Under Secretary for Nuclear Security
Washington, DC 20585

March 25, 2013

The Honorable Peter S. Winokur
Chairman
Defense Nuclear Facilities Safety Board
625 Indiana Avenue NW, Suite 700
Washington, DC 20004

Dear Mr. Chairman:

This letter transmits the enclosed Department of Energy Annual Report on Nuclear Criticality Safety for Fiscal Year (FY) 2012. The appendices to the report, which respond to the eight topics specifically identified in the Defense Nuclear Facilities Safety Board's January 29, 2008, letter, provide the National Nuclear Security Administration (NNSA) and the Office of Environmental Management (EM) summaries and input from the field and site offices respectively.

If you have any questions or need further information, please contact Dr. Jerry McKamy at (301) 903-7980 for issues related to the NNSA or Mr. Todd Lapointe, Director for the Office of Safety Management, at (202) 586-4653 for EM-related issues.

Sincerely,

Neile L. Miller
Acting Under Secretary
for Nuclear Security

Enclosure

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Fiscal Year (FY) 2012 Annual Report on Nuclear Criticality Safety Programs

A Defense Nuclear Facilities Safety Board (DNFSB) letter dated January 29, 2008, requested that the Department of Energy (DOE) address eight specific subject areas related to nuclear criticality safety (NCS) in an Annual Report on NCS Programs. The closure plan for DNFSB Recommendation 97-2, *Continuation of Criticality Safety at Defense Nuclear Facilities in the Department of Energy,* required DOE (including the National Nuclear Security Administration (NNSA)) to report on these subject areas for their respective NCS programs. This report summarizes the detailed information provided in the NNSA and DOE reports, included as Appendices 1 and 2 to this Enclosure.

The NNSA and overall point of contact for this report is Dr. Jerry McKamy. He may be reached at (301) 903-7980. The Office of Environmental Management (EM) point of contact for this report is Mr. Todd Lapointe, who can be reached at (202) 586-4653.

Table of Contents:

The NNSA sites are presented by field office from west to east as follows:

Livermore Field Office (LFO)	Lawrence Livermore National Laboratory (LLNL)
Nevada Field Office (NFO)	Nevada National Security Site (NNSS)
Los Alamos Field Office	Los Alamos National Laboratory (LANL)
Sandia Field Office (SFO)	Sandia National Laboratories (SNL)
NPO Pantex Field Office (NPO Pantex)	Pantex Plant (Pantex)
NPO Y-12 Field Office (NPO Y-12)	Y-12 National Security Complex (Y-12)
Savannah River Field Office (SRFO) (includes the NNSA Office of Fissile Material Disposition (NA-26)	Savannah River Site (SRS), NNSA operations

The EM sites are presented by field office as follows:

Richland Operations Office (RL)	CH2M-HILL Plateau Remediation Company (CHPRC) Washington Closure Hanford (WCH)
Office of River Protection (ORP)	Bechtel National, Inc. Waste Treatment Plant (WTP) Washington River Protection Solutions Tank Farms Operations
Portsmouth/Paducah Project Office (PPPO)	LATAKY-Paducah Fluor-B&W Portsmouth BWCS Paducah/Portsmouth
Idaho Operations Office (ID)	Idaho Cleanup Project (CWI) Advanced Mixed Waste Treatment Project (AMWTP)
Oak Ridge Office (OR)	Wastren Advantage Inc. (WAI) UCOR Isotek Systems, LLC
Savannah River Operations Office (SR)	Savannah River Nuclear Solutions (SRNS) Savannah River Remediation (SRR) Savannah River Parsons

Below is a summary of the NNSA and EM detailed reports that address the eight specific subject areas referenced in the DNFSB letters of January 29, 2008. The additional topics requested in January 2009 have been addressed previously.

Specific Subjects Addressed in the DOE Annual Report on NCS (per the DNFSB letter of January 29, 2008)

1. Performance Metrics

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

The suite performance metrics used in DOE defense-related CS programs are listed below in Table 1 by broad general areas. The NNSA and EM field offices use selected metrics from the Table 1 tailored to the processes and operations at their respective sites. A summary discussion of the metrics used by each site and field office follows the Table.

Table 1: Leading and Lagging Indicators	
Leading	**Lagging**
1) Proportion of CS non-conformances identified by workers, supervisors, CS staff, DOE oversight, and external to DOE personnel, in decreasing order of desirability	3) Number of repeated or similar CS non-conformances
2) Timely identification and resolution of non-conformances	4) Highest severity level of CS non-conformances
13) NCS staff presence in the operations areas having significant quantities of fissionable material	5) Number of spills of fissile solution greater than a specified threshold
14) Number of NCS non-managerial staff and Fissile Material Handlers (FMHs) serving on any American National Standard Institute/American Nuclear Society (ANSI/ ANS) - 8 Standard working groups	6) Number of fissile solution leaks of any size
15) Number of in-house technical seminars prepared and presented by NCS staff	7) Number of inadvertent transfers of fissile solution (e.g., transfer destination or route incorrect)
16) Percentage of the NCS engineering staff that is engaged in development activities (e.g., technical courses, conferences, graduate studies)	8) Fissile operations conducted without a process evaluation for CS
17) Percentage of NCS staff qualified to DOE-STD-1135 or ANSI/ANS 8.26	12) Timely performance and documentation of required audits or assessments
18) Percentage of contractor personnel completing fissile material handler training when required	20) Number and type of DOE comments on contractor criticality safety evaluations (CSE) and the quality of CSEs
19) Number of small group training sessions conducted with fissile material operations crews	22) Systematic identification of, and action taken on, improvement issues
21) Progress toward program improvement milestones	23) Number of supplemental guidance documents issued to clarify or correct CSEs
Control charting and rate of change may allow extracting leading information from #24	24) Schedule and cost performance for producing high-quality CSEs
	25) Number of assessment findings
	26) All controls derived in the process evaluation for CS are fully implemented in facility procedures.
Note: *Merely counting the rate of non-conformances will only lead to under-reporting. This is the most common and most dangerous metric. That is why these are listed last. See the Y-12 discussion in Section 6 for an example of methods for extracting leading information from the rate of non-conformances. Also, root causes of non-conformances are not a good metric, as recurrence control is a requirement of ANSI/ANS 8.1 § 4.1.5 and ANSI/ANS 8.19 § 7.7. If the data for metric 9 is desired, it can be extracted from metric 1*	
Control charting and rate of change may allow extracting leading information from #9.	9) Number of non-conformances

Table 1: Leading and Lagging Indicators	
Leading	**Lagging**
10) Type of non-conformances	11) Root causes of non-conformances
Metrics 6 and 23 were not used in 2012. Metric 26 was added.	

Conduct of Operations and Formality of Operations Metrics:
While these metrics are not normally tracked as part of the CS program, they are important to CS. Several sites use conduct of operations metrics as an adjunct to CS metrics.

National Nuclear Security Administration (NNSA)

The NNSA sites have developed a robust set of metrics for monitoring the health of the local CS programs. The most complete are at LLNL and Y-12. Both of these sites adjust the metric set periodically, usually at the beginning of the FY. The metric sets at these sites are used to foster continuous improvement or needed program improvements. The contractors and the field offices have collaborated in developing these metrics. The metrics have proved useful in monitoring program improvements found necessary by assessments. Where the metric set for the site is well-established, the metrics are useful in preventing program degradation.

Lawrence Livermore National Laboratory (LLNL): The contractor met or exceeded all of the negotiated CS performance metrics for FY 2012, earning a score of Excellent. The contractor significantly exceeded the minimum performance criteria through a combination of operator training compliance, CS inspections, NCSD staff continuing training activities, implementation of CS controls, and CS support for operations at the NNSS.

Metrics used: 1, 3, 4, 8, 13, 14, 15, 18, 20, 26

Metric 26, as applied by LFO, is a subjective measure of the rigor of implementation of criticality controls into work control documents.

NNSA judges the LFO/LLNL CS metric set to be the best in the complex for the site operation. The metrics used are weighted by importance, and can be objectively rated.

Nevada National Security Site (NNSS): NCS performance by the contractor was satisfactory this year.

Metrics used: 9, 12, 13, 24

NNSA judges the CS metrics process at NNSS to be functional.

Los Alamos National Laboratory (LANL): NNSA's focus in 2012 was oversight of the Criticality Safety Improvement Plan (CSIP) including the quality of work produced, and emergent issues created by the attrition of the LANL CS group staff. Emphasis was given to oversight of field implementation of the program in 2012. This emphasis included the plutonium facility (TA-55) and less than Hazard Category (HC) 2 facilities.

NNSA concludes that the NCS program does not meet the expectations of national consensus standards and DOE Order 420.1B. A Corrective Action Plan that includes compensatory safety measures has been submitted to NNSA by LANL.

Metrics used: 21, 22

NNSA judges that the metrics reported and the incentives in use place the emphasis where it is needed to bring the program to compliance.

Sandia National Laboratories (SNL): All established metrics were reported as satisfactorily met. Sandia has little CS risk other than in the experimental operations with nominal 7% enriched uranium. The disposition of legacy materials from former fissile operations is proceeding carefully with documented trivial criticality risk. The experimental operations are also monitored periodically by SSO criticality staff.

Metrics used: 9, 12, 13, 16, 17, 20

NNSA judges the Sandia CS and critical experiments safety programs to be commensurate with the risk. Since the SSO only assigns one individual 10% of his time to do the field office CS oversight, there is a constant chance that CS oversight will be subsumed by other priorities. The designated individual has been diligent to maintain CS oversight.

Pantex Plant: CS metrics were met. The Pantex CS program is judged acceptable. NA-17 staff assisted the Pantex Site Office (PXSO) in an assessment of the contractor program in August 2011. The program remains acceptable. The Pantex contractor has reworked staff assignments to provide several people able to assist in CS, while one person serves as the primary plant CS engineer.

Metrics used: 9, 12, 13, 17, 20

NNSA judges the metrics used by the Pantex criticality program to be adequate to assure program health, given the nature of operations and the overall risk.

Y-12 National Security Complex (Y-12): The performance as measured by the NCS metrics showed improvement in the area of non-conformances for the year. Metrics looking at closures of both minor non-compliances (MNCs) and deficiencies, showed improvement over the year. The Engineering and Nuclear Safety Area, which includes CS, was rated good for FY 2012.

Metrics used: 1, 2, 3, 5, 7, 9, 10, 11, 13, 15, 16, 17, 19, 21

Y-12 has a complex set of metrics, suitable for a mature program at a complex site, that target most areas of the program. NNSA judges that an adequate set of CS metrics exist at Y-12. In addition, NNSA agrees with Y-12 Site Office (YSO) that the metrics both identify areas where improvement is needed, and target the areas that have been identified as needing extra emphasis. YSO and the Y-12 contractor staff continue to develop and apply metrics as needed for program maintenance and improvement.

Savannah River Field Office (SRFO): No fissionable materials operations are currently underway. NNSA concurs with the SRFO that no CS performance metrics are yet needed.

Environmental Management (EM)

All operational EM contractors are measured against established performance metrics. The performance compared to these metrics is generally adequate but requires some improvement. In addition, contractor performance in CS is periodically assessed by internal and external

organizations. These assessments typically result in corrective actions, which lead to improved CS performance.

Ten of the 15 EM sites use counting of infractions as a principal CS metric, contrary to known good practice; however, this is an improvement from 14 last year. Two sites use infraction count as the only metric, down from five last year. Two of the sites are not yet operational, and therefore have no established metrics. Three sites list only the number of infractions and time to close as metrics.

Metrics Used: 1, 2, 4, 9, 10, 12, 13, 16, 17, 20, 22, 24, and 25.

The Headquarters (HQ) assessment is that EM sites, particularly at Idaho and Savannah River, should improve on application and use of metrics for monitoring the health of CS programs.

2. Contractor Staffing

The status of the contractor NCS engineer programs at each site, including staffing levels, plans to address vacancies, interim compensatory measures, and progress on training and qualification.

The NNSA and EM contractors in general have difficulty hiring and retaining qualified CS staff. This includes the development path of hiring recent graduates and training them in CS. LANL has lost several engineers in recent months. Some mission impact has occurred.

Some sites have received assistance from other sites nearby or with similar expertise. Y-12 has solicited, and has agreement in principle, to receive help from Oak Ridge National Laboratory CS staff. Operations at NNSS have been assisted by both LANL and LLNL staff. It is likely that LANL will receive staff assistance from LLNL in FY 2013. Staff attrition at LANL is an on-going NNSA concern.

The table below shows the contractor CS staffing levels at each of the NNSA and EM sites, and the line management judgment of whether staffing is adequate. Mission work has been slowed or delayed in both Y-12 and LANL operations.

Table 2: Contractor Criticality Safety Staffing		
Site	**Contractor CS staff, End of FY 2011**	**Status**
LLNL	8	Adequate
NNSS	3	Adequate
LANL	1 senior and 2 qualified in the criticality safety group 1 Senior, 1 qualified in other groups 4 in training	Inadequate to support mission and operations. Staffing has further declined since the end of the fiscal year. Corrective Action Plan and Compensatory measures are being implemented.
SNL	9 (only one near full-time, 2 full-time equivalents (FTEs) of work)	Adequate
Pantex	2. About 1 FTE of work	Adequate
Y-12	29 B&W, 20 Subcontractors	Marginal. Some mission delay may occur. The heavy reliance on contractor support is a concern.
Richland – CHPRC	8	Adequate
Richland – WCH	2 part time	Adequate
River Protection – WTP (Bechtel)	3, plus 2 in training	Understaffed by 2, pending completion of qualification
River Protection – Tank Farms (WRPS)	2	Adequate
PPPO – Paducah-LATAKY	0.5	Adequate
PPPO – Portsmouth- Fluor B&W Portsmouth	13	Understaffed by 6; the site is recruiting and using overtime and contracted support.
PPPO – BWCS	0.5	Adequate
Idaho – CWI	3	Adequate
Idaho – BWXT Idaho AMWTP	5	Adequate
Oak Ridge – Transuranic Waste Processing Center TWPC (WAI)	2 Part time plus available contract support	Adequate
Oak Ridge – UCOR	5	Adequate
Oak Ridge – Isotek	3 plus 2 part-time	Adequate
Savannah River - SRNS	21 (12 fully qualified Senior Engineers; 6 fully qualified Engineers; 3 in training)	Adequate; recruiting in progress
Savannah River - SRR	1 Plus 2 Part time	Adequate
Savannah River- Parsons	1 Plus 1 part time	Adequate

3. Federal Staffing

The status of the Federal NCS 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 HQ Line Management.

NNSA line management judges the Federal staffing at the NNSA sites adequate. The incumbent at NFO is still in qualification and supported by NNSA CS subject matter experts. The site-by-site status of federal staffing is given in Table 2.

EM staffing shortages are being addressed by contracted support at Portsmouth Paducah Project Office and Oak Ridge. Shortages at Savannah River were addressed by hiring and support from NNSA-SR staff. Other EM shortfalls are addressed in by support from EM staff, with occasional assistance from NNSA.

Table 3: Federal Criticality Safety Staffing

Field Office	Federal CS Staff (Full Time Equivalent)	Status
Livermore	1	Adequate
Nevada	1. In qualification	Understaffed
Los Alamos	1, 1 in qualification	Adequate
Sandia	0.1; support available from NNSA	Adequate
Pantex	0.25	Adequate
Y-12	1, 1 subcontract, 1 future leader.	Adequate
NNSA NA-SH	1.25, 1 in training	Adequate
Savannah River Field Office (no operations, design & construction only)	0.5	Adequate
Richland	1	Adequate;
River Protection	4	Adequate
Idaho	3	Adequate
PPPO	3 1 FTEs (including subcontract)	Adequate
Oak Ridge	1 FTE contract, plus part time support from other offices	Adequate
Savannah River (EM)	2 plus one in qualification, with support available from NNSA	Adequate

4. Lessons Learned from Assessments

A summary of the results and any lessons learned from federal assessments of CS 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 CS evaluations, and the consistency of sites' NCS programs.

In most cases, contractor self-assessments are adequate. Contractor response to self-assessment varies across the spectrum. Federal assessments of process evaluations for CS vary widely in sampling extent, from a small sample to all of the nuclear criticality safety evaluations (NCSEs) at a complex site. The quality of NCSEs is acceptable.
One federal assessment at Portsmouth this year identified a much larger scope of risk than was known by HQ. The assessment made the federal staff aware of an operational solution based recovery system for uranium of all enrichments. The risk was being adequately managed by the contractor, and no further action was warranted, but it had been stated by the HQ safety branch

shortly before the assessment that the site was low risk from a criticality perspective. For several years, the portion of the site managed by DOE had been low risk; however, DOE had recently taken back leased facilities that included high equity operations.

An assessment performed by the CS Support Group, at the request of the Los Alamos Field Office, found the contractor's CS program imploding due to staff losses and lack of understanding by contractor management of the criticality risk at the facility. Corrective actions at this site are underway, although the full scope of the corrective actions has not yet been defined.

A repeat lesson learned from oversight this year is that federal CS staff and other federal engineering division staff personnel should be actively involved with the contractor engineering staff to understand planned process conditions and how they affect CS. Also, coordination and collaboration between federal and contractor NCS staff is necessary in order properly review and assess process changes that potentially affect criticality safety. Federal and contractor CS staffs need to understand the effects of chemical and metallurgical engineering phenomena that may cause changes in process conditions.

5. Lessons Learned from Design Reviews

A summary of the results and lessons learned from contractor, federal, or independent reviews of proposed NCS 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.

A recurring lesson from the reviews of design projects is that the earlier the safety disciplines are involved, the more probable the operational success of the project, and the lower the cost for engineered safety.

The Uranium Processing Facility (UPF) was well underway to integrating CS features into the design in accordance with site CS guidance. However, recent NNSA reviews have found that the design guidance for CS is not commensurate with the expected or stated design maturity. NNSA will provide additional federal CS expertise to monitor the situation going forward and engage appropriately.

6. Trending of Infractions

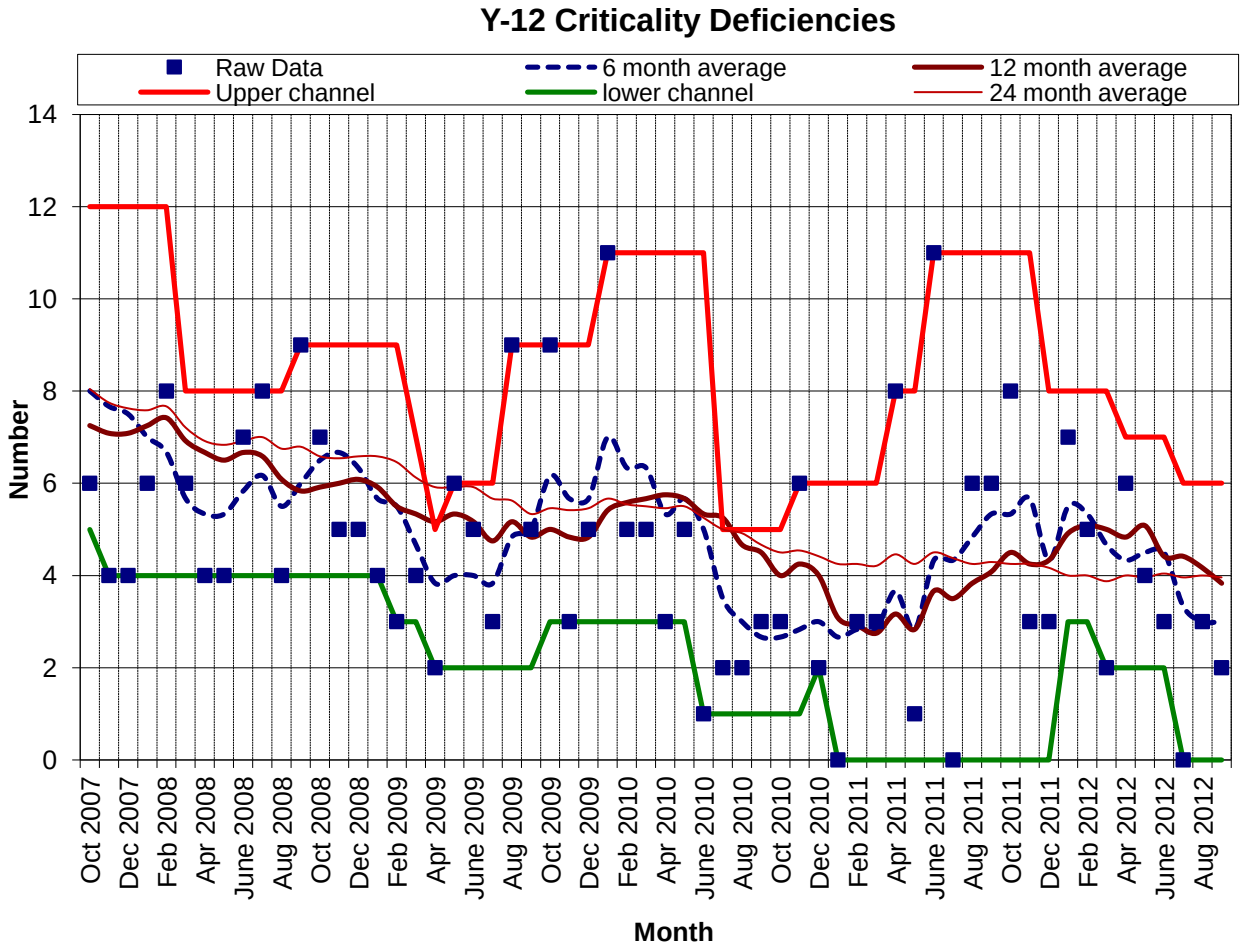
A summary of the results of trending and analysis of each site's reportable and non-reportable occurrences related to criticality.

NNSA comments:

The infraction rate at LANL has decreased in the last year, (from 16 to 13 per year) with all of the infractions identified by the operating staff or during joint reviews by the operating staff and the CS staff. The infraction rate at Y-12 has stabilized, and may be near the minimum rate reasonable for operations where human error rates are a factor.

LLNL had three CS infractions in 2012, up from two in 2011. No trends are identified. The completion of the large amount of unusual work needed to reduce the facility to security category III with this low level of infractions is exemplary.

Y-12 continues to have enough deficiencies and MNCs to provide sufficient data for statistical analysis. The chart below illustrates the use of leading and lagging indicators. The predictive ability of these indicators is not absolute; however, the combination of indicators predicts that the infraction rate will continue to decrease. When the upper and lower channels form a pinch point, as in about April 2009, a change should be expected. The difference or relative movement between the long-term and short-term averages indicates the direction of the change. This has been observed since about 2005 at Y-12. The rate fell from about six per month in 2006 to about three per month in 2010. It increased in FY 2011, but has since fallen. The trend indications are that the non-compliance rate is about as low as it will get without some type of breakthrough in culture and operational methods.



There were no CS non-compliances at NNSS, SNL, or Pantex in FY 2012. No fissionable materials operations are currently underway at Savannah River Field Office (NNSA) facilities.

Environmental Management

EM HQ comments:

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.

7. Follow-up Reviews

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

At NNSS, the Criticality Experiments Facility Operational Readiness Review had identified several pre-start findings associated with CS in FY 2010. Contractor corrective action plans were developed and approved by NFO. Closure of the corrective actions was validated by NNSA staff.

At LANL, the results of follow-up reviews have not met expectations, as discussed in previous sections 1 and 4. The Los Alamos Field Office and NNSA CS are monitoring operational implementation of the LANL CS program correction of engineering issues, and correction of staffing issues.

In previous years, several issues have been identified in assessments of the Y-12 CS program. Follow-up reviews by NPO-Y12 found that the quality of the Process Evaluations for CS has improved, although some issues remain. Y-12 has also activated a strong site CS committee, and positive effects are seen from this internal oversight.

In EM facilities and operations, NCS assessments by EM, field offices, and contractors identified CS 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 CS program.

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

8.1 Metrics Development

Only incidental effort has occurred in metrics development. One metric (#26) was added. Two NNSA sites (Livermore and Y-12) have a mature CS metrics program, and revise metrics as needed. Further metrics development will be addressed in section 1 as it occurs.

