Comparison between the US and UK Criticality Safety Personnel Training Program Guidance

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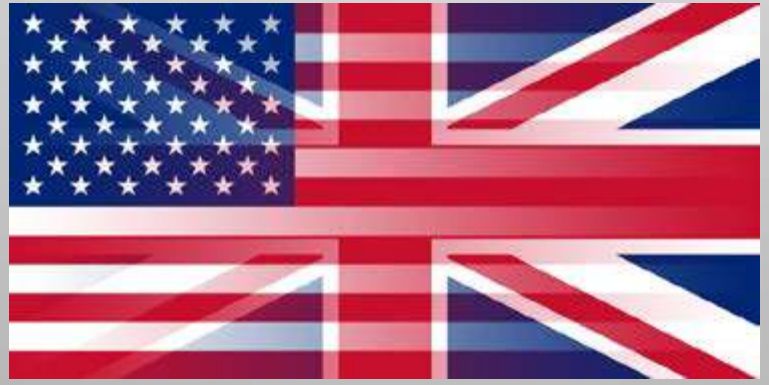
Introduction

- Joint Working Group 30 Exchange
  - US criticality safety engineer placed in Atomic Weapons Establishment Criticality Safety Group
  - One task was to benchmark US and UK training guidance in search of unique topics and best practices



US DOE CS Training Guidance

- DOE-STD-1135-99 – *Guidance for Nuclear Criticality Safety Engineer Training and Qualification*
  - Contains Ten Main Sections
    1. Nuclear Theory
    2. Calculational Methods
    3. Critical Experiments and Data
    4. Rules, Standards, and Guides
    5. Nuclear Criticality Safety Evaluations
    6. Safety Analysis and Control
    7. Criticality Alarm Systems (CAS) and Criticality Detection Systems (CDS)
    8. Accountability Practices
    9. Hands on Experimental Training
    10. Process/Facility Knowledge

UK CS Training Guidance

- UK has little official guidance from Health and Safety Executive
  - Many CS Programs utilize UK Working Party on Criticality (WPC) document *The WPC Criticality Safety Competence Framework*
  - Contains Four Main Sections
    1. Criticality Background Knowledge
    2. Criticality Safety Management
    3. Criticality Assessor Methods
    4. Criticality Safety Assessment Methodologies

Method of Comparison

- Matrix was created with eight main subject areas important to CS training
  1. Academic
  2. Experimental
  3. Assessment Methodology
  4. Assessment Analysis
  5. Rules, Standards, and Guides
  6. Alarms, Accidents, and Response
  7. Process/Facility Knowledge
  8. Special Concerns

Method of Comparison

- Many unique training guidance subject areas are result of difference in regulatory systems or organizational arrangement
  - UK Example: As Low As Reasonably Practicable (ALARP) and Optioneering
    - Not required in US regulations
  - US Example: Criticality Alarm System Placement, Use, and Testing
    - Responsibility lies within purview of Radiological Instrumentation and/or Dosimetry organizations in UK

Unique Guidance Subjects - UK

- Nine unique topics not resulting from regulatory or organizational differences:
  - Implications of Controls
  - Nuclear Data
  - Engineering Drawings
  - Reactor Physics
  - Reactor Kinetics and Transients
  - Fissile Assay Methods
  - Waste and Long Term Disposal
  - Burn-Up Credit
  - Mixed Oxide Fuels

Unique Guidance Subjects - US

- Two unique topics not resulting from regulatory or organizational differences:
  - Hands on Criticality Safety Training
  - Container Labeling and Postings

Best Practices

- Topics that should be included in US guidance
  - Implications of Controls
    - Helps to mitigate negative secondary effects on operations and personnel utilizing the derived criticality safety controls
  - Nuclear Data
    - Improves CS engineer understanding of computer calculations and the results/conclusions that are relied upon
  - Engineering Drawings
    - Allows more accurate and efficient use of material/equipment dimensions for use in analysis

Best Practices

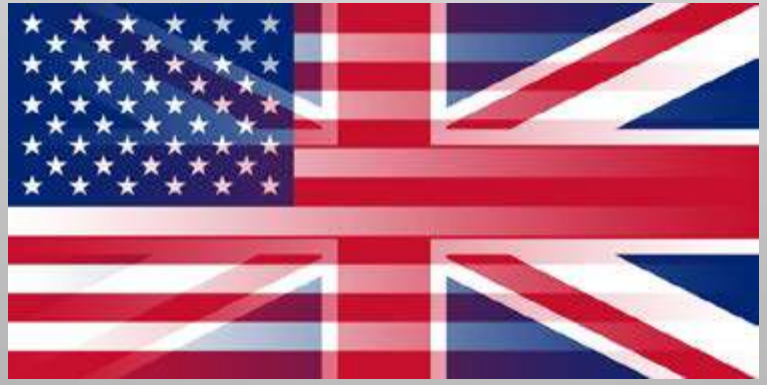
- Topics that should be included in UK guidance
  - Hands-On Criticality Safety Training
    - Provides more concrete understanding of main factors that effect reactivity
    - Forces CS engineer to be more mindful of challenges faced by operators working with material under CS constraints
  - Container Labeling and Postings
    - Allows CS engineer to reduce the occurrence of human error

Increased Collaboration

- Beneficial to both US and UK programs
  - Increased access to larger and more diverse training material
  - Benchmarking of training guidance to respective CS program
- One successful example is the US DOE Nuclear Criticality Safety Program Hands-On Training and Education Course
  - Allows UK CS professionals opportunity to gain Hands-On experience that does not exist domestically
- Other opportunities for increased collaboration:
  - New facility build
  - Retrofitting of old facilities
  - Fabrication of weapons components
  - Assembly/disassembly of weapons

Conclusion

- The US and UK share many commonalities in CS training guidance
- Several unique subject areas have been identified as Best Practices
- Continued collaboration between US and UK CS programs is in the best interest of both countries



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