Developments in Safety Culture

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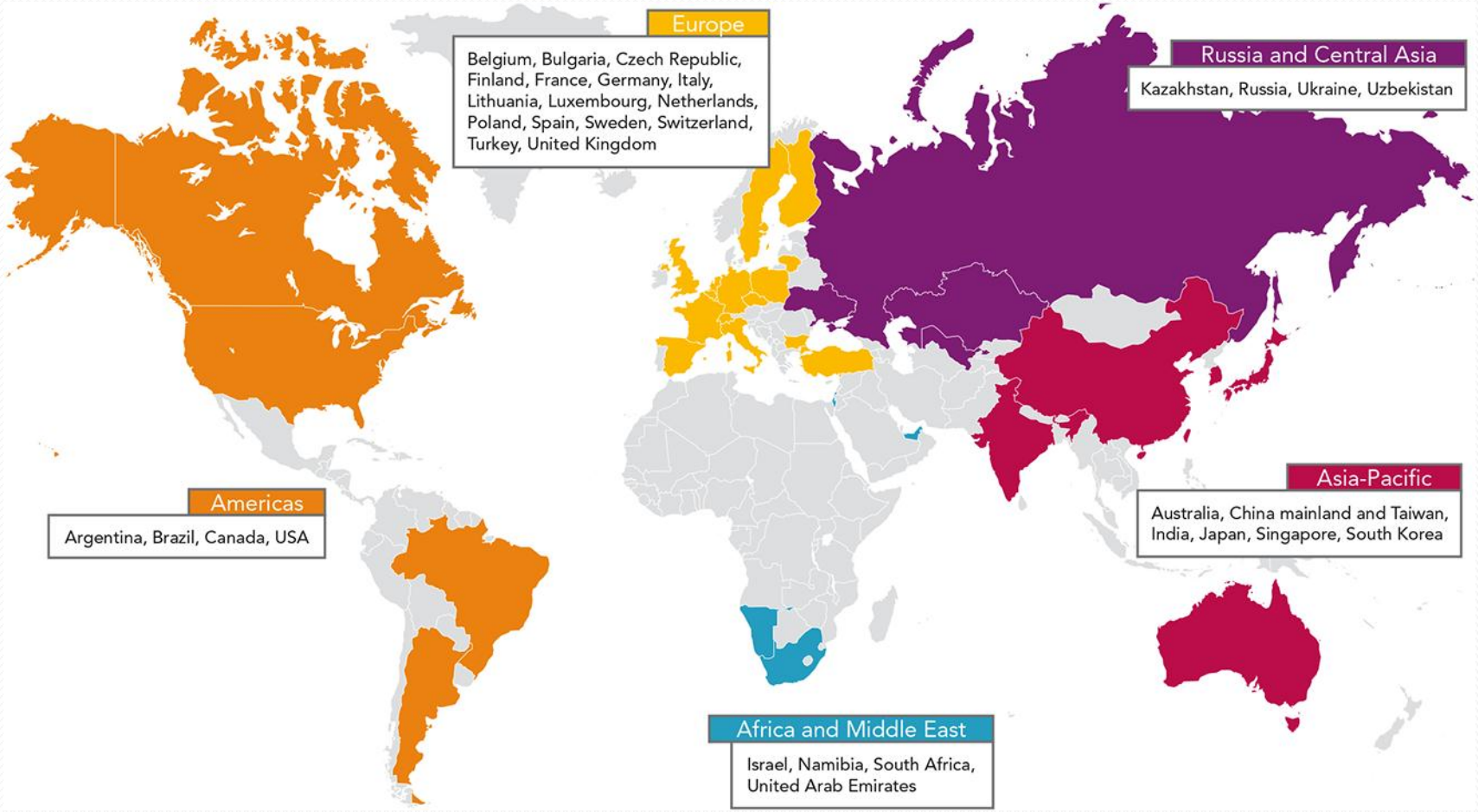
Background - WNA

- The World Nuclear Association (WNA)
  - International organization representing the global nuclear industry,
  - Promote a wider understanding of nuclear energy
  - Develop common industry positions, and contributing to the energy debate, as well as to pave the way for expanding nuclear business and safety.