More detailed descriptions of site-specific issues for NNSA and EM sites are provided in Appendices 1 and 2 to this report.

8.1. Status of NNSA open issues from FY 2011

LANL NCS Program Implementation

The LANL NCS Program still does not yet fully meet the requirements in the ANS-8 standards. The remaining issues are with legacy evaluations for operations that have little potential for process drift, and the emergent issue of too few qualified staff to support the on-going operations. Operations ownership of safety and formality of operations have greatly improved in the last year. The CS Program Improvement Plan will be revised to formalize the schedule for completion of Risk Category I (Inherent Drift Resistant) evaluation upgrades.

Contractor Staffing Shortages

These will persist for some time. The only viable way to increase staff is to develop staff from outside the discipline. The identified shortages are listed below. Shortages overall appear to be worsening. The discipline is affected by the same demographics that affect the DOE workforce in general.

Y-12 – Marginal, especially with the effort needed to support UPF
LANL – Staff losses were catastrophic, but do not appear to be market driven.

Federal staffing shortages:

The status of federal staffing is unlikely to change in the FY 2013 budget climate.

NNSA line management judges the federal staffing to be adequate, but there is no surge capacity. Enterprise level program improvement actions may be delayed. Since NFO has filled their NCS position, all field elements are at their allotted strength.

EM staffing shortages were addressed by training personnel from outside the discipline at Richland, and River Protection, and by contracted support at Portsmouth Paducah Project Office and Oak Ridge. Shortages at Savannah River were addressed by hiring. All sites are now judged to have adequate NCS staff federal or direct contract support.

UPF Design review results:

The most significant finding related to NCS expressed was a concern that the gap between CS Process Studies and the preliminary design could widen because of the schedule for updating the process studies. This appears to have occurred. NNSA reviews of the project indicated less than satisfactory leading of the design by CS.

8.2. Status of Open issues from EM from FY 2011

No open issues from EM for FY 2011 were identified.

8.3. Open issues for the FY 2012 Report

- CS-Related Directives
  - Revision to Standard 3009 to properly address integration of CS into Documented Safety Analysis is being considered. The revision number on the drafts is above 100. This issue is still open.
  - DOE O 420.1b has been issued. This issue is closed.
  - Potential revision of DOE-STD-3007-2007, *Guidelines for Preparing Criticality Safety Evaluations at Department of Energy Non-Reactor Nuclear Facilities.* This will be held until ANSI/ANS 8.1 is revised and DOE-STD-3009 revised. The revision to ANSI/ANS 8.1 is now in the consensus balloting process. Sufficient guidance exists to produce adequate process evaluations for CS. This is still open. We may be able to initiate revision efforts in FY 2013.

- The status of the LANL program in terms of staffing and completion of new evaluations for drift resistant operations remains open.

National Nuclear Security Administration (NNSA) Site Inputs to the Annual Report on Nuclear Criticality Safety Programs

Fiscal Year (FY) 2012 Annual Report on Nuclear Criticality Safety Programs

National Nuclear Security Administration

In January 2009, the Defense Nuclear Facilities Safety Board (DNFSB) requested an annual report on the status of criticality safety (CS) in defense-related Department of Energy (DOE) facilities. This enclosure is a compilation of the National Nuclear Security Administration (NNSA) site office input for the report. The outline of the report is given in the Table of Contents below.

National Nuclear Security Administration (NNSA) Site Inputs to the Annual Report on Nuclear Criticality Safety Programs

National Nuclear Security Administration (NNSA) Site Inputs to the Annual Report on Nuclear Criticality Safety Programs

1. Livermore Field Office (LFO)

1.1. Performance, Metrics, and Deficiencies

LFO's assessment of the Lawrence Livermore National Laboratory (LLNL) criticality safety (CS) program was based on a set of established performance metrics (see Table 1) and an extensive series of operational awareness activities in LLNL nuclear facilities.

- The contractor met or exceeded all of the negotiated CS performance metrics for Fiscal Year (FY) 2012 with a score of Excellent.

- The contractor significantly exceeded the minimum performance criteria through a combination of operator training compliance, CS inspections, Nuclear Criticality Safety Division (NCSD) staff continuing training activities, implementation of CS controls, and CS support for operations at the Nevada National Security Site (NNSS) [input provided by the Nevada Field Office (NFO)].

- Overall, the level of operational CS infractions and deficiencies were minor during FY 2012. All operational deficiencies were self-identified and corrected. Implementation of CS controls was excellent.

Table 1.1 FY 12 LLNL Criticality Safety Performance Metrics

No.	Metric:
1.	Highest severity level of CS infractions: *Criteria: 3 points for level 4 (or no infraction); 2 points for level 3; no points for level 2.*
2.	Number of similar infractions that occurred in a 12-month period. *Criteria: 2 points for no similar infractions; no points for repeat infractions.*
3.	CS infraction identified by workers. *Criteria: 0 points for fissile material handlers* (FMHs)*,* Nuclear Criticality Safety Division (*NCSD) and facility staff, -2 points for NNSA/LFO, and -3 points for other governmental organizations (DOE Headquarters (HQ), Defense Nuclear Facilities Safety Board (DNFSB), etc…). Points to be averaged over the total number of infractions for the FY.*
4.	All CSE derived controls are fully implemented in facility procedures. *Subjective rating (maximum of 4 points). Items for consideration: Use of a deliberate and documented process for implementing CSE derived controls in facility procedures; personnel trained in the implementation of controls; controls are clearly implementable by handlers; and DOE STD-1158.*
5.	Training compliance (% of LLNL personnel completing HS3100 or equivalent when required by job assignment): *Criteria: 3 points for 95-100%; 2 points for 90-94%; 1 point for 85-89% compliance.*
6.	Number of NCSD non-managerial staff and FMHs actively serving on an American National Standards Institute/American Nuclear Society (ANSI/ANS) – 8 standard working group. *Criteria: 3 points for 3 participants; 2 points for 2 participants; 1 point for 1 participant.*

National Nuclear Security Administration (NNSA) Site Inputs to the Annual Report on Nuclear Criticality Safety Programs

Table 1.1 FY 12 LLNL Criticality Safety Performance Metrics	
No.	Metric:
7.	NCSD conducts documented walk-through inspections of rooms with operations having significant quantity of fissionable material: *Criteria: 3 points for inspecting 95% quarterly; 2 points for inspecting 95% biannually; 1 point for inspecting 95% annually.*
8.	Number of NCSD technical seminars: *Criteria: 3 points for 6 seminars; 2 points for 4 seminars; 1 point for 2 seminars.*
9.	Quality of CSEs as evaluated by LFO. *Subjective rating (maximum of 4 points). Items for consideration: Compliance with standards, technical errors, conflicting control sets, failure to demonstrate criticality accident is not a credible event where required by Technical Safety Requirement (TSR), and DOE Standard (STD)-1158.*
10.	Operation Conducted without a CSE: *Criteria: -4 points for an operation being conducted without a CSE.*
	Scoring criteria: Excellent: 25 – 23 Very Good: 22 – 20 Good: 16 – 19 Satisfactory: 15 – 12 Unsatisfactory: less than 12

For FY 2013, LLNL revised its CS performance metrics to include revised operations in B332 (post de-inventory of Category 1 and 2 materials), operational procedure document reviews, participation in technical conferences, and implementation of corrective action plans for identified issues and deficiencies. These metrics will now be tracked on an on-going basis using LLNL Contractor Assurance System (CAS) processes.

Table 1.2 FY13 LLNL Criticality Safety Performance Metrics	
No.	**Metric**
Training and Professional Development	
1.	Training compliance[1] (% of LLNL personnel completing HS3100 or equivalent when required by job assignment): [1]*Criteria: 3 points for 95-100%; 2 points for 90-94%; 1 point for 85-89% compliance.*
2.	Number[2] of NCSD staff attending national or international conferences with sessions devoted to CS or Nuclear Criticality Safety Program (NCSP) activities (e.g., ANS, ICNC): [2]*Criteria: 3 points for 3 attendees; 2 points for 2 attendees; 1 point for 1 attendee.*
3.	Number[3] of NCSD staff attending national or international standards working groups: [3]*Criteria: 3 points for 3 attendees; 2 points for 2 attendees; 1 point for 1 attendee.*
4.	Number[4] of NCSD technical seminars:

National Nuclear Security Administration (NNSA) Site Inputs to the Annual Report on Nuclear Criticality Safety Programs

	[4]*Criteria: 3 points for 6 seminars; 2 points for 4 seminars; 1 point for 2 seminars.*
Audits, Assessments, Inspections, and Reviews	
5.	NCSD prepares a Corrective Action Plan (CAP) for all deficiencies identified in the IIA and completes[5] corrections promptly: [5]*Criteria: 3 points for completing within 45 days; 2 points for 60 days; and 1 point for 75 days.*
6.	NCSD completes[6] all required interim compensatory actions related to current 830 software versions: [6]*Criteria: 3 points by Nov. 30, 2012; 1 point within approved extension; otherwise 0 points.*
7.	NCSD conducts documented walk-through inspections[7] of rooms with operations having a significant quantity of fissionable material: [7]*Criteria: 3 points for inspecting 95% quarterly; 2 points for inspecting 95% biannually; 1 point for inspecting 95% annually.*
8.	NCSD conducts Basic Annual Reviews (BARs)[8] of OSPs for rooms having significant quantity of fissional materials: [8]*Criteria: 3 points for completing 100% of required BARs in FY 2013; 2 points for completing 95%; and 1 point for 90%.*
Criticality Safety Evaluations (CSEs)	
9.	Quality[9] of CSEs: [9]*Criteria: 3 points for high quality evaluations having no externally identified technical errors with safety significance; 0 points for evaluations with externally identified errors that are corrected with no adverse impact on operations; -3 points for low quality evaluations resulting in a Potential Inadequacy in Safety Analysis (PISA) and suspension of operations in excess of 5 business days.*
10.	Operations conducted[10] without a CSE: [10]*Criteria: -4 points for an operation being conducted without a CSE.*
	Process Improvements to Simplify Criticality Controls
11.	Significant[11] reduction in the number of approved items: [11]*Criteria: 2 points for 50% reduction; 1 point for 25% reduction.*
12.	Significant[12] reduction in the number of SCCCs [12]*Criteria: 2 points for 10% reduction; 1 point for 5% reduction.*
	Criticality Control Non-Compliances
13.	Highest severity level[13] of CS infractions: [13]*Criteria: 3 points for level 4 (or no infractions); 2 points for level 3; no points for level 2.*
14.	Number of similar[14] infractions that occurred in a 12-month period. [14]*Criteria: 2 points for no similar infractions; no points for repeat infractions.*
15.	CS infractions indentified[15] by workers. [15]*Criteria: 0 points for FMH, NCSD, or facility; -2 for NNSA/LFO; -3 for DOE, HQ, DNFSB, etc. Points to be average over the total number of infractions for the fiscal year.*

1.2. Contractor Nuclear Criticality Safety Engineer Programs

Staffing of the core element of the LLNL NCSD is adequate and relatively stable. One senior engineer (the supervising CS engineer in the Superblock) retired at the end of the year. The current core staff is comprised of 8 engineers (including the division leader), a full time computer scientist, and 2 administrative staff. Additionally, 3 retired computer scientists provide numerical methods support for the LLNL Monte-Carlo methods (funded by DOE NCSP). All LLNL CS engineers are qualified per the LLNL CS qualification program which satisfies DOE-STD-1135-99, Guidance for Nuclear CS Engineer Training and Qualification.

The division continues to support Superblock, Radioactive Waste Management, non-superblock programmatic operations with fissionable materials, and Transportation operations. In FY 2012, Superblock and Radioactive Waste Management operations were funded at the 3.9 CS FTE level. The level for FY 2013 was cut to 2 FTEs – with funding for one senior and one junior CS engineer. It should be noted that the current technical basis for CS in the Superblock supports Security Category I operations with significant quantities of fissionable materials. Sufficient CS resources will be needed to streamline the technical basis to support efficient Security Category III operations with less maintenance costs.

The division also continues to provide support to NNSS facilities, LLNL facilities with fissile materials that are not categorized as nuclear facilities, and DOE NCSP initiatives.

In an effort to provide adequate funding to maintain his staff, the LLNL NCSD leader has successfully sought additional work (non-CS) for his engineers from other directorates as well as providing significant support for the DOE NCSP.

The LFO CS engineer maintains an awareness of staffing levels to ensure adequate qualified staff remains on hand to support fissile material operations.

1.3. Federal Nuclear Criticality Safety Engineer Programs

The NNSA/LFO has one fully qualified criticality safety engineer. LFO has no plans at present to increase the staffing level for criticality safety oversight.

1.4. Results and Any Lessons Learned From Federal Assessments of Criticality Safety

The LFO CS Engineer and LFO Facility Representatives have conducted numerous CS-focused walkthroughs and surveillances in LLNL facilities with operations involving significant quantities of fissionable materials. No significant issues or deficiencies were identified in these reviews.

LLNL is required to conduct an annual audit of CS in B332, the Plutonium Facility. Typically, this self-assessment is conducted by the LLNL NCSD. On a triennial basis the Laboratory's conducts an assessment of the overall LLNL CS program using DOE-Standard-1158. This assessment addresses both the institutional LLNL CS program as well as CS in B332. The LLNL Quality Assurance (QA) Office conducted a triennial review of the CS program in August 2012. The review identified 3 strengths, 4 observations, and 1 deficiency: A non-compliance with DOE Order 414.1D, QA (LLNL NCSD procedures did not distinguish between records and non-records per Attachment 2, Criteria 4 of the DOE Order 414.1D).

LLNL NCSD staff continued to perform routine quarterly walkthroughs of all operations involving significant quantities of fissile material to ascertain that CS controls are being correctly implemented and that process conditions have not been altered from those analyzed in the applicable CSEs. The single exception to quarterly walkthroughs has been in the JASPER facility at NNSS where two walkthroughs were conducted during the fiscal year. Overall, LLNL NCSD criticality safety oversight of operations is judged excellent by the field office.

1.5. Results and Lessons Learned from Reviews of Proposed Nuclear Criticality Safety Controls and Design Requirements for New Facility Designs

LLNL has no such lessons learned to share for FY 2012.

1.6. Results of Trending and Analysis of Reportable and Non-Reportable Occurrences Related to Criticality

There were three CS infractions in FY 2012 and two infractions in each of the two prior years. A review of FY 2012 infractions compared to FY 2011 infractions did not identify any trends in type or severity of LLNL criticality safety infractions. One involved a few tens of grams of dry metal in a glovebox that was posted for oxide only, the second involved less than 20 grams of fissile material in an item that had exceeded the total weight allowance in a storage location, and the third involved receipt and storage of two items without CS approval for those items. These two items remained in the shipping containers until limits were prepared. In all cases, Program personnel took the appropriate actions in accordance with infraction response procedures. All three infractions were level 4, the lowest level of infraction. (A level 5 is used for items or events that are later determined to be within limits.)

Overall, the level of operational CS infractions and deficiencies at LLNL were relatively minor during FY 2012. All operational deficiencies were self-identified by operations staff. Implementation of CS controls in LLNL facilities is judged excellent by LFO.

1.7. Results of Follow-Up Reviews Undertaken by DOE to Assess Effectiveness of Corrective Actions and Improvements

LFO did not conduct any follow-up reviews during FY 2012.

1.8. Open Issues from Last Year's Annual Report

There are no open issues from prior years.

2. Nevada Field Office (NFO)

2.1. Performance, Metrics, and Deficiencies

NCS performance by Nevada Security Technologies (NSTec) CS Program overall was rated as satisfactory for FY 2012.

Metrics: NSTec established, populated, and maintained performance metrics, including;

- NCSP Assessment Performance,
- Conditions Adverse to NCS
- CS Document Delivery Performance, and
- CSE Walkthrough Time.

A Criticality Safety Review Committee (CSRC) whose purpose is to monitor and mentor the NSTec NCSP was chartered during FY 2012. The charter and membership is approved by NFO.

There have been no criticality safety infractions in FY 2012.

2.2. Contractor Nuclear Criticality Safety Engineer Programs

During FY 2012, the position of CS Program Manager was created and filled. A qualification program was developed for the new position whose content was concurred with by the CS Review Committee. The CS Program Manager has completed the qualification as of June 2012. NCS Staff remained stable at two Senior CS Engineers and one CS Engineer. All three CS Engineers have completed qualifications for multiple facilities.

2.3. Federal Nuclear Criticality Safety Engineer Programs

NFO has 1 CS Engineer in the final stages of qualification. Staffing from other field offices and Headquarters (HQ) are utilized as needed in the interim.

2.4. Results and Any Lessons Learned From Federal Assessments of Criticality Safety

A set of 14 corrective actions required by NFO based on findings from a 2011 assessment of NSTec level of compliance, effectiveness, and performance associated with implementation of DOE-STD-3007-2007 are complete. Confirmatory assessments will be performed in FY 2013.

NFO required that NSTec develop and document, jointly with LANL and LLNL, an integrated NCSP at the NNSS. This effort is nearing completion. Delays in completion resulted in fee reductions at one NNSA site.

2.5. Results and Lessons Learned from Reviews of Proposed Nuclear Criticality Safety Controls and Design Requirements for New Facility Designs

No new designs are proposed or underway.

2.6. Results of Trending and Analysis of Reportable and Non-Reportable Occurrences Related to Criticality

No infractions were reported in FY 2012.

2.7. Results of Follow-Up Reviews Undertaken by DOE to Assess Effectiveness of Corrective Actions and Improvements

Follow up reviews for the corrective actions from the 2011 review of DOE-STD-3007 implementation will be conducted in FY 2013.

2.8. Open Issues from Last Year's Annual Report

No Open Issues from FY 2011.

3. Los Alamos Field Office

3.1. Performance, Metrics, and Deficiencies

3.1.1. Field Element Line Management actions

Los Alamos Field Office oversight in FY 2012 focused on CS Program implementation at the Plutonium Facility (TA-55) and emergent issues created by attrition of Los Alamos National Security, LLC (LANS) criticality group staff. LANS has made progress on operational implementation of the CS program at all HC 2 nuclear facilities. LANS assessments, shadowed by the Los Alamos Field Office, independently verified this level of implementation. LANS also completed upgrades to CSEs for all high risk operations in FY 2012. The Los Alamos Field Office directed LANS to develop a CAP to address issues identified in the Criticality Safety Support Group (CSSG) assessment of March 2012. LANS submitted the CAP on November 8, 2012.

3.1.2. Evaluation

The CSSG assessment and Los Alamos Field Office reviews have identified several non-compliances including:

- The CSSG concluded that “LANL does not meet the requirements of ANSI/ANS-8.19, Section 4 "Management Responsibilities" with respect to monitoring the CS program, investigating and correcting CS problems, ensuring adequate qualified CS engineering staff are available, and in clearly identifying responsibility for establishing and maintaining the CS program.”
- Given the lack of experienced and qualified CS staff (Section 1.2), the requirements of ANSI/ANS-8.19 Section 6 “Nuclear Criticality Staff Responsibilities” are currently not met.
- About two hundred CSEs require updating in accordance with the Nuclear CS Program Improvement Plan to be compliant to the requirements of ANSI/ANS-8.19 Section 8 “Process Evaluation for Nuclear Criticality Safety.”
- Facility Implementation at less than HC-2 facilities is incomplete.

Based on the above, the LANL NCSP does not meet program requirements of applicable national consensus standards and DOE Order 420.1B. The LANS CAP is intended to address these issues.

3.2. Contractor Nuclear Criticality Safety Engineer Programs

In Terms of ANSI/ANS-8.26 Section 5 "Criticality Safety Engineer Qualification Levels," LANS has:

- Two Senior CS engineers − One is working outside the CS group at LANL; the other has submitted notice of departure from LANL by the end of November;
- Three CS engineers, with two of these in the CS group; and
- Four CS engineers in training.

This staffing level is insufficient to support long-term operations. The CSSG report identified the issue (Section 1.4). The LANS CAP includes commitments for 2013 to rebuild the CS group,

provide appropriate training, ensure the timely availability of outside CS expertise, and establish other appropriate interim compensatory measures.

3.3. Federal Nuclear Criticality Safety Engineer Programs

Los Alamos Field Office NCS engineering is fully staffed with one NNSA qualified CS Engineer. In FY 2012 a second engineer was identified as a backup. This engineer was issued the qualification standard and is in training. Los Alamos Field Office continues to receive support from NNSA HQ CS staff on an as needed basis.

3.4. Results and Any Lessons Learned From Federal Assessments of Criticality Safety

LANS conducted, and Los Alamos Field Office shadowed, two assessments focused on implementation of the TA-55 CS program. These assessments concluded that the CS program was fully implemented at TA-55.

At Los Alamos Field Office's request the CSSG conducted an assessment of the LANL CS program in March 2012. The assessment focused on TA-55 implementation with a secondary focus on the institutional program. The team identified that management ownership and monitoring of the NCSP is less than adequate and that LANS has also been unable to close outstanding criticality safety issues in a timely manner. It also identified that the LANL CS group staffing was experiencing attrition that grew worse as the year progressed. On November 8, 2012, LANS submitted a CAP to address these issues in 2013.

3.5. Results and Lessons Learned from Reviews of Proposed Nuclear Criticality Safety Controls and Design Requirements for New Facility Designs

The CS group was actively engaged in line item projects in 2012. Project support included: CMRR, TA-55 Reinvestment, and the TRU waste facility (TWF). Los Alamos Field Office reviews design documents at critical decision points to assure that design features are captured. The CS group's engagement in non-line item projects has declined. Facility management engagement of the group on facility modifications varies and appears to be declining.

3.6. Results of Trending and Analysis of Reportable and Non-Reportable Occurrences Related to Criticality

There were thirteen CS infractions at LANL in FY 2012, three fewer than in FY 2011. Five were reported in the Occurrence Reporting and Processing System (ORPS). All of the infractions were identified by LANS operations or by LANS CS staff during annual process reviews. The infractions are binned:

- Two Level 5 – no process parameter impacted;
- Ten Level 4 – A single process parameter impacted with other barriers remaining intact;
- One Level 3 – Legacy issue regarding waste boxes.

Trending and analysis indicates that facility implementation is improved over previous years. All infractions were discovered by LANS and of low safety significance.

3.7. Results of Follow-Up Reviews Undertaken by DOE to Assess Effectiveness of Corrective Actions and Improvements

These were addressed in Sections 3.1 through 3.6 above.

3.8. Open Issues from Last Year's Annual Report

These were addressed in Sections 3.1 through 3.6 above.

4. Sandia Field Office (SFO)

4.1. Performance, Metrics, and Deficiencies

NCS performance measures to meet DOE O 226.1, Attachment 3, Section 1.b (4) were established in a letter to Sandia National Laboratory (SNL) on May 31, 2006. These performance measures established metrics in

1) Non-Conformances
2) Self-Assessments and Committees
3) Staff Responsibilities, and
4) CS Assessments.

These performance measures have been incorporated Criticality Safety Program Document (CSPD). A brief status is as follows:

1) Non-Conformances

For NCS ORPS reportable, there was one in 2006 for the Manzano Nuclear Facility (MNF), one in 2007 for the Nuclear Material Storage Facility, and one in 2009 for the MNF. There were no NCS ORPS reportable in the last three years. The three earlier reportable events were discussed in last year's report.

2) Self-Assessments and Committees

DOE-STD-1158-2002 has been used extensively to meet American National Standards Institute (ANSI)/American National Standard (ANS) 8.19 requirements for self-assessments through 2009. SNL started an initiative in 2007 to complete self-assessments of their program per DOE-STD-1158-2002. 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. All nuclear facilities are reviewed annually with the reports issued within two to three months of the review. In 2012, SNL planned nine DOE-STD-1158-2010 self-assessments of facilities representing all the facilities where fissile mass is greater than threshold quantities. Through November 2012, three of the nine NCS self-assessments have been completed and the remaining six will be completed in December 2012. This is the fifth year where SNL has performed self-assessments on facilities. The nine self-assessments in 2012 represent 100% of the facilities where fissile mass is greater than threshold quantities. SFO reviews all of the self-assessments through the CAS. At the conclusion of the annual self-assessments, a final self-assessment reviews all of the facility self-assessments to identify trends, if applicable. Corrective actions are performed consistent with resource loading and safety/compliance importance. Information from self-assessments and walkthrough's in 2012 was included in a local action tracking system.

