National Nuclear Security Administration

Department of Energy
National Nuclear Security Administration
Washington, DC 20585

January 19, 2010

The Honorable John E. Mansfield
Vice Chairman
Defense Nuclear Facilities Safety Board
625 Indiana Avenue, NW, Suite 700
Washington, D.C. 20004

Dear Mr. Vice Chairman:

This letter transmits the Department of Energy Annual Report on Nuclear Criticality Safety for Calendar Year 2009, including the status of the supplemental information requested in the Board's letter of January 13, 2009. The report also responds to the eight topics specifically identified in the Board's January 29, 2008, letter. The remaining enclosures provide the National Nuclear Security Administration (NNSA) and the Office of Environmental Management (EM) summaries and input from the Site and Field Offices.

If you have any questions or need further information please contact Mr. Jerry Hicks at (505) 845-6287 for NNSA related issues and Dr. Chuan Wu at (202) 586-4166 for EM related issues.

Sincerely,

GARRETT HARENCAK, Brig Gen, USAF
Principal Assistant Deputy Administrator
for Military Application
Office of Defense Programs

Enclosures:
1. Annual Report on Nuclear Criticality Safety Programs
2. NNSA Site Inputs to Annual Report on Nuclear Criticality Safety Programs
3. EM Field office Attachments to Annual Report on Nuclear Criticality Safety Programs

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Annual Report on Nuclear Criticality Safety Programs

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

The NNSA and overall point of contact for this report is Jerry Hicks. He may be reached at 505-845-6287. The EM points of contact for this report are Robert Wilson (303-236-3666) or Chuan-Fu Wu (202-586-4166).

The following is a brief summary on each requested topic. NNSA and EM summaries and site reports are included as attachments.

The NNSA sites are presented from west to east for the following sites:

Lawrence Livermore National Laboratory (LLNL)
Nevada Test Site (NTS)
Los Alamos National Laboratory (LANL)
Sandia National Laboratory (SNL)
Pantex Plant (Pantex)
Y-12 National Security Complex (Y-12)
Savannah River Site (SRSO)
At SRSO, no fissile operations are underway. Savannah River Site Office efforts focus on assuring integration of safety into design for the proposed pit disassembly project.

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

Richland	CH2M-Hill Plateau Remediation Company (CHPRC)
	Washington Closure Hanford (WCH)
River Protection	Bechtel National Inc Waste Treatment Plant (WTP)
	Washington River Protection Solutions Tank Farms (Tank Farms)
Idaho	Idaho Cleanup Project (CWI)
	BBWI AMWTP
PPPO	Paducah
	Portsmouth
Oak Ridge	EnergXs
	BJC
	ISOTEK
Savannah River	SRS

1. DNFSB Request: A site-by-site evaluation of contractor nuclear criticality safety performance measured against established criticality safety performance metrics, including an evaluation of this performance and actions taken by DOE Field Element

Line Management to improve nuclear criticality safety and address known nuclear criticality safety program deficiencies.

Summary Response:

The performance metrics used in DOE defense related criticality safety programs are listed below. The NNSA site offices and EM field offices select metrics based tailored to the processes and operations at their respective sites. The metrics are listed below by broad general areas.

Non-Conformances:

1) Proportion of criticality safety non-conformances identified by workers, supervisors, criticality safety staff, DOE oversight, and external to DOE personnel, in decreasing order of desirability.
2) Timely identification and resolution of non-conformances
3) Number of repeated or similar criticality safety non-conformances.
4) Highest severity level of criticality safety non-conformances
5) Number of spills of fissile solution greater than a specified threshold.
6) Number of fissile solution leaks of any size
7) Number of inadvertent transfers of fissile solution (e.g. transfer destination or route incorrect)
8) Fissile operations conducted without a process evaluation for criticality safety (undesirable)
9) Number of Non-conformances
10) Type of Non-conformances
11) Root causes of non-conformances

Self-Assessments and Committees:

12) Timely performance and documentation of required audits or assessments
13) NCS staff presence in the operations areas having significant quantities of fissionable material:

Staff Responsibilities:

14) Number of NCS non-managerial staff and FMHs serving on any ANSI/ANS-8 standard working groups.
15) Number of in house technical seminars prepared and presented by NCS staff.
16) Percentage of the NCS engineering staff that is engaged in credited development activities (e.g., technical courses, conferences, graduate studies, etc.).
17) Percentage of NCS staff qualified to DOE STD 1135

Operations Training:

18) Percentage of contractor personnel completing fissile material handler training when required.
19) Number of small group training sessions conducted with fissile material operations crews

Continuous Improvement

20) Number and type of DOE comments on contractor criticality safety evaluations or quality of criticality safety evaluations.
21) Progress toward program improvement milestones.
22) Systematic identification of and action on improvement issues

Metrics 9, 10, 11, and 17 are used only by EM sites. Metrics 1, 5, 6, 7, 8, 18, 19, and 21 are used only by NNSA sites.

NNSA Sites:

LLNL met all metrics used during the year, and had only one criticality safety non-conformance. Metrics used: 1, 2, 3, 4, 8, 12, 13, 14, 15, and 18.

NTS met the metrics used during the year. There were no criticality safety non-conformances. Metrics used: 2, 3, 21

LANL did not meet the two performance based incentive metrics used during the year. One of the incentive metrics was met in early FY-10, and the second is expected to be met in FY-10. Although the LANL program is judged as not fully meeting the requirements of DOE Order 420.1b and the ANS-8 series standards, the continuous improvement exhibited indicates that the program is progressing in the correct direction. Metrics used: 2, 13, 20, and 21.

SNL met the performance requirements for the year. There was one reportable criticality safety non-conformance. Metrics used: 2, 12, 13, 14, and 16

Pantex had no criticality safety non-conformances for the year. The contractor has not produced an acceptable new process evaluation for criticality safety in several years. This may lead to mission impacts in the future. Metrics used: 12, 13, 16, and 20

Y-12 continues to produce NCS metrics and review these metrics in monthly NCS Advisory Council meetings and at quarterly senior plant managers NCS meetings. These meetings are attended by both the contractor and the NNSA Y-12 Site office (YSO) and have been the subject of DOE independent line reviews. Y-12 performance is considered adequate. Y-12 and YSO are working previously identified performance issues. Metrics used: 1, 2, 3, 6, 7, 12, 13, 14, 19, and 20.

EM Sites:

Richland – CHPRC: CHPRC: Due largely to reduced activity levels within the Plutonium Finishing Plant; the CHPRC has experienced a record low number of nonconformance events in the past year (approximately 10). This does not necessarily reflect an increase in the quality of work or in conduct of operations, but is a direct result of the reduced work scope and the inventory reductions in the PFP facility. Metrics used: 2, 9, 10, and 11.

Richland – WCH: No nonconformance events have been reported, 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.

River Protection – WTP: The WTP project has not advanced to the point where performance metrics specific to operations would be useful. However, weakness have been noted in the production of criticality safety evaluations, training and qualification of contractor criticality safety staff, and management assessment. Potential metrics have been identified but are not yet in use.

River Protection - Tank Farms met the metrics used during the year. WTP uses a system to identify criticality safety concerns that are not non-conformances, several of these were identified and addressed. Metrics used: 12, 13, 16, 17 and 22.

Idaho – CWI: NCS performance has been satisfactory. Metrics used: 9 and 10

Idaho - BBWI AMWTP: NCS performance has been satisfactory. Metrics used: 9 and 10.

PPPO – Paducah: The PRS NCS program meets DOE PPPO expectations. Metrics used: 9, 12, 13, and 16.

PPPO – Portsmouth: The program meets expectations. Metrics used: 9, 12, 13, and 16.

Oak Ridge – EnergX: The program meets expectations. There was one nonconformance reported. Metrics used: 2 and 9.

Oak Ridge – BJC: Contractor performance has been good, as evidenced by the lower number of ACRs experienced and DOE Criticality Safety Coordinating Team (CSCT) assessment results. Metrics used: 2 and 9.

Oak Ridge – ISOTEK: The program meets expectations. There were no nonconformances reported. Metrics used: 2 and 9.

Savannah River – SRS: DOE-SR Field Office assessments have concluded that the M&O and LWO contractors have a mature and healthy criticality safety program. However, several areas of improvement have been identified. Work is in progress on these improvement items. Metrics used: 4, 9, and 10.

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

Summary Response:

The largest contractor criticality safety staff at an NNSA site is at Y-12 where the contractor employs 42 nuclear criticality safety engineers. The other NNSA contractor staffs range from 3 to 12 in size. Three of the six sites are considered understaffed. The employment opportunities for criticality safety engineers are again exceeding the supply. Several sites are attempting to develop qualified criticality safety staff from in-house sources. Compensatory actions for lack of staff at Y-12 and LANL generally require delay of fissile activities which are less important to immediate mission needs.

The staffing shortage at NTS was alleviated during 2009 by using subcontract support from LLNL to provide criticality safety oversight of the DAF fissile material operations, and home laboratory support for fissile operations in the DAF and other experimental facilities. The NTS prime contractor is hiring staff.

Y-12 is pursuing both subcontracting and direct hiring to increase staff. The Y-12 site office and the NNSA Office of Safety are closely monitoring the criticality safety program status, including staffing issues, at Y-12.

The Los Alamos Site Office is monitoring the LANL criticality safety staff response to workload and has observed that staff pressure and stress has been reduced over the past year. LANL is pursuing internal hiring, and has been adding staff slowly. The current increase in staffing levels is judged to be an appropriate balance between backlog work and training of new staff. LASO has been encouraging increased involvement from operations staff, and this has improved the effectiveness of the criticality safety program.

Pantex lost qualified staff during the year, and now has one qualified criticality safety engineer. The existing operations can be maintained, but development of new process evaluations for criticality safety may require external support for peer review. Pantex is developing internal staff capability to provide peer review, and the site office is closely monitoring progress, with technical assistance from the NNSA Service Center.

The EM contractor criticality safety staff level varies widely from 2 to 28 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. The various federal oversight groups have assessed and affirmed, with minor exceptions, that the current level of staffing is adequate for the current work load.

Site	Contractor criticality safety staff, end of FY 09	Status
LLNL	10	Adequate
NTS	2	Understaffed
LANL	12	Understaffed
SNL	10 (only one near full time, 2 FTE of work)	Adequate
Pantex	1	Marginal
Y-12	42 (some loss has occurred)	Understaffed
Richland – CHPRC	26	Adequate

Richland – WCH	4	Adequate
River Protection – WTP	2	Adequate, One CSE in training
River Protection - Tank Farms	4	Adequate
Idaho – CWI	6	Adequate
Idaho - BBWI AMWTP	5	Adequate
PPPO – Paducah	1.25	Adequate
PPPO – Portsmouth	3	Adequate
Oak Ridge – EnergXs	2	Adequate
Oak Ridge – BJC	14	Adequate
Oak Ridge – ISOTEK	7	Adequate
Savannah River – SRS	34	Adequate

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

Summary Response: Each of the six NNSA site offices has a criticality safety subject matter expert on staff. All six of federal staff, have completed their Criticality Safety Functional Area Qualifications (FAQ). The YSO federal staff is augmented by one full-time support service contractor. In addition, YSO has an intern in criticality safety in the DOE Future Leader Program. During 2009 the Y-12 Site Office (YSO), the Los Alamos Site Office (LASO), the Pantex Site Office (PXSO), and the Nevada Site Office (NSO) and the Sandia Site Office (SSO) received federal support in criticality safety from either the NNSA Service Center or NNSA HQ or both. NNSA Headquarters Line Management judges the federal staffing at the Sandia and NSO site offices to be marginal. This is mitigated by the ability to augment site staff with staff from the Service Center or Headquarters. However, with the startup of CEF at Nevada and a potential increase of Critical Experiment capability at Sandia, federal criticality safety staff may be over-extended. Headquarters will continue to monitor the criticality safety status of the NNSA complex, and develop contingent actions if necessary.

The EM federal staffing levels are generally judged to be adequate. The Savannah River and Oak Ridge Offices are recruiting federal staff.

Site or Field office	**Federal criticality safety staff (Full Time Equivalent)**
Livermore	1
Nevada	½
Los Alamos	1
Sandia	0.1
Pantex	¼
Y-12	1, 1 sub-contract, 1 future leader intern
Service Center (Assists other sites and HQ)	1

Savannah River NNSA (no NNSA fissile activity, design only)	1
Richland	1
River Protection	1
Idaho	1
PPPO	1.5 with subcontract
Oak Ridge	1, Recruiting
Savannah River (EM)	3, Recruiting

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

Summary Response: All six of the NNSA site criticality safety programs were assessed multiple times by site office or headquarters elements or both. Each NNSA site is unique and the criticality safety hazard varies widely from site to site but there is reasonable consistency in the approach and safety philosophy among the criticality safety programs at NNSA sites. This stems in large part from a common understanding at the NNSA federal level regarding implementation of DOE Order 420.1B and DOE-STD-3007-2007 and from the technical collaboration of the site office criticality safety staff with the Service Center and NNSA Headquarters criticality safety staff. There were several opportunities for improvement found from federal oversight during the year. The most notable was from an assessment that found the contractor had no internal mechanism to assure safety oversight of critical experiments, or compliance to ANSI/ANS 1 (Conduct of Critical Experiments) and ANSI/ANS 14.1 (Operation of Fast Pulse Reactors). These standards were in appropriate operating contracts, but are not flagged in DOE O 420.1b. Other NNSA sites that have done or are doing these experiments do have a local contractor oversight mechanism.

Another improvement opportunity is that NNSA HQ should maintain operational awareness of the state of the criticality programs at the sites. At one site, it was noted by a HQ assessment that site office assessment findings were not being addressed in a timely manner, and several of these had to do with the quality of process evaluations for criticality safety. These issues included both errors in calculation and missed scenarios. Corrective actions are underway at this site, and appear to be having the proper effect.

EM HQ assessments of the NCS programs have been conducted for EM sites. The Findings, Recommendations and most of the Opportunities for Improvements resulted in Corrective Action Plans. In addition, site led assessments of NCS programs are performed and these result in corrective actions. The results and common elements of these assessments are shared at meetings of the federal Criticality Safety Coordinating Team and at the EM Nuclear Criticality Safety Workshops. The contractor's self assessments evaluated were considered adequate with some caveats. The criticality safety evaluations assessed in these activities are generally adequate although some HQ

assessments recommended that the hazard assessment part of the evaluations should be strengthened at some sites. All the site programs evaluated were consistent with federal and industry requirements.

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

Summary Response: There were two major NNSA facilities and construction projects that were noted in the site responses. These were the Chemistry and Metallurgy Research Replacement (CMRR) facility at LANL, the Uranium Processing Facility (UPF) at Y-12. The CEF construction at NTS was completed, and readiness reviews are in progress. NNSA oversight did find that one of the design criticality safety evaluations for the CEF vault was inadequate. A retrofit evaluation was prepared by LANL.LANL criticality staff continued to provide guidance to the CMRR design, and important design features were integrated. The UPF design is using an iterative approach to criticality analysis during design, where the process evaluations for criticality safety provide guidance to the design, and mature as the design matures.

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.

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

Summary Response:

NNSA Sites:

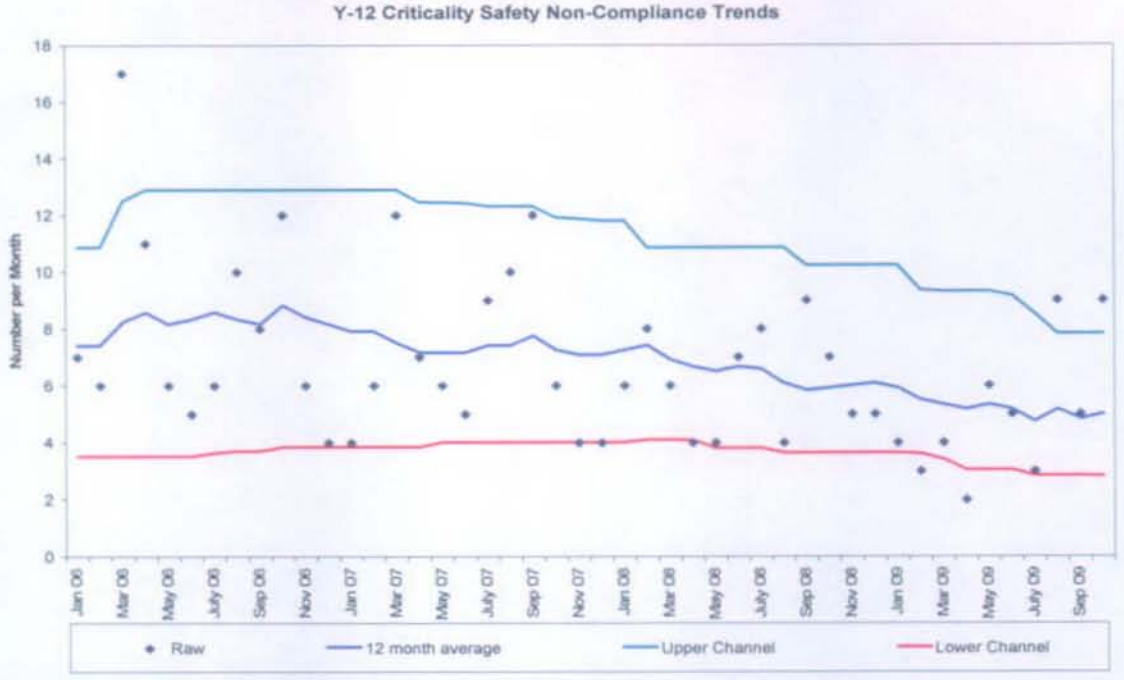
LLNL One non-compliance, which was not ORPS reportable.

SNL One non-compliance, the first in several years, which also involved a PISA and was ORPS reported.

LANL An increase in non-compliances occurred. There were 13 total non-compliances nine of which were infractions. Four of these involved partial loss of a process parameter with two or more parameters providing criticality safety margin. Two resulted from legacy issues, and evaluations were re-worked to deal with potential mischaracterization of legacy items. Several non-compliances were judged to result from operator confusion due to the extensive re-work of postings and administrative controls that occurred in 2008 from the Augmented Limit Review process.

Only one NNSA site, **Y-12**, has sufficient numbers of criticality safety related occurrences or deficiencies to warrant trending. The trend continues to be favorable. The trend data for this year indicates continued improvement, with a stable minimum of

about 3 infractions per month as opposed to 4 per month a year ago. As shown below, the number of infractions at Y-12 has been in a general downward trend for the last 3 years.



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

EM Sites:
Richland – CHPRC: Due largely to reduced activity levels within the Plutonium Finishing Plant; the CHPRC has experienced a record low number of nonconformance events in the past year (approximately 10).
River Protection - Tank Farms: There were no criticality safety non-conformances.
PPPO – Paducah: There were 3 nonconformances reported.
PPPO – Portsmouth: There were 7 nonconformances reported.
Oak Ridge – EnergXs: There was one non-conformance reported.
Oak Ridge – BJC: There were approximately 24 non-conformances reported (2 per month).
Oak Ridge – ISOTEK: No Non-conformances yet.
Savannah River – SRS: For the first three quarters of 2009, there have been 37 events (1 criticality accident alarm system issue. 35 minor events (< procedure limit) and 1 procedure limit violation. The events primarily involve minor documentation issues, human performance problems and communication issues. Equipment problems related to charging fissile material to the H-Canyon dissolver also occurred. The use of HPI tools continues to be emphasized.

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

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

Summary Response: NA-171 continues to follow the issues with evaluation quality, communications, and response to oversight that were identified earlier in FY 2009. The indications are that the program is improving.

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

Summary Response:
LANL has submitted, and LASO has approved, a Criticality Program Description Document which complies with DOE O 420.1b, and sets high expectations for LANL criticality safety program. Field implementation will continue through FY 2010. Criticality Safety Documentation for the HEUMF has been reworked to address YSO technical concerns.

From Responses to DNFSB letter of January 13, 2009

9. Regarding DOE Standard 1158-2002, *Self-Assessment Standard for DOE Contractor Criticality Safety Programs*, we agree that this Standard should be reviewed and modified as appropriate based on the latest revision to American National Standards Institute / American Nuclear Society Standard 8.19, and lessons learned through implementation of DOE Standard 1158-2002, during the last six years. The Nuclear Criticality Safety Program (NCSP) Manager will initiate a review of DOE Standard 1158-2002 by April 2009, using the federal Criticality Safety Coordinating Team (CSCT) as the lead with support from the Criticality Safety Support Group (CSSG). The results of this effort will be used to initiate the formal DOE RevCom process.

Summary Response: The revision of DOE STD 1158 is in the final stage of the RevCom Process. Issuance of the revised standard is expected in the second quarter of FY 10. The DNFSB staff has reviewed the revision.

10. Regarding the categorization of criticality safety non-compliances, on January 5, 2009, the CSSG was tasked by the NCSP Manager to review existing criticality

incident categorization schemes used at DOE sites (and possibly Nuclear Regulatory Commission or foreign categorization systems) and, if necessary develop a recommended scheme that can be used on a complex-wide basis. The response is due to the NCSP Manager on March 6, 2009. The results will be posted on the NCSP website once approved by the NCSP Manager and forwarded to the CSCT.

Summary Response: The recommended scheme was posted on the website on March 23, 2009. (http://ncsp.llnl.gov/2009ActivitiesandAccomplishments/2009-01-tasking-response-final-090702.pdf)

11. Finally, regarding leading and lagging indicators for monitoring the effectiveness of criticality safety program implementation, the CSCT invested significant time two years ago developing a flexible set of metrics that are appropriate for the diverse operations within the Department. The CSCT, chaired by the NCSP Manager, will re-examine the previously identified metrics with a view toward developing useful leading indicators where they are missing, categorizing all those previously identified as leading or lagging, and proposing a path forward for incorporating metrics in site performance plans in future years. The CSCT will take full benefit of the experience Y-12 Site Office has had with their sub-threshold leading indicators put in place for the Building 9212 Continued Safe Operations Oversight Team. This review will be completed by the end of June 2009, and the results posted on the NCSP website.