WNA Members


Uranium Mining, Conversion, Enrichment & Fuel Fabrication
Reactor Vendors
Operators
Nuclear Engineering, Construction & Waste Management
Transport, Legal, Financial, Insurance & Brokerage
180 Members

Worldwide Presence



Background - WNA

- The Radiological Protection Working Group (RPWG)
  - Created in 2002
  - Promote improvements in the international system of RP
  - Develop and advocate scientifically sound positions of policy and practice.
  - The RPWG is the global nuclear industry's interface with the established international institutions,
    - Special Liaison Organisation to the ICRP
    - Observer on the Radiation Safety Standards Committee of the IAEA (RASSC).

Background - WNA

- The Working Group has identified four principle areas of work:
  - Tissue reactions and non-cancer effects of exposure
  - Radiological protection in emergency and post-emergency situations
  - Radiological Protection of the Environment
  - Protection from Radon

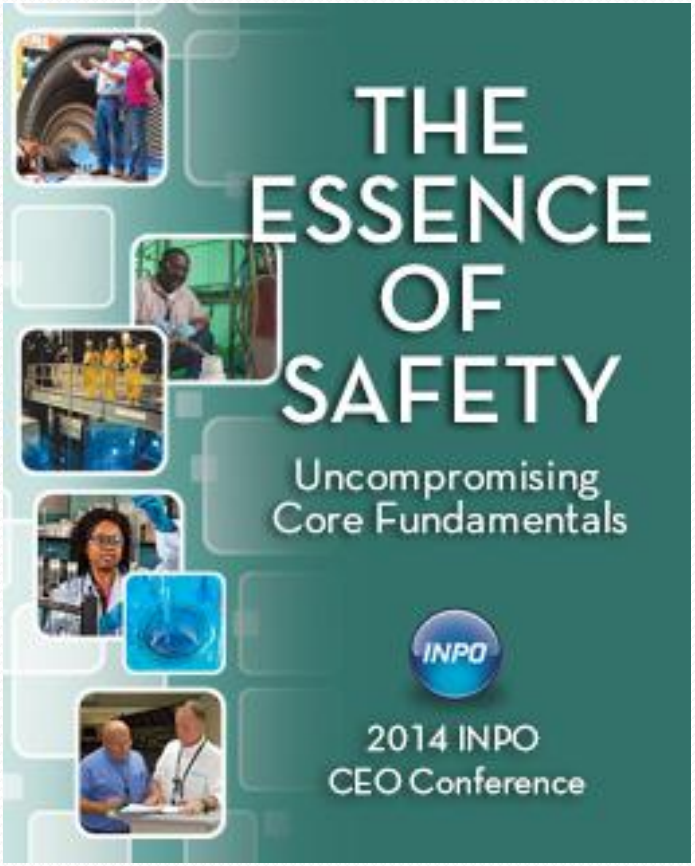
Background - Exelon Nuclear

IRPA Radiation Protection Culture

- Concept of culture relates to ideas, beliefs and customs that are shared and accepted by people in society
  - RP Culture is a combination of science, values, and ethics, as well as experience
  - RP culture principles include well –established, justification, optimization and dose limitation principles
- Developing a strong culture
  - Strong leadership
  - Education and training
  - Proper behaviors
  - Communication
  - Learning from operating experience

INPO Safety Culture

- Individual Commitment to Safety
  - Personal Accountability
  - Questioning Attitude
  - Effective Safety Communication
- Management Commitment to Safety
  - Leadership Safety Values and Actions
  - Decision-Making
  - Respectful Work Environment
- Management Systems
  - Continuous Learning
  - Problem Identification and Resolution
  - Environment for Raising Concerns
  - Work Processes



