Annual Report on Nuclear Criticality Safety Programs
National Nuclear Security Administration (NNSA)

A Defense Nuclear Facilities Safety Board (DNFSB) letter dated January 29, 2008 (A.J. Eggenberger to J. C. Sell) requested responses to eight specific subject areas related to Nuclear Criticality Safety in the Department of Energy (DOE) Annual Report on Nuclear Critical Safety (NCS) Programs. Information on each of topics is provided for each of the six NNSA sites with a criticality safety program.

The following is a brief summary on each requested topic for the NNSA. Individual detailed site reports are included as attachments. The NNSA point of contact for this report is Jerry Hicks. He may be reached at 505-845-6287.

1. DNFSB Request: A site-by-site evaluation of contractor nuclear criticality safety performance measured against established criticality safety performance metrics, including an evaluation of this performance and actions taken by DOE Field Element Line Management to improve nuclear criticality safety and address known nuclear criticality safety program deficiencies.

Summary Response: All NNSA site offices utilize criticality safety performance metrics tailored to the processes and operations at their respective sites. The Y-12 Site Office (YSO) has an extensive set of performance metrics for criticality safety, including two leading indicator metrics for Building 9212.

YSO established additional performance metrics and processes to monitor the criticality safety of Building 9212. An initial set of three metrics were developed and reported on beginning in October of 2007. The reporting distribution of these metrics was also expanded to include the Continued Safe Operations Oversight Team (CSOOT) for Building 9212. The additional metrics are leading indicators based on the Rocky Flats near miss experience and include:

- Unplanned Activities (Solution Spills and Inadvertent Transfers)
- Leak Indications

The approved criticality safety program for the M&O contractor at the Nevada Test Site (NTS) was implemented. The approved criticality safety program at the NTS contains expectations to establish and track criticality safety performance metrics.

LASO is using a set of performance metrics tailored to bring the LANL program into full compliance with DOE O 420.1B

2. DNFSB Request: The status of the contractor nuclear criticality safety engineer programs at each site, including staffing levels, plans to address

vacancies, interim compensatory measures, and progress on training and qualification. This must include an analysis of the adequacy of each by DOE Field Element Line Management.

Summary Response: The largest contractor criticality safety staff at an NNSA site is at Y-12 where the contractor employs 46 nuclear criticality safety engineers. The other NNSA contractor staffs range from 3 to 11 in size. Of the six sites, currently only one, the Los Alamos National Laboratory, is understaffed. LANL is planning to add two additional nuclear criticality safety engineers in 2009. LANL has seven fully qualified engineers on board, two engineers are in the final stages of the LANL qualification process, and one engineer is in the training process. As a compensatory measure, LANL has engaged criticality safety specialists from Pantex and a related organization at LANL. Four total individuals have been engaged commensurate with their qualifications and site familiarity to help compensate for the staffing shortfall at LANL.

3. DNFSB Request: The status of the federal nuclear criticality safety engineer programs at each site, including staffing levels, plans to address vacancies, interim compensatory measures, and progress on training and qualification. This must include an analysis of the adequacy of each by DOE Headquarters Line Management.

Summary Response: Each of the six NNSA site offices has a criticality safety subject matter expert on staff. All six of federal staff, have completed their Criticality Safety Functional Area Qualifications (FAQ). The individuals at the NSO and PXSO completed their FAQs in 2008. The YSO federal staff is augmented by one full-time support service contractor and an intern in the DOE Future Leader Program. During 2008 the YSO, the Los Alamos Site Office (LASO), the PXSO, and the NSO received federal support in criticality safety from either the NNSA Service Center or NNSA HQ or both. NNSA Headquarters Line Management judges the federal staffing at NNSA site offices to be adequate, especially with the ability to augment site staff as needed with experts from the Service Center or Headquarters.

4. DNFSB Request: A summary of the results and any lessons learned from federal assessments of criticality safety conducted throughout the year and the steps taken by the contractor and DOE in response to these assessments. This summary should highlight such factors as the quality of contractor self-assessments, the adequacy of criticality safety evaluations, and the consistency of sites' nuclear criticality safety programs.

Summary Response: All six of the NNSA site criticality safety programs were assessed multiple times by site office or headquarters elements or both. Each NNSA site is unique and the criticality safety hazard varies widely from site to

site but there is reasonable consistency in the approach and safety philosophy among the criticality safety programs at NNSA sites. This stems in large part from a common understanding at the NNSA federal level regarding implementation of DOE Order 420.1B and DOE-STD-3007-2007 and from the technical collaboration of the site office criticality safety staff with the Service Center and NNSA Headquarters criticality safety staff.

The assessments found that the local interpretation of the double contingency principle was not consonant with DOE requirements at Y-12. Deviations from the double contingency principle were requested for several operations. One permanent and a few short term exceptions were granted.

The planned detector placement for the new HEU at Y-12 facility was reviewed by the CSSG and was found adequate for detection of the ANSI/ANS-8.3 minimum accident of concern. It was also found that the development of an alternative facility-specific minimum accident was not necessary.

An NSO assessment at the DAF found that a site office procedure and the DAF safety basis could be improved by clarification to show line responsibility for safety from the immediate worker to the site office manager.

LASO assessment results at LANL are being used to tailor the site criticality safety improvement plan and adjust performance metrics.

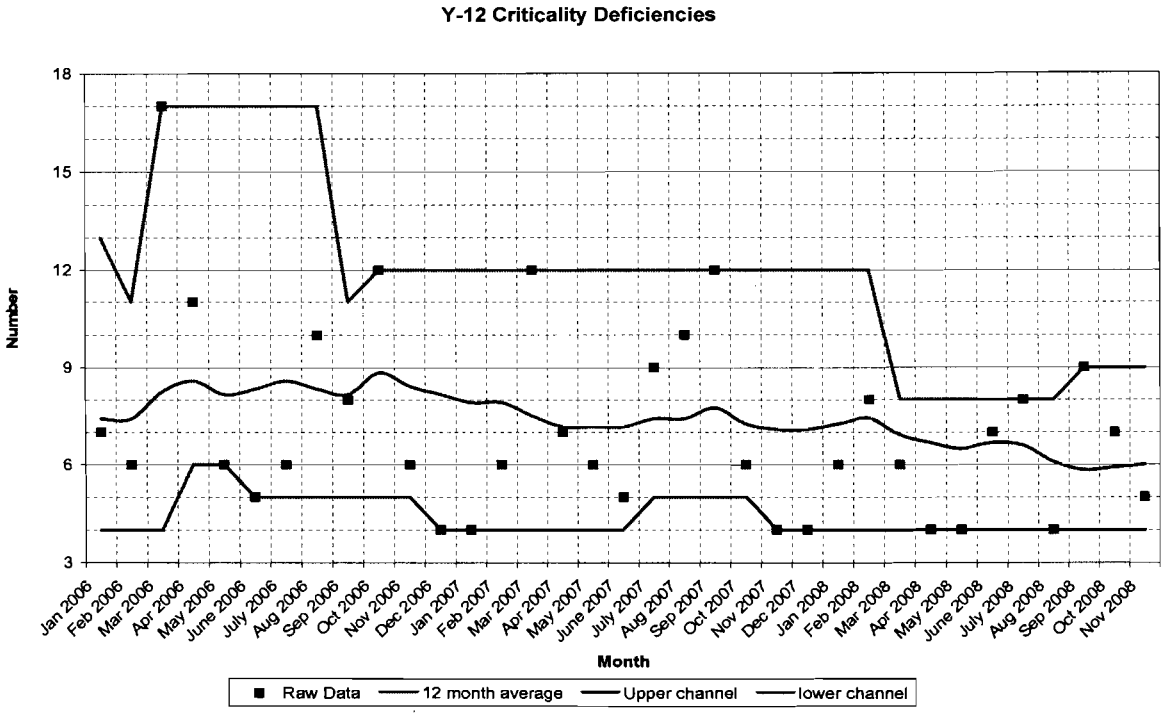
5. DNFSB Request: A summary of the results and lessons learned from contractor, federal, or independent reviews of proposed nuclear criticality safety controls and design requirements for new facility designs. Included with this is a description of how this information was used by the contractor and DOE Line Management Elements to improve facility designs and the design process.

Summary Response: There were three major NNSA facilities and construction projects that were noted in the site responses. These were the Chemistry and Metallurgy Research Replacement (CMRR) facility at LANL, the Uranium Processing Facility (UPF) at Y-12, and Critical Experiments Facility (CEF) at the NTS. LANL criticality staff performed calculations supporting the CMRR design. LASO, assisted by the NNSA Service Center, reviewed design documents at critical decision points to assure that design features are captured. The UPF project at Y-12 benefitted from lessons learned during the Highly Enriched Uranium Manufacturing Facility (HEUMF) project. A Criticality Safety Support Plan and draft safety documentation were tied earlier into the UPF design. There are weekly Safety and Design Team integration meetings and a nuclear criticality safety engineer is on the UPF Core Team. Also, the DOE Nuclear Criticality Safety Program (NCSP) made preliminary plans in 2007 to conduct a benchmark critical experiment at the CEF in support of CD-2 for the UPF. The NCSP Manager approved the Critical Experiment Decision (CED)-0 in early 2008. The experiment will provide an integral test of the ability to accurately calculate reactivity in processes relying on Borobond which may be

used at the UPF. These critical experiments should enable processes to be more efficient by removing uncertainty in the margin of subcriticality in criticality safety evaluations. Finally, design reviews of the CEF project at the NTS resulted in the decision to install criticality accident alarm systems in several additional areas.

6. DNFSB Request: A summary of the results of trending and analysis of each site's reportable and non-reportable occurrences related to criticality. The results of follow-up reviews undertaken by DOE to assess and validate the effectiveness of corrective actions and improvements from the above activities for the previous year.

Summary Response: Only one site, Y-12, has sufficient numbers of criticality safety related occurrences or deficiencies to warrant trending. No other NNSA site experienced more than seven occurrences with most having zero to two. Such low numbers reflect the nature of operations at those sites and are not amenable to tracking and trending beyond the expectation that repeat occurrences will not happen. By contrast, in 2007 Y-12 experienced a total of 85 criticality safety related deficiencies or minor non-conformances, none of which rose to the ORPS reportable level. For the 12 months ending November 2008, Y-12 experienced a total of 72 criticality safety related deficiencies. Y-12 has five performance metrics related to tracking and trending of criticality safety related deficiencies and minor non-conformances. As shown below, the number of infractions at Y-12 has been in a general downward trend for the last 2½ years. The trend data alone indicates a stable minimum at about 4 deficiencies per month.



One site found significant errors in old calculations, and decided to perform a review of all existing limits and evaluations to verify and document at least an overview basis of safety and compare all limits to known calculations. This process was titled the Augmented Limit Review, and took almost the entire fiscal year. A summary of the lessons learned has been published as an ANS presentation and a DOE Lesson Learned.

7. DNFSB Request: The results of follow-up reviews undertaken by DOE to assess and validate the effectiveness of corrective actions and improvements from the above activities for the previous year.

Summary Response: LASO continued to follow up on the program improvement, using performance based incentives to direct the program improvement plan. LASO also followed the augmented limit review (ALR) process to completion. The overall results from this process were published as a DOE Lesson Learned.

8. DNFSB Request: The status of open issues identified in the previous year's annual report.

Summary Response:

1. LSO Issues: LLNL should address DNFSB concerns regarding configuration management and software quality assurance for the Controlled Materials

Accountability and Tracking System (COMATS) and the Criticality Special Support System (CSSS).

a. Currently, CSSS is operational in B332 for producing labels that contain pertinent criticality information and archiving the information in a data base.

b. LLNL has developed a project plan for converting the CSSS to a safety significant system with a projection of having a fully functional CSSS by the end of FY11 at a projected cost of $3 million. LLNL is proposing a re-evaluation of this project in light of the present schedule to de-inventory the facility by FY2012.

2. YSO Issues:

Key corrective action status items are as follows:

a. Operational testing of the raffinate monitor will continue through the remainder of the FY 2009. Credited use of the raffinate monitor is currently expected in FY10.

b. Implementation plans for 3007-2007 are in the process of significant revision as a consequence of the May 2008 assessment discussed previously and is on track for completion on1/7/09.

c. The evaluation of the floor holdup migration issue in 9212 and characterization of 9206 remains unfunded.

d. A project to re-route the process condensate from the current basement storage safe tanks to other safe tanks in a large geometry exclusion control area, which will address the concentration control issue, is currently unfunded, but is being evaluated as part of a one year deviation granted 11/13/08.

e. Findings from a Joint assessment of inadvertent accumulation programs (UHSP/IAPP) conducted May 2007 were confirmed to be adequately addressed during the May 2008 independent wet chemistry review.

f. Findings from a Joint assessment of DOE-STD-1158 Management and Supervisory Responsibilities sections have been completed.

g. The replacement CAAS IEZ document for the new HEU facility has been delivered & reviewed by the site office.

Attachment:

Input reports (west to east) from

LSO (Livermore)	page 2
NSO (Nevada)	page 7
SSO (Sandia)	page 12
LASO (Los Alamos)	page 19
PXSO (Pantex)	page 24
YSO (Y-12, Oak Ridge)	page 27

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National Nuclear Security Administration
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MEMORANDUM FOR JERRY E. HICKS
NUCLEAR ENGINEER

FROM: MARK LEE
NUCLEAR ENGINEER

SUBJECT: Input for Annual Report to the Defense Nuclear Facilities Safety Board on Criticality Safety (TS: 080114)

Attached is The Livermore Site Office input for the annual report to the Defense Nuclear Facilities Safety Board on the Criticality Safety Program at Lawrence Livermore National Laboratory.

If you should have any questions, please call Mark Lee at (925) 422-4567.

Attachment: Livermore Site Office Input for Defense Nuclear Facilities Safety Board Annual Report

cc:
K. Carroll, L-198
M. Merritt, L-668

bcc:
P. Hill, TD
D. Nakahara, AMTS
S. Graham, AMTS
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LSO Input for DNFSB Annual Report

1. **Evaluation of Contractor Performance using established criticality safety performance metrics.**

The following is an excerpt from the Livermore Site Office's Annual Appendix F Assessment for FY08. The assessment was based on a set of established performance metrics.

The LLNL Nuclear Criticality Safety Program is **Outstanding** based on LLNL's performance as measured against eight DOE-LLNL Criticality Safety Performance metrics. These metrics address criticality safety infractions and the effectiveness of associated corrective actions, training and qualification compliance, LLNL participation in criticality safety national consensus standards activities, self-assessments and routine periodic fissile material operations inspections, and continuing training activities for LLNL criticality safety engineers.

2. **Status of Contractor program including staffing, training/qualifications.**

The LLNL Nuclear Criticality Safety Division (NCSD) is comprised of 9 engineers, and one engineer who is a support contractor. Eight engineers are fully qualified and one is in the final phase of the qualification process. Additionally, LLNL has several retired criticality safety professionals who assist on projects not directly related to the development and implementation of controls for operations such as criticality safety advisory committee, commenting on regulation, instruction, and development of institutional procedures. It is LSO's assessment that the group is adequately staffed.

3. **Status of LSO program including staffing, training/qualifications.**

The NNSA/Livermore Site Office has one fully qualified criticality safety engineer (re-qualified under the LSO TQP program in 2006). LSO has no plans at present to increase the staffing level for criticality safety oversight.

4. **Summary of results from federal assessments. Quality of contractor self-assessments, adequacy of criticality safety evaluations.**

The LSO Criticality Safety Engineer and LSO Facility Representatives have conducted numerous criticality safety focused walkthroughs and surveillances in all LLNL facilities with operations involving significant quantities of fissionable materials. LSO has not identified any criticality safety infractions. Overall, implementation of criticality safety controls has been observed to be very good.

LSO also performed a functional area review (FAR) of LLNL training and qualification program for criticality safety engineers. The program was judged by LSO to be adequate.

LLNL accomplished a comprehensive contractor self-assessment of the LLNL criticality safety program in 2008 using DOE-STD-1158-2002. The conclusion of the assessment

was that LLNL continues to have a strong criticality safety program. LSO concurs with this assessment.

5. Summary of lessons learned from reviews of proposed criticality safety controls and design requirements for new facility designs.

LLNL conducted a Process Improvement review of the Criticality Safety Program. This resulted in a more efficient process for initiating and providing criticality safety support and provided a detailed review of criticality safety controls and requirements in use. As a continuing process improvement initiative, LLNL is working to streamline, simplify and reduce the number of controls to enhance safety and efficiency of operations.

LLNL has no new facilities under design or construction that would involve use of significant quantities of fissionable materials.

6. Summary of reportable and non-reportable occurrences.

There were four non-reportable criticality safety infractions during FY08. The first involved a legacy item that, upon opening of the container in a glovebox, did not meet the cladding restrictions established in the criticality safety controls for the workstation. The second infraction involved a TRU waste drum that did not have its required criticality safety label. The third involved a small clad SNM disc that was introduced into a glovebox with cladding restrictions. The fourth involved a small SNM component that did not meet packaging instructions per facility procedures.

Overall, the level of operational criticality safety infractions and deficiencies at LLNL were very minor during 2008. None were reportable. All operational deficiencies were self-identified either by fissile material handlers or LLNL criticality safety engineers. Overall, implementation of criticality safety controls in LLNL facilities is excellent.

7. Results of follow-up reviews undertaken by DOE.

LSO did not conduct any follow-up reviews during FY08.

8. Open issues from prior years.

1. Issue: LLNL should address DNFSB concerns regarding configuration management and software quality assurance for the Controlled Materials Accountability and Tracking System (COMATS) and the Criticality Special Support System (CSSS).

a. Currently, CSSS is operational in B332 for producing labels that contain pertinent criticality information and archiving the information in a data base.

b. LLNL has developed a project plan for converting the CSSS to a safety significant system with a projection of having a fully functional CSSS by the end of FY11 at a

projected cost of $3 million. LLNL is proposing a re-evaluation of this project in light of the present schedule to de-inventory the facility by FY2012.

National Nuclear Security Administration Nevada Site Office (NNSA/NSO) Response for the Department of Energy (DOE) 2008 Annual Report on Nuclear Criticality Safety (NCS)

Summary

The main operations at the Nevada Test Site (NTS) with significant quantities of fissile material include the Device Assembly Facility (DAF), Area 5 Radioactive Waste Material Complex, and support activities for the Department of Homeland. Except for the assembly of radiation test objects at the DAF, the majority of the fissile material activities are in a containerized configuration. The NNSA/NSO performs operational awareness oversight and formal assessments of the fissile material activities. The NNSA/NSO approved and DOE Order 420.1B, compliant criticality safety program document has been fully implemented by National Security Technologies, LLC (NSTec) the Contractor for the Nevada Test Site (NTS) activities. Furthermore, on June 2, 2008 the DAF facility management responsibility transitioned to NSTec.

The NNSA/NSO input for the DOE annual report on NCS programs includes the following:

A site-by-site evaluation of contractor nuclear criticality safety performance measured against established criticality safety performance metrics, including an evaluation of this performance and actions taken by DOE Field Element Line Management to improve nuclear criticality safety and address known nuclear criticality safety program deficiencies.

Response

One of the most significant criticality safety improvements at the NTS was the full implementation criticality safety program (CSP). In addition, the NTS M&O Contractor have established performance indicators (PI) for the criticality safety program to trend the continued effectiveness of the program. Three of the Contractors performance indicators require monthly reporting to the NNSA/NSO, and the metrics for the three PI's focuses on the number of criticality safety non-compliances, timeliness in resolution of non-compliances and number of repeated criticality safety non-compliances. The performance indicators will be reported to the NNSA/NSO on a monthly basis with a rolling quarterly trend. Currently all performance indicators are Green indicating an acceptable level of performance. In addition, NNSA/NSO is conducting quarterly assessments of the Contractor's criticality safety program implementation effectiveness. The requirements for the quarterly assessments are derived from DOE Standard STD-1158, "Self-Assessment Standard for DOE Contractor Criticality Safety Programs," and applicable American National Standards Institute/American Nuclear Society (ANSI/ANS) ANSI/ANS-8 Standards.

There was one NCS infractions reported at the NTS in 2008.

The status of the contractor nuclear criticality safety engineer programs at each site, including staffing levels, plans to address vacancies, interim compensatory measure, and progress on training and qualification. This must include an analysis of the adequacy of each by DOE Field Element Line Management.

Response

Currently, NSTec has one qualified criticality safety engineers (CSE) and one in training to be qualified providing oversight of fissile material activities at the DAF. In addition, NSTec has assigned a lead CSE to manage the criticality safety program and mentor the criticality safety staff. The lead CSE has multiple years of experience from across the DOE complex and has had very positive impact on the criticality safety program since being assigned in October 2008. In addition to the qualified CSEs, one CSE in training has been assigned to Area 5 and will be completing a CSE qualification based on DOE-STD-1135-99. For the fissile material activities at the DAF, the National Laboratories performing the activities obtain qualified Criticality Safety Engineer (CSE) support from their main Laboratory. The DAF has one qualified CSE from the Lawrence Livermore National Laboratory assigned to provide oversight of the DAF fissile material activities. Given the current level of fissile material activities at the NTS, the currently assigned full-time-equivalents (FTEs) assigned for oversight is adequate. However, when the critical experiment activities begin in 2010, NSTec will need to re-assess the number of FTEs needed to properly monitor and evaluate the fissile material activities.

The status of the federal nuclear criticality safety engineer programs at each site, including staffing levels, plans to address vacancies, interim compensatory measures, and progress on training and qualification. This must include an analysis of the adequacy of each by DOE Headquarters Line Management.

Response

The NNSA/NSO has one qualified nuclear engineer that has completed the Technical Qualification Program standard, DOE-STD-1173-2003, qualification requirements for criticality safety and is considered fully qualified. In addition, NNSA/NSO utilizes qualified criticality safety engineer support from the DOE Service Center to supplement assessment activities. Staffing is adequate for the oversight of fissile material activities for the next few years given the tempo of fissile material activities occurring at the NTS and the available support from the Service Center.

A summary of the results and any lessons learned from federal assessments of criticality safety conducted throughout the year and the steps taken by the contractor and DOE in response to these assessments. This summary should highlight such factors as the quality of contractor self-assessments, the adequacy of criticality safety evaluations, and the consistency of sites' nuclear criticality safety programs.

