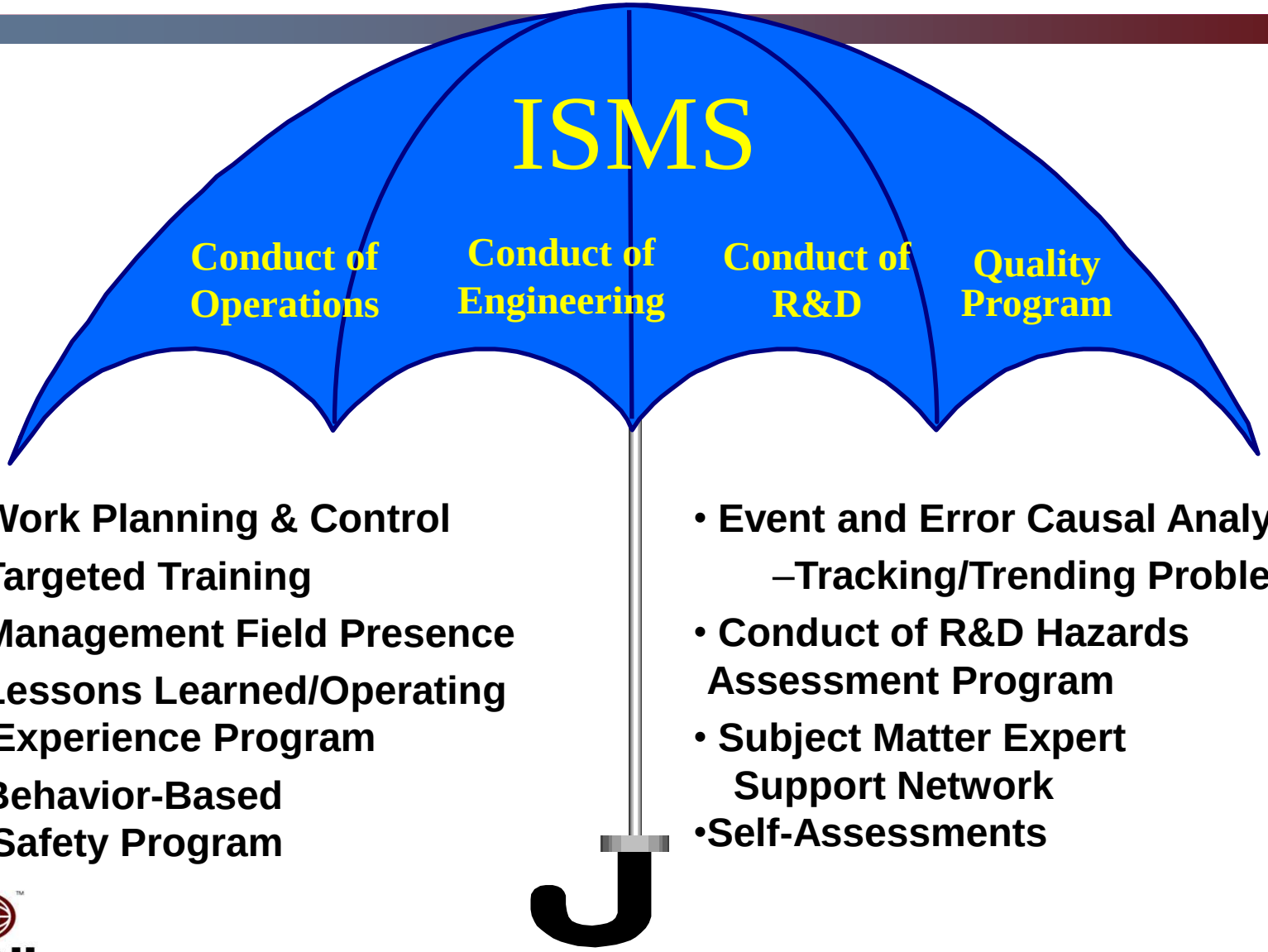
SRNL – Integrated Safety Management



- Work Planning & Control
- Targeted Training
- Management Field Presence
- Lessons Learned/Operating Experience Program
- Behavior-Based Safety Program

- Event and Error Causal Analysis
  –Tracking/Trending Problems
- Conduct of R&D Hazards Assessment Program
- Subject Matter Expert Support Network
- Self-Assessments