Traits of a Safety Culture – INPO 12-012

Principle	Trait
Everyone is personally responsible for safety	Personal Accountability
Leaders Demonstrate a commitment to Safety	Leader Safety Values and Actions
Trust Permeates the Organization	Effective Communication Respectful Environment Environment for Raising Concerns
Decision Making Reflects Safety First	Decision Making
Nuclear is recognized as Special and Unique	Work Processes
Questioning Attitude is Cultivated	Questioning Attitude
Organizational Learning is Embraced	Continuous Learning Problem Identification and Resolution
Safety Undergoes Constant Examination	Continuous Learning Problem Identification and Resolution

Leadership

- **Leaders demonstrate a commitment to safety in their decisions and behaviors.**
  - Executive and senior managers are the leading advocates of safety and demonstrate their commitment both in word and action.
  - The safety message is communicated frequently and consistently
  - Leaders throughout the nuclear organization set an example for safety.
  - Corporate policies emphasize the overriding importance of safety.

- **Leaders are commonly seen in working areas of the plant observing, coaching, and reinforcing standards and expectations**.

Example – Field Observation Card

Fundamentals: The essential knowledge, skills, behaviors and practices personnel need to apply to conduct their work properly, tied to our Management Model values, to ensure safe, event free, operation.
Attributes: The characteristics that describe the Fundamentals.

ONLY FILL IN THE BUBBLES THAT ARE APPLICABLE TO OBSERVATION
Please use a blue or black pen to complete this form. After shading a response if you need to select a different response clearly X out the first response. Like this: ✖

INDUSTRIAL SAFETY

GAP	Y	N
1. Vehicle Safety	○	○
2. Weapons Handling	○	○
3. Use of Tools and Machines	○	○
4. Use of Safety Equipment / PPE	○	○
5. Use of Chemicals	○	○
6. Rigging and Lifting	○	○
7. Clearance and Tagging	○	○
8. Compressed Gas Cylinders	○	○
9. Fire Protection	○	○
10. Walking / Winter Safety	○	○
11. Electrical Safety	○	○
12. Housekeeping	○	○
13. Material Handling	○	○
14. Work at Heights	○	○
15. Confined Space	○	○

NUCLEAR SAFETY

GAP	Y	N
1. Reactor Safety	○	○
2. Reactivity Management	○	○
3. Foreign Material Exclusion	○	○
4. Decision-Making Reflects Safety First	○	○
5. Organizational Learning is Embraced	○	○
6. Safeguards Control	○	○
7. Access Control	○	○
8. Search Activities	○	○
9. Cyber Security Awareness	○	○
10. Force and Plant Protection	○	○
11. Nuclear Safety Culture Communications	○	○

RADIOLOGICAL SAFETY

GAP	Y	N
1. ALARA Practices / RWP Adherence	○	○
2. Radiation Worker Practices / Dosimetry Use	○	○
3. Contamination Control	○	○
4. ERO Responsibilities	○	○
5. Radiation Protection Oversight	○	○
6. Radioactive Material Handling / Shipping	○	○

ENVIRONMENTAL SAFETY

GAP	Y	N
1. Permit Compliance	○	○
2. Chemical Control	○	○
3. Spill Control	○	○
4. Environmental Stewardship	○	○
5. Industrial Exposure	○	○

OPERATIONAL FOCUS

GAP	Y	N
1. Operational Configuration Control	○	○
2. Risk Awareness / Mitigation	○	○
3. Balanced Sense of Urgency	○	○
4. Precise Standards (Apply to Every Task, Every Time)	○	○
5. Schedule Preparation and Adherence / Meeting Commitments	○	○
6. Identification & Resolution of Equipment	○	○
7. Strategic Decision Making, Short & Long Term	○	○
8. Respect & Reinforce the Importance of Technical Considerations in Decision Making	○	○
9. Accept & Exercise Technical Authority	○	○
10. Intolerance for unexpected critical equipment failures	○	○
11. Clearance & Tagging	○	○

