

# ENGINEERING PRACTICES WORKING GROUP

## 2009 ANNUAL REPORT

*Chair: Charles Kronvall, CH2M Hill Plateau Remediation Company*

*Vice-Chair: Cherri Defigh-Price, Parsons (Salt Waste Processing Facility)*

### INTRODUCTION

Vision – The vision is to provide a forum for continuous improvement in engineering-related areas of carrying out the Department of Energy (DOE) and National Nuclear Security Administration (NNSA) missions.

Purpose - The purpose of the Engineering Practices Working Group (EPWG) is to promote engineering excellence in the execution of DOE missions by sharing best industrial practices, applying lessons learned and providing integrated recommendations to DOE officials and EFCOG contractor members.

Objectives – The EPWG is committed to the following objectives:

- Enable the success of DOE missions in terms of high-quality engineering that supports program and project objectives in a cost effective and safe manner
- Provide a forum for exchange of ideas, needs, and wants among the DOE complex-wide engineers that:
  - increases awareness and involvement of senior contractor management
  - increases awareness and involvement of senior DOE management
  - increases awareness and involvement of middle and line management
  - provides information bridges within the DOE, and
  - provides proactive, value-added recommendations to the DOE
- Promote, coordinate, and facilitate the active exchange of successful engineering programs, practices, procedures, lessons learned, and other pertinent information of common interest to contractors and subcontractors
- Enhance collaboration among DOE contractors and encourage early involvement of complex-wide experts, in order to maximize the probability of success for unique engineering projects.
- Promote employee development of participating companies' engineering talent, particularly young engineers, by sharing management and technical information among EPWG participants through mechanisms such as workshops, task groups, and seminars

Scope - The EPWG's scope includes the areas of engineering practice that are associated with DOE facilities, programs, and capital acquisitions. Engineering practice is the application of engineering disciplines and processes as governed by national codes and standards, recognized quality standards, and DOE orders and regulations. This includes the application of engineering practices throughout the lifecycle of DOE facilities, including initial design and construction, commissioning, operation and maintenance, decommissioning, and closure.

### MEMBERSHIP AND ORGANIZATION

#### MEMBERSHIP

There are total of approximately 210 members in EPWG, including 60 members of the Working

Group, and an additional 150 members in the eight Subgroups and Task Teams. Some EPWG members also participate in one or more of the Subgroups. 35 EFCOG member companies are represented on the EPWG.

## ORGANIZATION

Leadership in the EPWG is comprised of:

Chair: Charles Kronvall, CH2MHill Plateau Remediation Company

Vice-Chair: Cherri Defigh-Price, Parsons (Salt Waste Processing Facility, Savannah River Site)

Secretary: Tobin Oruch, Los Alamos National Laboratory

There are five subgroups and three task teams, with Chairs as follows:

- Fire Protection Subgroup Chair: Perry D'Antonio, Sandia National Laboratory
- Configuration Management Subgroup Chair: R. Scott Spencer, CH2MHill Plateau Remediation Company
- Value Management Subgroup Chair: Richard Harrington, CH2MHill Plateau Remediation Company
- Testing and Commissioning Subgroup Chair: Doug Messerli, Babcock & Wilcox Y-12
- Cognizant System Engineer Subgroup Co-Chairs:
  - Diane Cato, Washington River Protection Solutions
  - Fran Lemieux, National Security Technologies
- Pressure Safety Task Team Chair: Tom Etheridge, Oak Ridge National Laboratory
- Commercial Grade Item Dedication Task Team Co-Chairs:
  - Dennis Weaver, Bechtel National (Hanford Waste Treatment Plant)
  - Don Zinter, Washington River Protection Solutions
- DOE-STD-3024, "Content of System Design Descriptions" Task Team Chair: Cherri Defigh-Price, Parsons (Salt Waste Processing Facility, Savannah River Site)

EFCOG Sponsoring Director: Roy Schepens, Parsons

DOE and NNSA Sponsors: James McConnell, NNSA; Chip Lagdon, DOE Office of Environmental Management; Rick Kendall, Office of Nuclear Energy; and, James O'Brien, Office of Health, Safety, and Security (HSS)

The parent EPWG membership meets four times per year - twice via nation-wide teleconferences, and twice in person. At the meetings, task teams report on progress, completed focus areas are closed and new focus areas are discussed, new task teams are formed and pertinent lessons are shared. In addition, topical areas are selected for breakout sessions to take advantage of the face-to-face meetings for more interactive working level sessions versus only presentation formats during the meeting.

With regard to succession planning, EPWG elections for officers are held each year.