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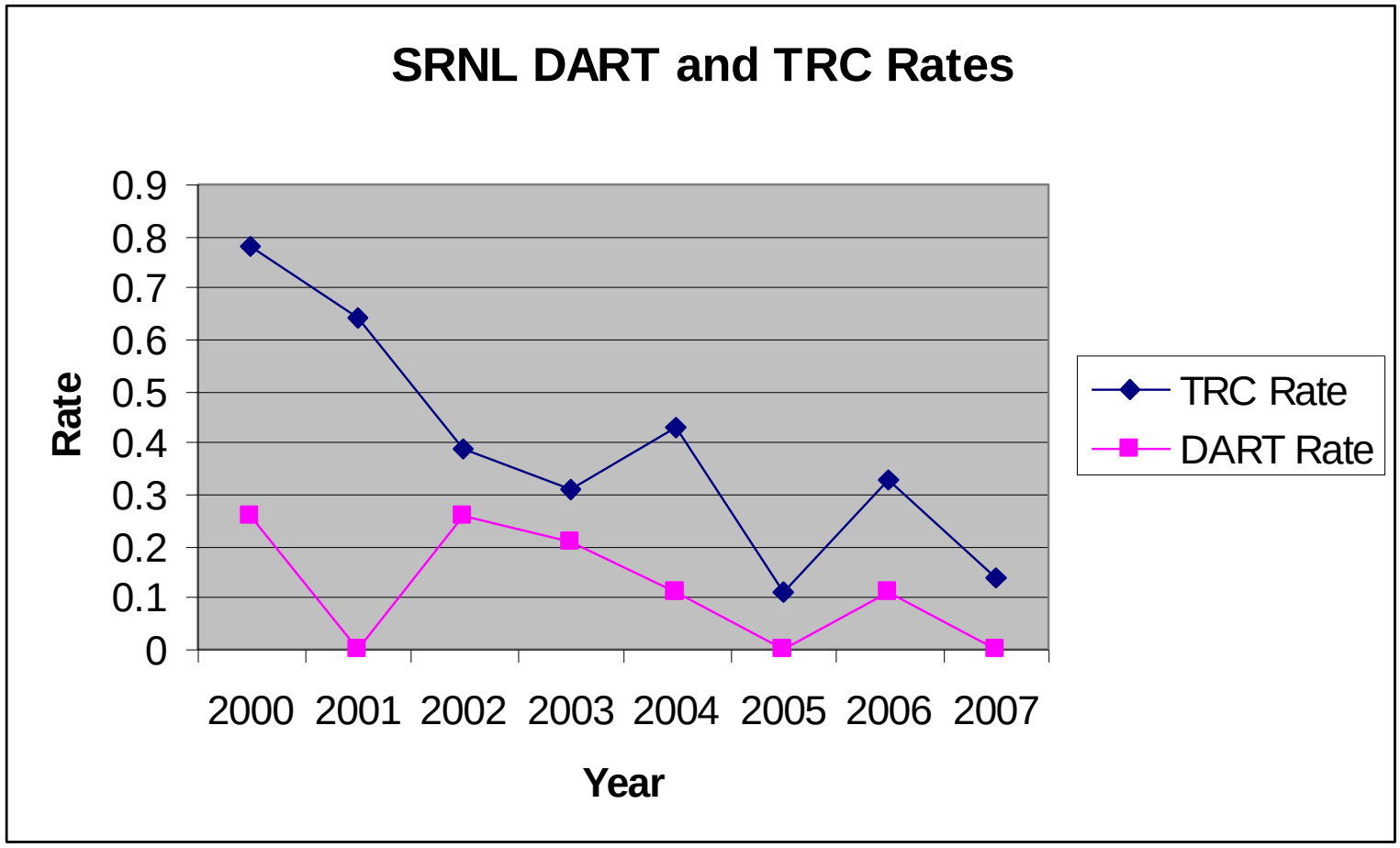
Safety Performance