Through November of 2012, the Radiological and Criticality Safety Committee (RCSC) met five times to review criticality safety for facilities within TA-V and the Sandia Nuclear Criticality Safety Committee (SNCSC) met two times to review criticality safety for facilities outside TA-V. Two or sometimes three qualified SNL criticality safety engineers were present at all meetings. The Annular Core Research Reactor (ACRR) and SPR review committees also met to review procedures that implemented criticality safety. SFO personnel have been included in the meeting notices and have attended several meetings. Meeting minutes were developed, reviewed, approved, and distributed usually within three months of the meeting date. Many members of the safety committees are members of other safety committees including the minute taker. 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. These are committee action items and are tracked and closed in the minutes. The minutes are reviewed by members and signed off by the Chair of the committee.

3) Staff Responsibilities

The NCS training program is based on DOE-STD-1135-99 and ANSI/ANS 8.26. SNL has nine qualified Nuclear Criticality Safety Engineers (NCSEs) in 2012 which in one less than in 2011. Of the nine qualified NCSEs, six are members of safety committees that require criticality expertise. So far, seven of the nine NCSEs have participated or observed the critical experiments at Sandia National Laboratory, Sandia Pulse Reactor/Critical Experiment (SPR/CX). One of the NCSEs is the lead designer and nuclear engineer for the SPR/CX experiments although several NCSEs were involved in preparing or providing the training. SNL NCSEs have supported the following:

- Five NCSEs attended ANS conferences.
- NCS engineers participate in all of the NCS safety committee DOE Standard 1158 based self-assessments and walk-through activities.
- Four NCSEs are members of the ANS/ANSI Standards working groups and/or oversight committees.
- One NCSE is involved in the NCS activities associated with the Energy Facility Contractors Group Safety (EFCOG).
- One NCSE attended the NCSP/CSSG Annual Review Meeting.
- One NCSE attended the NCSP 2012 Program Execution Meeting at DOE/NV.
- The University of New Mexico NCS short course included sections taught by two NCSEs.
- The Sandia Critical Experiments course was developed and taught by five NCSEs

Some NCS training has been transitioned to a computer-based training, which should aid operations personnel and management in maintaining training currency.

The NCSP hosted an MCNP training course (*Theory and Practice of Criticality Calculations with MCNP5: LA-UR-08-0849*) in 2012 and was well-attended by several criticality engineers at SNL and NNSA. The MCNP training course was taught by Forrest Brown of LANL. The class was free of charge as part of funding from the DOE NCSP.

National Nuclear Security Administration (NNSA) Site Inputs to the Annual Report on Nuclear Criticality Safety Programs

4) Criticality Safety Assessments (i.e. Process Evaluation for Criticality Safety)

Prior to operations, the CSAs are developed, reviewed, and approved. There are sixteen active CSAs for SNL. New CSAs are developed to DOE-STD-3007-2007, and if not, are submitted to SFO for approval. To date, no CSAs have required SFO approval but almost all have been reviewed by the SFO CRITPOC. Currently SNL has several facilities and activities that were developed prior to DOE-STD-3007-93. SNL is working on a gap analysis of the CSAs not meeting DOE-STD-3007-2007 and maintains a schedule for updating them. Several of the current pre-DOE-STD-3007-2007 CSAs will be updated through the issuance of two new CSAs by the end of 2013. There was one new CSA completed in 2012 for the *Criticality Safety Assessment for the LEU Cube Activities at HERMES Facility*. In addition, several CSI calculations were completed for shipment of materials from SNL or for storage at SNL.

The current SNL verification and validation (V&V) process is being evaluated to ANSI/ANS 8.24 to ensure software quality assurance requirements are addressed. The current program follows 414.1C. There are more than ten computers used to perform CS calculations. Prior to using the data from the computer for a CSA, the V&V packages are completed. The ANSI/ANS-8.24 *Validation of Neutron Transport Methods for Nuclear Criticality Safety Calculation* has not been completed. The ANSI/ANS-8.26 *Criticality Safety Engineer Training and Qualification Program* have been completed and an update to the NCSE training program is completed.

4.2. Contractor Nuclear Criticality Safety Engineer Programs

Nine engineers are qualified to DOE-STD-1135-99 as NCSEs. The program has been updated to address ANSI/ANS 8.26 requirements. NCSP work is ~ two full-time-equivalents (FTEs) in 2012. NCS projects work is anticipated to remain at two FTEs for 2013. 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.

4.3. Federal Nuclear Criticality Safety Engineer Programs

One engineer has completed the Technical Qualification Program (TQP) standard for DOE-STD-1173-2003 in December 2007 and requalified in 2011. The requirement to requalify is an SFO requirement for every five years and is not a requirement by TQP. CS 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. It is also expected within the next few years that the number of facilities will be reduced also. However, due to other commitments for the one engineer, SFO may require additional assistance as needed as observed in the last Chief of Defense Nuclear Safety (CDNS) Biennial Review.

4.4. Results and Any Lessons Learned From Federal Assessments of Criticality Safety

The only federal assessments performed in 2012 were the four facility walkthroughs. For the four assessments, there were minor observations identified. Since there were no deficiencies, no corrective action plans (CAPs) were required.

4.5. Results and Lessons Learned from Reviews of Proposed Nuclear Criticality Safety Controls and Design Requirements for New Facility Designs

No new designs are proposed or underway.

4.6. Results of Trending and Analysis of Reportable and Non-Reportable Occurrences Related to Criticality

One reportable occurrence occurred in 2009 concerning the difference in the amount of fissile material in containers at the MNF as described previously. The occurrence report was issued as a Potential Inadequacy in Safety Analysis (PISA) by the facility management and required an update to the MNF NCSE which was completed in 2010. No NCS related occurrence reports were required in the last three years.

4.7. Results of Follow-Up Reviews Undertaken by DOE to Assess Effectiveness of Corrective Actions and Improvements

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

4.8. Open Issues from Last Year's Annual Report

There are no open issues from prior years.

5. NNSA National Production Office (NPO) Pantex

5.1. Performance, Metrics, and Deficiencies

The FY 2011 NNSA Programmatic Assessment of the Babcock & Wilcox Technical Services Pantex, LLC (B&W) NCSP resulted in no deficiencies, weaknesses, or observations. The Contractor continued to focus on the issue of NCSE staffing and, at the beginning of FY 2012 had three qualified NCSEs. In April 2012 one of the Contractor CS engineers left the Plant leaving only two qualified engineers remaining. B&W continues to recruit to fill the vacant position. The NPO Pantex Plant continues with its established performance metric of no CS infractions. There were no NCS-related infractions at Pantex in FY 2012; no NCS infractions have been recorded in the past twenty years. The NPO Pantex CS Engineer, (dual qualified Nuclear Safety Specialist) is actively involved in reviewing B&W NCS-related work products. An NPO CS Engineer located at Pantex monitors the B&W qualified NCS Engineer Staffing, the status of the conduct of planned facility/operations walkdowns, and shadows Contractor management self-assessments involving the B&W NCSP. B&W Pantex metrics used to monitor the health of the CS Program are:

1) # of NCS-related infractions;
2) # of qualified NCSEs;
3) Status of NCS Walkdowns against the Annual Walkdown Plan; and
4) Status of completed NCS-related CAS assessments (and their results) compared to the CAS plan.

5.2. Contractor Nuclear Criticality Safety Engineer Programs

The B&W Pantex CS Program is currently staffed with two qualified CS engineers. Two CS Engineers are sufficient to maintain the NCS technical basis document and provide CS oversight for Pantex operations. Both B&W CS engineers have PhDs; one in nuclear engineering (NCS lead) and one in Chemistry. Both NCS engineers are qualified to the B&W Pantex NCS Engineer Qualification program (which meets the requirements of DOE-STD-1135-

99, *Guidance for Nuclear Criticality Safety Engineer Training and Qualification)*. If necessitated by operational events, additional NCS support may include using sub-contractor or getting support from other NNSA or DOE Sites. NPO has determined that the B&W Pantex CS Program is effective and minimally staffed to meet the needs of safe Pantex operations.

5.3. Federal Nuclear Criticality Safety Engineer Programs

NPO Pantex has one qualified federal CS engineer on a part-time basis to oversee B&W operations. Because of the form of the fissile material and the nature of the weapons component handling operations at Pantex, a part-time NPO Pantex CS Engineer is sufficient to oversee the B&W Pantex CS Program. The NPO CS Engineer has completed his qualification for *Criticality Safety Functional Area Qualification Standard,* DOE-STD-1173-2009. NNSA HQ CDNS conducted a Biennial Review of Site Nuclear Safety Performance in FY 2011. In the functional area of CS, the CDNS team identified one weakness and one opportunity for improvement. The issues have been subsequently resolved and closed in a timely manner. Overall, the NPO Pantex CS oversight was graded by CDNS as meeting expectations.

5.4. Results and Any Lessons Learned From Federal Assessments of Criticality Safety

The last NNSA programmatic assessment of the B&W Pantex NCSP occurred in September 2011. The NCSP Assessment identified no findings/ deficiencies, weaknesses, or observations. The B&W NCSP demonstrated improvement over what was observed in the FY 2010 NNSA Programmatic Assessment. NPO Pantex typically assigns Performance Measures, as necessary, to provide a focus for the B&W Pantex NCSP. In FY 2012 the Contractor continued developing an NCS safety management program description, and properly categorizing CS control set for the purposes of revising the Pantex Sitewide Safety Analysis Report (SAR), and technical safety requirements. B&W Pantex implemented a three-year cyclic assessment program based on DOE-STD-1158-2010 in which all CS Program elements would be assessed on a triennial basis. All NCS-related assessments are formally scheduled through the CAS. The B&W CS Program remains a very stable and effective oversight program in the Contractor's Integrated Safety Management System.

5.5. Results and Lessons Learned from Reviews of Proposed Nuclear Criticality Safety Controls and Design Requirements for New Facility Designs

No new designs are proposed or underway.

5.6. Results of Trending and Analysis of Reportable and Non-Reportable Occurrences Related to Criticality

There are no known reportable or non-reportable occurrences related to criticality in at least the last 20 or more years at Pantex. Therefore, there is no trending or analysis of such events.

5.7. Results of Follow-Up Reviews Undertaken by DOE to Assess Effectiveness of Corrective Actions and Improvements

No follow up reviews were necessary in FY 2012.

5.8. Open Issues from Last Year's Annual Report

There are no open issues from prior years.

6. NPO Y-12

6.1. Performance, Metrics, and Deficiencies

Y-12 has a set of metrics that measure performance in the areas of non-compliances with NCS requirements, NCS support for Operations personnel, professional development of the NCS Engineering staff, and performance related to identifying and closing NCS issues. Y-12 reviews these metrics in monthly NCS Advisory Council (NCSAC) meetings, and at periodic plant NCS Committee meetings. Additionally, some of the metrics are uploaded into the CAS. The extensive reporting of sub-threshold (i.e., non-reportable per DOE 0 231. 1 A) NCS issues at Y-12 forms the basis for many of these Y-12 NCS metrics. Non-reportable NCS issues are categorized as an NCS deficiency, a minor non-compliance, or a field correctable situation. The current set of Y-12 metrics reported on a monthly basis (unless indicated otherwise) includes:

- Closure timeliness of NCS deficiencies and minor non-compliances, focusing on the total number open longer than 45 days. This is a CAS metric.
- Overall Field Issues, focusing on the three-month average number of deficiencies, minor non-compliances, and field correctable situations. This is considered to be a leading indicator. There are three additional metrics that break down the data in other areas of interest:
    - Overall Field Issues (Category) − This metric tracks the number of NCS field issues occurring per month binned by category. The top six categories are displayed and information is provided for the number in the current month and average number per month in each category. The averages per month are based upon the past year's performance. This is considered to be a leading indicator.
    - Overall Field Issues (Operating Area) − This metric tracks the number of NCS field issues occurring per month binned by operating area. Data is provided for the number in the current month and average number per month in each area over the past year. It is a breakdown of the Overall Field Issues metric by location of issue. This is considered to be a leading indicator.
    - Overall Field Issues (Cause) − This metric tracks the number of NCS field issues occurring per month binned by cause. Data is provided for the number in the current month in each cause bin and the average per month data is based upon the past year's performance. This is considered to be a leading indicator.

- Self-Reporting of NCS Issues − Reports the percentage of issues self-reported by the contractor's production and line oversight organizations. This is a CAS metric and is considered to be a leading indicator.
- 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 are deemed to be “repeat deficiencies” by the NCSAC. This is a CAS metric and is considered to be a leading indicator.
- 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 in Building 9212 − This item has two components:

  - 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 overflows. This is an indication of the physical state of the facility.
  - Number of inadvertent transfers of fissile solution. An inadvertent transfer is one 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. This is a Continued Safe Operations Oversight Team (CSOOT) metric and is considered to be a leading indicator.

- NCS Issue Trends − This metric provides two years' worth of data on NCS deficiencies and minor non-compliances. This is an interactive metric that allows one to choose among four categories of issues: implementation, infrastructure, legacy, and performance. The time horizon for the display of data is adjustable so that long-term or short-term trends can be evaluated. This metric links directly to the NCS database and, with the exception of the category binning assignment, is fully automated. This is considered to be a leading indicator.
- NCS Issue Age − This metric tracks the number of NCS issues that are open in several age bins. Issues include Deficiencies and Minor Non-Compliances.
- NCS Engineer Task Qualification − This metric tracks the percentage of NCS staff (B&W Y-12 and subcontractors) qualified in various NCS tasks. This is a CAS metric and is considered to be a leading indicator.
- Material Access Area (MAA) Time Index − The metric tracks "MAA time," which is defined as time spent in MAAs for any purpose. This is a measure of NCS engineers' field support to the facilities and is considered to be a leading indicator.

The performance as measured by the NCS metrics shows a downward (improving) trend in the areas of non-reportable issues (deficiencies, minor non-compliances, and field correctible issues). The number of issues trended upward through half of FY 2012 and then decreased fairly steadily toward the end of the fiscal year. The total number of issues in FY 2012 is down slightly from FY 2011. This is consistent with an overall downward trend over the past several years (over 34% in comparison to FY 2008). Breakdown of the FY 2012 issues by operating area shows that the majority occurred in Building 9212 with an average of five and a half per month followed by Building 9204-2E with an average of just under three per month. Issues are binned by category and more issues were in the category of fissile storage than any other categories. Issues are also binned by cause and the most frequent cause was personnel error followed by equipment issues.

Metrics looking at closures of NCS items, both minor non-compliances (MNCs) and deficiencies, reveal that the improved levels achieved in the past two years are being maintained. At the beginning of FY 2011, there were only 10 MNCs and deficiencies on the books open over 45 days. That number has fluctuated within a small range around 10 and by the end of FY 2012 and was only 11. In regards to issues identified as repeat deficiencies, only one deficiency in FY 2012 was identified as being a repeat of past events. The self-reporting metric showed a downward trend over FY 2012 in issues identified by B&W personnel, although the overall percentage, about 94%, is considered to be very good performance in this area. The small group seminars metric showed very good performance with over 160 small group seminars performed throughout the year.

As of the end of FY 2012, there are four open issues greater than one year old. The number of unplanned activities in FY 2012 was only two.

The level of professional development of the NCS Engineering staff has dropped over the past year and is at a level considered to be only satisfactory.

B&W Y-12 does plan on revising the NCS metrics to include more metrics that measure performance of the NCS Engineering staff.

The NNSA NPO Y-12 NCS oversight for FY 2012 has provided regular contractor ratings (i.e., Performance Assurance reports) which include the Y-12 NCSP CAS metrics as about a third of the documented performance rating. The current set of NCS CAS metrics for FY 2012 is considered mature but needs improvements in tracking NCS analytical performance (efficiency - mentioned in last report) and implementation effectiveness. To meet this need the contractor has identified and has been collecting data in FY 2012 and is expected to develop additional measures early in the FY 2013 rating period.

6.2. Contractor Nuclear Criticality Safety Engineer Programs

At the Y-12 NSC, NCS engineers are part of the Safety Analysis Engineering (SAE) organization in the Engineering Division. At the end of FY 2012, including the Chief NCS Engineer, there were twenty eight B&W Y-12 and twenty subcontractor engineers practicing the NCS discipline. B&W Y-12 continues to pursue filling fulltime NCS engineer positions to reduce the current reliance on subcontractor engineers. There are currently five new nuclear engineers in an engineering rotation program (not included in the statistics below) that will be candidates for NCS engineer positions in the near future.

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

	B&W	**Subs**
Staff level, (Persons, not FTE):	28	20
Qualified Engineers in Training	100%	100%
Qualified NCSEs	57%	60%
Qualified Senior NCSEs	11%	Note 1
Process Reviews	93%	80%
NCS Evaluation and Documentation	75%	95%
Implementing Documentation Approval	82%	80%
Computations	89%	100%
Computation Review	29%	60%
NCS Evaluation Review	29%	55%
Criticality Accident Alarm System Support	11%	Note 2

Note 1: Subcontractors do not routinely qualify as Senior NCSEs.
Note 2: Subcontractors do not routinely qualify in this task.

NPO reviews several Y-12 NCSP indicators relative to staffing adequacy from a perspective of staff maturity, stability, and adequacy to accomplish mission goals including field presence and response to off normal events. The extensive use of sub-contracted resources continues to be of concern to NPO relative to building and retaining core expertise in the highly technical NCS engineering discipline, with no significant new NCS staff retention strategies being identified by the contractor in FY 2012.

6.3. Federal Nuclear Criticality Safety Engineer Programs

The federal NNSA NPO Y12 Site NCS staffing remains stable with one Sr. NCS Engineer augmented with one Future Leader Program (FLP) intern, a full time on-site subcontracted NCS engineering support contractor, and the assistance from the NNSA NCSP as follows:

- NPO, Senior NCS Engineer: BSEE, BSNE, and MSNE, with thirty years professional experience (with 15 years at Y 12).

- NPO, FLP intern: BSNE is scheduled to graduate from the DOE FLP program in 2013. He is currently training in the NCS and QA functional areas with NPO Y-12, and should finish his last course of the MSNE program at University of Tennessee in Knoxville soon, and has passed his NE PhD qualifying exam.

- NPO, Support Service Subcontractor Resources: NPO retains the services of one Senior NCS Engineer at Y12 reporting to the Sr. NCS Engineer.

- The DOE NCSP continues to support NPO and is available for assist reviews and reactive technical assistance at Y12 on an as needed basis. This support is expected to allow a more thorough review of NCS evaluations approved in FY 2013, and to provide independent review of newly developed NPO NCSP implementation, which combines both Pantex and Y-12 operations, to ensure consistency with NNSA NCSP expectations.

This current level of specific NPO Y12 NCS engineering staffing, which is also augmented with NPO Y12 Facility Representative engineering support through dedicated NCS Field Observation assessments, is considered adequate for Y-12 given the site's CAS maturity.

6.4. Results and Any Lessons Learned From Federal Assessments of Criticality Safety

NPO Y12 conducted approximately 143 assessments of the contractor NCSP during FY 2012 against formal NCS functional area elements which include NPO Facility Representative NCS field observances. This number includes 80 assessments conducted by the NPO NCS engineering Subject Matter Experts. Two weakness level issues were elevated to deficiencies in order to prompt formal corrective action plans − both are associated with the operation of the 9212 facility and dealt with insufficient basis for chemical recovery mopping activities and for issues associated with the 9212 process condensate system. Progress towards resolution of floor hold-up monitoring and evaluation using a new nondestructive assay (NDA) small angle scatter technique recently pioneered at Y-12 per published ANS papers early in FY 2012, and the implementation of an improved isolation strategy for 9212 out of service equipment were followed and are both scheduled to be completed in FY 2013. A letter was sent to the contractor relative to unsatisfactory progress in upgrading CSE's during FY 2012 and inadequate CSE implementation progress overall (i.e., also includes FY 2011 CSE upgrades) these issues will be followed in FY 2013 along with an independent contractor assessment of the CSE upgrade program effectiveness in the 2nd quarter of FY 2013. The upgrade of large antiquated container material handling and storage CSE's is expected to be a major focus of the upgrade effort.

The NPO Y12 is currently focused on several system improvement issues as discussed above, as well as a few areas for more general NCSP improvements to be made. In this regard the NCS process evaluation (i.e., CSE) annual operational review process, while meeting the basic

ANS requirements is not regarded by NPO as taking full advantage of the opportunity afforded by such a review to fully evaluate NCS field implementation issues and correct them before incurring an NCS infraction event. Several reviews of the contractors NCS committee during 2012 indicate a strong, well chartered organization that is actively engaged in issues of importance to NCS. As discussed in the first section, a mature set NCS metrics is in place and are a part of the regular contractor assessment process. Improvements to include improved measures of NCS CSE efficiencies and implementation effectiveness are expected to be in place and evaluated in 2013. A significant NPO field presence with dedicated focus on NCS, particularly in the 9212 wet chemistry areas, will continue in 2013. Other issues noted for action in 2012 include:

- Decontamination
- Maintenance
- Other materials backlog that pose challenges to large geometry exclusion area controls
- Equipment maintenance issues
- Maintenance of container labeling to current database updates
- Potential posting obfuscation by access to control area (e.g. , posting on back of door)
- General work control issues as they affect fissile materials

Several documentation concerns were identified in the review of CSE and NCS analysis or procedural documents. Detail comments and comments resolution process was engaged in 2012. New database methods to track NPO and contractor NCS SME comments were developed and are expected to mature in 2013. The contractor NCS management self-assessment program based on DOE standard 1158-2010 will be more actively shadow assessed in FY 2013. Review of past reports and procedures indicate an effective basis for a strong program in this regard; however it is uncertain that the level of significance placed upon assessments findings meets NPO expectations for continuous program improvement.

6.5. Results and Lessons Learned from Reviews of Proposed Nuclear Criticality Safety Controls and Design Requirements for New Facility Designs

A technical independent project review (TIPR) and a pre-TIPR review of the Uranium Processing Facility (UPF) were conducted in FY 2012. The pre-TIPR review included eight criteria covering the following:

1. All areas where a critical mass of material could conceivably amass have been designed to be criticality safe under normal operating and design base accident conditions.
2. The design incorporates appropriate criticality safety provisions of DOE 0 420.1 B and its design guides (DOE-STD-3007 and DOE-STD-1134).
3. The design is compliant with ANSIIANS 8. 1, Nuclear Criticality Safety in Operations with Fissionable Material Outside of Reactors.
4. The design complies with all applicable criticality regulations, DOE orders, and codes and standards.
5. A NCSP has been established and is integrated with the Preliminary Safety Design Report (PSDR).
6. Technical issues involving criticality safety, if identified, have been resolved or are in the process of being resolved.
7. Integrated Project Team member responsibilities regarding CS during the final design phase of the project have been identified and a sufficient number of qualified project team members are available to perform these activities.

8. Are design features concerning air duct flow adequate to prevent uranium accumulation.

All criteria but one were met. The criterion not met was #6 pertaining to the process for resolving technical issues. The issue was that informal methods were being used to change design criteria without an apparent technical basis. This issue has since been resolved by requiring the use of a form to transmit the changes with a documented technical basis.

The final TIPR was conducted late in FY 2012 and included an NCS objective to ensure that facility SSCs and supporting processes are being designed in accordance with DOE 0 420.1B requirements for NCS. The review determined that the overall objective for NCS was met but with some specific identified issues. One issue was raised on red oil explosions identified in the NCS analyses that defer to the facility safety analysis for development of controls that prevent such explosions. A recommendation was made to revise the NCS analyses to refine the analysis of red oil explosions and derive NCS controls and another related recommendation was made to specify all controls credited for NCS as NCS controls even if the controls are derived by other disciplines. Some of the NCS control statements were not clear and concise for all disciplines in the UPF project. A recommendation was made to revise the control statements to make them more understandable. Another issue was raised about the processes followed to ensure design features for NCS are captured in the project design. The concern noted is that as the design matures and the number of design documents generated increases, the adequacy and rigor of those reviews could be compromised. Finally, an issue was noted about the tools being used to track data needs and open assumptions need to be formalized at the project level.