## ACHIEVEMENTS

Requests were received from NNSA and DOE's Office of Environmental Management, and from the EFCOG Board of Directors for support on several important initiatives. These included:

- Implementation lessons for DOE-STD-1189, "Integration of Safety into the Design Process"
- DOE Order 420.1B, "Facility Safety", as applied to the cognizant system engineer program
- Identification of the need for commercial grade item program development and creation of a team to initiation program development
- Review of Guides to replace DOE Manual 413.3 in support of the relatively new DOE Order 413.3A, "Program and Project Management for the Acquisition of Capital Assets"
- Review of fire protection requirements for confinement ventilation system
- Development of fire protection best practices

These initiatives were completed in close cooperation with other EFCOG Working Groups, especially the Safety Analysis, Project Management, Energy and Infrastructure, and Integrated Safety Management & Quality Assurance Working Groups.

Two new Subgroups were formed during FY 2009 and chartered to share lessons and experiences: 1. the Testing and Commissioning Subgroup and 2. the Cognizant System Engineer Subgroup. Also, two new Task Teams were formed to support revision to DOE-STD-3024, "Content of System Design Descriptions", and for the purpose of developing best practices for the identification, technical evaluation, procurement, and dedication of commercial grade Items. The Engineering Standards Subgroup and the Non-Nuclear Focus Task Team were disbanded during the year due to waning interest and lack of pressing issues relative to other areas.

Best practices were posted for:

- Engineering calculations (for example, depth and rigor or documentation, input and assumption identification, input and assumption management)
- Safety equipment list
- Fire protection criteria for leased non-nuclear facilities - to improve the content of fire protection in the scope, reduce confusion, and define roles and responsibilities for fire protection when negotiating leased space. The best practice provides a tool to help ensure that the DOE contractor's leased facilities are more consistent and aligned to the appropriate level of fire protection to ensure the protection of workers, protection of government owned equipment to limits established by the DOE, and protection against unacceptable DOE program or mission interruption.

Actions undertaken by the EPWG to develop/compile additional best practice improvement recommendations and their status include cognizant system engineer documentation, including examples of system health reports, system performance monitoring and trending, system boundary documents, and system notebooks.

EPWG supported DOE's HSS in the development of a new standard to provide guidance on design of safety instrumented systems. The standard is drawing from ANSI/ISA 84.00.01-2004, "Functional Safety: Safety Instrumented Systems for the Process Industry Sector" and is expected to be issued to

DOE's formal review process (RevCom) in the coming year.

EPWG previously agreed to evaluate development of a DOE-specific standard for safety electrical power in lieu of commercial nuclear power IEEE standards. Early efforts resulted in the development of a preliminary scope plan for the effort. The group subsequently developed a draft formal task plan for the effort. Loss of all key lead personnel on this effort to new company assignments and retirement has stalled the effort. An action from the October EPWG meeting is to resurrect the effort of this team.

The Fire Protection Subgroup continues to provide a forum for members to share information and lessons learned, discuss common issues, and to develop best practices. To support the efforts of the Subgroup, one meeting and monthly conference calls were held. The meeting was held in conjunction with the DOE/Contractor Fire Safety Workshop, June 22-26, 2009, to best use limited resources.

A DOE working group formed to respond to the DNFSB Recommendation 2008-1, "Safety Classification of Fire Protection Systems", includes fire protection engineers from both DOE and contractors. The group developed design and maintenance criteria for sprinkler system design and water supplies classified as safety significant and safety class. The criteria included acceptable pipe schedules, fitting requirements, seismic bracing, and maintenance schedules. Single point failure tolerance design was included with design area and density requirements and sprinkler spacing of the sprinkler systems. Water supply reliability guidelines using redundant water supplies and risers were methods included in the DOE guidelines the working group developed. The guidelines are in the review process.

A small contingent of the Fire Protection Subgroup made an informational visit to FM Global to learn more about highly protected risk and how this concept can be better integrated into the contractor's fire protection programs. DOE Order 420.1B requires the contractors to follow "highly-protected risk" concepts but this concept is not well articulated in the requirements nor consistently implemented in the contractor community. This visit was very productive and follow-on discussions with FM Global are planned with the DOE-Headquarters customer. This information is being evaluated to determine if it can be captured as a best practice.

The Fire Protection Subgroup has continued to share information on the development of leading indicators. Leading indicators are an important component of the Department's contractor assurance system and a focus of the EFCOG Contractor Assurance Working Group. A broad set of indicators is being reviewed by the group for broader application and potential publication as a best practice. The EPWG has also been involved in some activities related to the update to DOE-STD-1066-99, "Fire Protection Design Criteria", including initiation of efforts to address fire protection design as it relates to confinement ventilation systems.

