



SAFETY ANALYSIS WORKING GROUP ANNUAL REPORT TO THE DIRECTORS CY 2004

1. INTRODUCTION

The purpose of the Energy Facility Contractors Group (EFCOG) Safety Analysis Working Group (SAWG) is to promote excellence in safety analysis applications and programs throughout the Department of Energy (DOE) community. The SAWG provides a forum for accomplishing its purpose through its Steering Committee (SC), Subgroups, meetings, teleconferences, workshops, and training. The SAWG is actively involved and integrated with facility and DOE customers to accomplish the following:

- Establish initiatives and priorities.
- Facilitate initiatives through subgroups and task teams.
- Investigate safety analysis strategies, leverage experiences, and share lessons-learned.
- Maintain safety analysis networking and interfaces using current technology.
- Provide a forum to effectively accomplish activities and conduct business.
- Train safety analysts, engineers, and managers.

The SAWG adheres to the following principles:

- Operate within the framework of the EFCOG charter.
- Ensure that planning and actions promote EFCOG objectives.
- Follow applicable DOE and contractor requirements.

2. MEMBERSHIP

The membership of the SAWG SC and its Subgroups includes representatives from EFCOG member companies representing most DOE Sites, national laboratories, and contractors that support their work. Currently there are 16 members on the SC, representing contractors at over 14 DOE sites. In addition, effective communication with DOE HQ personnel is facilitated through active participation on the SC, Subgroups, workshops and training functions. During the year, approximately 200 people participated in SAWG activities.

Leadership of SAWG Steering Committee and Subgroups for CY 2004

Steering Committee Chairman	David Renfro, ORNL
Steering Committee Vice Chairman	Paula Ostby, INEEL
DOE Sponsor	Dick Englehart, DOE-EH
Accident Analysis Subgroup Chair	Kevin O’Kula, WSMS
Accident Analysis Subgroup Vice Chair	Louis Restrepo, Omicron
Chemical Safety Subgroup Chair	J. C. Laul, LANL
Chemical Safety Subgroup Vice Chair	David Pinkston, LLNL
Safety Basis Subgroup Chair	Andrew Vincent, WSRC
Training Subgroup Chair	John Rice, Epsilon
Closure Interest Subgroup Co-Chair	Jerry Hansen, WSMS
Closure Interest Subgroup Co-Chair	Jeff Woody, Atlas

3. OBJECTIVES AND ACHIEVEMENTS

The SAWG conducts business through its SC and Subgroups. The SC coordinates the Subgroup actions, recommends changes, and establishes priorities. The SC also undertakes short-term activities through informal task teams or as a collective effort. The SAWG SC added several new members during CY 2004.

Steering Committee

- “Standardization of DSA Requirements Across PSOs”: Guidance and directions from DOE Program Secretarial Offices to field organizations concerning preparation of Documented Safety Analyses were collected and summarized in a white paper issued by Carl Smith (BNFL) in June 2004.
- Examples, lessons learned, and best practices were provided to DOE for a revision to DOE-STD-1120, *Integration of Environment, Safety and Health into Facility Disposition Activities* by the Closure Interest Subgroup. Support will continue in 2005 in training for the standard.
- One of the most significant SAWG activities each year is hosting the annual Safety Analysis Workshop. The workshop provides training, technical presentations, and panel discussions as it encourages interaction among the entire DOE community. The workshop is unique in that it is the only national forum of its type, bringing together most of the significant policy makers, line managers, analysts, trainers, reviewers and approvers of DOE safety basis-related activities, applications, and documentation. The 14th Annual Safety Analysis Workshop was held in Pleasanton, CA, in May 2004 and was sponsored by Lawrence Livermore National Laboratory (LLNL).

There were approximately 155 participants from the DOE, contractors, and the DNFSB. Emphasizing the theme "DSA—Lessons Learned, Feedback and Improvement," the consensus proclaimed the workshop to be highly beneficial, providing an outstanding forum for information exchange. The workshop continued to provide high value to the participants by allowing a way to resolve compliance issues and enhance Integrated Safety Management.

Training was provided to over 130 DOE and DOE contractors in source term and fire analysis, chemical and radiological dispersion/consequence analysis, decontamination and decommissioning techniques, and selection and use of hazard controls. Curricula, training materials, and class presentations were made during the workshop at no cost to participants.

Brigadier General Ronald J. Haeckel, Principal Deputy Assistant Administrator for Military Application, National Nuclear Security Administration, presented the Workshop keynote address. Gen. Haeckel spoke on the topic of "Lessons Learned from the Columbia Accident Investigation Board Report and Implications for NNSA". Another invited speaker, Gregory L. Tietbohl of LLNL, gave an overview of the National Ignition Facility and its unique safety challenges.

