National Nuclear Security Administration

Department of Energy
National Nuclear Security Administration
Washington, DC 20585

July 23, 2008

The Honorable A. J. Eggenberger
Chairman
Defense Nuclear Facilities Safety Board
625 Indiana Avenue, N.W., Suite 700
Washington, D.C. 20004-2901

Dear Mr. Chairman:

This letter transmits the Department of Energy (DOE) Annual Report on Nuclear Criticality Safety you requested in your letter of January 29, 2008. There are two enclosures that respond in detail to the eight topics you specifically identified. One is a response from the National Nuclear Security Administration (NNSA). The other is a response from the Office of Environmental Management (EM). Both have a concise summary report supported by detailed reports from their respective Site Offices.

In addition, your letter expressed a concern that Chief of Nuclear Safety (CNS) and Chief of Defense Nuclear Safety (CDNS) site reviews might not be of sufficient depth to adequately review site nuclear criticality safety programs. While no single review can guarantee that all issues needing attention will be identified, both the CNS and CDNS are conducting ongoing reviews that should be effective in monitoring the health of site criticality safety programs. The CNS is working closely with EM as line management conducts periodic in-depth site reviews. The CDNS conducts periodic reviews at NNSA sites utilizing expertise drawn from the DOE Criticality Safety Coordinating Team or the Criticality Safety Support Group.

If you have any questions or need further information, please contact Mr. Dae Chung at 202-586/5151 for EM related issues and Dr. Jerry N. McKamy at 301-903/8031 for NNSA related issues.

Sincerely,

Robert L. Smolen
Deputy Administrator
for Defense Programs

Enclosures

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

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

The following is a brief summary on each requested topic for the NNSA. Individual detailed site reports are included as attachments. The NNSA point of contact for this report is Dr. Jerry N. McKamy. He may be reached at 301-903-8031.

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

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

   YSO established additional performance metrics and processes to monitor the criticality safety of Building 9212. An initial set of three metrics were developed and reported on beginning in October of 2007. The reporting distribution of these metrics was also expanded to include the Continued Safe Operations Oversight Team (CSOOT) for Building 9212, which also includes NNSA HQ Line Membership from NA-17, a member from the NNSA Chief of Defense Nuclear Safety, and membership from the YSO nuclear and criticality safety staff. The three additional metrics are should be leading indicators based on the Rocky Flats near miss experience and include:

   - Nuclear Criticality Safety (NCS) Related Work Orders Performance
   - Unplanned Activities (Solution Spills and Inadvertent Transfers)
   - Leak Indications

   The criticality safety program for the M&O contractor at the Nevada Test Site (NTS) was approved by the NSO and is expected to be implemented by September 2008. The approved criticality safety program at the NTS does contain expectations to establish and track criticality safety performance metrics.

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

   Summary Response: The largest contractor criticality safety staff at an NNSA site is at Y-12 where the contractor employs 46 nuclear criticality safety engineers. The other NNSA contractor staffs range from 3 to 11 in size. Of the six sites, currently only one, the Los Alamos National Laboratory, is understaffed. LANL is planning to add two additional nuclear criticality safety engineers in 2008. As a compensatory measure, LANL has engaged criticality safety specialists from Pantex and a related organization at LANL. Four total individuals have been engaged commensurate with their qualifications and site familiarity to help compensate for the staffing shortfall at LANL.

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

   Summary Response: Each of the six NNSA site offices has a criticality safety subject matter expert on staff. Of the six federal staff, only two have yet to complete their Criticality Safety Functional Area Qualifications (FAQ). The individuals at the Pantex Site Office (PXSO) and the NSO will complete their FAQ in 2008. The YSO federal staff is augmented by one full-time support service contractor and will soon be augmented by an intern in the DOE Future Leader Program beginning later in 2008. During 2007 the YSO, the Los Alamos Site Office (LASO), the PXSO, and the NSO received compensating federal support in criticality safety from either the NNSA Service Center or NNSA HQ or both. NNSA Headquarters Line Management judges the federal staffing at NNSA site offices to be adequate, especially with the ability to augment site staff as needed with experts from the Service Center or Headquarters.

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

   Summary Response: All six of the NNSA site criticality safety programs were assessed multiple times by site office or headquarters elements or both. This includes

assessments of the contractor program at Pantex for which the potential for a criticality accident has been shown to be not credible at that site. 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.

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

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

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

   Summary Response: Only one site, Y-12, has sufficient numbers of criticality safety related occurrences or deficiencies to warrant trending. No other NNSA site

experienced more than seven occurrences with most having zero to two. Such low numbers reflect the nature of operations at those sites and are not amenable to tracking and trending beyond the expectation that repeat occurrences will not happen. By contrast, in 2007 Y-12 experienced at total of 85 criticality safety related deficiencies or minor non-conformances, none of which rose to the ORPS reportable level. The total is less than the total from either of the two preceding years. Y-12 has five performance metrics related to tracking and trending of criticality safety related deficiencies and minor non-conformances.

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

   Summary Response: Three NNSA sites conducted follow-up reviews of some type related to earlier assessments or occurrences. These were LASO, YSO, and LSO. The LASO initiated a follow-up review of the LANL Augmented Limit Review (ALR) process and the LASO oversight of the ALR process in 2007. YSO conducted a follow-up review on the Uranium Holdup Survey Program (UHSP) and the Inadvertent Accumulation Prevention Program (IAPP). Finally, LSO conducted a follow-up review of corrective actions stemming from a criticality safety occurrence.

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

   Summary Response: As this is a new reporting requirement from the DNFSB that supersedes the previous reporting requirement, there are no open issues.

DOE F 1325.8
(10/00)

United States Government **Department of Energy**

National Nuclear Security Administration

memorandum

DATE: **FEB 2 7 2008**

REPLY TO
ATTN OF: Y12-50

SUBJECT: **DOE 2007 ANNUAL NCS REPORT INFORMATION FOR Y-12**

TO: Dr. Jerry N. McKamy, Nuclear Criticality Safety Program Manager, NA-17, FORS

As requested, in coordination with the Y-12 National Security Center contractor, B&W Office of Safety and Engineering, please find the Y-12 Plant response for the subject report as revised according to the January 29, 2008, letter from the Defense Nuclear Facilities Safety Board. Our responses are organized according to the bulleted "Specific Subjects to be Addressed..." as requested in this letters attachment.

If you have any questions, please contact me via e-mail or at (865) 576-6735.

F. Edward Kendall
NCS Program Manager
Y-12 Site Office

Attachment:
As Stated

cc w/attachment:
J. Crociata, 9106, MS 8113, B&W Y-12
J. Gertsen, 301BCR, MS 8007, B&W Y-12
C. Robinson, 301BCR, MS 8112, B&W Y-12
C. Worley, 301BCR, MS 8010, B&W Y-12
K. Smith, Y12-01, YSO
J. Goss, Y12-50, YSO
S. Morris, Y12-50, YSO

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

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

Y-12 Response:
For several years Y-12 has collected NCS metrics and reviewed these in monthly NCS Advisory Council meetings and at the quarterly senior plant managers NCS meetings. These meetings are attended by both the contractor and the NNSA Y-12 Site office (YSO), and have been the subject of DOE independent line reviews. 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 45 days
- NCS Deficiency Closure Time – This is a new metric which replaces the metric from last year. It tracks the closure time for deficiencies and MNC's closed during the current month and over the past year.
- Self-Reporting of NCS Issues – reports the percentage of issues self-reported by the contractor's production and line oversight organizations (i.e., NCS engineering).
- NCS Small Group Seminars – reports the cumulative number of small group training sessions conducted with fissile material operations crews.
- NCS Repeat Deficiencies – reports the number of NCS deficiencies that re-occur within 2 years of prior instance for which the corrective actions of the prior instance have been completed and are not a legacy issue.
- NCS Professional Development Performance – reports the percentage of the NCS engineering population that is engaged in credited development activities (e.g., technical courses, conferences, graduate studies, etc.).
- NCS Annual Review Comment Resolution - This is a new metric which tracks resolution of NCS Annual Review comments during CSE revision. It is expected that comments will be addressed during revision unless there is a valid reason not to address the issue.

The latest contractor efforts to improve NCS for known issues have been the development of a set of new metrics to monitor the NCS status of 9212 wet chemistry operations as initially directed by YSO in late August of 2007 using input from NA-17. An initial set of three metrics were developed and reported on beginning in October of last year. The reporting distribution of these metrics was also expanded to include the

Continued Safe Operations Oversight Team (CSOOT) for 9212, which also includes NA-17, CDNS, and YSO NCS engineering members on the federal side. These newly developed metrics, which are hoped to be leading indicators based on the Rocky Flats near miss experience, include:

- NCS 9212 Work Orders Performance – The amount of NCS-related maintenance activity needed is the number of open maintenance requests on 14 selected systems of NCS interest. This is an indication of the physical state of the facility.
- NCS 9212 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, and regardless of the uranium content (i.e., this also includes associated process water, clean acid, etc.). 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, the contractor nuclear criticality safety (NCS) engineers are part of the Safety Analysis Engineering (SAE) organization in the Engineering Division. There are approximately thirty-three B&W and thirteen subcontractor engineers practicing the NCS discipline including the SAE manager. Four vacancies are shown on the SAE organization chart and B&W is actively pursuing filling the vacancies. However, the overall NCS staffing level at the Y-12 National Security Complex is consistent with the budgeted workload. Filling the vacancies is not required to support the budgeted workload, but is intended to reduce the current reliance on subcontractor engineers.

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

	B&W	Subs
Staff level:	33	13
Qualified Engineers in Training:	84.8%	100.0%

Qualified NCSEs:	54.5%	76.9%
Qualfiied Sr. NCSEs:	15.2%	Note 1
Process Reviews	78.8%	100.0%
NCS Evaluation and Documentation	66.7%	100.0%
Implementing Documentation Approval	75.8%	100.0%
Computations	75.8%	100.0%
Computation Review	33.3%	46.2%
NCS Evaluation Review	36.4%	69.2%
Emergency Response	12.1%	Note 2
Criticality Accident Alarm System Support	6.1%	Note 2
Order Compliance and NCS Procedures	27.3%	Note 2
Final NCS Technical Documentation Approval	9.1%	Note 2
NCS Program Oversight	21.2%	Note 2
Technical Support Center Support	6.1%	Note 2

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

No federal reviews of the contractors training and qualification program were conducted in CY-2007. Previous reviews indicate that this area is a programmatic strength for the Y-12 contractor and no degradation has been evident in day to day interactions, or indicated as a factor in the several assessments conducted throughout CY 2007. The next review of the contractor TQP is scheduled to occur as part of a line NA-17 lead review currently planned later this summer.

- 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 NCS program oversight needs at Y-12 are more extensive perhaps than for many other sites in the department because of the industrial production mission (i.e., throughput of fissile material) coupled with the variety of forms (including high equity fissile solutions) and configurations of fissile materials involved and the nature of Y-12's aged facilities. The Y-12 NCS program includes well over 400 active NCS evaluations combined with a few thousand supporting reports and documented calculations involving a contractor staff of over 50 NCS engineers, managers and administrators.

The three positions in place in the YSO federal organization dedicated to NCS engineering oversight, including training and qualification progress, as follows:

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, 25 years professional experience w/10 years at Y-12.

2. Sr. Support Service Sub-contractor NCS Engineer: MNE, Contractor TQP (7 different tasks - see last item) qualified, 22 years professional experience w/10 years at Y-12.
3. NCS Engineer Intern: a new DOE Future Leader Program (FLP) recruit has accepted a job offer and will report in the June timeframe of this year (BSNE).

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

The DOE line (currently designated as NA-17) support, involving a Sr. NCS engineer 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 maters of interest. The need for this highly valued support is expected to continue and is improving with the establishment of additional dedicated Sr. NCS engineering expertise in the NNSA service center, which also participated in a 2007 DOE independent line assessment (discussed below) for YSO this year. Based on this rather extensive continuing support, the YSO staffing levels are considered adequate.

