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Title: Safety Basis Academy
Summary of Project Implementation from 2007-2009

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Intended for: Familiarize Safety Analysts with the Safety Basis Academy Project that resulted in a set of 23 courses applicable for Safety Basis training for DOE/NNSA Complex's non-reactor nuclear and high hazard facilities.



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SAFETY BASIS ACADEMY

SUMMARY OF PROJECT IMPLEMENTATION FROM 2007-2009

1 PROJECT DEFINITION

During fiscal years 2007 through 2009, in accordance with Performance Based Incentives with DOE/NNSA Los Alamos Site Office, Los Alamos National Security (LANS) implemented and operated a Safety Basis Academy (SBA) to facilitate uniformity in technical qualifications of safety basis professionals across the nuclear weapons complex. The implementation phase of the Safety Basis Academy required development, delivery, and finalizing a set of 23 courses. The courses developed are capable of supporting qualification efforts for both federal and contractor personnel throughout the DOE/NNSA Complex.

2 ROLES AND RESPONSIBILITIES

The LANS Associate Director for Nuclear and High Hazard Operations (AD-NHHO) delegated project responsibility to the Safety Basis Division. The project was assigned to the Safety Basis Technical Services (SB-TS) Group at Los Alamos National Laboratory (LANL). The main tasks were project needs analysis, design, development, implementation of instructional delivery, and evaluation of SBA courses.

DOE/NNSA responsibility for oversight of the SBA project was assigned to the Chief of Defense for Nuclear Safety, and delegated to the Authorization Basis Senior Advisor, Continuous Learning Chair (CDNS-ABSA/CLC). NNSA developed a memorandum of agreement with LANS AD-NHHO.

Through a memorandum of agreement initiated by NNSA, the DOE National Training Center (NTC) will maintain the set of Safety Basis Academy courses and is able to facilitate course delivery throughout the DOE Complex.

3 BACKGROUND OF THE SAFETY BASIS ACADEMY PROJECT

During years 2004 through 2006, Los Alamos National Laboratory supported the needs analysis phase of the Safety Basis Academy Project. Staff from the vendor organization, Edgewater Technical Associates, worked collaboratively with LANL training and safety basis organizations to conduct a comprehensive gap analysis of training needs, along with a functional analysis of the Safety Analyst position and manager responsibilities. The result was a series of reports and a set of preliminary design specifications for 23 technical courses for persons with safety analysis responsibilities at non-reactor nuclear and high-hazard facilities within the DOE Complex.

The needs analysis identified that safety basis performance issues persist at DOE sites across the complex. There has not been a focus on consistent approaches, and as a result, many safety basis documents have been produced that were not compliant with the *Nuclear Safety Management Rule* (10 CFR 830). To compound the problem, those documents did not receive adequate review as the reviewers were not sufficiently trained. This led to a costly and inefficient process of developing quality documentation of appropriate controls to assure safe operations at DOE facilities.

The Safety Basis Academy Project was developed as a systematic effort to establish a comprehensive training program at non-reactor nuclear and high-hazard DOE facilities. The SBA Project approach included conducting a comprehensive analysis to identify and document job categories responsible for DOE facility safety functions, as well as the competencies required to support these functions. Based on the analysis results, training programs were designed to address the needs of each group identified as having facility safety responsibilities. Although Los Alamos National Laboratory (LANL) provided leadership for the project, safety basis authorities across the DOE complex participated in the validation of analysis and design products.

DOE has issued numerous guides and standards that support the use of a Systematic Approach to Training (SAT) implementation. Among these is DOE-STD-1070-94, *DOE Standard Guidelines for Evaluation of Nuclear Facility Training Programs*. SAT methodology was embedded in all the SBA courses. The DOE National Training Center evaluated all the submitted courses for SAT compliance.

Based on the results of a functional analysis of the jobs performed by Safety Analysts, the SBA Project's Safety Analyst curriculum design has received validation from safety basis authorities at numerous DOE sites across the complex. Consequently, the training program content (which is reflected in approved design documents) was linked to objectively established job requirements. Furthermore, the associated learning objectives and recommended learning activities promulgated a student-centered approach to course implementation.

While the development of the SBA Project was not specifically coordinated with the DOE/NNSA weapons complex, the individual sites of the complex were integrally involved in the needs analysis and functional design through the Energy Facility Contractors' Group (EFCOG), and in particular the Safety Analysis Working Group (SAWG) in which all the sites are members.

4 COURSE DEVELOPMENT

From 2007 through 2009, 23 courses were developed, piloted, and vetted by NNSA, SBA staff, and course participants. Each course contained the following components:

- Study Guide for student use
- Student activities and structured discussions, when applicable
- Lesson Plan containing instructor guidance
- Set of slides for classroom presentation
- Course exam
- LANL course cover page authorizing public release as unclassified content

Following the course development, each course was piloted to a student audience with diverse representation from the DOE/NNSA Complex. Following the pilot, the course developers/instructors ensured formal-documented resolution of NNSA, LANL, and student comments. Each course was finalized, then submitted by LANL to the DOE National Training Center. All courses were deemed acceptable to the DOE NTC, meeting their specifications and the SAT process.

The DOE NTC has accepted the long-term task of maintaining version control for all SBA courses. LANL Safety Basis Technical Services Group will serve as an additional provider for instructors of SBA courses. All the courses were designed so that any knowledge Subject Matter Expert who meets a site's instructor qualifications may serve as the presenter/instructor.

