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
• 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
    • Retain
talent in a competitive field.
...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
  – 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
• 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
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
• 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)
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)
• 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
  – 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
    • Growth opportunity

  – Provides breadth and depth.

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