- 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:
The results of over eighty YSO NCS program assessments conducted in 2007 are discussed which includes four independent assessments conducted for YSO by special request from the YSO manager to NA-17 line management. Strengths were cited in several (mostly independent line) assessments and include: the development of a computational tool for providing sprinkler density values, UHSP assessment and review, the practice of conducting quarterly senior Y-12 plant managers meetings for NCS, effective hands on operator training in NCS, effective criticality safety officers programs and NCS advisory council actions, and attention to detail in a particular movement planning effort. Three independent line assessments performed for YSO identified several issues of significance: unacceptable immediate evacuation zone (IEZ) technical basis improvement and upgrade documents, failure to have a written high level plant NCS policy statement, lack of a required NCS posting in a certain area, inadequate resources for the NDA technical support to the UHSP, inadequate resource management for UHSP, and failure to rigorously consider NMC&A data in NCS evaluations. Other

issues identified of significance, mostly from specific deficiencies and weaknesses that were cited in reactive (i.e., not scheduled in the NCS master assessment plan for 2007) assessments, include: less than adequate arguments or requirements used in a couple of the NCS analyses reviewed (machine coolant system analysis, V-blender loading configuration), the improper placement of a container with a wet loading, inadequate corrective actions to prevent NCS infractions recurrence, less than adequate critique of an NCS issue, corrective action for control of primary extraction raffinate transfers, concentration control of evaporator process condensate, failure to acceptably analyze floor holdup migration, failure to promptly isolate an out of service evaporator, and fissile material holdup issues remaining in the out of service 9206 facility. The status of corrective actions to these issues is discussed under the last item.

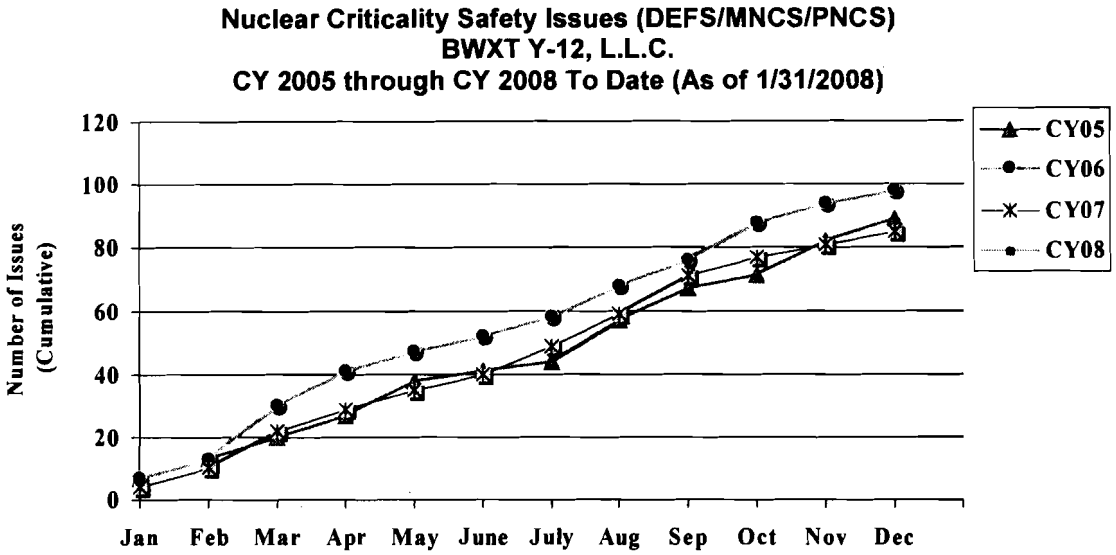
- A summary of the results and lessons learned from contractor, federal, or independent reviews of proposed nuclear criticality safety controls and design requirements for new facility designs. Included with this is a description of how this information was used by the contractor and DOE Line Management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

Y-12 Response:
The overall lessons learned process flow for UPF is shown in attachment 1. An example of an NCS-related lesson learned from the HEUMF project that has been used to improve the design effort of the UPF project is the need for early and often coordination and interface between the various design and safety disciplines. Due to complexity of UPF Design several improvements were made to the HEUMF process. These included a Criticality Safety Support Plan and draft safety documentation tied earlier into the design. The Criticality Safety Support Plan includes the production of "Nuclear Criticality Design Considerations for the UPF", weekly Safety and Design Team integration meetings, and placing a NCS engineer on the Core Team. Planned activities include Criticality Safety Process Studies which will lead to Criticality Safety Evaluations as the design evolves in detail. The Weekly Safety and Design Team integration meetings include the following functional areas:

- Criticality Safety
- Fire Safety
- Facility Safety
- ES&H
- Security
- NMC&A
- Operations
- Design Engineers (HVAC, Fire Systems, Gloveboxes, metallurgical & chemical processes, structural, piping, etc.)

- 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.

Y-12 Response:
There were no reportable NCS (i.e., category 3C-1, 2) occurrences per DOE O 231.1A in 2007. 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.



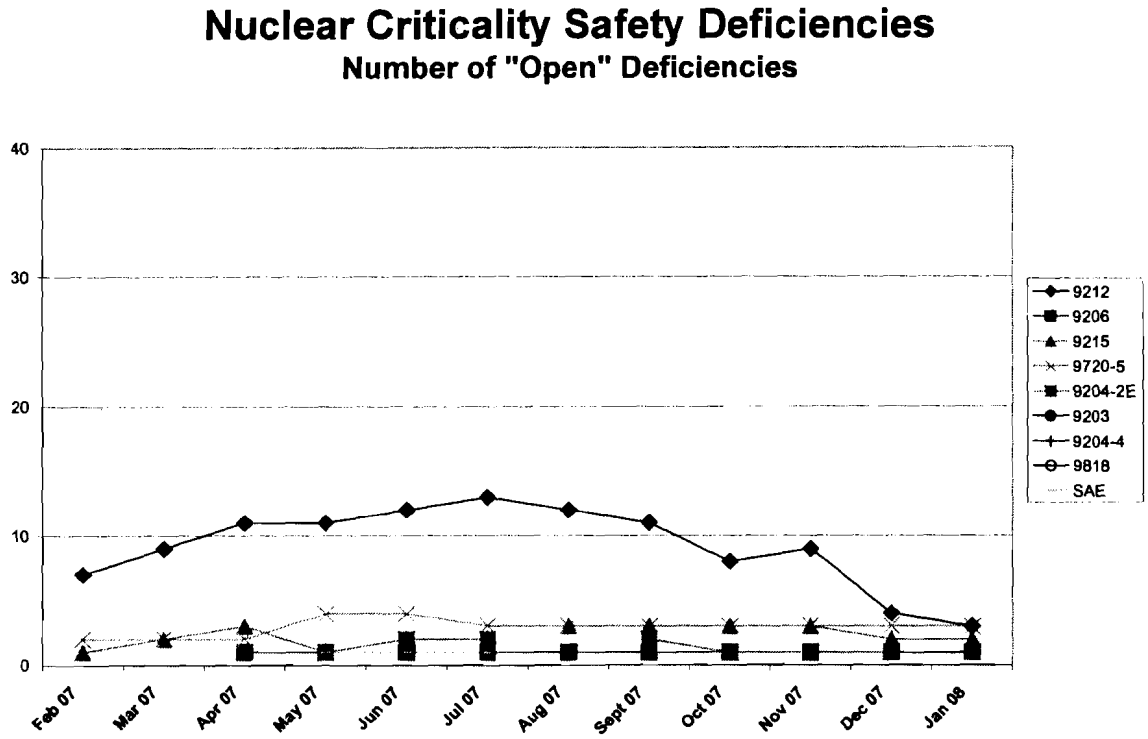
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
CY05	7	13	21	28	35	38	44	58	65	71	82	89
CY06	5	17	30	41	47	52	58	68	76	88	94	98
CY07	4	10	22	29	35	40	49	59	71	77	81	85
CY08	6											

No. of Issues (Cumulative)

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. A primary measure which is being driven for improvement is the closure of open NCS infraction items. Relative to the Deficiencies sub-category the number open over the past year by facility is illustrated below:



Specific YSO reviews of specific infraction events (i.e., usually defined locally as reactive assessments) are discussed in the fourth item response. The general status of corrective actions closure is included in the last item response.

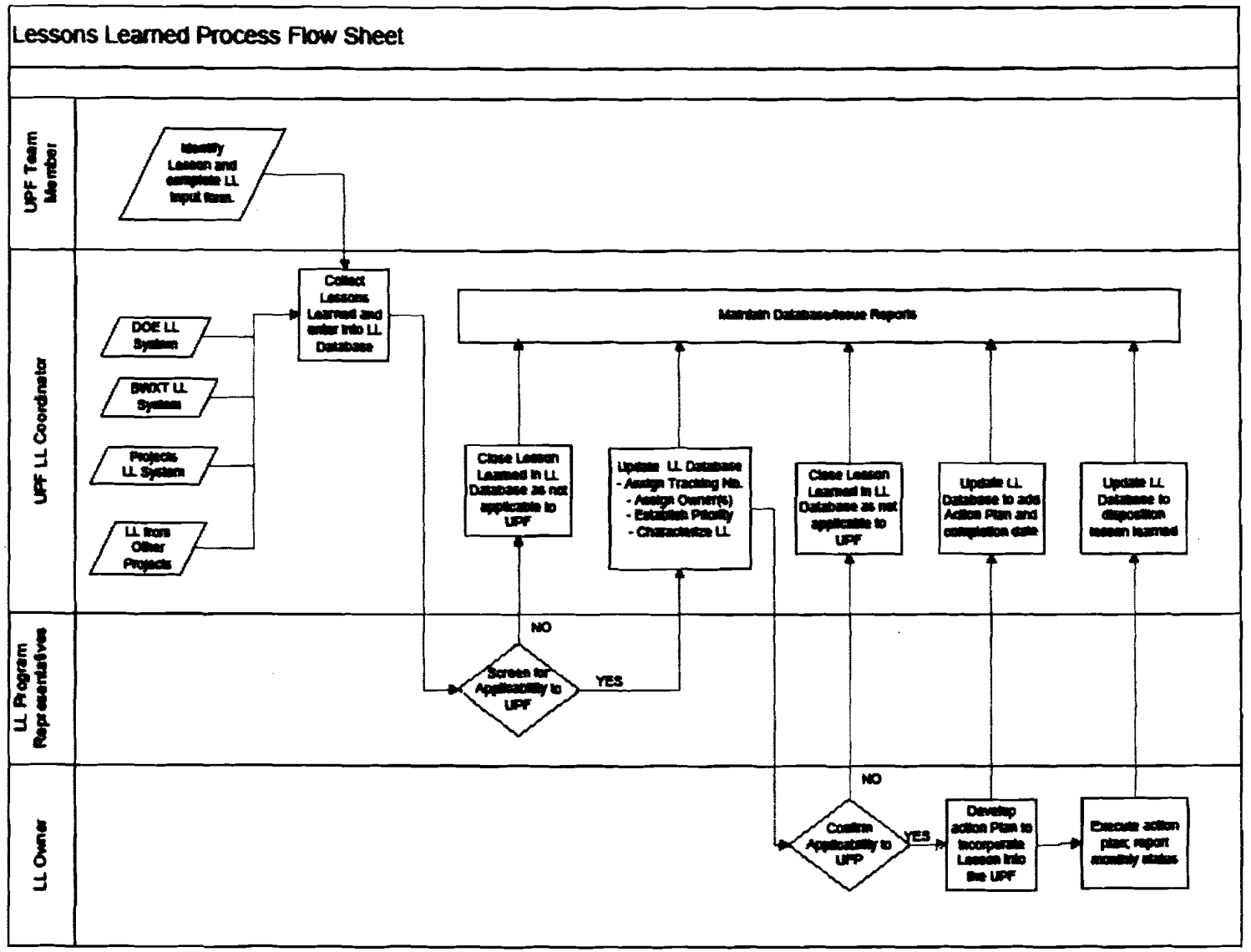
The contractor NCS advisory council review of these non-reportable infractions and associated metrics is regularly assessed in YSO and was also the subject of an independent line review which deemed this councils review actions were effective as discussed in the fourth item response.