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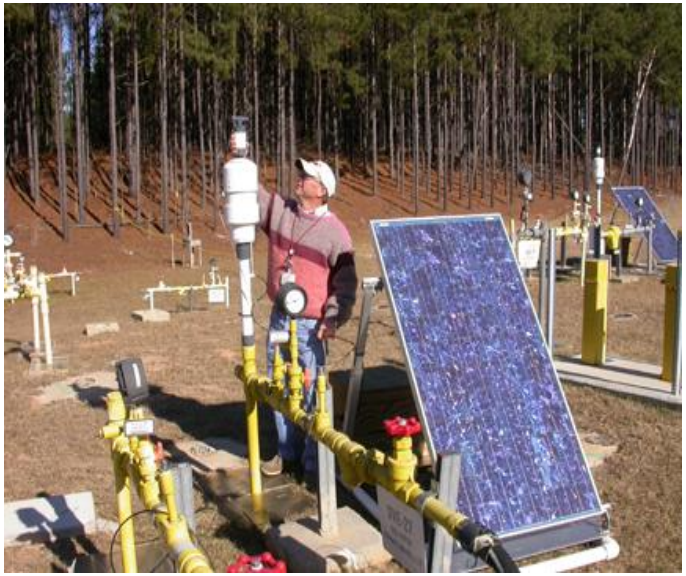
Lessons Learned – General

- Provide WP&C guidance language for R&D
  - Guidance language generally written for operations activities and culture
- Integrate WP&C into ISM
  - Foundation already institutionalized and understood
  - Simple construct, easily understood, people already conversant
  - Linking critical WP&C elements to ISM core functions enables more rapid learning
    - Both philosophy and language
- Develop a strong connection between WP&C and the business needs of the lab



WP&C → Safely Executed R&D → Good Business

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Lessons Learned – Define Scope of Work

- Guard against scope additions without careful thought
- Ensure that the scope accounts for:
  - Setup, decommissioning, maintenance, abnormal conditions, etc.
  - Appropriate interfaces/communications

Ask yourself:
"Have I added a new unanalyzed hazard with this change?"

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Lessons Learned – Analyze the Hazards

- Use of ES&H and Engineering experts is essential:
  - Industrial Hygiene
  - Pressure Protection
  - Health Physics/ Radiological Controls
  - Environmental Compliance
  - Electrical, etc.
- Provides consistency
- Develop screening criteria to guide "knowing when to ask for help"

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Lessons Learned – Develop and Implement Controls

- Ensure that hierarchy of controls does not start with PPE
- Ensure analysis is devoted to:
  - Elimination of the hazard
    - Material substitution
    - Equipment modifications
    - (e.g., auto shut-off)
  - Engineered controls

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PPE – Personal Protective Equipment

Lessons Learned – Confirmation of Readiness to Work

- Make *confirmation of readiness* a step in the process
  - Independent oversight during confirmation process is necessary
  - Use peer reviewers and SMEs (who participated in the hazards analysis)

Confirmation of readiness is an essential function that cannot be overlooked

SME – Subject Matter Expert

Lessons Learned – Confirmation of Readiness (cont.)

- Ensure all work is authorized
  - All preparations are completed
  - Required controls are in place and tested

No exceptions

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Lessons Learned – Confirmation of Readiness (cont.)

- Start all work with:
  - Pre-job safety discussion (less formal), or
  - Pre-job Safety Briefing (formal, documented)
- Involve all work planners and hands-on workers
- Ensure assigned workers
  - Understand all hazards
  - Ready to perform work
  - Understand responsibility to suspend work when . . . .

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Lessons Learned – Perform Work

- Use an informal stop work process – “time-out”
- Work only to approved scope of work

Scope additions without revisiting the hazards analysis are a recipe for an event

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Lessons Learned - Feedback

- Insist on a strong management field presence
  - Continually reinforce expectations
  - Validate that your personnel are using the safety management system
- Conduct post-job and post-event reviews
  - Review simple errors
  - Review all jobs
  - No blame environment

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Lessons Learned – Feedback (cont.)