Accident Analysis Subgroup

- Software Quality Assurance (SQA) Products: A significant number of the Accident Analysis Subgroup (AAS) deliverables supported DOE and DOE contractors in meeting commitments to the Defense Nuclear Facilities Safety Board (DNFSB) in resolving issues identified in Recommendation 2002-1, *Quality Assurance for Safety-Related Software*. Recommendation 2002-1 identified a number of quality assurance issues for software used in the DOE facilities for analyzing hazards, postulated accident conditions, and designing and operating controls that prevent or mitigate potential accidents. The development and maintenance of a collection, or "toolbox," of high-use, SQA-compliant safety analysis codes were one of the major commitments contained in the *Implementation Plan for Recommendation 2002-1* (March 2003). Ultimately, the DOE safety analysis toolbox will contain a set of appropriately quality-assured, configuration-controlled, safety analysis codes, maintained for DOE-broad safety basis applications. The DOE has designated six computer codes for toolbox consideration, including:

<u>Topic Area</u>	<u>Computer Code</u>
Fire Source Term:	CFAST
Leak Path Factor:	MELCOR
Chemical Release/Dispersion and Consequence:	ALOHA, EPIcode
Radiological Dispersion and Consequence:	MACCS2, GENII.

The AAS supported, in whole or in part, the following deliverables in 2004 to support the SQA project:

- a) **Gap Analysis for the Designated Toolbox Software - Using the SQA qualification criteria** established earlier in the project, and input from the code owners, the SQA deficiencies and the actions required to bring ALOHA, CFAST, EPIcode, GENII, MACCS2 and MELCOR into compliance were documented in three reports. The reports were completed in May 2004, as part of Commitment 4.2.1.3.
- b) **Guidance Reports for the Designated Toolbox Software** - These reports guide DOE analysts in the qualified use of these "toolbox" codes to support safety analysis consistent with 10 CFR 830, Subpart B Safety Basis Documentation. These guidance reports contain information on: (1) applicability; (2) appropriate regimes, recommended configurations, and conditions to avoid; (3) valid ranges of input parameters consistent with code capability and DOE safety basis applications; (4) default input values for site-independent parameters; and (5) citations of identified SQA documentation. Code-specific guidance reports were completed in June 2004.
- c) **Survey of Design Software for Toolbox Consideration** – A survey of computer codes, including commercially available and proprietary codes, used at the DOE sites for nuclear facility or non-nuclear high hazard facility design was performed in late 2003. Design computer codes that have widespread use in DOE safety applications, and meet appropriate qualification standards were identified in the areas of: (1) civil/structural/geotechnical; (2) mechanical; (3) HVAC; (4) electrical system; (5) fire protection; and (6) instrumentation and control. A final document evaluated the options for designating these computer codes as "toolbox" codes and placing them in the Central Registry. This document was completed in March 2004.
- d) All deliverables were finalized after review comments were incorporated per schedule in 2004, and are available through the DOE Central Registry website (http://www.eh.doe.gov/sqa/central_registry.htm).
- e) **Upgrading SQA Directives:** As part of Commitment 4.3.2 (Issue new/revised directives (DOE Policies, Orders, Manuals, Standards, or Guides) required to invoke industry or Federal agency standards for safety software quality assurance), AAS played a role as part of the Safety Software Guide DOE writing team. The Guide will document information plus acceptable methods useful for implementing the safety software quality assurance requirements of the draft Order, DOE O 414.1C, *Quality Assurance*. Both the Order and the Guide have completed the RevCom process, and are scheduled for release early in 2005.

The guide will be issued as DOE G 414.1-4, *Safety Software Guide for Use with 10 CFR 830 Subpart A, Quality Assurance Requirements, and DOE O 414.1C, Quality Assurance*. The current version is available at <http://www.directives.doe.gov/pdfs/doe/doetext/draftord/414/g4141-4.html>

- Strategic planning between the SAWG and its counterpart in the American Nuclear Society (ANS), the Nuclear Installation Safety Division (NISD), was continued in 2004. The Accident Analysis Subgroup led the coordination toward, and was part of the technical program committee for a Washington-based embedded topical meeting on *Operating Nuclear Facility Safety*, at the Winter Meeting of ANS, November 14 - 18, 2004.

The meeting reflected the understanding that the “proving grounds” for improving safety while performing effectively can no longer afford to be limited to the immediate plant or facility, but draws upon experience from similar operations in nuclear facilities worldwide. Reactor, high-level waste, laboratory, fuel fabrication, decommission and decontamination (closure) projects, nuclear material processing, transportation processes and operations, and software experiences were included in the scope of the topical. The emphasis was on operating and operational nuclear facility safety, common areas for improvement, and sharing of innovative approaches for achieving and maintaining robust safety while maintaining performance expectations. The embedded meeting explored similarities and differences, with review of the benefits identified through integrated safety management systems, risk-informed approaches, and other models for safety.

