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Title: Developing a Streamlined Approach to Criticality Safety Analyst Training and Qualification

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Developing a Streamlined Approach to Criticality Safety Analyst Training and Qualification

2017 Nuclear Criticality Safety Division Topical
Carlsbad, NM

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Agenda



- **Background**
- **Description of the Program**
- **Results**
- **Conclusion**

Background

Background

- **Autumn 2012:**

- Leverage decades of innovative and expert-based knowledge and practices
- Developing and standardizing new approaches that aligned with professional standards
 - Consider
 - Instructional design
 - Human resources
 - Nuclear Industry
- The program also had to:
 - Attract
 - Promote
 - Retaintalent in a competitive field.

Background (2)

- **...all of this and a delivery date of 4 weeks!**
- **LANL's accelerated development of a CSA training and qualification program**

The Program

Description of Program Development

- **The Team:**

- Training Professionals
- Criticality Safety Subject Matter Experts

- **The Goals:**

- Determine the construct of the new program
- Recommend an implementation plan for immediate- and long-term use

- **The Guidelines:**

- DOE Order 426.2
- ANSI/ANS-8.26-2007
- DOE-STD-1135-99
- LANL's Nuclear Criticality Safety Program (SD130)
- LANL's Conduct of Training Manual

- **The Background Information:**

- File drawers full of records and notes at organizational and individual levels

Description of the Program Development (2)

- **The Work:**

- The team interviewed:
 - Criticality Safety Analysts (CSAs)
 - Other subject matter experts (SMEs)
 - Criticality Safety Managers
 - Associated stakeholders
- To determine the specific needs of the target program

- **Results validated via:**

- Performance demonstrations
- Observations
- Facility walk-downs

The Program – Priority & Resources

- **Need for expedited approach set by:**
 - Cognizant managers; first line to senior management
 - Articulated mission & operational priority
 - Provided direction & resources
 - Navigated & negotiated inter- and intra-organizational expectations and collaborations
- **Boots on the ground:**
 - Data calls
 - Benchmarking visits
 - DOE Los Alamos Field Office
 - Lawrence Livermore National Laboratory (LLNL)
 - Sandia National Laboratories (SNL)
 - Oak Ridge National Laboratory (ORNL)
 - Pacific Northwest National Laboratory (PNNL)
 - University of New Mexico (UNM)

Results

Results

Program was modeled on ANSI/ANS-8.26-2007 and DOE-STD-1135-99:

- **Three phase approach**

- CSA In Training (CSA-IT)
- CSA Qualified (CSA-Q)
- CSA Senior Qualified (CSA-SQ)

- **Ten competencies**

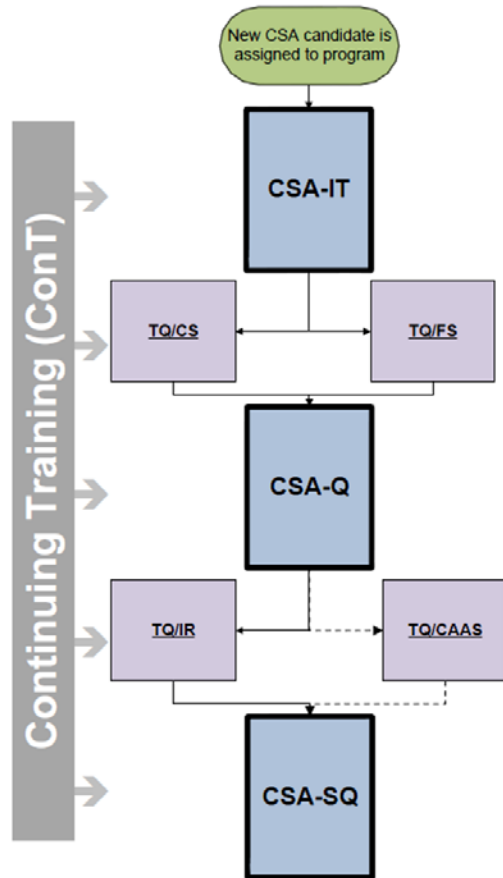
- Nuclear Theory
- Criticality Safety Calculation Methods
- Critical Experiments and Data
- Hands-on Experimental Training
- Rules, Standards, and Guides
- Nuclear Criticality Safety Evaluations
- Safety Analysis and Control
- Criticality Accident Alarm System (CAAS) and Criticality Detection Systems (CDS)
- Accountability Practices
- Facility Knowledge