NPO NCS conducted several assessments of NCS process studies for UPF, and evaluated key UPF project documents such as revised PSDR submittals. Review of UPF process design which is rapidly changing in several areas of significant interest to NCS was actively followed by NPO NCS SME's in 2012, including participation on the federal Integrated Project Team. Areas of concern identified include casting verification and validation methods with design revisions eliminating significant portions of the casting line and previous design features in 2012, advanced machining chip handling and related coolant systems design issues, and consistency with the approved CS program document controls elevation process. Upgraded container design to simplify approved loading requirements for UPF has received minimal attention in 2012 and is an area of concern given the scope of its challenge to current Y-12 fissile material operations. Significant support from the NNSA NCSP to review safety basis documents and NCS process studies for UPF was received in 2012 and is expected to be relied upon until or unless significant changes in organizational structure for UPF dictate otherwise (e.g., placement of full time federal NCS oversight on the project).

6.6. Results of Trending and Analysis of Reportable and Non-Reportable Occurrences Related to Criticality

There were no reportable NCS (i.e., Group 3 Subgroup C) occurrences per DOE 0 232.2 in Fiscal Year 2012.

There was one Category 3 occurrence for a hazard control violation related to a suspected noncompliance with dimensions required for NCS. Crucibles used for Reduction operations have dimensional requirements that are elevated to the TSR through the criticality control review (CCR) process. The NCS requirement invoked the drawing and not all dimensions on

the drawing were met. After the concern was identified, the specific dimensions on the drawing that are important to NCS were identified and the measurement techniques were refined. Further inspections using the new information and measurement instruments revealed that only a small percentage of crucibles were not in compliance and those crucibles were discarded.

There were two category 3 occurrences associated with the degradation of safety significant SSCs on criticality accident alarm system. Two failures of digital message recorders were discovered.

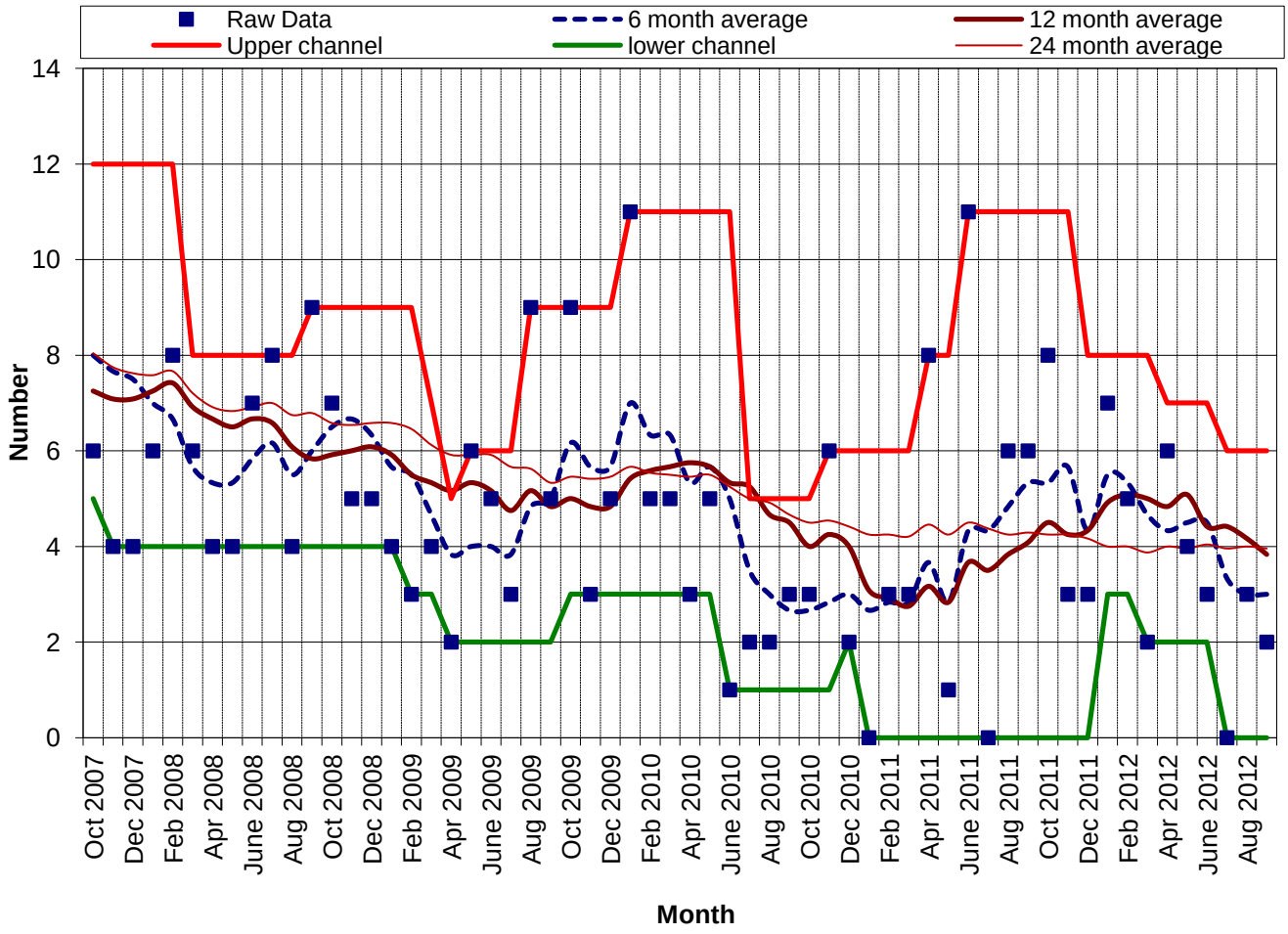
There was one management concern occurrence associated with the use of allowable birdcage accessories which affected multiple facilities. NCS requirements limit the form and amount of enriched uranium that can be loaded in birdcages and limit the quantity and type of accessories that may be used in the loaded birdcages. The accessories are intended to protect and segregate items in the birdcages and are limited because of their hydrogen content. The management concern was filed because of the discovery of combinations of accessories that were not permitted in multiple facilities and because of the confusion in how the NCS requirements were presented.

There were two PISAs associated with NCS. One resulted in a positive Unreviewed Safety Question (USQ) associated with the criticality accident alarm system in the 9720-5 warehouse. The TSR for that facility had recently been revised and changed the requirement for accident alarm system coverage from coverage by a single detection station for a few areas to double coverage. This change resulted from application of a criticality accident alarm system template and was not caught during reviews of the TSR.

The figure below shows the trending of non-reportable NCS deficiencies and MNCs over the past five fiscal years. The graph shows a downward trend for infractions with lows reached in FY 2011 and FY 2012.

National Nuclear Security Administration (NNSA) Site Inputs to the Annual Report on Nuclear Criticality Safety Programs

Y-12 Criticality Deficiencies



6.7. Results of Follow-Up Reviews Undertaken by DOE to Assess Effectiveness of Corrective Actions and Improvements

Major NCSP improvements were predominantly made in FY 2010, and this year afforded the first chance to evaluate the effects of some of these changes since many deliverables were not due until the end of FY 2011. A review of a set of 10 CSE upgrades indicates improved consistency with STD 3007-2007 requirements with much a better grasp of the analytical basis for some CSE's by breaking down large computer models into close coupled segments to better identify reactivity drivers. However, while general programmatic improvement is noted several analysis specific concerns were identified indicating a need for continued intensive CSE quality monitoring by the contractor. One CSE of the 10 upgraded CSEs reviewed, while satisfying STD 3007-2007 methodology was not regarded favorably as it omitted much of the basis detail information considered noteworthy in the previous revision. As previously mentioned NPO has issued a letter to the contractor relative to concerns over inadequate implementation and completion of CSEs.

Another area of major NCSP improvement was for the contractors NCS committee. A series of published NCS committee minutes, and reports as well as the shadow assessment of a meeting

in progress indicate a very strongly chartered and functioning committee. An ANS paper was presented in early FY 2012 in a dedicated technical session outlining improvements to the Y-12 NCSP. Other than the general NCS Improvement Program, regarded as the major corrective action in the area of NCS for Y-12, a couple of 9212 issues were reviewed and elevated to deficiencies in order to more formally define corrective action and ensure more active engagement of actions completion. As discussed above, these two are:

1) Chemical Recovery Mopping Activities
2) Process Condensate System

6.8. Open Issues from Last Year's Annual Report

Much emphasis has been placed on the CSE Upgrade program. Ten CSE upgrades were in development in FY 2012 with 5 completed. Significant progress has been made on the other 5 and work will continue on those in FY2013. A comprehensive CSE writer's guide was developed late in FY 2011 and used in FY 2012 to set expectations for CSE content and quality. This guide was updated late in FY 2012.

Many comments from NNSA were received on the UPF Preliminary Safety Design Report for UPF in FY 2011. A major rewrite of this document was accomplished in FY 2012. Review of the PSDR continued into FY 2013.

7. Savannah River Field Office (SRFO)

7.1. Results and Lessons Learned from Reviews of Proposed Nuclear Criticality Safety Controls and Design Requirements for New Facility Designs

The Savannah River Field Office (SRSO) is not responsible for any operations involving fissionable materials. NA-26, Office of Fissile Materials Disposition is responsible for two nuclear facility projects at the Savannah River Site; the Mixed Oxide Fuel Fabrication Facility (MFFF), and the Waste Solidification Building (WSB). No detailed input for these NA-26 projects is provided based on the following logic:

1) MFFF - this facility is being licensed by the Nuclear Regulatory Commission and is not subject to 10 CFR 830 or DOE O 420.1B. Thus, though it possesses an inadvertent criticality hazard, it is inappropriate to include in this report.

2) WSB - This project is intended to handle waste streams from the MFFF facilities. WSB design is complete and construction is expected to complete in FY2014. Radioactive operations will commence when needed to support MFFF startup and are currently estimated to begin in FY2019. However, based on the defined waste streams to the facility, an inadvertent criticality is not considered a credible hazard.

2012 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 (NCS) be included in the Department of Energy (DOE) Annual Report on NCS Programs. Information on these topics is provided below for Environmental Management (EM) sites. The Office of Environmental Management (EM) has 15 contractors at six field sites that required NCS programs. This is the fifth annual report.

The following is a brief summary on each requested topic for the EM complex. In Part I, II and III of the following table is the matrix summarizing the requested topic information with lines of inquiry at the various EM sites. Also attached are fifteen detailed reports submitted by the EM site offices. The individual site reports are included as attachments.

Measure of Nuclear Criticality Safety Performance

All operational EM contractors are measured against established performance metrics. The performance compared to these metrics is generally adequate but requires some improvement. 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 1 to 21, 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 support from subcontractors. Several of the contractors are now recruiting staff as a contingent action. With the exception of the Portsmouth office, the Federal oversight groups have assessed and affirmed that the current level of staffing is adequate for the current workload. The gaps in staffing at Portsmouth are being addressed via overtime and the contractor is actively recruiting additional resources.

Federal Criticality Safety Staffing

The Federal staffing levels are generally judged to be adequate. The Savannah River Operations Office (SRO), however, has two qualified staff solely assigned to criticality safety and one undergoing the qualification process rather than the four in their staffing plan, although they get occasional assistance from two qualified staffers currently in other positions. They also get periodic support from members of the Criticality Safety Coordinating Team. The Richland Operations Office (RL) now has on staff a fully qualified Criticality Safety Engineer (CSE)

Federal Assessments of Sites' NCS Programs

EM Headquarters (HQ) assessments of the NCS programs are periodically conducted for the federal oversight of the contractors programs and of the contractor's programs 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. The contractors' self-assessments evaluated were considered adequate with some caveats. The criticality safety evaluations assessed in these activities are generally adequate. Previous weaknesses in the

hazard assessment sections have shown improvement. 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, the better.

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 criticality 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.

The EM point of contact for this report is Robert Wilson, (303) 236-3666.

Matrix of EM Site Response to DNFSB Special Topics (Part I)						
Contractor	**CH2M-Hill Plateau Remediation Company**	**Washington Closure Hanford**	**Bechtel National Inc. Waste Treatment Plant**	**Washington River Protection Solutions Tank Farms**	**LATAKY Paducah**	**FBP-B&W Portsmouth**
Field Office	**Richland**	**Richland**	**River Protection**	**River Protection**	**PPPO**	**PPPO**
1. Measure of Contractor NCS Performance						
a. Have metrics been established to monitor contractor performance?	Yes	Yes	No, facility far from operational	Yes	Yes	Yes
b. If so, what are the metrics?	Nonconformances and closure of corrective action	Nonconformances and closure of corrective action	N/A	Nonconformances and closure of corrective action	See Att. 5	See Att. 6
c. If so, what is the contractor's record?	Acceptable, see Att. 1	Acceptable, see Att. 2	N/A	Acceptable	Acceptable	Acceptable
d. If no metrics have been established, what is the method of monitoring performance?	N/A	N/A	The Preliminary CSER receives ORP approval	N/A	N/A	N/A
e. What is the conclusion on contractor performance and what is the basis?	Acceptable Oversight	Acceptable Oversight	Acceptable Oversight and CSER approval	Acceptable Oversight	Acceptable Oversight	Acceptable Oversight
f. What actions have been taken to improve contractor performance?	Surveillances and corrective actions	Surveillances and corrective actions	Corrective action from EM 09 assessment and COAs from SER	Surveillances and corrective actions	Meetings	Meetings and NCS document reviews
2. Contractor Criticality Safety Engineer Program						
a. How many NCS staff needed?	8	2	5	2 CSEs, 3 CSRs	0.5	13
b. How many are there?	8	2 part time +	3.qualified, 2 in training	2 CSEs on task order, 3 qualified CSRs	0.5	7
c. Actions to address shortfall, if any?	N/A	N/A	For 2 to complete training	N/A	N/A	Overtime, contracting and recruiting

Matrix of EM Site Response to DNFSB Special Topics (Part I)						
Contractor	**CH2M-Hill Plateau Remediation Company**	**Washington Closure Hanford**	**Bechtel National Inc. Waste Treatment Plant**	**Washington River Protection Solutions Tank Farms**	**LATAKY Paducah**	**FBP-B&W Portsmouth**
Field Office	**Richland**	**Richland**	**River Protection**	**River Protection**	**PPPO**	**PPPO**
d. Has DOE Field Management affirmed adequacy?	Yes	Yes	Yes	yes	Yes	See Att. 6
3. Status of Federal Criticality Safety Oversight Program						
a. How many NCS staff are needed?	1		4		0.1	3
b. How many are there?	1		4		0.1	3
c. Actions to address shortfall, if any?	N/A		N/A		N/A	N/A
d. Has DOE Field Management affirmed adequacy?	Yes		Yes		Yes	Yes
4. Federal Assessments of Site NCS Programs						
a. What NCS assessments have been performed?	See Att. 1	See Att. 2	ORP & 09 CSSG assessments	See Att. 4	PPPO	PPPO and EM/NNSA
b. What corrective actions were taken as a result of these assessments?	See Att. 1	See Att. 2	See Att. 3	See Att. 4	See Att. 5	See Att. 6
c. What lessons learned were developed?	None	N/A	None	None	None	None
d. Were the contractor's self-assessments evaluated for adequacy? What was the conclusion?	Yes/adequate	Yes/adequate	N/A No operational facility	Yes/adequate	Yes/adequate	See Att. 6
e. Are criticality safety evaluations deemed adequate?	Yes	Yes	Yes	See Att. 4	Yes	Yes
f. Is the NCS program consistent with requirements?	Yes	Yes	Yes	Yes	Yes	Yes
5. New Facility Design						

Matrix of EM Site Response to DNFSB Special Topics (Part I)						
Contractor	**CH2M-Hill Plateau Remediation Company**	**Washington Closure Hanford**	**Bechtel National Inc. Waste Treatment Plant**	**Washington River Protection Solutions Tank Farms**	**LATAKY Paducah**	**FBP-B&W Portsmouth**
Field Office	**Richland**	**Richland**	**River Protection**	**River Protection**	**PPPO**	**PPPO**
a. Are any facilities being designed that will need a criticality safety program?	No; however new operations are planned	No	Yes	yes	No	No
b. Have these received a criticality safety design review by anyone?	N/A	N/A	Yes	yes	N/A	N/A
c. If so, what are the lessons learned? How were these lessons communicated?	N/A	N/A	N/A	none	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	See Att. 2	N/A	See Att. 4	None occurred	See Att. 6
b. Are leading and lagging indicators used to access the program?	No	No	No	No	No	No
c. What were the results?	See Att. 1	See Att. 2	N/A	See Att. 4	N/A	See Att. 6
d. How were the results used to improve performance?	See Att. 1	N/A	N/A	N/A	N/A	See Att. 6
7. Follow-Up to Assessments						
a. What prior assessments received a follow-up review?	See Att. 1	See Att. 2	N/A	N/A	See Att. 5	See Att. 6
b. Were the corrective actions effective?	See Att. 1	See Att. 2	N/A	N/A	See Att. 5	See Att. 6
c. Status of design projects	None	None			See Att. 5	N/A
8. Open issues from past reports						
	None	None	See Att. 3	none	none	See Att. 6

Matrix of EM Site Response to DNFSB Special Topics (Part II)					
Contractor	**BWCP Paducah/ Portsmouth**	**Idaho Cleanup Project (CWI)**	**ITG AMWTP**	**WAI**	**UCOR**
Field Office	**PPPO**	**Idaho**	**Idaho**	**Oak Ridge**	**Oak Ridge**
1. Measure of Contractor NCS Performance					
a. Have metrics been established to monitor contractor performance?	See Att. 7	Yes, see Att.8	Yes, see Att.9	Yes	Yes
b. If so, what are the metrics?	N/A	Nuclear Severity and Criticality Adversity Indexes	A nuclear safety index number which includes criticality and nuclear safety violations	Anomalous condition Reports (ACR),	Metrics established to monitor contractor NCS performance include the 12 month rolling average time to close ACRs (goal is <30 days average time to close).
c. If so, what is the contractor's record?	N/A	Acceptable	Acceptable	Acceptable	Acceptable
d. If no metrics have been established, what is the method of monitoring performance?	See Att. 7	N/A	N/A	N/A	N/A
e. What is the conclusion on contractor performance and what is the basis?	Acceptable/ Oversight	Acceptable/ Oversight	Acceptable/ Oversight	Acceptable/ Oversight	Acceptable/ Oversight
f. What actions have been taken to improve contractor performance?	N/A	Self-Assessments develop contractor identification of path for improvement	Self-Assessments develop contractor identification of path for improvement	Observations resulting from contractor self-assessments conducted in previous years have been satisfactorily addressed during the past FY.	N/A

Matrix of EM Site Response to DNFSB Special Topics (Part II)					
Contractor	**BWCP Paducah/ Portsmouth**	**Idaho Cleanup Project (CWI)**	**ITG AMWTP**	**WAI**	**UCOR**
Field Office	**PPPO**	**Idaho**	**Idaho**	**Oak Ridge**	**Oak Ridge**
2. Status of Contractor Criticality Safety Engineer Program					
a. How many NCS staff are needed?	0.5	3	5	3	5
b. How many are there?	0.5	3	5	2 FTES, 1PTE	5 FTEs
c. Actions to address shortfall, if any?	N/A	N/A	N/A	N/A	N/A
d. Has DOE Field Management affirmed adequacy?	Yes	Yes	Yes	Available resources are adequate for demand.	The staffing level is adequate for the current work plan. The DOE NCS oversight continues to monitor the contractor's staffing level for adequacy.
3. Status of Federal Criticality Safety Oversight Program					
a. How many NCS staff are needed?	0.1	3		2	
b. How many are there?	0.1	3		1 FTE, 1 PTE	
c. Actions to address shortfall, if any?	N/A	N/A		N/A	
d. Has DOE affirmed adequacy?	Yes	Yes		Yes	

Matrix of EM Site Response to DNFSB Special Topics (Part II)					
Contractor	**BWCP Paducah/ Portsmouth**	**Idaho Cleanup Project (CWI)**	**ITG AMWTP**	**WAI**	**UCOR**
Field Office	**PPPO**	**Idaho**	**Idaho**	**Oak Ridge**	**Oak Ridge**
4. Federal assessment of Site NCS Program					
a. What NCS assessments have been performed?	PPPO	Quarterly surveillances	Quarterly surveillances	A Contractor RA was conducted during FY12 as the contractor initiated operation of its Cask Processing Enclosure (CPE) for the handling of cask-borne wastes. The DOE NCS Contractor meets periodically with the WAI NCS Manager and evaluates program status and any new issues of concern.	Quarterly surveillances,
b. What corrective actions were taken as a result of these assessments?	IVR prestart issues corrected	N/A	N/A	One NCS-related observation was identified as a result of the CPE CRA and it has been addressed satisfactorily.	None required
c. What lessons learned were developed?	N/A	None	none	None	None
d. Were the contractor's self-assessments evaluated for adequacy? What was the conclusion?	Yes Adequate	Yes/ Adequate	Yes/ Adequate	Yes/ Adequate	Yes/ Adequate
e. Are criticality safety evaluations deemed adequate?	Yes	Yes	Yes	Yes	Yes
f. Is the NCS program compliant?	See Att. 7	Yes	Yes	Yes	Yes

Matrix of EM Site Response to DNFSB Special Topics (Part II)					
Contractor	**BWCP Paducah/ Portsmouth**	**Idaho Cleanup Project (CWI)**	**ITG AMWTP**	**WAI**	**UCOR**
Field Office	**PPPO**	**Idaho**	**Idaho**	**Oak Ridge**	**Oak Ridge**
5. New facility Design					
a. Are any facilities being designed that will need a criticality safety program?	No	No, SBWF will not need NCS program	No	Early efforts are being conducted to design systems for the processing of wastes in a sludge form. NCS requirements for this process will only involve imposition of requirements for waste profiles for incoming sludge or wastewater, such that criticality is not possible.	No
b. Have these received a criticality safety design review by anyone?	N/A	yes	N/A	NCS is involved with regard to the placement of restrictions on the nature of wastes received.	N/A
c. If so, what are the lessons learned? How were these communicated?	N/A	N/A	N/A	N/A	N/A

Matrix of EM Site Response to DNFSB Special Topics (Part II)					
Contractor	**BWCP Paducah/ Portsmouth**	**Idaho Cleanup Project (CWI)**	**ITG AMWTP**	**WAI**	**UCOR**
Field Office	**PPPO**	**Idaho**	**Idaho**	**Oak Ridge**	**Oak Ridge**
6. Trending and Analysis of Reportable and Non-reportable Nuclear Criticality Occurrences					
a. How are NCS occurrences tracked and trended?	None occurred	NCS program tracks and trends non-reportable occurrences.	ORP system used	NCS Program (ACR) and ORPS system	NCS Program (ACR) and ORPS system
b. Are leading and lagging indicators used to assess the program? If so, what are they?	No	Yes, see Att. 8	Yes/ Nuclear safety Index (See Att. 9)	No data to trend	Leading: number of lower level ACRs or ACRs with similar causes Lagging: numbers of days an ACR remains open
c. What were the results?	N/A	The trends affirm current program	No trends identified	Only one ACR was identified during FY12, and it was later determined to not represent an NCS concern.	Neither indicated programmatic issues.
d. How were the results used to improve performance?	N/A	N/A	None	N/A	N/A
7. Follow-up to Assessments					
a. What prior assessments received a follow up review?	N/A	No issues to track	No issues to track	none	none
b. Were the corrective actions effective?	N/A	N/A	N/A	N/A	N/A
c. Status of design projects.	N/A	N/A	N/A	N/A	N/A
8. Status of Open Items					
	N/A	none	None	none	none