There were over 40 papers presented in nine technical paper sessions, in addition to four panel sessions. More than half of the papers reflected DOE facilities and issues. Dr. R. Bruce Mathews of the DNFSB presented an invited talk on "Safety Management of Complex, High Hazard Operations".

Safety Basis Subgroup

- Hosted the January 27 - 28, 2004 Safety Basis Workshop in Albuquerque, NM, to discuss strategies for addressing DNFSB Recommendation 2002-3, Requirements for the Design, Implementation, and Maintenance of Administrative Controls, and use of administrative controls in Documented Safety Analysis (DSAs), integration of nuclear criticality safety analysis into DSAs, and safety basis development for disposition activities. The workshop was attended by about 115 DOE contractor, DOE, and DNFSB staff members.
- Held a special ad hoc session at the Annual SAWG Safety Analysis Workshop in Pleasanton, CA, to identify and discuss issues in the unreviewed safety question process, particularly those being raised by DOE-OA. A follow-up meeting was held in Washington, DC with DOE-EH to give careful consideration to these issues. Subsequent to that meeting, DOE-EH and DOE-EM began the development of guidance and the Subgroup participated in that development by providing comments on the draft guidance.

- Participated in the development and implementation of guidance for the use of new DOE-STD-1186-2204, *Specific Administrative Controls*.

Training Subgroup

- Updated Subgroup web page with list of members and training courses.

4. PLANNING FOR THE NEXT YEAR

Steering Committee

- Los Alamos National Laboratory will host the 15th Annual Safety Analysis Workshop in Santa Fe, NM, from April 30 – May 5, 2005. Training, subgroup meetings, technical paper presentations, panel discussions, and invited speakers will be featured.
- Contractor practices with safety basis metrics are being collected and a recommendation for benchmarking will be evaluated.
- Contractor experiences with self-assessments in the safety basis area are being collected.
- The Closure Interest Subgroup will support the 2005 ANS Topical “Decommissioning, Decontamination, and Reutilization”.

Accident Analysis Subgroup

- Continue to support DOE-EH and DOE contractors in improving SQA practices per Recommendation 2002-1, especially with regard to safety analysis software applications.
- Provide accident analysis training during the SAWG Workshop.
- Support DOE review and ultimate release of the Accident Analysis Guidebook.
- Compare and contrast chemical dispersion codes and provide recommendations.
- Provide user guidance on appropriate use of codes for leak path factor analysis relative to DNFSB Recommendation 2004-2.

Chemical Safety Subgroup

- The Subgroup is working to extend the range of materials for which appropriate airborne release fractions and respirable fractions are known based on DOE-HDBK-3010-94, *Airborne Release Fractions/Rates and Respirable Fractions for Nonreactor Nuclear Facilities*. A report on beryllium has been drafted and is being internally reviewed.

Safety Basis Subgroup

- Sandia National Laboratories will host the Safety Basis Workshop in Albuquerque, NM, from January 25 – 26, 2005. Session topics will include specific administrative controls, implementation of revised unreviewed safety question guidance, safety analyst training, integration of nuclear criticality safety into safety basis documentation, software QA, and revisions to DOE-STD-1120.
- Input will be provided during the pre-RevCom review of revised DOE-STD-3007, *Guidelines for Preparing Criticality Safety Evaluations at DOE Nonreactor Nuclear Facilities*.

Training Subgroup

- A session will be held at the 2005 Safety Basis Workshop to explore recent DOE initiatives in safety analyst training, contractor training needs, and available training courses.
- The SAWG Safety Analysis Training Standard will be revised.

5. LESSONS LEARNED

- The SAWG needs to improve subgroup task authorization and communication and deliverable review and approval processes. The task authorization method proposed by the ISM Working Group should help.
- The SAWG and its supporting member companies need to consider increasing the priority of safety basis training.
- The SAWG needs to intentionally enlist and mentor younger participants in WG activities.

6. EFFECTIVENESS EVALUATION

The SAWG continues to be a very effective working group as evidenced in part by its direct contributions in support of DOE for revisions of orders and standards on software QA, specific administrative controls, unreviewed safety questions, nuclear criticality safety, and facility disposition during CY 2004.

7. RECOMMENDATIONS

The Safety Analysis Working Group should continue. The Controls Selection and USQ Subgroups that have been inactive for over a year should be discontinued.