Summary Response: The metrics in use are discussed in item 1 above. Leading and lagging indicators are not demonstrated. Methods development for leading indicators continues.

NNSA Site Input for Annual Criticality Safety Report to the Defense Nuclear Facilities Safety Board

NNSA Livermore Site Office Input for the Department of Energy Annual Report on Nuclear Criticality Safety

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

The following is an excerpt from the Livermore Site Office's Annual Assessment for FY09. The assessment was based on a set of established performance metrics (see Table 1).

The Contractor achieved all possible points available in the FY09 negotiated performance metrics for criticality safety and earned the rating of OUTSTANDING.

- The Contractor implementation of criticality safety controls in facilities handling fissile materials was excellent with only one criticality safety violation (non-reportable) during the year.
- The Contractor Nuclear Criticality Safety Division implemented an aggressive continuing training program for it criticality safety engineers which included 6 technical seminars, sponsoring a visiting criticality safety engineer from Aldermaston in the UK, and sending an engineer to the World Nuclear University summer session in Oxford.
- The Contractor demonstrated outstanding performance in its annual criticality accident exercise which integrated response to a fire in the plutonium facility with a criticality accident.
- The Contractor submitted its Criticality Safety Program Description Document for LSO review and approval in FY09. This document provides a detailed description of how the Contractor implements criticality safety requirements specified in both DOE O 420.1b and the applicable ANS 8(series) standards.

Issues and Concerns. At present, there are no major issues or concerns associated with the contractors criticality safety program.

Table 1. FY09 LLNL Criticality Safety Performance Metrics

Highest severity level of criticality safety infractions: *Criteria: 3 points for level 4 (or none); 2 points for level 3; no points for level 2.*
Prompt issuance of recovery plans and infraction reports: *Criteria: 3 points for issuance within 1 week (or n/a); 2 points for within 2 weeks; 1 point for within 3 weeks.*
Number of similar infractions that occurred in a 12-month period. *Criteria: 2 points for no similar infractions; no points for repeat infractions.*
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.*
Number of NCSD non-managerial staff and FMHs serving on any ANSI/ANS-8 standard working groups. *Criteria: 3 points for 3 participants; 2 points for 2 participants; 1 point for 1 participant.*
LLNL performs and documents the criticality safety audit of B332 within 13, 18 or 24 months of the previous audit:

Criteria: 3 points for completion within 13 months; 2 points for 18 months; 1 point (with LSO approval) for 24 months.
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.*
Number of NCSD technical seminars: *Criteria: 3 points for 6 seminars; 2 points for 4 seminars; 1 point for 2 seminars.*

Table 2. FY10 Additions to LLNL Criticality Safety Performance Metrics

Criticality safety infraction identified by workers. *Criteria: 0 points for fissile material handlers, NCSD and facility staff , -2 points for NNSA/LSO , and -3 points for other governmental organizations (DOE HQ, DNFSB, etc...). Points to be averaged over the total number of infractions for the fiscal year.*
Operation Conducted without a Criticality Safety Evaluation: *Criteria: -3 points for an operation being conducted without an criticality safety evaluation.*

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

LSO has assessed the staffing of the LLNL Nuclear Criticality Safety Division (NCSD) as adequate. The current core staff is comprised of 9 engineers (including the division leader), 2 administrative staff and one engineer who is a support contractor. All LLNL Criticality Safety Engineers are qualified per the LLNL criticality safety qualification program which satisfies DOE-STD-1135-99, Guidance for Nuclear Criticality Safety Engineer Training and Qualification (the support contractor has partially completed the qualification standard and works under the supervision of fully qualified staff).

Because of the scheduled de-inventory of B332 by FY12, LSO is concerned that LLNL will be unable to retain adequate criticality safety personnel resources. One engineer has opted to retire by the end of the 2009 calendar year. In an effort to provide adequate funding to maintain criticality safety staff, the LLNL NCSD leader is actively seeking additional computational work (non-criticality safety) for his engineers from other directorates.

LSO continues to closely monitor LLNL criticality safety staffing levels to ensure adequate support of fissile material operations.

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

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

The Chief of Defense Nuclear Safety (CDNS) report of October 2008 concluded that the Livermore Site Office has adequately defined the requirements for oversight of the LLNL criticality safety program. The CDNS report also concluded that LSO's implementation of criticality safety oversight is very good and that this continued level of oversight has been instrumental in encouraging LLNL to maintain its own robust program.

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

The LSO Criticality Safety Engineer and LSO Facility Representatives have conducted numerous criticality safety focused walkthroughs and surveillances in LLNL facilities with operations involving significant quantities of fissionable materials. Additionally, over the course of the year, LSO observed a series of fissionable material movements (within B332) to ensure compliance with material movement controls. LSO has not identified any infractions. Overall, implementation of criticality safety controls has been observed to be very good.

This year the LLNL self-assessment was conducted by the LLNL Assessment and Oversight Division with participation from one off-site expert and one junior criticality safety engineer from the NCSD. The assessment evaluated two program elements from ANSI/ANS 8.19, Administrative Practices for Nuclear Criticality Safety: (1) Supervisor Responsibilities and (2) Operating Procedures. The assessment report concluded that the LLNL Criticality Safety Program as implemented in B332, conforms with the ANSI/ANS 8.19 standard. LLNL's self-assessment conclusions are consistent with LSO surveillances and reviews of the same criticality safety program elements. It is LSO's evaluation that the LLNL A&O assessment of criticality safety program in B332 was adequate.

In July, LLNL conducted a criticality accident exercise which involved a fire as the initiating event. LLNL formally conducted an assessment to evaluate NCSD's execution of emergency response plans using criteria from DOE-STD-1158-2002, Self-Assessment Standard for DOE Contractor Criticality Safety Programs. The evaluation team observed both NCSD responses at the facility site as well as support activities at the NCSD office. This report concluded that all of the review criteria were met. A separate after-action report was also generated by the facility operations staff which examined the broader scope of LLNL's response. This report concluded that LLNL's response to criticality accident was adequate and much improved over the prior year which, while using a differenent scenario, also had a fire as the initiating event. LSO observed LLNL's execution of the exercise and evaluated it as excellent.

Additionally, LLNL NCSD staff continues to perform routine walkthroughs of all operations involving significant quantities of fissile material to ascertain that criticality safety controls are being correctly implemented and that process conditions have not been altered from those analyzed in the applicable criticality safety evaluations.

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

The prior year's efforts to reduce the number of controls has been limited to a select number of operations due to the projected deinventorying of the facility.

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

6. Summary of reportable and non-reportable occurrences.

There was one criticality safety infraction in FY09. On 27 July 2009, a miscommunication between a Senior Certified Fissile Material Handler and a Certified Fissile Material Handler (both were wearing respirators) resulted in 6 liters of water being moved into a workstation that was only authorized for 4 liters. When the handlers discovered their error, they tried to correct the situation by bagging the water out of the workstation (in violation of the Facility Safety Plan). They then notified the room Responsible Individual (RI) of the situation. The RI instructed the senior handler to notify the Nuclear Criticality Safety Division (NCSD) which was done. The Facility Manager declared a Safety Pause for the facility and a meeting of all Fissile Material Handlers. At this meeting all fissile material handlers received refresher training on the correct response required to an actual or suspected criticality safety control violation. The handlers associated with the affected operations received further training on this subject the following day.

Overall, the level of operational criticality safety infractions and deficiencies at LLNL were relatively minor during FY09. All operational deficiencies were self-identified. Implementation of criticality safety controls in LLNL facilities is excellent.

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

LSO did not conduct any follow-up reviews during FY09.

8. Open issues from prior years.

There are no open issues from prior years.

Department of Energy
National Nuclear Security Administration
Nevada Site Office
P.O. Box 98518
Las Vegas, NV 89193-8518

NOV 16 2009

Jerry Hicks, Criticality Safety, NNSA/SC, Albuquerque, NM

NATIONAL NUCLEAR SECURITY ADMINISTRATION NEVADA SITE OFFICE (NNSA/NSO) RESPONSE TO DEPARTMENT OF ENERGY HEADQUARTERS (DOE/HQ) REQUEST FOR INFORMATION FOR THE DOE ANNUAL REPORT ON NUCLEAR CRITICLITY SAFETY (NCS)

Per the expectations of the Defense Nuclear Facilities Safety Board (DNFSB) letter dated January 29, 2008, "DOE Annual Report on NCS," the DOE/HQ prepares an annual report on the status of the NCS programs across the DOE complex. The DOE/HQ NCS Program Manager has requested the NNSA Site Offices to address the applicable (eight) items listed in the January 29, 2008, DNFSB Letter.

Please find attached the NNSA Nevada Site Office evaluation of the eight applicable bulleted items against the Nevada Test Site Criticality Safety Program and associated fissile material activities.

If you require further assistance, please contact Jimmy S. Dyke, of my staff, at (702) 295-1050.

Robert M. Bangerter Jr.

Robert M. Bangerter
Acting Deputy Assistant Manager
for Safety and Security

OAMSS:JSD-1008
DEF 01-01

cc w/atch:
J. S. Dyke, OAMSS, NNSA/NSO,
Las Vegas, NV
NNSA/NSO Read File

National Nuclear Security Administration Nevada Site Office (NNSA/NSO) Response for the Department of Energy (DOE) 2009 Annual Report on Nuclear Criticality Safety (NCS)

Summary

The main operations at the Nevada Test Site (NTS) with significant quantities of fissile material include the Device Assembly Facility (DAF), Area 5 Radioactive Waste Management Complex, and support activities for the Department of Homeland Security. Except for handling activities to assemble radiation test objects and fulfill material control and accountability expectations, the majority of the fissile material activities are in a containerized configuration. The NNSA/NSO performs operational awareness oversight and formal assessments of the fissile material activities. The NNSA/NSO approved and DOE O 420.1B, compliant criticality safety program document has been fully implemented by National Security Technologies, LLC (NSTec), the Management and Operations (M&O) contractor for the Nevada Test Site (NTS) activities.

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

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

Response

The NTS M&O contractor has established Performance Indicators (PI) for the Criticality Safety Program (CSP) to trend the continued effectiveness of the program. The following three Contractor performance indicators require monthly reporting to the NNSA/NSO, and the metrics for the three PI's focuses on:

- The number of criticality safety noncompliances
- Timeliness in resolution of noncompliances
- Number of repeated criticality safety noncompliances.

The PIs will be reported to the NNSA/NSO on a monthly basis with a rolling quarterly trend. Currently all PIs are Green indicating an acceptable level of performance. In addition, NNSA/NSO is conducting monthly operational awareness oversight of the contractor's CSP implementation effectiveness. The requirements for the monthly operational awareness are derived from DOE Standard STD-1158, "Self-Assessment Standard for DOE Contractor Criticality Safety Programs," and applicable American National Standards Institute/American Nuclear Society (ANSI/ANS) ANSI/ANS-8 Standards.

There were no NCS infractions reported at the NTS in 2009.

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. This must include an analysis of the adequacy of each by DOE Field Element Line Management.

Response

Currently, NSTec has two qualified Criticality Safety Engineers (CSE) providing oversight of fissile material activities at the DAF. In addition, NSTec has assigned a lead CSE to manage the CSP. The lead CSE has multiple years of experience from across the DOE complex and has had very positive impact on the CSP since being assigned in October 2008. In addition to the qualified CSEs, the M&O Contractor has allocated two additional CSE positions to fully staff the NTS CSP. Throughout 2009, the M&O contractor utilized subcontract support from Lawrence Livermore criticality safety staff to provide criticality safety oversight of the DAF fissile material operations. In addition, the National Laboratories performing fissile material activities at the DAF utilize home laboratory criticality safety personnel to evaluate their activities. Given the current level of fissile material activities at the NTS, the currently assigned Full-Time-Equivalents (FTEs) assigned for oversight is adequate. However, when the critical experiment activities begin in 2010, NSTec will need to re-assess the number of FTEs needed to properly monitor and evaluate the fissile material activities to verify the staff of four will be adequate for the whole NTS.

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 Headquarters Line Management.

Response

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

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

Response

The formal NNSA/NSO criticality safety oversight assessment performed in 2009 was performed on the DAF fissile material activities in May 2009. In addition, less formal oversight was performed through operational awareness walkthroughs of the DAF fissile

material activities. The criticality safety assessments of the DAF identified several findings. The findings were formally transmitted to the NTS Contractors and placed in their respective corrective action programs. The corrective actions for the findings will be monitored via operational awareness activities throughout the year. Status of the findings will be assessed and documented in the formal assessments for the facilities.

The assessment of the DAF CSP indicated overall, the DAF CSP implementation was found to be compliant with DOE criticality safety requirements identified in work smart standards, and with the applicable ANSI/ANS standards for nuclear criticality safety. The assessment identified one noteworthy practice. The noteworthy practice being from development and implementation of training modules to fulfill the majority of the qualification requirements for DOE-STD-1135, *Guidance for Nuclear Criticality Safety Engineer Training and Qualification*. NSTec utilized the criticality safety experts on staff at Omicron to develop and teach the training modules. NSTec went well beyond minimum expectations in developing the training modules. Furthermore, the training modules may be utilized by any DOE site to qualify their CSEs. Development of the modules will support making the NTS a preferred site in obtaining criticality safety training by other DOE sites. In addition, the training modules provide a broad range of criticality safety information, which may be tailored to qualify or certify various groups of personnel involved in duties associated with fissile material and affected by criticality safety (CSE, Facility Manager, Fissile Material Handler, etc.).

The assessment identified the following two Findings:

- The CSP policy excludes critical experiments from oversight, and no methodology or expertise has been identified to cover the area.

- NSTec has not maintained the proper qualified staffing of CSEs to adequately provide coverage of NTS activities or support startup of the CEF.

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.

Response

The NNSA/NSO has reviewed the Nuclear Criticality Safety Evaluations (NCSE) for the assembly of radiation test objects to support National Laboratory sponsored activities, and the review indicated the NCSEs were of high quality and identified appropriate criticality safety controls for implementation. No new facility designs associated with fissile material operations were started at the NTS in FY 2009; therefore, no lessons learned could be identified to improve facility designs or process.

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

Response
No reportable occurrences were identified in 2009 for criticality safety. The criticality safety performance indicators that have been established for the NTS indicated the criticality safety performance for the past quarter and throughout FY 2009 was Green which is a performance of Good.

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

Response
The NNSA/NSO monthly criticality safety operational awareness activities evaluated the status of open issues from the previous year's annual report. The follow-up reviews of the DAF fissile material activities indicate the NCSE documents being developed by the user organizations are of acceptable quality and are being appropriately implemented for the fissile material activities. The previous year criticality safety assessment of the DAF by NNSA/NSO did not identify any findings to resolve.

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

Response
The NNSA/NSO criticality safety operational awareness activities evaluated the status of open issues from the previous year's annual report. The previous year criticality safety assessment of the DAF did not identify any findings. Several minor issues were identified as opportunities for improvement during the previous year's assessment and the corrective actions for several of the issues have been completed. The following corrective actions have been completed for the issues identified in the previous year's annual report:

- The NSO Directive 412.X-1D was revised to clarify safety responsibility for all nuclear safety which includes fissile material activities at the DAF.
- The DAF Safety Basis Chapter 17, "Management, Organization, and Industrial Safety Provisions," was updated to clarify safety reporting.
- A permanent design change was made to the Nuclear Material Handling and Measurement Program staging bird cages so that only one fissile material item can be inserted.
- NSTec fissile material drum handlers received training on actions to be taken during off normal events.

UNITED STATES GOVERNMENT | DEPARTMENT OF ENERGY

memorandum

National Nuclear Security Administration
Los Alamos Site Office
Los Alamos, New Mexico 87544

DATE: NOV 13 2009
REPLY TO ATTN OF: SO:25PM- 212519
SUBJECT: Los Alamos Site Office Input to the Defense Nuclear Facilities Safety Board Annual Report on Criticality Safety

TO: Jerry Hicks, Nuclear Safety Engineer, National Nuclear Security Administration Service Center

Attached is the Los Alamos Site Office (LASO) input to the National Nuclear Security Administration (NNSA) annual Criticality Safety Report to Defense Nuclear Facilities Safety Board (DNFSB).

If you have any questions, you may contact Patrick S. Moss at (505) 665-9233.

Donald L. Winchell, Jr.
Manager

Attachment

cc:
D. Winchell, OOM, LASO
J. Vozella, AMSO, LASO
C. Keilers, AMFO, LASO
P. Moss, SO, LASO
B. Broderick, DNFSB, LASO
T. Davis, DNFSB, LASO
S. Monahan, LANL, SB-CS, MS-F691
R. Mobley, LANL, SB-DO, MS-E578
R. McQuinn, LANL, ADNHHO, MS-K778
Records Center, LASO
Official Contract File, LASO

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

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

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

   Field Element Line Management actions

   The focus of the LASO in 2009 was oversight of the Criticality Safety Improvement Plan (CSIP) including the quality of work produced.

   - A performance based incentive (PBI) remained in the contract directly measuring progress against the CSIP milestones.
   - The LASO criticality safety engineer met with LANL staff weekly on CSIP status.
   - The weekly meetings included review of comments on the LANL produced Criticality Safety Evaluations (CSEs). LASO performed a 100% review of CSEs produced in 2009.
   - LASO criticality safety staff and facility representatives performed field oversight activities to review implementation of the new program.

   In 2009 the CSIP was re-baselined to incorporate lessons learned from the Augmented Limit Review (ALR) and previous CSIP efforts. The CSIP is expected to be completed by the end of FY 2010. The CSIP was divided into two subplans. Plan 1 focused on program and implementation improvements and Plan 2 focused on Criticality Safety Evaluation (CSE) upgrades.

   Plan 1
   LANL missed two major milestones in 2009. The program description document was delivered to LASO behind schedule. The document met the LASO quality requirements and was approved in Oct 2009. Development and implementation of facility level procedures remains behind schedule. This delay is not expected to affect the CSIP end date.

   Plan 2
   A schedule for completion of CSE upgrades for all Risk Category C (High Conduct of Operations dependent) operations has been developed. The current schedule shows delayed completion. At the end of FY 2009, 9% (20 of 214 total evaluations) of Risk Category C operations have been completed. A schedule for completion of Risk Category I (Inherently Drift Resistant) operations will be developed in FY 2010.

Evaluation

The LANL nuclear criticality safety program does not yet meet the expectations of national consensus standards and DOE Order 420.1B in many cases. LANL performance on meeting the milestones defined in the CSIP did not meet LASO expectations in terms of timeliness, but the quality of work performed met expectations. The quality of CSEs produced by the LANL engineering staff has continued to be high quality as assessed by the LASO criticality safety engineer. Completion of the CSIP by the end of FY 2010 will be challenging.

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

   There are currently 10 technical staff and two management/technical staff in SB-CS. Two staff were hired (level 2 analysts) were hired as permanent staff in FY 2009. Ten of the technical staff are fully qualified. SB-CS currently has the necessary budget and need to hire several more criticality safety specialists. This may consist of a combination of contractors and permanent staff, depending upon what resources is available. There is currently 1 job posting available for the group. Retention of existing SB-CS staff, especially with the level 4 analysts, will be crucial to meeting the PIP milestones.

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

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

   The LASO nuclear criticality safety engineer program consists of one NNSA fully qualified Criticality Safety Engineer. There are no vacancies in criticality safety and LASO is fully staffed for this position. LASO continues to receive support from the NNSA Service Center on an as needed basis.

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

the adequacy of criticality safety evaluations, and the consistency of sites' nuclear criticality safety programs.

The Los Alamos Site Office, with NNSA Service Center support, conducted a focused assessment at TA-55 on management and supervisory responsibilities in April of 2009. Four findings and four observations were documented. The most significant of these are weaknesses in criticality safety training for line organizations, lack of line management understanding of their roles and responsibilities, and lack of engagement of operators in the development of procedures and operator aids. Los Alamos National Security (LANS) has entered these issues into their issues management system with actions to address them in conjunction with implementation of the revised program. LASO is modifying its FY 2010 oversight approach to focus on field implementation of the program. This includes incorporating criticality safety incentives as part of the subjective performance metric.

The LASO conducted a self assessment of the LASO criticality safety program. One observation was identified regarding backup and succession planning for the LASO criticality safety program manager. LASO management has addressed this issue through the issues management system. No action is required.

The Chief of Defense Nuclear Safety conducted an assessment of the LASO as part of the bi-annual assessment cycle. The criticality safety criteria was met, there were no findings or observations identified.

LANS conducted a broad assessment of safety management programs at the CMR facility. The Facility Grade in the area of criticality safety was reported as Above Average (AA) due to fact that CMR management and criticality safety personnel have set a high standard for the criticality safety program and in many cases continuous improvements are being made. LASO Shadowed this assessment and found it to be if high quality.

LANS conducted a Vital Safety System (VSS) self assessment of the Criticality Alarm System at TA-55. The assessment concluded that the CAS currently fulfills the safety function as defined in the safety basis. There were a number of deficiencies identified during the assessment, including one which led to an historic TSR violation. The facility and the cognizant system engineer have aggressively worked to address these compliance issues. LASO reviewed the assessment report as part of the LASO CAS VSS assessment and found it to be high quality. This is an indicator that LANS is making solid progress in self assessment in the area of criticality safety.

LASO also conducted a safety system oversight Vital Safety System (VSS) assessment of the Criticality Alarm System at TA-55. The assessment concluded that the system is well understood and well maintained. The hardware and settings are not modified, and the system has a clearly defined function in the safety basis

that is well understood by the assigned engineers. The engineers assigned have the requisite knowledge to effectively maintain the system; however the system is obsolete and needs replacement. The TA-55 Reinvestment Project, phase II has this work scheduled for the 2011-2012 timeframe. The assessment report is still in draft form and not yet submitted to the contractor.

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

The criticality safety group was actively engaged in line item projects in 2009. Project support of note were CMRR, TA-55 Reinvestment, and RLWTF replacement. LASO reviews design documents at critical decision points to assure that design features are captured. Safety related controls, both specific administrative controls and engineered features, have been modified or added as a result of the group's involvement. This constitutes continuing improvement over previous years performance. Non line item projects do not have the level of criticality safety support expected by LASO. This was identified as an observation in the April LASO assessment discussed in section 1. This trend is improving, as facility personnel understand that the group's engagement early in the design process is beneficial to successful project completion.