TRAINING & QUALIFICATION

GAP	Y	N
1. Conduct Effective Training	○	○
2. Identify Training Needs to Improve Performance	○	○
3. Participate in Training - "Come to learn"	○	○
4. Provide Meaningful Feedback	○	○
5. Simulator Fidelity	○	○
6. Exam Security	○	○
7. Individual Qualification Verification	○	○
8. Line Ownership	○	○

HUMAN ERROR PREVENTION

GAP	Y	N
1. Verification Practices	○	○
2. Self Check/STAR	○	○
3. 2-Minute Drill Usage	○	○
4. Peer Check	○	○
5. First Check	○	○
6. Flagging / ROB Usage	○	○
7. Paired Observations	○	○
8. Communications / 3-Way	○	○
9. Procedure Use & Adherence	○	○
10. Briefs (PJB, Post-Job Critiques, Turnover)	○	○
11. OOPS	○	○
12. 2-Foot Zone Rule	○	○

TECHNICAL HUMAN PERFORMANCE

GAP	Y	N
1. Challenge Conditions / Decisions	○	○
2. Identify, Communicate, Advocate Resolution of Technical Concerns	○	○
3. Identify and Validate Assumptions	○	○
4. Clear Problem Statement	○	○
5. Questioning Attitude / Critical Thinking	○	○
6. Use of the Corrective Action Program	○	○
7. Use of OPEX	○	○
8. Configuration / Design Basis Control	○	○
9. Use of SMEs when Required	○	○
10. Technical Rigor & Sound Engineering Principles to Support Conclusions	○	○
11. Nuclear Safety Culture Communications	○	○

