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**
  - Development
  - Priorities & Resources

- **Results**

- **Conclusion**

Background

Background

- **Autumn 2012:**
  - Levarage 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
    - Retain

      talent 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)
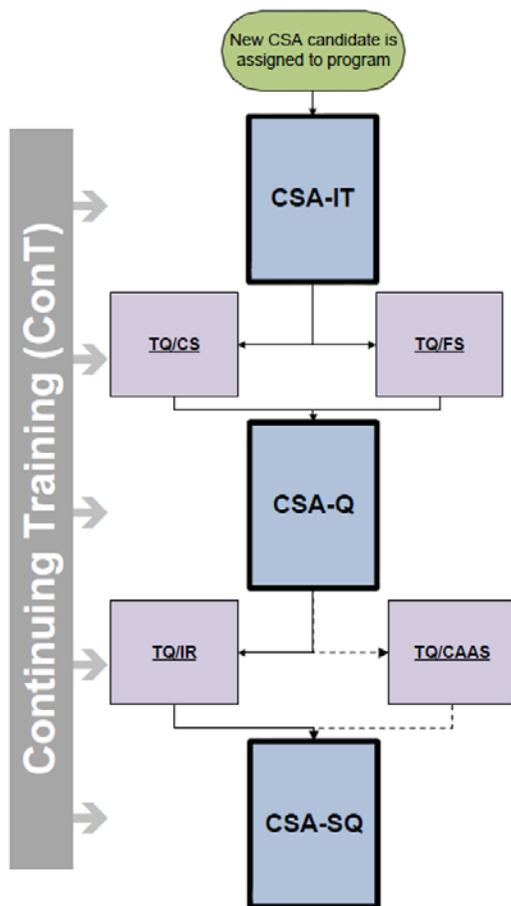
- **Within first 2 years of implementation, other needs emerged**
  - (1) Formal mentoring
    - Expert- and experience-based instructional methods
  - (2) Developing a way to qualify analysts to independently perform work

- **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

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

- **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
    - Growth opportunity

  – Provides breadth and depth.

- **Colleagues from Sandia and National Security Technologies (NSTec), LLC, attended 2016 courses.**
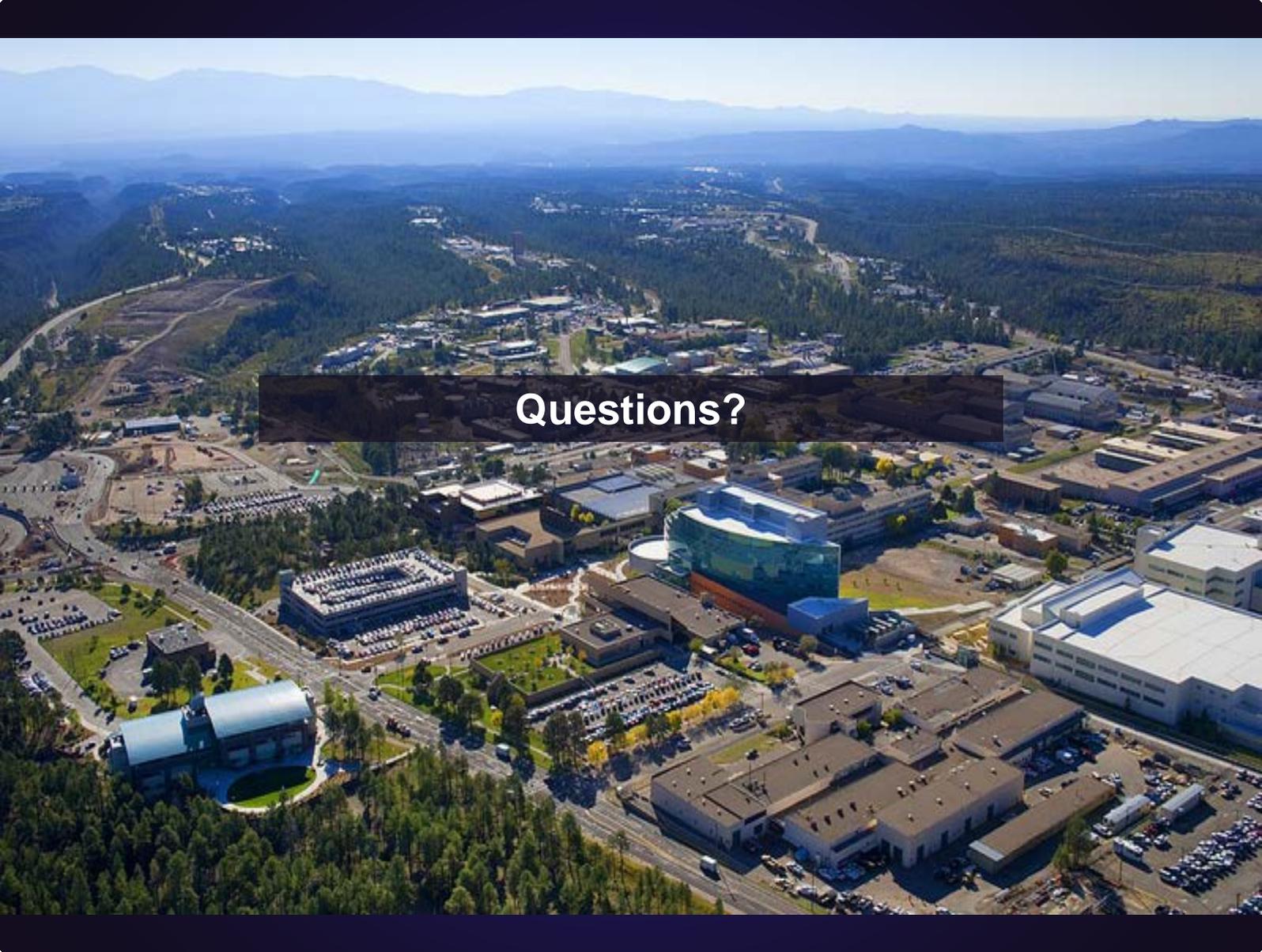
Questions?

Bonus Slides

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