CMRR TIPR – The CMRR TIPR review concluded that "Criticality Safety has been incorporated into design such that all normal and credible abnormal conditions remain subcritical. This is met by preliminary design that incorporates sufficient factors of safety to require at last two unlikely, independent and concurrent events before criticality is possible ..... All design requirements are passive engineering controls; administrative controls have not been developed yet, but are assumptions used in Preliminary Criticality Safety Evaluations (PCSEs) which addresses seismic concerns. Technical issues involving criticality safety have been identified, and are being resolved by iterative communication between CS staff, Project designers and Engineering staff ..... These interactions are proper and typical of this design stage.

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

There were 13 total events in FY2009 and 9 were actual infractions. Of the 9 infractions, 4 were level 4 infractions and 5 were level 5 infractions. Level 4 infractions involve the partial loss of a single process parameter with two or more parameters providing criticality safety margin. Level 5 infractions do not involve the loss of control of any of the criticality safety parameters, and implementation was not as intended by the process and applicable criticality safety basis. No formal

trending analysis was performed on the 9 infractions due to the simplicity of the events.

Two of the Level 4 infractions were the result of inaccurately characterized legacy items that led to an inadvertent over-mass of the locations. As a result evaluations for specific operations were developed to accommodate the higher likelihood that legacy items could be incorrectly characterized. In both cases, the personnel response was immediate and completely in accordance with operating procedures.

The remaining Level 4 and three of the Level 5 infractions were the result of operator confusion regarding the application of the administrative requirements. These types of infractions may be viewed as increased over historical steady state values. If the value is truly increased, it is due to the fact that many of the limits used were altered as a result of the extensive Augmented Limit Review process performed during FY 2008.

The final Level 5 infraction resulted from a failure to accurately characterize the existing fissionable material inventory within an operation prior to posting a new more restrictive control set. As a result, it was not recognized that a small metal sample was resident when the operation was transitioned to an oxide only limit.

The trends indicate that work needs to continue on educating group leaders, supervisors, and operators to a consistent approach to the establishment and enforcement of administrative requirements. The events also indicate a need to develop a specialized approach to legacy items as the processing of these materials is completed over the next few years.

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

These were addressed in the relevant sections above.

8. DOE'S plans for ensuring its standards provide sufficient and appropriate guidance for the review of NCS program element implementation, including the need for another technical standard or supplement to DOE Standard 1158.

The site office perspective is that the current suite of DOE Orders and Standards provide sufficient guidance to review and assess criticality safety program performance. DOE Standard 1158 is a useful tool to frame and develop an assessment strategy which ensures the entire program is appropriately assessed and which is catered to the unique aspects of the site specific program. When coupled with effective operational oversight activities, this flexibility is necessary to perform risk based oversight.

9. The approach to be used by DOE to ensure that the categorization of NCS non-compliances is consistent, so that the correct root causes, corrective actions, and lessons learned will be identified.

   The LANL categorization criteria for criticality safety control infractions are necessarily consistent with the overall LANL program structure. The infraction categorization logic is based on the impact of the infraction on the safety margin of the operation in terms of the relevant parameters. The cause of an infraction is therefore not related to the categorization. However, the program structure, based on compliance to DOE Order 420.1B and the ANSI/ANS-8 standards, defines both the control criteria and control implementation mechanisms. While interrelated, there is a clear distinction delineated as to the function of criticality safety controls, formality of operations, and the use of written operating procedures. Because the program elements, such as the definition of what constitutes a control, are clearly defined, determination of a consistent root cause and the appropriate corrective actions are more easily determined. For example, if a procedural error occurs in which an operator fails to conduct a required step such as weighing an item, a failure of formality of operations has definitely occurred. Whether a criticality safety limit infraction had also occurred would be dependent on if that failure also led to the exceeding of a criticality control. This ensures that proper attention is placed on the correct cause increasing the likelihood that the root causes will be correctly identified and the addressed appropriately.

10. An initial list of leading and lagging indicators for monitoring the effectiveness of NCS program implementation

    Historical criticality safety indicators focused on infraction rate. This is a lagging indicator which tends to have a small statistical population for a given facility/site. Nuclear Criticality Safety Program (NCSP) implementation is not dramatically different from any other safety system implementation. The criticality safety margin is defended by implementation of engineered features and administrative controls. Effectiveness of engineered feature implementation is reliant on configuration management and conduct of maintenance activities. Effectiveness of administrative limit implementation relies on conduct of operations. LANS has developed a formality of operations program which tracks issues relating to these three systems. The formality of operations index forms a leading set of indicators for the criticality safety program. The LASO CSPM is currently engaged with LANS management to determine how this system can be used to predicatively track NCSP implementation in a way which is meaningful to the facilities. With this more robust statistical basis trending should be possible to keep the criticality safety infraction rate at its natural level. Once the infraction rate natural level is known, small statistic methods can be employed for trending analysis to monitor program health against this lagging indicator.

11. The status of open issues identified in the previous year's annual report. These were addressed in the relevant sections above.

National Nuclear Security Administration
Sandia Site Office
P.O. Box 5400
Albuquerque, New Mexico 87185-5400

NOV 1 8 2009

MEMORANDUM FOR. Jerry Hicks, Occupational Safety and Health, National Nuclear Security Administration, Service Center

FROM. Jeff Petraglia, Sandia Site Office

SUBJECT: Sandia Site Office Response to Defense Nuclear Facilities Safety Board (DNFSB) Letter on January 29, 2008 for Status in Calendar Year 2009 (CY09)

The DNFSB issued a letter on January 29, 2008, on the *status of the Department of Energy Nuclear Criticality Safety Program for Calendar Year 2007.* DNFSB believed it was necessary to modify the contents of the Department of Energy (DOE) Annual Nuclear Criticality Safety (NCS) Report so that it did not report mainly on those issues where substantial and lasting progress has been made, but rather emphasized ongoing NCS issues. These changes help ensure continuous improvement in criticality safety across the DOE Complex. Prior to 2007, DOE Annual NCS Reports did not include required information on the quality of contractor self assessments for criticality safety, adequacy of NCS evaluations, and consistency of NCS programs across the Complex. DNFSB has modified the annual reporting requirements to include eight additional items to be reported by each site where the NCS program is implemented DNFSB has not modified the request for any other information for this year. The attached information provided the status of the NCS Program in CY09.

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

Attachment (1)

cc w/o attachment:
N. Schwers, SNL/NM, MS-1143
K. Davis, SSO
D. Brunell, SSO
J. Todd, SSO
R. Scott, SSO
09-024-PROG
09-194-AMFO

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

2009 Summary

A brief discussion of the NCS program from 2006 to 2009 will assist in understanding the information to follow. Sandia National Laboratories (SNL) under the oversight of the Sandia Site Office (SSO) has met the Presidential Directive to remove all of security Category I and II Special Nuclear Material (SNM) from SNL. These activities involve the packaging of solid metals, oxides, and other forms. These activities and all other activities at SNL do not involve fissile materials operations with liquids or the processing of materials which change the shape and form of fissile materials (e.g., grinding). From 2007 to 2009 there have been 19 shipments of SNM and other Transuranic materials to the Nevada Test Site (NTS), Los Alamos National Laboratory (LANL), Y-12, Idaho National Laboratory (INL), and the Off-site Source Recovery Program for disposition. These shipments of materials include the following:

1) Melt Progression #1 (reactor experiment) to NTS in April 2007
2) Melt Progression #2 (reactor experiment) to NTS in August 2007
3) Sandia Pulse Reactor (SPR) II Control Rods to LANL in September 2007
4) Highly Enriched Uranium (HEU) Material Control & Accountability (MC&A) Standards to Y-12 in September 2007
5) SPR II and SPR III Fuel Plates to NTS in September 2007
6) Sodium Debris Bed (reactor experiments) to INL in December 2007
7) Sodium Debris Bed (reactor experiments) to INL in February 2008
8) SPR II and SPR III Fuel Plates, Plutonium and HEU Source Plates to NTS in February 2008
9) Plutonium Source Plate to NTS in September 2008
10) SPR Samples to LANL in September 2008
11) Nine Radioisotopic Thermoelectric Generators (RTGs) to LANL in September 2008
12) Pu-238 Oxide Sealed Sources to INL in March 2009
13) Am-241 Oxide Sealed Sources to INL in March 2009
14) Pu-239 Oxide Fission Foils to Off-Site Source Recovery Program in March 2009
15) Np-237 Oxide Fission Foils to Off-Site Source Recovery Program in March 2009
16) Cesium & Cobalt Sources at SNL/CA and TTR to the Manufacture in June 2009
17) Depleted Uranium Oxide and Materials to Y-12 and NTS in June and Sept 2009
18) Fresh Enriched Uranium Oxide to NTS in September 2009
19) Highly Enriched Fission Chambers to NTS in September 2009

All of these shipments have required the support of the SNL NCS program by completing Criticality Safety Assessments (CSAs) and Criticality Safety Indexes (CSIs). This effort required a large part of the SNL NCS staff to complete this effort during that time period. To support this effort, SNL supplied the additional funding needed and had several new staff members become qualified to the NCS program. SNL had also started an initiative to complete self-assessments of their program per DOE-STD-1158-2002. In 2009, SNL has been able to remove several facilities (Building 810, Building 819 and the Tonopah Test Range) from being under the Criticality Safety Program because the facilities are below mass threshold values. SNL has started the Critical Experiments at the Sandia Pulse Reactor (SPR) Facility by performing

7uPCX Critical Benchmark in May and September 2009. The initial BUCCX Critical Experiments will be done in 2010. The Critical Experiments is the primary activity at the SPR Facility since the SPR reactors were sent to NTS in February 2008. SNL has been active in 2009 for the start-up of the Auxiliary Hot Cell Facility (AHCF) and the Transportation of Hazard Category 3 Materials in 2010, both which will be under the Criticality Safety Program. All these activities have been under the oversight of the SSO Criticality Safety Point-of-Contact (CRITPOC) who is responsible for the SSO NCS oversight program.

With the 11th shipment on September 29, 2008, this completes Phase 1A and removes all Category I and II SNM. This material not only represents material that is a greater security risk but also the largest amount of fissile material (i.e., pure highly enriched uranium material). Phase 2 started in 2009 with the 12th shipment with the removal of SNM that is security Category III SNM and includes smaller amounts of non-pure fissile materials. There were no NCS-related issues during Contractor or DOE ORR start-up reviews. There was one NCS-related issue from the Manzano Nuclear Facility (MNF) when it was discovered that one container was over the container fissile material limit and will be discussed later. The DNFSB request for the DOE annual report on NCS programs includes the following items:

- A site-by-site evaluation of Contractor Nuclear Criticality Safety performance measured against established Criticality Safety Performance metrics, including an evaluation of this performance and actions taken by DOE Field Element Line Management to improve Nuclear Criticality Safety and address known Nuclear Criticality Safety Program deficiencies.

Response

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

1) Non-Conformances

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

   There has been one NCS ORPS reportable in 2006 for the MNF, one in 2007 for the Nuclear Material Storage Facility (NMSF), and one in 2009 for the MNF. The first two (2006 and 2007) were self-identified as a Potential Inadequacy in the Safety Analysis (PISA) and are more related to details in the safety bases than specifically NCS issues and were determined to be Level 5-2. From a NCS standpoint, the ORPS reports would not have been required and were both subsequentially canceled. The update of the MNF CSA had already been in progress when it was decided that the old CSA did not meet the requirements. At NMSF, the issue was in the details of the container size for one of the packages. It is unclear why the level of detail was in the NMSF DSA since container size was an unnecessary detail for any of the accident analyses. In 2007, SSO identified one finding during an assessment for facilities with CSI postings and was determined to be

Level 6-2. The recurrence of infractions has been discouraged with the review of activities to reduce repeat infractions and common cause events.

Table 1 NCS Noncompliance Levels

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

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

In 2009 there was one NCS ORPS reportable that was determined to be Level 4-2. The event occurred when during the process of establishing Criticality Safety Indexes for Fissile Material containers to be moved from MNF to the AHCF, Fissile Material mass discrepancies were discovered between the MNF documented inventories and the Materials Accountability Records System (MARS). It was discovered that the historical Radioactive Material accounting methods for Radioactive Materials stored in MNF excluded isotopic activities that comprised less than 1% of the total container activity. Therefore, in some cases, Uranium mass was not fully accounted. Upon review of Radioactive Material containers staged in MNF, the Fissile Equivalent Mass (FEM) increased for multiple containers. With the exception of one container (C974021 located

in Bunker 37055), the FEM remained within the established limits. The one container that exceeded the FEM limit contains 459 grams of FEM.

A criticality safety review of the new data, *MNF Container Fissile Mass Information Compared to the Criticality Safety Analysis*, evaluated the new Fissile Mass of container C974021 with respect to the Criticality Safety Assessment, and determined that a safety issue did not exist. The evaluation concluded that the container's Fissile Material Mass is still bounded by the assumptions in the CSA, and no new Criticality Safety operating restrictions are necessary. However, the CSA must be revised to reflect the current configuration and Fissile Material Mass. Reference: *Evaluation of the Safety of the Situation, Manzano Nuclear Facilities for USQD-2009-09-05, Potentially Inadequate Safety Analysis (PISA) Evaluation of MNF Fissile Equivalent Mass (FEM) Discrepancies*, September 17, 2009.

2) Self-Assessments and Committees

DOE-STD-1158-2002 has been used extensively to meet ANSI/ANS 8.19 requirements for self-assessments. The self-assessments have transitioned from subjective walkthrough's to DOE-STD-1158-2002 self-assessments for nuclear facilities and radiological facilities where criticality controls are implemented. The nuclear facilities are generally reviewed annually with the reports issued within two months of the review.

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

Transition to a corporate tracking system occurred in 2008. In CY09, SNL planned eight DOE-STD-1158-2002 self-assessments of facilities. One was canceled due to the facility combining its activities with another existing facility and no fissile material is located at the previous site. None of the CY09 assessments are complete, but three are at least 50% completed. The remaining four assessments scheduled will be completed prior to the end of CY09. Nine self assessments were completed in CY08 which represented 100% of the facilities where fissile mass is greater than threshold quantities.

Through November of CY09, the RCSC met ten times to review criticality safety for facilities within TA-V and the SNCSC met four times to review criticality safety for facilities outside TA-V. SSO personnel have been included in the notices with an agenda for the NCS committee meetings and have attended several meetings. Meeting minutes were developed, reviewed, approved and distributed within three months of the meeting date. Many members of the safety committees are members of other safety committees including the secretary. This supports consistency between the SNL facilities. The action items are generally documented as being completed in a future set of minutes following the development of the action item. The action items are completed according to the agreement between the committee chairman and line management.

3) Staff Responsibilities

The NCS training program is based on DOE-STD-1135-99. SNL plans on having all ten qualified NCS engineers and one new trainee participate in the critical experiment series that started in May 2009. This will be an in-house training class applicable to training requirements. One of the NCSEs is the lead designer and nuclear engineer for the SPRF/CX experiments including 7UpCX and BUCCX. Six of the NCSEs have observed the load to critical and the new trainee was fully involved in the operation and data verification. 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 attended the International Criticality Safety Benchmark Evaluation Project (ICSBEP) and OECD-NEA Workshop on Future Criticality Safety Research Needs.
- One NCSE attended the NCSP/CSSG Quarterly Review Meeting at ORNL.
- One NCSE attended the NCSP FY 2010 Program Execution Meeting at DOE/NV.
- The University of New Mexico NCS short course included sections taught by two NCSEs. The new trainee attended the UNM short course.
- In the last three years five NCSEs attended the Lawrence Livermore National Laboratory (LLNL) short course for hands-on training.
- One NCSE co-developed the NCSE training course for NSTec in Nevada.
- One NCSE completed his PhD NE at UNM and one NCSE completed an MS NE at MIT. The new trainee will complete her MS NE at UNM in December and graduate May 2010.
- Of the ten qualified NCS engineers, seven are members of safety committees that require criticality expertise.

4) Criticality Safety Assessments

Prior to operations, the CSAs are developed, reviewed and approved. There are twelve active CSAs for SNL. With the completion of Phase 1 and 1A of the SNM de-inventory, six other CSAs have been archived. New CSAs are developed to DOE-STD-3007-2007, and if not, are submitted to SSO for approval. To date, no CSAs have required SSO approval. Currently SNL has several facilities and activities which were developed prior to DOE-STD-3007-93. SSO has requested a schedule for completion and a 25% update over the next two years. SNL is working on a gap analysis of the CSAs not meeting DOE-STD-3007-2007 and a schedule for the updates in 2009. The schedule will be based on safety, first; projected activities, second; and long term storage, third. There were three CSAs developed in CY09; one was to replace an old analysis, one is a special case CSA to evaluate interaction between processes, and one was developed for two containers as part of SNM Deinventory. Three CSAs are being modified to meet DOE

Standard 3007-2007. These three CSAs are scheduled to be completed in the second quarter CY09.

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

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

Response
Ten engineers are qualified to DOE-STD-1135-99 as NCSEs with one new trainee working to qualify in 2010. Nine of the ten NCSEs are available because one is on another detail. NCS program work is ~ 2 full-time-equivalents (FTEs). NCS projects work is anticipated to be 2 FTEs for FY10. Staffing is adequate for the level of effort for the next few years considering that SNL has now disposed of most of the fissile material and fewer analyses will be required in the next few years.

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

Response
One engineer has completed the Technical Qualification Program (TQP) standard for DOE-STD-1173-2003 in December 2007. Criticality safety oversight is not a full time responsibility for the engineer, approximately 10% of his time. Staffing is adequate for the level of effort for the next few years considering that SNL has now disposed of most of the fissile material and fewer operations will require oversight in the next few years. However, the start-up of the Criticality Experiments, AHCF, and On-Site Transportation of Hazard Category 3 Materials in addition to the requirement to requalify to TQP in 2010 (an SSO requirement) may required additional assistance is needed as observed in the recent Chief of Defense Nuclear Safety Biannual Review.

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

Response
The only federal assessments performed in 2009 were the three walkthroughs and two DOE-STD-1158-2002 assessments performed by the SSO CRITPOC. For the three walkthroughs and two 1158 assessments, there were two observations identified. In addition, SSO performed the first Safety Management Program (SMP) of the SPR Facility and the safety basis documentation. SSO requires that all nuclear facilities be reviewed every five years. There were no issues identified during the SMP review. In SSO performed two assessments of the Contractor Assurance System (CAS) for the SNL criticality safety program. There were two weaknesses and two observations identified during the CAS assessments. All items were transmitted from SSO to SNL via letters and were addressed by SNL. Since there were no deficiencies, no corrective action plans (CAPs) were required.

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

Response
For four of the last six years, SNL has participated in LANL/LLNL assessment at Device Assembly Facility (DAF) at NTS. SNL participates in DOE Complex End-User activities and meets with counterparts from other sites. An external assessment was completed in 2008 with other NCS members of the DOE Complex from LLNL and Idaho National Laboratories meeting a requirement to perform a triennial assessment. The next triennial assessment is scheduled for FY2011.

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

Response
One reportable occurrence occurred in 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 PISA by the facility management and requires an update to the MNF Criticality Safety Assessment which has yet to be completed.

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

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

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

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

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

NOV - 4 2009

MEMORANDUM FOR: Jerry E. Hicks, Criticality Safety Subject Matter Expert (SME), NNSA SC

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

SUBJECT: Pantex Site Office Submittal to DOE FY 2009 Annual Criticality Report

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

The referenced letter required eight (8) responses for items concerning Criticality Safety oversight and Nuclear Criticality Safety (NCS) program reviews at the various sites. The purpose of this letter is to transmit the requested information for Pantex for fiscal year 2009.

If you have any questions, please contact Roy Hedtke of my staff at (806) 477-6295.

Attachment

cc w/attachment:
K. Waltzer, PXSO, 12-36
D. Nester, PXSO, 12-36
C. Alvarado, PXSO, 12-36
NE Group, PXSO, 12-36
R. Hopson, B&W, 12-6
B. Hill, B&W, 12-101
G. Fondaw, B&W, 12-101

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

RHFY10-211278-NE

Enclosure
Pantex Plant Submittal for the 2009 Annual Report on Nuclear Criticality Safety

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

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

The following information is provided for the 2009 DOE Annual Report on Nuclear Criticality Safety:

1) The M&O Contractor (B&W Pantex) was provided a set of Nuclear Criticality Safety (NCS) performance indicators for FY 2009. No NCS-related infractions occurred at Pantex in FY 2009. The Pantex Site Office (PXSO) Criticality Safety Engineer, who is also a qualified Safety Basis Analyst, is involved in reviewing all NCS-related work products.

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

2) The B&W Pantex Criticality Safety Program is staffed with one qualified criticality safety engineer. Given the form of the material and the nature of operations at Pantex, B&W Pantex's one Criticality Safety Engineer is sufficient to maintain the technical basis and provide criticality safety support for Pantex operations. The B&W criticality safety engineer has a PhD in nuclear engineering and has completed the B&W Pantex Nuclear Criticality Safety Engineer Qualification Card (which meets the requirements of DOE-STD-1135-99, *Guidance for Nuclear Criticality Safety Engineer Training and Qualification)*. The NCS Engineer has completed both the LANL and the LLNL hands-on criticality safety courses. The Contractor has planned a self-assessment of the Nuclear Criticality Safety Walkdown Program for the 4th quarter FY 2010 and a self-assessment of the calculational methodology used within the NCS Program. These self-assessments will be shadowed by the PXSO Criticality Safety Engineer. The Pantex Site Office has determined that the B&W Pantex Criticality Safety Program and Staff are adequate for Pantex operations.