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

Y-12 Response:
While no open issues particular to Y-12 were identified in the previous year's annual report, several major open corrective actions are being actively engaged to close identified NCS issues as discussed. Key amongst these are PBI incentives this year to: (1) Fully implement and operate the primary extraction system raffinate monitor as an alternate engineered system to control the transfer of potentially fissile solution to large geometry tanks. This process will be reviewed this year in a scheduled DOE independent line assessment. (2) Perform a stream analysis diagnosis for NCS infractions issues. The status of corrective actions for the deficiency level issues identified, other than the two addressed under this years PBI incentives above, are as follows:

- The preparation of replacement IEZ basis documents is expected by summer, a second set of draft documents have already been reviewed and commented on.
- The policy statement and posting issues identified in an independent assessment are scheduled to close by the end June this year.
- The UHSP issues identified in an independent assessment are scheduled to close by June of this year. Follow-up reviews will be conducted to assess the effectiveness of these actions.
- An evaluation of the floor holdup migration issue in 9212 is underway and initial work to characterize and estimate the project for in situ field tests is expected to be completed by May of this year, with the development of further corrective actions leading to the completion of an acceptable NCS evaluation will follow.
- A project to re-route the process condensate from the current basement storage safe tanks to other safe tanks in a large geometry exclusion control area, which will address the concentration control issue, is currently being developed. This process will be reviewed this year in a scheduled DOE independent line assessment.
- Posting issue has been corrected in the field, but is not yet officially closed in YSO tracking system.
- The deficiencies associated with the prompt isolation of the out of service evaporator and the improper placement of a fissile material container have been closed.

Attachment 1



U. S. Department of Energy
National Nuclear Security Administration
Livermore Site Office
PO Box 808, L-293
7000 East Avenue
Livermore, California 94551-0808

APR 1 6 2008

5481.1.4.8
COR-LSO-4/15/2008-24553

MEMORANDUM FOR DR. JERRY MCKAMY, NA-17
NUCLEAR SAFETY ENGINEER

FROM: PHILLIP E. HILL
TECHNICAL DEPUTY

SUBJECT: Input for Annual Report to the Defense Nuclear Facilities Safety Board on Criticality Safety (TS: 080037)

Attached is the Livermore Site Office input for the annual report to the Defense Nuclear Facilities Safety Board on the criticality safety program at Lawrence Livermore National Laboratory.

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

Attachment: Livermore Site Office (LSO) Input for Annual Report to the Defense Nuclear Facilities Safety Board on Criticality Safety

cc:
K. Carroll, LLNL, L-198

Livermore Site Office (LSO) Input for Annual Report to the
Defense Nuclear Facilities Safety Board (DNFSB) on 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 Appendix F Assessment for FY07. The assessment was based on a set of established performance metrics.

The Lawrence Livermore National Laboratory (LLNL) nuclear criticality safety program is Outstanding.

Two of the criticality safety performance metrics focus on the severity of criticality safety infractions and repeat criticality safety infractions (failure of lessons learned). LLNL had only one criticality safety infraction during the course of the reporting period. This infraction was considered a level 4 infraction – the lowest level type of infraction. The infraction involved the use of a casting mold that had not been authorized and was self-identified by facility material handlers.

There were no repeat infractions during the reporting period.

LLNL has been highly effective in ensuring that the proper personnel receive nuclear criticality safety training. The reported number of required personnel, who had taken HS3100, *Fundamentals of Criticality Safety*, was over 99% at mid-year and LLNL continues to be well above the 95% target during the final quarter of FY07.

LLNL has also been involved in the development and maintenance of national consensus standards related to nuclear criticality safety. This work benefits not only the Laboratory, but organizations anywhere in the nation that work with significant quantities of fissionable material. Four LLNL Criticality Safety Section members participate on American National Standards Institute/American Nuclear Society (ANSI/ANS) standards working groups.

LLNL has also completed the Headquarters (NA-17) specified number of hands-on criticality safety training classes in support of the Department of Energy (DOE) National Criticality Safety Program. This program is the only one of its kind in the nation and provides DOE with a valuable training tool necessary in the qualification of criticality safety engineers around the complex.

LLNL's implementation of criticality safety controls in Building 332 has been excellent as evidenced by LSO observations of fissile material movements, implementation of workstation controls, and criticality accident drill execution.

Livermore Site Office (LSO) Input for Annual Report to the
Defense Nuclear Facilities Safety Board (DNFSB) on Criticality Safety

Issues and Concerns:

LLNL did not conduct its scheduled Triennial Review of Criticality Safety. This review normally assures LLNL is meeting requirements that management shall establish a way to monitor and assess the overall effectiveness the nuclear criticality safety program (ANSI/ANS 8.19, *Administrative Practices for Nuclear Criticality Safety.*) The review had been scheduled for the final quarter of the fiscal year but LLNL senior management canceled the review.

LLNL did not complete a FY 2007 formal annual criticality safety review of operations in Building 332, the Plutonium Facility (required under ANSI/ANS 8.1, *Nuclear Criticality Safety in Operations with Fissionable Materials Outside Reactors.)* LLNL had originally planned to conduct this review as part of the Triennial Review of Criticality Safety. This issue is mitigated by quarterly walkthroughs/inspections by a qualified criticality safety engineer of each B332 workstation which handles fissionable material. LLNL has requested an approval from LSO to defer this review to the next fiscal year.

Update: LLNL ES&H Assurance Office (EAO) has completed the Triennial assessment of the LLNL Criticality Safety Program that included one independent external subject matter expert. The results of the review were issued on March 20, 2008.

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

The LLNL Nuclear Criticality Safety Division (NCSD) is comprised of 10 engineers, and one engineer who is a support contractor. Of these 11 engineers, eight are fully qualified and one more is in the final stage of completing his qualification. It is LSO's assessment that the group is adequately staffed.

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

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

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

The LSO Criticality Safety Engineer and LSO Facility Representatives have conducted numerous criticality safety focused walkthroughs and surveillances in all LLNL facilities with operations involving significant quantities of fissionable materials. Additionally, over the course of the year, LSO observed a series of fissionable material movements 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.

LSO performed a Functional Area Review (FAR) of LLNL Criticality Safety Evaluations (CSEs) in 2007 (done with the support of the LASO criticality safety engineer.) No significant systemic problems were noted with LLNL criticality safety evaluations.

LSO performed a FAR assessing LLNL's process for ensuring that controls that are developed in the CSEs are properly implemented at the facility level. No significant or systemic problems were noted with the flowdown of controls from CSEs to implementing documents.

As noted earlier in this report, LLNL did not accomplish the scheduled contractor self-assessment of the LLNL criticality safety program in 2007. This was primarily due to the contract transition. LLNL did initiate its self-assessment of the LLNL criticality safety program in December 2007. This review has been completed by an internal element independent of the NCSD and the report has been issued.

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

Over the last year, the LLNL NCSD has participated in design discussions and reviews pertaining to the (Critical Experiment Facility) CEF vault racks and inserts. The rack design is currently being modified to better fit the vault building structure and the inserts are being completely designed by the fabrication vendor. The NCSD has been included in all discussions and reviews for these design efforts. LLNL has also taken the lead for the CEF project in developing an installation plan; and testing and calibration of a Criticality Accident Alarm System (CAAS) for CEF. The current plan is to install a surplus Rocky Flats CAAS into two general purpose bays.

6. Summary of reportable and non-reportable occurrences.

There has been one criticality safety infraction in 2007. The infraction involved an operation in B332. A workstation contained a graphite mold that had not been approved for operations in that glovebox. A larger similar mold had been authorized – so the unauthorized mold was bound by the previously authorized mold. LSO interviewed the LLNL handlers involved with the operation (who identified the deficient condition) and performed follow-up walkthroughs of the affected laboratory. Both LLNL and LSO calculations confirmed that the offending mold was less reactive than the mold that was actually authorized for operations.

There was also an incident in which the incorrect criticality safety posting was left on a workstation – no fissile material operations were in progress at the time. The problem was self-identified by fissile material handlers responsible for the operation. This issue was not considered an infraction by LLNL because no fissile material operations were conducted while the incorrect posting was in place.

There was also an incident in which a TRU waste drum had not received its proper criticality safety posting sticker. This issue was identified by an LLNL criticality safety engineer during a quarterly walkthrough. LLNL chose to consider this a minor paperwork deficiency that was immediately corrected rather than a criticality safety infraction. The LSO criticality safety engineer concurred (a verbal briefing was provided to LSO management.)

A third incident involved the misinterpretation of a Standard Criticality Control Condition (SCCC). Under the SCCC V6, the total material (limited to 120 grams) was supposed to have been limited to a single primary (inner) container and that container should be limited to 5 liters. Facility handlers allowed several containers (totaling less than 100 grams) with each container limited to 5 liters to be stored inside a larger secondary container. The use of multiple containers within the secondary container was not in compliance with V6 as intended by the Criticality Safety Section. However, the storage location was also authorized for condition V1, and the container as stored clearly met all controls for this condition. The non-conformance with conditionV6 was not clearly determined until after the location was changed to V1. Because this non-conformance did not meet the threshold for reporting to DOE, and because the container as found was compliant with an approved criticality safety condition for that location, the incident was not formally categorized as an infraction. LLNL committed to issuing a report on the incident per the LLNL procedure for criticality safety non-conformances.

Overall, the level of operational criticality safety infractions and deficiencies at LLNL were very minor during 2007. All operational deficiencies were self-identified either by fissile material handlers or LLNL criticality safety engineers. In the case of the infracted mold, an exemplary degree of operator inquisitiveness was required to identify the problem. Implementation of criticality safety controls in LLNL facilities is excellent.

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

As noted earlier, LSO performed a FAR assessing LLNL's process for ensuring that controls that are developed in the CSEs are properly implemented at the facility level. This review was a follow-up to an incident (discussed above) in which a criticality safety posting which was no longer authorized was found on a glovebox. The follow-up review found no other similar problems and that the facility was implementing a formal process to ensure no unauthorized criticality postings are available for use.

8. Open issues from prior years.

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

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

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

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

FEB 29 2008

Dr. Jerry N. McKamy, Nuclear Criticality Safety Program Manager, NNSA/HQ (NA-17)
FORS

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

NNSA/NSO has evaluated the bulleted items contained in the Defense Nuclear Facilities Safety Board letter on the Status of the Department of Energy Nuclear Criticality Safety Program for Calendar Year 2006. Please find attached the NNSA/NSO response concerning the subject information.

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

R. T. Brock
Senior Nuclear Safety Advisor

OMGR:JSD-840
SHM 5-5

Attachment:
As stated

cc w/atch:
B. G. Golden, A/DAMNS, NNSA/NSO,
Las Vegas, NV
E. J. Amarescu. OMGR, NNSA/NSO,
Las Vegas, NV
J. S. Dyke, OMGR, NNSA/NSO,
Las Vegas, NV
Jerry Hicks, DOE/AL, Albuquerque, NM

cc w/o atch:
NNSA/NSO Mailroom

Nevada Site Office Response for the Department of Energy Annual Report on Nuclear Criticality Safety (NCS)

Summary

The main operations at the Nevada Test Site (NTS) with significant quantities of fissile material include the Device Assembly Facility (DAF), Area 5 Radioactive Waste Material Complex, and support activities for the Department of Homeland Security (DHS). Except for the assembly of radiation test objects at the DAF, the majority of the fissile material activities are in a containerized configuration. The NSO performs operational awareness oversight of the fissile material activities which includes formal quarterly assessments. The NNSA/NSO has approved the management and operating (M&O) contractors DOE Order 420.1B compliant criticality safety program document and full implementation is expected by September 2008. Also, the NTS is going through a transition of facility management responsibility for all facilities to the current M&O contractor. The only facilities affected by the transition that has activities with significant amounts of fissile material are the DAF and DHS support.