Matrix of EM Site Response to DNFSB Special Topics (Part III)				
	ISOTEK	**Savannah River Nuclear Solutions**	**Savannah River Remediation**	**Parsons**
	Oak Ridge	**Savannah River**	**Savannah River**	**Savannah River**
1. Measure of Contractor Performance				
a. Are metrics established to monitor contractor NCS performance?	Yes	Yes	Yes	No, facility far from operational
b. If so, what are the metrics?	• Number and Severity Level of Condition Reports (CRs) • Timely Closure of CRs • Self-Reporting of CRs by Operations • Completion of NCSE Annual Assessments • New CRs with NCS Implications • Open/Unresolved CRs with NCS Implications • Completed NCS Surveillances • Number of UNSAT Surveillance Conditions • Completed NCS Assessments • Number of UNSAT Assessment Conditions • NCS Engineer Professional Development Activities	See Att. 13	See Att. 14	N/A
c. If so, what is the contractor record?	Acceptable	See Att. 13	See Att. 14	N/A
d. If no metrics have been established, what is the method of monitoring performance?	N/A	N/A	N/A	Design Reviews

Matrix of EM Site Response to DNFSB Special Topics (Part III)				
	ISOTEK	**Savannah River Nuclear Solutions**	**Savannah River Remediation**	**Parsons**
	Oak Ridge	**Savannah River**	**Savannah River**	**Savannah River**
e. What conclusion on contractors NCS program performance and what is the basis?	Acceptable based on oversight	Adequate based on metrics and assessments	Adequate based on metrics and assessments	Adequate based on previous reviews
f. Actions have been taken to improve contractor's NCS Performance?.	N/A	See Att. 13	See Att. 14	N/A
2. **Contractor Criticality Safety Engineer Program**				
a. How many NCS staff are needed?	5	Current staff minimally adequate	3 FTE	1 FTE, 1 PTE
b. How many are there?	3 FTE, 1 lead, 1 PTE	12 senior CSEs, 6 CSEs, 3 in training	1 FTE, 2 PTE	1 full time senior engineer and 1 part time
c. Actions to address shortfall, if any?	N/A	Two new experienced hires to report FY 13	Recruit and hire staff	N/A
d. Has DOE management affirmed adequacy?	All personnel are qualified in the development of NCS evaluations, and all but one full-time personnel are qualified peer reviewers. The NCS staff consists of highly experienced personnel and the staff size is adequate for the current state of the project. With the pending authorization to perform design work associated with the dissolution of ^{233}U inventory, additional staffing may be required in the future, but this work may experience delay due to funding	Yes	Yes	Yes

Matrix of EM Site Response to DNFSB Special Topics (Part III)				
	ISOTEK	**Savannah River Nuclear Solutions**	**Savannah River Remediation**	**Parsons**
	Oak Ridge	**Savannah River**	**Savannah River**	**Savannah River**
3. **Status of federal Criticality Safety Oversight Programs**				
a. How many NCS staff are needed?	2	4		
b. How many are there?	1 FTE, 1 PTE	2 NCS qualified, 1 will be qualified 12/2012		
c. Actions to address shortfall, if any?	N/A	2 other qualified staff are available as backup.		
d. Has DOE Field Management affirmed adequacy?	Yes	Yes		
4. **Federal assessment of Sites NCS Programs.**				
a. What NCS assessments have been performed?	A formal CRA and a formal Federal Readiness Assessment was conducted during this period in support of the contractor's activities to ship material to the Device Assembly Facility (DAF) at the Nevada National Security Site (NNSS). The Federal NCS Staff also has frequent (at least bi-weekly) meetings with the Isotek Lead NCS Engineer to monitor contractor NCS progress and issues, which enables timely identification and resolution of concerns.	90 assessments related to NCS by SRO	13 NCS assessment by SRO	No additional NCS assessments. Previous assessments of NCSE and CSPDD

Matrix of EM Site Response to DNFSB Special Topics (Part III)				
	ISOTEK	**Savannah River Nuclear Solutions**	**Savannah River Remediation**	**Parsons**
	Oak Ridge	**Savannah River**	**Savannah River**	**Savannah River**
b. What corrective actions were taken as a result of these assessments?	The CRA for ZPR resulted in the identification of an inconsistency between the wording of an NCS requirement in the NCSE and the operating procedure which implemented the requirement.Field conditions were unaffected and the operating procedure was revised.	See Att. 13	See Att. 14	None
c. What lessons learned were developed?	None	See Att. 13	See Att. 14	None
d. Were the contractor's self-assessments evaluated for adequacy? What was the conclusion?	Yes/Adequate	Yes., Adequate See Att. 13	Yes, Adequate, See Att. 14	N/A
e. Are criticality safety evaluations deemed adequate?	Yes	Yes	Yes	Yes
f. Is the NCS program consistent with requirements?	Yes	Yes	Yes	Yes
5. New Facility Design				
a. Are any facilities being designated that will need a criticality safety program?	Efforts are underway to propose modifications to an existing ORNL hot cell facility (Building 2026) that will permit dissolution and downblending of the 3019 inventory of fissile material. Efforts involve those activities necessary to submit a proposal to DOE.	No	Yes	Yes

Matrix of EM Site Response to DNFSB Special Topics (Part III)				
	ISOTEK	**Savannah River Nuclear Solutions**	**Savannah River Remediation**	**Parsons**
	Oak Ridge	**Savannah River**	**Savannah River**	**Savannah River**
b. Have these received a criticality safety design review by anyone?	The NCS Staff is involved in weekly meetings regarding the basics of the design and is fully engaged in this initial stage of design. The impact of NCS on the design is fully acknowledged by project personnel at all levels, including projecting the appropriate NCS evaluations for the proposed modifications and an initial set of NCS controls. The safety goal for this facility is for an inadvertent nuclear criticality to not be credible.	N/A	See Att. 14	See Att. 15
c. If so, what are the lessons learned? How were these lessons communicated?	The Isotek NCS Staff is a senior group of knowledgeable practitioners of NCS and brings to bear a wide range of experience from other sites. This experience is used to incorporate lessons learned from other sites into the proposed new facility design.	N/A	See Att. 14	See Att. 15
6. Trending and Analysis of Occurrences				
a. How are NCS occurrences tracked and trended?	The contractor assigns cause codes and tracks identified anomalous conditions via its Condition Reporting Procedure. Trending is conducted and reported in accordance with the contractor's Occurrence Reporting procedure. All NCS condition reports are included in this process.	See Att. 13	See Att. 14	N/A

Matrix of EM Site Response to DNFSB Special Topics (Part III)				
	ISOTEK	**Savannah River Nuclear Solutions**	**Savannah River Remediation**	**Parsons**
	Oak Ridge	**Savannah River**	**Savannah River**	**Savannah River**
b. Are leading and lagging indicators used to access the program?	Leading: NCS Surveillance performance Lagging: Number of NCS Condition Reports identified	See Att. 13	See Att. 14	N/A
c. What were the results?	There have been an insufficient number of anomalous conditions identified to date to establish any trends.	See Att. 13	See Att. 14	N/A
d. How were the results used to improve performance?	N/A	See Att. 13	See Att. 14	N/A
7. Follow Up to Assessments				
a. What prior assessments received a follow-up review?	None	See Att. 13	See Att. 14	None
b. Were the corrective actions effective?	N/A	See Att. 13	See Att. 14	N/A
c. Status of design projects	See responses to Items 5.a, 5.b, and 5.c above.	See Att. 13	See Att. 14	N/A
8. Open Issues from Past Reports				
	N/A	N/A	N/A	N/A

Field/Site Manager: Matt McCormick NCS POC: Paul Macbeth

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

The metrics utilized to monitor contractor NCS performance include:

1) Number and Type of Criticality Safety Non-conformances Reported. These range from internally managed "discrepancies" to loss of contingency events reportable through ORPS.
2) Record of Closure of Corrective Actions identified as a result of the Nonconformance events. RL tracks the contractor closure of the nonconformance itself as well as the associated corrective actions.
3) RL requires a review of the root causes of the nonconformance events and an assessment of trends whether negative or positive*.*

Effect on performance

The CHPRC has experienced only one nonconformance event in the past year. The one nonconformance event was recorded at the 209E facility. Three potential criticality safety non-conformances were initially identified at the Waste and Fuels facilities and the Plutonium Finishing Plant (PFP). These three potential criticality safety non-conformances were later determined to represent conforming conditions.

The one nonconformance identified this fiscal year was associated with no fissile labels on several waste containers holding nonexempt quantities of fissionable materials. This nonconformance was not reportable per DOE O 231.1-2 and did not have any significant impact on operations.

CHPRC instituted a number of corrective actions to improve CSER development in FY2010 and FY2011. No issues were identified with CSERs during this past fiscal year.

Field Office assessment of NCS program performance

The operational record has been good from the perspective of reportable nonconformance events in criticality safety, largely because of the reduction in work scope involving significant quantities of fissile materials. The contractor has re-centralized the criticality safety program staff reporting. Operational performance in criticality safety is measured against the record of actual hours worked in handling fissile materials. Recent funding decreases due to completion of American Recovery and Reinvestment Act work have resulted in a significant ramp-down in D&D activities in high-risk facilities - particularly at the Plutonium Finishing Plant.

Most of the gloveboxes have been removed from PFP. The remaining work at PFP is focused on a few gloveboxes with high fissile content, cleanout of the PRF, 242-Z disassembly and removal of process lines from the facility. Remaining CS staff has been aligned to support continued PFP activities and K Basin activities to remove the remaining fissile material from the Basin.

CHPRC continues to self-identify, report, and correct criticality safety issues at a relatively low level. This is an excellent practice as it tends to identify safety issues early and allows implementation of changes before the issues become larger problems.

It should be noted that some of the remaining work scope potentially involves more significant quantities of fissile material holdup at the PFP (removing pencil tanks from the Plutonium Reclamation Facility). RL expects that there could be a corresponding increase in nonconformance events due to the nature of the work and the complexity of the safety controls.

The RL criticality safety Subject Matter Expert (SME) provided oversight during the year to contractor activities, reviewed all potential nonconformance reports for adequacy, and reviewed changes to the CHPRC criticality safety program documentation. Additionally, several oversight activities were conducted by the RL criticality safety SME and recorded in the Operational Oversight Database system. These included participation in contractor self assessments and responses to DNFSB concerns.

2. Status of Contractor Criticality Safety Engineer Staffing

The CHPRC criticality safety (CS) staff during most of FY-2012 included one program manager, six qualified CS Engineers and six qualified Criticality Safety Representatives (CSRs) (four are also qualified CSEs). At the end of the fiscal year the CHPRC criticality safety staff was reduced to five qualified CS Engineers and six qualified CSRs (four are also qualified CSEs). One new Engineer is undergoing CSR/CSE qualification. Given the planned reduction in fissile work for FY 2013, this is considered adequate but minimum staffing.

3. Status of Federal Criticality Safety Oversight Program

The Richland Operations Office presently has one fully qualified Federal Criticality Safety Engineer. A single qualified Federal CSE at RL has been the norm for approximately the past decade. It does not appear that additional support beyond that is necessary in the near future.

4. Federal Assessments of Site NCS Programs

Formal Assessments are not performed each fiscal year unless a particular issue or deficiency is identified requiring that level of oversight. During the fiscal year however, the RL criticality safety SME conducted separate oversight events that resulted in reports issued through the Operational Awareness Database.

Three Management Assessments were conducted by CHPRC following lines of inquiry from DOE-STD-1158 and ANSI/ANS-8.19. This year the focus was on criticality safety evaluations, the flow down of controls into operations and fissionable material controls. The overall conclusions of these management assessments were that the CSERs were documented in accordance with DOE-STD 3007 (2007) and the limits and controls were implemented in the work control documents. A number of opportunities for improvement and nine findings resulted from these three management assessments. The findings represented documentation issues associated with isolated noncompliance with CHPRC programmatic requirements for operational reviews in prior years, mandated CSER reviews, criticality control reviews, one case of lack of documented review and approval of a procedure by criticality safety staff, and one case where limits and controls were not judged to be adequately captured in one procedure. The opportunities for improvement and the findings have been entered into the CHPRC Condition Reporting and Resolution System (CRRS) and are being addressed.

Eleven Work Site Assessments and two Management Assessments were also conducted to look at criticality safety at K Basins, PFP, Waste and Fuels and other facilities implementing the CHPRC Criticality Safety Program. Both the opportunities for improvement and findings have been entered into the CHPRC CRRS and are being addressed.

DOE-RL participated in portions of these contractor management assessments as an oversight activity. Additionally, the RL criticality safety SME receives copies of the CHPRC management assessments and work site assessments and reviews them for completeness and adequacy of corrective actions.

5. New Facility Design

There are no new facilities being designed within the CHPRC that will require a criticality safety program. There are however, new projects that fall under the established criticality safety program that will require criticality safety support for design. The Sludge Treatment Project (STP) required modification of K-West Basin to support planned sludge processing. This effort is in the final design phase. The STP project has been assigned contractor CSE support.

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

NCS occurrences are tracked and trended within the CHPRC issues management process (Condition Reporting and Resolution System [CRRS]). There were no reportable nuclear criticality safety occurrences during the past fiscal year. Non-reportable non-conformances are tracked by the Criticality Safety Program and shared with RL. The CHPRC Criticality Safety Program (Revision 21 of HNF-7098) requirements for nonconformance reporting have been modified to align with DOE O 232.2. The CHPRC Criticality Safety Organization (central organization) is responsible for trending the non-conformances on a quarterly basis. The CHPRC Criticality Safety Organization has been watching the trend in posting/labeling non-conformances at PFP. PFP has been proactive in addressing this issue. The last posting/labeling nonconformance at PFP was in April, 2011. The corrective actions implemented by PFP have been judged to be effective. No trend in the non-conformances has been observed in FY2012.

As reported above, the CHPRC has experienced only one nonconformance event in the past year. (See attached Figure)

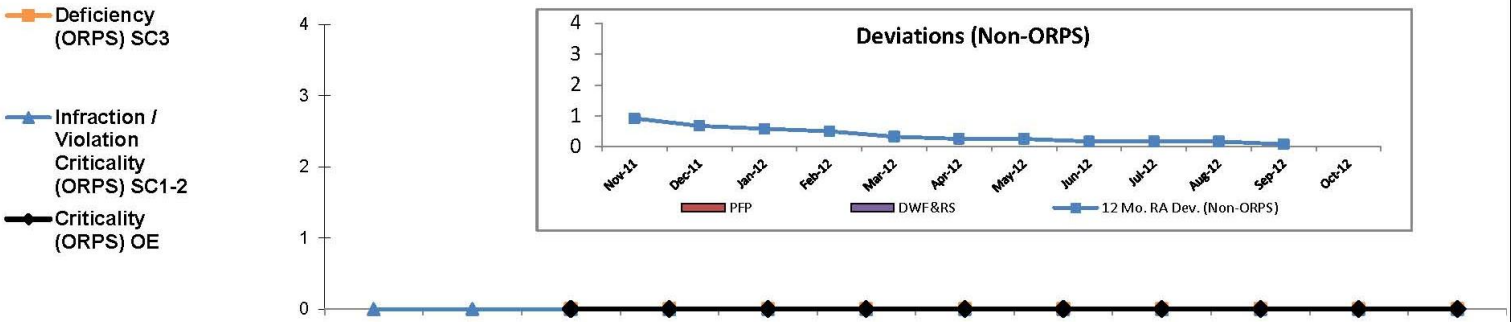
7. Follow Up to Assessments

At CHPRC, all actions arising from the previous year's management assessment are reviewed during the current year's management assessment. All open items have been closed by the projects.

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

Presently there are no open issues.

CHPRC Criticality Safety



	Nov-11	Dec-11	Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	Jul-12	Aug-12	Sep-12	Oct-12
PFP	0	0	0	0	0	0	0	0	0	0	0	0
DWF&RS	0	0	0	0	0	0	0	0	0	0	0	0
12 Mo. RA Dev. (Non-ORPS)	**0.92**	**0.67**	**0.58**	**0.50**	**0.33**	**0.25**	**0.25**	**0.17**	**0.17**	**0.17**	**0.08**	
Deficiency (ORPS) SC3			**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Infraction / Violation Criticality	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Criticality (ORPS) OE			**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
ORPS Fiscal Year Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Definition

Nonconforming criticality safety conditions identified, entered into the Potential Criticality Nonconformance Checklist in accordance with project specific procedures and tracked by program management ORPS Group 3C and Non-ORPS levels.

This chart has been expanded to include newly developed ORPS criteria implemented January 1, 2012.

Analysis / Action

Analysis: There were no criticality safety non-conformances identified during October 2012.
October 2011 - W&F, Three SWBs stored outside of building 209-E did not have fissile material labels affixed.

Goal	Zero Events
Blue	0
Green	1 - 2
Yellow	3
Red	≥ 4

Goal is based on annual accumulation of ORPS events (OE, SC1 & SC2)

Action: Continue management focus in the field.

POC: Nuclear Safety / A. Ramble

Field/Site Manager: Matt McCormick NCS POC: Paul Macbeth

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

The metrics utilized to monitor contractor NCS performance include:

- Number and Type of Criticality Safety Non-conformances Reported. These range from internally managed "discrepancies" to loss of contingency events reportable through ORPS.
- Record of Closure of Corrective Actions identified as a result of the Nonconformance events. RL tracks the contractor closure of the nonconformance itself as well as the associated corrective actions.
- RL requires a review of the root causes of the nonconformance events and an assessment of trends whether negative or positive.

Effect on performance

No nonconformance events have been reported at WCH, largely due to the nature of the work (burial grounds remediation and building demolition). WCH operates under an incredibility analysis in criticality safety, thus there are no limits or controls.

Field Office assessment of NCS program performance

Due to the nature of the work (largely burial grounds remediation and Decontamination &Decommissioning of buildings), the criticality safety program is limited in extent and facilities operate under incredibility analyses. The WCH program is appropriately graded, comprehensive, and effectively implemented. No safety issues have been identified during this fiscal year.

2. Status of Contractor Criticality Safety Engineer Staffing

WCH retains two dual-qualified CSR/CSEs who provide support on a part-time basis.

3. Status of Federal Criticality Safety Oversight Program

The Richland Operations Office presently has one fully qualified Federal Criticality Safety Engineer. A single qualified Federal CSE at RL has been the norm for approximately the past decade. It does not appear that additional support beyond that is necessary in the near future.

4. Federal Assessments of Site NCS Programs

Formal Assessments are not performed each fiscal year unless a particular issue or deficiency is identified requiring that level of oversight. During the fiscal year however, the RL criticality safety SME conducted oversight reviews to ensure that the WCH program remained compliant.

WCH is currently in the process of conducting their annual programmatic management assessment of the Criticality Safety Program. No significant findings are anticipated from the assessment, which is scheduled to be completed in December. The Federal CSE will review the completed assessment and any resultant corrective action plans.

5. New Facility Design

There are no new facilities being designed within WCH that will require a criticality safety program.

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

No nonconformance events have been reported at WCH, largely due to the nature of the work (burial grounds remediation and building demolition). WCH operates under an incredibility analysis in criticality safety, thus there are no limits or controls.

7. Follow Up to Assessments

There were no open items from previous years requiring follow-up assessment activities at WCH.

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

Presently there are no open issues.

Field Office Manager: Scott Samuelson NSC POC: Tom Nirider

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

As reported for FY 2011, the Waste Treatment Plant (WTP) project has not advanced to the point where performance metrics specific to operations have been implemented. The project is approximately at 60% completion. However, performance metrics specific to the production of criticality safety evaluations, training, and qualification of contractor criticality safety staff, management assessment, periodic inspections, and identification and resolution of problems in criticality safety will be implemented prior to project completion. The Office of River Protection, Nuclear Safety Division has developed a fully staffed Federal criticality safety program and is actively training nuclear safety staff as Federal Criticality Safety Engineers. When all staff are trained, ORP will retain four fully qualified Federal CSEs and one Division Director who is also qualified as a CSE. As the project nears completion and the program develops it will incorporate the programmatic features necessary to conduct oversight of the operating WTP facility. Among those features are; development of appropriate performance metrics applicable to safety documentation, training, assessments, and problem resolution, as well as a Field Office Oversight and Assessment Plan addressing criticality safety.

As previously reported, ORP and CSSG assessments of the WTP criticality safety program were conducted in 2008 and 2009 (refer to section 4, below). The contractor has prepared and revised several times the, “Preliminary Criticality Safety Evaluation Report” (PCSER), but has not yet issued a revision that addresses the presence of Pu-Oxide particle size distribution greater than 10 microns, preferential settling of Pu-Oxide particles in process vessels, sampling non-representativeness, and the COAs addressed in the 2009 safety evaluation report. DOE-ORP approval of this CSER has been documented in a Safety Evaluation Report (SER) written in 2009. This SER, however, contains nine conditions of acceptance (COAs). These COAs are currently being tracked to completion. Six of the COAs pertain to the Preliminary Documented Safety Analyses (PDSA), while the remaining three will require resolution by the time the DSA is finalized. There has not been significant progress in resolving these issues during the past year due largely to several significant technical issues and scheduling problems.

BNI has prepared a plan and schedule for updating the existing Preliminary Criticality Safety Evaluation Report (PCSER), with scheduled completion in October, 2013. It is doubtful however, that this date will be met. There are numerous technical issues that require resolution prior to completion of the new PCSER. The main technical difficulty involves the presence in the Tank Farms waste solids of Pu-Oxide particles of high density and large effective diameter. BNI has planned three specific technical studies to assist in resolution of this issue. First is a study of the hydrodynamics of large, high density particles. This study will be conducted by a team of independent experts under contract to BNI and will involve the Pacific Northwest National Laboratory. Second is a paper that addresses the chemistry of the Pretreatment Facility from a criticality safety perspective. Additionally, the PCSER work is also awaiting the results of large scale mixing studies. Once these three studies are completed, the Hazards Analysis will be conducted and work will begin on the PCSER.

Construction activities on the Pretreatment Facility have been placed on hold pending resolution of numerous technical issues which are being addressed at the Secretarial level by a special team. A special review team headed by a safety engineer from within Bechtel Corporate, but outside of the WTP criticality safety program has been tasked to conduct an independent review of the revised Preliminary Criticality Safety Evaluation Report for the

WTP. Several outside experts from the National Laboratories will comprise the team members which will number between 8 and 12 members. This review team will address technical issues in the CSER including control strategies for large, high density fissile particulate. A report is expected in March, 2013.

2. **Status of Contractor Criticality Safety Engineer Program**

Bechtel National, Inc. (BNI), the Contractor responsible for construction of the WTP, retains three qualified criticality safety engineers and 2 criticality engineers in training. Two of the criticality safety engineers are subcontractors. It is intended to replace one of the subcontractors with a permanent employee. This will most likely occur by converting one of the sub-contract to a staff position. A planned update/rewrite of the Preliminary Criticality Safety Evaluation Report will require additional support and expertise not presently available within the BNI staff.

A criticality safety assessment of WTP was completed by WTP ORP staff in January 2008. A final assessment report was issued to Bechtel National, Inc. in April 2008. It is anticipated that another assessment will be conducted in the next two years. Additionally, ORP will review and approve revisions to the Criticality Safety Evaluation Report for WTP.

Contractor staffing is presently adequate to support design and construction of the WTP. However, as mentioned above, a planned update/rewrite of the Preliminary Criticality Safety Evaluation Report will require additional support and expertise not presently available within the BNI staff in the areas of hydrodynamics, plutonium chemistry, and in criticality safety. BNI continues to work toward qualification of two additional staff members in criticality safety. The BNI radiation and criticality safety organization employs several engineers who conduct Monte Carlo N-Particle (MCNP) modeling. These resources will be utilized in addressing problems specific to criticality safety in support of a major revision to the PCSER revision.

3. Status of Federal Criticality Safety Oversight Program

The Criticality Safety function at ORP resides within the Nuclear Safety Division. All qualified Federal Criticality Safety Engineers (CSEs) are also qualified nuclear safety specialists. Currently, one senior qualified Federal CSE assigned to the Pretreatment Facility as a nuclear safety specialist oversees the WTP Criticality Safety Program. Two nuclear safety specialists have recently qualified as Federal CSEs. These two staff members have responsibility for oversight of the Tank Farms nuclear criticality safety program, but are available to assist with WTP criticality safety issues as needed. A second WTP nuclear safety specialist has begun working toward qualification as a Federal CSE. The ORP goal is to have a total of 4 federal staff qualified as CSEs to oversee ORP facilities. Additionally, the Nuclear Safety Division Director is a qualified CSE.