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

4) In FY 2009 the PXSO Criticality Safety Engineer, with support from the Service Center, conducted a programmatic assessment of the B&W Pantex Nuclear Criticality Safety Program. A shadow assessment of the B&W NCS Engineer Training & Qualification Program was also conducted. The NCS Programmatic Assessment noted three observations: 1) concern over the reduction of criticality safety staff to one engineer and its impact on the ability to conduct independent peer review; 2) revising the cross walk of NCS requirements to flowdown

documents and removing that from the NCS Program Description Document; and 3) a draft criticality safety evaluation that was not STD-3007 compliant.

5) In 2009 there were no new nuclear criticality safety controls identified and no new nuclear facility designs prepared. Current criticality safety controls are sufficient for fissile material operations currently authorized at the Pantex Plant. However, when applicable, the Pantex M&O Contractor routinely uses the criticality safety group to review new facility designs, tooling, and processes. DOE-STD-1189-2008, *Integration of Safety into the Design Process*, has been fully adopted in the M&O Contract.

6) Bullets 6 through 8 do not apply to Pantex. There are no known reportable or non-reportable occurrences related to criticality in at least the last 17 years at Pantex. Therefore, there is no trending or analysis of such events. There have been no corrective actions necessary for the previous year. Finally, there were no open issues from last year's Annual Criticality Report that pertained to Pantex.

DOE 2009 Annual NCS Report Information for Y-12 R2.doc

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

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

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

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

simple spills. This is an indication that the facility systems are operating as designed/intended.

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

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

Y-12 Response:
At the Y-12 National Security Complex, nuclear criticality safety (NCS) engineers are part of the Safety Analysis Engineering (SAE) organization in the Engineering Division. There are approximately twenty-six B&W and sixteen subcontractor engineers practicing the NCS discipline including the SAE manager. The overall NCS staffing level at the Y-12 National Security Complex is slightly less than the budgeted workload. The shortfall is being managed by bring in additional subcontractors. In addition, B&W continues to pursue filling full time NCS engineer positions to reduce the current reliance on subcontractor engineers.

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

	B&W	Subs
Staff level:	26	16
Qualified Engineers in Training:	92.3%	100.0%
Qualified NCSEs:	57.7%	56.3%
Qualfiied Sr. NCSEs:	15.4%	Note 1
Process Reviews	88.5%	93.8%
NCS Evaluation and Documentation	69.2%	93.8%
Implementing Documentation Approval	88.5%	93.8%
Computations	80.8%	93.8%
Computation Review	34.6%	43.8%
NCS Evaluation Review	38.5%	56.3%
Emergency Response	11.5%	Note 2
Criticality Accident Alarm System Support	11.5%	Note 2
Order Compliance and NCS Procedures	34.6%	Note 2
Final NCS Technical Documentation Approval	15.4%	Note 2
NCS Program Oversight	23.1%	Note 2
Technical Support Center Support	7.7%	Note 2

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

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

Y-12 Response:
The federal NNSA Y-12 Site Office NCS staffing remains stable, and is the same as reported last year:

1. Sr. NCS Engineer: MSNE, Initial Federal Technical Qualification Program (TQP) completed at Y-12 on 10/9/01 and last 3-year federal TQP requalification received 11/19/07, 27 years professional experience w/12 years at Y-12.
2. Sr. Support Service Sub-contractor NCS Engineer: MNE, Contractor TQP (7 different tasks - see last item) qualified, 24 years professional experience w/12 years at Y-12.
3. NCS Engineer Intern: BSNE, a new DOE Future Leader Program (FLP) recruit who reported in June of 2008, with 1-year remaining in program and 1 year at Y-12.

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

The NNSA line support (through NA-17), involving Sr. NCS engineer's well experienced in industrial criticality safety application, of the YSO NCS oversight program has been extensive and continued for many years since the 1998 time frame. This support includes marshalling resources for conducting team NCS reviews, participation in smaller dedicated on-site reviews and assistance visits, periodically performing the YSO NCS program annual self-assessment (at a minimum of once every 3 years), review of the YSO NCS program master assessment schedule, and general day to day collegial counseling and advice on NCS matters of interest. The need for this highly valued support is expected to continue and will utilize dedicated Sr. NCS engineering expertise in the NNSA service center, which also led a 2009 independent line assessment (mentioned above) for YSO this year, and participated in the 2009 CDNS review which included NCS in its scope.

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

Y-12 Response:
Major federal assessments of note conducted by YSO, or at YSO request this past year, are as follows:

I YSO Review of Revision Level 3 and 4 HEUMF CSEs:

Early in the year a significant number of comments on the Revision level 3 HEUMF CSEs were released to the contractor based primarily upon various inconsistencies, invalid references or unsupported assumptions, and parametric identification and the supporting analysis to demonstrate system reactivity changes to contingency parameter variations. The number was uncharacteristically large because each instance was identified as a separate comment instead of being grouped together as is common practice. Each comment was reviewed with the YSO in extensive resolution meetings and finally addressed in finalized STD 3007-2007 compliant CSEs. Additionally the revision level 4 CSEs also received independent expert review from outside the Y-12 site.

II YSO Review of HEUMF CAAS Detector Placement and IEZ Documents:

YSO, through the HEUMF project, performed a review of the subject HEUMF CAAS documents using the services of a well recognized independent NCS expert. These documents were newly revised to address previous CSSG findings as required under YSO assigned issues corrective action plans. As a result of this review, further significant revision of the documents was deemed necessary even though the efficacy of the HEUMF CAAS design was not called into question. This later revision effort included the services of the retained NCS expert and the documents were reviewed by YSO NCS staff. Comments as a result of this review were responded to by the contractor and expert staff, and are documented in the assessment report. While some continued effort is indicated in technically controversial areas - most notably those dealing with the establishment of an alternate minimum accident of concern (MAC) - the basis information provided is considered sufficient to establish the ability of the HEUMF CAAS to meet the ANS-8.3 default MAC specification and other DOE requirements closing out the YSO issues.

III CDNS Review of NCS, March 2009:

The review was conducted in March of 2009 and the final report was issued May 8, 2009 under a cover memorandum signed by Thomas P. D'Agostino, the Administrator of NNSA. The Biennial Review noted and identified several items of significance to NCS. The Executive Summary of the Final Report noted two issues as rising to the level of a Management Concern, one of which was in the area of criticality safety: B&W Y-12 has demonstrated less than adequate compliance to DOE orders and ANSI/ANS standards. These are ongoing concerns with criticality safety evaluations, and action taken at the time of the March review had not been effective. These issues were previously identified in 2008 per the last DNFSB data call – most significantly the YSO May 2008 Wet Chemistry review, and the topic of subsequent findings including those noted in the 1/23/09 DNFSB letter. Relative to YSO NCS oversight two opportunities for improvement were identified, which have been addressed: (CS.1-1/OFI) The site office should consider using service center support for tasks which can be supported by site visits and remote view. (CS.1-2/OFI) The site office should consider increasing the number of criticality safety basis documents reviewed to ensure that all ongoing operations have an adequate basis of criticality safety.

Numerous corrective actions initiated originally in response to the YSO 2008 Wet Chemistry review and modified as a result of the 1/23/09 DNFSB letter and subsequent presentation to the Board continue. While not complete, the corrective actions are beginning to bear fruit as evidenced by the 2009 YSOP review below and by a positive response to an update to the Board on NCS issues held on 10/27/09. The corrective actions have included extending "Extent of condition Reviews" to include all active processes in major facilities, update to the CSE Upgrade Plan including commitment for FY10 upgrades to major wet chemistry processes, revision to HEUMF CSEs to convert to DOE-STD-3007-2007 format and content, establishment of a "Senior Review Board", initiation of peer review process and document quality improvements, involving the parent company through a Board of Managers review and use of Bechtel resources, attaining the services of a senior advisor/mentor, appointing a senior-level chair for the Plant NCS Committee, and contracting for senior technical support for selected issues.

IV 2009 NCS Operating Procedures and Fissile Material Control:
An on-site assessment was performed Sept. 29 – Oct 1, 2009 using lines of inquiry from DOE-STD-1158-2002, "Self-Assessment Standard for DOE Contractor Criticality Safety Programs", Section 4 Operating Procedures, and Section 6 Materials Control. The assessment team consisted of the NNSA Service Center NCS Engineer Subject Mater Expert (Acting Lead NCS Program Manager), the YSO NCS Subject Matter Expert, an NNSA intern who is supporting NCS for YSO, the cognizant YSO Facility Representative for 9212 Chemical Area Processing, a YSO Safeguards and Security Subject Matter Expert, and a Sr. B&W NCS engineer who is new to the Y-12 site (former ETTP site NCS manager). The major conclusions from the review were: that Line responsibility for safety was found at all levels (from the Vice President, Production to fissile material operators and handlers), that Evidence shows that B&W response to oversight has improved substantially since March 2009, that Some issues in implementation of NCS controls were identified (The discrepant items found were minor - at least one of these may be due to the inherent complexity of operations), and that Efforts to improve the quality and clarity of criticality safety evaluations are ongoing. Issues are specified for (1) Conditions of Approval in Technical Deviations or Clarifications are not consistently implemented, and (2) The criticality safety posting for Workstation "V" allowed an "activity" not supported by analysis.

Corrective actions for identified weaknesses and issues have been initiated including development of a formalized implementation process for deviation TDCs which will be included in an upcoming revision to the applicable procedures. The workstation posting has been corrected and is now consistent with the analysis.

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

Y-12 Response:

The development of preliminary analyses (called Criticality Safety Process Studies) is well underway for the UPF design activities. Draft A Process studies have been prepared for all processes and the Draft B studies are underway as the design evolves. These studies were developed with the input from design engineers, facility safety engineers, and Manufacturing representatives. The preliminary control sets derived from these studies are being folded into the preliminary design and the studies will be revised as necessary through the design development process. This iterative process will ensure that the NCS analysis, equipment design, and facility design do not diverge to the point where conflicts result in project delays and cost overruns.

An outside assessment of the Process Study approach was performed by WSMS personnel to provide some assurance that the process was working as intended. Summarized results are provided below:

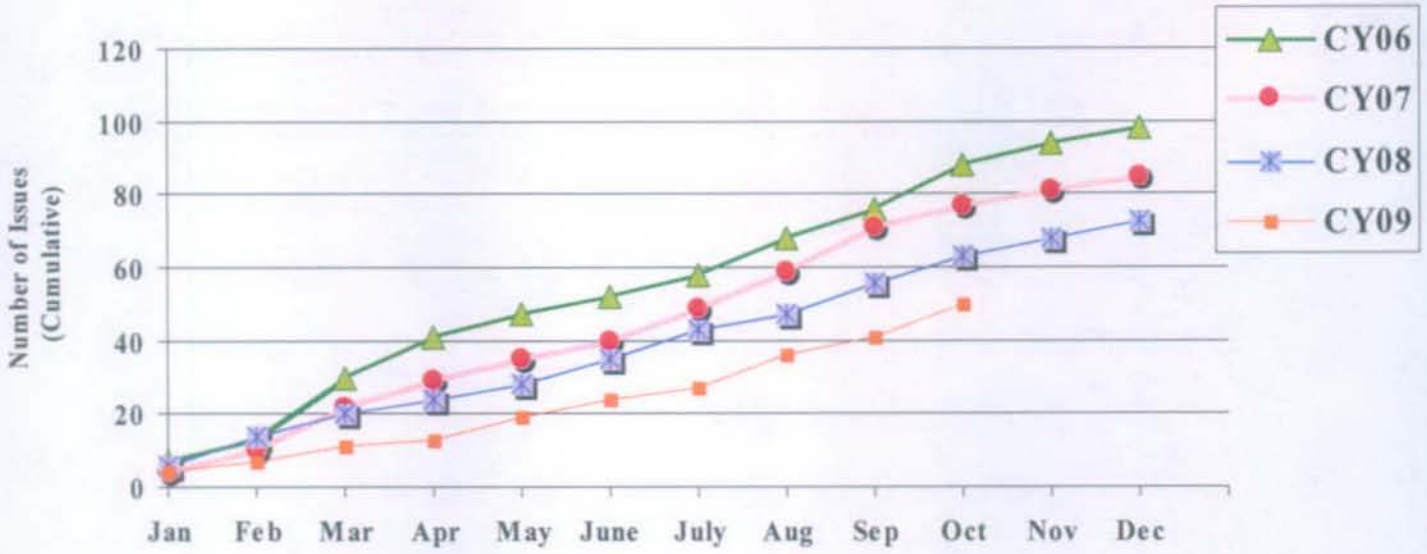
- Most areas seemed reasonably conservative, in some cases may even be overly restrictive
- Processes appear heavily weighted to engineering controls, which is appropriate.
- The UPF NCS team has a wide background of experience
- Several good practices were identified including the use of a contingency "bank" for consistency, the development of NCS Design Criteria, interface meetings, the Standard Review Plan, and co-location of the project team
- Some improvement suggestions were provided

In addition to process studies, a preliminary CAAS assessment will be performed to provide an estimate of the total number of detectors needed and to outline detection coverage and evacuation boundary strategies. Performing this preliminary analysis will allow B&W NCS personnel, YSO project personnel, and YSO oversight personnel to understand CAAS strategies at an early stage and work out disagreements well before the construction of the facility. This dissemination of CAAS strategy will also allow project design personnel to recognize how potential design changes may conflict with the CAAS strategy and provide an opportunity to resolve such issues as early as possible during design development.

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

Y-12 Response:
There were no reportable NCS (i.e., category 3C-1, 2) occurrences per DOE O 231.1A in 2008. There was a PISA (occurrence category 3B-2 Cat. 3) filed which was NCS-related due to a lack of documented analysis for an event which had been considered not credible to lead to a criticality by the analyst, but not dispositioned as such in the applicable CSE. The CSE has subsequently been revised to properly disposition the event.

The graph and chart below shows the trending of all Y-12 non-reportable (i.e., per DOE O 231.1A) infraction events over the past few years regardless of the sub-categorization.



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

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

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

The contractor NCS advisory council review of these non-reportable infractions and associated metrics is regularly assessed by YSO. Specific infraction events are reviewed as assessed as required.

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

Y-12 Response:

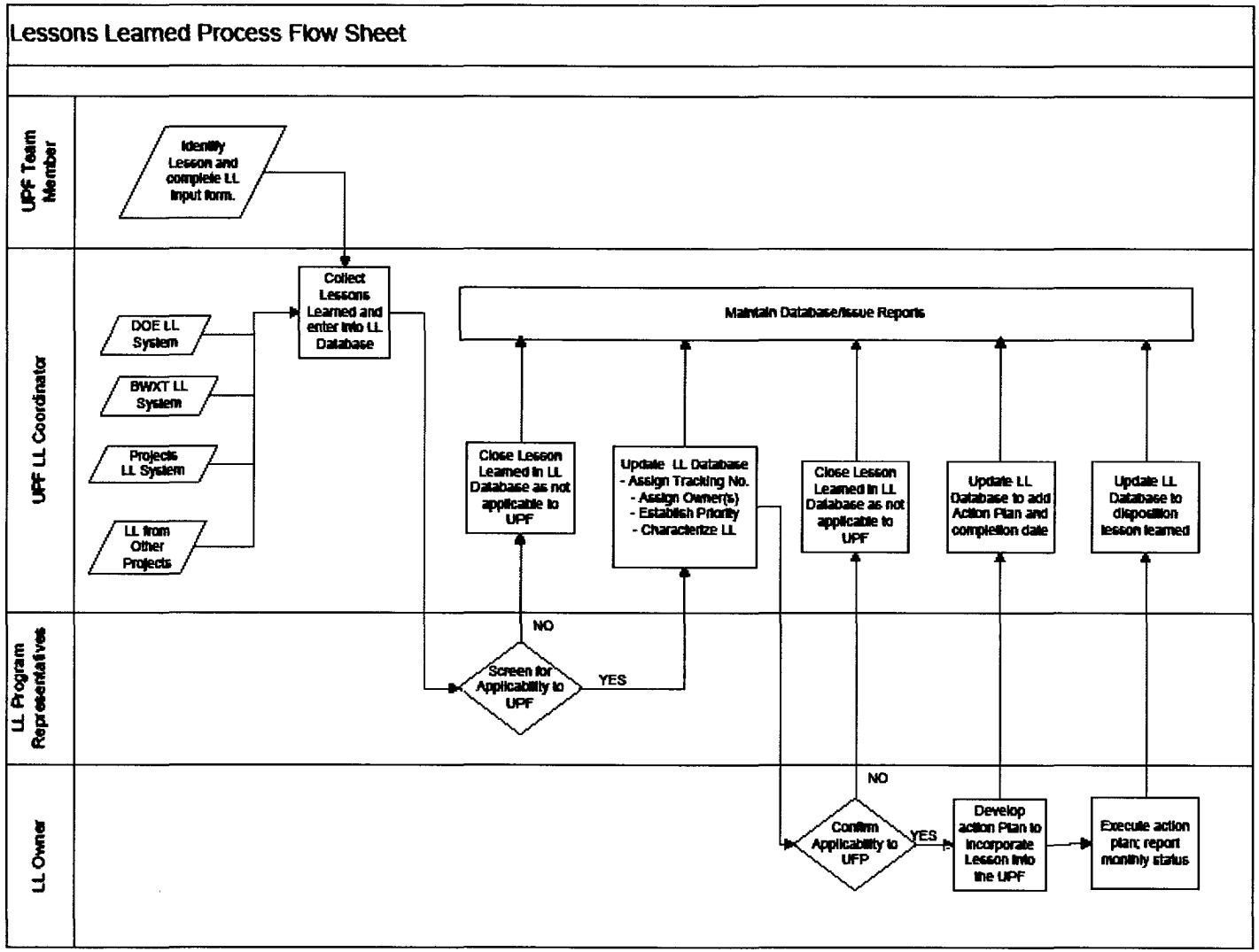
Key corrective action status items are as follows:

- Operational testing of the raffinate monitor will continue in FY 2010. Credited use of the raffinate monitor remains expected in FY10.
- Implementation plans for DOE-STD-3007-2007 are in place and all HEUMF CSEs have been revised to comply with the Standard.
- An evaluation of the floor holdup migration issue in 9212 is underway based upon assumptions until data from destructive floor analysis can be obtained.
- A project to re-route the process condensate from the current basement storage safe tanks to other safe tanks in a large geometry exclusion control area remains

unfunded, but various alternatives are under study to determine the most cost effective.

- The replacement CAAS documents for the new HEU facility were prepared with the assistance of an outside expert and have been accepted by YSO.

Attachment 1



NA-26 input to the Annual (2009) Nuclear Criticality Safety Program Report to the DNFSB

Currently, NA-26 is responsible for three nuclear facility projects here at the Savannah River Site; the Mixed Oxide Fuel Fabrication Facility (MFFF), the Pit Disassembly & Conversion Facility (PD&CF), and the Waste Solidification Building (WSB). I do not plan on providing any input to the subject report for these NA-26 projects. This was discussed in the last Criticality Safety Coordinating Team (CSCT) conference call and is based on the following logic:

1) MFFF - this facility is being licensed by the NRC and is not subject to 10 CFR 830 or DOE O 420.1B. I also do not believe it falls with the DNFSB purview. Thus, though it possesses an inadvertent criticality hazard, I don't think it is appropriate to include in the subject report.

2) PD&CF - the future of this facility is presently at a significant decision point and will likely not proceed as previously envisioned (i.e. as a new greenfield facility.) If an alternate path is chosen, this will likely involve revisiting the department's acquisition strategy and possibly affect the contractor(s) who have supported the project to date. It will certainly impact the design activities conducted to date. Given all the uncertainty associated with the project, it seems there is little value for including input for this project as it will likely be dated by the time the report is issued to the DNFSB.

3) WSB - This project is intended to handle waste streams from the previous two facilities. Based on the currently defined feed streams, an inadvertent criticality is not considered credible.

If you have any question on this subject, or would like to discuss further, feel free to call me.

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FY 2009 Annual Report on Nuclear Criticality Safety Programs
Office of Environmental Management

A DNFSB letter dated January 29, 2008 (A. J. Eggenberger to J. C. Sell) requested that answers to specific subject areas related to Nuclear Criticality Safety be included in the Department of Energy (DOE) Annual Report on Nuclear Critical Safety (NCS) Programs. Information on these topics is provided below for Environmental Management (EM) sites. The Office of Environmental Management (EM) has fourteen (14) contractors at six (6) field sites that required nuclear criticality safety programs. This is the third annual report.

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

Measure of Nuclear Criticality Safety Performance

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

Contractor Criticality Safety Staffing

The EM contractor criticality safety staff level varies widely from 2 to 28 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. The various federal oversight groups have assessed and affirmed, with minor exceptions, that the current level of staffing is adequate for the current work load.

Federal Criticality Safety Staffing

The federal staffing levels are generally judged to be adequate. The Savannah River and Oak Ridge Offices are recruiting federal staff.

Federal Assessments of Sites NCS Programs

EM HQ assessments of the NCS programs have been conducted for EM sites. The Findings, Recommendations and most of the Opportunities for Improvements resulted in Corrective Action Plans. In addition, site led assessments of NCS programs are performed and these result in corrective actions. The results and common elements of these assessments are shared at meetings of the federal Criticality Safety Coordinating Team and at the EM Nuclear Criticality Safety Workshops. The contractor's self

assessments evaluated were considered adequate with some caveats. The criticality safety evaluations assessed in these activities are generally adequate although some HQ assessments recommended that the hazard assessment part of the evaluations should be strengthened at some sites. All the site programs evaluated were consistent with federal and industry requirements.

New Facility Design

There are a number of new designs at the EM sites and each received a review by nuclear criticality safety staff. The general lesson learned is that the earlier the criticality safety input is received 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 critical safety issues and opportunities for improvement that resulted in corrective actions. Those actions are tracked to closure. Follow-up assessments are conducted as necessary to verify completion of corrective actions and evaluate the improvement in the criticality safety program.

Attached to this summary is a table summarizing the requested topic information with lines of inquiry at the various EM sites as well as the detailed reports from each EM site office.