5 PARTICIPATION

The SBA Project worked with the DOE/NNSA Site Offices and contractor sites safety basis community. Safety Analysts, associated DOE/NNSA document reviewers, and associated managers participating in SBA courses broadly represented the DOE/NNSA Complex, with an approximate 50/50 split of federal and contractor participants in courses. During the three-year SBA project implementation, LANS supported delivery of 33 classes; this included the set of 23 pilot courses, plus 10 classes that were re-delivered. A total of 734 participants attended the classes, with 17,280 total person-hours of contact time. A breakdown by fiscal year is provided in Tables 1a, 1b, and 1c, illustrating the details of training locations, number of participants, contact hours, and total person-hours of involvement.

Table 1a: LANS-Supported Safety Basis Academy Courses for FY2007

Course Title	Location	Participants*	Course Length (hr)	Total of Person-hours
Safety Basis Overview	Los Alamos	32	16	512
Safety Basis Doc. Prep. Adv.	Los Alamos	27	32	864
TSR Developer	DOE NTC	25	32	800
MACCS2 Modeling Code	Sandia	24	32	768
CFAST Modeling Code	Sandia	23	32	736
ALOHA Modeling Code	DOE NTC	19	32	608
EPIcode Modeling Code	Los Alamos	17	16	272
Hazard Eval. Tech. I	Las Vegas	23	40	920
Hazard Eval. Tech. II	Las Vegas	18	40	720
		208		6200

*Includes instructors who participated

Table 1b: LANS-Supported Safety Basis Academy Courses for FY2008

Course Title	Location	Participants*	Course Length (hr)	Total of Person-hours
Hazard Identification	Los Alamos	19	16	304
Accident Analysis Techniques	Las Vegas	32	24	768
Analytical Modeling Techniques	Sandia	19	16	304
Specific Hazards Analysis	Pantex	29	24	696
Safety Basis Doc. Prep. Basics	Los Alamos	17	24	408
Nuclear Safety Management	Santa Fe	17	8	136
Hazard Categorization	Las Vegas	26	8	208
ARF/RF	Sandia	27	32	864
MELCOR Modeling Code	Los Alamos	20	32	640
Accelerator Facility Safety Basis	Sandia	19	16	304
Safety Basis Doc. Prep. Adv.	EFCOG SAWG	20	16	320
		245		4952

*Includes instructors who participated

Table 1c: LANS-Supported Safety Basis Academy Courses for FY2009

Course Title	Location	Participants*	Course Length (hr)	Total of Person-hours
Chemical Facility Safety Basis	Los Alamos	11	24	264
ER/D&D Safety Basis	Santa Fe	28	24	672
GENII Modeling Code	Santa Fe	14	16	224
Packaging & Transportation SB	Santa Fe	26	24	624
Safety Basis Overview	Las Vegas	26	16	416
Hazard Identification	Savannah	14	8	112
Accident Analysis Techniques	Oakridge	24	24	576
Safety Basis Doc. Prep. Adv.	Savannah	33	24	792
Safety Basis Doc. Prep. Adv.	Pantex	26	24	624
TSR Developer	Savannah	22	32	704
ARF/RF	Pantex	26	24	624
Hazard Eval. Tech. II	EFCOG	12	16	192
	SAWG			
Analytical Modeling Overview	EFCOG	19	16	304
	SAWG			
		281		6128

*Includes instructors who participated

Course developers and instructors were from LANL, other DOE contractor sites, sole-source providers, or selected from technical evaluation of requests for proposals solicited from vendor organizations. Seven of the 23 courses were developed by LANL, one course was developed by PNNL, one by SRNL, and the remaining 14 through vendor contracts. The vendor organizations involved with SBA course development were Edgewater Technical Associates, ABS Consulting, Washington Safety Management Solutions, Hukari Technical Services Inc., ARES Corporation, Sonalysts, Link Technologies Inc., Hughes Associates Inc., and Shaw Environmental Inc.

6 COLLABORATION WITHIN THE SAFETY BASIS COMMUNITY

The SBA Project held the courses at a variety of NNSA Site Office and DOE/NNSA contractor site locations. For year 2009, the DOE NTC collaboration identified interest from Site Offices for re-delivery of seven SBA courses. Final selection for course dates and delivery locations was subject to budgetary constraints, travel allocations, and instructor and SBA staff availability. As the organization providing the funding support, LANL made final decisions on schedule and locations in concurrence with the NNSA ABSA/CLC. Three additional courses were presented at the EFCOG SAWG conferences in 2008/2009. A total of 33 courses were delivered from 2007 through 2009 through LANL SBA Project funding support. One additional course, delivered in 2008, was funded/supported through the DOE NTC.

7 FUTURE CHALLENGES

Continued use of the Safety Basis Academy courses after FY2009 will be a challenge. The following points are notable:

- The overlay of the Safety Basis Academy with existing DOE/NNSA Complex Safety Basis training programs will require attention as there could be conflicting or duplicative efforts.
- We assume there will be sufficient interest and support within the Complex so that DOE/NNSA Site Offices and contractor sites use the SBA courses to train staff.
- The DOE NTC will continue as the provider of course materials to requestors.
- Annually, the DOE NTC will coordinate with DOE/NNSA Site Offices to prioritize which courses will be delivered that year.
- The EFCOF SAWG will continue to identify new technical training for Safety Analysts and work within the DOE/NNSA community to ensure that training is current and meets identified needs.
- DOE/NNSA sites have a clear need for attracting personnel with technical education and knowledge of safety analysis. Collaboration with universities as a pipeline for interested undergraduate and graduate students should be pursued.