

United States Government

Department of Energy

Office of River Protection

# memorandum

APR 05 2006

DATE:

REPLY TO  
ATTN OF:

ORP:DCB 06-TED-022

SUBJECT:

INDEPENDENT REVIEW OF THE U.S. DEPARTMENT OF ENERGY, OFFICE OF RIVER PROTECTION (ORP) SAFETY SYSTEM OVERSIGHT (SSO) IMPLEMENTATION

TO: File

This memorandum documents the attached Independent Review of the U.S. Department of Energy, Office of River Protection's Safety System Oversight Program Implementation. This review was performed by a qualified independent Federal Technical Capabilities Agent at the request of ORP.



Dana C. Bryson, ORP Agent  
Federal Technical Capabilities Panel

Attachment

cc w/attach:

M. A. Mikolanis, DOE-SR

S. J. Coleman, INNOV

# memorandum

Savannah River Operations Office (SR)

MAR 30 2006

DATE:

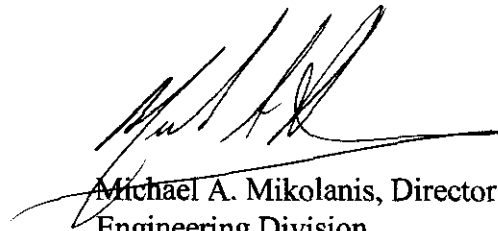
REPLY TO  
ATTN OF: WDED (Mikolanis/803-208-1223)

SUBJECT: Independent Review of the Office of River Protection (ORP) Safety System Oversight (SSO) Implementation

TO: Dana C. Bryson, Director, Tank Farm Engineering Division, Office of River Protection, Richland, WA

This memorandum transmits the attached SSO Implementation Assessment of ORP performed at your request. ORP factual accuracy comments have been incorporated. This assessment met the Fiscal Year 2005 Federal Technical Capabilities Program Annual Plan Action 3.2 for each site to perform independent SSO program implementation final assessments.

Please let me know if I can be of service to ORP in the future. If you have any questions please contact me at (803) 208-1223.



Michael A. Mikolanis, Director  
Engineering Division  
Waste Disposition Project

WDED:MAM:kl

WDED-06-29

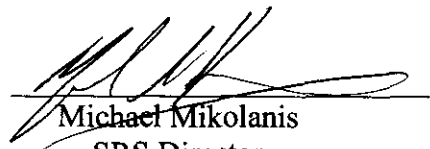
Attachment:  
SSO ORP

# Independent Review of the Office of River Protection (ORP) Safety Systems Oversight (SSO) Program Implementation

## ASSESSMENT REPORT



**November 2005**

  
Michael Mikolanis  
SRS Director

Waste Disposition Engineering Division  
Independent FTCP Agent

Approved:

  
Dana C. Bryson  
ORP FTCP Agent

## EXECUTIVE SUMMARY

The Safety System Oversight (SSO) function established at the Office of River Protection (ORP) was reviewed to assess efforts to implement the program. The assessment field work was performed November 7 through 10, 2005. Results of the review are intended to provide ORP with a measure of the progress that has been made in their implementation of the SSO function. During the assessment, 17 interviews were conducted, 28 documents were reviewed, and one facility visit was made to assess SSO performance in the field.

The ORP SSO Program Plan describes a process to implement the SSO function which meets or exceeds the requirements of DOE M 426.1-1A. Line managers and SSO personnel understand the program objective and are actively working to implement the function for safety systems at ORP. ORP is completing qualification card development for Safety Management Program (SMP) SSOs. One Strength, one Finding, and four Observations were noted during this assessment:

### Strength

S-1 Dedicating time for study and application of a rigorous qualification process for tank farm SSOs resulted in qualified personnel with a thorough, in-depth understanding of assigned system design and operating characteristics.

### Finding

F-1 Additional work is needed to complete and implement or revise qualification requirements for SMP and Waste Treatment Plant SSOs. Although qualified subject matter experts (e.g., qualified in related TQP Functional Areas) are covering these areas, they have not formally been qualified as SSOs.

### Observations

OBS-1 Qualification cards for WTP SSO personnel are not consistent with current facility design. Project needs during design is more representative of a design oversight role than a safety system operational oversight role than a SSO role. It is recommended management evaluate the current use of WTP system qualification standards and the need for additional SMP SSOs.