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

Facility/Contractor	CH2M-Hill Plateau Remediation Company	Bechtel National Inc Waste Treatment Plant	Washington River Protection Solutions Tank Farms	Washington Closure Hanford	Paducah	Portsmouth
Field Office	**Richland**	**River Protection**	**River Protection**	**Richland**	**PPPO**	**PPPO**
1. Measure of Contractor NCS Performance						
a. Have metrics been established to monitor contractor performance?	Yes	No, Facility far from operational	Yes	Yes	Yes	Yes
b. If so, what are the metrics?	Non-conformances and closure of occurrences	N/A	See Att. 3	See Att. 1	See Att. 4	See Att. 5
c. If so, what is the contractor's record?	Acceptable, see Att. 1	N/A	Acceptable	Acceptable,	Acceptable	Acceptable
d. If no metrics have been established, what is the method of monitoring performance?	N/A	N/A	N/A	N/A	N/A	N/A
e. What is the conclusion on contractor performance and what is the basis?	Acceptable	N/A	Acceptable	Acceptable	Acceptable	Acceptable
f. What actions have been taken to improve contractor performance?	Surveillances and corrective actions	N/A	Meetings	Surveillances and corrective actions	Meetings	Completion of Corrective Action Plan
2. Status of Contractor Criticality Safety Engineer Program						
a. How many NCS staff are needed?	26 to 28	2	4	4	1.25	3

Facility/Contractor	CH2M-Hill Plateau Remediation Company	Bechtel National Inc Waste Treatment Plant	Washington River Protection Solutions Tank Farms	Washington Closure Hanford	Paducah	Portsmouth
b. How many are there?	26	2	4	4	1.25	3
c. Actions to address shortfall, if any?	N/A contingent recruiting	One CSE in training	N/A	N/A	N/A	N/A
d. Has DOE Field Management affirmed adequacy?	yes	Yes	yes	Yes	Yes	Yes
3. Status of Federal Criticality Safety Oversight Program						
a. How many NCS staff are needed?	1	1	1	1	0.5	1
b. How many are there?	1	1	1	1	0.5	1
c. Actions to address shortfall, if any?	N/A	MOA from RL	MOA from RL	N/A	N/A	Subcontractor
d. Has DOE Field Management affirmed adequacy?	Yes	Yes	Yes	Yes	Yes	Yes
4. Federal Assessments of Site NCS Programs						
a. What NCS assessments have been performed?	See Att. 1	ORP and CSSG assessments	See Att. 3	See Att. 1	See att. 4	See Att. 5
b. What corrective actions were taken as a result of these assessments?	1 Corrective Action Plan; RL rejected it	Conditions of acceptance of safety documents	See Att. 3	N/A	N/A	See Att. 5
c. What lessons learned were developed?	None	None	None	N/A	N/A	None
d. Were the contractor's self assessments evaluated for adequacy? What was the conclusion?	Yes/adequate	N/A	Yes/adequate	Yes/adequate	Yes/ Adequate	Yes/ Adequate

Facility/Contractor	CH2M-Hill Plateau Remediation Company	Bechtel National Inc Waste Treatment Plant	Washington River Protection Solutions Tank Farms	Washington Closure Hanford	Paducah	Portsmouth
e. Are criticality safety evaluations deemed adequate?	Yes	Yes	Yes	Yes	Yes	Yes
f. Is the NCS program consistent with requirements?	Yes	Yes	Yes	Yes	Yes	Yes
5. New Facility Design						
a. Are any facilities being designated that will need a criticality safety program?	No; new operations however	Yes	yes	No	No	No
b. Have these received a criticality safety design review by anyone?	N/A	Yes	yes	N/A	N/A	N/A
c. If so, what are the lessons learned? How were these lessons communicated?	N/A	N/A	none	N/A	N/A	N/A
6. Trending and Analysis of Reportable and Non-reportable Nuclear Criticality Occurrences						
a. How are NCS occurrences tracked and trended?	See Att. 1	N/A	See Att. 3	See Att. 1	See Att. 4	See Att. 5
b. What were the results?	See Att. 1	N/A	See Att. 3	See Att. 1	See Att. 4	See Att. 5
c. How were the results used to improve performance?	See Att. 1	N/A	N/A	N/A	See Att. 4	See Att. 5
7. Follow Up to Assessments						
a. What prior assessments received a follow up review?	See Att. 1	See Att. 2	N/A	See Att. 1	See Att. 4	See Att. 5
b. Were the corrective actions	See Att. 1	N/A	N/A	See Att. 1	Yes	See Att. 5

Facility/Contractor	CH2M-Hill Plateau Remediation Company	Bechtel National Inc Waste Treatment Plant	Washington River Protection Solutions Tank Farms	Washington Closure Hanford	Paducah	Portsmouth
effective?						
8. Open issues from past reports						
	none	none	none	none	none	none

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

Facility/Contractor	Idaho Cleanup Project (CWI)	BBWI AMWTP	SRS	EnergXs	BJC	ISOTEK
Field Office	**Idaho**	**Idaho**	**Savannah River**	**Oak Ridge**	**Oak Ridge**	**Oak Ridge**
1. Measure of Contractor NCS Performance						
a. Have metrics been established to monitor contractor performance?	Yes	Yes	Yes for M&O contractor and Liquid Waste contractor. No for Salt Waste Project	Yes	Yes	Yes
b. If so, what are the metrics?	See Att. 6	See Att. 6	See Att. 7	Anomalous condition Reports (ACR)	New ACRs, 12 month rolling average to close	Infractions
c. If so, what is the contractor's record?	Acceptable	Acceptable	Acceptable	Acceptable	Average time to close ACRs has increased	Acceptable
d. If no metrics have been established, what is the method of monitoring performance?	In addition to metrics, both ID and contractor Conduct periodic Program audits	In addition to metrics, both ID and contractor Conduct periodic Program audits	N/A	N/A	N/A	N/A

Facility/Contractor	Idaho Cleanup Project (CWI)	BBWI AMWTP	SRS	EnergXs	BJC	ISOTEK
e. What is the conclusion on contractor performance and what is the basis?	Acceptable/ Oversight	Acceptable/ Oversight	Acceptable/ Oversight	Good DOE oversight	Good, based on lower ACR number and assessment conclusion	Acceptable, DOE oversight
f. What actions have been taken to improve contractor performance?	Self-Assessments develop contractor identification of path for improvement	Self-Assessments develop contractor identification of path for improvement	See Att. 7	N/A		NCS staff diligently worked issued to closure
2. Status of Contractor Criticality Safety Engineer Program						
a. How many NCS staff are needed?	3	5	M&O (27) LWO (3) SWPF (4)	2	14	7
b. How many are there?	6	5	same	2	14	7 FTEs with 2 part time staff
c. Actions to address shortfall, if any?	N/A	N/A Recruiting for future work	M&O contingent recruiting	N/A	DOE monitoring staffing	DOE monitoring staffing
d. Has DOE Field Management affirmed adequacy?	Yes	No	Ongoing	Yes	Yes	Yes
3. Status of Federal Criticality Safety Oversight Program						
a. How many NCS staff are needed?	EM (1) QSD (2)	EM (1) QSD (2)	4	1 part time	1 part time	1 part time
b. How many are there?	1	1	3	1	1	1
c. Actions to address	N/A	N/A	recruiting	Recruit	Recruit	Recruit

Facility/Contractor	Idaho Cleanup Project (CWI)	BBWI AMWTP	SRS	EnergXs	BJC	ISOTEK
shortfall, if any?				additional staff	additional staff	additional staff
4. Federal Assessments of Site NCS Programs						
a. What NCS assessments have been performed?	Quarterly surveillances	Quarterly surveillances	50 SRO assessments	NCS program assessment in 07 and ES&H assessment in 08	ORO 2008 assessment of BJC NDA; external assessment of K-25 west wing disposal	Code validation for U-233 project; 60% project review; ISMS review
b. What corrective actions were taken as a result of these assessments?	See Att. 6	See Att. 6	See Att. 7	none	none	none
c. What lessons learned were developed?	None	none	See Att. 7	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/ Program now considered Adequate	Yes/ Adequate
e. Are criticality safety evaluations deemed adequate?	Yes	Yes	Yes	Yes	Yes	Yes
f. Is the NCS program consistent with requirements?	Yes	Yes	Yes	Yes	Yes	Yes
5. New Facility Design						
a. Are any facilities being designated that will need a criticality safety program?	Yes, ISFF has received CD-0 approval	No	Yes, see Att. 7	No, sludge treatment will not need program	No, however expansion of old facilities	Yes.< 60% design review

Facility/Contractor	Idaho Cleanup Project (CWI)	BBWI AMWTP	SRS	EnergXs	BJC	ISOTEK
b. Have these received a criticality safety design review by anyone?	Too early	N/A	See Att. 7	Yes	N/A	Yes
c. If so, what are the lessons learned? How were these communicated?	N/A	N/A	See Att. 7	N/A	N/A	Comments from review to be incorporated
6. Trending and Analysis of Reportable and Non-reportable Nuclear Criticality Occurrences						
a. How are NCS occurrences tracked and trended?	NCS program tracks and trends	ORP system used	See Att. 7	Number of events and days to closure	NCS program and ORS track NCRs	None to date
b. What were the results?	No trends identified	No trends identified	See Att. 7	No trends seen	Several issues uncovered with further action	N/A
c. How were the results used to improve performance?	None	none	See Att. 7	Procedure revision	Not yet	N/A
7. Follow-Up to Assessments						
a. What prior assessments received a follow up review?	No issues to track	No issues to track	See Att. 7	none	none	none
b. Were the corrective actions effective?	N/A	N/A	See Att. 7	N/A	N/a	Unknown at this time
8. Status of open Items	none	none	None	none	none	Staffing issue resolved

Attachment 1

Richland Operations Criticality Safety Program Annual Report Topics

Field/Site Manager: Dave Brockman NCS POC: Tom Nirider

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

Metrics have been established to monitor contractor NCS performance

1) Number and Type of Criticality Safety Nonconformances 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

CHPRC: Due largely to reduced activity levels within the Plutonium Finishing Plant; the CHPRC has experienced a record low number of nonconformance events in the past year (approximately 10). This does not necessarily reflect an increase in the quality of work or in conduct of operations, but is a direct result of the reduced work scope and the inventory reductions in the PFP facility.

WCH: No nonconformance events have been reported, 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 conclusion on NCS program performance

CHPRC: The operational record has been very good from the perspective of reportable nonconformance events in criticality safety but again, this is mostly a function of the reduction in work scope involving significant quantities of fissile materials. Some decentralization of the safety functions including criticality safety has been noted and this has the potential to adversely affect safety performance. Over the past decade, efforts have been focused upon organizing and managing a central safety organization in criticality safety. This is being significantly diluted. Operational performance must be measured against the record of actual hours worked in handling fissile materials. As the work scope has slowed, naturally the number and severity of safety issues has slowed as well. Recent funding increases due to ARRA work has resulted in preparations

for a significant ramp-up in D&D activities in high-risk facilities and areas particularly at the Plutonium Finishing Plant. We can expect a corresponding increase in nonconformance events once that work begins.

Significant issues requiring direct action from the Field Office were not observed during the Fiscal Year. Numerous oversight activities were conducted and recorded in the Operational Oversight Database system. Two formal Surveillances were conducted and they resulted in one Finding and two Observations.

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

Criticality safety staff includes 12 CSRs/CSEs and one Criticality Safety Manager: 7 qualified CSEs and 1 CSE undergoing qualification; 6 qualified CSRs (2 are also qualified CSEs). This is considered adequate but minimum staffing. CHPRC could make use of additional criticality safety staff and is continuing a level of recruiting.

3. **Status of Federal Criticality Safety Oversight Program**

The Richland Operations Office has one qualified Fed Criticality Safety Engineer. This level of staffing has been continuous for approximately the past decade. It does not appear that additional support 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 47 separate oversight events that resulted in reports issued through the Operational Awareness Database. Additionally, two formal Surveillances were conducted and issued to the contractor containing findings and observations.

Corrective actions as a result of assessments

Finding: S-09-SED-PRC-023-F-01:

CHPRC has not reported through the Criticality Safety Non-conformance Process an event of significance (CSER deficiency) discovered during an RL-directed review. The event was significant enough to warrant a stop work by suspending the operating procedure.

The contractor's corrective action involved simply performing a checklist to ascertain whether the event was a nonconforming event or not. Their conclusion that it was not, and that no further action was required was rejected by the Field Office on November 16, 2009. The contractor will have 30-days to resubmit a corrective action closure package on this finding.

The other items identified during the Surveillances were Observations. The contractor adequately addressed these observations with appropriate corrective actions.

Field Office review of contractor's NCS self assessments

A surveillance report was dedicated to assessing the contractor's performance on self-assessment in criticality safety. The conclusion was;

The reorganization since the CHPRC contract was awarded has resulted in a reassignment of responsibility for criticality safety implementation to the criticality safety program. The central criticality safety organization located in Stevens Center manages the overall program as implemented at the facilities. Previously, the implementation responsibility was managed by the nuclear safety group. Criticality safety had responsibility for assessments.

ANSI/ANS-8.19 requires that management monitor the criticality safety program typically through audits and assessments. CHPRC is following this requirement in this management assessment. Previously, the DOE-STD-1158 assessment guidelines were utilized verbatim. The contractor reviewed each of the areas in the Standard over a 3-year period. This Management Assessment utilized questions from the Standard, but only those deemed relevant to the implementation issues they are presently exploring. This is an acceptable practice particularly in light of the new organizations created since the contract change. The assessment format enables the contractor to measure the quality of their program implementation in a meaningful way by carefully selecting the review criteria.

The Management Assessment was well-organized with defined lines of inquiry. Assessment of compliance to the Key Attributes combined with a review of operating procedures and criticality process evaluations is a best practice.

The Management Assessment utilized questions from the DOE-STD-1158 Standard, but only those deemed relevant to the implementation issues being explored. This is a good practice particularly in light of the new organizations created since the contract change. The assessment format enables the contractor to measure the quality of their program implementation in a meaningful way by carefully selecting the review criteria.

Criticality safety evaluations and the expectations of DOE-STD 3007-2007

Significant changes were made to the process when DOE O 420.1B Criticality Safety Program Description Document were implemented in the contract. This has resulted in improvements in the criticality safety evaluation development process. The contractor is in full compliance with Standard.3007-2007.

5. New Facility Design

There are no new facilities being designed within the CHPRC that will require a criticality safety program. There are new projects that fall under the established criticality safety program that will need criticality support for design. The Sludge Treatment Project will require modification of T Plant to support planned sludge processing. This effort is still in the conceptual design phase. Retrieval of waste from the Alpha Caissons also includes criticality safety support to process and equipment design. This activity is also in the conceptual design phase. Both projects have assigned CSE support.

CS staff have participated in the hazards assessment meetings for both new (conceptual design) projects.

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]). Non-reportable nonconformances are also tracked within CRRS. All nonconformances are reviewed and trended by the CHPRC Criticality Safety Program and shared with RL.

As a result of deficiencies (errors and omissions) in CSERs supporting K-Basins Operations, an extent of condition review was completed on all active CSERs for 100K project in October 2009. Three CSERs were judged to have issues that required entering the CHPRC nonconformance process. As of this date no trends were identified in these three issues. The extent of condition review has been expanded to include CSERs supporting operations at the Plutonium Finishing Plant. Two problems have been identified, but no trending has been conducted.

7. Follow Up to Assessments

A formal surveillance conducted in September, 2009 was partly designed to follow up a previous assessment. The surveillance addressed; a review of the status of corrective actions from the September 2006, "Technical Evaluation of the Fluor Hanford Criticality Safety Program".

Three Recommendations and nine Opportunities for Improvement were identified in the September, 2006, "Technical Evaluation of the Fluor Hanford, Inc. Nuclear Criticality Safety Program".

R-PE.01: Establish and demonstrate rigorous and disciplined methods to determine appropriate sets of abnormal conditions for analysis in CSERs.

The response of the operating contractor was to change the Nuclear Criticality Safety Program manual, HNF-7098 to; (1) require a disciplined Hazard Identification process in the development of Criticality Safety Evaluation Reports (CSERs) and, (2) to train the criticality engineers in hazard identification methods. These actions are complete. The two CSERs reviewed in this surveillance showed clear evidence of rigorous and disciplined hazard assessment methods.

R-MC-01: FHI should remove operational postings from non-operational equipment.

The tour of PFP showed no evidence of inappropriate postings. The operating contractor has removed the subject postings.

R-MC-02: Reevaluate the criteria for locating criticality safety postings, especially in waste buildings.

FHI issued a posting guide to assure consistent posting practices.

OFI-MC-01: Implement a consistent practice for labeling fissile material storage areas.

The FHI NCS manager referred this issue to representatives from the various operations areas, who concluded that a consistent practice was not a problem. As a result of this evaluation it was deemed that no specific corrective action was necessary.

OFI-MC-02: Develop a standard site procedure describing a formal process for removing criticality postings.

The FHI NCS manger referred this issue to the Criticality Safety Center of Expertise for action. The COE members concluded that the existing practice at some facilities of informal removal of criticality postings was not a problem.

OFI-MC-03: ZO-200-518, Rev J., should be revised to reflect actual practice requirements addressing the use of conservative values for uranium.

The procedure was changed as suggested.

OFI-NC-01: Staff should be trained and encouraged on the use of handbooks and hand methods to check complex calculations.

This opportunity was accepted and the NCS staff received additional training on use of handbooks and "hand calculational methods". One of the CSERs reviewed (CSER 06-003) showed evidence of the practice.

OFI-SR-01: Fluor Hanford should clarify the role of Criticality Safety Representatives in terms of independence of the safety function and ownership of safety performance.

The CH2MHill organization has the Criticality Safety Representatives reporting to the project organization and matrixed to the Criticality Safety organization. They see this structure as supporting the desired safety function independence and operations ownership. The team considers this an adequate response.

OFI-OP-01: PFP should adopt a consistent practice for identifying criticality controls in operating procedures.

A standard practice was established.

OFI-MA-01: Develop a corrective action plan to correct observed Conduct of Operations issues.

FHI determined that there were already 66 corrective actions open from other reviews addressing observed deficiencies in conduct of operations. These had not been known to those interviewed at the time of the 2006 assessment. FHI decided these 66 would also correct the deficiencies observed during the review and that no additional action was necessary.

OFI-MA-02: Strengthen the Senior Criticality Safety Committee in reporting level, authority, and consider inclusion of outside members.

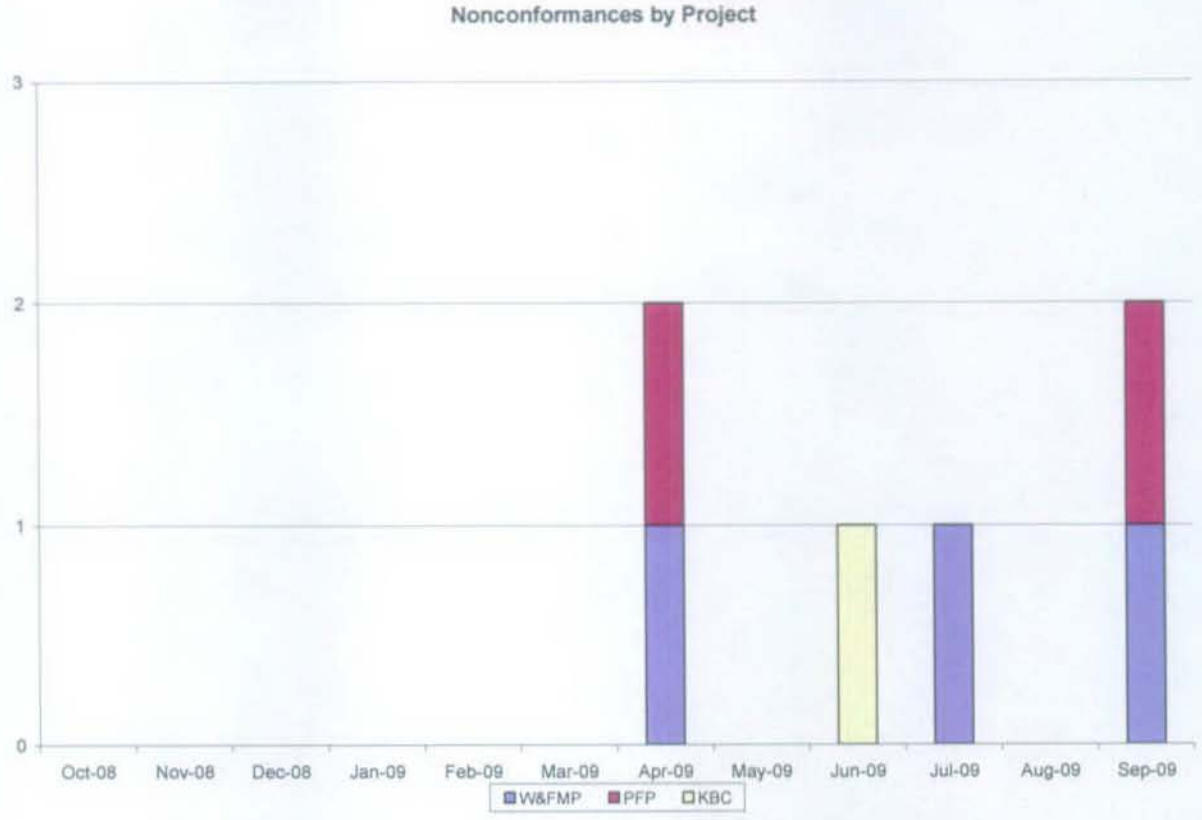
The committee was strengthened with a new charter, authority and reporting level. Outside members however, were not added.

OFI-MA-03: Develop and monitor internal FHI performance measures.

No internal measure were developed, because only infraction and deviation events were thought worthy of tracking and these were already regularly reviewed.

Effectiveness of corrective actions

The Contractor's response to the "Recommendations" from the report was appropriate and resulted in positive programmatic improvements. The responses to the less important "Opportunities for Improvement" however, were not as positive.



Richland Operations NCS Nonconformances

Attachment 2

Office of River Protection Criticality Safety Program Annual Report
Waste Treatment Plant

Field Office Manager: Shirley Olinger NSC POC: Victor Callahan

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

The WTP project has not advanced to the point where performance metrics specific to operations would/could be useful. 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 are needed. The Field Office plans on scheduling WTP NCS assessments on a three year basis.

