Statement
By
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Defense Nuclear Facilities Safety Board

18th Annual Facility Representative Workshop
May 4, 2011

Presentation Topics

- Observations specific to the Facility Representatives and SSO engineers
- Integrating safety into the design and construction of nuclear facilities
- Lessons learned from nuclear facilities construction experience and links to directives reform.

Facility Representative and SSO Program Observations

Key Factors in Qualification Program

- Mentoring of newer personnel by senior FRs and SSOs
- Making full qualification a primary objective early on
- Providing focused instruction on implementation of Documented Safety Analysis (DSA) controls
- Taking technical courses and pursuing an advanced technical degree
- Cross-training at other facilities and sites

Senior Management Involvement

- Site and senior technical managers are directly involved in qualification checkouts and oral boards
- Senior managers consistently participate with the Facility Rep and SSO engineer in facility walkthroughs
- Facility Reps and SSO engineers periodically brief senior managers on their findings and concerns
- Senior managers hold federal and contractor personnel accountable for addressing Facility Rep and SSO and concerns.

DOE Fac Rep Staffing Summary 2010

HQ Offices & Sites	Staffing Analysis	# Onboard	% Onboard Fully Qualified*
Environmental Mgmt	107	100	88
Nuclear Energy	9	8	100
Science	21	20	93
NNSA	62	56	94
TOTAL	199	184	91 (81 in 2009)

* Goal is 80 % fully qualified

DOE SSO Staffing Summary 2010

HQ Offices & Sites	Staffing Analysis	# Onboard	% Onboard Fully Qualified
Environmental Mgmt	43	40	75
Nuclear Energy	6	6	83
Science	2	2	50
NNSA	25	24	71
Other	13	13	79
TOTAL	89	85	74 (70 in 2009)

NNSA* Fac Rep Staffing/Qualification 2010

NNSA Site Office	# FRs Onboard	% FRs Fully Qualified (2007)
Livermore	**6**	**100 (30)**
Los Alamos	**13**	**85 (30)**
Nevada	**7**	**86 (45)**
Sandia	**8**	**88 (45)**

* Select NNSA sites

Integrating Safety into the Design and Construction of Nuclear Facilities

Objectives

- The Nuclear Age recently celebrated its 70th Birthday! In light of that milestone we will take:
  - A look at the past
  - A look at the present
  - A look at the future
- And we will discuss what we have experienced, what we have forgotten, and what we must remember.

The Past

- Expertise resided in a few large, global, vertically integrated companies
- Each project was a customized version of a basic nuclear steam supply system design
- Regulatory process was immature but improving
- Frequently observed issues in early commercial nuclear construction projects were:
  - Concrete placement
  - Piping installations
  - Safety System-related welding
  - Significant number of reworks & additions
  - Inadequate management of quality

Causal Factors

- Utilities lacked previous nuclear experience
- Lack of corporate appreciation for formalized QA
- Inadequate communications between groups
- In critiquing themselves, the NRC noted an
  - Insufficient level of regulatory involvement
  - Frequently changing regulatory environment

The Present

- In US, most current new construction is in DOE
  - 20 projects, 10 under construction now
- Applications for 12 Combined Construction/Operating Licenses (COL) are under active NRC review (20 units)
- One US enrichment plant has been completed
- TVA restarted 1 reactor, resumed construction on 2 others

- What has changed?
  - Improved design & construction technologies
  - Mature standards & regulatory environment
  - More standardization in commercial NPPs
  - Improved project management tools

Present DOE Experience

- Design issues:
  - Insufficient DOE design oversight
  - Seismic and structural design deficiencies
  - Inadequate identification of process-specific hazards and controls
  - Use of immature technology (most DOE projects are one-of-a-kind designs)
  - Inadequate protection of safety basis assumptions in design requirements
- Construction issues:
  - Rebar installation & concrete placement problems
  - Welding issues and shortage of qualified welders
  - Poor conversion of design drawings to construction drawings
  - Shortage of qualified field inspectors

DOE (Owner) Causal Factors

- Inadequate federal project management staff
- Lack of experience & training at all levels
- Inadequate oversight of work & sub-tiered contractors
- Inadequate communications between groups
- Changing regulatory environment
- Insufficient regulatory involvement

US Commercial Experience

- National Enrichment Facility (NM) was first plant constructed under an NRC COL.
- The COL approach requires real-time recognition and assessment of variances between design and as-built plant.
- Success revolves around:
  - Completeness and flexibility of design
  - Presence of a strong nuclear safety culture
  - Extensive owner involvement in the field
- Implementation of an effective corrective action program