- **Ensure that Self-Assessment Program has:**
  - Hands-on workers conducting assessments
  - Assessments driven by performance analysis (not just compliance)
  - Work groups assessing each other as appropriate
  - Vertical and horizontal assessments to add depth and breadth

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Other Recommendations

- Engage researchers
  - Champions for safety
  - Involve them in safety management system design and implementation
- Continuously restate expectations for safe work performance
  - Make accountability for safety an element of performance assessment
  - Establish that failure to meet safety expectations has consequence

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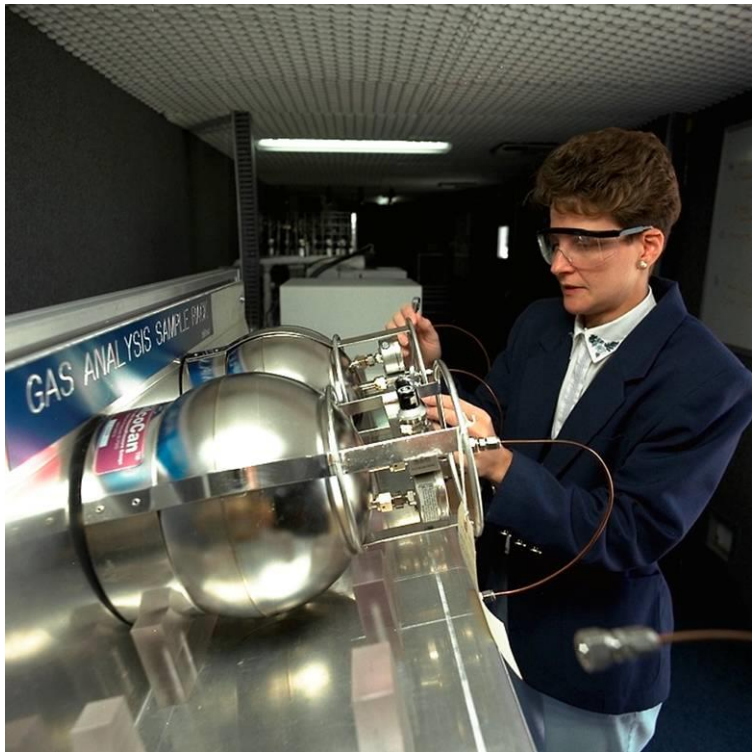
Summary

- Scope additions without careful thought are a recipe for an event
- Subject Matter Expert involvement with hazards analysis is essential
- Controls need to focus on eliminating or reducing the hazards
- Confirmation of readiness is critical
- Insist on a strong management field presence



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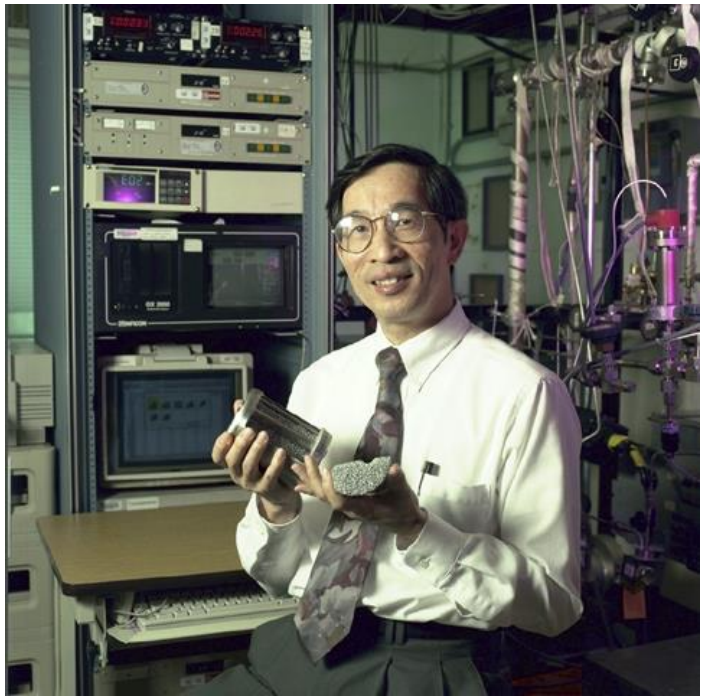
Summary – cont.

- Management expectations for performance need to be continually reinforced
- Involve your research staff in the design and operation of your ISMS
- Integrate WP&C into ISM
- WP&C is applicable to an R&D environment



WP&C → Safely Executed R&D → Good Business

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Questions?


Define Scope Of Work
Analyze Hazards
Develop/ Implement Controls
Perform Work Safely
Feedback/ Improvement
ISMS