DOE Field Management at ORP considers Federal staffing adequate to oversee criticality safety programs for WTP and the Tank Farms Contractor.

4. Federal Assessments of Site NCS Programs

There were no formal assessments of the contractor criticality safety programs conducted during FY 2011. ORP conducts assessments of the criticality safety programs on an as-needed basis because WTP is not an operating facility. The previous assessment conducted by ORP staff was completed April 2008. The report contained three findings. Corrective actions have subsequently been implemented.

In 2010, the WTP Contractor submitted the WTP Criticality Safety Program description document to ORP for approval as required by DOE O 420.1B. ORP evaluated the program description documented and approved it. This approval closed one of the nine COAs issued in the SER for the WTP CSER described in Item #1.

Additionally, as reported previously, in December 2008, the DOE Criticality Safety Support Group (CSSG) conducted a review and assessment of the WTP Criticality Safety Evaluation Report (CSER). The CSSG reported no major findings, but recommendations and areas for improvement were documented.

In 2009, the ORP federal CSE conducted a review of the WTP CSER and issued a Safety Evaluation Report (SER) conditionally approving the document with nine (9) conditions of acceptance (COA). The WTP contractor is currently in the process of resolving the COAs. The ORP criticality safety engineer is working closely with the contractor and is tracking the closure of these issues. Notably, the DOE CSSG assessment recommendations and areas for improvement were incorporated into the COAs written for the ORP SER. Progress on closure of the COAs has slowed due to several technical challenges (e.g., presence of Pu-Oxide particles greater than 10 microns, preferential settling of heavy Pu-Oxide particles in WTP process vessels, and pulse jet mixer design issues to ensure adequate vessel bottom clearing) which have caused the Criticality Safety Evaluation Report revision to be rescheduled until October, 2013.

5. New Facility Design

When it becomes operational, the Waste Treatment Plant Project will require Technical Safety Requirement level criticality safety controls, evaluations, and programs. Criticality safety considerations are being included in the facility design. Criticality safety evaluations addressing the process flow, process chemistry, and safety of operations have been developed, and continue to be updated with process design changes. Facility designs have incorporated these basic control concepts. The contractor maintains and updates a Preliminary Criticality Safety Evaluation Report addressing the safety of operations and processes from a criticality safety perspective.

A significant lesson learned from ORP oversight to date is that federal criticality safety engineers and WTP federal engineering division staff personnel must be actively involved with the contractor design changes and how they affect the CSER. Also, closer coordination between ORP and WTP contractor NCS staff is necessary in order properly review and assess design changes that potentially affect criticality safety. Staff training plans at ORP are addressing these issues directly. ORP conducts joint bi-weekly interface meetings with BNI and WRPS criticality safety. The meeting is also attended by the One System manager. These meetings have proven invaluable in enabling a constructive team approach to addressing criticality safety issues at both WTP and Tank Farms.

Technical issues and questions involving the mixing of the WTP Pretreatment Facility waste feed receipt process vessels using pulse jet mixers are ongoing. These technical issues involve questions associated with; sample non-representativeness, effect of co-precipitated plutonium and metal absorber agglomerations, the effects of gravity segregation and preferential settling of heavy particles such as PuO2, solids accumulation in process vessels, and particle size distribution. These are being tracked to closure through DNFSB commitments to Recommendation 2010-2, Pulse Jet Mixing at the Waste Treatment and Immobilization Plant.

In February, 2011, Washington River Protection Solutions (WRPS), the contractor operating the Tank Farms, WRPS, declared a PISA associated with the presence of large, dense Pu-oxide particles previously unidentified in tank wastes. There has not been significant progress in resolving this issue since reported last year. As described in this report, progress is awaiting the results of several technical reports and the large scale mixing studies. This issue is summarized below:

• Mixing studies conducted by WTP indicated that large dense particles (>10 micron and >8 g/cc) will not remain suspended in certain process vessels.

• A study commissioned by the WTP and released in January concluded that there was a possibility for plutonium oxide and metal particles of larger than 10 micron equivalent spherical diameter and with densities exceeding 8 g/cc to be present in significant quantities in tank farms wastes destined for processing within the WTP.

• WRPS determined that these finding affected their operations (mixing, waste transfer) a PISA was declared and certain operations were placed on hold. These large dense particles are of concern for tank farms operations principally because they do not form agglomerations with credited neutron poisons (Fe, Cr, and Ni) as assumed in previous criticality safety evaluations and preferential settling could occur during mixing or waste retrieval operations.

• A special team was assembled and chartered to evaluate the extent of the problem and confirm or dismiss the conclusions of the earlier WTP report. This team concluded that;

• Approximately 100 kg of Pu was sent to tank farms from various facilities, of which up to 30 kg were dense Pu-oxides or metal fines greater than 10 microns in equivalent spherical diameter.

• Sixteen tanks received this waste, 8 received greater than 750 grams, and 8 received less than 400 grams.

• The special team was able to verify that the earlier study was correct and conservative with regard to the conclusions on possible inventories of Pu oxides and metal fines.

Because these results will directly impact the operation of the WTP Pretreatment Facility, resolution of the technical issues associated with the presence of large quantities of previously unanticipated forms of Pu will require significant changes to the criticality safety strategy for WTP operations and a significant revision to the Preliminary Criticality Safety Evaluation Report.

In the past few years, reviews of the preliminary criticality safety control strategy at WTP have been performed by various external groups, such as the Consortium for Risk Evaluation with Stakeholder Participation (CRESP), Criticality Safety Support Group (CSSG), and the Defense Nuclear Facilities Safety Board (DNFSB). These reviews have provided a range of expert input that typically includes further perspective on issues needing to be addressed in the final criticality safety evaluations. As the reviews are received, the various perspectives are integrated and documented. Response to the review comments will be made as part of hazards analyses supporting the revision of the current preliminary criticality safety evaluations. The reviews provide important information to be considered when additional criticality control strategies and the need for facility design changes are addressed in hazards analyses and control selection processes.

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

The Waste Treatment Plant is not an operating facility. A nonconformance or occurrence reporting process for criticality safety is not yet in place.

7. Follow Up to Assessments

ORP will conduct criticality safety assessments only on an as-needed basis. Closure of the open assessment finding and numerous open conditions of approval associated with the CSER are being tracked to closure by the Nuclear Safety Division. No formal assessments of the contractor criticality safety program have been conducted this fiscal year.

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

There are no specific open issues from previous reports however there are outstanding COAs from the SER approving the WTP Preliminary Criticality Safety Evaluation Report and some remaining actions to be closed from the 2009 CSSG Assessment of 2009. These will be addressed in the upcoming revision of the Preliminary Criticality Safety Evaluation Report.

9. Criticality safety integration with design

At WTP, criticality safety is integrated into design by requiring criticality safety engineers review designs and design changes impacting criticality safety for consistency with criticality requirements for each phase. Additionally, criticality safety training is provided to design engineers and other safety personnel to ensure that criticality is integrated into the design.

Beyond the established design and criticality safety review processes above, there are design and control proposals for addressing criticality safety concerns being developed by various external reviews and under other contractual arrangements. Such design and control proposals are typically associated with expected WTP feed conditions and are being developed outside of the DOE STD-3007-2007 process for criticality safety evaluation and control development. These proposals are reviewed by WTP criticality safety engineers.

Field Office Manager: Scott Samuelson NSC POC: John Harris/Kevin Sandgren

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

The Tank Farm Contractor's NCS performance is measured through assessments, quarterly inspections, and close interaction between the Criticality Safety Representative (CSR) and Operations personnel as shown below:

- Perform regular management self-assessment of nuclear criticality safety program implementation. Washington River Protection Solutions, LLC (WRPS) conducted a management assessment of the Criticality Safety Program in May 2011. The Office of River Protection (ORP) conducted a surveillance and issued two findings in January 2012, based on concerns of lack of technical basis with criticality safety ANS standards, of recent CSER submittals in support of project retrievals. ORP also completed an overall assessment of the Tank Operations Contract (TOC) nuclear criticality safety program in August 2012 and issued three findings and four observations.
- Qualify Criticality Safety Engineers and Criticality Safety Representatives (using DOE STD 1135-99 as a guide). Presently all TOC 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 August 2012.
- 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 walk downs, job planning, pre-job briefs, and interactions with operations.
- Frequent interaction of the Nuclear Criticality Safety Representatives with Process Engineering staff. Nuclear Criticality Safety Representatives review waste compatibility assessments prior to waste transfers and retrievals.
- Perform quarterly criticality safety inspections of fissionable material storage areas/arrays and laboratory areas.
- Any identified issues or deficiencies are identified in a Problem Evaluation Report (PER). PERs are entered into a corrective action management system for tracking and trending.

2. Status of Contractor Criticality Safety Engineer Program

WRPS employs one Nuclear Safety Manager responsible for criticality safety, 2 qualified Criticality Safety Engineers (CSE) on a task-order contract basis (the CSE's are not full-time staff), and 3 qualified Criticality Safety Representatives.

Staffing appears to be adequate based upon the current mission needs; however, monitoring by DOE will be continued through periodic assessments to ensure that CSE support is available when needed.

3. Status of Federal Criticality Safety Oversight Program

Federal oversight staffing appears to be adequate; with three qualified NCS Federal Nuclear and Criticality Safety Engineers (two assigned to Tank Farms and one assigned to the Waste Treatment Plant acting as backup for Tank Farms).

4. Federal Assessments of Site NCS Programs

DOE conducts a review of the WRPS Criticality Safety Management Self-Assessment and reviews the quarterly facility inspections.

Because of infrequent changes to the criticality safety evaluation report (CSER), DOE has raised concerns whether the existing technical bases developed many years ago for the CSER are considered adequate. As a result, DOE requested the DOE Criticality Safety

Steering Group (CSSG) to assess the technical bases of the Tank Farms criticality safety program. The DOE CSSG reviewed the WRPS criticality safety program in December 2009.

The CSSG review uncovered no underlying safety issues; however several recommendations and areas for improvement were identified. ,

These recommendations or areas for improvement were included in a plan for CSP improvements submitted by WRPS to ORP in July 2010. The scope of these improvements was approved by ORP in 2011. WRPS has initiated the program upgrades as identified in the approved plan for CSP improvements. Program upgrades completed to date include the revision and upgrade of the surveillance and inspection procedure to include lines of inquiry from the DOE Orders and Standards and ANSI/ANS Standards, and the revision of the procedure to identify what documents require CSR approval.

Additionally, WRPS recently completed the qualification of two CSRs resulting in a total of three qualified CSRs for the Tank Farms. This addresses a long standing staffing issue that had been identified by ORP in previous assessments and the most recent ORP assessment of August 2012.

Tank Farms nuclear criticality safety is based upon; 1) preserving the form and distribution of the fissile bearing waste, and 2) maintaining the total fissile gram equivalent (FGE) inventory below ½ minimum critical mass (MCM) in the 222-S Laboratory.

The scope of routine waste operations (i.e.; storage, transfer, sampling, surveillance, evaporation, etc.) was incorporated into the NCS safety basis when it was developed. Therefore, the waste storage mission yielded little chance of non-conformance with established limits and controls.

The addition of waste retrieval activities and the design of new waste treatment processes have made it necessary to update and broaden the scope of the Tank Farms NCS program. This in turn, has provided an expanded opportunity for identifying process improvements and application of past lessons learned.

5. New Facility Design

There are no new facilities undergoing design or construction in the Hanford Tank Farms requiring a criticality safety program. However, there were two new criticality safety evaluations for 2011 and three for 2012. Two of the five dealt with a new retrieval technology for sludge from the single-shell tanks (high caustic soak and dissolution of hardened sludge heels in the tank), and the other three involved a closure activity for the reportable occurrence (Unreviewed Safety Question on PuO_2) discussed below. The overall CSER for the Tank Farms was unaffected by the retrieval and closure activities.

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

WRPS tracks criticality safety issues through the Problem Evaluation Request (PER) system. Eleven PERs in criticality safety were identified in 2011, and twenty-five for 2012. Most were low-level concerns or opportunities for improvement, and were closed through the PER process. The increased number of criticality safety PERs were not due to a lack of regulatory compliance, but increased awareness by the WRPS criticality safety staff in documenting concerns so that they are tracked for resolution. Of the 2011 PERs, only one remains open. And of the 2012 PERs, eight were identified by ORP (in the 2012 surveillance and assessment), and the remainder were identified by the Tank Farms Contractor. Of the twenty-five, fifteen are closed or have the changes made to the required documents and are in approval for closure.

There was a non-conformance identified in the Tank Farms in 2011which came about as a result of a sample analysis report of a double-shell tank potentially containing larger and denser PuO_2 particles than were allowed for in the Tank Farms CSER. An independent task force team conducted an in-depth analysis of historical records which resulted in WRPS declaring a "positive" USQ involving 8 tanks (2 double-shell and 6 single-shell) that potentially contain more than 450 grams of PuO_2 or Pu metal fines (PuO_2 or Pu metal was not co-precipitated with the credited absorbers of the CSER, and, with sufficient mass, and if the particles are large and dense enough, could concentrate with mechanical agitation such as mixing or retrieval above CSER maximum localized concentration levels.) The USQ was closed through the addition into the Tank Farms Documented Safety Analysis (DSA) of a prohibition of any activities in these tanks that might disturb the solids (i.e. mixer pump operation, retrieval, or waste additions which might compact existing solids until the completion of a CSER to determine the effects on the criticality hazard in the tank. In addition, there were 8 other single-shell tanks that contained less than 450 grams of the PuO_2 particles, and addition of more fissiles to these tanks are controlled through evaluation of the CSR.

No other criticality safety non-conformances were identified in the Tank Farms for this reporting period though October 31, 2011.

Consistent with previous years, the periodic inspections, assessments, etc., have identified several areas for programmatic improvement that result in the generation of PERs. Identified PERs pertain to:

- Program documentation and maintenance
- Requirements documentation
- Training/qualification
- NCS/Projects interface

Trends are rolled up and reported to senior management semi-annually.

Of the 10 PERs identified in 2011, one involves the PuO_2 issue described above. Of the remainder of the 2011 PERs, one details the instance of a missing sign from a fissile storage area at the 222-S Laboratory (added the same day) and the remaining seven deal with procedural or training inconsistencies: e.g., activation of a procedure without CSR review, a delinquency of one individual on their biannual criticality safety training, out-of-date organizational charts in web-based training, and failure of the CSR to specify the degree of training required for individuals concerning the revision of administrative procedures. These documentation PERs have all been corrected and closed.

The open 2012 PERs are associated with CSR signature on work documents, evaluation of the annual inventory at the 222-S labs (specifically the comparison of the actual values to the values in the daily report), the need to include the CCR process in the CSER procedure, general procedure revisions and review/upgrade of the training process. All of these open items are associated with the planned program upgrades in accordance with the CSSG review and recommendations.

7. Follow Up to Assessments

ORP will conduct surveillances of the WRPS CSP during 2013 of relevant CSERs and activities.

8. Status of any open issues identified in previous reports

Planned activities in the PuO_2 tanks are currently being evaluated by a new CSER for the planned activity to ensure continued subcriticality. The restriction is captured in the criticality safety documents and the DSA.

Office Manager William Murphie NCS POC Tom Hines

1. Measure of Contractor Nuclear Criticality Safety (NCS) Performance
A formal set of performance metrics is used to track the LATA Environmental Services of Kentucky, LLC (LATA Kentucky) 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, and number of surveillances, assessments, anomalous conditions, and lessons learned are included in these metrics.

LATA Kentucky provides the information in quarterly NCS metrics reports. These reports indicated that no ACRs were generated in FY- 2012.

A DOE-PPPO NCS Assessment was performed in February 2012 with one finding and five observations.

An NCS Training Assessment was performed in June 2012 with two findings.

An NCS Roll-up Assessment was completed in September 2012 with no findings or observations

PPPO meets with LATA Kentucky NCS staff to coordinate the integration of NCS Program requirements with the safety basis. The significant reduction in fissile material inventory has resulted in limited NCS requirements.

The LATA Kentucky Independent Review Committee monitors and assesses the implementation and performance of the NCS Program

The LATA Kentucky NCS program meets DOE PPPO expectations. The LATA Kentucky scope of work involves operations that do not pose a high risk of criticality. The ^{235}U enrichment of fissile material is typically less than 2.0 weight percent and most of the fissile waste has been shipped from the Paducah site. The NCS Program is well documented. The LATA Kentucky NCS staff is qualified, knowledgeable, and experienced at the Paducah Site.

2. Status of Contractor Criticality Safety Engineer Program
During FY-2012, LATA Kentucky had one senior NCS engineer who performed both NCS and nuclear safety basis work. Based on the current level of contractor activity, 0.2 NCS Staff Full Time Equivalent (FTE) is required to support the mission at the Paducah site in FY-2013. LATA Kentucky has 0.2 NCS Staff FTE; therefore, LATA Kentucky has no staffing shortfalls.

Based on the performance of the LATA Kentucky NCS Program and the minimal fissile material inventory, PPPO management has affirmed the current LATA Kentucky staffing adequate.

3. Status of Federal Criticality Safety Oversight Program
Based on the current level of activity and minimal fissile material inventory at the Paducah site and the contractor's NCS Program, PPPO needs only limited NCS subject matter expert (SME) oversight.

PPPO has one Nuclear Safety Oversight Lead (NSOL). He provides oversight for the LATA Kentucky NCS Program. However, he has multiple responsibilities and has limited time to provide oversight. In addition, PPPO utilizes two Facility Representatives at Paducah to provide oversight on safety management programs (including the NCS Program). PPPO also has a

support contractor that assists in NCS oversight of the contractor as needed. The level of PPPO oversight for LATA Kentucky NCS Program is deemed adequate.

4. Federal Assessments of Site NCS Programs

The last DOE assessment of the Paducah NCS program was performed in February 2012 that resulted in one finding and five observations. The finding and two of the observations indicated that LATA Kentucky does not perform evacuation and CAAS response drills every year and evacuation assembly points are not readily published in appropriate procedures. Other observations were errors in auditing procedures and the definition of supermoderators. The final observation indicated a lack of training on the importance of a questioning attitude.

The NCS Training Assessment findings included the need to ensure Facility Managers had been briefed on new/revised NCS Determinations and providing assurance that training materials match the NCS Evaluations.

All of the findings and observations were corrected and documented.

5. New Facility Design

There are no plans to design and build a new Hazard Category 2 or 3 facility at Paducah.

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

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

Based on only one ACR in FY-2010, two in FY-2011, and none in 2012; there is no recent trend in anomalous conditions. In previous trend analyses, management problems related to prior operations at the site was the leading cause of anomalous conditions. The contract scope has been to disposition the radiological waste generated from the gaseous diffusion plant and ship to off-site waste disposal facilities. Most ACRs since 2003 involved the discovery of conditions that differ from prior accepted knowledge. These conditions have generally been assigned to “Management Problems”.

LATA Kentucky reviews any ACRs quarterly and any trend identified has a cause analysis performed that results in a Corrective Action Plan (CAP) for the Root Cause and any contributing items.

7. Follow up Assessments

PPPO has followed up on the effectiveness of corrective actions for the February 2012 assessment. PPPO noted that the corrective actions were completed and the results were determined to be effective. There are no outstanding issues.

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

Presently there are no open issues.

Office Manager William Murphie NCS POC Tom Hines

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

A formal set of performance metrics were developed by Fluor-B&W Portsmouth (FBP) to track the FBP NCS program implementation for both the former uranium enrichment facilities (FUEF) and non-FUEF facilities in FY-2012 as the two previous NCS programs were being consolidated into one FBP NCS Program.

FBP NCS maintains a schedule of walkdowns and surveillances and tracks open items. The number of Anomalous Condition Reports (ACRs) and NCS-related Problem Reports (PRs) are tracked and trended. Additionally, field support time, continuing education, assessments and reviews, and lessons learned are tracked.

There were four ACRs generated in FY-2012 in PORTS FBP facilities. The four ACRs involved changing information on legacy fissile materials and inattention to detail. Three of the four did not challenge Double Contingency.

FBP performs a self-assessment of the NCS Program semiannually, using a section of DOE-STD-1158-2010 and documents results in a NCS Report. The areas covered in FY-2012 included Review of Fissile Material Movement and Review of Operating Procedures and Operations during Extended Shutdown. The conclusion of the first assessment included one NCS recommendation to implement the revised NCS Evaluation (NCSE) for fissile material transport, which was accomplished. The conclusion of the second assessment was that FBP operating procedures adequately met the NCS requirements for operations in extended shutdown.

NCS Staff performed over 200 walkdowns/surveillances of NCS Approvals (NCSAs), NCSEs, and NCS Determinations during FY-2012. In addition, self-assessments of implementation of all NCSEs were conducted by the operating groups with NCS Engineering support.

FBP submitted the NCS Program Description Document for the consolidated NCS Program for PPPO approval in September 2012.

PPPO continued its increased oversight of the FBP facilities since the transition of activities from LATA/Parallax Portsmouth and the United States Enrichment Corporation to FBP in FY-2011. PPPO performed an NCS Assessment during third quarter FY-2012 for the FBP NCS Program. DOE oversight also includes routine monitoring of safety management program implementation by two Facility Representatives and one Facility Representative-in-Training.

2. Status of Contractor Criticality Safety Engineer Program

The FBP NCS organization continues to be understaffed. Based on the current level of contractor activity, about thirteen NCS Staff Full Time Equivalents (FTE's) are required to support the mission at the Portsmouth site. Currently FBP has one NCS Manager, one criticality safety officer (CSO), and five NCS engineers, including subcontractor NCS engineers. FBP currently has multiple postings for NCS Engineers and another CSO. The FBP NCS Staff are attempting to fill the gap by working overtime and pursuing additional contractor support.

FBP recognizes that there is an increased need for NCS support. FBP is trying to meet the minimum requirements by utilizing the present resources with scheduled overtime while actively recruiting additional resources and pursuing additional contractor support. PPPO is monitoring the staffing issue to ensure that NCS support is available when needed.

3. Status of Federal Criticality Safety Oversight Program

Based on the current level of activity at the Portsmouth site and the planning for Decontamination and Decommissioning (D&D), PPPO needs approximately 3.0 FTEs in addition to the two Facility Representatives and one Facility Representative-in-training.

PPPO has one Nuclear Safety Oversight Lead (NSOL) who provides oversight for the DOE Contractor Nuclear Safety and NCS Programs at both Paducah and Portsmouth. Because of his multiple responsibilities, he has limited time to provide day-to-day oversight at PORTS. The Portsmouth Site Office has one Safety System Oversight (SSO) Engineer who provides oversight for the DOE PORTS Contractor Nuclear Safety and NCS Programs in addition to the safety systems. PPPO also has support contractor personnel that assist in oversight of the FBP NCS Program with 2.5 FTEs that report to the NSOL/SSO. PPPO provides adequate oversight of the FBP NCS Program.

4. Federal Assessments of Site NCS Programs

A PPPO assessment of the FBP NCS program was completed in June 2012 and provided verification that the FBP NCS Program has been effectively implemented with flowdown requirements for those selected plant areas of review. The NCS programmatic areas reviewed in the assessment included: NCS Program Implementation, NCS Training, NCS Review of Non-Destructive Assay (NDA) Data, and NCS Program Oversight.

Issues identified as Findings that require correction were noted in each of the following review areas: Nuclear Criticality Safety, Technical Safety Requirements Implementation, Training, and Conduct of Operations. No Findings or Observations were categorized as *Significant Conditions Adverse to Quality* as a result of the PPPO assessment.

Corrective actions that address these findings have been issued and some have been verified as completed. The remaining corrective actions and the effectiveness review are anticipated to be complete by second quarter FY-2013.