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

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

Response

One of the most significant improvements in the NTS criticality safety program during 2007 was the preparation and submittal of a DOE Order 420.1B compliant criticality safety program document. The document has been approved by NSO and is scheduled for implementation by September 2008. Currently, the NTS M&O contractor has not established performance metrics for the criticality safety program. However, the recently approved DOE O 420.1B compliant criticality safety program document contains an expectation to establish, implement, and track performance metrics to monitor the continued effectiveness of the NCSP and identify trends, positive or negative, in the performance of work with fissile materials. In addition, NNSA/NSO is conducting quarterly assessments of the Contractor's criticality safety program implementation. The requirements for the quarterly assessments are derived from DOE Standard STD-1158, "Self-Assessment Standard for DOE Contractor Criticality Safety Programs," and applicable ANSI/ANS-8 Standards.

There were no NCS infractions reported at the NTS in 2007.

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

Response

Currently, the nuclear safety program for Area 5 has two criticality safety engineers qualified to DOE-STD-1135-99 and one subcontractor completing qualification. For fissile material activities at the DAF, the National Laboratories performing the activities obtain qualified Criticality Safety Engineer (CSE) support from the main Laboratory personnel. The DAF has one qualified CSE from the Lawrence Livermore National Laboratory assigned to provide oversight of the DAF fissile material activities. Given the current level of fissile material activities at the NTS, the currently assigned full-time-equivalents (FTEs) assigned for oversight is adequate. However, as the facility transition is completed, the NTS M&O contractor will need to reassess the number of FTEs needed to properly monitor and evaluate the fissile material activities.

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

Response

One engineer has completed 85% of the Technical Qualification Program (TQP) standard for DOE-STD-1173-2003, and is scheduled to fully complete the qualification by September 2008. Until the qualification is completed, the NNSA/NSO utilizes a qualified criticality safety engineer from the DOE Service Center to supplement assessment activities. Staffing is adequate for the oversight of fissile material activities for the next few years given the tempo of fissile material activities occurring at the NTS and the available support from the Service Center.

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

Response

The formal NNSA/NSO criticality safety oversight performed in 2007 is documented in two DOE-STD-1158-2002 assessments of the NTS (DAF and Area 5). Less formal oversight was performed through four operational awareness walkthroughs of

the DAF fissile material activities, and shadowing of the Contractor's Readiness Assessment (RA) for startup of the Nuclear Material Handling Project. The four walkthroughs and shadowing of the Contractor RA identified no deficiency at the DAF. The criticality safety assessments of the NTS identified several findings. The findings were formally transmitted to the NTS Contractors and placed in their respective corrective action programs. The corrective actions for the findings will be monitored via operational awareness activities throughout the year. Status of the findings will be assessed and documented in the formal assessments for the facilities. The assessment of the DAF criticality safety program indicated the contractor's criticality safety staff maintained adequate awareness of the fissile material activities and the nuclear criticality safety evaluations (NCSEs) were of high quality and the controls identified within the NCSEs were properly flowed down to the operational areas. The NNSA/NSO assessment of the Area 5 indicated the contractor was lacking in performing self-assessments of their fissile material activities and NCSEs associated with Transuranic (TRU) materials were lacking in adequacy. Specifically the Area 5 Assessment identified the following Findings:

1. NSTec Procedure OP-2151.612, Radioactive Waste Management Nuclear Criticality Safety Program, states the CSE will perform quarterly inspections or audits. Interviews with operations and CSE personnel indicate that no inspections had been performed since March 2007 **(Finding-CS.1-1.1)**.

2. Area 5 fissile waste handlers and their supervision do not possess sufficient knowledge on criticality safety principles. This insufficient knowledge could affect their ability to understand the importance of criticality safety controls or accept responsibility for criticality safety during the performance of their duties **(Finding-CS.1-2.1)**.

3. Non-qualified personnel are performing criticality safety reviews for waste acceptance and personnel performing these duties are not administratively independent from the operations organization **(Finding-CS.1-3.1)**.

4. NSTec Area 5 Waste Operations are not utilizing area postings specifying all limits on criticality safety parameters subject to procedural control as required by ANS 8.1 **(Finding-CS.1-4.1)**.

5. The NSTec Area 5 management or the criticality safety staff does not maintain a complete set of formally approved criticality safety evaluations which outlines the criticality safety basis for the Area 5 fissile material activities **(Finding-CS.1-5.1)**.

6. The Area 5 Radioactive Waste Management Complex (RWMC) application of the Unreviewed Safety Question (USQ) Screening process was deficient in evaluating proposed changes as evidenced by the approval of an inadequate USQ Screening document by facility management that supported a fissile material movement. A criticality safety infraction and a potential inadequacy of the Area 5 RWMC

safety analysis resulted from the inadequate screening and subsequent management approval of the USQ screen document. **(Finding-CS.1-5.2)**.

7. The criticality safety evaluations that were assembled for the TRU activities in Area 5 for the TRU fissile material activities do not meet the expectations of a DOE Standard 3007 compliant NCSE **(Finding-CS.1-7.1)**.

The immediate action taken by the Area 5 Contractor, as a result of the assessment, was to prepare a NCSE to properly evaluate the fissile material configuration which resulted in the potential inadequacy of the safety analysis identified in Finding 6 above. The remaining findings will be completely closed upon implementation of the recently approved criticality safety program document. In addition, the contractor has taken interim action to increase oversight by the contractor's criticality safety staff and self-assessments by the newly formed criticality safety review committee.

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

NNSA/NSO participated on resolution of proposed design change to add a criticality accident alarm system (CAAS) in the DAF for subcritical experiment operational areas. The project team made the decision to make a design change to the Criticality Experiments Facility (CEF) project to add the CAAS. Also, NNSA/NSO performed reviews of the draft criticality safety evaluation for the CEF staging operations. In addition to review of design changes, the NNSA/NSO performs reviews of documented safety analysis (DSA) documents. As part of the review of the DSAs, the hazards analysis is reviewed to determine if the hazard from a criticality is properly analyzed and the appropriate controls are selected for implementation. As a result of the DSA review for the DAF, a deficiency was noted because the DSA had not captured the NCSE controls as recommended by DOE Standard DOE-STD-3007-2007. As a result of this deficiency a Condition of Approval was added to the Safety Evaluation Report that provided a basis for approval of the DSA.

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

Response

No reportable occurrence occurred in 2007 concerning criticality safety.

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 quarterly criticality safety assessments evaluate the status of previous assessment findings. It is anticipated that the currently open previous year findings will be closed upon implementation of the recently approved DOE Order 420.1B complaint criticality safety program scheduled for implementation in September 2008.

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.

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

FEB 1 0 2008

Dr. Jerry McKamy
United States Department of Energy
National Nuclear Security Administration
NA-17/GTN
19901 Germantown Rd
Germantown, MD 20874

Subject: Sandia Site Office (SSO) Response to Defense Nuclear Facilities Safety Board (DNFSB) Letter on January 29, 2008

Dr. McKamy:

The DNFSB issued a letter on January 29, 2008, on the "Status of the Department of Energy Nuclear Criticality Safety Program for Calendar Year 2006." The Board believes it was necessary to modify the contents of the Department of Energy (DOE) Annual Nuclear Criticality Safety (NCS) Report so that it does not mainly report on those issues where substantial and lasting progress has been made, but rather emphasizes ongoing NCS issues. These changes will help ensure continuous improvement in criticality safety across the DOE Complex. The latest DOE Annual NCS Report did not include required information on the quality of contractor self-assessments for criticality safety, adequacy of NCS evaluations, and consistency of NCS programs across the Complex. The Board has modified the annual reporting requirements to include eight additional items to be reported by each site where the NCS program is implemented. The enclosed information is being supplied to meet the deadline of March 31, 2008.

If you have any questions, you may contact me at (505) 845-5456.

Sincerely,

Jeffrey Petraglia

Jeffrey Petraglia
SSO Criticality Safety Point-of-Contact

Enclosure

cc w/enclosure:
D. Nichols, CDNS
N. Schwers, SNL/NM MS-1143
P. Wagner, SSO
K. Davis, SSO
D. Brunell, SSO
J. Todd, SSO
08-040-AMFO

FEB 2 6 2008

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

2007 Summary

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

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

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

With the last shipment on February 18, 2008, this completes Phase 1 and removes all Category I and II SNM. This material not only represents material that is a greater security risk but also the largest amount of fissile material (i.e., pure highly enriched uranium material). Phase 2 of the removal of SNM will include material that is security Category III SNM and includes smaller amounts of non-pure fissile materials. Phase 2 will be started in 2008 and will require less support from the NCS SNL staff.

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 the SSO approved as the Criticality Safety Program Document. A brief status is as follows:

1) Non-Conformances

Non-Conformances levels have been established by SNL and SSO as follows:

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
		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.

There has been one NCS ORPS reportable in 2006 for the Manzano Nuclear Facility and one in 2007 for the Nuclear Material Storage Facility (NMSF). Both were self-identified as a Potential Inadequacy in the Safety Analysis (PISA) and are more related to details in the safety bases than specifically NCS issue 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 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.

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 walk-throughs 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 walk-throughs in 2007 are included in a local action tracking system. Transition to a corporate tracking system will occur in 2008. In 2007, SNL completed DOE-STD-1158-2002 self-assessments of eight facilities. SSO completed walkthroughs assessments of eleven facilities to validate the results in the SNL self-assessments. In 2008, SNL has scheduled self-assessments of all eleven facilities and SSO has schedule walkthroughs assessments of six facilities.

NCS committees met twenty times in 2007. SSO personnel have been included in the notices with an agenda for the NCS committee meetings. Meeting minutes are developed, reviewed, approved and distributed within three months of the meeting date. Many members of the safety committees are members of other safety committees including the secretary. This supports consistency between the SNL facilities. The action items are generally documented as being completed in a future set of minutes following the development of the action item. The action items are completed according to the agreement between the committee chairman and line management.

3) Staff Responsibilities

The NCS training program is based on DOE-STD-1135-99. SNL plans on having all five of the qualified NCS engineers and three trainees participate in the 7uPCX experiment series if it occurs. This will be an in-house training class applicable to training requirements. In the last year, four of the five qualified NCS engineers and all three trainees attended ANS conferences. The University of New Mexico NCS short course was attended by four managers, one NCS engineer, and all three trainees. All three trainees have attended the Lawrence Livermore National Laboratory (LLNL) short course for hands-on training. Of the five qualified NCS engineers, three are members of each of the two criticality safety committees. NCS engineers participate in most of the NCS safety committee self-assessments and walk-through activities.

4) Criticality Safety Assessments

Prior to operations, the CSAs are developed, reviewed and approved. There are eighteen active CSAs for SNL. With the completion of Phase I of the SNM de-inventory, six of the CSAs will no longer be active. 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 will complete a gap analysis of the CSAs not meeting DOE-STD-3007-2007 and a schedule for the updates in 2008. The schedule will be based on safety, first; projected activities, second; and long term storage, third.

The current SNL verification and validation (V&V) process is being evaluated to ensure software quality assurance requirements are addressed. There are twelve computers used to perform criticality safety calculations and all have V&V packages completed. The ANSI/ANS criticality safety standard has been evaluated, but not completed. SNL will develop enhanced guidance by the end of 2008.