Response

The formal NNSA/NSO criticality safety oversight assessment performed in 2008 was performed on the DAF fissile material activities in June 2008. In addition, less formal

oversight was performed through operational awareness walkthroughs of the DAF fissile material activities. The criticality safety assessments of the DAF identified several findings. The findings were formally transmitted to the NTS Contractors and placed in their respective corrective action programs. The corrective actions for the findings will be monitored via operational awareness activities throughout the year. Status of the findings will be assessed and documented in the formal assessments for the facilities. The assessment of the DAF criticality safety program indicated the contractor's criticality safety staff maintained adequate awareness of the fissile material activities. Also, the nuclear criticality safety evaluations (NCSEs) were of high quality and the controls identified within the NCSEs were properly flowed down to the operational areas. Overall, the DAF CSP implementation was found to be compliant with DOE criticality safety requirements identified in work smart standards, and with the applicable ANSI/ANS standards for nuclear criticality safety. A total of seven criteria were evaluated for the assessment and all of the criteria were met. Consequently, the overall criticality safety objective was deemed to be met. The assessment identified no Findings, four Opportunities for Improvement, and no Noteworthy Practices. Specifically the DAF Assessment identified the following Opportunities for Improvement:

1. NSO Directive 412.X-1D does not identify an explicit expectation that the responsible party for a facility's safety basis is ultimately responsible for the safety of all fissile material activities.

2. The DAF Safety Basis Chapter 17, "Management, Organization, and Industrial Safety Provisions," contains a flow of responsibility figure which could be interpreted that personnel performing activities at the DAF under a secondary Real Estate Operating Permit do not have a reporting function through the DAF Facility Manager (FM) for safety.

3. A permanent design change should be made to the NMH&MP staging bird cages so that only one fissile material item can be inserted.

4. NSTec fissile material work packages specific actions and qualified fissile material drum handlers knowledge of appropriate actions for off normal events during fissile material container movements was not adequate.

A summary of the results and lessons learned from contractor, federal, or independent reviews of proposed nuclear criticality safety controls and design requirements for new facility designs. Included with this is a description of how this information was used by the contractor and DOE Line Management Elements to improve facility designs and the design process.

Response

The NNSA/NSO CSE participated on resolution of proposed design change to add a criticality accident alarm system (CAAS) in the DAF for subcritical experiment operational areas. The project team made the decision to make a design change to the Criticality

Experiments Facility (CEF) project to add the CAAS. Based on a recommendation from the DOE/HQ Criticality Safety Support Group, Los Alamos National Laboratory (LANL), the responsible Contractor for CEF, prepared a position paper concerning the appropriate criticality safety alarms for the CEF activities. NSTec reviewed the LANL position paper and concurred with the LANL position and forwarded a DAF position on criticality safety alarms coverage to the NNSA/NSO for concurrence. The NNSA/NSO CSE performed a review of the NSTec position on criticality safety alarms and recommended a response that concurred with the NSTec position paper. The NNSA/NSO has reviewed the NCSE for the assembly of radiation test objects to support National Laboratory sponsored activities, and the review indicated the NCSEs were of high quality and identified appropriate criticality safety controls for implementation.

A summary of the results of trending and analysis of each site's reportable and non-reportable occurrences related to criticality.

Response

One reportable occurrence occurred in 2008 concerning criticality safety. The criticality safety performance indicators that have been established for the NTS indicate the criticality safety performance for the past quarter is Green which is a performance of Good.

The results of follow-up reviews undertaken by DOE to assess and validate the effectiveness of corrective actions and improvements from the above activities for the previous year.

Response

The NNSA/NSO monthly criticality safety operational awareness activities evaluated the status of open assessment findings from the previous year's annual report. The follow-up reviews for Area 5 indicated the corrective actions have improved the overall formality of the personnel implementation of criticality safety expectations. In addition the NSTec criticality safety staff has increased in personnel and more time is being spent in the field evaluating the effectiveness of the criticality safety program.

The status of open issues identified in the previous year's annual report.

Response

The NNSA/NSO criticality safety operational awareness activities evaluated the status of open assessment findings from the previous year's annual report. A recent review of the corrective action status for the Area 5 findings indicated the findings are in the of being closed because corrective actions have been completed.

National Nuclear Security Administration
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DEC 22 2008

MEMORANDUM FOR: Jerry Hicks, US Department of Energy,
National Nuclear Security Administration, Service Center

FROM: Jeff Petraglia, Sandia Site Office

SUBJECT: Sandia Site Office Response to Defense Nuclear Facilities Safety Board (DNFSB) Letter on January 29, 2008 for Status in Fiscal Year 2008 (FY08)

The DNFSB issued a letter on January 29, 2008, on the *Status of the Department of Energy Nuclear Critically Safety Program for Calendar Year 2007.* The Board believed it was necessary to modify the contents of the Department of Energy (DOE) Annual Nuclear Criticality Safety (NCS) Report so that it did not report mainly on those issues where substantial and lasting progress has been made, but rather emphasized ongoing NCS issues. These changes help ensure continuous improvement in criticality safety across the DOE Complex. Prior to 2007, the DOE Annual NCS Reports did not include required information on the quality of contractor self assessments for criticality safety, adequacy of NCS evaluations, and consistency of NCS programs across the Complex. The Board has modified the annual reporting requirements to include eight additional items to be reported by each site where the NCS program is implemented. The attached information provided the status of the NCS Program in FY08.

Should you have any questions, you may contact me at (505) 284-7668.

cc w/attachment:
Specific Subjects to be Addressed
in the DOE Annual Report on NCS

D. Nichols, NA-1, HQ-FORS
N. Schwers, SNL/NM, MS-1143
K. Davis, SSO
B. Scott, SSO
D. Brunell, SSO, SB/STSA
J. Todd, SSO, FO
08-015-PROG

Attachment
Specific Subjects to be Addressed in the
Department of Energy Annual Report on Nuclear Criticality Safety

2008 Summary

A brief discussion of the Nuclear Criticality Safety (NCS) program from 2006 to 2008 will assist in understanding the information to follow. Sandia National Laboratories (SNL) under the oversight of Sandia Site Office (SSO) has been met the Presidential Directive to remove all of security Category I and II Special Nuclear Material (SNM) from SNL. These activities involve the packaging of solid metals, oxides, and other forms. These activities and all other activities at SNL do not involve fissile materials operations with liquids or the processing of materials which change the shape and form of fissile materials (e.g., grinding). During 2007 and 2008 there have been eleven shipments of SNM to the Nevada Test Site (NTS), Los Alamos National Laboratory (LANL), Y-12, and Idaho National Laboratory (INL) for disposition. These shipments of materials include the following:

1) Melt Progression #1 (reactor experiment) to NTS in April 2007
2) Melt Progression #2 (reactor experiment) to NTS in August 2007
3) Sandia Pulse Reactor (SPR) II Control Rods to LANL in September 2007
4) Highly Enriched Uranium (HEU) Material Control & Accountability (MC&A) Standards to Y-12 in September 2007
5) SPR II and SPR III Fuel Plates to NTS in September 2007
6) Sodium Debris Bed (reactor experiments) to INL in December 2007
7) Sodium Debris Bed (reactor experiments) to INL in February 2008
8) SPR II and SPR III Fuel Plates, Plutonium and HEU Source Plates to NTS in February 2008
9) Plutonium Source Plate to NTS in September 2008
10) SPR Samples to LANL in September 2008
11) Nine Radioisotopic Thermoelectric Generators (RTGs) to LANL in September 2008

All of these shipments have required the support of the SNL NCS program by completing criticality safety assessments (CSAs) and criticality safety indexes (CSIs). This effort has required a large part of the SNL NCS staff to complete this effort. To support this effort, SNL has supplied the additional funding needed and has had several new staff members become qualified to the NCS program. SNL has also started an initiative to complete self-assessments of their program per DOE-STD-1158-2002. All these activities have been under the oversight of the SSO criticality safety point-of-contact (CRITPOC) who is responsible for the SSO NCS oversight program.

With the last shipment on September 29, 2008, this completes Phase 1A and removes all Category I and II SNM. This material not only represents material that is a greater security risk but also the largest amount of fissile material (i.e., pure highly enriched uranium material). Phase 2 of the removal of SNM will include material that is security Category III SNM and includes smaller amounts of non-pure fissile materials. Phase 2 will be started in 2009 and will require less support from the SNL NCS staff. Preparation for critical experiments was re-started in 2008 with the next set of BUCCX experiments and the initial 7uPCX experiments set for operations in

2009. There were no NCS-related issues from the contractor or Department of Energy (DOE) Operational Readiness Review (ORR) start-up reviews.

The Defense Nuclear Facilities Safety Board (DNFSB) request for the DOE annual report on NCS programs includes the following items:

- A site-by-site evaluation of contractor nuclear criticality safety performance measured against established criticality safety performance metrics, including an evaluation of this performance and actions taken by DOE Field Element Line Management to improve nuclear criticality safety and address known nuclear criticality safety program deficiencies.

Response

Nuclear criticality safety performance measures to meet DOE O 226.1 Attachment 3 Section 1.b(4) were established in a letter to SNL on May 31, 2006. These performance measures established metrics in 1) Non-Conformances, 2) Self-Assessments and Committees, 3) Staff Responsibilities, and 4) Criticality Safety Assessments. These performance measures have been incorporated in the SNL document, GN470072 *Nuclear Criticality Safety*, which the SSO approved as the Criticality Safety Program Document. A brief status is as follows:

1) Non-Conformances

Non-Conformances levels have been established by SNL and SSO as listed in Table 1.

There has been one NCS Occurrence Reporting and Processing System (ORPS) reportable in 2006 for the Manzano Nuclear Facility (MNF) and one in 2007 for the Nuclear Material Storage Facility (NMSF). Both were self-identified as a Potential Inadequacy in the Safety Analysis (PISA) and are more related to details in the safety bases than specifically NCS issues and were determined to be Level 5-2. From a NCS standpoint, the ORPS reports would not have been required and were both subsequentially canceled. The update of the MNF CSA had already been in progress when it was decided that the old CSA did not meet the requirements. At NMSF, the issue was in the details of the container size for one of the packages. It is unclear why the level of detail was in the NMSF Documented Safety Analysis (DSA) since container size was unnecessary detail for any of the accident analyses. In 2007, SSO identified one finding during an assessment for facilities with CSI postings and was determined to be Level 6-2. The recurrence of infractions has been discouraged with the review of activities to reduce repeat infractions and common cause events. There have been no NCS ORPS reportable incidents in FY08.

2) Self-Assessments and Committees

DOE-STD-1158-2002 has been used extensively to meet American National Standards Institute/American Nuclear Society (ANSI/ANS) 8.19 requirements for self-assessments. The self-assessments have transitioned from subjective walkthrough's to DOE-STD-1158-2002 self-assessments for nuclear facilities and radiological facilities where

criticality controls are implemented. The nuclear facilities are generally reviewed annually with the reports issued within two months of the review.

Corrective actions are performed consistent with resource loading and safety/compliance importance. Information from Self-Assessments, the Criticality Safety Support Group review, and walkthrough's in 2007 were included in a local action tracking system.

Transition to a corporate tracking system has occurred in 2008. In FY08, SNL planned eleven DOE-STD-1158-2002 self-assessments of facilities. Two were canceled due to being below the threshold, five are complete, three have the in-facility portion completed and the assessments are in-progress, and one is scheduled. SSO completed.

Table 1 NCS Noncompliance Levels

Barriers to Criticality	Level	NCS Noncompliance Description	Reporting Category & Tracking System
None	1	A nuclear criticality accident occurs.	Emergency in Occurrence Reporting & Processing System (ORPS)
No barriers remain	2	All barriers violated such that none are available to prevent criticality (No criticality occurred).	Occurrence in ORPS
Only 1 barrier remains	3	Barriers are violated such that criticality is possible with loss of a single remaining barrier.	
A barrier is violated	4	A Technical Safety Requirement (TSR) affecting NCS is violated, but double contingency or incredibility barriers are maintained with no realistic potential for criticality	
		A CSA control is violated, but double contingency or incredibility barriers are maintained with no realistic potential for criticality.	
Barriers not identified	5	An unanalyzed credible contingency is discovered which does not have appropriate barriers.	
		An approved CSA does not exist for an ongoing FMO.*	
All barriers remain in place	6	NCS Program requirement that affects NCS is violated, but no TSR or CSA control is violated.	Lessons Learned in the Action Item Tracking System within TAVIMS or in CATs
		Administrative errors, such as in FMO procedures, postings, labels, physical barriers, etc.	
		Abnormal facility conditions, for example water entry that may be inconsistent with the CSA description, but not violate NCS controls.	

*Exception: Activities involved in transition to DOE O 420.1B listed in the SNL Criticality Safety Program Implementation Plan.

Walkthrough's assessments of six facilities to validate the results in the SNL self-assessments. SSO has completed the second of three years performing assessments per DOE-STD-1158-2002. Five of the seven assessments are completed (Sections 1.0, 2.0, 4.0, 5.0, and 7.0) and the final two will be complete in 2009. An NCS Triennial assessment of the SNL Criticality Safety Program was performed in 2008 using an Nuclear Criticality Safety Evaluation (NCSE) for LLNL and from INL. There were five observations, two noteworthy practices, and no findings.

NCS committees met twelve times in FY08. SSO personnel have been included in the notices with an agenda for the NCS committee meetings. Meeting minutes are developed, reviewed, approved and distributed within three months of the meeting date. Many members of the safety committees are members of other safety committees including the secretary. This supports consistency between the SNL facilities. The action items are generally documented as being completed in a future set of minutes following the development of the action item. The action items are completed according to the agreement between the committee chairman and line management.

3) Staff Responsibilities

The NCS training program is based on DOE-STD-1135-99. SNL plans on having six of the eight qualified NCS engineers and two trainees participate in the 7uPCX experiment series that is scheduled to start in early 2009. This will be an in-house training class applicable to training requirements. In the last year, four of the six qualified NCS engineers attended American Nuclear Society (ANS) conferences and one attended the International Criticality Safety Benchmark Evaluation Project (ICSBEP). The University of New Mexico NCS short course was taught by two NCS engineers but no staff attended the conference. One trainee and one manager has attended the Lawrence Livermore National Laboratory (LLNL) short course for hands-on training. Of the eight qualified NCS engineers, four are members of safety committees that requires criticality expertise. NCS engineers participate in all of the NCS safety committee self-assessments and walk-through activities. Three of the NCSEs and one of the trainees are members of the ANS/ANSI Standards working groups and/or oversight committees.

4) Criticality Safety Assessments

Prior to operations, the CSAs are developed, reviewed and approved. There are twelve active CSAs for SNL. With the completion of Phase 1 and 1A of the SNM de-inventory, six other CSAs have been archived. New CSAs are developed to DOE-STD-3007-2007, and if not, are submitted to SSO for approval. To date, no CSAs have required SSO approval. Currently SNL has several facilities and activities which were developed prior to DOE-STD-3007-93. SSO has requested a schedule for completion and a 25% update over the next two years. SNL is working on a gap analysis of the CSAs not meeting DOE-STD-3007-2007 and a schedule for the updates in 2009. The schedule will be based on safety, first; projected activities, second; and long term storage, third.

The current SNL verification and validation (V&V) process is being evaluated to ensure software quality assurance requirements are addressed. There are twelve computers used to perform criticality safety calculations. Prior to using the data from the computer for a CSA, the V&V packages are completed. The ANSI/ANS criticality safety standard 8.24 Verification and Validation has been evaluated, but not completed. The ANSI/ANS criticality safety standard 8.26 NCSE training has been completed and an update to the NCSE training program is in progress.

- The status of the contractor nuclear criticality safety engineer programs at each site, including staffing levels, plans to address vacancies, interim compensatory measure, and progress on training and qualification. This must include an analysis of the adequacy of each by DOE Field Element Line Management.

  Response
  Eight engineers are qualified to DOE-STD-1135-99 as NCSEs with two trainees working to qualify in early 2009. Only six of the eight NCSEs are available because two are on other details. NCS program work is ~ 2 full-time-equivalents (FTEs). NCS projects work is anticipated to be 2 FTEs for FY09. Staffing is adequate for the level of effort for the next few years considering that SNL has now disposed of most of the fissile material and fewer analyses will be required in the next few years.

- The status of the federal nuclear criticality safety engineer programs at each site, including staffing levels, plans to address vacancies, interim compensatory measures, and progress on training and qualification. This must include an analysis of the adequacy of each by DOE Headquarters Line Management.

  Response
  One engineer has completed the Technical Qualification Program (TQP) standard for DOE-STD-1173-2003 in December 2007. Criticality safety oversight is not a full time responsibility for the engineer, approximately 10% of his time. Staffing is adequate for the level of effort for the next few years considering that SNL has now disposed of most of the fissile material and fewer operations will require oversight in the next few years. However, the start-up of the Criticality Experiments may required additional time as pointed out in the recent Chief of Defense Nuclear Safety Biannual Review.

- A summary of the results and any lessons learned from federal assessments of criticality safety conducted throughout the year and the steps taken by the contractor and DOE in response to these assessments. This summary should highlight such factors as the quality of contractor self-assessments, the adequacy of criticality safety evaluations, and the consistency of sites' nuclear criticality safety programs.

  Response
  The only federal assessments performed in 2008 were the six walkthroughs and three DOE-STD-1158-2002 assessments performed by the SSO CRITPOC. For the six walkthroughs and three assessments, there were three weakness and three observations. All items were

transmitted from SSO to SNL via letters and were addressed by SNL. Since there were no deficiencies, no corrective action plans (CAPs) were required.

- A summary of the results and lessons learned from contractor, federal, or independent reviews of proposed nuclear criticality safety controls and design requirements for new facility designs. Included with this is a description of how this information was used by the contractor and DOE Line Management Elements to improve facility designs and the design process.

  Response
  SNL has participated in LANL/LLNL assessment at Device Assembly Facility (DAF) at NTS. SNL participates in DOE Complex End-User activities and meets with counterparts from other sites. An external assessment was completed in 2008 with other NCS members of the DOE Complex from LLNL and INL meeting a requirement to perform a triennial assessment. SNL participates in ANS conferences, ANSI/ANS Standards, MCNP & SCALE training programs, ICBEP Benchmark Program, and LLNL Hands-on training.

- A summary of the results of trending and analysis of each site's reportable and non-reportable occurrences related to criticality.

  Response
  One reportable occurrence occurred in 2007 concerning the difference between data in container size for items in a CSI array. A few of the packages have required updates to the CSI values as a result of the evaluation. The occurrence report was issued as a PISA by the facility management and later cancelled as information was evaluated. One non-reportable occurrence occurred in late 2006 concerning the CSI posting at one facility. This was corrected at all SNL facilities in 2007. There have been no NCS ORPS reportable incidents in FY08.

- The results of follow-up reviews undertaken by DOE to assess and validate the effectiveness of corrective actions and improvements from the above activities for the previous year.

  Response
  No items were identified in the previous year and so no follow-up reviews were required.

- The status of open issues identified in the previous year's annual report.

  Response
  No items were identified in the previous year and so no follow-up reviews were required.

Los Alamos Site Office
Input to the Defense Nuclear Facilities Safety Board
Annual Report

1. A site-by-site evaluation of contractor nuclear criticality safety performance measured against established criticality safety performance metrics, including an evaluation of this performance and actions taken by Department of Energy (DOE) Field Element Line Management to improve nuclear criticality safety and address known nuclear criticality safety program deficiencies.

Field Element Line Management actions

The focus of the LASO in 2008 was on oversight of the Criticality Safety Improvement Plan (CSIP) including the quality of work produced.

- A performance based incentive (PBI) remained in the contract directly measuring progress against the CSIP milestones.
- The LASO criticality safety engineer, with support from the NNSA Service Center criticality safety engineer, met with LANL staff weekly on CSIP status.
- The weekly meetings included review of comments on the LANL produced Criticality Safety Evaluations (CSEs). LASO performed a 100% review of CSEs produced in 2008.
- LASO criticality safety staff and facility representatives performed field oversight activities to review implementation of the new program.

The CSIP was modified to include milestones driven by the Augmented Limit Review (ALR) being conducted at TA-55.

In June 2007, the Defense Nuclear Facility Safety Board (DNFSB) staff expressed concern about the reliance of neutron poisons in certain vault rooms at Technical Area (TA)-55. Preliminary assessments and as-found analyses performed by LANL in September 2007 to evaluate the actual dependence on boron in these rooms not only revealed a dependence on the poison, but determined that there was not enough boron present to support the existing limits. This called into question the adequacy of historic CSE's in place supporting limits throughout the facility. As a result, an Augmented Limit Review (ALR) was begun at TA-55 to evaluate the adequacy of the existing limit sets.

The ALR performed at TA-55 to evaluate the adequacy of the existing limit sets concluded in 2008. LASO oversight of this process consisted of:

- Technical review of all release forms.
- Shadowing the TA-55 field verification of resumption activities, or performing independent field verification.

The ALR concluded September 16, 2008. The ALR team reviewed five hundred twenty six individual operations at the TA-55 Plutonium Facility. All operations within the facility have been returned to service. Many criticality safety limits were modified during the review, resulting in an increased criticality safety margin. Lessons Learned have been developed and are being incorporated into the criticality safety program improvement plan.

Evaluation

The LANL nuclear criticality safety program does not yet meet the expectations of national consensus standards and DOE Order 420.1B in many cases. LANL performance on meeting the milestones defined in the CSIP has met LASO expectations. The quality of CSE's produced by the LANL engineering staff has dramatically improved as assessed by the LASO and Service Center criticality safety engineers. LASO expects the CSIP end-date to slip. This is acceptable due to the criticality safety margin gains resulting from the ALR. Overall, LANL performance against the LASO established criticality safety performance metrics has been exceptional and of high quality.

2. The status of the contractor nuclear criticality safety engineer programs at each site, including staffing levels, plans to address vacancies, interim compensatory measures, and progress on training and qualification. This must include an analysis of the adequacy of each by DOE Field Element Line Management.

   After the October 2005 NNSA program assessment a staffing plan was generated by the Nuclear Criticality Safety (NCS) Group as a part of the CSIP. Action on that staffing plan was initiated in August of 2006. Two new staff members were hired and working within the NCS group by December of 2006 and both are at various stages of the qualification and training process. An extensive internal hiring effort produced no capable candidates and so permission for hiring externally was obtained. Plans call for the hiring of two additional personnel with at least limited qualifications and experience.

   LANL is currently staffed with seven fully qualified criticality safety engineers, two engineers qualified to a junior level (fully qualified but group leader task restricted), and one engineer is in training. The number of new hires was limited by the availability of current staff to support and mentor new hires and the lack of qualified criticality safety personnel nation-wide. The recent event involving the TA-55, PF-4 vault limits and consequent ALR have led to the conclusion that additional staff is necessary and actions are being taken to

hire two additional staff members this year. The NCS program has engaged criticality safety specialists from Pantex and a related organization at LANL to support the ALR. Four experienced individuals, external to the NCS group, have been engaged in this respect commensurate with their qualifications and abilities.

LASO assesses the program as currently understaffed to address the emergent issues facing the site. The staffing levels are approaching those needed to complete the CSIP and sustain and improve the program in the future. LASO does not believe any dramatic changes in the current approach are needed.

3. The status of the federal nuclear criticality safety engineer programs at each site, including staffing levels, plans to address vacancies, interim compensatory measures, and progress on training and qualification. This must include an analysis of the adequacy of each by DOE Headquarters Line Management.