ORP assessments of the WTP criticality safety program and the criticality safety evaluation report have been documented through findings and conditions of acceptance. These deficiencies are currently being tracked to completion.

2. Status of Contractor Criticality Safety Engineer Program

The staffing level is two CSEs who have been with the WTP project for several years. In addition, there is a junior level staff person training to be a CSE.

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. Three findings were issued: (1) lack of evidence of NCS staff involvement in design reviews with process engineering; (2) lack of criticality safety training program and lack of criticality safety training for staff besides CSEs that are involved with the design of equipment and processes that involve fissional material; (3) lack of documented evidence of management assessment of the NCS program.

ORP has closed two (2) findings. The outstanding finding regarding management assessments of the WTP Criticality Safety Program (CSP) is still open. ORP has determined that the contractor did not meet the intent of ANS 8-19 requirements for management participation in CSP assessments.

3. Status of Federal Criticality Safety Oversight Program

The field office has one qualified Federal Criticality Safety Engineer (CSE) to oversee the WTP CSP. A memorandum of agreement between ORP and RL allows an additional qualified Federal Criticality Safety Engineer on an as-needed basis. The one qualified federal staff CSE assigned to the ORP Nuclear Safety Division full time, but provides coverage and support to WTP specific criticality safety issues

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

4. Federal Assessments of Site NCS Programs

ORP performed a criticality safety assessment of the WTP by federal staff and issued the report in April 2008. The report had three findings and corrective actions were taken for two of the findings. The third finding concerned management assessments and ORP does not consider corrective action sufficient and the finding remains open.

An earlier assessment found that the contractor did not provide evidence of self assessments. Only management assessments or audits performed was by the contractor Quality Assurance personnel who reviewed aspects of the NCS program. Environmental and Nuclear Safety management for which Criticality Safety and CSEs are under have not performed any management assessments. BNI (San Francisco office) personnel did perform an assessment of the CSER in June 2007, but this was in response to concerns brought up by DNFSB staff during a criticality review of WTP in April 2007.

In December 2008, the DOE 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 wrote 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 DOE CSSG assessment recommendations and areas for improvement were incorporated into one of the COAs for the ORP SER.

5. New Facility Design

The Waste Treatment Plant Project will require 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 lesson learned from ORP oversight to date is that WTP authorization basis staff must stay 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. Mixing of the WTP pretreatment waste feed receipt process vessels using pulse jet mixers is an ongoing issue that affects criticality safety.

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

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

7. Follow Up to Assessments

ORP will conduct criticality safety assessments every three years.

The recent criticality safety assessment performed by WTP federal staff was the first documented assessment of the WTP NCS program. Two of three findings from the ORP assessment have been closed. A third finding (regarding management participation in CSP assessments) is still open.

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

N/A

Attachment 3

Tank Farms Operations Criticality Safety Program Annual Report

Field Office Manager: Shirley Olinger NSC POC: Victor Callahan

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

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

- Nuclear Criticality Safety Staff participates in professional development activities such as ANSI/ANS-8 standards working groups, nuclear criticality safety workshops (or similar) on an annual basis.
- Perform regular management self-assessment of nuclear criticality safety program implementation. WRPS conducted a Management Assessment of the Criticality Safety Program in February 2007.
- Qualify Criticality Safety Engineers and Criticality Safety Representatives (using DOE STD 1135-99 as a guide). Presently all criticality safety staff working in facilities and preparing evaluations are qualified to the Standard. Training and qualification were assessed as part of the management assessment process in February 2007.
- Frequent interaction of the Nuclear Criticality Safety Representatives with operations staff in operating facilities. Facility criticality safety programs emphasize participation of the CSR in facility walkdowns, job planning, pre-job briefs, interactions with operations.
- Perform quarterly criticality safety inspections of fissionable material storage areas/arrays and laboratory areas.
- Problem Evaluation Reports (PER) are tracked, trended and entered into a corrective action management system.

2. Status of Contractor Criticality Safety Engineer Program

WRPS employs one Process Engineering Manager responsible for criticality safety, 1 qualified Criticality Safety Engineers on a task-order contract basis, 2 qualified Criticality Safety Representatives.

Staffing appears to be adequate based upon the mission needs, however, frequent monitoring is required to ensure that CSE support is available when needed.

3. Status of Federal Criticality Safety Oversight Program

The Program was reviewed by a HQ assessment team in 2006. The reviewed concluded: "The RL Criticality Safety Oversight program is well implemented."

Federal oversight staffing appears to be adequate; with one qualified NCS Federal Nuclear Engineer.

4. Federal Assessments of Site NCS Programs

RL conducts a Review of the WRPS Criticality Safety Management Self-Assessment and process and reviews the quarterly facility inspections.

Criticality Evaluations change infrequently. However, they were reviewed in 2006 as part of a Field Office Assessment. RL/ORP reviews a sampling of new analyses as they are prepared. Because of criticality safety evaluations infrequent changes, 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 review will be conducted during the period of December 7-11, 2009.

A DOE Assessment of the Tank Farms Criticality Safety Program was conducted in March, 2006. Four Findings resulted: 1) The TFC does not meet ANSI/ANS 8.19 requirements for retention of CSE support. 2) Sample procedures do not comply with ANSI/ANS 8.19 Standards requirements for response to deviations from normal process conditions. 3) TFC operations staff members were delinquent in criticality safety training. 4) Trained and qualified criticality safety staff members not utilized in the hazards identification process for a new facility design.

Corrective actions (PERs) were generated for each of these issues and all were satisfactorily addressed and closed.

Tank Farms nuclear criticality safety is based upon; 1) preserving the form and distribution of the fissile bearing waste, and 2) maintaining the total FGE inventory below ½ 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

New facilities requiring a criticality safety program include (1) the Demonstration Bulk Vitrification Facility (DBVS), (2) the Contact Handled-TRU (CH-TRUM), and (3) the Interim Disposal Facility (IDF). Criticality safety evaluations for all three projects have received DOE review.

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

WRPS tracks criticality safety issues through the PER system. One PER in criticality safety was identified in 2008, and six for 2009. Most were low-level concerns and all were closed through the PER process. Proceduralized review of new or modified operations within Tank Farms facilities has thus far precluded operational non-conformances with existing NCS limits and controls. However, periodic inspections, assessments, etc., have identified several areas for programmatic improvement that result in the generation of the PERs mentioned above. Identified PERs pertain to:

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

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

7. Follow Up to Assessments

None planned at this time.

8. Status of any open issues identified in previous reports

Presently there are no open issues.

Attachment 4

Paducah Site Criticality Safety Program Annual Report

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 PRS NCS program implementation at Paducah.

The number of Anomalous Condition Reports (ACRs), the amount of field time for NCS engineers, continuing education of NCS engineers, and number of surveillances, assessments, and lessons learned are included in these metrics.

PRS provides the information in quarterly NCS metrics reports. These reports included three ACRs that were generated in fiscal year 2009. The three ACRs involved the discovery of legacy fissile materials, the inadequacy of NCS Determination (NCSD) implementation, or the lack of NCSD clarity.

The PRS Quality Assurance (QA) Program monitors and assesses the implementation and performance of the NCS Program. In addition, PRS and the DOE oversight staff perform Implementation Verification Review (IVRs) of the NCS Program implementation following updates to the safety basis documents. A DOE assessment of the PRS NCS Program implementation was performed as part of the annual Integrated Safety Management System (ISMS) assessment during June 2009. DOE oversight also includes routine monitoring of program implementation by the Facility Representatives.

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

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

2. Status of Contractor Criticality Safety Engineer Program

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

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

3. Status of Federal Criticality Safety Oversight Program

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

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

PPPO has been increasing the number of Federal oversight staff at the Portsmouth and Paducah sites. A position for the third Facility Representative at Paducah was filled during FY-2009. In addition, positions for PPPO nuclear safety staff are being developed.

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

4. Federal Assessments of Site NCS Programs

DOE has conducted two assessments of the PRS NCS program since the start of the PRS contract. The second assessment was performed in June 2009.

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

5. New Facility Design

PPPO has constructed a new facility at the Paducah Site. The new facility is designed to process UF_6 depleted in the ^{235}U isotope. The NCS Program for the facility is limited to prohibiting the introduction of fissile material into the facility. The facility is scheduled for startup in 2010.

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

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

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

Based on the PRS trend analysis, management problems related to prior operations at the site are the leading cause of anomalous conditions. The PRS contract scope is to disposition the radiological waste generated from the gaseous diffusion plant (ship to off-site waste disposal facilities). Most ACRs

involve the discovery of conditions that differ from prior accepted knowledge. These conditions have generally been assigned to "Management Problems".

PRS reviews the trend analysis quarterly and any trend identified has a cause analysis performed that results in a 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 prior assessments. A PPPO assessment of the PRS NCS Program was performed in June 2009 with no new findings or observations.

PPPO noted that previous corrective actions were completed and the results were determined to be effective.

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

Presently there are no open issues.

Attachment 5

Portsmouth Site Criticality Safety Program Annual Report

Office Manager William Murphie NCS POC Tom Hines

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

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

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

ACRs and NCS-related Problem Reports were reported in FY-2009. Seven ACRs were generated in FY- 2009. The seven ACRs involved changing information on legacy fissile materials, personnel errors (lack of adherence to procedures), or the lack of NCS Evaluation (NCSE clarity.)

The LPP Quality Assurance (QA) program is used to formally monitor and assess the implementation and performance of the NCS Program. In addition, LPP and the DOE oversight staff perform Implementation Verification Review (IVRs) of the NCS Program implementation following updates to the safety basis documents. DOE oversight also includes routine monitoring of program implementation by the three Facility Representatives.

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

PPPO continued its increased oversight of the LPP contractor during FY-2009. PPPO performed readiness assessments for several new operations that involved limited processing of fissile bearing materials. DOE EM HQ staff was also invited to assist in the assessment process.

2. Status of Contractor Criticality Safety Engineer Program

Based on the current level of contractor activity, three NCS Staff Full Time Equivalents (FTE's) are required to support the mission at the Portsmouth site. Currently LPP has 3 NCS engineer FTEs, including availability of subcontractor staff.

PPPO has affirmed adequacy of the LPP NCS Program staffing.

3. Status of Federal Criticality Safety Oversight Program

Based on the current level of activity at the Portsmouth site and the planning for Decontamination and Decommissioning (D&D), PPPO needs approximately 1.0 FTE.

PPPO has one Safety Systems Oversight (SSO) lead. He provides oversight for the LPP NCS Program. However, he has multiple responsibilities and has limited time to provide oversight. In addition, PPPO utilizes three Facility Representatives at PORTS to provide oversight on safety management programs (including the NCS Program). PPPO also has support contractors that assist in oversight of the LPP NCS Program.

PPPO is increasing the number of Federal oversight staff at the Portsmouth and Paducah sites. Positions for PPPO nuclear safety staff are being developed.

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

4. Federal Assessments of Site NCS Programs

A DOE assessment of the LPP NCS program was conducted in October 2007. A PPPO follow-up assessment conducted in October 2008 concluded that the NCS Program was compliant with DOE requirements.

The DOE assessment identified areas for improvements. LPP developed a Corrective Action Plan (CAP) in response to the DOE assessment. PPPO approved the CAP and has provided oversight as the CAP was implemented. The CAP included the following corrective actions:

- LPP utilized consultant(s) to perform functional reviews and assessments to determine the overall effectiveness of the NCS program and recommend improvements.
- A crosswalk of DOE O 420.1B and ANSI/ANS requirements was performed to LPP NCS Program documents and all documentation was revised to ensure proper flow down and compliance.
- A new NCS training module was developed and presented specifically for the Superintendents/Task Leads to ensure a better understanding of NCS methods and controls.
- Training for "Hazard Identification Methods/Scenario Development" was incorporated into NCS staff training requirements per Training Position Description (TPD) and Qualification Card.
- Reviewed data and properly marked drum(s) in storage arrays and other areas to ensure all drums were properly labeled in compliance with the NCSE.
- Reviewed previous ACRs and identified the corrective measures taken to prevent re-occurrence of improper drum storage.
- Reviewed Nuclear Criticality Safety postings and made improvements for communicating controls on tasks through simplicity and clarity.

- Reviewed the NCSE process to determine the effectiveness and manner in which criticality safety evaluations are performed and written showing that all credible scenarios have been identified and that adequate controls have been developed in order to facilitate effective independent review.

5. New Facility Design

PPPO has constructed a new facility at the Portsmouth Site. The new facility is designed to process UF_6 depleted in the ^{235}U isotope. The NCS Program for the facility is limited to prohibiting the introduction of fissile material into the facility. The facility is scheduled for startup in 2010.

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

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

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

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

Corrective actions have been implemented to address the weakness associated with non-compliance with procedures.

7. Follow Up to Assessments

PPPO has been performing follow up on the corrective actions from the first DOE assessment.

PPPO determined that the corrective actions for NCS have been effective.

8. As applicable, provide status of any open issues identified in previous reports.
There are no open issues since all corrective action items have been properly closed out and documented.

Attachment 6

Idaho EM Criticality Safety Program Annual Report

Field/Site Manager: Dennis Miotla / Rick Provencher

NSC POC: Kermit Bunde/Roger Harshbarger

1. **Measure of Contractor Nuclear Criticality Safety (NCS) Performance**
   - Idaho Cleanup Project (ICP) / CH2M*WG Idaho (CWI) NCS metrics
     - Two criticality safety metrics are reported monthly to DOE-ID as part of the Safety Performance Objectives, Measures, and Commitments (SPOMC) report.
       - The first metric is called the Nuclear Safety Severity Index (NSSI). 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 goal in to maintain the NSSI less than 35. It is reported as a rolling 12 month average. The NSSI is calculated as follows.

Nuclear Safety Severity Index (NSSI)

$NSSI = (10^6) \sum wf_i / (\text{hours worked})$

NSSI =	Nuclear Safety Severity Index
10^6	Constant (scaling factor)
Wf_i	Weighting factor per event (see below)
Hours worked	Number of hours worked (contractor and subcontractor combined) in an accounting month

Significant Category	wf_i
4	10
3	20
2, R or OE	40
1	200

- The second metric is called the Criticality Safety Adversity Index (CSAI). This is a weighted index of criticality safety noncompliances. This is a new metric, starting October 2009 that has been negotiated with DOE-ID. The CSAI is calculated as follows.

Criticality Safety Adversity Index (CSAI)

CSAI = $(\sum wf_i \times 200{,}000)/$ (hours worked)

Where

CSAI =	Criticality Safety Adversity Index
200,000	constant (person-hours for an 100 person work force)
wf_i	weighting factor for i^{th} program element defined as: wf_1 = Infraction = 4 wf_2 = Deficiency = 1
Hours worked	Actual hours worked for workforce population – [Same hours used to calculate OSHA Total Recordable Case Rate (TRCR)]

- Advanced Mixed Waste Treatment Project (AMWTP) / Bechtel Babcock-Wilcox Technologies (BBWI)
  - Two criticality safety metrics are reported monthly to DOE-ID as part of the SPOMC report.
  - The first metric is called the Nuclear Safety Index (NSI). Only ORPS reportable events in Group 3, Subgroups A and C and Group 4, Subgroup A, B (2), and B (3) are included. The goal in to maintain the NSSI less than 35. It is reported as a rolling 12 month average. The NSI is calculated as follows.

    BBWI Nuclear Safety Index

$$NSI = \frac{1{,}000{,}000 \times \Sigma [\text{Event1} \times WF + \text{Event2} \times WF \ldots \text{Event}_N]}{\text{Hours Worked}}$$

Hours Worked for AMWTP (actual by accounting month)

Event is the OPRS reportable event

1,000,000 constant

- Severity Weighting Factors (WF) are taken from Group 3, Subgroups A and C and Group 4, Subgroup A, B (2), and B (3).

Where: Each event is multiplied by severity using a Weighting Factor (WF) as defined below:

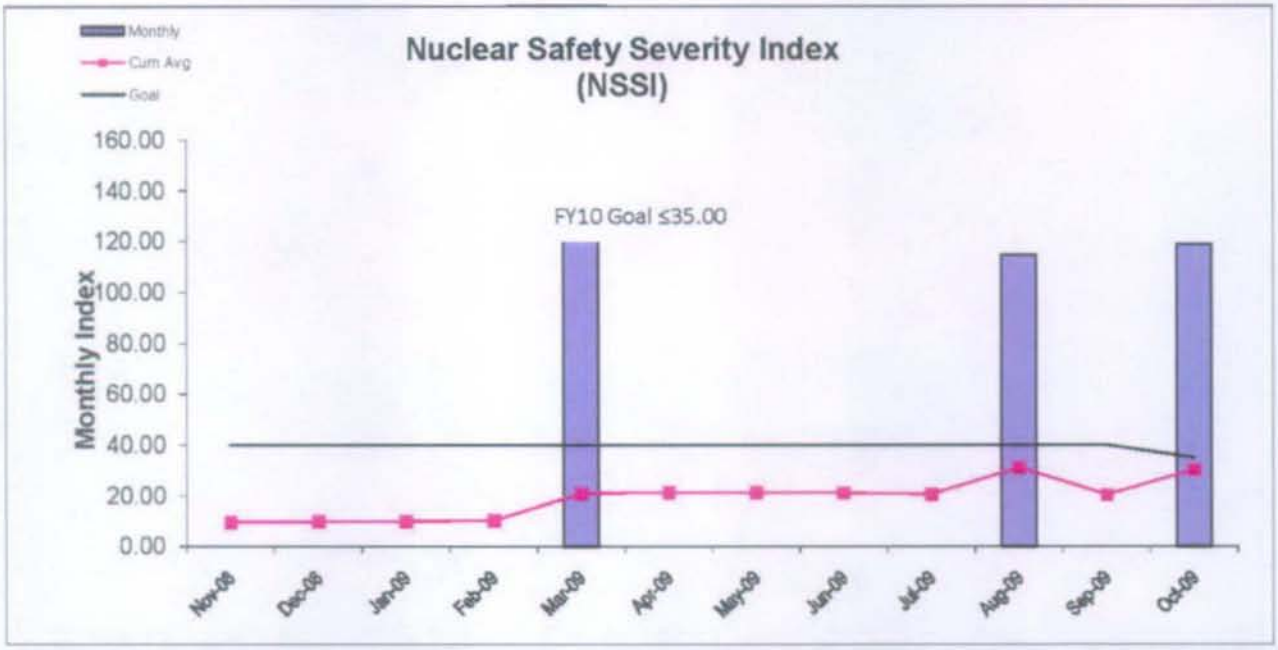
Significant Category	wf_i
4	10
3	20
2,R, or OE	40
1	200

  - Criticality Non Compliance Measure (CNCM) – Starting in October 2009, BBWI is piloting CNCM as a leading indicator for NCS issues, which will measure the number of ORPS events and non-reportable events related to Nuclear Safety. Each event is categorized as to cause (e.g.,

implementation, execution, or level of knowledge). The total number of events will be categorized and graphically presented to help target future corrective actions.

Graphs are presented in the next four pages illustrating the status of the metrics for twelve months through October 2009.

ICP/CWI – NSSI



	Nov-08	Dec-08	Jan-09	Feb-09	Mar-09	Apr-09	May-09	Jun-09	Jul-09	Aug-09	Sep-09	Oct-09
Goal	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	35.00
Monthly	0.00	0.00	0.00	0.00	133.42	0.00	0.00	0.00	0.00	114.74	0.00	118.67
Cum Avg	9.75	9.91	10.11	10.41	21.09	21.29	21.30	21.21	20.71	31.25	20.50	30.35

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, CCN309164 of September 24, 2009.

Analysis

There was one ORPS reportable event in October involving the degradation of a safety-significant structure at the Irradiated Fuel Storage Facility (IFSF). The roof of the IFSF is safety-significant with a safety function of precluding water leaks onto fuel canisters stored in IFSF. The CPP-601/IFSF roof drain systems were plugged during and unusually heavy rain fall resulting in standing water on the roof and water leaking into the IFSF. This event was previously reported in the September FY09 SPOMC report in error.

Actions

Corrective actions are being performed in accordance with an approved corrective action plan. The IFSF roof has been re-caulked and a new limiting condition for operation (LCO) is being drafted that addresses the potentially degraded roof structure. Other long-term corrective actions include a more permanent fix for the roof to prevent leaking.

Goals	Points of Contact	
Annual Performance Goal is ≤35.00. Monthly Grading Criteria: Blue <.43.75, Green (43.76-52.50), Yellow (52.51-61.25), Red >61.25. Cum Avg: Blue (<31.50), Green (31.51-35.00), Yellow (35.01-38.50), Red (>38.50).	Responsible Manager: SME: POC:	J. L. Harvey (3-0849) R. G. Peatross (520-6662) M. D. Allred (3-6294)

○ ICP/CWI – CSAI

Data	Nov-08	Dec-08	Jan-09	Feb-09	Mar-09	Apr-09	May-09	Jun-09	Jul-09	Aug-09	Sep-09	Oct-09
Goal												0.85
Monthly	0.00	2.96	0.00	0.00	2.67	0.00	0.00	1.30	0.00	1.72	0.00	2.31
Cum Avg	0.44	0.64	0.66	0.57	0.74	0.75	0.75	0.85	0.83	0.99	0.72	0.86

Definition

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.

This is a new measure for FY10, therefore no previous goals or color grades are established.