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

Response

Six engineers are qualified to DOE-STD-1135-99 with two trainees 90% completed and expected to qualify within two months. NCS program work is ~ 2 full-time-equivalents (FTEs). NCS projects work is anticipated to be 1-2 FTEs for 2008. 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. 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.

- 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 2007 were the twelve walkthroughs and two DOE-STD-1158-2002 assessments performed by the SSO CRITPOC. For the thirteen walkthroughs, there was one deficiency, one weakness, six observations, and two strengths. All items were transmitted from SSO to SNL via letters and were addressed by SNL. For the one deficiency on CSI posting for facilities, a corrective action plan (CAP) was developed and all milestones were completed. A verification assessment was performed by SSO to verify the actions had been closed in all appropriate facilities.

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

Response
SNL has participated in LANL/LLNL assessment at Device Assembly Facility (DAF) at NTS. SNL participates in DOE Complex End-User activities and meets with counterparts from other sites. External assessment planned for 2008 from other NCS members of the DOE Complex. SNL participates in ANS conferences, ANSI/ANS Standards, MCNP & SCALE training programs, ICBEP Benchmark Program, and LLNL Hands-on training.

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

Response
One reportable occurrence occurred in 2007 concerning the difference between data in container size for items in a CSI array. A few of the packages have required updates to the CSI values as a result of the evaluation. The occurrence report was issued as a PISA by the facility management and later cancelled as information was evaluated. One non-reportable occurrence occurred in late 2006 concerning the CSI posting at one facility. This was corrected at all SNL facilities in 2007.

- 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

FEB 28 2008

MEMORANDUM FOR: Dr. Jerry N. McKamy, Nuclear Criticality Safety Program Manager, NNSA/HQ (NA-17) FORS

FROM: Karl E. Waltzer, Assistant Manager for Nuclear Engineering

SUBJECT: Pantex Site Office Submittal to DOE Annual Criticality Report

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

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

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

Attachment

cc w/attachment:
K. Waltzer, PXSO, 12-36A
D. Nester, PXSO, 12-36A
C. Alvarado, PXSO, 12-36A
R. Daniel, B&W Pantex, 12-6F
B. Hill, B&W Pantex, 12-101
G. Fondaw, B&W Pantex, 12-101
L. Vickers, B&W Pantex, 12-37
cc w/o attachment:
S. Klein, PXSO, 12-36

RH08-30399-NE

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

1) The M&O Contractor (B&W Pantex) was provided a set of Nuclear Criticality Safety performance metrics for FY 2007. At the end of FY 2007, the Contractor provided closure evidence for four of the five performance metrics. They are currently working to close the 5th metric and the Site Office subject matter expert is involved in reviewing all work products.

   The Pantex M&O Contractor provides a report at the beginning of the fiscal year detailing which facilities are to receive a criticality safety walkdown; at the end of the fiscal year a report is provided detailing the results. The CRITPOC independently walks down facilities and shadows any assessments related to criticality safety. The PXSO criticality safety representative meets with the Contractor criticality safety staff periodically throughout the year.

2) The B&W Pantex Criticality Safety Program is fully staffed with three qualified criticality safety engineers. B& W Pantex's three Criticality Safety Engineers are sufficient for Pantex operations. All three criticality safety engineers have a masters or higher degree in nuclear engineering. All three have completed the B&W Pantex Nuclear Criticality Safety Engineer Qualification Card which meets the requirements of DOE-STD-1135-99, *Guidance for Nuclear Criticality Safety Engineer Training and Qualification*. All have completed either the LANL or the LLNL (or both) hands-on criticality safety course. In March 2007, the Contractor completed an independent assessment of the Nuclear Criticality Safety Engineer Qualification Process. This self-assessment was shadowed by the Pantex Site Office (PXSO) criticality subject matter expert. The conclusion of the assessment was that "The applicable requirements for NCS Engineer qualification are implemented."

3) PXSO has one primary criticality safety point of contact (CRITPOC). The job of CRITPOC is an additional duty largely because of the type of fissile materials and the nature of the operations at Pantex. One PXSO CRITPOC is sufficient to oversee the Contractor's Criticality Safety Program. Pantex Site Office Procedure, 506.2.0, *Nuclear Criticality Safety*, defines the roles and responsibilities and requirements related to criticality safety at PXSO. This procedure, revised in November 2007, requires the CRITPOC to meet the Technical Qualification Program requirements for *Nuclear Safety Specialist Functional Area Qualification Standard, DOE-STD-1183-2004*. The applicable elements of *Criticality Safety Functional Area Qualification Standard*, DOE-STD-1173-2003, not included in the Nuclear Safety Specialist program requirements are added to the Site Specific Training requirements of the CRITPOC.

The PXSO CRITPOC has undergone all required training, including the LANL introductory MCNP Class and the LLNL 4-Day hands on Criticality Safety Class and is in the process of writing a Criticality Safety Evaluation for a fissile material operation problem provided by Mr. Jerry Hicks, DOE/NNSA Albuquerque Service Center. Completing the Criticality Safety Functional Area Qualification is a requirement on the CRITPOC's 2008 performance evaluation plan. Finally, Mr. Jerry Hicks assists the PXSO CRITPOC with assessments of the Contractor Criticality Safety Program and any other criticality safety related issues that arise.

The PXSO Criticality Safety Program underwent a self-assessment in September 2007 prior to being evaluated during the CDNS Review in the last quarter of CY 2007. The CDNS assessment of the PXSO Criticality Safety Program had no findings or weaknesses.

4) In 2007 the PXSO CRITPOC conducted two Walkdown Assessments of fissile material operations and shadowed the Contractor self-assessment of the Nuclear Criticality Safety Engineer Qualification Process. The Walkdown assessments, which resulted in no findings, demonstrated compliance with procedures and applicable criticality safety controls. The shadow assessment of the NCS Engineer Qualification Process resulted in PXSO comments concerning the requalification process, but all Contractor Criticality Safety Engineers are qualified. The comments involved the types of courses/studies that could be credited for criticality safety engineers' requalification. The NCS Requalification Card was revised accordingly. The Contractor self-assessment was thorough and resulted in no findings.

5) In 2007 the Special Nuclear Material Component Requalification Facility (SNMCRF) commenced operations at Pantex. Criticality safety controls are already incorporated into the Site Technical Safety Requirements. During the design phase for the SNMCRF, criticality safety engineers reviewed the operations and facility structure from the NCS standpoint. This resulted in material inventory limits, a shielded transport cart for use within the facility, and specific workstation designs that limit operations to a single item. No new criticality-specific controls or designs were required. The Pantex Contractor routinely uses the criticality safety group to review new facility designs and processes.

6) Bullets 6 through 8 do not apply to Pantex. There are no known reportable or non-reportable occurrences related to criticality in at least the last 15 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.

UNITED STATES GOVERNMENT | DEPARTMENT OF ENERGY

memorandum

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

DATE: FEB 28 2008
REPLY TO ATTN OF: SET/ 4PM-001
SUBJECT: Los Alamos Site Office Input to the Defense Nuclear Facilities Safety Board Annual Report

TO: Jerry N. McKamy, Nuclear Safety Engineer, NA-171, HQ/GTN

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

Donald L. Winchell, Jr.
Manager

Attachment

cc:
D. Glenn, OOM, LASO
J. Vozella, AMSO, LASO
F. Bell, SETL, LASO
P. Moss, SET, LASO
C. Keilers, DNFSB, LASO
B. Broderick, DNFSB, LASO
S. Monahan, LANL, SB-CS, MS-F691
R. M. Mobley, LANL, SB-DO, MS-E578
R. McQuinn, LANL, ADNHHO, MS-K778
Records Center, LASO

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

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

   Background

   In late October 2005, National Nuclear Security Administration (NNSA) formed an expert team and conducted a review of the Los Alamos National Laboratory (LANL) criticality safety program. The Team found that the LANL nuclear criticality safety program did not meet many of the expectations of the national consensus criticality safety standards. A Criticality Safety Improvement Plan (CSIP) was developed in response to this review.

   In October 2006, the Chief of Defense Nuclear Safety performed a follow-up review of the LANL criticality safety program of behalf of the Los Alamos Site Office (LASO). The review team concluded that the criticality safety basis was now documented and auditable but LANL criticality safety program did not yet meet the expectations of the standards and order in many cases.

   In December 2006, LANL re-base lined the Nuclear Criticality Safety Improvement Plan (CSIP). The new plan was accepted by the LASO Contracting Officers Representative (COR) in December 2006.

   Field Element Line Management actions

   LASO's focus in 2007 was on oversight of the CSIP including the quality of work produced.
   - A performance based incentive (PBI) was placed in the contract directly measuring LANL's progress against the CSIP milestones. This occurred in 2006, but was in force during the entire 2007 year.
   - The LASO criticality safety engineer, with substantial support from the NNSA Service Center criticality safety engineer, met with LANL staff weekly on CSIP status.
   - The weekly meetings included review of comments on the LANL produced Criticality Safety Evaluations (CSEs). LASO performed a 100% review of CSEs produced in 2007.
   - LASO criticality safety staff and facility representatives performed field oversight activities to review implementation of the new program.

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

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

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. The CSIP has significantly improved the program. LANL performance on meeting the milestones defined in the CSIP has met LASO expectations. The quality of CSE's produced by the LANL engineering staff has dramatically improved as assessed by the LASO and Service Center criticality safety engineers. The ALR process is having a significant impact on the ability to sustain progress against the CSIP. This impact will be formally analyzed at the conclusion of the ALR. LASO expects the CSIP end-date to slip. This is acceptable due to the criticality safety margin gains resulting from the ALR. The ALR process has uncovered a number of deficiencies which impact the safety margin of operations in PF-4. LANL has been diligent in correcting these issues, resulting in improved margins. Overall, LANL performance against the LASO established criticality safety performance metrics has been exceptional and of high quality.

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

   After the October 2005 NNSA program assessment a staffing plan was generated by the Nuclear Criticality Safety (NCS) Group as a part of the CSIP. Action on that staffing plan was initiated in August of 2006. Two new staff members were hired and working within the NCS group by December of 2006 and both are at various stages of the qualification and training process.

LANL is currently staffed with seven fully qualified criticality safety engineers, two engineers in the final mentoring stages of qualification, and one engineer in training. The number of new hires was limited by the limited time current staff had to support and mentor new hires and the lack of qualified criticality safety professionals nation-wide. The recent event involving the TA-55, PF-4 vault limits and consequent ALR have led to the conclusion that additional staff is necessary and actions are being taken to hire two additional staff members this year. The NCS program has engaged criticality safety specialists from Pantex and a related organization at LANL to support the ALR. Four total individuals have been engaged in this respect commensurate with their qualifications and abilities.

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

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

   The LASO nuclear criticality safety engineer program consists of one engineer, currently enrolled in the qualification program. There are no vacancies in criticality safety and LASO is fully staffed for this position. The incumbent engineer is expected to be fully qualified by March 2008. LASO is receiving significant support from the NNSA Service Center to support mentoring and oversight. This support will continue at a reduced level once the LASO engineer is qualified to support continuing oversight of the LANL ALR at TA-55 and Safety Basis review teams.

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.

   There were no NNSA assessments of the LANL criticality safety program during 2007. This was a deliberate decision by LASO to allow LANL to address corrective actions as defined in the CSIP. Operational awareness was maintained as detailed in item one above.