   The LASO nuclear criticality safety engineer program consists of one NNSA qualified Criticality Safety Engineer. There are no vacancies in criticality safety and LASO is fully staffed for this position. The incumbent engineer completed the qualification program in March 2008. LASO continues to receive support from the NNSA Service Center for technical support.

4. A summary of the results and any lessons learned from federal assessments of criticality safety conducted throughout the year and the steps taken by the contractor and DOE in response to these assessments. This summary should highlight such factors as the quality of contractor self-assessments, the adequacy of criticality safety evaluations, and the consistency of sites' nuclear criticality safety programs.

   The Los Alamos Site Office (LASO) conducted a Nuclear Criticality Safety Assessment the week of July 21, 2008. The assessment focused on aspects of field implementation at the Plutonium Facility, Chemistry and Metallurgy Research Building, and Area G. The assessment was conducted by Site Office personnel augmented by members of the Criticality Safety Support Group (CSSG). The CSSG members included personnel from the 2005 NNSA review that prompted development of the CSIP to establish a compliant, standards-based criticality safety program at LANL. The team observed that significant progress has been made since 2005 on priority issues. The team also observed that the current plan to improve operator training and increase field presence by criticality safety engineers is the correct direction. There were no findings.

   At the request of LANL management, a WSMS criticality safety expert was invited to LANL to perform a peer review of the ALR process the week of April

21, 2008. The WSMS criticality safety expert stated in his final report that, "...the conclusion of this peer review is that the [ALR] process is sound and comprehensive and that no other issues relative to safety of operations were uncovered during the review." The WSMS criticality safety expert did state that the ALR process severely limited the criticality safety engineer floor presence in the operating facilities and prevented "glovebox-level" criticality safety training that had routinely been done in the past. These issues are currently being addressed via scheduled walk downs and increased interactions with operations personnel by SB-CS staff.

Observations from the LASO assessment and lessons learned from the ALR process, including suggestions for improvement from the WSMS criticality safety expert April visit, are currently being addressed through a re-baseline of the CSIP, which includes a redevelopment of the LANL Criticality Safety Program Manual and revision of internal SB-CS policies.

5. A summary of the results and lessons learned from contractor, federal, or independent reviews of proposed nuclear criticality safety controls and design requirements for new facility designs. Included with this is a description of how this information was used by the contractor and DOE Line Management Elements to improve facility designs and the design process.

   In item two LASO assessed the NCS program as currently understaffed to address emergent issues facing the site. In 2008 LANL criticality safety staff increased their participation in the project and design processes. This interface has significantly increased since the conclusion of the ALR. The CMRR project is of note as having a full complement of Preliminary Criticality Safety Evaluations. LASO is currently reviewing these as part of the CMRR PDSA review. Other projects with notable increase in Criticality Safety engineer engagement are: TA-55 Reinvestment, RLWTF replacement, and TA-55 vault enhancements resulting from the ALR. LASO, with assistance from the NNSA service center, reviews design documents at critical decision points to assure that design features are captured. Several ongoing projects have some residual project risk due to inadequate criticality safety input early in the design process. This risk is being reduced due to better engagement by criticality safety staff. This is a marked improvement since the 2007 report. NNSA assesses the residual project risk to be low and acceptable.

6. A summary of the results of trending and analysis of each site's reportable and non-reportable occurrences related to criticality.

   There were a total of five events that were of criticality safety relevance in 2008. Because of the straight-forward nature of these events no formal trending and analysis was performed on the reportable and non-reportable occurrences related to criticality safety. The events continue to reinforce the issues raised by the October 2005 program assessment conducted by the

NNSA and the importance of continuing with the CSIP. It is clear that progress is being made in this area, as the discovery of the events were a direct result of heightened awareness by LANL operations staff resulting from implementation of the more formal program. This was, in fact ,the expectation as a result of this NCS PIP.

Three of these events were declared infractions under the LANL ISD 130-1.0, Nuclear Criticality Safety Program Manual criteria. One was assigned an Infraction Severity Level of 4 (One parameter partially lost but more than one additional parameter intact), and two were assigned an Infraction Severity Level of 5 (No parameters affected but implementation was not as intended).

The two remaining events, after review by the NCS Group, Facility Management, and/or the operating groups were not classified as infractions as no parameters were affected and the implementation was as intended. One instance did point to a weakness in the understanding of a limit, concerning the handling of machine turnings, which resulted in the conclusion that the limit was overly restrictive. It was agreed to alter the limits to reflect the acceptability of the easier handling protocols. In the meantime, the operating group leader required verbatim compliance to the existing limit structure.

7. The results of follow-up reviews undertaken by DOE to assess and validate the effectiveness of corrective actions and improvements from the above activities for the previous year.

   This is addressed in item one above.

8. The status of open issues identified in the previous year's annual report.

   These were addressed in the relevant sections above.

Department of Energy
National Nuclear Security Administration
Pantex Site Office
P. O. Box 30030
Amarillo, TX 79120

DEC - 8 2008

MEMORANDUM FOR: Jerry Hicks, Criticality Safety, NSA/ALSC

FROM: David C. Nester, Acting Assistant Manager for Nuclear Engineering

SUBJECT: Pantex Site Office Submittal to DOE FY 2008 Annual Criticality Report

REFERENCE: DNFSB Letter of January 29, 2008, Regarding the DOE Annual Criticality Safety Reporting Requirements

The referenced letter required responses for eight items concerning criticality safety oversight and NCS program reviews at the various sites. The purpose of this letter is to transmit the requested information for Pantex for fiscal year 2008.

Specific questions should be directed to my Criticality Safety Point of Contact, Roy Hedtke, at 806-477-6295.

Attachment:

cc w/attach:
K. Waltzer, PXSO, 12-36A
D. Nester, PXSO, 12-36A
C. Alvarado, PXSO, 12-36A
B. Hill, B&W Pantex, 12-101
G. Fondaw, B&W Pantex, 12-101

cc w/o attachments:
S. Klein, PXSO, 12-36

RH09-44205-NE

Enclosure

Pantex Plant Submittal for the 2008 Annual Report on Nuclear Criticality Safety

The Pantex Plant is the primary DOE Site for nuclear weapons dismantlement, maintenance, upgrades (e.g., life extension programs) and assembly, and storage of weapons components such as pits and radioisotopic thermo-electric generators (RTGs). Pantex fissile material operations involve encapsulated weapons grade plutonium (Pu^{239}) and highly enriched uranium (U^{235}). Depleted uranium (U^{238}) and the Pu^{238} found in RTGs do not constitute criticality safety concerns.

Fissile material operations at Pantex involve material that is fully encapsulated. By design, operations do not involve 'bare' fissile material or fissile material solutions. Components that are staged at Pantex are in containers approved by DOE for on-Site storage and transportation. Therefore, as is analyzed in the Criticality Safety Program basis document, it is not credible to have a criticality excursion at Pantex.

The following information is provided for the 2008 DOE Annual Report on Nuclear Criticality Safety:

1) The M&O Contractor (B&W Pantex) was provided a set of Nuclear Criticality Safety (NCS) performance metrics for FY 2008. At the end of FY 2008, the Contractor provided closure evidence for four of the five performance metrics and a plan to complete the remaining performance measure involving a revision of the NCS Program technical basis and validation/ categorization of all criticality safety controls. The Pantex Site Office (PXSO) Criticality Safety Engineer, who is also a qualified Safety Basis Analyst, is involved in reviewing all NCS-related work products.

   In addition to independently walking down facilities and shadowing any assessments related to criticality safety, the PXSO Criticality Safety Engineer meets with the Contractor criticality safety staff periodically throughout the year.

2) The B&W Pantex Criticality Safety Program is fully staffed with three qualified criticality safety engineers. B&W Pantex's three Criticality Safety Engineers are sufficient for Pantex operations. All three criticality safety engineers have a masters or higher degree in nuclear engineering. All three have completed the B&W Pantex Nuclear Criticality Safety Engineer Qualification Card which meets the requirements of DOE-STD-1135-99, *Guidance for Nuclear Criticality Safety Engineer Training and Qualification*. All have completed either the LANL or the LLNL (or both) hands-on criticality safety course. The Contractor has planned an independent assessment of the Nuclear Criticality Safety Engineer Qualification Process for the 2nd quarter FY 2009. This self-assessment will be shadowed by the PXSO Criticality Safety Engineer. The Pantex Site Office has determined that the B&W Pantex Criticality Safety Program and Staff are adequate for Pantex operations.

3) PXSO has one primary criticality safety point of contact (CRITPOC). Because of the type of fissile materials and the nature of the operations at Pantex one PXSO CRITPOC is sufficient to oversee the Contractor's Criticality Safety Program. The PXSO Criticality Safety Engineer has met Technical Qualification Program requirements for *Nuclear Safety Specialist Functional Area Qualification Standard, DOE-STD-1183-2004* and completed his qualification.

4) In FY 2008 the PXSO Criticality Safety Engineer conducted two Walkdown Assessments of fissile material operations and shadowed two Contractor self-assessments related to Nuclear Criticality Safety: Criticality Safety Training for Fissile Material Handlers and Software Quality Assurance for Criticality Safety Computer Codes. The Walkdown assessments, which resulted in no findings, demonstrated compliance with procedures and applicable criticality safety controls.

The shadow assessments concurred with the results of both Contractor self-assessments and had no findings, observations, or weaknesses. The PXSO Criticality Safety Engineer conducted a Programmatic Assessment of the Criticality Safety Program in the 4th quarter of FY 2008. There were no findings, weaknesses, or observations noted; one strength was identified in the area of Criticality Safety Engineer Training and Qualification.

5) In 2008 there were no new nuclear criticality safety controls identified and no new nuclear facility designs prepared. Current criticality safety controls are sufficient for fissile material operations currently authorized at the Pantex Plant. However, when applicable, the Pantex Contractor routinely uses the criticality safety group to review new facility designs, tooling, and processes.

6) Bullets 6 through 8 do not apply to Pantex. There are no known reportable or non-reportable occurrences related to criticality in at least the last 16 years at Pantex. Therefore, there is no trending or analysis of such events. There have been no corrective actions necessary for the previous year. Finally, there were no open issues from last year's Annual Criticality Report that pertained to Pantex.

The Department of Energy's (DOE) annual report on nuclear criticality safety should address, at a minimum, the following items:

- A site-by-site evaluation of contractor nuclear criticality safety performance measured against established criticality safety performance metrics, including an evaluation of this performance and actions taken by DOE Field Element Line Management to improve nuclear criticality safety and address known nuclear criticality safety program deficiencies.

Y-12 Response:
For several years Y-12 has collected NCS metrics and reviewed these in monthly NCS Advisory Council meetings and at the quarterly senior plant managers NCS meetings. These meetings are attended by both the contractor and the NNSA Y-12 Site office (YSO), and have been the subject of DOE independent line reviews. Additionally, metrics are reported, as applicable, to the 9212 Continued Safe Operating Oversight Team (CSOOT) attended by both the contractor and YSO. The extensive reporting of sub-threshold (i.e., non-reportable per DOE O 231.1A) NCS issues at Y-12 forms the basis for many of these Y-12 NCS metrics. Non reportable NCS issues are categorized as either an NCS deficiency or minor non-conformance. The current set of Y-12 metrics reported on a monthly basis include:

- Closure timeliness of NCS Deficiencies, focusing on the total number open longer than 45 days
- Closure timeliness of NCS Minor Non-compliances, focusing on the total number open longer than 30 days
- Self-Reporting of NCS Issues – reports the percentage of issues self - reported by the contractor's production and line oversight organizations (i.e., NCS engineering).
- NCS Small Group Seminars – reports the cumulative number of small group training sessions conducted with fissile material operations crews.
- NCS Repeat Deficiencies – reports the number of NCS deficiencies that re-occur within 2 years of prior instance for which the corrective actions of the prior instance have been completed and are not a legacy issue.
- NCS Professional Development Performance – reports the percentage of the NCS engineering population that is engaged in credited development activities (e.g., technical courses, conferences, graduate studies, etc.).
- NCS Unplanned Activities – Has two components:
    1. Number of spills of fissile solution > 4 l. A spill is an unplanned discharge of solution from its containment vessel. Leaks collected in approved containers are not considered to be spills unless the collecting container is overflowed. This is an indication of the physical state of the facility.
    2. Number of inadvertent transfers of fissile solution. An inadvertent transfer is a transfer where the solution was transferred to an unintended location, or by an unintended route. It does not include simple spills. This is an indication that the facility systems are operating as designed/intended.

- NCS 9212 Leak Indications – The total number of active leaks regardless of size from fissile process systems. It is intended to track progress in correcting the "leak list" issues. The listing will be updated on a quarterly basis.

- The status of the contractor nuclear criticality safety engineer programs at each site, including staffing levels, plans to address vacancies, interim compensatory measures, and progress on training and qualification. This must include an analysis of the adequacy of each by DOE Field Element Line Management

Y-12 Response:
At the Y-12 National Security Complex, nuclear criticality safety (NCS) engineers are part of the Safety Analysis Engineering (SAE) organization in the Engineering Division. There are approximately thirty-two B&W and fourteen subcontractor engineers practicing the NCS discipline including the SAE manager. Six vacancies are shown on the SAE organization chart and B&W is actively pursuing filling the vacancies. However, the overall NCS staffing level at the Y-12 National Security Complex is consistent with the budgeted workload. Filling the vacancies is not required to support the budgeted workload, but is intended to reduce the current reliance on subcontractor engineers.

The qualification status of the NCS engineers is shown on the table below:

	B&W	Subs
Staff level:	32	14
Qualified Engineers in Training:	87.5%	100.0%
Qualified NCSEs:	53.1%	71.4%
Qualfiied Sr. NCSEs:	15.6%	Note 1
Process Reviews	78.1%	100.0%
NCS Evaluation and Documentation	65.6%	100.0%
Implementing Documentation Approval	75.0%	100.0%
Computations	75.0%	100.0%
Computation Review	31.2%	42.8%
NCS Evaluation Review	34.4%	64.3%
Emergency Response	12.5%	Note 2
Criticality Accident Alarm System Support	9.4%	Note 2
Order Compliance and NCS Procedures	28.1%	Note 2
Final NCS Technical Documentation Approval	9.4%	Note 2
NCS Program Oversight	21.9%	Note 2
Technical Support Center Support	6.3%	Note 2

Note 1: Subcontractors do not routinely qualify as Sr NCSE
Note 2: Subcontractors do not routinely qualify in this task

A federal review of the contractor's training and qualification program was conducted in CY-2008. This review was part of a line NA-17 lead review conducted in June, 2008 using DOE standard 1158 covering sections on NCS staff responsibilities and NCS evaluations. While some issues were noted during the review, the overall conclusion from the review, which applies to the contractor's training and qualification program, was that the NCS organization program is mature and slowly improving.

- The status of the federal nuclear criticality safety engineer programs at each site, including staffing levels, plans to address vacancies, interim compensatory measures, and progress on training and qualification. This must include an analysis of the adequacy of each by DOE Headquarters Line Management.

Y-12 Response:
There are three positions in place in YSO dedicated to NCS engineering program oversight:

1. Sr. NCS Engineer: MSNE, Initial Federal Technical Qualification Program (TQP) completed at Y-12 on 10/9/01 and last 3-year federal TQP requalification received 11/19/07, 26 years professional experience w/11 years at Y-12.
2. Sr. Support Service Sub-contractor NCS Engineer: MNE, Contractor TQP (7 different tasks - see last item) qualified, 23 years professional experience w/11 years at Y-12.
3. NCS Engineer Intern: BSNE, a new DOE Future Leader Program (FLP) recruit who reported in June of 2008.

This level of staffing, if not for DOE line support discussed below, would be considered marginal at best for the next several years until the FLP recruit is sufficiently trained and experienced (approximately 3-5 Years – 2 years of which is directly involved with the FLP itself), and the new fissile material processing facilities (particularly UPF) becomes operational.

The NNSA line support (through NA-17), involving Sr. NCS engineer's well experienced in industrial criticality safety application, of the YSO NCS oversight program has been extensive and continued for many years since the 1998 time frame. This support includes marshalling resources for conducting team NCS reviews, participation in smaller dedicated on-site reviews and assistance visits, periodically performing the YSO NCS program annual self-assessment (at a minimum of once every 3 years), review of the YSO NCS program master assessment schedule, and general day to day collegial counseling and advice on NCS matters of interest. The need for this highly valued support is expected to continue and will utilize dedicated Sr. NCS engineering expertise in the NNSA service center, which also led a 2008 independent line assessment (mentioned above) for YSO this year.

- A summary of the results and any lessons learned from federal assessments of criticality safety conducted throughout the year and the steps taken by the contractor and DOE in response to these assessments. This summary should highlight such factors

as the quality of contractor self-assessments, the adequacy of criticality safety evaluations, and the consistency of sites' nuclear criticality safety programs.

Y-12 Response:
There were three major federal independent assessments conducted at YSO request this past year:

I May 2008 Wet Chemistry:
In May 2008 an on-site review of selected wet chemistry processes was conducted and led by NA-17. This scope of the review included the following 9212 wet chemistry areas: process condensate system, implementation of new primary extraction raffinate concentration lab protocols, status of raffinate monitor, review of uranium holdup survey program (UHSP) and inadvertent accumulation prevention program (IAPP) corrective actions plan closure, and experienced based review of current UPF design.

To this end CSE evaluations for four wet chemistry processes were included in team preparation materials for pre-assessment information including: draft copies of the new high capacity evaporator (HC) and primary extraction (PX) process evaluations, and latest revisions of the secondary extraction (SX) and intermediate evaporator (IE) process evaluations. Given the number of observable issues noted by the review team, the review quickly focused on CSE compliance with current contract requirements. The report identified 1 weakness, 6 deficiencies, and 3 observations. Deficiencies 4 and 5 cite examples where incorrect use of key terms (i.e., "unlikely" and "credible"), and other significant defects in CSE as required to meet the double contingency principle (DCP) per DOE O 420.1B, and as interpreted by DOE-STD-3007-2007, were discovered. Of particular note are the inconsistencies in the correct application of terminology important to the safety basis for NCS.

II June 2008 NCS Staff Responsibilities and NCS Evaluations:
An on-site assessment was performed June 23-27, 2008 using lines of inquiry from DOE-STD-1158-2002, "Self-Assessment Standard for DOE Contractor Criticality Safety Programs", Section 3 Nuclear Criticality Safety Staff Responsibilities, and Section 5 Process Evaluation for Nuclear Criticality Safety. The assessment team consisted of three NNSA NCS Engineers from outside of Y-12, the NNSA-YSO Subject Matter Expert, an NNSA intern who is supporting criticality safety for YSO and a subcontract NCS Engineer supporting Y 12 NNSA - YSO. The overall impression of the team was that the NCS organization program is mature and slowly improving and it was noted that the NCS staff interviewed by the audit team were professional, courteous, and competent. There were 2 Strengths, 4 Weaknesses, and 2 Deficiencies identified. The deficiencies involved NCS staff not qualified as mentors performing mentoring duties, and a technical procedure process problem that improperly allowed the procedure coordinator or writer to process a procedure revision without NCS review.
III August 2008 CSSG Review of Selected Y-12 CAAS Documents:
An off-site CSSG Review of selected Y-12 CAAS related technical documents was completed in August 2008. The review concluded the planned detector placement for the new HEU facility is adequate for detection of the ANSI/ANS-8.3 minimum accident

of concern, and that the development of an alternative facility-specific minimum accident is not necessary and that several of the technically inadequate CCG documents reviewed are not needed to support the adequacy of the planned detector placement in the new HEU facility.

YSO has conducted a number of internal assessments as scheduled including 12 NCS evaluation and analysis, 36 documented field walk-through assessments, 4 fissile material control assessments, and 9 contractor self-assessment activities. Additionally, over 70 other assessments were conducted by YSO NCS including support for the new HEU facility and several for-cause reviews. Of the 109 assessments conducted, 15 were considered unacceptable which is in line with the 16 of 99 assessments considered unacceptable last year. However, it has been noted that an increased number are associated with field assessment activities which will be an emphasized area of focus for FY 2009. Another area of concern is CSE review level of effort adequacy given the limited staff resources as compared to the large number of evaluative efforts being conducted by the contractor NCS organization.

- A summary of the results and lessons learned from contractor, federal, or independent reviews of proposed nuclear criticality safety controls and design requirements for new facility designs. Included with this is a description of how this information was used by the contractor and DOE Line Management Elements to improve facility designs and the design process.

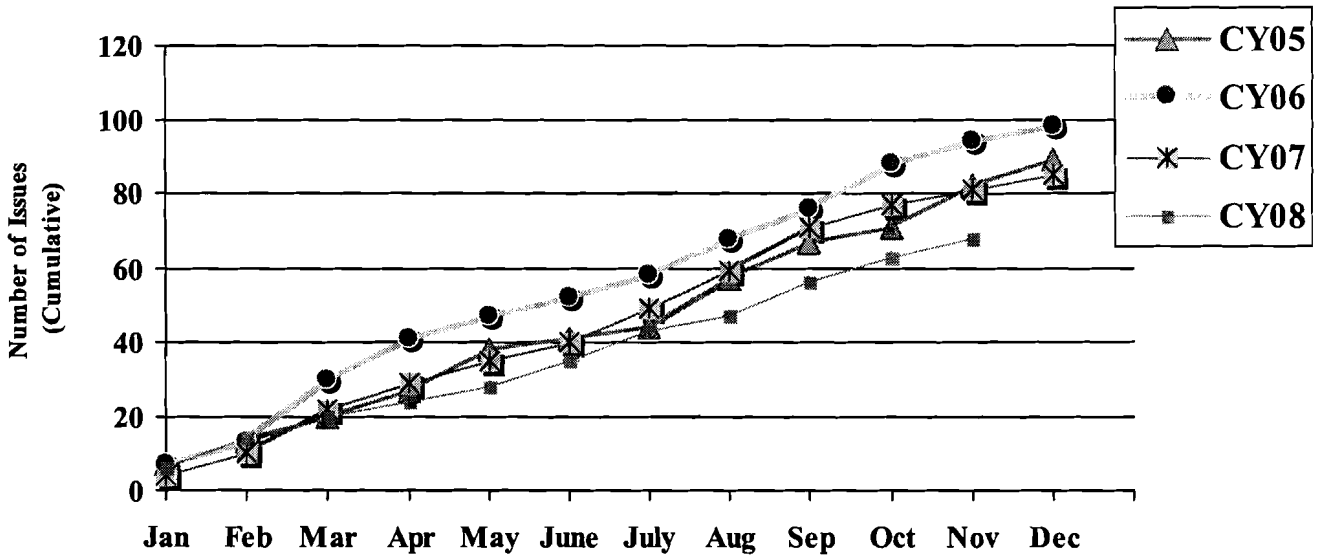
Y-12 Response:
The implementation of lessons learned described in last year's response has been followed and has led to the development of preliminary analyses (called Criticality Safety Process Studies) based on the early stages of preliminary design. These studies were developed with the input from design engineers, facility safety engineers, and Manufacturing representatives. The preliminary control sets derived from these studies are being folded into the preliminary design and the studies will be revised again with input from the intermediate preliminary design deliverables. This iterative process will ensure that the NCS analysis, equipment design, and facility design do not diverge to the point where conflicts result in project delays and cost overruns. Approximately 15 draft A Criticality Safety Process Studies have been issued so far with approximately 30 more in advanced stages of development.