Analysis

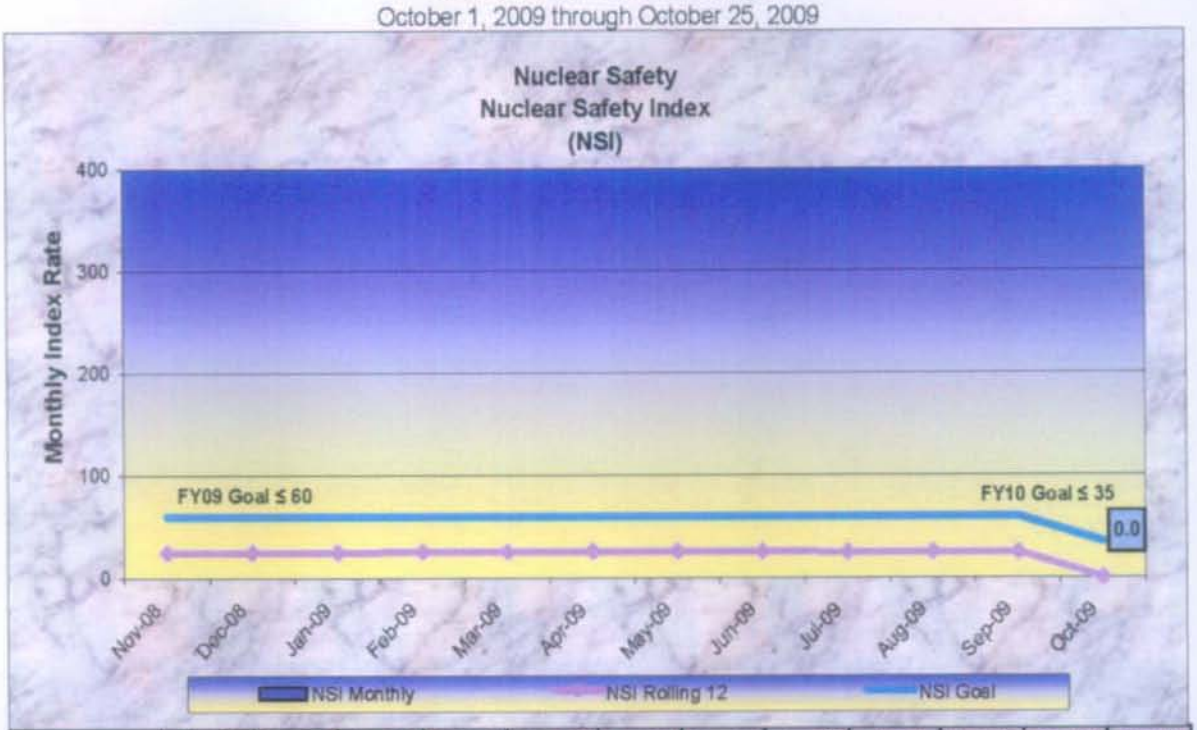
There was one criticality safety infraction this reporting period. This noncompliance resulted in a loss of double contingency. Supervision was notified, and the Nuclear Facility Manager (NFM) and Criticality Safety Officer (CSO) entered the TSR-114 3.114.1 LCO for a noncompliance with the criticality safety requirements for the facility. Nuclear criticality safety was notified, and the shuttle bin and cask transfer car were administratively tagged to prevent any fuel movement.

Actions

Immediate actions were taken to stop the roof leak and prevent future leaks. These actions included roof caulking, clearing the roof scuppers, and repairing rain gutters. Preventive maintenance on roof was reviewed and frequency increased. Routine leak inspections have been implemented. Long term corrective actions are being reviewed for more permanent roof repairs. Safety basis documents and the criticality safety evaluation were revised to address the possibility of future roof leaks.

Goals	Points of Contact	
Annual performance goal is ≤0.85 Monthly Grading Criteria: Blue <1.06, Green (1.07-1.28), Yellow (1.29-1.49), Red >1.49. Cum Avg: Blue <.77, Green (.78-.85), Yellow (.86-.94), Red >.94.	Responsible Manager: SME:	M. Thieme (520-0506) K. Woods (3-0052)

AMWTP Detailed SPOMC Metrics
Measurement Period Covering:
October 1, 2009 through October 25, 2009



Data	Nov-08	Dec-08	Jan-09	Feb-09	Mar-09	Apr-09	May-09	Jun-09	Jul-09	Aug-09	Sep-09	Oct-09
NSI Monthly	0	0	0	0	0	0	0	0	0	0	0	0
NSI Rolling 12	24.6	24.8	25.0	25.5	25.6	25.8	25.7	25.6	25.0	25.2	24.9	0.0
NSI Goal	60	60	60	60	60	60	60	60	60	60	60	35

Definition

The Nuclear Safety Index (NSI) is an index that measures TSR/LCO violations and criticality safety events in accordance with ORPS reportable criteria.

Analysis

There were no ORPS events related to the Nuclear Safety Index for the October reporting period.

Performance is below the annual NSI goal of ≤ 35.
Note: The FY10 Goal was revised, per the AMWTP SPOMC, AMWTP-RPT-025, of September 2009.

Actions

No specific actions required at this time.

Goals

FY 10 Performance Goal = ≤ 35

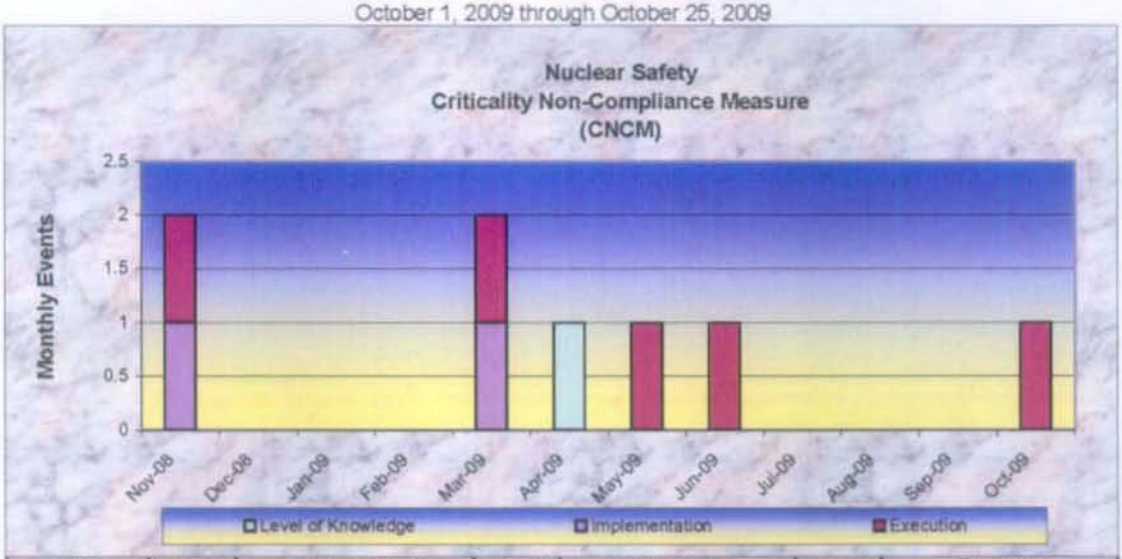
NSI Grading Criteria:	Monthly		Rolling 12
≤ 125%	(≤ 44)	≤ 90 %	(≤ 32)
> 125 - 150%	(> 44 - 53)	> 90 - 100%	(> 32 - 35)
> 150 - 175%	(> 53 - 61)	> 100 - 110%	(> 35 - 39)
> 175%	(> 61)	> 110%	(> 39)

Point of Contacts

Responsible Manager:	Lee Sygitowicz (557-6320)
POC:	Tim Finup (557-7128)

○ AMWTP/BBWI – CNCM

AMWTP Detailed SPOMC Metrics
Measurement Period Covering:
October 1, 2009 through October 25, 2009



Month	# Events	Level of Knowledge	# Events	Implementation	# Events	Execution
Nov-08			1	Discrepancy in # squeezants	1	CWR-ETR Review
Dec-08						
Jan-09						
Feb-09						
Mar-09			1	CWR-ARP FGE	1	CWR S/C
Apr-09	1	Use of unapproved absorbents				
May-09					1	CWR CCP
Jun-09					1	CWR Failing to notify CSO on leak
Jul-09						
Aug-09						
Sep-09						
Oct-09					1	CWR DTF Operation Procedure Violation
Totals	1	0.08	2	0.17	5	0.42

Definition

The Criticality Non-Compliance Metric measures the number of ORPS events and non-reportable events related to Nuclear Safety. Each event is categorized as cause (i.e., level of knowledge, implementation, and execution). The total number of events occurring each month are categorized and graphically presented to help target future corrective actions. Total values are computed based on the total number of events/12.

Actions	Point of Contact
Oct Event - Drum Treatment Facility Procedure Non-Compliance Results in CWR Violation (FF-MM-09-033) Follow-up corrective actions associated with this event is being tracked in Trackwise: -CAR 47705 - will document and track the follow-on improvement actions for this event.	Responsible Manager: Lee Sygitowicz (557-6320) POC: Tim Finup (557-7126)

- The two contractors have well-developed criticality safety programs. The criticality safety programs appear to have a well-developed self-assessment program. This has been observed during quarterly CSP oversight surveillances conducted by the DOE SME for criticality safety throughout the reporting period.
- For both contractors, NCS performance has been satisfactory.

2. **Status of Contractor Criticality Safety Engineer Staffing**
   - ICP/CWI
     - Two full time CWI engineers, one full time subcontractor
   - AMWTP/BBWI
     - Two full time Criticality Safety Officers, one full time criticality safety engineer (CSE), and two subcontract CSEs. BBWI is currently (November 2009) engaged in procuring the services of an additional two subcontractor criticality safety engineers to accommodate peak needs.
   - DOE Field Management analysis of the adequacy of contractor's NCS staffing.
     - ICP/CWI

       The contractor has adequate staffing for current activities. A criticality engineer qualification program is in place if the need arises to hire additional staff.
     - AMWTP/BBWI

       The contractor has adequate staffing for current activities. Planned additional subcontractor CSEs will support additional work scope associated with the AMWTP contract extension. In the near-term, the contractor might have difficulty responding with a CSE in an emergency situation until the in-house CSE is qualified, due to the subcontract nature of their staff. A new in-house criticality safety engineer has a target qualification date of December 31, 2009. When qualified, this additional in-house capability will further alleviate shortfalls..

3. **Status of Federal Criticality Safety Oversight Program**

   EM has one qualified Criticality Safety Specialist (Roger Harshbarger)
   QSD has two qualified Criticality Safety Specialists (Adolf Garcia and Kermit Bunde)
   DOE Field Management analysis of the adequacy of Federal NCS staffing. concluded that staffing is adequate for current and near-term activities. One additional EM staff member is in training

4. **Federal Assessments of Site NCS Programs**

   Quarterly surveillances of both ICP contractors are conducted by QSD (Kermit Bunde) and EM (Roger Harshbarger).

Periodic surveillance of AMWTP Criticality Alarm System by Roger Harshbarger.
No issues were identified. Contractor Criticality Safety Programs are 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.
New and revised criticality safety evaluations do meet the expectations of DOE-STD-3007-2007.

5. New Facility Design

ICP/CWI

The Idaho Spent Fuel Facility (ISFF) has received Critical Decision (CD)-0 approval. The project will utilize the existing, DOE-approved criticality safety program.

Two other EM funded facilities at Idaho will not need a criticality safety program. The Integrated Waste Treatment Unit will process liquids with no criticality risk, and new Advanced Retrieval Project facilities (ARP-4 and beyond) are a continuation of currently designed facilities.

Lessons learned from contractor, DOE Field Management, or independent reviews of proposed NCS controls and design requirements for new facilities

The ISFF project is following the requirements in DOE-STD-1189, *Integration of Safety Into the Design Process*. The contractor has submitted the Safety Design Strategy and the Conceptual Safety Design Report for this project to DOE-ID for review and approval, to support CD-1A approval.

The ISFF project is following the requirements in DOE-STD-1189, *Integration of Safety Into the Design Process*. The contractor has submitted the Safety Design Strategy and the Conceptual Safety Design Report for this project to DOE-ID for review and approval, to support CD-1A approval.

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

NCS occurrences are tracked and trended

- ORPS and contractor controlled list of deficiencies
- The ICP criticality safety group tracks and trends NCS occurrences. The results are reviewed annually by senior management as part of the annual CSP safety management program review

AMWTP/BBWI

NCS occurrences are tracked and trended through the ORPS system and the AMWTP issues tracking system. There were no NCS reportable occurrences in 2009.

7. Follow Up to Assessments

one of the assessments identified any shortcomings so no follow-up assessments were scheduled.

8 Open issues identified in previous reports.

None.

Tabulation of Criticality Safety related Assessments and Surveillances

Assessment Number	Type	Title	Start	Finish	Person Responsible
AST-ID-10/17/2008-89653	Surveillance	AMWTP Criticality Safety - Materials Control (Chapter 6 from DOE-STD-1158)	1/1/2009	3/31/2009	BUNDE, KERMIT
AST-ID-10/29/2008-14315	Surveillance	CWI Criticality Safety - Materials Control (Chapter 6 of DOE-STD-1158)	1/1/2009	3/31/2009	BUNDE, KERMIT
AST-EM-2/2/2009-28081	Surveillance	Vital Safety System surveillance of the AMWTP CIDAS system.	2/2/2009	2/2/2009	Harshbarger, Roger
AST-ID-10/29/2008-1612	Surveillance	CWI Criticality Safety - Safety Staff Responsibilities & Operating Procedures (Chapters 3 & 4 of DOE-STD-1158).	4/1/2009	6/30/2009	BUNDE, KERMIT
AST-ID-10/29/2008-97198	Surveillance	BBWI Criticality Safety - Safety Staff Responsibilities & Operating Procedures (Chapters 3 & 4 of DOE-STD-1158).	4/1/2009	6/30/2009	BUNDE, KERMIT
AST-ID-10/29/2008-97564	Surveillance	CWI Criticality Safety - Supervisory Responsibilities and Process Evaluation for NCS (Chapters 2 & 5 of DOE-STD-1158).	7/1/2009	9/30/2009	BUNDE, KERMIT
AST-ID-10/29/2008-91987	Surveillance	BBWI Criticality Safety - Supervisory Responsibilities and Process Evaluation for NCS (Chapters 2 & 5 of DOE-STD-1158).	7/1/2009	9/30/2009	BUNDE, KERMIT
AST-OS-7/20/2009-31385	Operational Awareness	Quarterly Criticality Safety Management Program Review Idaho Cleanup Project	7/1/2009	7/20/2009	BUNDE, KERMIT
AST-OS-7/20/2009-2156	Operational Awareness	Quarterly Criticality Safety Management Program Review - AMWTP	7/1/2009	7/20/2009	BUNDE, KERMIT

AST-OS-10/5/2009-14342	Surveillance	ICP Criticality Safety	10/1/2009	12/31/2009	BUNDE, KERMIT
AST-OS-10/5/2009-50006	Surveillance	AMWTP - Criticality Safety	10/1/2009	12/31/2009	BUNDE, KERMIT

Attachment 7

Savannah River Operation Office Criticality Safety Program Annual Report

Field/Site Manager: Jeff Allison NCS POC: Norman Shepard

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

Metrics been established to monitor contractor NCS performance for the Savannah River Nuclear Solutions (SRNS) Management and Operating (M&O) and Savannah River Remediation (SRR) Liquid Waste Operations (LWO) contractors.

The Salt Waste Processing Facility (SWPF) contractor has not yet progressed to the stage where a metric is necessary.

The SRNS/SRR Nuclear Criticality Safety Review Committee (NCSRC) maintains a criticality safely indicator based on reportable and non-reportable occurrences that arc reported into a site database. The database includes items from M&O facilities as well as Liquid Waste facilities. A rating scale is used to score each reportable and 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 arc also compiled and tracked to determine the major causes of the occurrences. A goal is established by the NCSRC on an annual basis to reduce the number of occurrences in the groupings having the highest number of occurrences.

DOE O 232.1 reporting criteria were revised effective in 2003. The M&O/LWO database for reportable and non-reportable events came on line about the same time. However, full site-wide implementation of the database did not occur until 2005. Therefore, a consistent set of data is available for calendar years 2005 through the 2009. For M&O and Liquid Waste facilities, the indicator score for 2005 included 62 total events (4 criticality alarm system issues, 37 minor events < procedure limit, 20 procedure limit violations, 1 TSR level; total score = 144). The results for 2006 showed improvement with 49 events (3 criticality alarm system issues, 31 minor events < procedure limit, 12 procedure limit violations, 3 TSR level; score = 119) - a reduction in total score of approximately 20%. For 2007, indicator results approved again with 43 events (5 criticality alarm system issues, 31 minor events < procedure limit, 6 procedure limit violations, 1 TSR level; score = 91) - a reduction of about 24% compared to 2006. Based on 2006 results, a goal was established for 2007 to reduce the number of instrument problems and human performance problems by 20%. The goal was met. However, the number of management problems and communication problems increased during 2007. Management recognized that human performance was a general site issue that required continuing efforts for improvement. Therefore, during 2007 and 2008, a series of Human Performance Improvement training sessions were provided to site management and engineers. For 2008 there were 40 events related to criticality safety (6 criticality alarm system issues, 24 minor events < procedure limit, and 10 procedure limit violations: score = 84) - a small improvement versus 2007 results. Only one event (< procedure limit violation) occurred in a LWO facility. For 2007 and 2008, the Human Performance Improvement (HPI) training and tools appear to have reduced human performance problems related to criticality

safety. For the first three quarters of 2009, there have been 37 events (1 criticality accident alarm system issue. 35 minor events (< procedure limit) and 1 procedure limit violation. The events primarily involve minor documentation issues, human performance problems and communication issues. Equipment problems related to charging fissile material to the H-Canyon dissolver also occurred. The use of HPI tools continues to be emphasized.

The M&O Contractor's Criticality Safety Engineering organization also prepares a quarterly criticality safety Performance Assessment (PA) using the same data (including both M&O and LWO facilities). However, the PA examines the data more closely on a facility by facility basis. If a facility is experiencing an unusually high number of reportable or non-reportable occurrences, or a higher than expected number of the same type of problem, or unusually special or severe problems, the facility is placed on the "watch list" or a recurring event is declared. As a result of dropping three fissile material charges into the H-Canyon dissolver, which could impact the dissolver insert geometry and the inability of H-Material Disposition (HMD) to restart the HMD area criticality safety committee, H-Canyon/HMD is being added to the watch list. The PA also identifies other areas that affect the efficiency of activities. In 2007, the PA identified the need for improved dedicated personal computers (PCs) for criticality safely engineers to perform criticality safety calculations for M&O facilities. The previous dedicated PCs were outdated and slow. One of the major improvements during M&O contractor transition in August, 2008, was the purchase of new dedicated PCs in the M&O facilities. These computers are running fine and represent a substantially improved calculational capability.

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

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

In addition to the PA's above, the M&O/LWO Contractors have a rigorous and active self-assessment process. Performance is reviewed using the lines of inquiry established in DOE-STD-1158.

Several facilities have undergone Facility Evaluation Board (FEB) reviews during 2009 that included criticality safety as a review topic. These facilities were: Solid Waste Management Facilities, K-Area Complex, Spent Fuel Project (L-Area) and Savannah River National Lab. Criticality Safety Engineering staff participated in an assessment of the Solid Waste Management Facility DSA/TSR update implementation. The K-Area Criticality Safety Committee performed a walk-down of the new HUFP storage facility in K-Area. There were no SRNS or SRR Operational Readiness Reviews or Readiness Assessments involving criticality safety during 2009.

Trained SRNS criticality safely technicians, working together with SRNS facility engineers and at least one criticality safety engineer, perform criticality safety facility self assessments. Some items identified during the 2009 SRNS facility self-assessments include:

1) The SWMF Area Criticality Safety Committee did not meet during 2008 due to contractor and organizational changes. [The Committee was reconstituted in August 2009 and has held two meetings since then.]

2) One SWMF technical staff member had not received criticality safety training for several years.

3) The H-Area Material Disposition Criticality Safety Committee (and its successor Committee), which provides assistance to, and review of, H-Canyon, HB-Line, and F-Area facilities (F-Canyon and F/H Lab), has not met during the latter part of 2008 or during 2009.

4) There are inconsistencies between the HB-Line DSA and Double Contingency Analysis.

5) The K-Area linking document database contains a few inconsistencies.

6) Criticality Accident Alarm System (CAAS) placement analyses could not be found in Document Control for all locations requiring a CAAS in H-Canyon. For H-Canyon locations that do not require a CAAS, but do require a Criticality Detection System

CDS), the detection system applicable is the stack monitor. However, the procedure governing the stack monitor does not currently address criticality.

7) The Fire preplans for facilities 211-H and 292-H did not include a review by the cognizant criticality safely engineer.

Corrective actions have been developed for each item listed above.

One criticality safety related items was identified during the 2009 SRR DWPF facility self assessment.

1) A procedure that was used to record caustic molarity during a process evolution was used to record average molarity during the process rather than the specific molarity. (The procedure has been corrected.]

There were no criticality safety related self assessment findings for F-Tank Farm. H-Tank Farm, or Actinide Removal Process Modular Caustic Side Solvent Extraction facilities

In addition to its self-assessment program, the M&O Contractor received feedback on its program from Federal assessments. These assessments are described more fully in Item 4 below, but include assessment activities such as the March/April 2006 DOE-EM program assessment, DOE-SR Field Office DOE-STD-1158 based assessments during 2009, and a DOE-HQ Central Technical Authority technical observation of NDA measurements in K-Area during 2009.

The 2006 DOE-EM assessment stated that "The team observed no ongoing unsafe operations from a criticality safety perspective. SRS has a well documented criticality safely program with a strong qualification program for its criticality safely professionals. The strength of the system in developing criticality safety controls for nuclear operations is the team approach to uncovering accident scenarios that require controls; the weaknesses are the apparent de-emphasis of the defense-in-depth measures and a diffuse control implementation system." Corrective actions identified to respond to the DOE-EM appraisal were completed during 2007 and early 2008. The DOE-EM Criticality Safety Program Manager reviewed corrective action closures during January, 2008. All actions have been closed.

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

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

1. The M&O Contractor, in cooperation with LWO contractor, has worked with DOE-SR and DOE-EM to prepare a Criticality Safety Program Description Document (CSPDD). This document was approved by DOE-SR in June. 2009. As part of the CSPDD, an improved functional classification methodology has been developed that is consistent with DOE-STD-3009.