   There were three external assessments conducted at the site.

a. The biannual Chief of Defense Nuclear Safety (CDNS) assessment of LASO. This was an assessment of the LASO criticality safety program. CDNS assessed the LASO program as satisfactory with the lack of a qualified criticality safety engineer being the primary issue. The corrective action for this finding is summarized in item three above.
b. The DNFSB staff led an assessment of TA-55 vault operations in June 2007. Two issues were identified as a result of this assessment:
   - Utilization of the Material Accountability and Safeguards System (MASS) by PF-4 personnel. This is being addressed as detailed in the NNSA response to the September 10, 2007 letter requesting a report regarding the National Nuclear Security Administration's (NNSA) utilization of the Materials Accountability and Safeguards System (MASS) at the Los Alamos National Laboratory (LANL).
   - Vault CSE's where the use of boron neutron poisons could not be verified. This is addressed in item one above.
c. The NA-17/DNFSB assist visit in November 2007. This assist visit was requested of NA-17 by LASO to review the ALR process and provide recommendations to improve the process. NA-17 and DNFSB staff requested to jointly assess/provide recommendations to LASO and LASO accepted. The outcome of the visit was a set of recommendations to improve the ARR process. These were accepted and incorporated into the LASO and LANL procedures. Implementation of the ALR process is addressed in item one above.

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

   In item two LASO assessed the NCS program as currently understaffed to address emergent issues facing the site. Input into design requirements has been delayed as a result of this and poor engagement from LANL project management teams. There remains a legacy issue regarding what input criticality safety should provide during design. To date this has been broad guidance documentation and direct interface with the design team. Significant quantitative evaluation, in the form of criticality safety analysis, has not been performed. The CMRR is the only project which has had calculations performed during the design process. Issues uncovered as a result of the TA-55 vault re-evaluation are providing lessons-learned on the importance of more detailed analysis as part of the design process. These lessons learned will be evaluated at the close of the ALR to determine how to most effectively engage in the design process. LASO, with significant assistance from the NNSA service center, reviews design documents at critical decision points to assure that design features are captured. Several ongoing projects have

some residual project risk due to inadequate criticality safety input early in the design process. LANL has attempted to mitigate this risk by applying additional support to high value projects, such as CMRR. NNSA assesses the residual project risk to be low and acceptable.

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

   There were a total of seven events that were of criticality safety relevance in 2007. Because of the straight-forward nature of these events no formal trending and analysis was performed on the reportable and non-reportable occurrences related to criticality safety. Each of the events reinforced the issues raised by the October 2005 program assessment conducted by the NNSA and the importance of continuing with the CSIP.

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

   The two remaining events, after review by the NCS Group, Facility Management, and/or the operating groups were not classified as infractions as no parameters were affected and the implementation was as intended. However, in one instance concerning the PF-4 vault, the event led to the declaration of a Potentially Inadequate Safety Analysis (PISA). After analysis of the situation a positive Un-reviewed Safety Question Determination was declared requiring a Justification for Continued Operations. The facility response to this event was to pause all operations, implement the ALR discussed in bullet one, and to immediately begin re-evaluation of all of the vault limits.

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

   This is addressed in item one above.

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

   N/A

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 the first seven of those topics is provided below for Environmental Management (EM) sites. The Office of Environmental Management (EM) has 12 facilities/contractors at six (6) field sites that required nuclear criticality safety program.

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 point of contact for this report is Chuan-Fu Wu. He may be reached at 202-586-4166.

Measure of Nuclear Criticality Safety Performance

Most of the 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 26, depending primarily on the scope and size of the nuclear operations. There are periodic shortages and the shortfall is typically made up by recruiting new hires or by technical supports from subcontractors. One contractor (ISOTEK at Oak Ridge), now starting up a program, is significantly understaffed for projected work and is planning staff growth. The various federal oversight groups have assessed and affirmed that the current level of staffing is adequate for the current work load.

Federal Criticality Safety Staffing

The EM sites baseline criticality safety assessments conducted in 2006-2007 concluded that the federal staffing levels were adequate except at Savannah River Office. Since then, Savannah River has increased the NCS staff from one (1) to four (4). A recent follow up assessment found the current federal staffing level adequate to provide criticality safety oversight at Savannah River.

Federal Assessments of Sites NCS Programs

EM HQ assessments of the NCS programs were conducted for Savannah River, Hanford, K-25, and Portsmouth. 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 informally shared at meetings of the federal Criticality Safety Coordinating Team and at the recent EM Nuclear Criticality Safety Workshop. The contractor's self assessments evaluated were considered adequate with some caveats. The criticality safety

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

New Facility Design

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

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

Facility/Contractor	Fluor Hanford	BNI Waste Treatment Plant	CHG 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, See Att. 2	Yes	Yes	Yes	No
b. If so, what are the metrics?	See Att. 1	N/A	See Att. 3	See Att. 4	See Att. 5	N/A
c. If so, what is the contractor's record?	Acceptable	N/A	Acceptable	Acceptable	Acceptable	N/A
d. If no metrics have been established, what is the method of monitoring performance?	N/A	N/A	N/A	N/A	N/A	DOE IVR process
e. What is the conclusion on contractor performance and what is the basis?	Acceptable	N/A	Acceptable	Acceptable	Acceptable	Not acceptable
f. What actions have been taken to improve contractor performance?	Meetings	N/A	Meetings	Meetings	Meetings	Corrective Action Plan
2. Status of Contractor Criticality Safety Engineer Program						
a. How many NCS staff are needed?	25	One	3	3	1.25	2
b. How many are there?	24	One	3	3	1.25	2
c. Actions to address shortfall, if any?	Sub-contract/new hire	N/A	Sub-contract	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	One	Partial	1	1	0.5
b. How many are there?	1	One	Partial	1	1	0.5
c. Actions to address shortfall, if any?	N/A	MOA from RL	MOA from RL	N/A	N/A	Subcontractor
d. Has DOE Field Management affirmed adequacy?	Yes	Yes	Yes	Yes	Yes	Yes
4. Federal Assessments of Site NCS Programs						
a. What NCS assessments have been performed?	See att. 1	See Att. 2	See att. 3	See att. 4	Planned	See att. 6
b. What corrective actions were taken as a result of these assessments?	3 Corrective Action Plans	2 Corrective Action Plans	4 Corrective Action Plans	N/A	N/A	See att. 6
c. What lessons learned were developed?	None	None	None		N/A	None
d. Were the contractor's self assessments evaluated for adequacy? What was the conclusion?	Yes/ adequate	Yes/Inadequate	Yes/adequate	yes/adequate	N/A	No
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	Yes	Yes	No	No	No
b. Have these received a criticality safety design review	Yes	Yes	Yes	N/A	N/A	N/A

by anyone?						
c. If so, what are the lessons learned? How were these lessons communicated?	N/A	N/A	N/A	N/A	N/A	N/A
6. Trending and Analysis of Reportable and Non-reportable Nuclear Criticality Occurrences						
a. How are NCS occurrences tracked and trended?	See att. 1	See Att. 2	See att. 3	See att. 4	See att. 5	See att. 6
b. What were the results?	See att. 1	See Att. 2	See att. 3	See att. 4	See att. 5	See att. 6
c. How were the results used to improve performance?	See att. 1	See Att. 2	N/A	N/A	See att. 5	See att. 6
7. Follow Up to Assessments						
a. What prior assessments received a follow up review?	See att. 1	See Att. 2	N/A	See att. 4	See att. 5	See att. 6
b. Were the corrective actions effective?	See att. 1	N/A	N/A	See att. 4	Yes	N/A

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

Facility/Contractor	Idaho Cleanup Project (CWI)	BBWI AMWTP	SRS	EnergXs	BJC	ISOTEK
Field Office	**Idaho**	**Idaho**	**Savannah River**	**Oak Ridge**	**Oak Ridge**	**Oak Ridge**
1. Measure of Contractor NCS Performance						
a. Have metrics been established to monitor contractor performance?	Yes	Yes	Yes	Yes	Yes	Yes
b. If so, what are the metrics?	See att. 7	See att. 7	See att. 8	ACRs	ACRs	Infractions
c. If so, what is the contractor's record?	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable
d. If no metrics have been established, what is the method of monitoring performance?	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	Acceptable	Acceptable	Good	Acceptable	Acceptable
f. What actions have been taken to improve contractor performance?	N/A	N/A	See att. 8	N/A	Increase staff	Add nuclear safety staff
2. Status of Contractor Criticality Safety Engineer Program						
a. How many NCS staff are needed?	6	5	26 (M&O)	2	16	6
b. How many are there?	6	4	24	4	16	2
c. Actions to address shortfall, if any?	N/A	New hire	New hire	N/A	N/A	Recruit staff
d. Has DOE Field Management affirmed adequacy?	Yes	Yes	Ongoing	Yes	Yes	Concur with staff

						insufficiency
3. Status of Federal Criticality Safety Oversight Program						
a. How many NCS staff are needed?	1 for EM	1 for EM	4	1	1	1
b. How many are there?	1	1	4	1	1	1
c. Actions to address shortfall, if any?	Cross training of 4 others	Cross training	N/A	N/A	N/A	N/A
d. Has DOE Field Management affirmed adequacy?	Yes	Yes	Yes	Yes	Yes	Yes
4. Federal Assessments of Site NCS Programs						
a. What NCS assessments have been performed?	See att. 7	See att. 7	See att. 8	See att. 9	See att. 10	See att. 11
b. What corrective actions were taken as a result of these assessments?	N/A	N/A	See att. 8	See att. 9	See att. 10	See att. 11
c. What lessons learned were developed?	none	None	See att. 8	None	None	None
d. Were the contractor's self assessments evaluated for adequacy? What was the conclusion?	Yes/ Adequate	Yes/ Adequate	Yes Conditionally adequate	Yes Adequate	Yes Adequate	Yes Premature
e. Are criticality safety evaluations deemed adequate?	Yes	Yes	Yes	Yes	Yes	No
f. Is the NCS program consistent with requirements?	Yes	Yes	Yes	Yes	Yes	Not yet
5. New Facility Design						
a. Are any facilities being designated that will need a criticality safety program?	No	No	Yes	Yes	Yes	Yes
b. Have these received a criticality safety design review by anyone?	N/A	N/A	See att. 8	Yes	Yes	Yes

c. If so, what are the lessons learned? How were these lessons communicated?	N/A	N/A	See att. 8	No	Early NCS input	Involve NCS
6. Trending and Analysis of Reportable and Non-reportable Nuclear Criticality Occurrences						
a. How are NCS occurrences tracked and trended?	See att. 7	See att. 7	See att. 8	See att. 9	See att. 10	Not yet
b. What were the results?	See att. 7	See att. 7	See att. 8	See att. 9	See att. 10	Not yet
c. How were the results used to improve performance?	See att. 7	See att. 7	See att. 8	See att. 9	See att. 10	N/A
7. Follow-Up to Assessments						
a. What prior assessments received a follow up review?	None	None	See att. 8	Close CA	Feb. 2007 HQ assessment	Design review
b. Were the corrective actions effective?	N/A	N/A	See att. 8	Yes	Yes	Not yet

Attachment 1

Fluor Hanford Criticality Safety Program Annual Report

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

Nuclear Criticality Safety Performance Metrics have been established for the Fluor Hanford Inc. 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 an annual self-assessment of nuclear criticality safety program implementation. An annual self-assessment covering approximately one-third of the DOE-STD-1158 lines of inquiry is conducted each year. Additional topical areas of interest are explored.
- 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 are assessed as part of the annual assessment process approximately every three years.
- Frequent interaction of the Nuclear Criticality Safety Engineers with operations staff in operating facilities. Facility criticality safety programs emphasize participation of the CSE/CSR in facility walkdowns, job planning, pre-job briefs, and interactions with operations.
- Perform monthly inspections of fissionable material storage areas/arrays and criticality alarm systems. Criticality safety staff participates in monthly inspections of the facility operations.

2. Status of Contractor Criticality Safety Engineer Program.

- FHI employs one Director of Nuclear and Criticality Safety, one Criticality Safety Manager, 12 qualified Criticality Safety Engineers, 9 qualified Criticality Safety Representatives, and 2 Criticality Safety Representatives in-training.
- FHI is exploring the hiring of an entry-level engineer as a Criticality Engineer in-training.
- FHI has the ability to contract on short-notice one qualified Criticality Engineer if needed.
- Staffing appears to be adequate based upon the mission needs.