In addition to process studies, recent reviews of the HEUMF CAAS analyses have resulted in significant rework due to both a lack of clarity and disagreements related to source term derivations. In order to avoid such issues at a late point in the UPF project, a preliminary CAAS assessment will be performed to provide an estimate of the total number of detectors needed and to outline detection coverage and evacuation boundary strategies. Performing this preliminary analysis will allow B&W NCS personnel, YSO project personnel, and YSO oversight personnel to understand CAAS strategies at an early stage and work out disagreements well before the construction of the facility. This dissemination of CAAS strategy will also allow project design personnel to recognize

how potential design changes may conflict with the CAAS strategy and provide an opportunity to resolve such issues as early as possible during design development.

- A summary of the results of trending and analysis of each site's reportable and non-reportable occurrences related to criticality.

Y-12 Response:
There were no reportable NCS (i.e., category 3C-1, 2) occurrences per DOE O 231.1A in 2008. The graph and chart below shows the trending of all Y-12 non-reportable (i.e., per DOE O 231.1A) infraction events over the past few years regardless of the sub-categorization.



Specific information categories, and trending information (metrics) used to review these occurrences, which were NOT discussed in the first response include:

- NCS Deficiency Types by Organization (12 Month)
- NCS Deficiency 6 Month Totals by Organization/Area
- NCS Deficiency/Minor Non-Conformance 6 Month Totals

These metrics, as mentioned in the first response, are reviewed at monthly contractor NCS advisory council meetings. Note that the current trend is running below those of the past few years.

A STREAM analylsis of NCS issues was conducted during the year. The STREAM indicated that the principal drivers for the Criticality Safety issues are:

- **Workforce instability.** The Y-12 workforce (Operators/Engineers) turns over frequently. For operators, this occurs soon after they are hired. Once they receive their Q clearance and HRP certification, they move on to higher paying jobs as machinists, or other skilled workers. With a mix of long-term operators and frequently changing new operators, it is difficult to determine and achieve the right level of detail in the operating procedures. For engineers, older engineers are leaving due to retirement, and current college graduates are leaving due to many opportunities from the "Nuclear Renaissance". Skill mix issues and lack of succession planning aggravate this issue.
- **Legacy nuclear material.** Nuclear material in storage presents problems when in storage for lengthy periods of time. Labels deteriorate and storage containers degrade.
- **Complex materials in storage.** The nuclear material in storage is in many different forms and in many different storage containers. This presents many challenges in procedure construction and what is presented to operators who have to work with the material.
- **Roles, Responsibilities, Accountabilities and Authorities.** Nuclear Material Control and Accountability (NMC&A) personnel have broad responsibilities. Controller personnel are responsible for both NMC&A and Nuclear Criticality Analysis (NCA) duties. Supervisors lack technical guidance.
- **Corrective Action Program.** The facility experiences repeat occurrences indicating lack of effectiveness in the program. Additionally, many corrective actions are backed up due to lack of resources to complete them in a timely manner.

The contractor NCS advisory council review of these non-reportable infractions and associated metrics is regularly assessed in YSO and was also the subject of an independent line review which deemed this council's review actions were effective as discussed in the fourth item response. Specific infraction events are reviewed as assessed as required.

- The status of open issues identified in the previous year's annual report.

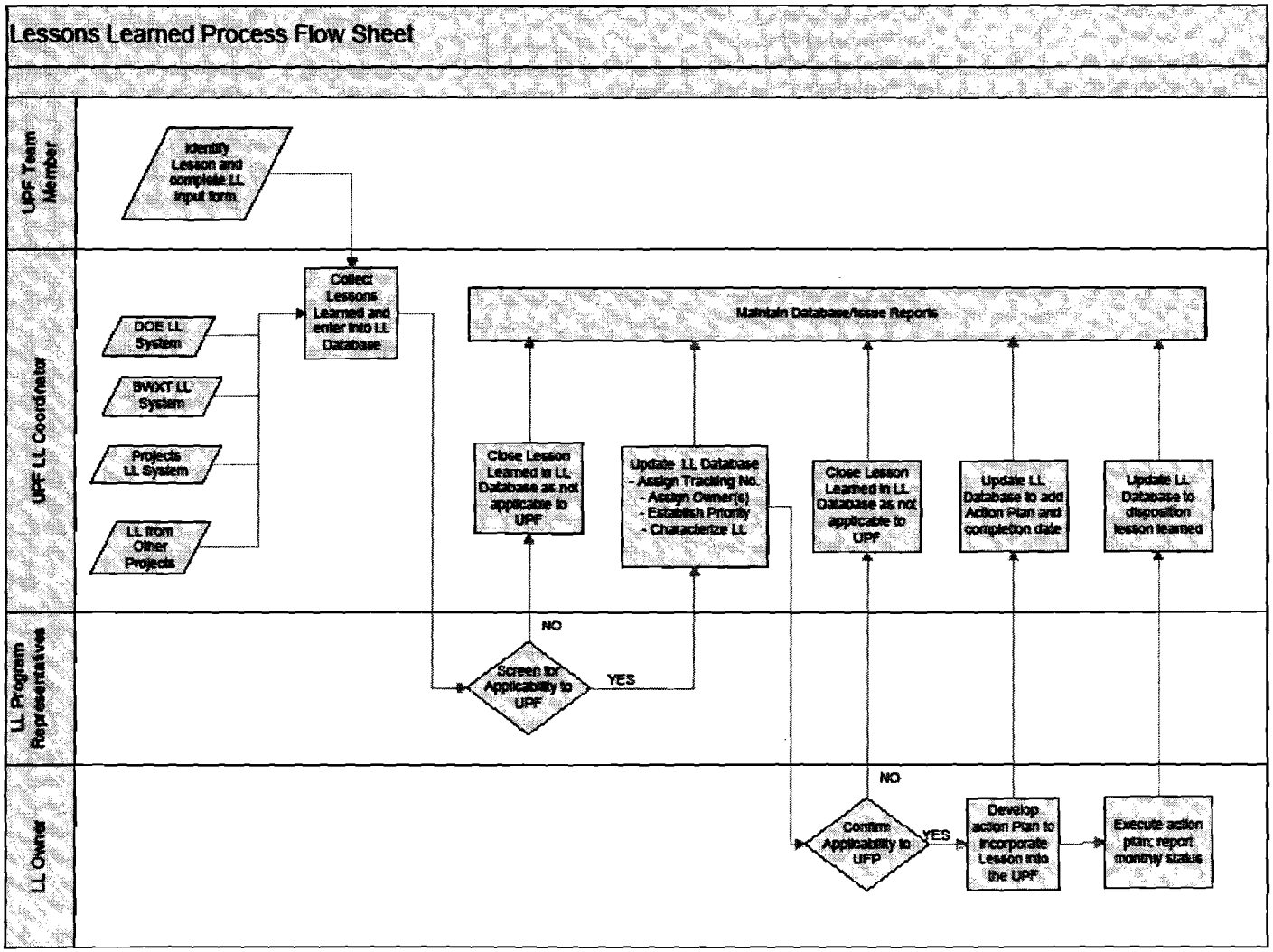
Y-12 Response:
Key corrective action status items are as follows:

- Operational testing of the raffinate monitor will continue through the remainder of the FY 2009. Credited use of the raffinate monitor is currently expected in FY10.
- Implementation plans for 3007-2007 are in the process of significant revision as a consequence of the May 2008 assessment discussed previously and is on track for completion on1/7/09.
- The evaluation of the floor holdup migration issue in 9212 and characterization of 9206 remains unfunded.
- A project to re-route the process condensate from the current basement storage safe tanks to other safe tanks in a large geometry exclusion control area, which

will address the concentration control issue, is currently unfunded, but is being evaluated as part of a one year deviation granted 11/13/08.

- Findings from a Joint assessment of inadvertent accumulation programs (UHSP/IAPP) conducted May 2007 were confirmed to be adequately addressed during the May 2008 independent wet chemistry review discussed earlier.
- Findings from a Joint assessment of DOE-STD-1158 Management and Supervisory Responsibilities sections have been completed.
- The replacement CAAS IEZ document for the new HEU facility is scheduled to be delivered December 2008 with other safety basis document submittals.

Attachment 1



CY 2008 Annual Report on Nuclear Criticality Safety Programs

Office of Environmental Management

A Defense Nuclear Facilities Safety Board (DNFSB) letter dated January 29, 2008, (A. J. Eggenberger to J. C. Sell) requested that answers to specific subject areas related to Nuclear Criticality Safety be included in the Department of Energy (DOE) Annual Report on Nuclear Critical Safety (NCS) Programs. Information on those topics is provided below for Environmental Management (EM) sites. The Office of Environmental Management (EM) has 12 facilities/contractors at six field sites that required nuclear criticality safety programs. This is the second annual report.

The following is a brief summary on each requested topic for the EM complex. A matrix of the response from each EM site is also provided. Individual site reports are included as attachments. The EM points of contact for this report are Robert Wilson (303-236-3666) or Chuan-Fu Wu (202-586-4166).

Measure of Nuclear Criticality Safety Performance

All operational EM contractors are measured against established performance metrics. The performance compared to these metrics is generally good. In addition, contractor performance in criticality safety is periodically assessed by internal and external organizations. These assessments typically result in corrective actions which lead to improved criticality safety performance.

Contractor Criticality Safety Staffing

The EM contractor criticality safety staff level varies widely from 2 to 25, depending primarily on the scope and size of the nuclear operations. There are periodic shortages and the shortfall is typically made up by recruiting new hires or by technical supports from subcontractors. Several of the contractors are now recruiting staff. The various Federal oversight groups have assessed and affirmed, with minor exceptions, that the current level of staffing is adequate for the current work load.

Federal Criticality Safety Staffing

The Federal staffing levels are judged to be adequate. The recent addition of Federal staff in Idaho is considered positive.

Federal Assessments of Sites NCS Programs

EM Headquarters (HQ) assessments of the NCS programs have been conducted for EM sites. The Findings, Recommendations and most of the Opportunities for Improvements resulted in Corrective Action Plans. In addition, site-led assessments of NCS programs are performed and these result in corrective actions. The results and common elements

of these assessments are shared at meetings of the federal Criticality Safety Coordinating Team and at the EM Nuclear Criticality Safety Workshops. The contractor's self assessments evaluated were considered adequate with some caveats. The criticality safety evaluations assessed in these activities are generally adequate although the HQ assessments recommended that the hazard assessment part of the evaluations should be strengthened at most of the sites. All the site programs evaluated were consistent with federal and industry requirements.

New Facility Design

There are a number of new designs at the EM sites and each received a review by nuclear criticality safety staff. The general lesson learned is that the earlier the criticality safety input is received for design the more beneficial it is.

Trending and Analysis of NCS Occurrences

Each of the sites has a process to identify, record, track, and trend NCS occurrences. The results of the information and analysis are used to focus management attention and resources on solving the identified issues. The issues are usually related to conduct of operations.

Follow Up to Assessments

NCS assessments by HQ, field/site offices, or contractors identified critical safety issues and opportunities for improvement that resulted in corrective actions. Those actions are tracked to closure. Follow-up assessments are conducted as necessary to verify completion of corrective actions and evaluate the improvement in the criticality safety program.

Matrix of EM Site Response to DNFSB Special Topics (Part I)

Facility/Contractor	CH2M-Hill Plateau Remediation Company	Bechtel National Inc Waste Treatment Plant	Washington River Protection Solutions Tank Farms	Washington Closure Hanford	Paducah Remediation Services	Portsmouth LATA Parallax
Field Office	**Richland**	**River Protection**	**River Protection**	**Richland**	**PPPO**	**PPPO**
1. Measure of Contractor NCS Performance						
a. Have metrics been established to monitor contractor performance?	Yes	No, see Att. 2	Yes	Yes	Yes	Yes
b. If so, what are the metrics?	Non-conformances and CSER schedule	N/A	See Att. 3	See Att. 1	See Att. 4	See Att. 5
c. If so, what is the contractor's record?	Acceptable, see Att. 1	N/A	Acceptable	Acceptable, see Att. 1	Acceptable	Acceptable
d. If no metrics have been established, what is the method of monitoring performance?	N/A	N/A	N/A	N/A	N/A	N/A
e. What is the conclusion on contractor performance and what is the basis?	Acceptable	N/A	Acceptable	Acceptable	Acceptable	Not acceptable
f. What actions have been taken to improve contractor performance?	N/A	N/A	Meetings	N/A	Meetings	Corrective Action Plan
2. Status of Contractor Criticality Safety Engineer Program						
a. How many NCS staff are	16	2	5	4	1.25	2

needed?						
b. How many are there?	16	2	3	4	1.25	2
c. Actions to address shortfall, if any?	N/A	N/A	Qualify CSRs	N/A	N/A	N/A
d. Has DOE Field Management affirmed adequacy?	Yes	Yes	N/A	Yes	Yes	Yes
3. Status of Federal Criticality Safety Oversight Program						
a. How many NCS staff are needed?	1	1	Partial	1	1	0.5
b. How many are there?	1	1	Partial	1	1	0.5
c. Actions to address shortfall, if any?	N/A	MOA from RL	MOA from RL	N/A	N/A	Subcontractor
d. Has DOE Field Management affirmed adequacy?	Yes	Yes	Yes	Yes	Yes	Yes
4. Federal Assessments of Site NCS Programs						
a. What NCS assessments have been performed?	See Att. 1	See Att. 2	none	See Att. 1	Planned	See Att. 5
b. What corrective actions were taken as a result of these assessments?	2 Corrective Action Plans	2 Corrective Action Plans	N/A	N/A	N/A	See Att. 5
c. What lessons learned were developed?	None	None	None	N/A	N/A	None
d. Were the contractor's self assessments evaluated for adequacy? What was the conclusion?	Yes/adequate	Yes/adequate	Yes/adequate	Yes/adequate	N/A	No
e. Are criticality safety evaluations deemed adequate?	Yes	Yes	Yes, see Att. 3	Yes	Yes	Yes
f. Is the NCS program consistent with	Yes	Yes	Yes	Yes	Yes	Yes

requirements?						
5. New Facility Design						
a. Are any facilities being designated that will need a criticality safety program?	No	Yes	No	No	No	No
b. Have these received a criticality safety design review by anyone?	N/A	Yes	N/A	N/A	N/A	N/A
c. If so, what are the lessons learned? How were these lessons communicated?	N/A	N/A	N/A	N/A	N/A	N/A
6. Trending and Analysis of Reportable and Non-reportable Nuclear Criticality Occurrences						
a. How are NCS occurrences tracked and trended?	See Att. 1	N/A	See Att. 3	See Att. 1	See Att. 4	See Att. 5
b. What were the results?	See Att. 1	N/A	See Att. 3	See Att. 1	See Att. 4	See Att. 5
c. How were the results used to improve performance?	See Att. 1	N/A	N/A	N/A	See Att. 4	See Att. 5
7. Follow Up to Assessments						
a. What prior assessments received a follow up review?	See Att. 1	See Att. 2	N/A	See Att. 1	See Att. 4	See Att. 5
b. Were the corrective actions effective?	See Att. 1	N/A	N/A	See Att. 1	Yes	N/A

Matrix of EM Site Response to DNFSB Special Topics (Part II)

Facility/Contractor	Idaho Cleanup Project (CWI)	BBWI AMWTP	SRS	EnergXs	BJC	ISOTEK
Field Office	**Idaho**	**Idaho**	**Savannah River**	**Oak Ridge**	**Oak Ridge**	**Oak Ridge**
1. Measure of Contractor NCS Performance						
a. Have metrics been established to monitor contractor performance?	Yes	Yes	Yes	Yes	Yes	Yes
b. If so, what are the metrics?	See Att. 6	See Att. 7	See Att. 8	ACRs	ACRs	Infractions
c. If so, what is the contractor's record?	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable
d. If no metrics have been established, what is the method of monitoring performance?	In addition to metrics, both ID and contractor Conduct periodic Program audits	In addition to metrics, both ID and contractor Conduct periodic Program audits	N/A	N/A	N/A	N/A
e. What is the conclusion on contractor performance and what is the basis?	Acceptable	Acceptable	Acceptable	Good DOE oversight	Acceptable, negative trend in new ACRS	Acceptable, DOE oversight
f. What actions have been taken to improve contractor performance?	Self-Assessments develop contractor identification of path for improvement	Self-Assessments develop contractor identification of path for improvement	See Att. 8	N/A	Root cause analysis and six sigma review with resulting corrective actions	Internal assessments identified needed administration program changes. The program has been revised

2. Status of Contractor Criticality Safety Engineer Program						
a. How many NCS staff are needed?	6	5	SRNS (30)	2	16	7
b. How many are there?	6	5	SRNS (17) WSMS (8)	2	16	5 FTEs with part time staff
c. Actions to address shortfall, if any?	N/A	N/A	New hire	N/A	N/A	Recruit staff plus training
d. Has DOE Field Management affirmed adequacy?	Yes	Yes	Ongoing	Yes	Yes	Concur with staff insufficiency
3. Status of Federal Criticality Safety Oversight Program						
a. How many NCS staff are needed?	2 ½	2 1/2	4	1	1	1
b. How many are there?	2 ½	2 1/2	4	1	1	1
c. Actions to address shortfall, if any?	N/A	N/A	N/A	N/A	N/A	N/A
d. Has DOE Field Management affirmed adequacy?	Yes	Yes	Yes	Yes	Yes	Yes
4. Federal Assessments of Site NCS Programs						
a. What NCS assessments have been performed?	See Att. 6	See Att. 7	See Att. 8	NCS program assessment in 07 and ES&H assessment in 08	NCS program assessment in 07 and ES&H assessment in 08	ES&H assessment in 08
b. What corrective actions were taken as a result of these assessments?	See Att. 6	See Att. 7	See Att. 8	See Att. 9	See Att. 10	See Att. 11

c. What lessons learned were developed?	See Att. 6	See Att. 7	See Att. 8	None	None	None
d. Were the contractor's self assessments evaluated for adequacy? What was the conclusion?	Yes/ Adequate	Yes/ Adequate	Yes Conditionally adequate	Yes/ Adequate	Yes/ Adequate	Yes/ Premature
e. Are criticality safety evaluations deemed adequate?	Yes	Yes	Yes	Yes	Yes	No
f. Is the NCS program consistent with requirements?	Yes	Yes	Yes	Yes	Yes	Not yet
5. New Facility Design						
a. Are any facilities being designated that will need a criticality safety program?	No	No	Yes, see Att. 8	Yes, see Att. 9	No	Yes. Preliminary NCSEs are being developed for new facilities
b. Have these received a criticality safety design review by anyone?	N/A	N/A	See Att. 8	Yes	N/A	Yes
c. If so, what are the lessons learned? How were these lessons communicated?	N/A	N/A	See Att. 8	N/A	N/A	N/A
6. Trending and Analysis of Reportable and Non-reportable Nuclear Criticality Occurrences						
a. How are NCS occurrences tracked and trended?	See Att. 6	See Att. 7	See Att. 8	See Att. 9	See Att. 10	N/A
b. What were the results?	See Att. 6	See Att. 7	See Att. 8	See Att. 9	See Att. 10	N/A
c. How were the results used to improve	See Att. 6	See Att. 7	See Att. 8	See Att. 9	See Att. 10	N/A

performance?						
7. Follow-Up to Assessments						
a. What prior assessments received a follow up review?	All issues are tracked to completion	All issues are tracked to completion	See Att. 8	Closure of CA from 2007 NCS program review	BJC NDA program review	Follow up to design review
b. Were the corrective actions effective?	N/A	N/A	See Att. 8	Yes	Yes	Unknown at this time

Attachment 1

CH2M-Hill Plateau Remediation Company and Washington Closure Hanford Criticality Safety Program Annual Report

1. Measure of Contractor Nuclear Criticality Safety (NCS) Performance

CHPRC

Two metrics have been established:

- **Number and type of nonconformances identified each month**

  Through November 2008, a total of ten new nonconformances were identified for CY2008. A total of thirty-three (33) nonconformances were identified in CY2007.

  Performance on meeting CSER development schedule (started in May 2008)

  All 6 CSERs scheduled for completion during the period between May and November 2008 were completed within 30 days of planned sign-off date.

WCH

Six metrics have been established:

- **Nuclear Criticality Safety Staff participate in professional development activities such as ANSI/ANS-8 standards working groups, nuclear criticality safety workshops (or similar) on an annual basis.**

  One NCS staff person is a member of the ANSI/ANS-8.19 working group, which he attended 10/7-9/08 in Pojoaque, NM, and another is a member of the ANSI/ANS-8.3 and ANSI/ANS-8.23 working groups.

- **Perform an annual self-assessment of nuclear criticality safety program implementation.**

  A NCS staff person performs annual self-assessments of the WCH CSP IAW DOE-STD-1158-2002. An independent assessment is performed by qualified criticality safety engineers once every 3 years.

  WCH Self-Assessment NS-2008-SA004 of the WCH Criticality Safety Program 9/16/07 – 9/10/08, DocsOpen # 816527.

  WCH Self-Assessment NS-2007-SA004 of the WCH Criticality Safety Program 8/1/06 – 9/15/07, DocsOpen # 751957.

  WCH Self-Assessment NS-06-SA-001 of the WCH Criticality Safety Program 8/16/05 – 7/31/06, DocsOpen # 679045.

  Independent Assessment Report QA&S-2007-009 of the WCH Criticality Safety Program, performed 3/5/07 – 3/29-07, DocsOpen # 723679. Team members, led by Louis Simmons of WCH/QA, were Mikolaj Dec from PNNL and Dr. Hans Toffer, retired, Fluor Technical Functional Expert in Nuclear Engineering - 2004.

- **Define qualifications for Criticality Safety Engineer (using DOE STD 1135-99 as a guide).**

From Section 3.0 *WCH Criticality Safety Program,* NS-1-1.1 Rev 3 (effective 2/20/08):

"Criticality safety personnel are required to be qualified prior to signing Criticality Safety Reviews. The qualification requirements for the position of CSE [Qualification Card 105363, WCH Criticality Safety Engineer] were developed in accordance with DOE-STD-1135-99. A CSE in Training may prepare Criticality Screening and Initial Criticality Evaluation forms (WCH-NS-005A and WCH-NS-005B), but only a qualified CSE may sign them. The program for training and qualifying criticality safety staff is implemented using a graded approach based on the duties and responsibilities of the CSE, which establishes priorities appropriate to ensure all aspects of criticality safety."