OBS-2 Development of SMP SSO qualification cards are significantly behind schedule. It is recommended management review current use of SMP subject matter experts and evaluate the need for additional SMP SSOs.

OBS-3 List of QOs needs to be updated to support SMP and WTP SSO qualification.

OBS-4 SSO interaction with contractor system engineers counterparts is still maturing in terms of frequency of interaction and feedback/improvement mechanisms.

The ORP SSO Program Plan describes a process to implement the SSO function which meets or exceeds the requirements of DOE M 426.1-1A. Line managers and SSO personnel understand the program objective and are actively working to implement the function for safety systems at ORP. Although most ORP SSOs have not completed formal qualification, SSOs understand their roles and responsibilities, are knowledgeable of the design, maintenance and operation of their assigned systems, and are working with their contractor counterparts. Interviews and walkdowns confirmed SSOs demonstrated an in-depth understanding of system design requirements and their impact upon functions credited in hazard analyses.

## INTRODUCTION

In May 2004, the Department of Energy (DOE) institutionalized the Safety System Oversight (SSO) function to monitor the performance of systems relied upon to assure safe operation of nuclear facilities and evaluate effectiveness of the Contractor's cognizant system engineer program. The SSO function, including roles and responsibilities of personnel assigned this function, are described in DOE M 426.1-1A, *Federal Technical Capability Panel Manual*. DOE M 426.1-1A also defines the knowledge, skills and abilities to be incorporated into technical qualification programs for personnel assigned the SSO function.

In July, 2004, a review was performed to assess initial actions taken by the Office of River Protection (ORP) to implement the SSO function. The results were documented in a report issued to the ORP Manager. A follow on review was performed November 14 – 17, 2005 to assess ORP implementation of the SSO function. The reporting format described in DOE M 426.1-1A was used to document the review results.

## SCOPE and METHODOLOGY

The review was performed by the ORP FTCP Agent and the Savannah River Site alternate FTCP Agent. Criteria and Review Approach Documents (CRADs) developed by the Federal Technical Capabilities Panel (FTCP) were used to assess implementation of the SSO function at ORP. The CRADs are located in Attachment A of this report.

Implementation of the SSO program was emphasized more in this assessment than in the initial assessment. The initial review of the ORP Safety Oversight (SO) Program, conducted in July 2004, focused heavily upon the Program (PGM), Training and Qualification (TQ), and Management (MG) CRAD functional areas. This follow-on review builds upon that initial assessment and focused primarily upon the Oversight Performance CRAD functional areas. The follow-on review was performed in two parts: 1) an assessment of revisions made to SSO program documents and actions taken to address opportunities for improvement noted in the initial assessment and 2) on-site interviews with line management and personnel assigned SSO functions to assess performance of the oversight function. The results of document reviews and interviews are documented in the "Results" section of this report and broken out by the four CRAD functional areas: Program (PGM); Training and Qualification (TQ); Management (MG); and Oversight Performance (OP).

### Documents reviewed:

- ORP Memorandum from R.J. Schepens to Distribution, The U.S. Department of Energy, Office of River Protection (ORP) Safety Oversight (SO) Updated Program Plan, 04-TED-026, dated April 24, 2004. (including attachments)
- The U.S. Department of Energy, Safety System Oversight (SSO) Program Desktop Instruction, Safety System Oversight Qualification Process, SSO-DI-001 R1.
- U.S. Department of Energy Safety Oversight (SO) Program, Desktop Instruction (DI) (SO-DI-001 R. 2), Safety Oversight Qualification Process.
- The U.S. Department of Energy, Safety System Oversight (SSO) Program Desktop Instruction, Qualification Evaluation Methods, SSO-DI-002 R1.
- U.S. Department of Energy Safety Oversight (SO) Program, Desktop Instruction (DI) (SO-DI-002 R. 2), Qualification Evaluation Methods