A DOE EM/NNSA/PPPO independent assessment of the FBP NCS program was performed in the fourth quarter FY-2012. The purpose of the review was to verify program requirements of ANSI/ANS-8.19, *Administrative Practices for Nuclear Criticality Safety*. The assessment team determined that the consolidated FBP NCS Program generally met the overall objectives of the requirements; however, weaknesses were identified and documented as one finding, seven observations, and two proficiencies. The assessment report was issued first quarter FY-2013. The findings, observations, and corrective actions from this independent NCS assessment will be discussed in the *2013 Annual Report on Criticality Safety Programs at DOE/EM Sites*.

5. New Facility Design

There are no plans to design and build a new Hazard Category 2 or 3 facility at PORTS.

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

FBP utilizes the ACR process and the Performance Assurance Program to track NCS occurrences. Trending is performed quarterly in the NCS Metrics Report, which is provided to PPPO.

A review of the ACRs and associated problem reports indicate that the principle weakness in the NCS Program is personnel error. FBP is providing additional NCS training and additional oversight for fissile material activities to reduce the number of personnel errors.

7. Follow Up to Assessments

PPPO has been performing regular follow-up teleconferences on the corrective actions from the anomalous conditions and the PPPO NCS assessment performed in FY-2012. Many of the findings, observations, and associated corrective actions are being addressed as a part of the FBP NCS Program consolidation process, which is under implementation.

8. As applicable, provide status of any open issues identified in previous reports.
There are no open issues from the FY 2011 report.

Office Manager William Murphie NCS POC Tom Hines

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

The B&W Conversion Facilities (BWCS) started production at Paducah, KY and Portsmouth, OH, on September 30, 2011. The BWCS NCS Program for Paducah and Portsmouth is a limited scope program since production only converts tails (non-enriched uranium) material. The NCS Program is provided to ensure that any cylinder with enriched material in the uranium cylinder storage yards does not enter the production facilities and to ensure NCS in the storage yards. At this time no metrics are established for tracking; however, an Anomaly Detection Process covered under the Hazardous Material Protection Program has been established under which Anomalous Conditions, NCS infractions, or NCS deficiencies will be identified and promptly corrected. The occurrence of such events will be tracked and trended in order to prevent reoccurrence and transmit lessons learned. BWCS did not have any NCS anomalous conditions in FY-2012.

2. Status of Contractor Criticality Safety Engineer Program

During FY-2012, BWCS had part-time Sr. NCS Engineer who provided support to both Paducah and Portsmouth sites. Based on the current level of contractor activity, 0.5 NCS Staff Full Time Equivalent (FTE) is required to support the mission at both sites in FY-2012. BWCS has 0.5 NCS Staff FTE; therefore, there is no staffing shortfall.

Based on the performance of the BWCS NCS Program and the minimal fissile material inventory in the cylinder storage yards, PPPO management has affirmed the current BWCS staffing is adequate.

3. Status of Federal Criticality Safety Oversight Program

Based on the minimal fissile material inventory at the Paducah and Portsmouth BWCS cylinder storage yards and the contractor's NCS Program, PPPO needs only limited NCS subject matter expert (SME) oversight.

PPPO has one Nuclear Safety Oversight Lead (NSOL) and one Safety System Oversight (SSO) Engineer at Portsmouth. The PORTS SSO provides oversight for the BWCS NCS Program at Portsmouth and the PPPO NSOL provides oversight for the BWCS NCS Program at Paducah. In addition, PPPO utilizes one Facility Representative at Paducah and one at Portsmouth to provide oversight on safety management programs (including the NCS Program). PPPO also has a support contractor that assists in NCS oversight of the contractor as needed. The level of PPPO oversight for the BWCS NCS Program is deemed adequate.

4. Federal Assessments of Site NCS Programs

BWCS has only been in production since September 2011; prior to that, there was little activity in the cylinder storage yards. A draft NCS Program Description Document was provided to the PPPO NSOL for review and approval. Comments were provided to the Sr. NCS Engineer for resolution. The BWCS NCS Program identifies applicable standards and exceptions. The NCS Evaluations are written in accordance with the appropriate DOE guidance and requirements. The primary fissile operation of BWCS is the storage of fissile UF_6 cylinders which is a singly contingent operation that has been DOE-approved for previous contractors. DOE O 420.1B requires DOE approval for singly contingent operations and DOE approval for BWCS storage of fissile cylinders is being pursued.

In July 2012, PPPO performed an Independent Verification Review of BWCS. There were no NCS findings or observations.

5. New Facility Design

The BWCS facility is complete and has been in production for a year. There are no plans to design and build another Hazard Category 2 or 3 facility at Paducah or Portsmouth.

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

The BWCS NCS Engineer will analyze the ACRs and identify the trend in causes. NCS occurrences will be entered into the Condition Reporting/Non-Compliance Reporting process governed by the Condition Reporting procedure.

There were no NCS anomalous conditions to track or trend during FY-2012.

7. Follow up Assessments

There were no outstanding issues from the Independent Verification Review in July 2012. There are no NCS assessments scheduled for FY-2013 at present.

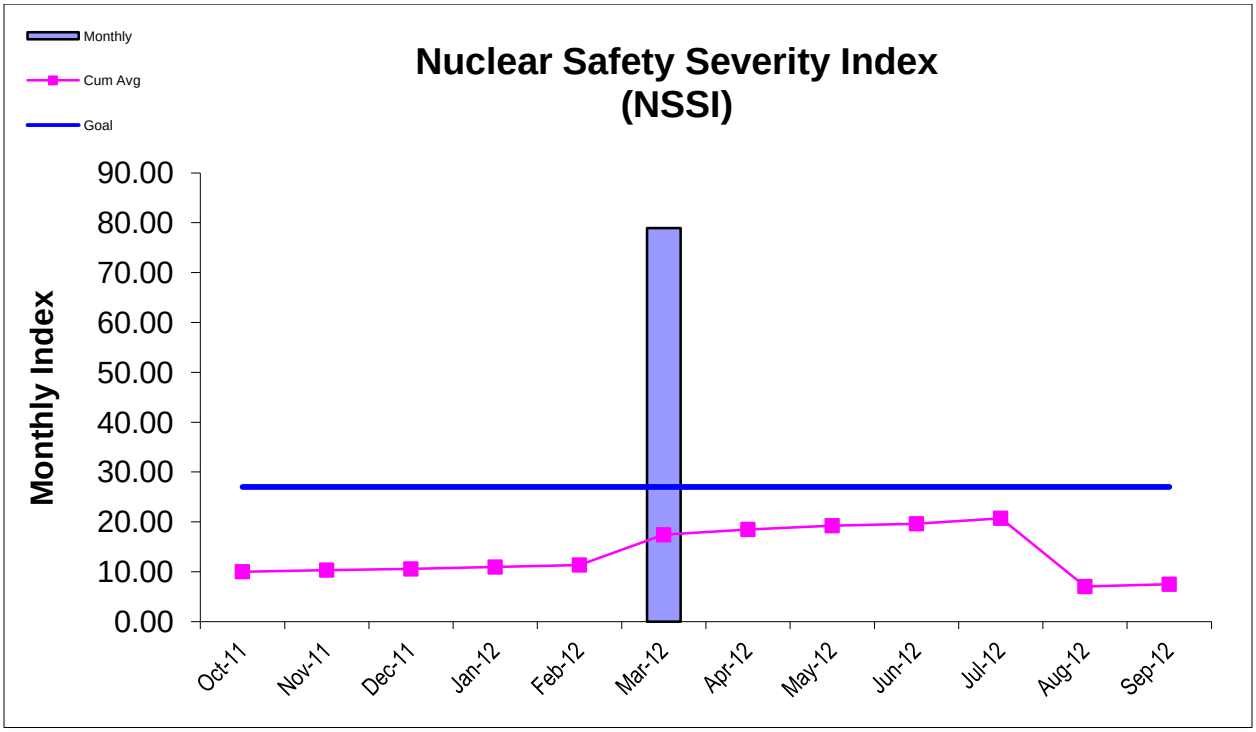
1. As applicable, provide status of any open issues identified in previous reports.

Presently there are no open issues.

Field/Site Manager: Richard Provencher/James Cooper NSC POC: Kermit Bunde/Roger Harshbarger

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

Two criticality safety metrics are used. The first metric is called the Nuclear Safety Severity Index (NSSI) and is reported monthly to DOE-ID as part of the Safety Performance Objectives, Measures and Commitments (SPOMC) report. This is an index of severity of ORPS reports related to TSR violations, criticality safety events (i.e., loss of double contingency), or degradation of SSCs. The second metric is called the Criticality Safety Adversity Index (CSAI). This metric is a weighted index of criticality safety noncompliances. The 12 month average for both of these metrics exceeds the goals.



Oct-11	Nov-11	Dec-11	Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	Jul-12	Aug-12	Sep-12
27.00	27.00	27.00	27.00	27.00	27.00	27.00	27.00	27.00	27.00	27.00	27.00
0.00	0.00	0.00	0.00	0.00	78.95	0.00	0.00	0.00	0.00	0.00	0.00
10.02	10.34	10.57	10.95	11.37	17.43	18.50	19.24	19.64	20.74	7.05	7.50

Definition

This is an index of severity of ORPS reports related to TSR violations, criticality safety events, or degradation of SSCs. NSSI = $10^6 \sum wf_i$/hours worked. The weighting factors are further described in the SPOMC submittal letter, CCN 312487 of September 27, 2011.

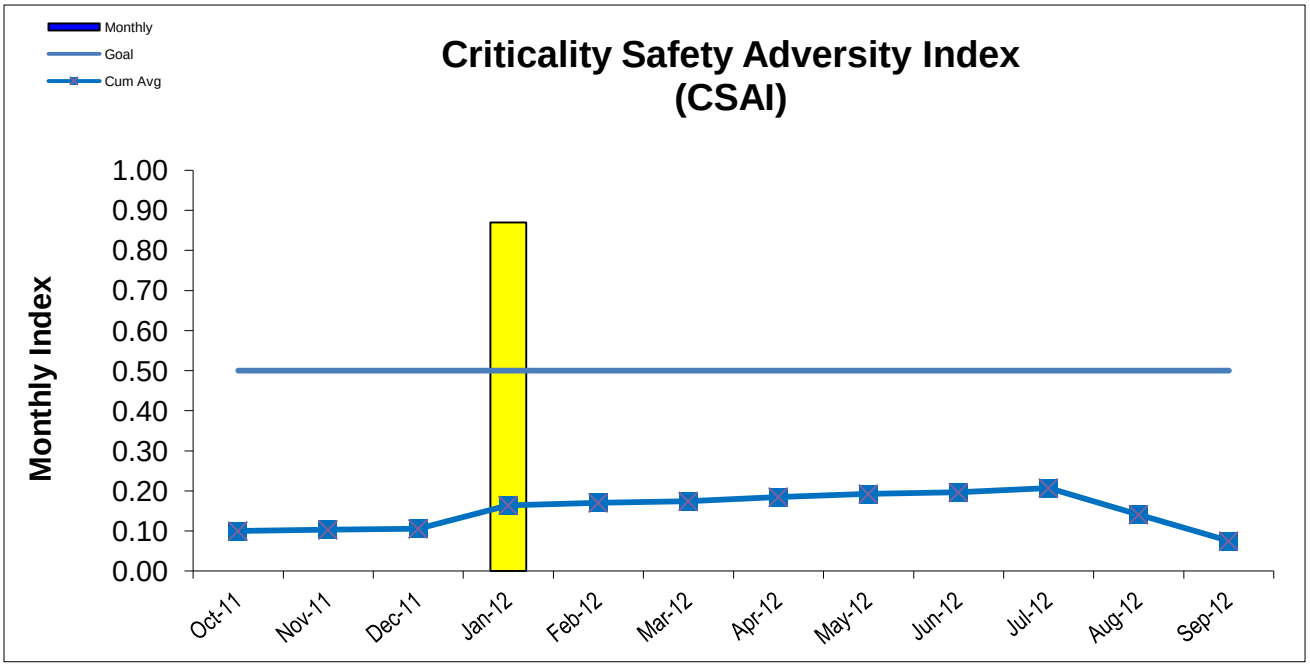
Analysis

There were no ORPS reports submitted during the reporting period that meet the SPOMC criteria.

Actions

There were no new events during the reporting period; therefore, there are no new corrective actions. Nuclear Facility operations will continue to improve compliance with nuclear safety related controls through vigilance in implementation of controls, and identification and correction of noncompliant conditions.

Goals	Points of Contact					
Annual Performance Goal is ≤27.00.	Responsible Manager:			J. L. Harvey (3-0849)		
Monthly Grading Criteria: Blue ≤33.75, Green (33.76-40.50), Yellow (40.51-47.25), Red >47.25.	SME:			R. G. Peatross (520-6662)		
Cum Avg: Blue ≤24.30, Green (24.31-27.00), Yellow (27.01-29.70), Red >29.70.						



Oct-11	Nov-11	Dec-11	Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	Jul-12	Aug-12	Sep-12
0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
0.93	0.00	0.00	0.87	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.15	0.16	0.16	0.22	0.23	0.23	0.25	0.26	0.26	0.21	0.14	0.15

0.16

The Criticality Safety Adversity Index (CSAI) is an index to measure criticality safety infractions and deficiencies.
The CSAI calculation is ($\sum wf_i * 200{,}000$)/hours worked.
The weighting factors are defined as;
Infraction = 4 and Deficiency = 1.

Analysis

January 2012 - A criticality safety control requiring verification of fuel identification numbers was not performed by operations before placing fissile material into a fuel storage port. Double contingency was not lost. This event was not ORPS reportable.

Actions

Criticality safety continues to support operations by writing criticality safety evaluations, answering safety bases questions, and performing assessments.

Goals	Points of Contact
Annual performance goal is ≤0.50 Monthly Grading Criteria: Blue ≤0.62, Green (0.62-0.75), Yellow (0.75-0.88), Red >0.89. Cum Avg: Blue ≤0.45, Green (0.45-0.50), Yellow (0.51-0.55), Red >0.55.	Responsible Manager: M. Thieme (520-0506)

No negative trends in nuclear criticality safety have been identified by DOE Line Management.

2. Status of Contractor Criticality Safety Engineer Program

CWI has one full time criticality safety engineer, one full time sub contract criticality safety engineer, and one full time criticality safety manager. All three employees are fully qualified as criticality safety engineers. Staffing levels are adequate. There are no plans for compensatory measures.

DOE line management determined that the contractor had adequate staffing for FY-12 activities.

3. Status of Federal Criticality Safety Oversight Program

EM programs have one qualified federal criticality safety engineer and the DOE-ID Quality and Safety Division (QSD) has two qualified federal criticality safety engineers.

DOE line management determined the office has adequate staffing for current activities.

4. Federal Assessments of Site NCS Programs

Quarterly surveillances of the contractor were conducted by QSD (Kermit Bunde) and EM (Roger Harshbarger).

No issues were identified during the surveillances. The contractor Criticality Safety Program is functioning at a level that ensures facility safety.

As part of the above mentioned quarterly surveillances, the contractors' self-assessments were reviewed. Recent self-assessments have been found to be in-depth and accomplished with appropriate rigor.

New and revised criticality safety evaluations meet the expectations of DOE-STD-3007-2007.

5. New Facility Design

There are no new facilities (in construction or planned) at Idaho that need criticality safety controls or design requirements.

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

There was one infraction in FY 2012, regarding a fuel handling unit stored without proper documentation of the unit identification number. No trends are identified.

7. Follow up Assessments

No follow-up assessments were needed.

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

No open issues were identified in the 2011 annual report

Attachment 9 Idaho Operations Office, Advanced Mixed Waste Treatment Project (AMWTP)

Field/Site Manager: Richard Provencher/James Cooper NSC POC: Kermit Bunde/Roger Harshbarger

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

Advanced Mixed Waste Treatment Project (AMWTP) continues to track and trend all events and deficiencies that impact or potentially impact NCS, regardless of severity. This tracking and trending utilizes AMWTP's formal issues tracking system, Trackwise, and is included in the AMWTP self-assessment of the Nuclear Criticality Safety (NCS) program.

In addition, AMWTP utilizes a lagging indicator metric (Nuclear Safety Index) for NCS issues, which is included in the Safety Performance Objectives, Measures, and Commitments (SPOMC) report to DOE-ID.

No negative trends in nuclear criticality safety have been identified by DOE line management.

2. Status of Contractor Criticality Safety Engineer Program

In FY-12, AMWTP NCS staffing was three full-time AMWTP employees (two criticality safety officers, one qualified criticality safety engineer). In addition, AMWTP employs three criticality safety engineers on a subcontracted basis (sharing 80 hours per week).

DOE line management determined that the contractor had adequate staffing for FY-12 activities.

3. Status of Federal Criticality Safety Oversight Program

EM programs have one qualified federal criticality safety engineer and the DOE-ID Quality and Safety Division (QSD) has two qualified federal criticality safety engineers

DOE line management determined the office has adequate staffing for current activities.

4. Federal Assessments of Site NCS Programs

Quarterly surveillances of the contractor are conducted by QSD and this is supplemented by periodic surveillance of AMWTP Criticality Alarm System by Roger Harshbarger. The contractor took actions in response to TSR violations related to Independent Verification of safety significant manual data entries (Specific Administrative Controls). In addition, the Documented Safety Analysis and Technical Safety Requirements were revised to provide clarity. No additional corrective actions were deemed necessary as the contractor Criticality Safety Program is functioning currently at a level that will ensure facility safety.

As part of the above-mentioned quarterly surveillances, the contractors' self-assessments are reviewed. Recent self-assessments have been found to be in-depth and accomplished with appropriate rigor. Also, it was determined that new and revised criticality safety evaluations meet the expectations of DOE-STD-3007-2007.

5. New Facility Design

Design and modification of a Retrieval Contamination Enclosure (RCE) and Inner Contamination Enclosure (ICE) for the resumption of Retrieval activities in WMF-636 were performed. In addition, Operating Instructions for new retrieval methods were generated. In accordance with ANSI/ANS-8.19, each phase of the design, construction, and documentation generation was reviewed and evaluated by NCS staff.

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

Three infractions occurred in FY 2012. All three involved failure to perform independent verifications required by criticality safety. A fourth incident dealt with failure to change operating modes prior to maintenance of an assay system.

7. Follow up Assessments

No follow-up assessments were necessary.

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

No open issues were identified in the 2011 annual report

Field/Site Manager: Mark Whitney NCS POC: Brenda Hawks

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

Wastren Advantage Inc. (WAI) manages the TRU Waste Processing Center (TWPC) in Oak Ridge. Metrics established to monitor contractor NCS performance include the number of infractions.

WAI has had only one Anomalous Condition Report (ACR) that was identified as NCS related during FY 2012. This ACR was identified as a situation where a waste drum was considered to be overloaded based on the site-wide limit. The drum mass content was determined based on NDA. Subsequently, it was determined that the drum was well within the mass limit and the ACR was accordingly dispositioned. The NCS Manager responded to the issue and informed the Federal NCS Staff in a timely manner of the initial concern and the response.

Management attention to issues continues to be prompt and appropriate and ORO considers the performance acceptable.

2. Status of Contractor Criticality Safety Engineer Program

TWPC (WAI) has two NCS Engineers supporting the criticality safety program on a part time basis. Additional senior qualified NCS Engineers are available/on call and the NCS Manager is also a Qualified Senior NCS Engineer.

Additional resources are subcontracted and available. There is no shortfall at this time and a contracting mechanism is in place to prevent any shortfall in the future.

3. Status of Federal Criticality Safety Oversight Program

Oak Ridge EM has one Federal NCS Engineer who is currently on detail assignment with NNSA at the Uranium Processing Facility (UPF) design project, but who still supports ORO EM NCS on a part-time, as-needed basis. One additional full-time subcontract NCS Engineer is also on staff. Additional support is available on an as-needed basis from a qualified NCS Engineer and an engineer-in-training from the Oak Ridge Office of Science. An independent assessment conducted by EM Headquarters found the ORO EM NCS to be effective and compliant. The Oak Ridge NCS staffing level is adequate.

4. Federal Assessments of Site NCS Programs

Periodic informal assessments (twice per year) are conducted by the Federal subcontract NCS Engineer. No issues of concern were identified as a result of these informal reviews.

TWPC has conducted one management self-assessment of its NCS program during the year using criteria from DOE-STD-1158. This is part of a triennial assessment approach that is used to ensure that all DOE-STD-1158 criteria are examined as applicable to the TWPC operations over a 3-year period, with a selection of criteria examined each year. This assessment identified two observations:

(1) The need to ensure that NCSE reference documents are available in the site-wide document database; and,
(2) The need to provide traceability of NCS requirements that are incorporated in procedures back to the parent NCS evaluation. Responses to these concerns were being determined at the end of the FY.

A Contractor Readiness Assessment was conducted during FY12 as the contractor initiated operation of its Cask Processing Enclosure (CPE) for the handling of cask-borne wastes. One

NCS-related observation was identified as a result of this CRA and it has been addressed satisfactorily.

In addition to management assessments, the Contractor also has conducted the annual operations reviews of NCSEs as required by ANSI/ANS-8.1.

5. New Facility Design

Any potential change in facility design regarding longer-term sludge treatment is in the planning phase. NCS is involved in the current planning and design activities for sludge treatment at TWPC.

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. With only one ACR identified in FY2012 (subsequently withdrawn as noted above), there was insufficient data to indicate a trend.

7. Follow-Up to Assessments

None

8. Status of Open Issues Identified in previous reports

There were no open issues from previous reports.

Field/Site Manager: Mark Whitney NCS POC: Brenda Hawks

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

Metrics established to monitor contractor NCS performance include the 12-month rolling average time to close ACRs (goal is < 30 days average time to close).

Less than two new ACRs occurred per month (15 ACRs during FY 2012). The average time to close ACRs has remained about the same as FY2011 and 65% of ACRs in FY2012 were closed within 10 days. Five were open longer than 30 days, with the longest being 110 days.

Contractor performance has been good, as evidenced by the lower number of ACRs experienced and the continued emphasis placed upon closing ACRs that have occurred.

2. Status of Contractor Criticality Safety Engineer Program

The URS|CH2M Hill (UCOR) NCS program currently has five FTEs. The DOE NCS oversight continues to monitor the contractor's staffing level for adequacy. The UCOR Criticality Safety Officers are not included in the total FTE count but are vital to the UCOR NCS Program as applied specifically to the K-25 and K-27 Projects. The DOE NCS oversight will continue to observe the CSO staffing levels for adequacy, as well.

3. Status of Federal Criticality Safety Oversight Program

Oak Ridge EM has one Federal NCS Engineer who is currently on detail assignment with NNSA at the Uranium Processing Facility (UPF) design project, but who still supports ORO EM NCS on a part-time, as-needed basis. One additional full-time subcontract NCS Engineer is also on staff. Additional support is available on an as-needed basis from a qualified NCS Engineer and an engineer-in-training from the Oak Ridge Office of Science. An independent assessment conducted by EM Headquarters found the ORO EM NCS to be effective and compliant. The Oak Ridge NCS staffing level is adequate.

4. Federal Assessments of Site NCS Programs

Criticality Safety was included as a functional area in quarterly surveillances of the contractor.

Monthly informal assessments were performed by the ORO subcontract NCS Engineer. The monthly assessments used selected portions of DOE-STD-1158 as lines of inquiry.

The contractor NCS Program Description document was recently revised and approved by DOE-ORO.

Criticality safety evaluations and the NCS program are consistent with DOE Order 420.1B and applicable ANSI/ANS standards.

5. New Facility Design

There are no new facilities being designed.

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

All ACRs are tracked and trended internally by the UCOR corrective action tracking system (I/CATS or CATS), as required by the NCS program. All Level 1, 2, and 3 ACRs are also tracked through the Occurrence Reporting system, which is independent of the NCS Program.

Leading and Lagging indicators are also used to monitor the health of the NCS Program. The main leading indicator would be a rise in the number of lower level ACRs or ACRs with similar causes, indicating potential programmatic/common cause failures. The main lagging indicator would be an increase in the numbers of days an ACR remains open, indicating a potential lack of attention to degraded safety status.