Results (2)

- **Instructional methods selected based on:**
 - Target population
 - Both new and existing staff with unique learning styles & preferences
 - Design and methods had to be flexible
 - Availability of renowned industry experts to serve as SMEs and instructors

- **In early 2013, “CSA Boot Camp” consisted of:**
 - Lectures
 - Independent study
 - Performance demonstrations
 - Examinations
 - Final oral board examination (capstone)

Results (3)



- **Within first 2 years of implementation, other needs emerged**

- (1) Formal mentoring
 - Expert- and experience-based instructional methods
- (2) Developing a way to qualify analysts to independently perform work

- **Result of (2) was four “task qualifications” (TQs):**

- Calculation Specialist (TQ/CS)
- Facility Specialist (TQ/FS)
- Independent Review (TQ/IR)
- Criticality Accident Alarm System Specialist (TQ/CAASS)

Results (4)

- **Continuing training & biannual requalification methods incorporated early in program implementation**
 - Multiple training methods used:
 - Required reading
 - Briefings
 - Attendance at seminars and lectures
 - Incorporated & designed to address:
 - Significant facility system and component changes
 - Procedure changes
 - Selected fundamentals
 - Applicable industry operating experience

Results (5)

November 2016 – major curriculum change

- **Boot Camp**

- Comprehensive & unique
- Also, costly & time consuming

- **Analysis performed [again] on competency criteria vs course curricula for:**

- DOE Nuclear Criticality Safety Program (NCSP) Hands-On Course
- UNM's
 - Nuclear Criticality Safety (NCS) Short Course
 - Assessments & Criticality Safety Evaluations Course
 - Manager's Workshop

- **Result**

- NCSP + UNM Courses satisfied criteria of ANSI/ANS-8.26-2007
- Replacement for the CSA Boot Camp's core academic requirements
 - LANL site requirements would still need to be addressed via local instruction & performance requirements

Conclusions

Conclusions

- **The Program demonstrates valid and reliable implementation.**
 - The program curricula were developed to meet specific industry criteria and unique site/facility needs.
 - The program may be consistently and repeatedly implemented.

Conclusions (2)

- **The Program augments staffing requirements.**
 - Enhances recruiting because it is self-driven, giving much control to the CSA-IT.
 - Enables more working resources earlier on.
 - For example, by qualifying at the task level, the CSA in training can independently perform a predefined work scope.
 - Offers progressive growth opportunities, such as:
 - CSA-IT introduces entry-level requirements, including DOE Nuclear Criticality Safety Engineer Training (NCSET) training modules [10]— available complex-wide—and LANL requirements;
 - CSA-Q consists of site-level competency requirements categorized as core and facility specific; and
 - CSA-SQ includes expanded and applicable site-wide requirements.
 - Provides a robust continuing training program with weekly and monthly sessions

Conclusions (3)

- **The Program has operational impact.**
 - It is agile, flexible, and dynamic.
 - Site, facility, programmatic, and personal needs and changes are easily addressed.
 - For example, performance requirements are assigned by NCS management based on need and may include individual professional goals, such as the CAASS.
 - It may also incorporate background, i.e., chemical engineering or operations experience.
 - Previous training and qualification records from other sites/organizations can satisfy LANL requirements

Conclusions (4)

- **The Program shares and takes advantage of all resources.**
 - Existing industry training is used where appropriate.
 - NCS management can assign the CSA to areas based on
 - organizational need,
 - CSA expertise,
 - or growth opportunity.
 - Provides breadth and depth.
- **Colleagues from Sandia and National Security Technologies (NSTec), LLC, attended 2016 courses.**

An aerial photograph of a large university campus, likely the University of North Carolina at Chapel Hill, showing various academic buildings, parking lots, and surrounding greenery. A semi-transparent dark banner is overlaid across the center of the image, containing the text "Questions?".

Questions?