- The U.S. Department of Energy, Office of River Protection (ORP) Office of Assistant Manager for Tank Farms, Safety System Oversight Qualification Standard for Hose-in-Hose Transfer (HIHT) Systems, Revision 1.
- The U.S. Department of Energy, Office of River Protection (ORP) Office of Assistant Manager for Waste Treatment Plant, Safety System Oversight Qualification Standard for Ventilation Systems, Revision 1.
- Office of Assistant Manager for Tank Farms Safety Management Program Qualification Standard, Environmental Program R. 0, Draft 1
- U.S, Department of Energy Office of River Protection, Safety Oversight Program Implementation Self Assessment, Final Report, July 2004
- The U.S. Department of Energy, Office of River Protection (ORP) Safety Oversight (SO) Program Personnel List, Revision 2
- CH2M HILL Conduct of System Engineering: Manual- Engineering, Document TFC-ENG-FACSUP-P-01 Rev. C-4
- CH2M HILL System Health Report Preparation: Manual- Engineering, Document TFC-ENG-FACSUP-D-01.1, Rev. B-7
- Federal Technical Capability Panel, List of Senior Technical Safety Manager (STSM) Positions
- Hazard and Accident Analysis, HNF-12125, Revision 1-222-S LAB DSA Ch. 3,4,5
- Hazard and Accident Analyses, Chapter 3.0, 242-A-Evap DSA Ch. 3,4,5
- Tank Farms Documented Safety Analysis (RPP-13033), Chapters 3, 4 and 5.
- System Health Report for Waste Feed Operations Ventilation Systems for Third Quarter CY 2005, RPP-RPT-25799, Rev. 2
- 05-WED-033, Transmittal of Design Oversight Report on Waste Treatment and Immobilization Plant, (WTP) Oxidative Leaching
- Task Order Agreement Pursuant to Subcontract Agreement No. ORP-EPS001 (SMP qualification card development)
- System Engineer Assignment List Vital Safety Systems (VSS)
- Memorandum, The U.S. Department of Energy, Office of River Protection (ORP) Safety Oversight (SO) Program Plan, Revision 2, 05-TED-073
- CH2MHILL Engineering Management Observation Checklist 05-11-D01, CH2MHILL/ORP System Engineering Interface, dated 11/16/05.
- Comments Supporting DOE-ORP Review of Draft RPP-27439, Remote Water Lance Demonstration Test Plan, Rev.0.
- Comments Supporting DOE-ORP Review of DVI Safety Basis Amendment
- Comments Supporting 241-C Tank Farm 100-Series Tanks Ventilation System Safety Basis Amendment
- Office of River Protection Organization Chart
- Individual Performance Plans (IPPs) for two Tank Farm SSOs.

Personnel interviewed include:

- Manager, ORP
- WTP Project Manager
- Deputy Assistant Manager Tank Farms Project
- Director, WED
- Director, TED
- WTP SSOs (2)
- Tank Farm SSOs (3)
- Tank Farm Facility Representatives (4)

- WTP Facility Representative (2)
- CH2MHILL Engineering Standards Director

## RESULTS

### Program (PGM)

The SSO function established at ORP is defined by the Office of River Protection Safety Oversight Program Plan (Program Plan). The Program Plan and personnel assigned SSO responsibilities were identified by Manager Memorandum. SSO-DI-001 and SSO-DI-002 describe ORP processes to qualify SSO candidates and evaluate their level of knowledge.

The review performed under this functional area addressed program changes made since the initial FTCP program assessment. In general, only minor changes were made during the last year to update SO Program documentation to address opportunities for improvement noted in the initial SSO assessment (e.g., SSO stop work authority, identification of safety management program SSOs, etc.), personnel changes, and minor process clarifications. The only significant update to the program identified personnel assigned SO responsibilities for safety management programs in a Manager's memorandum dated November 4, 2005.

In addition, the review under this functional area addressed actions taken to address opportunities for improvement noted in the initial assessment. Documentation was provided to demonstrate these actions were adequately addressed. ORP continues to maintain documentation that effectively describes processes associated with the SSO function. The objective of this CRAD has been met.

### Training and Qualification (TQ)

This functional area addressed actions taken to ensure SSO personnel and supervisors with responsibilities for SSO personnel are appropriately trained and qualified. SSO TQP status was evaluated in the initial SSO FTCP assessment. With the exception of safety management program (SMP) SSOs, only minor revisions were made to training and qualification desktop procedures. These minor revisions reflected personnel/organization changes and minor process clarifications.