- **Formally qualify all Nuclear Criticality Safety Engineers.**

  Both WCH NCS engineers are both fully qualified WCH Criticality Safety Engineers to the WCH standards and each has over 3 decades of experience at the Hanford site. Another employee is a WCH Criticality Safety Engineer in Training.

- **Nuclear Criticality Safety Engineer meets with operations staff at the facility on a quarterly basis (limited to operations with criticality safety limits and controls).**

  This metric was only applicable when another contractor was responsible for D4 of the 233-S Building, which is now completed. Six of 24 currently issued Criticality Safety Reviews include Field Verification Requirements, but none include criticality safety limits or controls.

- **Perform monthly surveillances of fissionable material storage areas/arrays and criticality alarm systems. Perform quarterly surveillances of criticality safety.**

  This metric was only applicable when another contractor responsible for D4 of the 233-S Building, which is now completed.

  The Richland Field Office has assessed both contractors' NCS performance and has concluded:

  CHPRC: Contractor performance in NCS has been consistently above average. The rate of nonconformances has fallen significantly. Some of this is due to the reduction in activity levels at many of the major facilities such as the Plutonium Finishing Plant and Waste Burial Grounds. However, the Contractor has a long history of good performance in managing minor criticality events and correcting identified deficiencies.

  WCH: Contractor has a zero rate of nonconformances in criticality safety, due to the nature of the work. The retrieval of waste from historical burial grounds is conducted under criticality incredibility analyses. Thus there are not numerous controls and limits. For WCH operations, most of the control is upon material-at-risk and these controls are more conservative than what may be required for criticality safety.

2. Status of Contractor Criticality Safety Engineer Program

CHPRC:

Contractor current staffing level includes a criticality safety manager, nine qualified criticality safety engineers, four qualified criticality safety representatives and two criticality safety representative in training.

Staffing, while having been reduced due to attrition recently, appears to be adequate based upon the level of work. However, the contractor may find themselves temporarily short-handed in criticality safety once D&D activities receive full funding for restart at the Plutonium Finishing Plant.

WCH:

The WCH staffing level consists of one primary Criticality Safety Engineer, one backup Criticality Safety Engineer, one Criticality Safety Engineer in Training, and Lynn Curry, the Nuclear Safety Manager.

The contractor retains a single criticality safety engineer on a part-time contract basis. This has not changed over the past several years and appears to be serving them well. The need for criticality engineer support is infrequent and rarely urgent. This level of support is adequate.

3. Status of Federal Criticality Safety Oversight Program

Federal NCS oversight staff consists of one qualified Federal Criticality Safety Engineer. RL has retained a single Federal criticality engineer for the past 6 years. This level of staffing has proved to be adequate to support the current mission.

4. Federal Assessments of Site NCS Programs

CHPRC:

Federal staff conduct regular operational oversight activities, scheduled surveillances, and assessments on a less frequent basis. Oversight activities this FY were limited to these regular oversight activities. Due to the reduction in active D&D work, programmatic assessments were not conducted this fiscal year. As the contractor conducts a comprehensive annual criticality safety management self-assessment, the Field Office utilizes this activity as a measure of contractor performance in criticality safety. This assessment utilizes the DOE-STD-1158 assessment criteria. The Field Office criticality engineer conducts active oversight of this assessment activity, reviews the report for adequacy and completeness, and conducts oversight of the corrective action process. Additionally, CHPRC conducts periodic self-assessment for cause. In September, 2008 CHPRC conducted a self-assessment of their criticality safety training program. This resulted in the identification of numerous low-level deficiencies and two findings.

The contractor's NCS evaluations are meeting the expectations and requirements of the DOE-STD 3007-2007. This process is described within the DOE-approved Criticality Safety Program Description Document.

WCH:

An annual criticality program self-assessment was conducted in September, 2008. The assessment resulted in the identification of minor observations that were resolved immediately.

For NCS evaluations of burial ground operations, WCH does not adhere to some of the requirement of the DOE-STD 3007-2007. However the evaluation process used is described within the DOE approved WCH Criticality Safety Program Description Document.

5. New Facility Design

No new facilities.

6. Trending and Analysis of Reportable and Non-reportable Nuclear Criticality Occurrences

CHPRC:

Site procedures require a formal tracking and trending process. Quarterly trending reports are developed from this data. However, due to the low number of nonconformances, there have been no recent identified trends

WCH:
Insufficient data exists for trending purposes. Due to the low number of nonconformances, there have been no identified trends.

7. Follow Up to Assessments

WCH:

There were five Issue Identification Forms (IIF) issued with *Independent Assessment Report QA&S-2007-009 of the WCH Criticality Safety Program,* performed 3/5/07 – 3/29/07, DocsOpen # 723679. The response to each IIF follows each issue:

IIF-2007-0327: Issue 1 of 1: The training and qualification program for individuals with the primary responsibilities for implementation of the CSP is not well defined nor is it consistently documented. There is no objective evidence of a DOE approved qualification program for staff and subcontractors responsible for implementing the CSP. There are no training program descriptions or minimum training criteria defined for the following positions that are identified in the CSP with implementation roles and responsibilities: Project Manager, Nuclear Safety Manager, Nuclear Analyst, Engineering Services Director, and Criticality Safety Alternate.

- A training program was developed with descriptions and minimum training requirements for the following positions that were identified in the CSP with implementation roles and responsibilities for Project Manager and/or Project Engineer, Nuclear Safety Manager, Nuclear Safety Analyst, and the Engineering Services Manager. (Section 3.0 of NS-1-1.1)
- Text was added to NS-1-1.1 Section 4 Criticality Safety Training stating that a training position description has been developed for those involved in implementation of the criticality safety program as identified the Action above. The TPD [training program description] includes required reading of NS-1-1.1,

NS-1-2.1, and NS-1-2.2 and a training class conducted by the Criticality Safety Engineer.

IIF-2007-0328: Issue 1 of 5: The guidance provided in the WCH CSP document and implementation procedures for a situation where mass exceeds the single parameter values is very sparse. Demonstration of incredibility in such a situation may require a criticality safety analysis report with detailed contingency analyses that are peer reviewed.

- A statement of how double contingency is met was added to Section 1.6 of NS-1-1.1 Rev 2.

IIF-2007-0328: Issue 2 of 5: There are multiple inconsistencies in the direction provided in the NS-1-2.2 *Criticality Safety Reviews* between Section 6.0 and Attachment 1 – Criticality Safety Review Process. Examples include inconsistent terms, reference to Exhibits that do not exist, and descriptions of enrichment values.

- The flow diagram provided in Attachment 1, which was applicable only to Revision 0 of NS-1-2.2, Criticality Safety Reviews, was removed.

IIF-2007-0328: Issue 3 of 5: There are roles and responsibilities differences between NS-1-1.1 and NS-1-2.2. For example the CSA [criticality safety alternate] is allowed to identify criticality safety limits in NS-1-1.1 and not allowed to do so in NS-1-2.2; the Engineering Services Director is mentioned in NS-1-1.1 and not mentioned in NS-1-2.2. In general, the consistency between these two documents needs attention.

- All roles and responsibilities are now stated in NS-1-1.1, and are duplicated in Sections 6.4 and 6.5 of NS-1-2.2.

IIF-2007-0328: Issue 4 of 5: There is no established programmatic process for maintaining configuration control of revisions to consensus standards. According to DOE Order 420.1B, the latest revision of a standard is to be used. The CSP does not have a requirements / standards implemented matrix or other type of mechanism that documents applicable standards.

- A new Section 9.2 was inserted in NS-1-1.1 listing all sections of ANSI/ANS-8 standards applicable to RCCC work when criticality is documented to not be credible under all normal and credible abnormal conditions

IIF-2007-0328: Issue 5 of 5: The approval page of the CSP document identifies the author of the document as the individual providing the concurrence signature. The approval signature is consistent with the roles and responsibilities in Section 2.2 of the CSP, however, there is not a Technical Reviewer / Subject Matter Expert signature identified.

- The approval page of NS-1-1.1 Rev 2 and Rev 3 was signed off by the backup WCH Criticality Safety Engineer signifying review and concurrence by an independent technical reviewer/subject matter expert.

IIF-2007-0329: Issue 1 of 2: The CSP document states that "For criticality to not be credible, it is required that, at a minimum, the double contingency principle of ANSI/ANS-8.1 be met, which will be documented and justified in the Criticality Safety Reviews" (per NS-1-1.1, Section 1.5, WCH Criticality Safety Program Determines CRD 420.1B Applicability). However, the justification and documentation of the double contingency principle is not evident in the Criticality Safety Reviews.

The CSR procedure indicates that it is sufficient to determine for the defined scope of work "that normal and credible abnormal conditions are subcritical" (per NS-1-2.2, Section 6.2, Initial Criticality Evaluation, and Step 2).

The CSRs typically argue that "there are no normal or any credible abnormal conditions that could lead to criticality."

The manner and extent to which the double contingency principle should be justified and documented in the CSRs should be clarified.

- A statement of how double contingency is met, which is the same for all CSRs, was added to Section 1.6 of NS-1-1.1.

IIF-2007-0329: Issue 2 of 2: Nine new sites with estimated quantities of fissionable material above SCML for U-235 were added to the CSR 0300X-CE-N0010 after February 23, 2006 (per draft revision 3 of the CSR). It appears that this represents addition of new sites to the scope of the WCH CSP. However, the guidance offered in the WCH CSP document for discovery or addition of new sites is limited to assigning a responsibility for a Project Engineer (PE): "Determines if a new or revised Criticality Safety Review is needed for proposed changes or discovered conditions." Given that the PE has no criticality safety expertise, it is not clear why the PE is not required to notify the CSE who is qualified to evaluate criticality safety of new conditions. This should be addressed.

- A statement that the CSE will receive an approved and documented calculation of material at risk or its equivalent, on which the Criticality Safety Engineer will base the CSR, was added to Section 7.1 of NS-1-1.1, which resulted in the addition of nine new sites to the cited draft CSR. Training Position Descriptions were added as part of Section 4.0 in NS-1-1.1 to formalize CSP training and documenting for Project Engineers, Nuclear Safety Analysts, and others having criticality safety responsibilities listed in NS-1-1.1.

IIF-2007-0330: Issue 1 of 2: WCH has essentially no in-house expertise at the CSE / CSA levels, which may result in long-term program continuity problems.

- Based on the amount of time and special subject matter expertise required to maintain the CSP (0.25 CSE person/year in 2006), WCH has been using two retired long-time Hanford CSEs through a subcontract on a part time basis. In addition, WCH has designated a full time WCH employee, Al Horner, as a Criticality Safety Engineer in Training. Based on his previous experience in criticality safety, he is being considered for grandfathering in as a CSE.

IIF-2007-0330: Issue 2 of 2: There are no Criticality Safety Limits established for WCH facilities or projects. Given this fact, the Criticality Safety Engineer and Criticality Safety Alternate have essentially the same job. Consideration should be given to eliminating the CSA position and having two qualified CSEs. This could be useful in peer checking.

- The position for CSA was eliminated in NS-1-1.1 and NS-1-2.2, and was replaced by Criticality Safety Engineer in Training, who can prepare Criticality Screening and Initial Criticality Evaluation forms (WCH-NS-005A and WCH-NS-005B). The program document and procedure stipulates that only a qualified CSE can sign Criticality Screening, Initial Criticality Evaluation, and Detailed Criticality Evaluation Summary forms.

IIF-2007-0331: Issue 1 of 2: There has not been an Independent or External Assessment of the CSP since January, 2000. This period of seven years is not consistent with the requirement for "external or independent assessments are conducted periodically."

- A requirement to perform an independent assessment of the CSP once every 3 years was added to Section 2.2 of NS-1-1.1. An action to perform the next independent assessment of the CSP in March 2010 was added to the Engineering Services Action Tracking System.

IIF-2007-0331: Issue 2 of 2: Safety Margin is used extensively in the CSP procedure NS-1-2.2, and is numerically defined as the "sum of the ratios" (see Step 1 in Section 6.2, Initial Criticality Evaluation). Sum of the ratios is indicative of the inventory of fissionable material; however it is not indicative of any of the subcritical safety factors. The numerical definition of Safety Margin is counterintuitive: increasing Safety Margin is equated with increasing inventories of fissionable material – these typically correlate with reduction in criticality safety margins. Safety Margin should not be set equal to the sum of the ratios (see Section 6.2 and Attachment 1 in NS-1-2.2).

- Statements clarifying the inverse relationship between Safety Margin and Sum of Fractions were added to Section 6.2 of NS-1-2.2. Attachment 1 in NS-1-2.2 was removed.

8. As applicable, provide status of any open issues identified in previous reports.

Presently there are no open issues.

Attachment 2

Bechtel National Inc. (BNI) Criticality Safety Program Annual Report

1. Measure of Contractor Nuclear Criticality Safety (NCS) Performance

The Office of River Protection (ORP) has no specified metrics established with the Contractor at this time. ORP performed an assessment of the Waste Treatment Plant (WTP) Criticality Safety Program early 2008 and found deficiencies in training/qualification record keeping, lack of management assessment of criticality safety, lack of summarized controls and limits in the Preliminary Documented Safety Analysis for criticality safety, and lack of Criticality Safety Evaluation Report (CSER) review with the Contractor AB Maintenance Procedure. The Contractor has committed to fixing these deficiencies. ORP will conduct a follow-up surveillance in FY 2009 to determine adequacy.

2. Status of Contractor Criticality Safety Engineer Program

The Contractor has one CSE involved with WTP criticality safety. There was a second CSE contracted to assist in the CSER development during last fiscal year. The Contractor stated that they are trying to re-hire this second CSE and expect to have the individual by mid-December 2008. At present, one CSE is on-site to handle criticality safety issues. The Contractor has indicated there is another staff member who is a CSE in-training. The DOE Criticality Safety Steering Group (CSSG) conducted a review of the WTP CSER in December 2008 and identified no major issues. The CSSG review team had no issue with the number of contractor staff CSEs supporting NCS at this time.

3. Status of Federal Criticality Safety Oversight Program

There is one (1) federal staff in ORP to perform NCS oversight of WTP. A second federal staff member from the RL Field Office is available to assist if needed. Currently the RL NCS staff member performs oversight of the criticality safety program at Hanford Tank Farms. The ORP staff member is currently going through the qualification standard DOE-STD-1173 and should be completed in FY 2009.

4. Federal Assessments of Site NCS Programs

An NCS assessment of the WTP criticality safety program was performed early in 2008. The report is in ORP letter, 08-WTP-026R1, dated April 15, 2008. The report identified two Findings and four Observations. The Contractor has issued a response letter with commitments to correct deficiencies. The DOE Criticality Safety Steering Group (CSSG) assessed the WTP Criticality Safety Evaluation Report (CSER) in December 2008. The final report is expected to be released in February 2009. While the review team affirmed the basic approach of the CSER they provided five (5) recommendations for change in the CSER, nine (9) opportunities for improvement, and identified one positive practice that the WTP contractor performed in support of criticality awareness training with their process and design engineers. The CSSG review team also provided a proposed DOE response to NCS issues raised by the Nuclear Regulatory Commission's report, "Review of the U.S.

Department of Energy's Regulatory Processes for the Hanford Waste Treatment Plant", dated August 4, 2008.

5. New Facility Design

The handling of large quantities of waste containing significant fissile material safely at WTP drove the requirement for a criticality safety program consistent with criticality consensus standards. The Pretreatment (PT) Facility was identified to require criticality safety limits in its design and construction, and operation of its waste process flow. The WTP CSER is mainly focused on PT. The DOE CSSG review team scheduled in December 2008 evaluated adequacy of criticality controls and the technical bases at WTP.

6. Trending and Analysis of Reportable and Non-reportable Nuclear Criticality Occurrences

As the Waste Treatment Plant is not an operating facility, criticality safety is not included in the project's nonconformance or occurrence processes.

7. Follow Up to Assessments

The CSSG WTP CSER review team recommended a follow-on review of the CSER in about 3 years. ORP concurs and supports this recommendation.

8. As applicable, provide status of any open issues identified in previous reports.

No open issues.

Attachment 3

CHG – Tank Farms Operations Criticality Safety Program Annual Report

1. Measure of Contractor Nuclear Criticality Safety (NCS) Performance

Nuclear Criticality Safety Performance Metrics have been established for the Washington River Protection Solutions criticality safety program. The metrics are:

- Nuclear Criticality Safety Staff participates in nuclear criticality safety workshops (or similar) on an annual basis.
- Perform regular management self-assessment of nuclear criticality safety program implementation. A Management Assessment of the Criticality Safety Program in February 2007 by the previous contractor. A new contractor has recently assumed the Tank Farms operation. The first management assessment is scheduled for February 2009.
- Qualify Criticality Safety Engineers and Criticality Safety Representatives (using DOE STD 1135-99 as a guide). Presently all criticality safety staff working in facilities and preparing evaluations are qualified to the Standard. Training and qualification were assessed as part of the management assessment process in February 2007.
- Frequent interaction of the Nuclear Criticality Safety Representatives with operations staff in operating facilities. Facility criticality safety programs emphasize participation of the CSR in facility walkdowns, job planning, interactions with operations.
- Perform quarterly criticality safety inspections of fissionable material storage areas/arrays and laboratory areas.
- Problem Evaluation Reports (PER) are tracked, trended and entered into a corrective action management system.

The contractor's performance in the areas monitored by performance metrics is acceptable. The contractor's criticality safety program is appropriately managed, adequately implemented and is functioning well. There is limited activity in criticality safety, as safety is assured through maintaining the tank chemistry (pH). Waste acceptance criteria ensure the chemistry does not vary outside safe parameters. The review of waste acceptance criteria indicates this program works well and involves the criticality staff at an appropriate level.

The Contractor could benefit from the addition of one additional Criticality Safety Representative having recently lost one of the two trained CSRs for Tank Farms. See discussion below:

2. Status of Contractor Criticality Safety Engineer Program

WRPS employs one Nuclear Safety Engineering Manager responsible for criticality safety, 1 qualified Criticality Safety Engineers on a task-order contract basis, and 1 qualified Criticality Safety Representatives. Two engineers are currently working on becoming qualified Criticality Safety Representatives. The ORP believes the contractor could benefit from the addition of a second qualified CSR and a backup.

Training is proceeding. When the two additional engineers become qualified as CSRs, staffing should be adequate based upon the mission needs.

3. Status of Federal Criticality Safety Oversight Program

The Federal NCS staffing level is one qualified Fed Criticality Engineer who provides support from the Richland Operations Office. ORP considers this staffing to be adequate based upon the level of activity.

4. Federal Assessments of Site NCS Programs

The Federal Criticality Safety SME reviews all the self assessments/inspections conducted by the contractor. They are adequate and complete.

The existing evaluations for Tank Farms operations were prepared a decade ago under a different set of requirements than current from DOE-STD 3007-2007. As DOE Order 420.1B is adopted, new NCS evaluations will use the current set of requirements.

5. New Facility Design

Currently there are no new facilities being designed.

6. Trending and Analysis of Reportable and Non-reportable Nuclear Criticality Occurrences

WRPS tracks criticality safety issues through the PER system. Three PERs in criticality safety were identified in 2008. All were low-level concerns and either have been closed or are in the process of being closed. Proceduralized review of new or modified operations within Tank Farms facilities has thus far precluded operational non-conformances with existing NCS limits and controls. However, periodic inspections, assessments, etc., have identified areas for programmatic improvement that result in the generation of the PERs mentioned above. Identified PERs pertain to:

- Program documentation and maintenance
- Requirements documentation

7. Follow Up to Assessments

An EM-supported review was conducted in June, 2008. The effectiveness of corrective actions from the Findings and Opportunities for Improvement identified during the FY2006 assessment were assessed and found to be acceptable.

8. As applicable, provide status of any open issues identified in previous reports

Presently there are no significant open issues. One minor issue is open (PER-2008-1918). This issue is related to documenting that the 616 building (a solid waste storage site) should not receive non-tank farm waste without a criticality safety review. (Note that it currently does not receive non-tank farm waste.)

Attachment 4

Paducah Remediation Services (PRS)
Criticality Safety Program Annual Report

1. Measure of Contractor Nuclear Criticality Safety (NCS) Performance

A formal set of performance metrics is used to track the PRS NCS program implementation at Paducah.

The number of Anomalous Condition Reports (ACRs), the amount of field time for NCS engineers, continuing education of NCS engineers, number of surveillances, assessments, anomalous conditions and lessons learned.

PRS provides a quarterly NCS metrics report. Three ACRs were generated in fiscal year 2008. The three ACRs involve the discovery of legacy fissile materials.

The PRS Quality Assurance Program monitors and assesses the implementation and performance of the NCS Program. In addition, PRS and the DOE oversight staff perform Implementation Verification Review (IVRs) of the NCS Program implementation following updates to the safety basis documents. A DOE assessment of the PRS NCS Program implementation is scheduled to be performed as part of the annual ISMS assessment planned for the last week of March 2009. DOE oversight also includes routine monitoring of program implementation by the Facility Representatives.

The PRS NCS program meets DOE PPPO expectations. The PRS scope of work involves operations that do not pose a high risk of criticality. The U-235 enrichment of fissile material is typically less than 2.0 weight percent. The NCS Program is well documented. The PRS staff is knowledgeable and experienced at the Paducah Site.

PPPO regularly meets with PRS NCS staff to coordinate the integration of NCS Program requirements with the safety basis.

2. Status of Contractor Criticality Safety Engineer Program

Based on the current level of contractor activity, 1.25 NCS Staff Full Time Equivalents (FTEs) are required to support the mission at the Paducah site. PRS has 1.25 NCS Staff FTEs. Therefore PRS has no staffing shortfalls.

Based on the performance of the PRS NCS Program, PPPO management has affirmed the current PRS staffing adequate.

3. Status of Federal Criticality Safety Oversight Program

Based on the current level of activity at the Paducah site, and the contractor's NCS Program, PPPO needs only limited NCS SME oversight.

PPPO has one Safety Systems Oversight (SSO) lead. He provides oversight for the PRS NCS Program. However, he has multiple responsibilities and has limited time to provide oversight. In addition, PPPO utilizes two Facility Representatives at each site to provide oversight on safety management programs (including the NCS Program). PPPO also has a support contractor that assists in oversight of the contractor.

PPPO is increasing the number of Federal oversight staff at the Portsmouth and Paducah sites. Positions for additional Facility Representatives have been posted. In addition, positions for PPPO nuclear safety staff are being developed.

PPPO management is aware of the staffing needs and is taking action to increase oversight capabilities.

4. Federal Assessments of Site NCS Programs

DOE has conducted one assessment of the PRS NCS program since the start of the PRS contract. A second assessment is scheduled for the end of March 2009.