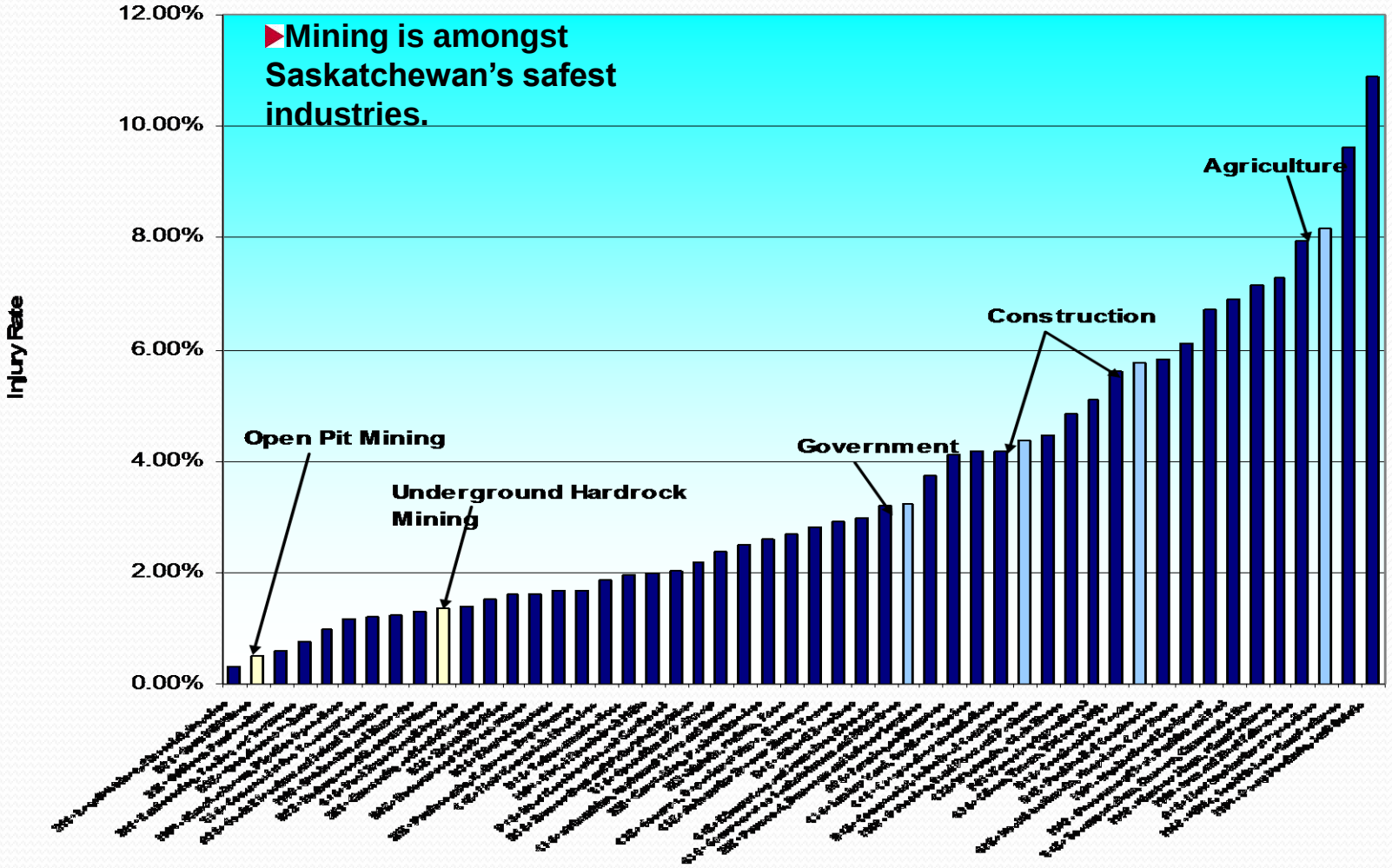
Individual Behaviors

- **All individuals take personal responsibility for safety.**
  - Responsibility and authority for safety are well defined and clearly understood.
  - Reporting relationships, positional authority, and team responsibilities emphasize the overriding importance of nuclear safety.
- Individuals encourage each other to adhere to high standards.
- **Individuals demonstrate a proper focus on safety and reinforce this focus through peer coaching and discussions**.

Peer To Peer Coaching

- Program established to encourage workers to “Peer Coach” each other
  - Coaching from a peer can be an effective tool to change behavior
  - Can occur more frequently
  - Encourages teamwork and a sense of “looking out for each other”
- Employees encouraged to “Peer Coach” each other in
  - Industrial Safety
  - Radiological safety
  - Work practices and performance

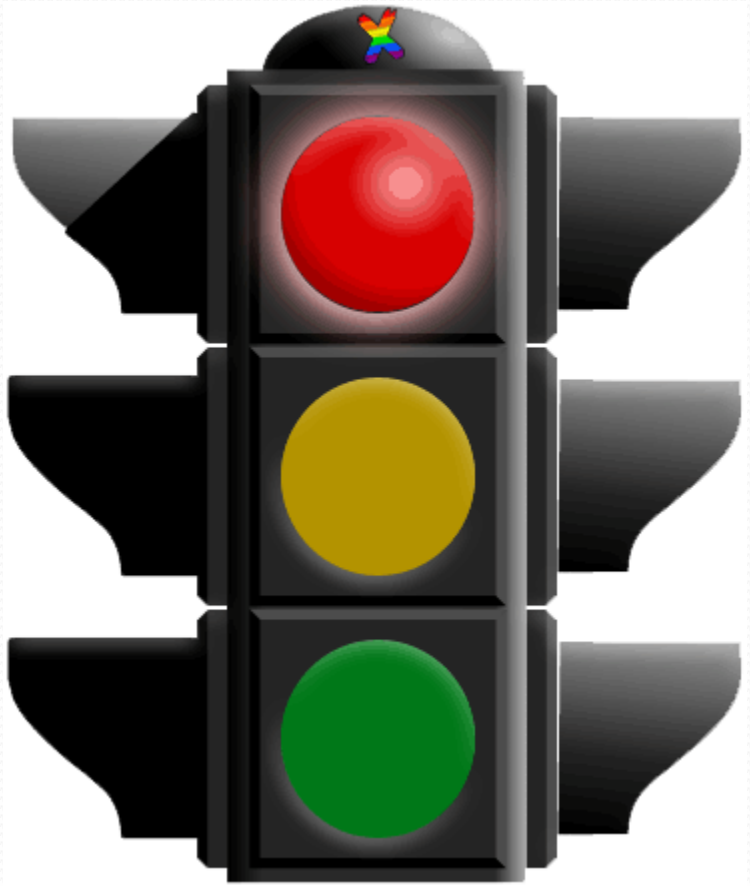
Safety Performance - Saskatchewan Injury Rates