Some new personnel were assigned to supervisory positions for SSO personnel. All SSO supervisors had completed qualification as Senior Technical Safety Managers.

A significant change to the TQ functional area information was the designation of personnel assigned SMP SSO responsibilities. Revision 2 of the Safety Oversight Personnel List identified eight SMPs that were included in the SO Program and assigned leads (and in many cases back-ups) for each SMP. Twelve personnel were assigned lead or back up responsibility as SMP SSOs. SMP Qualification standards/cards were reviewed and only one of the eight standards was complete (Fire Protection) and three others are undergoing final reviews (Emergency Management, Environmental, and Industrial Hygiene). **(TQ-1)** In October 2005, a task order agreement (ORP-EPS001) was issued to complete the remaining four SMP qualification standards. Due to the lack of qualification standards, only two SMP SSOs are currently undergoing qualification. **(TQ-2)**

Four engineers were assigned SSO responsibilities for Tank Farm systems. Three had completed qualification and the final candidate completed his final 100% written examination during the assessment.

Qualification standards were established last fall for WTP systems credited with a safety function in the Preliminary Safety Analysis Report (PSAR). Ten personnel were assigned WTP SSO responsibility and placed into qualifications – none have completed qualification. **(TQ-3)** WTP SSOs were interviewed to assess the degree of achieving qualifications. Interview results are summarized in the OP functional area of this report. In general, WTP SSOs were found to be highly knowledgeable of their system design and capable of performing SSO functions applicable to WTP design phase activities.

WTP SSO interviews also indicated evolution of facility design has resulted in changes that added or deleted safety related structures, systems. Thus, the content of WTP qualification standards do not necessarily reflect the current stage of facility/system design. **(TQ-4)**

Designation of qualifying officials (QOs) was reviewed. The Program Plan assigns responsibility for identifying QOs to the Manager, ORP. The latest QO list, issued May 4, 2004, does not identify QOs for WTP SSO personnel, SMP SSO personnel, and included personnel who were no longer assigned to ORP. **(TQ-5)** A draft ORP Manager memorandum was prepared, but not issued during this assessment, which updated QOs for Tank Farm system and SMP SSOs.

Additional work is needed to complete and implement qualification requirements for SMP and WTP SSOs. Progress in these areas is behind schedule and documentation related to these qualifications are either incomplete or outdated. Management evaluation may be warranted regarding current use of WTP system qualification standards and ongoing development of SMP qualification standards. Although not formally qualified as SSOs these individuals were well qualified and performing their respective functions.

### Management (MG)

This functional area addresses actions taken to ensure SSO personnel and supervisors with responsibilities for SSO personnel are appropriately trained and qualified. The initial FTCP SSO Program assessment concluded Line managers understood the program objective and were actively working to implement the function for safety systems at ORP. The objective of this follow-on review was to assess whether SSO supervisors continued to effectively perform their responsibilities.

Interviews were conducted with supervisors to determine whether the objective of this functional area continued to be met. The interviews indicated line management recognizes the value added by the SSO function and continue to support the program. Implementation of the program is primarily driven by the two WTP and Tank Farms Engineering Division Directors. These supervisors monitor qualification progress and periodically provide status updates to the ORP Manager. Supervisors were involved in selecting SMP SO candidates. Where necessary, SSO personnel in training were allowed to concentrate full time on qualification activities. Individual Performance Plans are used to establish training and performance expectations.

Site-specific qualification standards and cards were not established for all SMP SSO functions and site-specific standards/cards for WTP systems were not consistent with the current stage of facility design. This issue is described in the TQ functional area of this assessment report.

ORP line management continues to demonstrate an adequate understanding and support of the SSO function. The objective of this CRAD has been met.

## Oversight Performance (OP)

The CRADS used for this functional area addressed actions taken to oversee the Contractor's cognizant system engineer program and to ensure SSO personnel are knowledgeable and familiar with assigned safety systems. Interviews and document reviews were performed to confirm program understanding, ownership and implementation by personnel assigned SSO responsibilities and assess the interface with contractor system engineers.