3. Status of Federal Criticality Safety Oversight Program.

- Program was reviewed by HQ assessment team in 2006.

- Conclusion: "The RL Criticality Safety Oversight program is well implemented."
- 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 FHI Annual Criticality Safety Self-Assessment and process.
- Criticality Evaluations are reviewed as part of this Self-Assessment process and RL reviews a sampling of new analyses as they are prepared. Conclusion is that the evaluations are appropriate for the scope of work at FHI facilities. Few issues associated with evaluations have been discovered.
- A May 10, 2007 letter issued an assessment report of the FHI Criticality Safety Program conducted in FY2007. The assessment resulted in no findings, however there were three Recommendations which were adequately addressed in corrective action plans. No significant lessons learned were developed as a result of this assessment. A review in-process at the present time has verified closure of all the items identified in this report. The most significant Recommendation was that FHI should; "Establish and demonstrate rigorous and disciplined methods to determine sets of abnormal conditions for analysis." A strengthening of the hazards assessment process has corrected this deficiency.

5. New Facility Design

- New facilities requiring a criticality safety program are not fully funded. However, FHI is aware of the need to address criticality safety concerns in the design process and has plans to do so.
- The M91 project for waste packaging has not proceeded past an initial design phase.
- The Sludge Treatment Project has a Criticality Engineer assigned to the project who is supporting the design process.

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

- FHI provides monthly roll-ups of criticality safety non-conformance events to FHI Senior Management that includes numbers of non-conformances, severity level, and whether self-identified or identified by DOE.
- FHI program requires tracking and trending of non-conformances if more than two non-conformances occur within a period of one year within a given facility.

- Trends are rolled up site-wide and reported to the Senior Nuclear Criticality Safety Committee and their semi-annual meeting. Results of recent trending analysis recorded no significant trends. However, non-conformance events at the Plutonium Finishing Plant were down from the previous year while non-conformance events for the Solid Waste organization were up.

7. Follow Up to Assessments

- An EM-supported review is on-going. Part of that review will be to assess the closure of Recommendations and Opportunities for Improvement identified during the FY2007 assessment. Preliminary results indicate that FHI has adequately addressed the prior concerns.

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

- Presently there are no open issues.

Attachment 2

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

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

- The 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 is presently in the process of developing Performance Measures in these areas.

2. Status of Contractor Criticality Safety Engineer Program

- The staffing level had consisted of one CSE who has been with the WTP project for several years. There have been other contractor personnel working in the NCS over the past 8 years that have come and gone. BNI has brought in another CSE specifically to assist in the revision of the WTP CSER. In general, the CSE is involved in NCS as needed.
- A criticality safety assessment of WTP was conducted by WTP ORP staff in December 2007. An assessment report was issued to Bechtel National, Inc. in January 2008. Three findings were issued: (1) apparent 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 is currently in discussions with BNI over the first two (2) findings. BNI did provide additional documentation to suggest that there is some integration between CSEs and process design personnel in WTP design and modification of fissionable material processes, systems, and equipment. However, it appears that NCS program does not have a procedural method for documenting all training aspects as found in DOE-STD-1135 into a qualification card.

3. Status of Federal Criticality Safety Oversight Program

- One qualified Federal Criticality Safety Engineer on an as-needed basis provided through a memorandum of agreement between ORP and RL.
- WTP has one person in the Authorization Basis group that is qualified as a Nuclear Safety Specialist (DOE-STD-1183) and WTP Nuclear Safety

Engineer (site specific). The qualifications include similar aspects of criticality safety as found in the DOE FAQ Standard, DOE-STD-1173.

- While an MOA exists, the present arrangement provides for an acceptable level of support. Full-time Fed oversight of criticality safety is not required at this point in the project development. The Federal Program (RL Criticality Safety Program) was reviewed by an HQ assessment team in 2006. The conclusion in that report; "The RL Criticality Safety Oversight program is well implemented." Staffing appears to be adequate; with one qualified NCS Federal Nuclear Engineer providing support through an MOA.
- There presently is no shortfall in Federal oversight of the WTP program while an MOA exists between ORP and RL to provide support on an as-needed basis. In addition, one federal staff assigned to WTP Authorization Basis provides coverage and support to WTP specific criticality safety issues.

4. Federal Assessments of Site NCS Programs

- ORP criticality safety assessment performed on WTP by ORP federal staff – report issued in January 2008.
- Contractor did not provide evidence of self assessments. Only management assessment or audit 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.
- ORP had specific concerns with the present revision of the WTP CSER and sent a letter to BNI with questions to answer before ORP would approve the CSER. BNI recently discussed these with ORP. BNI is planning to issue a new revision to the CSER this year superseding the current revision.

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.
- WTP authorization basis staff must stay involved with the contractor design changes and how they affect the CSER.

- Federal staff understands the process design, and how they can affect criticality safety.

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

- As the Waste Treatment Plant is not an operating facility, a nonconformance or occurrence process for criticality safety is not yet in place. As such this is N/A.

7. Follow Up to Assessments

- The recent criticality safety assessment performed by WTP federal staff was the first documented assessment of the WTP NCS program. Tracking corrective actions and effectiveness of these actions are yet to be determined.
- ORP will conduct criticality safety assessments every three years.

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

- No open issues.

Attachment 3

CHG – Tank Farms Operations Criticality Safety Program Annual Report

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

Nuclear Criticality Safety Performance Metrics have been established for the CHG 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. CHG 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

- CHG 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

- Program was reviewed by 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 CHG 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. New facility designs have resulted in the development of new evaluations. These have been extensively reviewed as part of an on-going oversight process. In general, the evaluations are appropriate at CHG facilities. Some issues associated with difficult, cumbersome and overly complex controls in evaluations for the Demonstration Bulk Vitrification Facility were discovered in the 2006 assessment but have since been corrected.
- 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, Demonstration Bulk Vitrification Facility (DBVS), Contact Handled-TRU (CH-TRUM), and

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

- CHG tracks criticality safety issues through the PER system. Ten PERs in criticality safety were identified in 2007. All 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
  - Requirements documentation
  - Training/qualification
  - NCS/Projects interface
- Trends are rolled up and reported to senior management semi-annually.

7. Follow Up to Assessments

- An EM-supported review is planned for June, 2008. Part of that review will be to assess the effectiveness of corrective actions from the Findings and Opportunities for Improvement identified during the FY2006 assessment however, CHG has closed these prior concerns.

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

- Presently there are no open issues.

Attachment 4

Washington Closure Hanford Criticality Safety Program Annual Report

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

Nuclear Criticality Safety Performance Metrics were established for the BHI (now WCH) CSP in November 2000. The metrics (modified for WCH) 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.
  - Les Davenport is a member of the ANSI/ANS-8.19 working group.
  - Warner Blyckert is a member of the ANSI/ANS-8.3 and ANSI/ANS-8.23 working groups.
- Perform an annual self-assessment of nuclear criticality safety program implementation. Les Davenport performs annual self-assessments of the WCH CSP IAW DOE-STD-1158-2002:
  - WCH Self-Assessment NS-2007-SA004 of the WCH Criticality Safety Program 8/1/06 – 9/15/07, DocsOpen # 751957.
  - WCH Self-Assessment NS-06-SA-001 of the WCH Criticality Safety Program 8/16/05 – 7/31/06, DocsOpen # 679045.
  - ERC Self-Assessment DE-SA-005-02 of the ERC Criticality Safety Program 8/1/04 – 8/15/05, DocsOpen # 623376.
  - Independent Assessment Report QA&S-2007-009 of the WCH Criticality Safety Program, performed 3/5/07 – 3/29-07, DocsOpen # 723679.
- Define qualifications for Criticality Safety Engineer (using DOE STD 1135-99 as a guide). From Section 3.0 *WCH Criticality Safety Program,* NS-1-1.1 Rev 2 (July 2007) and Rev 3 (effective 2/20/08):
- "Criticality safety personnel are required to be qualified prior to signing Criticality Safety Reviews. The qualification requirements for the position of CSE [Qualification Card 105363, WCH Criticality Safety Engineer] were developed in accordance with DOE-STD-1135-99. A CSE in Training may prepare Criticality Screening and Initial Criticality Evaluation forms (WCH-NS-005A and WCH-NS-005B), but only a qualified CSE may sign them. The program for training and qualifying criticality safety staff is implemented using a graded approach based on the duties and responsibilities of the CSE, which establishes priorities appropriate to ensure all aspects of criticality safety." Les Davenport, the primary WCH Criticality Safety Engineer, is fully qualified in accordance with the predecessor to qualification card 105363, which was signed 2/7/00 by J. W. Darby, BHI Manager of Design Engineering. Warner Blyckert's demonstration of qualification statement was signed 11/7/05 by Lynn

Curry. Les Davenport and Warner Blyckert are both fully qualified WCH Criticality Safety Engineers and each has over three decades of experience at the Hanford site. Al Horner is a WCH Criticality Safety Engineer in Training.

- Nuclear Criticality Safety Engineer meets with operations staff at the facility on a quarterly basis (limited to operations with criticality safety limits and controls). This metric was only applicable when BHI was responsible for D4 of the 233-S Building, which is now completed. Seven of 34 currently issued Criticality Safety Reviews include Field Verification Requirements, but none include criticality safety limits or controls.
- Perform monthly surveillances of fissionable material storage areas/arrays and criticality alarm systems. Perform quarterly surveillances of criticality. This metric was only applicable when BHI was responsible for D4 of the 233-S Building, which is now completed.

2. Status of Contractor Criticality Safety Engineer Program.

- The staffing level consists of one primary Criticality Safety Engineer, one backup Criticality Safety Engineer, one Criticality Safety Engineer in Training, and Lynn Curry, the Nuclear Safety Manager.
- Staffing appears to be adequate based upon the mission needs.

3. Status of Federal Criticality Safety Oversight Program.

- Program was reviewed by HQ assessment team in 2006.
- Conclusion: "The RL Criticality Safety Oversight program is well implemented."
- Staffing appears to be adequate; one qualified NCS Federal Nuclear Engineer

4. Federal Assessments of Site NCS Programs.

- RL conducts a Review of the WCH Annual Criticality Safety Self-Assessment and process.
- Criticality Evaluations are reviewed as part of this Self-Assessment process and RL reviews new analyses as they are prepared. Conclusion is that the evaluations are appropriate for the scope of work at WCH facilities.

5. New Facility Design.

- No new facilities are being designed by WCH that will need a criticality safety program.

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

During the 2007 Self-Assessment, the following three Observations (there were no issues) were stated in the final report:

- Observation 1: WCH has an effective nuclear criticality safety program using a graded approach that includes cooperation among management, supervision, and the criticality safety staff; and for each employee, involves conformance with operating procedures involving criticality safety.
- Observation 2: No problem areas were discovered during this self assessment, as discovered in the attached "WCH Nuclear Criticality Safety Self-Assessment Checklist – 8/1/06 through 9/15/07," which involved about one third of the specific lines of inquiry from DOE-STD-1158-2002 (about one third of the lines of inquiry are covered each year in the allowed 3-year cycle).
- Observation 3: All Field Verification Requirements were met by Waste Operations (two CSRs for ERDF & one CSR for 1330-N), and by Field Remediation (four CSRs for 300 Area burial grounds) as described in the attached "WCH 2007 Field Verification Requirements Checklist – 8/1/06 through 9/15/07."