Communication

- **Communications maintain a focus on safety.**
  - Safety communication is broad and includes plant-level communication, job-related communication, worker-level communication, equipment labeling, operating experience, and documentation.
  - Leaders use formal and informal communication to convey the importance of safety. The flow of information up the organization is considered to be as important as the flow of information down the organization

Human Performance Stoplights



- Used to communicate station events
- Color is changed based on significance of the event
  - Red – most significant issue – such as personnel injury or significant radiological event
- Communications go to all station personnel on the event

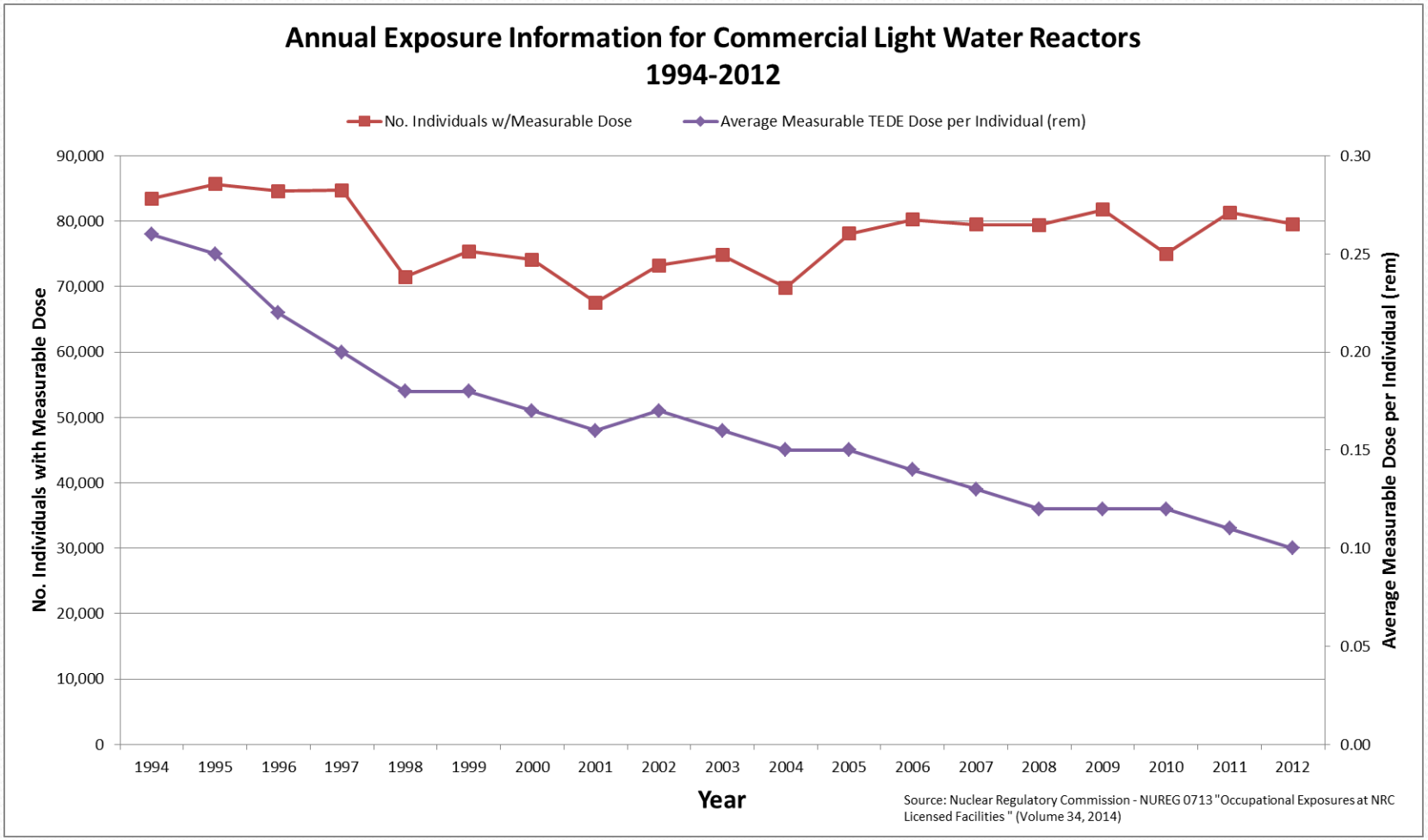
Organizational Learning

- **Opportunities to learn about ways to ensure safety are sought out and implemented.**
  - Operating experience is highly valued
  - Self-assessments and benchmarking are used to stimulate learning and improve performance.
- **Issues potentially impacting safety are promptly identified, fully evaluated, and promptly addressed and corrected commensurate with their significance**

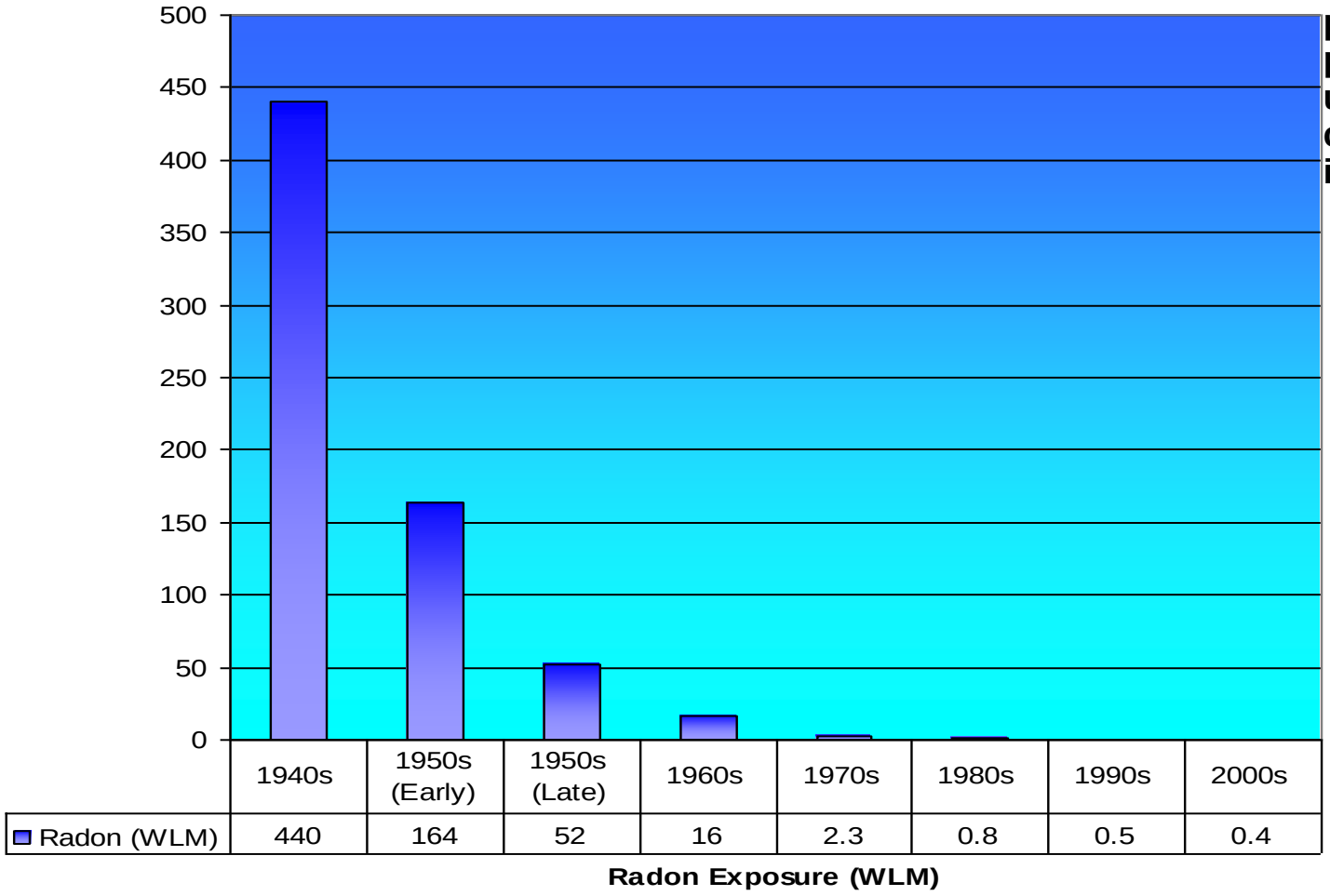
Benchmarking – International System on Occupational Exposure (ISOE)