Implementation of SSO program elements was primarily assessed under the Oversight Performance CRADs. The criteria of these CRADs address a) the effectiveness of the SSO interface/oversight of contractor system engineers and b) the extent to which the SSO duties and responsibilities are implemented in the field. DOE – contractor interaction, evidence system deficiencies are being identified and corrected by SSOs, and engineer level of knowledge are important implementation performance indicators. These indicators are particularly important given the current low percentage of SSOs completing qualification and the lack of SMP qualifications.

### *Effectiveness of SSO Oversight of the Contractor's System Engineer Program*

Interviews were conducted with WTP and Tank Farm SSOs to assess maturity of the SSO - contractor system engineer interface and how system engineer performance was monitored. SSOs demonstrated a good understanding of contractor system engineer activities with respect to their assigned systems. For example, contractor system engineers develop and implement system health reports for vital safety systems in accordance with TFC-ENG-FAC SUP-P-01 Rev. C-4 and TFC-ENG-FAC SUP-D-01.1, Rev. B-7. Interviews indicated SSOs routinely review these reports and incorporate the results into their system assessments. A comparison of the waste feed operations ventilation systems third quarter CY 2005 system health report (RPP-RPT-25799, Rev.2) content with SSO interview results confirmed SSO understanding of system status was consistent with information documented by the contractor.

An interview with a contractor manager supervising system engineers confirmed implementation of the ORP SSO program has established an interface between contractor system engineers and SSOs. CH2M HILL understands the basic intent of the DOE SSO function. System engineers are assigned to both safety-related system and nonsafety-related systems important to the site mission. The contractor system engineer list for Tank Farm vital safety systems also identified ORP SSO personnel assigned to those systems.

ORP management leveraged the experience and capability of Facility Representatives to implement their SSO program. Facility Representatives were used to mentor SSO candidates through qualifications and interfacing with facility operations and engineering personnel. As a result, interface with contractor system engineers tended to rely upon involvement of the Facility Representative. For example, when an ORP Facility Representative identified an operations, maintenance, or facility problem, the contractor documented the issue in a PER which is then entered into the corrective action management system to ensure the issue is properly addressed and closed. In general, Tank Farm SSOs are using the Facility Representative interface with the contractor to ensure system deficiencies they identify are properly documented and tracked to closure. Although this of Facility Representative feedback mechanisms has been effective in providing feedback relative to system engineer and safety system performance during initial implementation, it has had an unintended consequence of limiting SSO – system engineer interaction. **(OP-1)** Reliance upon the Facility Representative to provide feedback is expected to diminish as SSOs establish a more visible engineering presence in the field. This expectation was validated during

interviews with Facility Representatives, SSOs, SSO supervisors, and a contractor system engineer supervisor. A contractor engineering management observation was performed to assess the maturity of that contractor-DOE interface. The results demonstrated system engineers were cognizant of their DOE SSO counterparts, however, the level of interaction was fairly low (none to once per month) and indicative of a program which is still maturing. **(OP-2)** As a result of the contractor engineering management observation, CH2MHILL identified actions to be taken to discuss the results at a future staff meeting and improve the interface with DOE.

SSO participation in facility work planning and management review of system status is inconsistent. **(OP-3)** Weekly and daily planning meetings are held where facility operations or maintenance affecting safety systems is discussed. SSOs gather this information through discussions with system engineers vice attending facility planning meetings. CH2MHILL also holds a quarterly review of system health reports where status, trends and problems are discussed with management. In addition, CH2MHILL recently initiated a similar quarterly review of safety management programs. Although invited, there has been limited attendance/participation by ORP SSOs and SSO supervisors.

The ORP technical assessment plan includes a scheduled baseline assessment of the contractor system engineer program.

Implementation of the SSO function at WTP is more analogous to a design oversight function than the more traditional cognizant system engineer function. The WTP SSO function is unique to a project focused upon facility design/construction and continues to evolve as more experience is gained applying the concept to a construction project. WTP SSOs interact regularly with contractor counterparts involved in the design of the new facility. At this point of WTP design/construction, oversight of system engineer performance has been primarily through in-process design reviews and acceptance of contract deliverables. **(OP-4)**

Although only a small fraction of the SSOs have completed qualifications, qualified SSOs and SSO candidates in qualification are providing effective oversight of contractor system engineer activity.