The NCSEs have been evaluated as part of safety basis document reviews and as part of the Implementation Verification Reviews (IVRs) conducted for updated safety basis documents. The evaluation concluded that the NCS Program is compliant with DOE requirements.

5. New Facility Design

PPPO has constructed a new facility at the Paducah Site. The new facility is designed to process UF6. The UF6 is depleted in the U-235 isotope. The NCS Program for the facility is limited to prohibiting the introduction of fissile material into the facility. The facility is scheduled for startup in 2010.

PPPO has reviewed and approved the design and procurement of the conversion facility through the 10 CFR 830 safety basis process.

6. Trending and Analysis of Reportable and Non-reportable Nuclear Criticality Occurrences

The PRS NCS Manager analyzes the ACRs and identifies the trend in causes. The corrective actions are tracked through the PRS Issues and Corrective Actions Tracking System.

Based on the PRS trend analysis, management problems related to prior operations at the site are the leading cause of anomalous conditions. The PRS contract scope is to disposition the radiological waste generated from the gaseous diffusion plant (ship to off-site waste disposal facilities) Most ACRs involve the discovery of conditions that differ from prior accepted knowledge. These conditions have generally been assigned to "Management Problems".

PRS reviews the trend analysis quarterly and any trend identified has a cause analysis performed that results in a CAP for the Root Cause and any contributing items.

7. Follow Up to Assessments

PPPO has followed up on the effectiveness of corrective actions for prior assessments. A PPPO assessment of the PRS NCS Program was performed at the end of March 2008.

PPPO determined that the corrective actions related to a failure in characterization results affecting NCS were determined to be effective.

Attachment 5

Portsmouth LATA Parallax
Criticality Safety Program Annual Report

1. Measure of Contractor Nuclear Criticality Safety (NCS) Performance

A formal set of performance metrics have been developed to track the LPP NCS program implementation at Portsmouth. LPP NCS maintains a schedule of Walkdowns and tracks open Walkdown Items.

The number of Anomalous Condition Reports (ACRs) and NCS related Problem Reports (PRs) are tracked and trended. Additionally, Walkdown performance and open items, Field support Time, Training Support, Education, and scheduled Assessments are tracked.

ACRs, NCS related PRs , and NCS Walkdowns were reported in 2008.

The LPP Quality Assurance program is used to formally monitor and assess the implementation and performance of the NCS Program. In addition, LPP and the DOE oversight staff perform Implementation Verification Review (IVRs) of the NCS Program implementation following updates to the safety basis documents. A DOE IVR was performed for the LPP DSA/TSR that encompassed the NCS Program in September 2008. DOE oversight also includes routine monitoring of program implementation by the Facility Representatives.

As evidenced in the Issue Reports from the 2007 DOE assessment, the LPP NCS program was not meeting DOE PPPO expectations from the previous year. LPP has developed corrective actions and implemented changes to address these deficiencies as determined from the assessment findings and observations. The overall NCS program over 2007 through October 2008 has improved as determined from the DOE assessment conducted in October 2007. This assessment concluded that the NCS program is compliant with DOE requirements.

PPPO is increasing its oversight of the LPP contractor. PPPO will perform readiness assessments for several new operations that involve limited processing of fissile bearing materials. DEO EM HQ staff has been invited to assist in the assessment process.

2. Status of Contractor Criticality Safety Engineer Program

Based on the current level of contractor activity, two NCS Staff Full Time Equivalents (FTEs) are required to support the mission at the Portsmouth site. Currently LPP has 2 NCS engineer FTEs, including availability of subcontractor staff. LPP currently has a posting for an NCS engineer to replace the subcontract employee.

PPPO has affirmed adequacy of the LPP NCS Program staffing.

3. Status of Federal Criticality Safety Oversight Program

Based on the current level of activity at the Portsmouth site and the planning for D&D, PPPO needs approximately 0.5 FTE.

PPPO has one Safety Systems Oversight (SSO) lead. This individual provides oversight for the LPP NCS Program. However, he has multiple responsibilities and has limited time to provide oversight. In addition, PPPO utilizes two Facility Representatives at each site to provide oversight on safety management programs (including the NCS Program). PPPO is in the process of hiring an additional Facility Representative for each site. The third Facility Representative has been hired for the Portsmouth Site. PPPO also has support contractors that assist in oversight of the LPP NCS Program.

PPPO is increasing the number of Federal oversight staff at the Portsmouth and Paducah sites. Positions for additional Facility Representatives have been posted, and are in the process of being filled. In addition, positions for PPPO nuclear safety staff are being developed.

PPPO management is aware of the staffing needs and is taking action to increase oversight capabilities.

4. Federal Assessments of Site NCS Programs

A DOE assessment of the LPP NCS program was conducted in October 2007. The assessment concluded that the NCS Program is compliant with DOE requirements.

The DOE assessment identified areas for improvements. LPP developed a Corrective Action Plan (CAP) in response to the DOE assessment. PPPO approved the CAP, and is ensuring that the CAP is being adequately implemented. The CAP includes the following corrective actions:

- LPP will utilize a consultant(s) to perform functional reviews and perform periodic assessments to determine the overall effectiveness of the NCS program.
- The NCS Program shall determine the measurement performance to support the assumptions and analysis within the NCSE.
- A written review of NCSE-SM-ERWM-013R01 General Batching of Solutions shall be completed covering the failure modes associated with the characterization process and the effects that the various failures on NCS could have.
- Review and identify the appropriate training to encompass "Hazard Identification Methods / Scenario Development" and determine the appropriate method to incorporate this training into NCS staff training requirements.
- Review data and properly mark drum(s) to ensure compliance to NCSE and storage array and area to ensure all drums are properly labeled.
- Review previous ICATS / Anomalous Condition Reports and identify the corrective measures taken to prevent re-occurrence of improper drum storage and perform a trend analysis, in accordance to LPP-NS-1003 section L, covering FY2006 – 2007.
- Review Nuclear Criticality Safety posting to determine possible improvements for communicating through simplicity and clarity.
- Review the NCSE process to determine the effectiveness and manner in which criticality safety evaluations are performed and written showing that all credible scenarios have been identified and that adequate controls have been developed in order to facilitate effective independent review.

5. New Facility Design

PPPO has constructed a new facility at the Portsmouth Site. The new facility is designed to process UF6. The UF6 is depleted in the U-235 isotope. The NCS Program for the facility is limited to prohibiting the introduction of fissile material into the facility. The facility is scheduled for startup in 2010.

DOE has approved the design of the facility PPPO has reviewed and approved the design and procurement of the conversion facility through the 10 CFR 830 safety basis process.

6. Trending and Analysis of Reportable and Non-reportable Nuclear Criticality Occurrences

LPP utilizes the ACR and Problem Reporting processes to track NCS occurrences. Trending is performed quarterly by LPP QA.

A review of the ACRs and associated problem reports indicate that the principle weakness in the NCS Program is the adherence to procedures. This is consistent with results of recent LPP trend reporting.

Corrective actions have been developed and will address the weakness associated with non-compliance with procedures.

7. Follow Up to Assessments

PPPO is currently performing follow up on the corrective actions from the first DOE assessment.

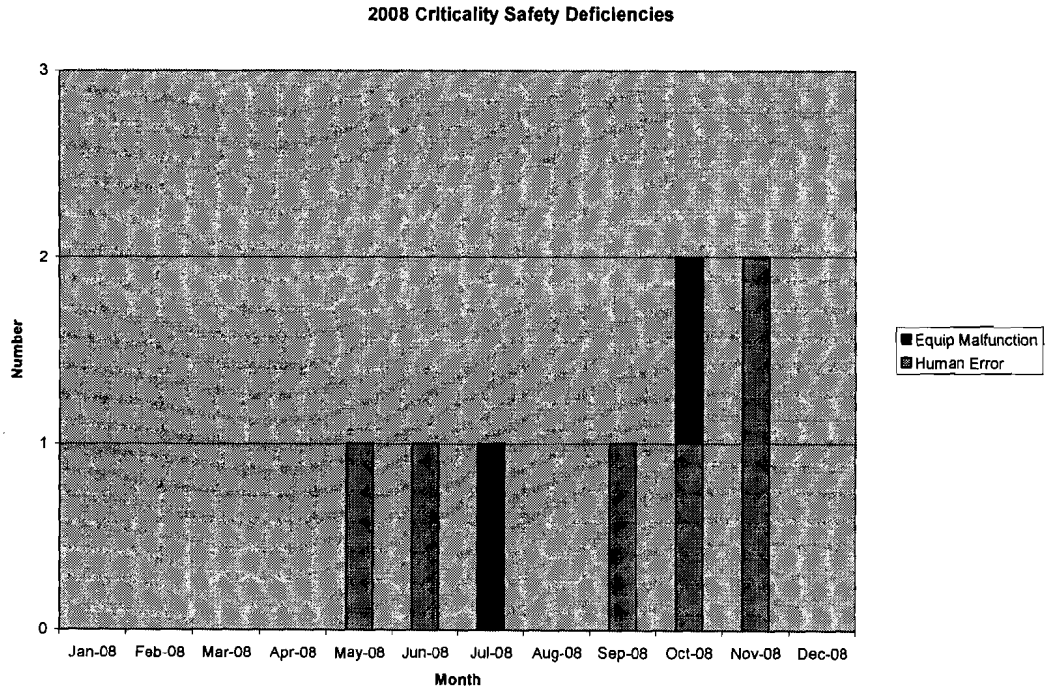
Attachment 6

Idaho Environmental Management AMWTP/BBWI Criticality Safety Program Annual Report

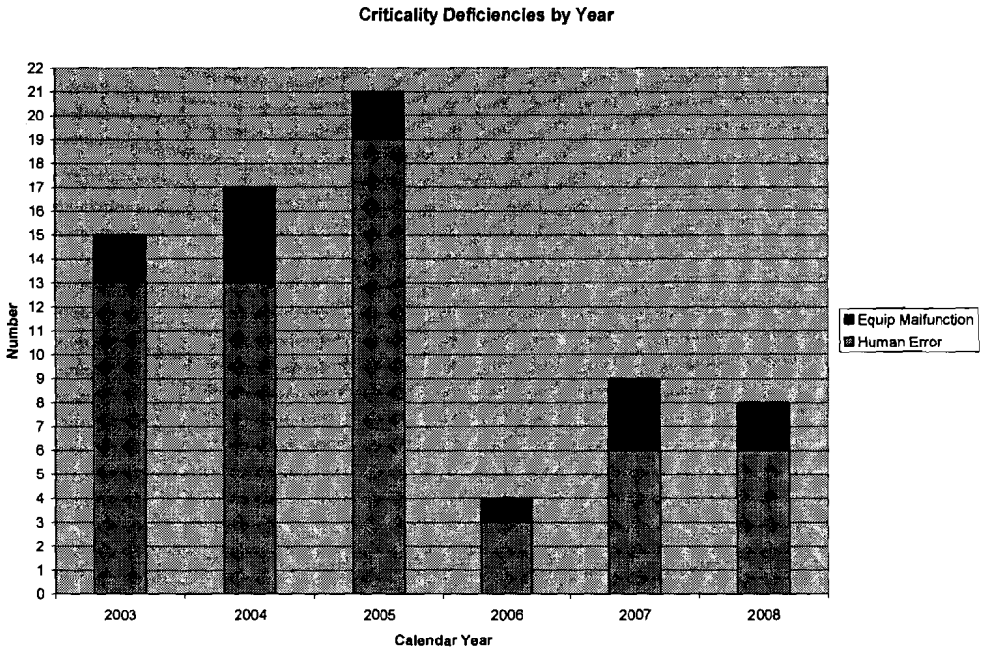
1. Measure of Contractor Nuclear Criticality Safety (NCS) Performance

A set of metrics to monitor contractor NCS performance is used to monitor contractor NCS performance.

- Advanced Mixed Waste Treatment Project (AMWTP) / Bechtel Babcock-Wilcox Technologies (BBWI): The Safety Performance Objectives, Measures, and Commitments for the AMWTP include tracking/trending of Criticality Safety deficiencies. (see Attachment) This tracking/trending includes all deficiencies with an impact or potential impact on Criticality Safety, regardless of severity.



AMWTP Criticality Deficiencies, CY 2008



AMWTP Criticality Deficiencies, by Year AMWTP Criticality Deficiencies, CY 2008

Noncompliance Date	Discovery / Report Date	Description	Comments / Disposition
5/2/08		Two operators performed a batch promotion for three drums after ETR and missed the fact that there was a mismatch between the Fissile Gram Equivalent (FGE) values for FTS and WTS.	
6/18/08		While cycling a circuit breaker thought to control a soft drink machine, the Criticality Incident Detection and Alarm System (CIDAS) was tripped, activating the Keep Out Warning Lights (KOWL).	
7/1/08		Bar code scanner misread a package ID, assigning the packet's FGE value to another container.	The packet assay value was assigned to a puck drum.
9/29/08	9/29/08	Exponent misread on an assay result. High-FGE Box was subsequently stored out of compliance.	Upon discovery of assay-reported value, the box was relocated to the ISA.
10/13/08	10/13/08	Waste material removed from the Supercompactor not tracked.	55-gallon drums loaded with TRU (or potentially TRU) waste must either, a) have the FGE value entered into WTS, or b) have a mass

			loading verification worksheet, such as a paper traveler.
	10/16/08	Software parameter used for assaying 83/85 gallon drums was discovered to be incorrect, and resulted in a non-conservative error in the calculated fissile mass of the drums' contents.	Possible effect on > 1000 83/85 gallon drums.
	11/2/08	Box assay value upgraded beyond 380 FGE. Box handled as USA box.	Notification not made by ETR.
Nov. 2008	11/10/08	Discrepancy discovered in Supercompactor Glovebox (re: Number of "Squeezant" containers)	More containers were discovered than the number of containers filled since previous Criticality Cleanout. Commingling assumed.

- The measures indicate heightened Criticality Safety awareness. Though lesser deficiencies are being tracked, the trend is decreasing.

2. Status of Contractor Criticality Safety Engineer Program

Three full-time BBWI employees (two criticality safety officers; one criticality safety engineer), one full time criticality engineer from Nuclear Safety Associates, and one part time subcontract criticality engineer. Current staffing analysis allows for two criticality safety officers, one in-house criticality engineers, and 1 ½ subcontract criticality engineers.

The DOE Field Management analysis of the adequacy of contractor's NCS staffing is that the contractor has adequate staffing for current activities.

Although no major new work is anticipated, a criticality engineer qualification program is in place and one criticality safety engineer is undergoing qualification activities.

3. Status of Federal Criticality Safety Oversight Staffing

The federal staffing level is 2 ½, with additional support from EM technical personnel. The ID Safety Division has one very experienced full time person as well as a staff person who shares responsibility for Nuclear Safety. Both are fully qualified to the DOE qualification standard. Another staff is part time and qualified to the apprentice level.

The EM side of ID has four individuals with Nuclear Safety and Criticality Safety responsibilities. All four have participated in a university NCS short course, various computer training courses (SCALE and MCNP), and DOE ID Criticality Safety Training sessions and are training to the federal standard.

4. Federal Assessments of Site NCS Programs

Quarterly NCS assessments are conducted by ID staff.

Assessment #	Type	Subject	Earliest Start	Planned Finish	Lead Assessor	Complete
AST-ID-10/25/2007-28282	Assessment	Criticality Safety - Materials control.	1/1/2008	3/31/2008	GARCIA, ADOLF S	Yes
AST-ID-12/18/2007-11185	Surveillance	Criticality Safety, Ch 6 Material Control, BBWI	2/1/2008	2/29/2008	GARCIA, ADOLF S	Yes
AST-ID-12/18/2007-58472	Surveillance	Criticality Safety, Ch 6 Material Control, CWI	2/1/2008	2/29/2008	GARCIA, ADOLF S	Yes
AST-ID-7/28/2008-70023	Surveillance	BEA Criticality Safety Program Surveillance (4th Quarter FY 2008): Process Evaluation for Criticality Safety and Planned Response to Criticality Accidents	7/1/2008	9/30/2008	GARCIA, ADOLF S	Yes
AST-ID-7/28/2008-85795	Surveillance	CWI Criticality Safety Program Surveillance (4th Quarter FY 2008): Process Evaluation for Criticality Safety and Planned Response to Criticality Accidents	7/1/2008	9/5/2008	GARCIA, ADOLF S	Yes
AST-OS-6/9/2008-14877	Surveillance	BEA 3rd Quarter, FY08 Criticality Safety Assessment; DOE-STD-1158, Sections 3 and 4	4/1/2008	6/2/2008	GARCIA, ADOLF S	Yes
AST-OS-	Surveillance	CWI 3rd Quarter,	4/1/2008	6/2/2008	GARCIA,	Yes

6/9/2008-52275		FY08 Criticality Safety Assessment; DOE-STD-1158, Sections 3 and 4			ADOLF S	
AST-ID-10/25/2007-28282	Assessment	Criticality Safety - Materials control.	1/1/2008	3/31/2008	GARCIA, ADOLF S	Yes
AST-ID-12/18/2007-11185	Surveillance	Criticality Safety, Ch 6 Material Control, BBWI	2/1/2008	2/29/2008	GARCIA, ADOLF S	Yes
AST-ID-12/18/2007-58472	Surveillance	Criticality Safety, Ch 6 Material Control, CWI	2/1/2008	2/29/2008	GARCIA, ADOLF S	Yes
AST-ID-7/28/2008-70023	Surveillance	BEA Criticality Safety Program Surveillance (4th Quarter FY 2008): Process Evaluation for Criticality Safety and Planned Response to Criticality Accidents	7/1/2008	9/30/2008	GARCIA, ADOLF S	Yes
AST-ID-7/28/2008-85795	Surveillance	CWI Criticality Safety Program Surveillance (4th Quarter FY 2008): Process Evaluation for Criticality Safety and Planned Response to Criticality Accidents	7/1/2008	9/5/2008	GARCIA, ADOLF S	Yes
AST-OS-6/9/2008-14877	Surveillance	BEA 3rd Quarter, FY08 Criticality Safety Assessment; DOE-STD-1158, Sections 3 and 4	4/1/2008	6/2/2008	GARCIA, ADOLF S	Yes
AST-OS-6/9/2008-52275	Surveillance	CWI 3rd Quarter, FY08 Criticality Safety Assessment;	4/1/2008	6/2/2008	GARCIA, ADOLF S	Yes

		DOE-STD-1158, Sections 3 and 4				
AST-ID-7/28/2008-83323	Surveillance	BBWI Criticality Safety Program Surveillance (4th Quarter FY2008): Process Evaluation for Criticality Safety and Planned Response to Criticality Accidents	7/1/2008	9/5/2008	NEIL, DAVID M	Yes
AST-OS-6/9/2008-93587	Surveillance	BBWI 3rd Quarter, FY08 Criticality Safety Assessment; DOE-STD-1158, Sections 3 and 4	4/1/2008	6/2/2008	NEIL, DAVID M	Yes

The contractor's self assessments were evaluated for adequacy. No issue was identified. Contractor Criticality Safety Programs are functioning currently at a level that will ensure facility safety.

As CSEs are revised or new CSEs are developed, the guidance of DOE-STD-3007-2007 is being applied.

5. New Facility Design

No EM funded facilities at Idaho will need a criticality safety program. (Note: IWTU will process liquids with no criticality risk, ARP-3 is just a continuation of currently designed facilities).

6. Trending and Analysis of Reportable and Non-reportable Nuclear Criticality Occurrences

NCS occurrences are tracked and trended using ORPS and contractor controlled List of Deficiencies.:

BBWI ORPS:

- 10/13/2008 - EM-ID--BBWI-AMWTF-2008-0014. After evaluating recent events at the Advanced Mixed Waste Treatment Project (AMWTP) that - individually - did not rise to the level of ORPS reportability, AMWTP line management identified several common issues with executing "general use" procedures. Most of the issues involved either a knowledge-based error of a procedure requirement or a lack of a follow-up to ensure the requirement was met. (Deficiencies contributing to this ORPS report are identified below with asterisk*)

- 10/16/2008 - EM-ID—BBWI-AMWTF-2008-0015. PISA. Software parameter used for assaying 83/85 gallon drums was discovered to be incorrect, and resulted in a non-conservative error in the calculated fissile mass of the drums' contents.
- 11/10/2008 - EM-ID—BBWI-AMWTF-2008-0018. TSR, SAC violation. Discrepancy discovered in Supercompactor Glovebox (re: Number of Squeezant containers).

BBWI List of Deficiencies:

- 5/2/2008 - Two operators performed a batch process for three drums after Expert Technical Review and missed the fact that there was a mismatch between the Fissile Gram Equivalent (FGE) values for the Fissile Tracking System (FTS) and the Waste Tracking System (WTS).
- 6/18/2008 – While cycling a circuit breaker thought to control a soft drink machine, the Criticality Incident Detection and Alarm System (CIDAS) was tripped, activating the Keep Out Warning Lights (KOWL).
- 7/1/2008 – Bar code scanner misread a package ID, assigning the packet's FGE value to another container.
- 9/29/2008 – Exponent misread on an assay result. High-FGE Box was subsequently stored out of compliance.
- 10/13/2008 - Waste material removed from the Supercompactor not tracked.
- 11/2/2008 - Box assay value upgraded beyond 380 FGE.

7. Follow Up to Assessments

None of the assessments identified any shortcomings so no follow-up assessments were scheduled.

8. As applicable, provide status of any open issues identified in previous reports.

No open issues.

Attachment 7

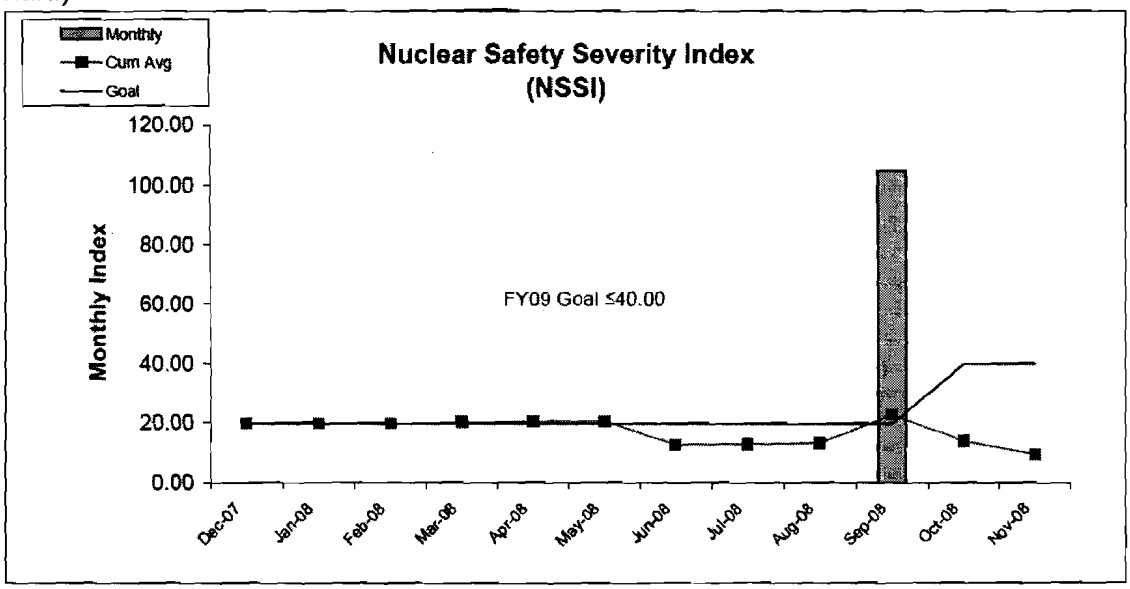
Idaho Environmental Management ICP/CWI Criticality Safety Program Annual Report

1. Measure of Contractor Nuclear Criticality Safety (NCS) Performance

A set of metrics to monitor contractor NCS performance is used to monitor contractor NCS performance.