Using those Leading/Lagging indicators, no adverse trends were noted in the ACRs for FY2012. The total number of ACRs has dropped compared to FY2011 and the time to close ACRs remained steady.

7. Follow-Up to Assessments

None.

8. As Applicable, Provide Status of any Open Issues Identified in Previous Reports

There are no open issues.

Field/Site Manager: Mark Whitney NCS POC: Brenda Hawks

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

Metrics established to monitor contractor NCS performance on a quarterly basis include:

- Number and Severity Level of Condition Reports (CRs)
- Timely Closure of CRs
- Self-Reporting of CRs by Operations
- Completion of NCSE Annual Assessments
- New Condition Reports with NCS Implications
- Open/Unresolved Condition Reports with NCS Implications
- Completed NCS Surveillances
- Number of UNSAT Surveillance Conditions
- Completed NCS Assessments
- Number of UNSAT Assessment Conditions
- NCS Engineer Professional Development Activities

There have been no infractions since Isotek took over operations in February 2007. The primary NCS activities engaged in by the Isotek NCS staff have been to support operations involving the transfer of fissile material to the Nevada National Security Site (NNSS) Device Assembly Facility (DAF) and to prepare NCS evaluations and establish readiness for the upcoming effort to transport other fissile material for disposal at NNSS. Only one NCS-related Condition Report (CR) was identified during this period and this was closed within 11 days. Numerous field surveillances have been conducted by the NCS Staff and over 100 hours of professional development activities were logged.

2. Status of Contractor Criticality Safety Engineer Program

The Isotek NCS program currently has a stable workforce consisting of a Lead NCS Engineer, three full-time NCS Engineers, and one part-time NCS Engineer. All personnel are qualified in the development of NCS evaluations, and all but one full-time person are qualified peer reviewers. The NCS staff consists of highly experienced personnel and the staff size is adequate for the current state of the project.

3. Status of Federal Criticality Safety Oversight Program

Oak Ridge EM has one Federal NCS Engineer who is currently on detail assignment with NNSA at the Uranium Processing Facility (UPF) design project, but who still supports ORO EM NCS on a part-time, as-needed basis. One additional full-time subcontract NCS Engineer is also on staff. Additional support is available on an as-needed basis from a qualified NCS Engineer and an engineer-in-training from the Oak Ridge Office of Science. An independent assessment conducted by EM Headquarters found the ORO EM NCS to be effective and compliant. The Oak Ridge NCS staffing level is adequate.

4. Federal Assessments of Site NCS Programs

Monthly informal assessments were performed by the ORO subcontract NCS Engineer. One assessment each month used a selected portion of DOE-STD-1158 as lines of inquiry. Additional assessments were used to monitor the status of NCSE development, program procedure revisions, implementation status for NCS controls, and other related NCS activities.

The Federal NCS Staff also has frequent (at least bi-weekly) meetings with the Isotek Lead NCS Engineer to monitor contractor NCS Program status and issues, which enables timely identification and resolution of concerns.

No findings or observations have been identified with respect to these reviews and no open items presently exist.

Contractor and DOE readiness assessments were conducted during this period to permit start-up of fissile material activities associated with transport of materials to the DAF at NNSS. Only one NCS-related finding was identified and it was appropriately dispositioned as a CR.

The contractor has performed an annual management assessment of the NCS Program using DOE-STD-1158 criteria. The contractor has implemented a self-assessment process where the NCS Program is examined using all applicable DOE-STD-1158 criteria over a three-year period. In the annual review conducted in July 2012, no findings and five observations were identified. Program enhancements have been made as a result of all five observations. NCS-related concerns are being given timely and appropriate consideration.

5. New Facility Design

Facility design has been limited to minor miscellaneous modifications and modifications associated with upcoming activities to transport material for disposal at the NNSS. All modifications are examined by the NCS Staff for potential impact to NCS evaluations.

The contractor is currently involved in the development of initial design concepts for the dissolving and downblending of the remaining facility inventory. This involves use of a facility that currently belongs to the Oak Ridge National Laboratory. The contractor's NCS Staff is directly involved with the development of the design concept through regular participation on the design team. The Federal NCS Staff receives biweekly briefings from the contractor's NCS Staff and is closely monitoring the design concept development.

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

There have been an insufficient number of NCS-related issues identified during the reporting period to establish trends or indications. Fissile material operations have included storage and the transport of approximately 120 canisters of material to the Device Assembly Facility at the NNSS.

7. Follow-Up to Assessments

None

8. Status of Open Issues Identified in previous reports

There are no open issues for this reporting period.

SRO Field/Site Manager: Dr. David Moody NCS POC: Norman Shepard

1. Measure of contractor Nuclear Criticality safety Performance

Savannah River Nuclear Solutions (SRNS), the Management and Operations (M&O) Contractor, has an established criticality safety metric. The SRNS central criticality safety oversight committee, the Nuclear Criticality Safety Review Committee (NCSRC), maintains a criticality safety indicator based on reportable and non-reportable deficiencies that are submitted into a site database from the M&O facilities. A rating scale is used to score each reportable and non-reportable deficiency. On a quarterly basis, with an annual summary roll-up, the cumulative score, and the number of reportable and non-reportable deficiencies in each rating bin, are presented to and reviewed by the NCSRC. Cause codes for each deficiency are also compiled and tracked to determine the major causes of the deficiencies.

For FY 2011, there were a total of 53 deficiencies (10 criticality alarm system/evacuation route issues, 40 minor deficiencies involving less than a procedure limit violation or less than a control failure, and 3 procedure limit violations). There were no violations of the highest level Criticality Safety Limits upon which the procedure limits are based. The minor deficiencies are typically identified during facility self-assessments, readiness assessments, and criticality engineer walkdowns. Emphasis on the use of Human Performance Improvement (HPI) tools to prevent human factors related errors helps to reduce the number of these errors.

For FY 2012, there were a total of 53 deficiencies (8 criticality alarm system/evacuation route issues, 41 minor deficiencies less than a procedure limit violation or less than a control failure, and 4 procedure limit/control violations). There were no violations of the highest level Criticality Safety Limits upon which the procedure limits are based. The minor deficiencies are typically identified during facility self-assessments, readiness assessments, and facility engineer or criticality safety engineer walkdowns. The use of HPI tools, readiness assessments, and system walkdowns prove useful in an environment of changing missions, procedure changes, and configuration management challenges.

During FY 2012, the SRNS Criticality Safety Program organization continued to prepare quarterly criticality safety Performance Assessments (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 non-reportable deficiencies, or a higher than expected number of the same type of deficiency, or unusually special or severe problems, the facility is placed on the “watch list” or a recurring event is declared. During 2011 and 2012 no “watch list” items or recurring events were identified.

DOE-SR Field Office personnel also reviewed and commented on the criticality safety related sections of several DSAs and associated NCSEs. DOE-SR Field Office assessments have concluded that SRNS has an adequate criticality safety program. More information is provided in Item 4 below. Monthly criticality safety DOE-SR/SRNS interface meetings serve to review performance, identify and discuss needed improvements, and identify ongoing/upcoming issues.

2. Status of the Contractor Nuclear Criticality Safety Engineer Staffing

SRNS has created a criticality safety engineer (CSE) qualification program in compliance with ANS-8.26 and DOE-STD-1135. Savannah River Remediation (SRR), the Liquid Waste contractor, utilizes the SRNS CSE qualification program as well. SRNS manages the majority of DOE-EM activities at SRS. SRNS currently has 12 fully qualified Senior CSEs, 6 fully qualified

CSEs, and 3 staff members working to complete the CSE qualification. All eighteen of the qualified Senior CSEs and CSEs are also qualified as Criticality Safety Officers in various facilities. Two staff members are qualified as Criticality Safety Officers, but not as CSEs. SRNS has established a program to incentivize the staff to achieve the appropriate qualifications. SRNS also has a Criticality Safety Technician that serves as a qualified assessor and currently utilizes the services of a subcontractor to provide additional analytical support in K-Area. Efforts are continuing to bring additional staff on board.

DOE-SR reviews the adequacy of contractor's CS staffing level throughout the year. For example, the contractor's criticality safety staffing level is routinely discussed at the monthly DOE-SR – SRNS monthly interface meetings. In addition, DOE-SR staff review the criticality safety sections of DSAs/TSRs as well as the NCSEs that serve as the safety basis support documents to the DSAs/TSRs. The adequacy of the criticality safety documentation provides a basis, in part, to judge the adequacy of the contractor CS staffing level. While the current level of support appears adequate, there is little capacity to accommodate additional work at a level beyond that which currently exists.

3. Status of the federal nuclear criticality safety Program.

During FY 2012, Federal staffing was two full time qualified criticality safety engineers and one full time engineer working toward qualification. The engineer working on qualification should be fully qualified this calendar year. Additionally a qualified criticality safety engineer working as a facility engineer and another qualified criticality safety engineer working for NNSA are available to provide support as necessary. DOE-SR is still short of the staff of four needed to support criticality safety as identified in the January 2008 Five Year Work Force Management Plan for Fiscal Years 2008 - 2013.

4. Federal Assessments of Site NCS Programs.

In FY 2012, the DOE-SR Operations Office with assistance of DOE-EM HQ conducted an assessment of the SRNS Criticality Safety Program by interviewing the SRNS Criticality Safety Program Manager, the SRNS Criticality Safety Assessment Manager, the SRNS Criticality Safety Program Senior CS Engineer responsible for the criticality safety metric, and the K-Area Complex Criticality Safety Officer. No findings or opportunities for improvement were generated. In addition, an NCSE related to processing and handling high mass drums was reviewed by DOE-EM HQ staff and comments requesting clarification of several points were transmitted to the DOE-SR Operations Office. SRNS added additional information to the high mass drum NCSE to provide the requested clarification.

During FY 2012 DOE-SR conducted over a ninety reviews relating to SRNS criticality safety. The distribution of these reviews was as follows: 17 contractor Criticality Safety Program Assessments Reviews, 11 reviews providing criticality safety support for Documented Safety Analyses/Technical Safety Requirements, 28 Operational Awareness Reviews (including 6 reviews by DOE-HQ), 34 reviews of criticality safety evaluations, 3 reviews associated with the Criticality Safety Alarm System, 2 reviews associated with Readiness Assessments, 1 Follow-up from DOE-HQ review and 1 assessment of an in-situ NDA process in response to DNFSB Recommendation 2007-1. Conclusion of the DOE reviews were overall the SRNS criticality program was adequate. SRNS has an adequate facility criticality safety self-assessment process. Performance is reviewed using the lines of inquiry established in DOE-STD-1158. A trained SRNS criticality safety technician and several criticality safety engineers, working together with facility engineers, perform criticality safety facility self-assessments. SRNS criticality safety evaluations were adequate. SRNS criticality safety evaluations were performed

and reviewed by trained and qualified criticality safety engineers meeting the requirements of DOE-STD-1135 and the evaluations met the requirements of DOE-STD-3007 and were evaluated in accordance with DOE-STD-1134.

During FY 2012, specific reviews or assessments were performed by both SRNS and DOE-SR that involved criticality safety considerations for the Purification Area Vault and the Culvert Storage in K-Area, Alternate Feed Stock-2 processing in HB-Line and H- Canyon, and Sodium Reactor Experiment fuel processing in H-Canyon.

5. New Facility Design

No new SRNS facility design activities began in FY 2012.

6. Trending and Analysis of Reportable and non-Reportable Occurrences Related to Criticality.

As indicated in Section 1, the SRNS NCSRC maintains a criticality safety indicator based on reportable and non-reportable occurrences. A rating scale is used to score each reportable and non-reportable occurrence. On a quarterly basis, with an annual summary roll-up, the cumulative score, and the number of reportable and non-reportable 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 results. INPO-based cause codes are identified for each occurrence and compiled and tracked to determine the major causes of the occurrences. A goal and suggested actions are established by the NCSRC on an annual basis to reduce the number of occurrences in the groupings having the highest number of occurrences. Human performance and communication deficiencies account for the majority of events.

During FY 2012, the SRNS Criticality Safety Program organization continued to prepare a quarterly criticality safety 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 non-reportable occurrences, 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 DOE-SR. No facilities are currently on the watch list.

The criticality safety indicator is primarily a lagging indicator. The data indicate 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 a few 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.

The number of minor events (less than procedure limit violation or less than loss of a control) in FY 2012 was 41 versus 40 in FY 2011. The number of events involving a procedure limit violation or loss of a control was four in FY 2012 versus three in FY 2011. It continues to appear that minor deficiencies are being identified and corrected before more significant problems arise. There were no reportable 3C2s during FY 2012. No common relationship was identified among any of these events, and no significant negative trends were identified. A summary of the four events involving a procedure limit violation or loss of control follows:

A 3C3 (based on 2011 reporting criteria) event in H-canyon occurred on 11/28/2011 – On 11/20/2011, the 16H sump liquid level instrumentation was removed from service due to a discrepancy between the instrumentation and direct observation. Alternate controls were implemented. However, transfers of unanalyzed sump solution to or through the cell are not permitted with the sump liquid level instrumentation out of service. On 11/27/2011, a flush of 15H cell was performed. The flush solution was transferred through 16H, which was not permitted. One credited control was lost. Two other controls remained in place.

A 3C4 event (based on 2012 reporting criteria) occurred 8/23/2012. TRU drum remediation activities take place in the F-Canyon truckwell waste handling area. The waste handling area ventilation system hold up fissile inventory is maintained less than a specified value such that the combined fissile inventory of a drum being remediated plus the ventilation hold up is less than an established procedural limit. Operators incorrectly completed the procedure steps to verify these limits. At least two additional criticality safety barriers remained in place.

An ORPS non-reportable event occurred on 8/30/2012 in SRNL. In SRNL, all fissile material is controlled within Mass Control Zones (MCZs). When fissile material is moved between MCZs, it is administratively controlled using specific material control transfer forms. Radiation readings needed to be taken on some TRU drums located in an MCZ, but background radiation was too high. The drums were temporarily moved to another area that was not an MCZ, without completing the required paperwork, to take the readings. Operations staff realized the error and returned the drums to the MCZ. No other fissile moves were in progress and no mass control limits were violated.

An ORPS non-reportable event occurred on 9/11/2012 in Solid Waste Management Facilities related to the storage of a high mass drum in a storage culvert. A criticality safety administrative requirement specified that the drum was supposed to be stored on the top tier in the culvert surrounded by 6 empty drums, with 7 empty drums on the bottom tier. However, when the culvert was opened, it only contained drums on the bottom tier (i.e., one high mass drum surrounded by 6 empty drums, without a top tier.).

A criticality accident was never approached in any of these events because of the presence of multiple additional controls.

Due to periodic changes in the number of facilities operating, the planned and unplanned number of facility outages that occur, mission changes and changes in the type of fissile or fissionable material involved, it is not possible to normalize indicator results from year to year. Nevertheless, due to the substantial number of activities performed each year across the site and the large number of personnel involved, the indicator results provide a meaningful data set that can be used to determine if the Criticality Safety Program is functioning effectively and to identify areas of improvement.

7. Follow up to Assessments;

Concerns developed by DOE-SR identified early in the review process are provided and discussed with the contractor and are often resolved prior to formal issuance of the associated document. Concerns developed later during reviews undertaken by DOE-SR result in Essential Comments and Findings, Suggested Comments and Opportunities for Improvement. The Essential Comments and Findings require immediate attention. Generally the Essential Comments must be resolved before DOE approval of the activity that the review supports. Findings require a Corrective Action Plan and are formally documented in a database requiring DOE follow-up for closure. Suggested comments and Opportunities for Improvement are followed up the next time it becomes necessary to review the activity which is generally at least

annually. A specific follow-up review of last years' HQ Criticality Safety Assessment of Procedures in H-Canyon was conducted. There were no findings from this assessment and the follow-up review concluded that the Opportunities for Improvement identified in the assessment had been adequately dispositioned.

8. The status of any on-going design projects, how criticality safety is being integrated into design, and any design changes that were made because of criticality

The Waste Solidification Facility (WSF) project continues. The WSF is intended to process high and low activity waste from the Mixed-Oxide Fuel Fabrication Facility MFFF).

An NCSE for WSF is approved and the WSF DSA Chapter 6 (Criticality Safety) has been drafted and is in the review process. In general, the concentrations of fissile materials in the waste streams projected to be sent to the WSF from the MFFF are so low that criticality safety is not an issue. Any future changes to the MFFF and WSF flowsheets will be evaluated.

9. The status of any Open Issues Identified in Previous Reports

There are no SRNS open items from the FY 2011 report.

Field/Site Manager: Dr. David Moody NCS POC: Norman Shepard

1. Measure of Nuclear Criticality Safety Performance

Savannah River Remediation (SRR}, the Liquid Waste (LW) Contractor and Savannah River Nuclear Solutions (SRNS), the Management and Operations (M&O) Contractor have jointly established metrics.

SRNS and SRR have a central criticality safety oversight committee, the Nuclear Criticality Safety Review Committee (NCSRC). The NCSRC maintains a criticality safety indicator based on reportable and non- reportable occurrences that are submitted into a site database. The database includes items from M&O facilities as well as LW facilities. A rating scale is used to score each reportable and non-reportable occurrence. On a quarterly and annual basis, the cumulative score, and the number of reportable and non-reportable 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.

In FY11, LW had no deficiencies. In FY12, LW had no deficiencies.

In addition, SRR performs an Annual Functional Area Program Performance Analysis, the previous covering the time period 6/1/2011 through 5/31/2012. The Program Performance Analysis documented reviews of Occurrence Reporting and Processing System (ORPS) reports categorized under criterion 3C (criticality safety), plus ORPS reports categorized under other areas such as TSR violations, instrumentation/equipment problems, surveillance problems, procedure problems, safety significant control problems, and management concerns related to criticality safety.

Similarly, the Site Tracking, Analysis, and Reporting System (STAR) reports categorized under FA 15 (criticality safety) were reviewed, plus STAR reports categorized under other areas such as TSR violations, instrumentation/equipment problems, surveillance problems, and management concerns that were related to criticality safety. The SRSOC critique database and New Information (NI) databases were reviewed as well.

There were no criticality safety related ORPS events in the reporting period.

In addition to the Performance Indicators above, the M&O/LW Contractors have a rigorous and active self-assessment process. Performance is reviewed using the lines of inquiry established in DOE STD-1158 and ANSI/ANS 8.19.

DOE-SR conducts reviews of SRR criticality safety related activities. The overall conclusion from these assessments is that SRR has an adequate criticality safety program. More detail is provided under Item 4. Monthly criticality safety DOE-SR/SRR interface meetings serve to review performance, identify and discuss needed improvements, and identify ongoing/upcoming issues.

2. Status of Contractor Criticality Safety Engineer Staffing

SRR currently has three senior criticality engineers available. The current criticality safety staffing level is adequate. Since two of the engineers available are retirees providing part-time support, SRR is attempting to bring in an additional staff member.

DOE-SR agrees that the criticality safety engineering staffing for SRR is adequate

3. Status of Federal Criticality Safety Oversight Program

During FY 2012, Federal staffing was two full time qualified criticality safety engineers and one full time engineer working toward qualification. The engineer working on qualification should be fully qualified this calendar year. Additionally a qualified criticality safety engineer working as a facility engineer and another qualified criticality safety engineer working for NNSA are available to provide support as necessary. DOE-SR is still short of the staff of four needed to support criticality safety as identified in the January 2008 Five Year Work Force Management Plan for Fiscal Years 2008 - 2013.

4. Federal Assessments of Site NCS Programs

In FY 2012 DOE-SR conducted thirteen reviews of SRR relating to criticality safety. The distribution of these reviews was as follows: eight contractor Criticality Safety Program Assessments Reviews, one review dealing criticality safety support for Documented Safety Analyses/Technical Safety Requirements, three Operational Awareness Reviews, and one review of a criticality safety evaluation. Conclusion of the DOE reviews were overall the SRR criticality program was adequate. SRR has an adequate facility criticality safety self-assessment process. Performance is reviewed using the lines of inquiry established in DOE-STD-1158. SRR criticality safety evaluations were determined to be adequate. SRR criticality safety evaluations were performed and reviewed by trained and qualified criticality safety engineers meeting the requirements of DOE-STD-1135 and the evaluations met the requirements of DOE-STD-3007 and were evaluated in accordance with DOE-STD-1134.

5. New Facility Design

A new larger Saltstone Disposal Unit was designed and the design was incorporated into the Saltstone NCSE. Existing criticality safety controls were determined to be adequate and used for the new larger design.

6. Trending and Analysis of reportable and non-reportable Occurrences Related to Criticality.

SRR had no criticality safety related ORPS events.

7. Follow-up to Assessments

No follow-up reviews by DOE were needed and none were conducted.

8. Leading and Lagging indicators for monitoring the effectiveness of NCS program implementation.

As discussed in Section 1, the M&O and LW contractor site Nuclear Criticality Safety Review Committee (NCSRC) maintains a criticality safety indicator based on reportable and non-reportable occurrences. A rating scale is used to score each reportable and non-reportable occurrence.

The criticality safety indicator is a lagging indicator.

Also, an Annual Functional Area Program Performance Analysis is performed for LW criticality safety by SRR.

9. The status of any on-going design projects.

Tank Closure is an on-going project and criticality safety is involved with each individual tank closure. Depending on the tank and its history, this may include NCSEs, NCSAs, as well as discussions on required samples and sample data.

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

There were no issues identified in the previous year’s annual report.

SRO Field/Site Manager: Dr. David Moody NSC POC: Norman Shepard

1. Measure of Contractor Nuclear Criticality Safety Program

The Salt Waste Processing Facility (SWPF) project is currently still in the construction phase and has not commenced hot operations. Therefore the project has not progressed to the stage for metrics for criticality safety performance

2. Status of Contractors Criticality Safety Engineer Staffing

The SWPF project has one full time engineer and one part time engineer for criticality safety staff. Both were qualified as Senior Criticality Safety Engineers in accordance with DOE-STD-1135.

DOE-SR agrees that this staffing for a relatively small liquid waste processing facility is adequate.

3. Status of Federal Criticality Safety Oversight Programs

During FY 2012, Federal staffing was two full time qualified criticality safety engineers and one full time engineer working toward qualification. The engineer working on qualification should be fully qualified this calendar year. Additionally a qualified criticality safety engineer working as a facility engineer and another qualified criticality safety engineer working for NNSA are available to provide support as necessary. DOE-SR is still short of the staff of four needed to support criticality safety as identified in the January 2008 Five Year Work Force Management Plan for Fiscal Years 2008 - 2013.

4. Federal assessments of Site NCS Programs

The SWPF Criticality Safety Program Description Document (CSPDD) has been reviewed and was approved by DOE-SR in late 2009. Additionally a review of a preliminary Nuclear Criticality Safety Evaluation (NCSE) has been performed. Comments provided on the CSPDD document were resolved prior to approval. The review of the NCSE concluded that it was done in accordance with DOE-STD-3007-2007. Criticality safety evaluations are deemed adequate based on the NCSE review. No additional DOE-SR reviews have been performed in FY 2012.

5. New facility Design

The SWPF project is a new facility design and requires a criticality safety program. The CSPDD which describes the Criticality Safety Program for the SWPF project has been reviewed and approved by DOE-SR. In 2008, a 90% design review was performed by DOE that included review of the Preliminary Documented Safety Analysis (PDSA). Revisions to the Nuclear Criticality Safety Evaluations are in the comment/review cycle and focus on incorporating considerations from Operations. Future new or revised NCSEs will be performed as appropriate as the project matures. DOE comments were incorporated in Chapter 6 of the PDSA, which summarized the preliminary analysis (NCSE) results, important limits, and controls.

Some of the lessons learned from reviews and assessments of this new project work include:

1) Importance of getting criticality safety engineers involved early in the project, importance of determining credibility/noncredibility of a criticality accident,

2) Identification of a control strategy early in the project, and 3) importance of evaluating the functional classification of controls.

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

The facility is not operational. There are no reportable or non-reportable nuclear criticality safety occurrences.

7. Follow-up Assessments

No DOE follow-up reviews were undertaken.

8. The status of any on-going design projects

Facility is in the construction phase not an ongoing design project.

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

There are no open items from the FY 2011 report.