#### *SSO Knowledge and Familiarity with Assigned Systems*

Interviews were conducted with WTP and Tank Farm SSOs to assess level of knowledge regarding the status, performance, maintenance operation, and design of assigned safety systems. SSO ability to apply system knowledge and familiarity was assessed during a walkdown of instrumentation and control systems in the AP tank farm.

Both fully qualified SSOs and SSO candidates demonstrated adequate system knowledge during interviews. Where SSOs were relieved of their normal duties to study and complete qualification, they demonstrated a thorough understanding of assigned system design and operating characteristics. This competence is attributed largely to the rigorous qualification process which included an 80% oral board, a 100% written examination, and a 100% oral examination. Dedicating time for study and application of a rigorous qualification process for tank farm SSOs is recognized as a strength of the ORP program. **(OP-5)**

SSO supervisors established minimum expectations for SSO candidate time in the field. This time was spent largely studying system configuration and shadowing Facility Representatives during their tours. Facility Representative confidence in SSO level of knowledge has grown through that interaction. However, there are indications that SSOs are spending less time in the facility once qualification activities

were completed. Continued management emphasis will be needed to continue to develop and mature the SSO/Facility Representative/contractor system engineer interface.

To assess system condition and cognizant system engineer performance, Tank Farm SSOs perform system walkdowns and spot checks of design documentation. Through interaction with Facility Representatives and contractor system engineers they are actively monitoring system performance and are involved in troubleshooting problems. For example, redundant safety related trains of HVAC provide air flow through double shell tanks. ORP SSO and Facility Representatives have been working issues related to equipment degradation that has allowed one train to be inoperable for extended periods of time. As a direct result of SSO involvement, contractor management is evaluating whether to take action to improve system reliability beyond measures specified within the TSRs. Another noteworthy example includes action taken to ensure traffic control barriers credited in the tank farm DSA were properly installed in the field. Design drawing review and field walkdowns performed during qualification activity identified locations where barriers were improperly installed in the field. Through interaction with the Facility Representatives and contractor system engineers the SSO ensured these structures, systems and components would perform their intended safety function. SSOs are involved in actions taken to identify, evaluate and correct system deficiencies. Where Facility Representative/SSO interaction is insufficient to resolve a system issue, the issue is elevated for management attention and resolution. Interviews with SSO supervisors confirmed management was cognizant of current issues which demonstrated information was routinely communicated to STSMs.

In addition to supporting Facility Representatives, SSOs provide support during the development of Safety Evaluation Reports. In most cases, personnel assigned SSO responsibilities are not trained and qualified to lead reviews of changes made to the facility DSA. Where DSA revisions include system modifications or changes to the technical baseline, SSOs are included as contributing reviewers during the development of ORP Safety Evaluation Reports. SSO comments were documented by DSA reviewers and transmitted to the contractor for resolution. Contractor responses to DOE-ORP DSA review comments demonstrate Tank Farm SSO personnel are actively involved in reviewing safety basis changes that affect their assigned systems.

SSO walkdown and assessment abilities were assessed during a tour of AP tank farm facilities. During the walkdown the SSO was questioned regarding safety related functions and their bases, principles of operation, maintenance required for sensors and alarm systems, system operating characteristics, and operator response to alarm conditions. The SSO demonstrated an understanding of the bases for safety related functions credited in DSA accident analyses, design operating parameters, and some familiarity with system operating procedures. Some minor system deficiencies were noted by the SSO and brought to the attention of the contractor shift manager for correction. The SSO was able to outline actions that he would have to take if the deficiencies were more significant in nature.

Oversight performance by WTP SSO candidates could only be measured through the products of their system design reviews. Interviews confirmed these candidates were experienced engineers, many of which had advanced degrees. WTP SSO candidates are required to complete TQP Functional Area Standards related to their assigned systems as a prerequisite to SSO qualifications. Subject matter experts are readily available for technical support during system reviews. WTP design oversight reports provide evidence of the thoroughness of design reviews and compliance with contractual design requirements/standards.

Interviews indicated that subject matter experts were assigned SSO responsibility for safety management programs. Although qualification cards are still being developed and little progress has been made completing the one card that has been issued, Facility Representatives and system SSOs were confident of