The Safety Performance Objectives, Measures, and Commitments for the ICP include the Nuclear Safety Severity Index (NSSI). ICP is managed by CWI. The NSSI is calculated as follows. Only ORPS reportable events in Group 3, Subgroups A and C and Group 4, Subgroup A, B (2), and B (3) are included. The goal is to maintain the NSSI less than 20. It is reported as a rolling 12 month average (see attached "CWI Nuclear Safety Severity Index"

chart.)



	Dec-07	Jan-08	Feb-08	Mar-08	Apr-08	May-08	Jun-08	Jul-08	Aug-08	Sep-08	Oct-08	Nov-08
Goal	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	40.00	40.00
Monthly	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00
Cum Avg	19.73	19.89	19.86				12.89	13.04	13.42		14.14	9.75

Definition

This is an index of severity of ORPS reports related to TSR violations, criticality safety events, or degradation of SSCs. NSSI = 200,000 *4 [(Event 1/(SigCati) + (Event 2/SigCati) + (Eventi/SigCati)...] / Hours Worked. The weighting factors are further described in the SPOMC submittal letter, CCN307621 of October 28, 2008.

Desired performance is below the annual goal of 40. This goal more accurately reflects current performance and provides consistency across the site companies.

Analysis

There were no events in November.

Actions

No actions planned at this time.

Goals

Annual Performance Goal is ≤40.00.
Monthly Grading Criteria: Blue (0.00-20.00), Green (20.01-30.00), Yellow (30.01-40.00), Red (>40.00).
Cum Avg: Blue (<20.00), Green (20.01-30.00), Yellow (30.01-40.00), Red (>40.00).

Points of Contact

Responsible Manager: J. L. Harvey (3-0849)
SME: R. G. Peatross (520-6662)
POC: M. D. Allred (3-6294)

2. Status of Contractor Criticality Safety Engineer Program

The staffing level of CWI's NCS program is three full time CWI engineers, two full time subcontractors, and one full time administrative support.
The DOE-ID analysis of this staffing is that it is adequate

3. Status of Federal Criticality Safety Oversight Program

The federal staffing level is 2 ½, with additional support from EM technical personnel. The ID Safety Division has one very experienced full time person as well as a staff person who shares responsibility for Nuclear Safety. Both are fully qualified to the DOE qualification standard. Another staff is part time and qualified to the apprentice level.

The EM side of ID has four individuals with Nuclear Safety and Criticality Safety responsibilities. All four have participated in a university NCS short course, various computer training courses (SCALE and MCNP), and DOE ID Criticality Safety Training sessions and are training to the federal standard.

4 Federal Assessments of Site NCS Programs

Assessment #	Type	Subject	Earliest Start	Planned Finish	Lead Assessor	Complete
AST-ID-10/25/2007-28282	Assessment	Criticality Safety - Materials control.	1/1/2008	3/31/2008	GARCIA, ADOLF S	Yes
AST-ID-12/18/2007-11185	Surveillance	Criticality Safety, Ch 6 Material Control, BBWI	2/1/2008	2/29/2008	GARCIA, ADOLF S	Yes
AST-ID-12/18/2007-58472	Surveillance	Criticality Safety, Ch 6 Material Control, CWI	2/1/2008	2/29/2008	GARCIA, ADOLF S	Yes
AST-ID-7/28/2008-70023	Surveillance	BEA Criticality Safety Program Surveillance (4th Quarter FY 2008): Process Evaluation for Criticality Safety and Planned Response to Criticality Accidents	7/1/2008	9/30/2008	GARCIA, ADOLF S	Yes
AST-ID-7/28/2008-85795	Surveillance	CWI Criticality Safety Program Surveillance (4th Quarter FY 2008): Process Evaluation for Criticality Safety and Planned Response to Criticality Accidents	7/1/2008	9/5/2008	GARCIA, ADOLF S	Yes

AST-OS-6/9/2008-14877	Surveillance	BEA 3rd Quarter, FY08 Criticality Safety Assessment; DOE-STD-1158, Sections 3 and 4	4/1/2008	6/2/2008	GARCIA, ADOLF S	Yes
AST-OS-6/9/2008-52275	Surveillance	CWI 3rd Quarter, FY08 Criticality Safety Assessment; DOE-STD-1158, Sections 3 and 4	4/1/2008	6/2/2008	GARCIA, ADOLF S	Yes
AST-ID-10/25/2007-28282	Assessment	Criticality Safety - Materials control.	1/1/2008	3/31/2008	GARCIA, ADOLF S	Yes
AST-ID-12/18/2007-11185	Surveillance	Criticality Safety, Ch 6 Material Control, BBWI	2/1/2008	2/29/2008	GARCIA, ADOLF S	Yes
AST-ID-12/18/2007-58472	Surveillance	Criticality Safety, Ch 6 Material Control, CWI	2/1/2008	2/29/2008	GARCIA, ADOLF S	Yes
AST-ID-7/28/2008-70023	Surveillance	BEA Criticality Safety Program Surveillance (4th Quarter FY 2008): Process Evaluation for Criticality Safety and Planned Response to Criticality Accidents	7/1/2008	9/30/2008	GARCIA, ADOLF S	Yes
AST-ID-7/28/2008-85795	Surveillance	CWI Criticality Safety Program Surveillance (4th Quarter FY 2008): Process Evaluation for Criticality Safety and Planned Response to Criticality Accidents	7/1/2008	9/5/2008	GARCIA, ADOLF S	Yes
AST-OS-6/9/2008-14877	Surveillance	BEA 3rd Quarter, FY08 Criticality Safety Assessment; DOE-STD-1158, Sections 3 and 4	4/1/2008	6/2/2008	GARCIA, ADOLF S	Yes
AST-OS-6/9/2008-52275	Surveillance	CWI 3rd Quarter, FY08 Criticality Safety Assessment; DOE-STD-1158, Sections 3 and 4	4/1/2008	6/2/2008	GARCIA, ADOLF S	Yes
AST-ID-	Surveillance	BBWI Criticality Safety	7/1/2008	9/5/2008	NEIL,	Yes

7/28/2008-83323		Program Surveillance (4th Quarter FY2008): Process Evaluation for Criticality Safety and Planned Response to Criticality Accidents			DAVID M	
AST-OS-6/9/2008-93587	Surveillance	BBWI 3rd Quarter, FY08 Criticality Safety Assessment; DOE-STD-1158, Sections 3 and 4	4/1/2008	6/2/2008	NEIL, DAVID M	Yes

5. **New Facility Design**

No EM funded facilities at Idaho will need a criticality safety program. (Note: IWTU will process liquids with no criticality risk, ARP-3 is just a continuation of currently designed facilities).

6. **Trending and Analysis of Reportable and Non-reportable Nuclear Criticality Occurrences**

NCS occurrences are tracked and trended using ORPS and contractor controlled List of Deficiencies.

- ORPS Reports: The first ORPS report involves incorrectly loading fuel into a shipping cask. The cask loading procedure was incorrectly revised resulting in a violation of criticality safety controls and the TSR. Subsequent analysis was performed to show the as loaded configuration was safe. The second ORPS report involves storing fuel in the wrong storage port of a storage rack. This was a procedure violation; however criticality safety analysis was in place to allow storage in this configuration. The third ORPS report involves discovery of legacy fuel in the facility. This fuel was thought to have been shipped out of the facility years ago under a different contractor.

EM-ID--CWI-FUELRCSTR-2008-0006	Fuel incorrectly loaded into cask.
EM-ID--CWI-FUELRCSTR-2008-0007	Failure to store fuel in accordance with procedure..
EM-ID--CWI-FUELRCSTR-2008-0011	Discovery of fuel at fuel storage area.

7. **Follow Up to Assessments**

None of the assessments identified any shortcomings so no follow-up assessments were scheduled.

8. **As applicable, provide status of any open issues identified in previous reports.**

None.

Attachment 8

Savannah River Criticality Safety Program Annual Report

1. Measure of Contractor Nuclear Criticality Safety (NCS) Performance

The Savannah River Site (SRS) Management and Operating (M&O) and Liquid Waste Operations (LWO) contractors have established metrics to monitor contractor NCS performance. The Salt Waste Processing Facility (SWPF) contractor has not.

The M&O and LWO Nuclear Criticality Safety Review Committee (NCSRC) maintains a criticality safety indicator based on reportable and nonreportable occurrences that are reported into a site database. The database includes items from M&O facilities as well as Liquid Waste facilities. A rating scale is used to score each reportable and nonreportable occurrence. On a quarterly and annual basis, the cumulative score, and the number of reportable and nonreportable occurrences in each rating bin, are presented to and reviewed by the NCSRC. Cause codes for each occurrence are also compiled and tracked to determine the major causes of the occurrences. A goal is established by the NCSRC on an annual basis to reduce the number of occurrences in the groupings having the highest number of occurrences.

DOE O 232.1 reporting criteria were revised effective in 2003. The M&O/LWO database for reportable and non-reportable events came on line about the same time. However, full site-wide implementation of the database did not occur until 2005. Therefore, a consistent set of data is available for calendar years 2005 through 2008. For M&O and Liquid Waste facilities, the indicator score for 2005 included 62 total events (4 criticality alarm system issues, 37 minor events < procedure limit, 20 procedure limit violations, 1 TSR level; total score = 144). The results for 2006 showed improvement with 49 events (3 criticality alarm system issues, 31 minor events < procedure limit, 12 procedure limit violations, 3 TSR level; score = 119) - a reduction in total score of approximately 20%. For 2007, indicator results approved again with 43 events (5 criticality alarm system issues, 31 minor events < procedure limit, 6 procedure limit violations, 1 TSR level; score = 91) - a reduction of about 24% compared to 2006. Based on 2006 results, a goal was established for 2007 to reduce the number of instrument problems and human performance problems by 20%. The goal was met. However, the number of management problems and communication problems increased during 2007. Management recognized that human performance was a general site issue that required continuing efforts for improvement. Therefore, during 2007 and 2008, a series of Human Performance Improvement training sessions were provided to site management and engineers. Through the end of the 3rd quarter, 2008 there have been 29 events related to criticality safety (2 criticality alarm system issues, 20 minor events < procedure limit, 7 procedure limit violations; score = 63) - a modest improvement versus 2007 results on a quarterly basis. None of the events for 2008 were pertinent to LWO facilities.

The M&O Contractor's Criticality Safety Program Development & Site Support organization also prepares a quarterly criticality safety Performance Assessment (PA) using the same data (including both M&O and LWO facilities). However, the PA examines the data more closely on a facility by facility basis. If a facility is experiencing an unusually high number of reportable or nonreportable occurrences, or a higher than expected number of the same type of problem, or unusually special or severe problems, the facility is placed on the "watch list" or a recurring event is declared. Currently, no facilities are on the watch list. The PA also identifies other

areas that affect the efficiency of activities. In 2007, the PA identified the need for improved dedicated personal computers (PCs) for criticality safety engineers to perform criticality safety calculations for M&O facilities. The existing dedicated PCs were outdated and slow. One of the major improvements during M&O contractor transition in August, 2008, was the purchase of new dedicated PCs in the M&O facilities

Previously, the M&O Contractor tracked criticality safety engineer interactions with the facilities. The QI program was developed as a response to a DOE-HQ Criticality Audit conducted in CY 2000 and tracked a set of six measures of NCS staff interactions with facility staff to ensure the criticality engineers were effectively integrating with facility staff personnel. The requirement to perform these activities has subsequently been incorporated into the M&O/LWO criticality safety manual, SCD-3.

For the SWPF, no metrics have yet been established for monitoring contractor performance in NCS. The SWPF project, just recently granted CD-3 approval, has not matured sufficiently for such metrics to be established.

In addition to the PI's above, the M&O/LWO Contractors have a rigorous and active self-assessment process. Performance is reviewed using the lines of inquiry established in DOE-STD-1158. In addition, several facilities have undergone Operational Readiness Reviews and Readiness Assessments which also verified adequacy of the criticality program implementation (e.g., Actinide Removal/Modular Caustic Side Solvent Extraction Unit (ARP/MCU) in LWO.) Trained criticality safety technicians, working together with facility engineers and at least one criticality safety engineer, perform criticality safety facility self assessments. Some items identified during 2008 include:

- need to avoid criticality alarm system evacuation routes that traverse contaminated areas,
- evacuation routes should be revised to acknowledge the absence of credible scenarios in specific areas,
- more training is needed for firefighters on the criticality safety aspects of firefighting,
- a few design changes were not transmitted to criticality safety engineer for review,
- signs must be maintained in place related to firefighting and moderator control areas, and
- a few instances have occurred in which an operator recorded an incorrect value.

In addition to its self-assessment program, the M&O Contractor received feedback on its program from Federal assessments. These assessments are described more fully in Item 4 below, but include assessment activities such as the March/April 2006 DOE-EM program assessment and DOE-SR Field Office DOE-STD-1158 based assessments.

The 2006 DOE-EM assessment stated that "The team observed no ongoing unsafe operations from a criticality safety perspective. SRS has a well documented criticality safety program with a strong qualification program for its criticality safety

professionals. The strength of the system in developing criticality safety controls for nuclear operations is the team approach to uncovering accident scenarios that require controls; the weaknesses are the apparent de-emphasis of the defense-in-depth measures and a diffuse control implementation system." Corrective actions identified to respond to the DOE-EM appraisal were completed during 2007 and early 2008. The DOE-EM Criticality Safety Program Manager reviewed corrective action closures during January, 2008.

DOE-SR Field Office assessments have concluded that the M&O and LWO contractors have a mature and healthy criticality safety program. However, several areas of improvement have been identified. More information is provided in Item 4 below.

Corrective actions are developed, tracked and implemented in response to identified deficiencies and observations or opportunities for improvement. The corrective actions involved numerous improvements to such things as the contractor criticality safety manual, specific procedures, technical calculations, engineering manuals, TSR revisions, needed S/RID updates, and definitions of terms. Some examples would include (additional examples provided in Item 4 below):

- Improvement of the site criticality safety program manual to provide clarification of required control designation for incredible scenarios and more specific guidance of what is involved in a facility walk down;
- The M&O Contractor, in cooperation with the LWO contractor, has worked with DOE-SR and DOE-EM to prepare a Criticality Safety Program Description Document;
- Implementing a more formalized HAZOP approach for contingency analyses;
- Increase criticality safety engineer direct involvement in facility self-assessments
- Clarify requirements for criticality safety engineer to periodically perform field observations.
- Self-Assessments evaluate a sampling of design and process changes to ensure they received adequate NCS review;
- Corrective Action Plans developed by the M&O contractor have been reviewed by DOE-SR and revisions made where necessary to improve these plans.

2. Status of Contractor Criticality Safety Engineer Program

Significant contractor changes have occurred at SRS since the last status report. A new M&O contractor, Savannah River Nuclear Solutions (SRNS), was selected and has taken over responsibility for the primary site nuclear criticality safety program and operation of most of the SRS facilities. This does not include the liquid waste operations (LWO) related facilities. The contractor responsible for these facilities, Washington Savannah River Company (WSRC) is comprised of the remnant of the old M&O contractor (i.e. portions not absorbed into SRNS under the new contract.) The LWO contractor utilizes the SRNS criticality safety program and, as has been done in past years, utilizes the services of Washington Safety Management Solutions (WSMS) for the criticality safety engineering support staff. The M&O contractor change has no direct impact on the SWPF project contractor, which is Parsons.

The site's M&O Contractor (SRNS) manages the vast majority of DOE-EM activities at SRS. SRNS currently has 10 qualified NCS engineers with 7 in training. They also have two qualified assessors. SRNS currently utilizes the services of WSMS to provide an additional 8 qualified NCS engineers (some only part time). A Basis of Estimate (BoE) for the SRNS managed activities has been drafted and it has identified a need for approximately 13 additional NCS Engineers (this includes replacement of WSMS supplied staff).

The site's Liquid Waste Operations Contractor currently uses two WSMS criticality safety engineers. This provides adequate support. Additional personnel are being trained to perform criticality reviews for added flexibility.

For the SWPF project, the criticality safety staff normally consisted of two full time, and two more on an "as needed" basis. All staff were qualified as Senior Criticality Safety Engineers per DOE-STD-1135-99. Because the SWPF project is a small liquid waste processing facility, the criticality safety staff will likely consist of "in-house" and sub-contractor personnel on a fluctuating basis as needs are identified. This provides adequate support.

The M&O Contractor, SRNS, is actively advertising and recruiting to obtain additional NCS staff. Interviews with selected candidates are taking place to add to staff. SRNS is generating a plan to identify needed training for staff (at all levels) and a program is being put in place to incentivize the staff to achieve the appropriate qualifications. The SRNS training and qualification program is also undergoing revision to better align with facility needs.

As a compensatory measure, the new M&O contractor entered into an agreement with the contractor who previously provided the qualified criticality safety staff resources (WSMS) to provide staff augmentation. It is expected that this agreement will exist for some time period (at least 8 months, and likely 14 months) while SRNS hires and qualifies sufficient internal criticality safety resources.

The liquid waste operations contract has recently been awarded to Savannah River Remediation, LLC (SRR). The transition of these operations from WSRC to SRR is currently anticipated to begin in January of 2009 and is expected to be completed within 90 days. The new contractor will be responsible to ensure adequate criticality safety resources remain in place as part of contract transition activities.

As indicated last year's report, DOE-SR was concerned that adequate staffing has not been provided. However, because the M&O contractor transition was initiated in 2008 and it profoundly affected the criticality safety organization, an explicit evaluation in this area was not completed in 2008. Instead, focus was placed on ensuring adequate criticality safety resources were provided both during and after the M&O contract transition (for M&O and LWO facilities.) This criterion was validated by DOE-SR as a precondition to authorizing the contract transition. In order to meet this condition, the new M&O contractor (SRNS) elected to enter into an agreement with the contractor who previously provided the qualified criticality safety staff resources (WSMS) to provide staff augmentation. It is expected that this agreement will exist for some time period (at least 8 months, and likely 14 months) while SRNS hires and qualifies sufficient internal criticality safety resources.

In light of the M&O Contractor change that occurred in 2008, a couple of targeted DOE-SR assessments are scheduled for 2009. These two assessments will include an evaluation new M&O contractor's 1) criticality safety engineer training and

qualification program, and 2) criticality safety engineering staffing level (to include any associated criticality safety engineering staffing needs analysis.) To complete these assessments, the new M&O contractor will need to accomplish its related objectives. Accordingly, the timing of these assessments may be adjusted somewhat in response to those accomplishments and to balance DOE-SR resources.

For LWO, no issues have been identified with staffing to date. As was done with M&O contract transition, DOE-SR will ensure adequate criticality safety resources are provided both during and after the LWO contract transition. However, due to the limited nature of the criticality hazard in the facilities under this contract, and the fact that the contractor selected to take over liquid waste operations (SRR) has WSMS identified as an approved subcontractor, it is expected that the impact to the current criticality safety resources during this transition will be minimal.

For SWPF project, sufficient resources have been provided.

3. Status of Federal Criticality Safety Oversight Program

DOE-SR has four federal employees assigned full time to the criticality safety program. One is assigned as the DOE-SR Nuclear Criticality Safety Program Manager, while the other three serve a Criticality Safety Specialists for the various DOE-EM facilities at SRS. All four are qualified in accordance with the DOE Technical Qualification Program and the Criticality Safety Functional Area Qualification Standard.

In January 2008, DOE-SR issued an updated "5-Year Workforce Management Plan, Fiscal Years 2008 – 2013." The purpose of the plan to ensure DOE-SR has the appropriate skill mix to safely accomplish its mission. The plan specifically addresses federal NCS staffing and indicates DOE-SR requires 4 full time equivalent (FTE) positions through the time period addressed in the analysis.

4. Federal Assessments of Site NCS Programs

In 2008, DOE-SR assessment activities included program assessments per DOE-STD-1158, a NCS-related safety system assessment, fissionable material operations observations, reactive assessments and numerous NCS-related document reviews. The number of NCS-related assessments completed in 2008 exceeded the planned assessments.

Full program reviews, utilizing DOE-STD-1158, were completed in K-Area Material Storage Facility, Solid Waste Management Facilities, F-Canyon Complex, F/H-Area Analytical Laboratories, and the Savannah River National Laboratory. This included DOE-SR review of the contractor's proposed corrective actions to address the identified deficiencies.

Numerous planned assessments of a narrower scope were also completed. A system level assessment was conducted for the criticality accident alarm system in H-Canyon and HB-Line which focused on detector placement. A review of MAP-1 accountability software used by HB-Line was performed. Three corrective actions were identified in response to concerns raised by DOE-SR during the review. H-Canyon 17.2 level control software was assessed for which one deficiency and three observations were noted. Corrective actions were agreed upon with the Contractor.

Another assessment included a review of material movement in HB-Line and H-Canyon assessed in cooperation with the DOE-CNS Lead for NCS.

Several reactive assessments were conducted in response to criticality safety-related developments or discoveries during the year. These included: the H-Canyon and HB-Line path forward related to the handling of unexpected uranium solids after dissolution operations was reviewed (DOE-SR worked with DOE-EM and DOE-CNS staff on this issue); review of contractor declared Potential Inadequacy in the Safety Analysis (PISA) involving Be and C moderators in Solid Waste packages and vaults; oversight of the upgraded DSA implementation in the Solid Waste Management Facility; review of Contractor actions in response to a high mass TRU waste drum in solid waste, and review of actions taken upon discovery of an invalid assumption regarding water flow from HB-Line 6th level to HB-Line 5th level (this related to a safety shower leak.)

In addition to the "normal" NCS-related assessment, DOE-SR provided significant oversight of the M&O contract transition process. As discussed above, this transition had a profound impact on the manner in which the contractor provided criticality safety resources. The primary purposes of DOE-SR's transition oversight were to 1) verify the completion of the transition activities of the successor contractor contained in the DOE-approved Transition Plan, and 2) validate the readiness of the successor contractor to assume full contractual responsibility and corporate liability from the incumbent contractor.