The Testing and Commissioning Subgroup was commissioned at their December 2008 meeting. Members established the Testing and Commissioning charter and came to a consensus that a standard process should be established for testing and commissioning at the DOE sites. Further, the standard process should be generated by the Subgroup and then be submitted to the full EPWG for review and concurrence with a probable recommendation to establish it as a good practice (or have it issued as a standard/guide to one of the DOE orders). The Subgroup then assigned development

of specific sections of this standard/practice to Subgroup members. Thus far, two of the sections have been drafted. The Subgroup Chair and the two sections authors initiated an initial peer review of the submittals. Once the reviews are completed, the two sections will be sent to the remaining Subgroup members for their input.

The Cognizant System Engineer Subgroup held its kickoff meeting in Denver, Colorado in April 2009. The Subgroup charter was approved, officers elected, and list of actions identified. Two more meetings were held, including one in May as part of the Annual DOE Facility Representative/Safety System Oversight workshop in Las Vegas, Nevada. Several candidate best practices were identified for further exploration, including one drafted on system health monitoring (as noted above) which is in final review.

The Value Management Subgroup held its annual meeting in conjunction with the Society of American Value Engineers International Conference in late June-early July in Detroit, Michigan. Updates from each site on value management studies completed and planned were discussed, as well as a proposed paper that defines how the systematic value management/value engineering approach can support the system engineering methodology and discipline.

The Pressure Safety Task Team continued its work to develop a standard understanding of the requirements of an effective pressure safety program as required by the Worker Safety and Health Program, 10 CFR 851 Appendix A Section 4.0. A pressure vessel SharePoint site has been established for collaboration purposes. This team is working to raise awareness of pressure safety program aspects and quickly accelerate sites with relatively new programs to experienced, soundly-based programs. The Team met in September 2009 at the Oak Ridge National Laboratory, with special presentations on LANL's Legacy Walkdown/Disposition Approach; PNNL-18696, "Pressure Systems Stored-Energy Threshold Risk Analysis", and DOE Pressure Safety Manifold (SNL). The primary focus was a development effort of an Implementation Guide for Pressure System Safety as specified in 10 CFR 851 Appendix A.4 using the sections of 10 CFR 851 Section A.4 as an outline: 4a - The General Program; 4b - Codes and Standards; and 4c - Equivalency. A team presented draft sections for group discussion.

#### PLANNING FOR THE YEAR AHEAD

EPWG has the following initiatives planned for FY 2010:

- Follow-up activities related to health and safety assessments will be a key focus area for the EPWG. The EPWG is committed to preparing a minimum of three best practices, including some in this focus area. The actions and practices will be developed in concert with the HSS to achieve common expectations for system engineering programs. This will continue the theme of teaming with DOE to improve engineering effectiveness in the complex.
- Continue support to HSS for development of safety instrumented system standard. It is anticipated that the draft standard will be released into the DOE formal review process (RevCom) in the coming year.
- In the pressure safety area, plans include:
  - Continue interaction and information sharing;
  - Organize support for criteria for barrier design of pressure systems;
  - Seek HSS resolution of the American Society of Mechanical Engineers Boiler and

- Pressure Vessel Code dates associated with 10 CFR 851; and,
  - Complete a draft of an Implementation Guide for Pressure System Safety as specified in 10 CFR 851 Appendix A.4 using the sections of 10 CFR 851 Section A.4 as an outline: 4a – The General Program; 4b – Codes and Standards; and 4c – Equivalency Sub-team
- Continue to support DOE in the implementation of DOE Standard 1189 in conjunction with the EFCOG Safety Analysis and Project Management Working Groups. This will include developing best practices on application and providing a revised draft of DOE-STD-3024 to HSS to address use in the integration of safety and design during project implementation.
- Continue to support NNSA and DOE on the development of a technical position to address actions appropriate for potential significant HEPA filter loadings under fire scenarios
- In the fire protection area, plans include:
  - Benchmark site Authority Having Jurisdiction (AHJ) programs, particularly looking at roles, responsibilities, authorities and accountabilities
  - Benchmark fire barrier penetration seal configuration management practices
  - Benchmark of site fire protection design criteria (international codes vs. National Fire Protection Association)
  - Develop and post Fire Hazards Analysis Tool Box
  - Develop updated fire protection system and equipment inspection, testing and maintenance recommended frequencies
- Revitalize the Configuration Management Subgroup; conduct meetings and/or phone conferences to set goals and complete actions. Goals previously established and planned were:
  - Develop and issue configuration management best practices. Candidate topics include:
    - Maintaining configuration management in work packages during decontamination and decommissioning (D&D)
    - Version and formal change control during design
    - Design deliverables at 30-60-90-100%
    - Final design documents and system design descriptions as design tools and deliverables
    - “As-built ”: definition (versus “as found”)
    - Title III services by the original architect-engineer
    - Software configuration management
    - Vendor information (formats, control, cataloging)
    - Major modifications to operating facilities – special considerations
- Provide best practice documents for the creation, implementation, and maintenance of an Nuclear Quality Assurance-1 compliant commercial grade item dedication program
- Re-vitalize the effort to develop DOE standards in lieu of IEEE standards for electrical power safety systems
- Hold its next full EPWG meeting in Idaho Falls, Idaho on October 27-29, 2009

