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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)

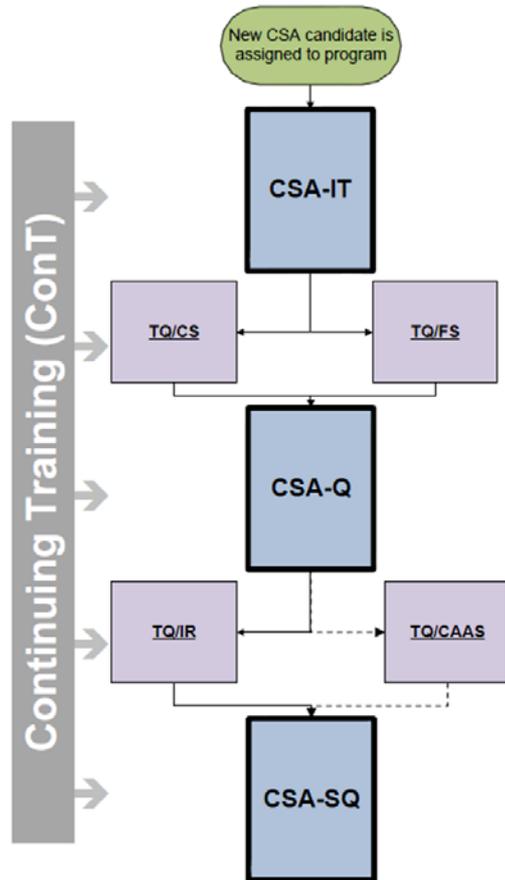
- **Ten competencies**

- 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)

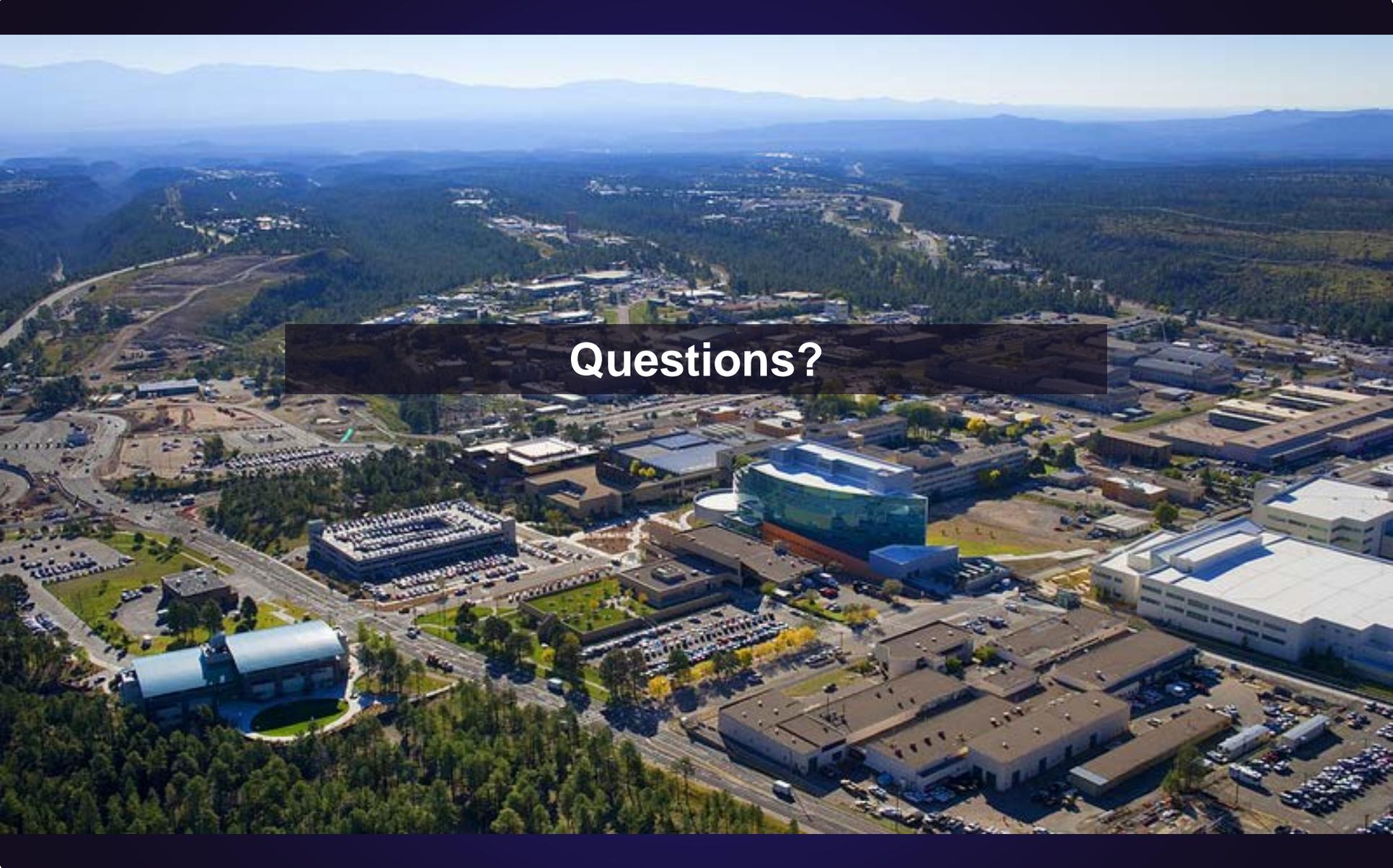
- **The Program augments staffing requirements.**
  - Enhances recruiting because it is self-driven, giving much control to the CSA-IT.
  - Enables more working resources earlier on.
    - For example, by qualifying at the task level, the CSA in training can independently perform a predefined work scope.
  - 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 green spaces. The campus is set against a backdrop of rolling hills and mountains under a clear blue sky. A semi-transparent dark banner is overlaid across the center of the image, containing the text "Questions?".

Questions?