Separate from the M&O and LWO contractors, the SWPF project is a new facility being designed at SRS which requires a CSP. A 90% design review was performed by DOE that included the review the Preliminary Documented Safety Analysis (PDSA). DOE comments were incorporated in Chapter 6 of the PDSA which summarized the preliminary analysis (NCSE) results, important limits and controls.

At least fifty nuclear criticality safety evaluations, safety basis documents (criticality safety related portions), and other criticality safety program related documents were reviewed during 2008. This also included Criticality Safety Program Description Documents (CSPDD) covering all contractors with NCS programs at SRS. These have been submitted to the department for approval, have been reviewed and were returned with comments. For M&O and LWO operations (which are covered jointly under a single CSPDD, the CSPDD has been revised, resubmitted to the department, and is currently under review. It should be noted it has changed significantly from the prior version due primarily to the introduction of a new M&O contractor. The contractor for the SWPF is currently working to resolve the one comment on its CSPDD.

Where assessments identified deficiencies (i.e. requirements were not met), the issues were forwarded to the contactor for action. The contractor then developed a corrective action plan (CAP) to address each deficiency. For example, for the DOE-STD-1158 reviews, each identified instances where ANS-8.19 requirements were not being met. Each was forwarded to the contractor for development of a CAP. The contractor has provided CAPs for each facility. In addition to deficiencies, observations (a.k.a. opportunities for improvement) were identified and provided to the contractor for evaluation and development of possible program improvements. Finally, noteworthy practices were also identified. Where other program or system level assessments identified deficiencies and observations, these were similarly provided to the M&O Contractor for action.

Some of the more significant issues identified, and corrective actions taken, are summarized below. However, no attempt has been made to include all issues in this summary report. All assessment results are documented separately in greater detail.

- The use of a best estimate 'k' value for probabilistic risk assessment purposes was challenged by DOE-SR and discussed with the Contractor. The CSSG was contacted and requested to evaluate this issue. The CSSG agreed that the use of 'k (best estimate)' was appropriate as used by the Contractor, but that any other use should be carefully considered before use.
- A high mass TRU waste drum containing fissile material, oil, and "oil dry" was evaluated. It was concluded that the criticality evaluation did not contain sufficient information to conclude that the drum was safe for all abnormal scenarios that might impact the drum. The contractor revised the criticality evaluation such that additional information was provided to conclude that the drum was safe.
- The documentation related to the potential for, or incredibility of, a criticality accident during a design basis earthquake was inadequate. NCSEs and DSA changes are in preparation to address design basis earthquakes and criticality safety directly.
- The personnel who reviewed the mid-1990's criticality evaluations for F/H Lab were not necessarily qualified as criticality safety engineers. Current F/H Lab management committed to preparing an up to date criticality evaluation completed by a qualified criticality safety engineer. The updated evaluation is complete.
- A documented basis of criticality safety engineer staffing needs has not yet been obtained from the new M&O Contractor. The M&O Contractor is developing a criticality safety engineer staffing needs analysis.

In response to the 2006 DOE-EM assessment, the contractor also provided a Corrective Action Plan to address Findings, as well as the Opportunities for Improvement. The status of the corrective actions has been reviewed periodically, most recently during January, 2008. DOE reviews of the corrective actions have found them to be generally effective at improving the contractor's CSP.

Copies of completed contractor assessments are provided to DOE-SR. During the DOE-STD-1158 reviews, performance of self assessments is validated. The conclusions to date have been they are effective and adequate.

The capacity for DOE-SR to do a detailed evaluation of these self assessments (beyond that conducted in DOE-STD-1158 reviews) in previous years has been limited due to either staffing issues (i.e., 2007), the need to address higher priority activities (e.g., more broad DOE-STD-1158 program reviews), and emerging items (e.g., M&O contract transition). The increased qualified federal staffing level now available should permit a more rigorous review of the contractor's self assessment performance. The DOE-SR's documented CSP assessment plan, approved in September 2008, includes a focused review of the contractor's assurance system in the second quarter of 2009.

As indicated above, numerous nuclear criticality safety evaluations (NCSEs), safety basis documents (criticality safety related portions), and other criticality safety related documents were reviewed during 2008. At least half of these documents were

NCSEs completed in accordance with DOE-STD-3007-2007. Overall, they were compliant with applicable ANS-8.xx and DOE-STD-3007 requirements, and were technically adequate. Specific issues are occasionally identified during document reviews and usually resolved in a timely fashion. The M&O Contractor needs to transition to NCSEs that facilitate meeting the DOE Order 420.1B requirement related Double Contingency Principle deviations (i.e. obtaining DOE approval of single parameter controls schemes for credible inadvertent criticality hazards.) Full implementation of this requirement for SRS is expected in 2009. All LWO activities are considered non-credible and therefore do not require departmental approval of single parameter control schemes.

Some of the more significant comments related to the adequacy of NCSEs are summarized below and are similar to comments made in 2007. No attempt has been made to include all issues in this summary report. Comments are normally forwarded to the contractor for action and are adequately resolved prior to DOE-SR approving an associated safety basis document.

- The NCSE, or other related CSP documents, did not include a relevant or correct reference identifying the basis for included information.
- The NCSE failed to consider or document credible abnormal events that were relevant from DOE-SR's perspective.
- The NCSE failed to clearly identify all controls relied upon to ensure safety.
- The NCSE was not up-to-date with respect to the current operating condition or the fissionable material content of the facility.
- The NCSE applied an ANS-8.1 single parameter subcritical limit to a situation where it was not applicable.

5. New Facility Design

For the M&O contractor, work progressed on two K-Area Material Storage Facility modifications: the Presentation Room Storage modification and the shuffler modification. Also, the Solid Waste Management Facility has installed new waste box NDA equipment. These modifications use the existing M&O contractor criticality safety program and involve new or updated criticality safety evaluations.

The SWPF project is a new facility design at SRS which requires a CSP and criticality safety evaluations.

In 2008 the Department approved Critical Decision 1A, selection of preferred alternative, for the Plutonium Preparation Project. This project is intended to use a combination of existing and new facilities to address up to 13 MT of surplus plutonium. As the design of this project matures it will require a CSP and criticality safety evaluations.

Finally, a Liquid Waste Salt Disposition Integrated Project is underway. This project is intended to provide all modifications needed to process high level salt waste (currently stored in the tank farms) through the tank farms, through the SWPF, and to the Defense Waste Processing Facility. It involves all three contractors at SRS. Criticality safety engineers are working together to establishing an integrated control strategy for this project.

New facilities/projects are often performed as modifications of existing facilities. When this occurs, the new facility/project is handled per the contractor site Conduct of Engineering Manual. The Design Authority Engineer determines early in the modification process whether criticality safety needs to be involved. Once this is determined, a NCSE is prepared, along with initial scoping studies. This may occur as part of the preconceptual design phase or conceptual design phase depending on the availability of information. The NCSE is revised throughout the design process as the design evolves.

As part of the review process for the above facilities, Management Self Assessments, Operational Readiness Reviews, and DNFSB reviews were performed. Discussions were held early in the design phase of each project identified above regarding the criticality safety strategy to be employed (e.g., what parameters should be controlled, what types of limits need to be generated, is there a potential need for a criticality alarm system).

In addition to items identified in the 2007 submittal, which remain valid, the major lessons learned from new project work include:

- importance of getting criticality safety engineers early in the project;
- identification of a control strategy early in the project.

Implementation of DOE Standard 1189, "Integration of Safety into Design Process", will help re-enforce both of these lessons learned.

6. Trending and Analysis of Reportable and Non-reportable Nuclear Criticality Occurrences

The M&O and LWO contractor site Nuclear Criticality Safety Review Committee (NCSRC) maintains a criticality safety indicator based on reportable and nonreportable occurrences. A rating scale is used to score each reportable and nonreportable occurrence. On a quarterly and annual basis, the cumulative score and the number of reportable and nonreportable occurrences in each rating bin, are presented to and reviewed by the NCSRC. The DOE-SR NCS staff participates in the NCSRC review and discussion of the criticality safety indicator. Cause codes for each occurrence are compiled and tracked to determine the major causes of the occurrences. A goal is established by the NCSRC on an annual basis to reduce the number of occurrences in the groupings having the highest number of occurrences.

The M&O contractor Criticality Safety Program Development & Site Support organization also prepares a quarterly criticality safety Performance Assessment (PA) using the same data. However, the PA examines the data more closely on a facility by facility basis. If a facility is experiencing an unusually high number of reportable or nonreportable occurrences, or a higher than expected number of the same type of problem, or unusually special or severe problems, the facility is placed on the "watch list" or a recurring event is declared. This information is provided to and reviewed by the DOE-SR.

The SWPF project has not matured sufficiently for occurrences to exist.

The data indicates that the majority of reportable and non reportable occurrences over the past several years are low consequence events (i.e., less severe than violation of a procedural limit). There were some cases in which a procedural limit was violated, but the actual higher level Criticality Safety Limit CSL) was not

challenged. In a few cases, a control credited in protecting the double contingency principle was violated, but other controls remained in place such that actual violation of the double contingency principle was never an issue.

DOE O 232.1 reporting criteria were revised effective in 2003. The M&O Contractor's database for reportable and non-reportable events came on line about the same time. However, full site-wide implementation of the database did not occur until 2005. Therefore, a consistent set of data is available for calendar years 2005 through 2007. The indicator score for 2005 included 62 total events (4 criticality alarm system issues, 37 minor events < procedure limit, 20 procedure limit violations, 1 TSR level; total score = 144). The results for 2006 showed improvement with 49 events (3 criticality alarm system issues, 31 minor events < procedure limit, 12 procedure limit violations, 3 TSR level; score = 119) - a reduction in total score of approximately 20%. For 2007, indicator results approved again with 43 events (5 criticality alarm system issues, 31 minor events < procedure limit, 6 procedure limit violations, 1 TSR level; score = 91) - a reduction of about 24% compared to 2006. For the first three quarters of 2008, there were 29 events related to criticality safety with a score of 63, a modest improvement on a quarterly basis compared to 2007. No events were associated with LWO facilities.

The results of the M&O contractor's NCSRC indicator are used to establish goals to reduce occurrences in specific causal areas. Based on 2006 results, a goal was established for 2007 to reduce the number of instrument problems and human performance problems by 20%. The goal was met. However, the number of management problems and communication problems increased during 2007. Human Performance Improvement training has been provided to M&O and Liquid Waste Operations site management and engineers in an effort to improve the reliability of administrative controls.

The results of the criticality safety Performance Assessment were used to inform facility management and engineering of the need to continue to perform management observed evolutions and procedure improvement initiatives. Results also were used to increase the number of contractor criticality safety engineer facility walk-throughs and participation in facility criticality safety self-assessments. Results were also used to purchase new dedicated personal computers for SRNS criticality safety engineers in order to perform calculations more efficiently.

7. Follow Up to Assessments

The M&O Contractor/Liquid Waste Operations has a well defined and mature self-assessment process. The process requires consideration of many issues during the development of the scope of self-assessment activities. This includes historical information such as corrective action open and completed items, current performance information such as facility performance parameters and observation program results, reports from past audits and self-assessments, and feedback from external groups. Thus, the process requires consideration of prior assessments.

Likewise, DOE-SR considers many of the same issues both during its development of the yearly assessment plan and during the definition of the scope of planned assessments. However, due to the limited Federal NCS staffing, the capacity to do follow-up reviews has been limited until recently. As federal oversight resources grew during the year, emphasis was placed on performing baseline program assessments versus effectiveness reviews. It is expected that the increased

qualified federal staffing now in place will permit more efforts in this area. Accordingly, the DOE-SR annual assessment plan for fiscal year 2008 explicitly included an effectiveness review during the 2nd quarter of the fiscal year. The scope of the review was to look at the contractor's corrective actions taken in response to the 2006 DOE-EM assessment. Although the status of these corrective actions has been reviewed periodically in the past, the review scheduled for the 2nd fiscal quarter was more comprehensive. The Team Lead for the 2006 DOE-EM assessment visited SRS early in 2008 to review the current state of the Contractor's corrective actions (as well as DOE-SR's corrective actions). This effectiveness review indicated that the array of corrective actions taken were comprehensive and sufficient.

Separately, DOE-SR reviewed corrective actions plans submitted in response to DOE-SR assessments (as describe in Item 4 above) for adequacy. In general, the Contractor's plans submitted in 2008 were reviewed at the time they were formulated and found to be acceptable. Follow-up effectiveness reviews for the corrective actions are scheduled and will be conducted in 2009.

8. As applicable, provide status of any open issues identified in previous reports.

There were no Open issues specifically identified in the previous report.

Attachment 9

EnergX Criticality Safety Program Annual Report

1. Measure of Contractor Nuclear Criticality Safety (NCS) Performance

Metrics established to monitor contractor NCS performance include the number ACRs, and the number of days an ACR is open (goal is 30 days average time to close).

TWPC had one ACR in 2008. That ACR was with respect to accepting a drum that was not listed on the transfer request. The discovered drum was confirmed to be within NCS limits and was then handled in accordance with the facilties' non-conforming drum process and sent back to the originator. The ACR was closed out in one day based upon the implementation of the Corrective Action Plan that included a review of the waste receipt process and procedures.

2. Status of Contractor Criticality Safety Engineer Program

EnergX has adequate staffing including three senior qualified NCS Engineers who are available/on call in addition to the NCS Manager who is also a Qualified Senior NCS Engineer.

Resources are subcontracted from Washington Safety Management Solutions (WSMS). Additional resources are available. There is no shortfall at this time and contracting mechanism are in place to prevent any shortfall in the future.

DOE has affirmed the adequacy of contractor NCS staffing. An assessment was conducted that resulted in no findings and three observations. One proficiency was listed regarding the graded/scaled nature of the NCS Program.

3. Status of Federal Criticality Safety Oversight Program

Oak Ridge Operations needs and is staffed with one person to provide NCS oversight of EM operations, with one technical support from the matrix organization.

There was an independent assessment performed of the Federal NCS staff in August 2006 with no findings for EM.

4. Federal Assessments of Site NCS Programs

A Management Self-Assessment of the limited NCS Program, as implemented for Contact Handled Operations, was conducted in March 2008. There were no findings or observations. Implementation of the NCS Program was deemed adequate for the risks encountered at TWPC.

DOE assessed the NCS program as an element of the implementation of Revision 15 of the DSA/TSR for Remote Handled Operations in April 2008. There were no findings or observations for NCS. The NCS Program was deemed adequate for the risks encountered at TWPC.

A Management Self-Assessment of the NCS Program was conducted in September 2008 to demonstrate compliance with ANSI/ANS 8.19. Two observations were noted regarding notification protocols. Both of these observations have been closed.

No corrective actions were necessary as a result of the assessments.

No Lessons Learned were necessary to be developed as a result of the assessments.

The contractor's self assessments were evaluated for adequacy. The conclusion was the planned contractor's process for self assessments is adequate.

The NCS program is consistent with DOE Order 420.1B and applicable ANSI/ANS Standards for the scope of material and activities allowed.

5. New Facility Design

The Sludge Retrieval operation is currently in the design phase and will require implementation of the limited TWPC NCS Program.

All relevant lessons learned from contractors, DOE Field Management, and independent reviews will be carefully considered for applicability.

TWPC is in the early stages of design for this project. The operation will be designed such that a criticality is not credible.

6. Trending and Analysis of Reportable and Non-reportable Nuclear Criticality Occurrences

NCS occurrences are tracked and trended by ACRs. When the Occurrence Reporting Criteria is met, they are tracked via the Occurrence Reporting and Processing System (ORPS) in addition to the ACR process. No trends or common causes have been noted because in 2008 there has been only one NCS infraction and no reportable events.

7. Follow Up to Assessments

The formal assessment was performed the last quarter of fiscal year 2008. The Federal Criticality Safety Oversight person has reviewed the corrective actions which closed the observations. An informal follow-up assessment was conducted in 10/08.

The corrective actions were effective. There were no observation or findings identified in that 2008 informal assessment.

8. As applicable, provide status of any open issues identified in previous reports

None

Attachment 10

Bechtel Jacobs Company (BJC) Criticality Safety Program Annual Report

1. Measure of Contractor Nuclear Criticality Safety (NCS) Performance

Metrics established to monitor contractor NCS performance include the number of New ACRs, and the 12 month rolling average time to close ACRs (goal is 30 days average time to close).

Number of new ACRs per month within the K-25 D&D Project has increased over the previous calendar year. Some of this increase is attributed to an increased amount of work being done in the K-25 D&D Project. The average time to close ACRs has been reduced to less than 30 days. Most ACRs were closed within 10 days.

Contractor performance has been good overall, but Conduct of Operations and work control issues affecting the NCS program within the K-25 D&D Project are a concern, as evidenced by the number of new ACRs occurring in the K-25 D&D Project.

A root cause analysis and a separate six-sigma review were performed for the increase in ACRs within the K-25 D&D Project. Some corrective actions were taken by the project based on the root cause analysis and six-sigma review, and other corrective actions continue to be developed to address the issue.

2. Status of Contractor Criticality Safety Engineer Program

The BJC NCS program needs and has 16 FTEs. The DOE NCS oversight continues to monitor contractor's staffing level for adequacy.

3. Status of Federal Criticality Safety Oversight Program

Oak Ridge needs and has one qualified Nuclear Criticality Safety Engineer to provide NCS oversight of EM operations, with one qualified Nuclear Criticality Safety Engineer support from the matrix organization.

There was an independent assessment performed of the Federal NCS staff in August 2006 with no findings for EM.

4. Federal Assessments of Site NCS Programs

DOE performed an assessment of the BJC NDA Program, including its use by NCS. One observation was made regarding the need to adequately address NDA upsets within the criticality incredibility analysis for K-25 Building West Wing demolition.

The criticality incredibility analysis for K-25 Building West Wing demolition does address NDA upsets. This analysis is currently being reviewed by a team of NCS experts from DOE HQ.

The contractor's self assessments were evaluated for adequacy. The conclusion is that their self assessments are adequate.

Criticality safety evaluations were deemed adequate, and the NCS program is consistent with DOE Order 420.1B and applicable ANSI/ANS standards.

5. New Facility Design

No new facilities are being designed. Modifications to existing facilities are evaluated through the NCS Program.

6. Trending and Analysis of Reportable and Non-reportable Nuclear Criticality Occurrences

All ACRs are tracked and trended internally by the NCS program. All Level 3 and higher ACRs are also tracked through the Occurrence Reporting system, which is independent of the NCS Program. The NCS Review Board evaluates the ACR tracking and trending when they meet. The ACR trends are reported to DOE ORO on a routine basis.

Trending identified an increase in the number of new ACRs within the K-25 D&D Project, and resulted in a root cause analysis and a separate six sigma review for the increase. Common causes for the new ACRs within the K-25 D&D Project were identified. The common causes were related to Conduct of Operations and work control. A number of corrective actions have been completed by the project based on the root cause analysis and six sigma reviews. Other corrective actions continue to be developed to address the increase in new ACRs.

7. Follow Up to Assessments

The NDA Program assessment corrective actions have been completed and verified closed by DOE ORO.

8. As applicable, provide status of any open issues identified in previous reports

None.

Attachment 11

ISOTEK Criticality Safety Program Annual Report

1. Measure of Contractor Nuclear Criticality Safety (NCS) Performance

Metrics established to monitor contractor NCS performance include the number of infractions, cause of the infraction and the number of days to close an action (goal is 30 days average time to close) and overdue surveillances.

There have been no infractions since Isotek took over operations in February 2007.

Isotek is not authorized to perform fissile handling operations. DOE-ORO has approved the Isotek Nuclear Criticality Safety Program Description Document, which contains enhancements that will improve the program. Significant revisions to the NCS Program procedure and the procedure on developing NCS evaluations have been written and implemented. These revisions also implement many program improvements.

The 2007 Isotek reorganization has lead to a stronger focus on criticality safety. A Criticality Safety Lead has been recruited. In addition, a Criticality Safety Review Board is being established and the Nuclear Safety Manager is leading the Safety Design Integration Team.

2. Status of Contractor Criticality Safety Engineer Program

The Isotek NCS program has increased staff, significantly. Currently, there are two FTEs assigned to the field, two FTEs preparing NCS documents to support the new process design, one FTE preparing Criticality Accident Alarm System documents, and several part time engineers to support NCS reviews. An additional full-time NCS engineer is being aggressively recruited.

Isotek has also established continuing education and training requirements for the NCS engineers to remain proficient.

3. Status of Federal Criticality Safety Oversight Program

Oak Ridge needs and has staffed with one person to provide NCS oversight of EM operations, with one technical support from the matrix organization.

There was an independent assessment performed of the Federal NCS staff in August 2006 with no findings for EM.

4. Federal Assessments of Site NCS Programs

A formal NCS assessment has not been completed but NCS is reviewed as part of the design review process of the U-233 Material Down-blending and Disposition Project.

A Safety Design Integration Team has been established, with NCS a formal participant.

Isotek finalized and the Site Office approved the NCS Program description document. Isotek has revised the NCS Program procedure and the procedure on

developing NCS evaluations. The format and content of metric reporting is currently being revised.

Isotek is performing self-assessments using DOE-STD-1158 as a guide for performing the assessment.

Isotek took possession of operations in February 2007and fissile operations continue to be limited via the DOE Safety Basis restrictions placed on the facility. The contractor and DOE will evaluate the contractor's program including self assessments prior to initiation of significant fissile operations in the facility.

Criticality safety evaluations historically have not met the format required by DOE-STD-3007-93. As part of the formal program implementation the evaluation format now meets the standard and a template has been developed. The standardization of the evaluation format should drive quality improvements in content.

The NCS program is maturing, with new procedures implementing the requirements of DOE Order 420.1B and applicable ANSI/ANS-8 standards. Both the contractor and DOE recognize improvements in the overall program are underway and have defined an adequate program for upcoming operations.

5. New Facility Design

New facility design is still being formalized. Preliminary NCS evaluations are being developed in support of the new design, and the NCS organization participates on the Safety Design Integration Team.

6. Trending and Analysis of Reportable and Non-reportable Nuclear Criticality Occurrences

To date, there have not been any NCS infractions or reportable events. The NCS program tracks and trends NCS non-conformances when applicable through the contractor internal condition reporting process or the DOE Occurrence Reporting and Processing System (ORPS).

7. Follow Up to Assessments

Additional Design reviews are planned as the process continues. DOE has formed an oversight "support" team. Now that the Isotek NCS Program Description document is approved, DOE will schedule overall NCS program review(s).

It cannot be determined if the corrective actions for the NCS program are effective at this time. DOE is scheduled to perform the first of several assessments in early 2009, with the first assessment focusing on the validation of NCS computer codes. The effectiveness in the design process will be followed during design and confirmed during the formal DOE review at specified completion levels.

8. As applicable, provide status of any open issues identified in previous reports

None.