#### LESSONS LEARNED

A positive aspect of the EPWG and its Subgroups and Teams this year has been the continuation of increased communication among members. Members of EPWG are now routinely communicating, using the EPWG as a sounding forum, on issues that arise in their locations. In the Fire Protection Subgroup, for example, communication within the DOE fire protection community has substantially

increased, resulting in very positive response to the Subgroup and its activities. A challenging aspect of the Working Group and its Subgroups and Teams is the great diversity among the various members in how Engineering, Configuration Management, Testing, Pressure Safety System design and operation, Commercial Grade Item Dedication, and Fire Protection activities are organized and executed at their sites. Working Groups need to keep this in mind, to ensure value is maintained for all its members. The EPWG website, and the very strong meeting minutes developed and distributed, are very positive communication tools used to distribute lessons learned and best practices to members.

Communication and teamwork with other Working Groups is improving. Several cross-cutting EPWG items of importance to DOE and its cadre of contractors are being worked. These afford opportunities to coordinate positions and develop strong teams within EFCOG.

Distribution of work assignments continues to be a challenge. As in most volunteer groups, it is difficult at times to get *full* participation in the group. Key members tend to bear the burden of the majority of assignments. In addition to assigning actions to staff present at meetings, efforts are being made to recruit additional support staff from member organizations that were not able to travel to the face-to-face meetings.

#### EFFECTIVENESS EVALUATION

The EPWG has been effective during the past year, most notably in supporting DOE in several major initiatives for the complex. The EPWG has been positively recognized by the DOE customers in these activities, demonstrating the benefit of the EFCOG and Working Group's close interaction with DOE. DOE recognition is reflected in the request for Working Group support on new initiatives. This interaction is increasing performance and effectiveness across the complex. The tasks being worked on by the group are issues that are significant and the output of the EPWG is being used by member companies to enhance engineering effectiveness. Strong cross EPWG interaction was evidenced throughout the year on numerous initiatives discussed above. The adjustment of the face-to-face meetings to include more interactive sessions versus presentations is an example of this. The year saw creation of new Subgroups and Task Teams, disbanding of one Subgroup and one Task Team, re-energization of some tasks and hibernation of others. In summary, the EPWG activities and contributions in 2009 covered a broad spectrum of activities and the results were positively recognized by DOE. Members are enthusiastic with respect to the 2010 planned activities and significant contributions will be expected of EPWG.

#### RECOMMENDATIONS

Except as noted below, it is recommended that the EPWG and its Subgroups/Task Teams continue their activities in support of DOE and the common interest of the contractor community in accordance with the 2010 plans.

- The Pressure Safety Task Team should be chartered as a fully functioning Subgroup. A recommendation was made at the October EPWG meeting to upgrade the Task Team to subgroup status. What had originally been thought to be a short-term, limited focus topic has evolved to be more encompassing and justifies the more permanent status of subgroup designation.
- The Value Management Subgroup should either be transferred to the Project Management

Working Group or disbanded, with the Subgroup Chair person noted as a subject matter expert on the EFCOG website.

- The majority of the Fire Protection Subgroup initiatives have focused on maintenance and operations, rather than engineering design. Consideration should be given to assigning the Fire Protection Subgroup actions related solely to design issues, Inspection, testing and maintenance, and the role of the Fire Authority Having Jurisdiction, or transferring the Fire Protection Subgroup to the Energy and Infrastructure Working Group.
- A decision needs to be made related to the future of the Value Management Subgroup. Options include:
  - Continue with the Subgroup as a part of EPWG
  - Transfer the Subgroup to the Project Management Working Group
  - Disband the Subgroup and list the Chair person as a Value Management Subject Matter Expert on the Project Management Working Group website.

The EPWG is available to help support other critical initiatives of the EFCOG Board of Directors and DOE that may be identified during the upcoming year. To accomplish all tasks, robust member company interaction and involvement on major activities and effective integration among various Working Groups will be required.