2. Improvement of the site criticality safety manual, SCD-3, to provide clarification of required control designation for incredible scenarios, more specific guidance of what is involved in a facility walk down, and incorporation of ANS-8.10. ANS-8.12. ANS-8.20. ANS-8.24. and ANS-8.26:

3. Continued implementation of more a formalized HAZOP approach for contingency analyses;

4. Preparation of an SRNS criticality safety engineer qualification program in compliance with ANS-8.26 and DOE-STD-I135. and qualification of SRNS and SRR criticality safety engineers to the plan:

5. Monthly criticality safety DOE-SR SRNS/SRR interface meetings are scheduled to review performance and identify upcoming issues

2. Status of Contractor Criticality Safety Engineer Program

Significant contractor changes have occurred at SRS since the last status report. A new M&O contractor, Savannah River Nuclear Solutions (SRNS), was selected and took over responsibility for the primary site nuclear criticality safety program

and operation of most of the SRS facilities in August 2008. A new liquid waste operations (LWO) contractor Savannah River Remediation (SRR) took over responsibility for liquid waste facilities in July. 2009. The M&O and LWO contractor changes have no direct impact on the SWPF project contractor, which is Parsons.

SRNS has created a criticality safety engineer qualification program in compliance with ANS-8.26 and DOE-STD-1135. SRR, the LWO contractor, utilizes the SRNS criticality safety engineer qualification program.

The site's M&O Contractor (SRNS) manages the majority of DOE-EM activities at SRS. SRNS currently has 12 fully qualified CS Engineers, 5 working to complete the CS Engineer qualification, and 3 CS Engineers in training. Ten of the qualified criticality safely engineers are also qualified as criticality safety officers in various facilities. One person is qualified as a criticality safety officer but not as a criticality safety engineer. One new engineer in training has been hired and will begin employment in January 2010. SRNS also has three qualified assessors. SRNS currently utilizes the services of a subcontractor to provide an additional 7 qualified NCS engineers (some only part time). A Basis of Estimate (BoE) for the SRNS managed activities has been drafted and has identified a need for approximately 3 additional CS Engineers. The level of support is adequate.

The site's Liquid Waste Operations Contractor (SRR) currently uses three fully qualified WSMS criticality safety engineers. These engineers are qualified under the SRNS program. This provides adequate support. Additional personnel are being trained to perform criticality reviews for added flexibility.

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

The M&O Contractor, SRNS, is actively advertising and recruiting to obtain additional NCS staff. Interviews with selected candidates are taking place to add to staff. SRNS has established a program to incentivize the staff to achieve the appropriate qualifications.

As a compensatory measure, SRNS continues to use qualified subcontractor criticality safety engineers to provide staff augmentation. It is expected that this subcontract will continue while SRNS hires and qualifies sufficient internal criticality safety resources.

The liquid waste operations contract was awarded to Savannah River Remediation, LLC (SRR). The transition from WSRC to SRR was completed on June 30, 2009. Criticality safety resources remain in place from WSMS which is part of the SRR team.

The DOE Field Management conclusion is that the M&O contractor still has a shortfall in staff that is being filled with subcontractor criticality safety personnel. The M&O contractor is actively recruiting to fill this shortfall. The contractors for the Liquid Waste Operations and the SWPF Project have sufficient criticality safety resources. DOE-SR has conducted and evaluation of the M&O contractor's training and qualification program and concluded that it adequately implements the requirements of DOE-STD-1135.

3. Status of Federal Criticality Safety Oversight Program

DOE-SR has three federal employees assigned full time to the criticality safety program. The DOE-SR Nuclear Criticality Safety Program Manager position is currently vacant. The two remaining qualified federal Nuclear Criticality Safety Specialists are rotating to fill the Program Manager's position on a monthly basis. The third federal employee assigned to the criticality safety program is currently being trained as a Nuclear Criticality Safety Specialist.

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

The Nuclear Criticality Safety Program Manager and the Nuclear Criticality Safety Specialist positions are currently being recruited.

4. Federal Assessments of Site NCS Programs

In Fiscal Year 2009, DOE-SR assessment activities included more than fifty assessments. The distribution of the different types of assessments is as follows: Seven of the assessments were programmatic and included two contractor Criticality Safety Program Descriptions Documents which were finally DOE approved and an evaluation of the M&O contractor's Criticality Safety Engineers Training and Qualification Program which was determined to adequately implement DOE-STD-1135. Six assessments dealt with reviewing changes to Documented Safety Analysis and/or Technical Safety Requirements for criticality safety related changes. Two assessments were associated with criticality safety for Onsite Transportation. Six assessments were related to changes to criticality safety documents that identify limits and controls for storage, handling and shipment of Spent Nuclear Fuel. Twenty six assessments were of criticality safety evaluations either new evaluations or changes to existing evaluations. Three of the assessments were Field Observations of criticality safety related operations.

Where assessments identified significant deficiencies or concerns, comments are provided to the contractor either formally for deficiencies or informally for some concerns. Contractor responses are provided. For significant comments that identify deficiencies Corrective Action Plans are provided. Resolution of the comments is required before DOE approval of the document itself or in the case

of a criticality safety evaluation before DOE approval of the document that it supports.

The following are examples of some of the comments identified:

1. Comments were provided to identify that the effects of temperature on nuclear cross sections were not being dealt with as required by the M&O contractors Criticality Safety Program Document. The document indicated that the effects of temperature on nuclear cross sections would be addressed in the NCSEs. Many of the NCSEs that covered operations or credible conditions at elevated temperatures did not address temperature effects on nuclear cross sections. As a result of the comments the contractor did extensive research and documented the result in a report entitled "Temperature and Criticality Safety – A Compilation of Information with Application to SRNS and SRR Facilities", SRNS-TR-2009-00286. Additionally the contractor revised the Criticality Safety Program Document to clarify that it is conservative to use room temperature cross sections and material densities when performing criticality safety calculations for systems at the elevated temperatures experienced at SRS.

2. Comments were provided on NCSEs supporting receipt, handling, storage and shipping limits for fuel elements that there were numerous errors in the NCSEs. These errors were determined not to be significant to the overall results of the NCSEs, however concern that these types of errors if continued could potentially impact the overall results of the NCSEs was expressed. The contractor evaluated the problem and took action to provide an additional technical review to focus on the types of errors identified. This extra review has reduced the numbers of errors significantly.

3. The contractors' Criticality Safety Program Description Documents (CSPDDs) were developed and submitted for the DOE review and approval to comply with DOE Order 420.1B. Numerous comments were provided to clarify the intent of the CSPDDs and to assure that all the ANS and DOE Order requirements were adequately addressed. The comments were resolved. The CSPDDs were approved by DOE-SR. One result of this process was a detailed guide for classification of criticality safety controls being included as an attachment to the M&O contractor's CSPDD.

The M&O contractor has a good Criticality Safety Lessons Learned Program that provides a monthly Lessons Learned Newsletter. The Newsletter is distributed to the DOE community.

The contractor's self assessments are evaluated by the field office. Copies of completed assessments are provided and the results of these assessments are subjects for the monthly Interface Meetings between the DOE Criticality Safety Program Manager and the Contractor Criticality Safety Management. The purpose of these meeting is to provide the contractor Criticality Safety Programmatic feedback and to exchange information on criticality safety related activities.

The capacity for DOE-SR to do a detailed evaluation of these self assessments is limited due to staffing issues, the need to address higher priority activities, and emerging items.

Numerous nuclear criticality safety evaluations (NCSEs), safety basis documents (criticality safety related portions), and other criticality safety related documents were reviewed during 2009. Most of these documents were NCSEs completed in accordance with DOE-STD-3007-2007. Overall, they were compliant with applicable ANS-8.xx and DOE-STD-3007 requirements, and were technically adequate. Specific issues are occasionally identified during document reviews and are resolved in a timely fashion.

5. New facility Design

For the M&O contractor, work continues on two K-Area Material Storage Facility modifications: the Presentation Room Storage modification and the shuffler modification. These modifications involve new or updated criticality safety evaluations.

The Salt Waste Processing Facility (SWPF) project is a new facility design at SRS which requires a CSP and criticality safety evaluations. The CSP Description Document for this contractor has been submitted to DOE-SR and following comment/resolutions interactions has been approved by DOE-SR.

Finally, a Liquid Waste Salt Disposition Integrated Project is underway. This project is intended to provide all modifications needed to process high level salt waste (currently stored in the tank farms) through the tank farms, through the SWPF, and to the Defense Waste Processing Facility. It involves all three contractors at SRS. Criticality safety engineers continue to interface on an integrated control strategy for this project. A detailed criticality safety HAZOP study was performed to identity controls and nature of process barriers that prevent a criticality.

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

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

In addition to items identified in the 2008 submittal, which remain valid, the major lessons learned from new project work include:

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

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

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

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

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

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

The data indicates that the majority of reportable and non-reportable occurrences over the past several years are low consequence events (i.e., less severe than violation of a procedural limit). There were some cases in which a procedural limit was violated, but the actual higher level Criticality Safety Limit (CSL) was not challenged. In a few cases, a control credited in protecting the double contingency principle was violated, but other controls remained in place such that actual violation of the double contingency principle was never an issue.

DOE 0 232.1 reporting criteria were revised effective in 2003. The M&O/LWO database for reportable and non-reportable events came on line about the same time. However, full site-wide implementation of the database did not occur until 2005. Therefore, a consistent set of data is available for calendar years 2005 through the 2009. For M&O and Liquid Waste facilities, the indicator score for 2005 included 62 total events (4 criticality alarm system issues. 37 minor events < procedure limit, 20 procedure limit violations, 1 TSR level; total score = 144). The results for 2006 showed improvement with 49 events (3 criticality alarm

system issues, 31 minor events < procedure limit, 12 procedure limit violations, 3 TSR level; score = 119) - a reduction in total score of approximately 20%. For 2007, indicator results approved again with 43 events (5 criticality alarm system issues, 31 minor events < procedure limit, 6 procedure limit violations, 1 TSR level; score = 91) - a reduction of about 24% compared to 2006. Based on 2006 results, a goal was established for 2007 to reduce the number of instrument problems and human performance problems by 20%. The goal was met. However, the number of management problems and communication problems increased during 2007. Management recognized that human performance was a general site issue that required continuing efforts for improvement. Therefore, during 2007 and 2008, a series of Human Performance Improvement training sessions were provided to site management and engineers. For 2008 there were 40 events related to criticality safety (6 criticality alarm system issues, 24 minor events < procedure limit, and 10 procedure limit violations; score = 84) - a small improvement versus 2007 results. Only one event (< procedure limit violation) occurred in a LWO facility. For 2007 and 2008, the Human Performance Improvement (HPI) training and tools appear to have reduced human performance problems related to criticality safety. For the first three quarters of 2009 there have been 37 events (1 criticality accident alarm system issue. 35 minor events (< procedure limit) and 1 procedure limit violation. The events primarily involve minor documentation issues, human performance problems and communication issues. Equipment problems related to charging fissile material to the H-Canyon dissolver also occurred. The use of HPI tools continues to be emphasized.

The results of the M&O contractor's NCSRC indicator are used to establish goals to reduce occurrences in specific causal areas. Based on 2006 results, a goal was established for 2007 to reduce the number of instrument problems and human performance problems by 20%. The goal was met. However, the number of management problems and communication problems increased during 2007. Human Performance Improvement (HPI) training for managers, engineers, and operators began in 2007 and continued into 2008. The result was a modest reduction in the number of management and communications problems during 2008 and 2009. Human Performance Improvement techniques continue to be emphasized in an effort to improve the reliability of administrative controls.

The results of the criticality safety Performance Assessment were used to inform facility NCSRC members, management, and engineering of the need to continue to perform management observed evolutions and procedure improvement initiatives. Results also were used to review the number of contractor criticality safety engineer facility walk-throughs and participation in facility criticality safety self-assessments. Finally, results were also used to reconstitute area criticality safety committees after contractor transition and reorganization.

7. Follow Up to Assessments

The M&O Contractor/Liquid Waste Operations has a well defined and mature self-assessment process. The process requires consideration of many issues during the development of the scope of self-assessment activities. This includes historical information such as corrective action open and completed items, current

performance information such as facility performance parameters and observation program results, reports from past audits and self-assessments, and feedback from external groups. Thus, the process requires consideration of prior assessments.

Likewise, DOE-SR considers many of the same issues both during its development of the yearly assessment plan and during the definition of the scope of planned assessments. However, due to the limited Federal NCS staffing, the capacity to do follow-up reviews is still limited. As federal oversight resources grow these follow-up assessments will receive appropriate additional emphasis.

Separately, DOE-SR reviewed corrective actions plans submitted in response to DOE-SR assessments (as describe in Item 4 above) for adequacy. In general, the Contractor's plans submitted in 2009 were reviewed at the time they were formulated and found to be acceptable. Follow-up effectiveness reviews for the corrective actions will be conducted in 2010 as staffing permits.

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

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

Attachment 8

TWPC (EnergX) Criticality Safety Program Annual Report

Field/Site Manager: John Eschenberg NCS POC: Brenda Hawks

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

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

TWPC has had two ACRs since the inception of the limited scope NCS program two years ago. One ACR (2008) was with respect to the discovery that an "empty" tank that actually had solution in it. The solution was characterized, and the ACR was closed the same day of discovery. The other ACR (2009) was associated with the improper acceptance of a drum due to an error reading the identification number. The error was caught by independent review and resolved within a few days of the error. Procedures were modified to enhance the receipt inspection process.

The performance of the contractor is exceptional based on these two data points. Management attention to the issues was prompt and appropriate. No improvement has been deemed necessary at this time.

2. Status of Contractor Criticality Safety Engineer Program

EnergX has two NCS Engineers supporting the criticality safety program on a part time basis. In addition, three senior qualified NCS Engineers are available/on call in addition to the NCS Manager who is also a Qualified Senior NCS Engineer.

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

DOE has affirmed the adequacy of contractor NCS staffing. An assessment was conducted in 2008 that resulted in no findings and three observations, all of which have been dispositioned. One proficiency was listed regarding the graded/scaled nature of the NCS Program.

3. Status of Federal Criticality Safety Oversight Program

Oak Ridge needs an NCS Engineer as the current NCS Engineer has been promoted. There is one NCS Engineer currently who is the Quality Assurance Director, with one technical support from the matrix organization.

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

4. Federal Assessments of Site NCS Programs

DOE performed an assessment of the TWPC Nuclear Criticality Safety Program 10/07 and routine communications between DOE and the contractor.

A Management Assessment/Independent Verification Review for Implementation of the TWPC Nuclear Criticality Safety Program and DSA/TSR, Revision 14 was conducted 9/07. There were no Findings, 3 observations, and 5 Opportunities for Improvement. There were no significant issues identified. A corrective action plan was prepared and closure of actions for all observations and opportunities for improvement have been closed.
EnergX performs periodic self-assessments using DOE-STD-1158 as a guide to evaluate the effectiveness of their program, and performs periodic surveillances of ongoing fissionable material operations to ensure compliance with the requirements of the NCS evaluations.
The NCS program is consistent with DOE Order 420.1B and applicable ANSI/ANS standards for the scope of material and activities allowed.

5. New Facility Design

No new facility design that requires NCS program. – Sludge treatment is not expected to require an NCS program based on nature of process. NCS is involved in the recent planning and design activities for sludge treatment at TWPC to ensure nature of process is met for the operation based on nature of process.

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. To date, there has only been one NCS infraction and no reportable events.

7. Follow Up to Assessments

The Federal Criticality Safety Oversight person has reviewed the corrective actions which closed the observations from the formal 2007 assessment.
The corrective actions were effective. The observations that were noted by the assessment have been resolved.

8. Status of Open Issues Identified in previous reports.

There are no open issues.

Attachment 9

Bechtel Jacobs Company (BJC) Criticality Safety Program Annual Report

Field/Site Manager: John Eschenberg NCS POC: Brenda Hawks

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

Metrics established to monitor contractor NCS performance include the number of New ACRs, and the 12 month rolling average time to close ACRs (goal is 30 days average time to close).
Approximately two new ACRs occurred per month. The average time to close ACRs has increased but most ACRs were closed within 10 days.
Contractor performance has been good, as evidenced by the lower number of ACRs experienced and DOE Criticality Safety Coordinating Team (CSCT) assessment results.

2. Status of Contractor Criticality Safety Engineer Program

The BJC NCS program has 14 FTEs. The DOE NCS oversight continues to monitor the contractor's staffing level for adequacy. As the contract draws near to an end, the monitoring of the NCS staffing levels will be enhanced. (Note: The Criticality Safety Officers are not included in the total FTE count but are vital to the NCS Program. The DOE NCS oversight will continue to observe the staffing levels of these individuals as well.)

3. Status of Federal Criticality Safety Oversight Program

Oak Ridge needs an NCS Engineer as the current NCS Engineer has been promoted. There is one NCS Engineer currently who is the Quality Assurance Director, with one technical support from the matrix organization.
There was an independent assessment performed of the Federal NCS staff in August 2006 with no findings for EM.

4. Federal Assessments of Site NCS Programs

ORO-EM assessment of BJC NDA Program at the K-25/K-27 Project, Oct. 2008. The team concluded that substantial improvements have been made since the last DOE assessment and that a technically sound NDA program is in place.
DOE CSCT performed a technical evaluation of the BJC NCS program in December 2008, focusing on the basis for K-25 West Wing material disposal. No findings were identified during the review.
Criticality safety evaluations and 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. There are facilities being cleanup/decommissioning/decontamination (e.g. Tank W1A and EMWMF Cell Expansion) that will need a criticality safety program.
There were no formal lessons learned.

6. **Occurrences**

All ACRs are tracked and trended internally 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. The NCS Review Board evaluates the ACR tracking and trending when they meet.

Trending has revealed a few common issues that have resulted in both a root cause analysis and a human performance study for the K-25 Project.

The root cause analysis reported a finding that identified needed revision to the NCS procedures. The report of the human performance study has not yet been completed.

7. **Follow Up to Assessments**

No subcontractor input

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

No subcontractor input

Attachment 10

Isotek Criticality Safety Program Annual Report

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

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

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

Isotek is only authorized to perform limited fissile operations. The contractor submitted their Nuclear Criticality Safety Description Document with enhancements. A review determined the document was acceptable.

Isotek developed a metrics process. The process is adequate to track progress.

Isotek NCS staff diligently works identified issues to closure this was confirmed in *US Department of Energy Oak Ridge National Laboratory Building 3019 U^{233} Material Downblending and Disposition Project Sixty Percent Design Review Final Report Appendix C – Topical Area Document Reviews Section Engineering Design – Criticality Safety* . The report states; "Discussions with NCS staff indicate that these open issues are being aggressively addressed with the responsible disciplines".

2. Status of Contractor Criticality Safety Engineer Program

The Isotek NCS program has added the necessary staff (7 FTE and 2 part time NCS Engineers) to meet project needs.

3. Status of Federal Criticality Safety Oversight Program

Oak Ridge needs an NCS Engineer as the current NCS Engineer has been promoted. There is one NCS Engineer currently who is the Quality Assurance Director, with one technical support from the matrix organization.
There was an independent assessment performed of the Federal NCS staff in August 2006 with no findings for EM.

4. Federal Assessments of Site NCS Programs

DOE performed a verification and validation assessment. The assessment was documented in *Technical Evaluation of the SCALE 5.1 Verification and Validation for the Isotek, 233U Material Downblending and Disposition*

Project. There were no findings, and a corrective action plan is not required.

A formal NCS assessment has not been completed but NCS was reviewed as part of the *Construction Project Review Construction Project Review of the URANIUM-233 MATERIAL DOWNBLENDING AND DISPOSITION PROJECT* and as part of the *Final Report – Integrated Safety Management System Verification Isotek Systems, LLC.*.

The NCS description document has been approved and implemented.

Additional resources have been recruited. Isotek NCS staff is adequate.

Isotek took possession of operations in February 2007, with no NCS infractions, fissile operations remain limited via the DOE Safety Basis restrictions placed on the facility. The contractor and DOE will evaluate the contractor's program including self assessments prior to significant fissile operations being performed in the facility.

NCSEs being generated in support of facility design meet the Isotek procedure requirements and the intent of DOE-STD-3007-93. This was confirmed in *US Department of Energy Oak Ridge National Laboratory Building 3019 U^{233} Material Downblending and Disposition Project Sixty Percent Design Review Final Report Appendix C – Topical Area Document Reviews Section Engineering Design – Criticality Safety* . The report states:

> The format and content of both evaluations were formatted in accordance with DOE-STD-3007-93, *Guidelines for Preparing Criticality Safety Evaluations at Department of Energy Non-Reactor Nuclear Facilities.* Isotek implements DOE-STD-3007 via procedure ISO-NCS-301, *Guidelines for Preparing and Reviewing Nuclear Criticality Safety Evaluations.* Both evaluations were verified as meeting the guidelines of ISO-NCS-301.

DOE O 420.1B implementation has been completed.

The NCS documentation supporting new facility design has improved and the 60% design was approved.

The storage NCSE continues to be adequate for current storage activities.

5. New Facility Design

New facility design is 60% complete. As noted by the DOE CPR review, *US Department of Energy Oak Ridge National Laboratory Building 3019 U^{233} Material Downblending and Disposition Project Sixty Percent Design Review Final Report,* design of the Criticality Accident Alarm System was not at the 60% maturity level. The report also notes that the NCS staff are working the identified issues; "Discussions with NCS staff indicate that these open issues are being aggressively addressed with the responsible disciplines".

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

   To date, there have not been any NCS infractions or reportable events. The NCS program tracks and trends NCS infractions in quarterly metrics. If the condition is reportable via the occurrence reporting process they will also be tracked as part of the occurrence reporting/condition process.

7. **Follow Up to Assessments**

   The NCS V&V was conducted in April 2009; no follow up assessments have been conducted.

   The Corporate ISMS Assessment is being followed up by DOE NCS Program assessment as part of the DOE HQ ISMS assessment (1st Quarter FY 2010) and a 90% Design Review will be conducted in (1st quarter CY 2010). A readiness review will be conducted prior to start of new operations.

   The effectiveness in the design process will be followed during design and confirmed during the formal DOE review at specified completion levels.

8. **Status of Open Issues Identified in previous reports.**

   The staffing issue has been resolved.