- Established in 1989 NEAs Committee on Radiation Protection and Public Health (CRPPH)
  - Establishing procedures for interplant comparability
  - promoting international exchanges on optimization of radiological protection.
- After 20 years, the ISOE objectives of covering the world are nearly reached,
  - 323 operating reactors
  - 40 shutdown reactors participating.
- Benchmarking tools established :
  - User friendly tools for collecting, keeping and analyzing exposure data
  - Published key works - such as the work management books and workshops,
  - Conduct symposia for radiological protection managers and regulatory authority representatives
  - Conduct plant visits for development of benchmarking best practices

Significant Improvements Results



Improvements – (Con't)



- **Radiation protection performance in uranium mining has continually improved.**

Questioning Attitude

- **Individuals avoid complacency and continuously challenge existing conditions and activities in order.**
- SOER 10-02 Engaged Thinking Organizations

With this is Mind -

- The RPWG feels is that further research and discussion is warranted with regard to non-cancer effects from radiation, particularly for cardiovascular diseases
- Due consideration should be applied where there is insufficient scientific evidence for such recommendations, particularly where it could result in higher risk from external (non-radiological) hazards, and result in unnecessary public concern by inflating the perceived risk of exposure to low-level radiation.

With this is Mind -

- Prior to enacting new regulations ensure that:
  - Changes are based on a preponderance of scientific evidence
  - Can be implemented
  - Provides a benefit and improvement in radiation protection relative to the cost to implement
  - Involve are key stakeholders
- Specific WNA and Nuclear Fuel Cycle areas of concern:
  - **Tissue Reactions and Non-Cancer Effects (TRNCE)**
  - **RP in Emergency and Post-Emergency Situations**
  - **Protection of the Environment**
  - **Protection from Radon**

Conclusions – RP Culture

- RP Processes exist for:
  - Leadership involves
  - Monitoring of workers, workplaces and the environment
  - Training of workers
  - Communications
  - Collecting feedback (directly or anonymously)
  - RP Program review and auditing system in place
  - Corrective Action Programs

Thank You For Your Attention