National Enrichment Facility (NEF) in NM

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The Future

- Increase in external pressures:
  - The need for new nuclear facilities
  - The public expectation for quality and safety
  - More specialized standards
  - Stronger regulations
  - More complex emergency management expectations
- Increasing complications:
  - Expertise dispersing into smaller companies
  - Aging experienced workforce, inadequate talent pipeline
  - Complex interfaces when companies share responsibilities
  - Lack of NQA-1 qualified vendors

Solutions

- Processes (e.g., QA/QC) must be formal and robust
- Requirements must flow down to worker
- Internal & external assessments must be rigorous
- Regulatory environment must be stable/mature
- Managers must be directly involved and supportive
- Begin rebuilding nuclear design/construction workforce now

Board's Focus

- Heed the lessons of previous construction cycles
- Continue driving improvements in project management so that facility safety is addressed early in the design process
- Ensure that technology employed in projects is mature
- Encourage DOE to be proactive on construction quality of nuclear safety-related systems, including:
  - Learning from safety system construction quality problems experienced by DOE projects
  - Determining the need for augmented requirements, training, and DOE oversight resources

Linking Construction Experience with Directives Reform

DOE 2010 Safety and Security Reform Plan

- Issued on March 16, 2010, by the Deputy Secretary
- Reform plan included reviewing and either revising or cancelling all 109 HSS Directives
- 2010 Reform Plan includes policies, orders, manuals, and guides
- Though some technical standards have been revised as a result of revising other directives

Directives of Interest to the Board

- About 75 of the 109 HSS directives were of interest to the Board
  - Directive content affects safety at defense nuclear facilities
- Board is responsible for providing oversight of DOE's defense nuclear facilities to ensure the adequate protection of the health and safety of the public, workers, and environment
  - Directives of interest to the Board include more than just those directives associated with "nuclear safety."
  - Board's Website: http://www.dnfsb.gov/pub_docs/orders_of_interest/ooi.php
  - DepRep's Website: http://www.hss.doe.gov/deprep/status.asp

Directives Revision Process

- HSS recently reviewed and revised many directives
- DOE executive steering committees and the Board's staff reviewed draft revisions of directives
- HSS submitted draft directives to the RevCom system
  - Most of HSS's 109 directives have been submitted to RevCom
  - Many have made it completely through RevCom
- A thorough and rigorous review process and revising directives based on lessons learned is a constructive exercise
- Revisions to requirements ensure safer and more efficient processes are implemented

Justifying Revised Requirements

- Removing requirements and guidance from directives:
  - Specify a solid technical justification
  - Cite a lesson learned
  - Explain the basis for reducing the specificity in requirements
  - Otherwise, DOE will re-learn the basis for specific requirements and guidance
- Fac Rep and SSO Engineer day-to-day observations
  - Must get fed back into the content of DOE directives
  - Existing requirements that don't serve the intended purpose must be revised during a directive's next revision citing your basis
- Similar to the Feedback and Continuous Improvement Core Function of ISM

“Burdensome” Directives

- Board has been told that DOE directives are “burdensome” and need to be revised or “streamlined”
- Board asks sites, “which DOE directives are burdensome and why?”
  - It isn’t the DOE directives or their requirements that are burdensome
  - It is the way requirements are implemented that results in this perception that directives are burdensome
- A rigorous and properly executed directives reform effort is not only good but a valuable exercise

Implementing DOE Directives

- Many HSS directives made it through the DOE RevCom process and have been signed out for use
- Field must implement revised directives
- Directives approved within the past 15 months:
  - DOE Order 210.2A, *DOE Corporate Operating Experience Program*
  - DOE Order 225.1B, *Accident Investigations*
  - DOE Order 226.1B, *Implementation of Department of Energy Oversight Policy*
  - DOE Order 252.1A, *Technical Standards Program*
  - DOE Order 414.1D, *Quality Assurance*
  - DOE Order 425.1D, *Verification of Readiness to Start Up or Restart Nuclear Facilities*
  - DOE Order 426.2, *Personnel Selection, Training, Qualification, and Certification Requirements for DOE Nuclear Facilities*
  - DOE Order 450.2, *Integrated Safety Management System*

Changes in Directives

- Some are not drastically different from predecessors:
  - DOE Order 225.1B, *Accident Investigations*
  - DOE Order 252.1A, *Technical Standards Program*
  - DOE Order 426.2, *Personnel Selection, Training, Qualification, and Certification Requirements for DOE Nuclear Facilities*
- Portion of the specificity was removed in the revisions:
  - DOE Order 210.2A, *DOE Corporate Operating Experience Program*
  - DOE Order 226.1B, *Implementation of Department of Energy Oversight Policy*
  - DOE Order 450.2, *Integrated Safety Management System*
- DOE Order 414.1D, *Quality Assurance*, requirements were enhanced and clarified
- DOE Order 425.1D, *Verification of Readiness to Start Up or Restart Nuclear Facilities*, written to make it clear that sites must have implementing procedures.

Questions?