7. Follow Up to Assessments.

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

- IIF-2007-0327: Issue1 of 1: The training and qualification program for individuals with the primary responsibilities for implementation of the CSP is not well defined nor is it consistently documented. There is no objective evidence of a DOE approved qualification program for staff and subcontractors responsible for implementing the CSP. There are no training program descriptions or minimum training criteria defined for the following positions that are identified in the CSP with implementation roles and responsibilities: Project Manager, Nuclear Safety Manager, Nuclear Analyst, Engineering Services Director, and Criticality Safety Alternate.
  - A training program was developed with descriptions and minimum training requirements for the following positions that were identified in the CSP with implementation roles and responsibilities for Project Manager and/or Project Engineer, Nuclear Safety Manager, Nuclear Safety Analyst, and the Engineering Services Manager. (Section 3.0 of NS-1-1.1 Rev 2)
  - Text was added to NS-1-1.1 Section 4 Criticality Safety Training stating that a training position description has been developed for those involved in implementation of the criticality safety program as identified in Action 1 above. The TPD includes required reading of NS-1-1.1, NS-

1-2.1, and NS1-1.2 and a training class conducted by the Criticality Safety Engineer.

- IIF-2007-0328: Issue 1 of 5: The guidance provided in the WCH CSP document and implementation procedures for a situation where mass exceeds the single parameter values is very sparse. Demonstration of incredibility in such a situation may require a criticality safety analysis report with detailed contingency analyses that are peer reviewed. A statement of how double contingency is met was added to Section 1.6 of NS1-1.1 Rev 2.
- IIF-2007-0328: Issue 2 of 5: There are multiple inconsistencies in the direction provided in the NS-1-2.2 Criticality Safety Reviews between Section 6.0 and Attachment 1 – Criticality Safety Review Process. Examples include inconsistent terms, reference to Exhibits that do not exist, and descriptions of enrichment values. The flow diagram provided in Attachment 1, which was applicable only to Revision 0 of NS-1-2.2, *Criticality Safety Reviews,* was removed.
- IIF-2007-0328: Issue 3 of 5: There are roles and responsibilities differences between NS-1-1.1 and NS-1-2.2. For example the CSA is allowed to identify criticality safety limits in NS-1-1.1 and not allowed to do so in NS-1-2.2; the Engineering Services Director is mentioned in NS-1-1.1 and not mentioned in NS-1-2.2. In general, the consistency between these two documents needs attention. All roles and responsibilities are now stated in NS-1-1.1, and are duplicated in Sections 6.4 and 6.5 of NS-1-2.2.
- IIF-2007-0328: Issue 4 of 5: There is no established programmatic process for maintaining configuration control of revisions to consensus standards. According to DOE Order 420.1B, the latest revision of a standard is to be used. The CSP does not have a requirements / standards implemented matrix or other type of mechanism that documents applicable standards. A new Section 9.2 was inserted in NS-1-1.1 listing all sections of ANSI/ANS-8 standards applicable to RCCC work when criticality is documented to not be credible under all normal and credible abnormal conditions
- IIF-2007-0328: Issue 5 of 5: The approval page of the CSP document identifies the author of the document as the individual providing the concurrence signature. The approval signature is consistent with the roles and responsibilities in Section 2.2 of the CSP, however, there is not a Technical Reviewer / Subject Matter Expert signature identified. The approval page of NS-1-1.1 Rev 2 and Rev 3 was signed off by the backup WCH Criticality Safety Engineer signifying review and concurrence by an independent technical reviewer/subject matter expert.
- IIF-2007-0329: Issue 1 of 2: The CSP document states that "For criticality to not be credible, it is required that, at a minimum, the double contingency principle of ANSI/ANS-8.1 be met, which will be documented

and justified in the Criticality Safety Reviews" (per NS-1-1.1, Section 1.5, WCH Criticality Safety Program Determines CRD 420.1B Applicability). However, the justification and documentation of the double contingency principle is not evident in the Criticality Safety Reviews. The CSR procedure indicates that it is sufficient to determine for the defined scope of work "that normal and credible abnormal conditions are subcritical" (per NS-1-2.2, Section 6.2, Initial Criticality Evaluation, and Step 2). The CSRs typically argue that "there are no normal or any credible abnormal conditions that could lead to criticality." The manner and extent to which the double contingency principle should be justified and documented in the CSRs should be clarified. A statement of how double contingency is met, which is the same for all CSRs, was added to Section 1.6 of NS-1-1.1.

- IIF-2007-0329: Issue 2 of 2: Nine new sites with estimated quantities of fissionable material above SCML for U-235 were added to the CSR 0300X-CE-N0010 after February 23, 2006 (per draft revision 3 of the CSR). It appears that this represents addition of new sites to the scope of the WCH CSP. However, the guidance offered in the WCH CSP document for discovery or addition of new sites is limited to assigning a responsibility for a Project Engineer: "Determines if a new or revised Criticality Safety Review is needed for proposed changes or discovered conditions." Given that the PE has no criticality safety expertise, it is not clear why the PE is not required to notify the CSE who is qualified to evaluate criticality safety of new conditions. This should be addressed. A statement that the CSE will receive an approved and documented calculation of material at risk or its equivalent on which the Criticality Safety Engineer will base the CSR was added to Section 7.1 of NS-1-1.1, which resulted in the addition of nine new sites to the cited draft CSR. Training Position Descriptions were added as part of Section 4.0 in NS-1-1.1 to formalize CSP training and documenting for Project Engineers, Nuclear Safety Analysts, and others having criticality safety responsibilities listed in NS-1-1.1.
- IIF-2007-0330: Issue 1 of 2: WCH has essentially no in-house expertise at the CSE / CSA levels, which may result in long-term program continuity problems. Based on the amount of time and special subject matter expertise required to maintain the CSP (0.25 CSE person/year in 2006), WCH has been using two retired long-time Hanford CSEs through a subcontract on a part time basis. In addition, WCH has designated a full time WCH employee, Al Horner, as a Criticality Safety Engineer in Training. Based on his previous experience in criticality safety, he is being considered for grandfathering in as a CSE.
- IIF-2007-0330: Issue 2 of 2: There are no Criticality Safety Limits established for WCH facilities or projects. Given this fact, the Criticality Safety Engineer and Criticality Safety Alternate have essentially the same job. Consideration should be given to eliminating the CSA position and

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

- IIF-2007-0331: Issue 1 of 2: There has not been an Independent or External Assessment of the CSP since January, 2000. This period of seven years is not consistent with the requirement for "external or independent assessments are conducted periodically." A requirement to perform an independent assessment of the CSP once every 3 years was added to Section 2.2 of NS-1-1.1. An action to perform the next independent assessment of the CSP in March 2010 was added to the Engineering Services Action Tracking System.
- IIF-2007-0331: Issue 2 of 2: Safety Margin is used extensively in the CSP procedure NS-1-2.2, and is numerically defined as the "sum of the ratios" (see Step 1 in Section 6.2, Initial Criticality Evaluation). Sum of the ratios is indicative of the inventory of fissionable material; however it is not indicative of any of the subcritical safety factors. The numerical definition of Safety Margin is counterintuitive: increasing Safety Margin is equated with increasing inventories of fissionable material – these typically correlate with reduction in criticality safety margins. Safety Margin should not be set equal to the sum of the ratios (see Section 6.2 and Attachment 1 in NS-1-2.2). Statements clarifying the inverse relationship between Safety Margin and Sum of Fractions were added to Section 6.2 of NS-1-2.2. Attachment 1 in NS-1-2.2 was removed.

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

- There are no open issues since all action items have been properly closed out and documented.

Attachment 5

Paducah Site Criticality Safety Program Annual Report

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

- A formal set of performance metrics is used to track the PRS NCS program implementation at Paducah.
- The number of Anomalous Condition Reports (ACRs), the amount of field time for NCS engineers, continuing education of NCS engineers, number of surveillances, assessments, anomalous conditions and lessons learned.
- PRS provides a quarterly NCS metrics report. Three ACRs were generated in the first quarter of 2008. The three ACRs involve the discovery of legacy fissile materials. The ACRs have been closed.
- The PRS Quality Assurance Program monitors and assesses the implementation and performance of the NCS Program. In addition, PRS and the DOE oversight staff perform Implementation Verification Review (IVRs) of the NCS Program implementation following updates to the safety basis documents. A DOE assessment of the PRS NCS Program implementation is scheduled to be performed as part of the annual ISMS assessment planned for the last week of March 2008. DOE oversight also includes routine monitoring of program implementation by the Facility Representatives.
- The PRS NCS program meets DOE PPPO expectations. The PRS scope of work involves operations that do not pose a high risk of criticality. The U-235 enrichment of fissile material is typically less than 2.0 weight percent. The NCS Program is well documented. The PRS staff is knowledgeable and experienced at the Paducah Site.
- PPPO regularly meets with PRS NCS staff to coordinate the integration of NCS Program requirements with the safety basis.

2. Status of Contractor Criticality Safety Engineer Program

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

3. Status of Federal Criticality Safety Oversight Program

- Based on the current level of activity at the Paducah site, and the contractor's NCS Program, PPPO needs only limited NCS SME oversight.
- PPPO has one Safety Systems Oversight (SSO) lead. He provides oversight for the PRS NCS Program. However, he has multiple responsibilities and has limited time to provide oversight. In addition, PPPO utilizes two Facility Representatives at each site to provide oversight on safety management programs (including the NCS Program). PPPO also has a support contractor that assists in oversight of the contractor.
- PPPO is increasing the number of Federal oversight staff at the Portsmouth and Paducah sites. Positions for additional Facility Representatives have been posted. In addition, positions for PPPO nuclear safety staff are being developed.
- PPPO management is aware of the staffing needs and is taking action to increase oversight capabilities.

4. Federal Assessments of Site NCS Programs

- DOE has not conducted an assessment of the PRS NCS program since the start of the PRS contract. The first assessment has been scheduled for the end of March 2008.
- The NCSEs were evaluated previously as part of safety basis document reviews and as part of the Implementation Verification Reviews (IVRs) conducted for prior contractors. The evaluation concluded that the NCS Program is compliant with DOE requirements.

5. New Facility Design

- PPPO is constructing a new facility at the Paducah Site. The new facility is designed to process UF6. The UF6 is depleted in the U-235 isotope. The NCS Program for the facility is limited to prohibiting the introduction of fissile material into the facility.
- DOE has approved the design of the facility PPPO has reviewed and approved the design and procurement of the conversion facility through the 10 CFR 830 safety basis process.

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

- 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 the "Management Problems".

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

7. Follow Up to Assessments

- PPPO has followed up on the effectiveness of corrective actions for prior assessments (under prior contracts). The PRS contract was awarded approximately 18 months ago. A PPPO assessment of the PRS NCS Program is scheduled for the end of March 2008.
- PPPO determined that the corrective actions related to a failure in characterization results affecting NCS were determined to be effective.

Attachment 6

Portsmouth Site Criticality Safety Program Annual Report

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

- A formal set of performance metrics has not 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, Walkdowns performance and open items, Field support Time, Training Support, Education, and scheduled Assessments are tracked.
- Two ACRs, five NCS related PRs , and 38 NCS Walkdowns were reported in 2007.
- The LPP Quality Assurance program is used to formally monitor and assess the implementation and performance of the NCS Program. In addition, LPP and the DOE oversight staff perform Implementation Verification Review (IVRs) of the NCS Program implementation following updates to the safety basis documents. A DOE IVR is scheduled for the LPP NCS Program for September 2008. DOE oversight also includes routine monitoring of program implementation by the Facility Representatives.
- As evidenced by 5 Issue Reports and recognized within a recent DOE assessment, the LPP NCS program has not met DOE PPPO expectations over the last calendar year. In addition, LPP has recently experienced staffing changes in the NCS engineering and management positions. LPP has adequately staffed the program and is effecting the changes to close to the findings and observations in the 2007 DOE Assessment. This is effecting an overall improvement to the program.
- DOE PPPO has recently approved an LPP corrective action plan for the findings associated with the recent DOE assessment. In addition, PPPO is increasing its oversight of the LPP contractor. The staff changes have brought a fresh approach to the program and a new attitude that is expected to show an overall improvement in the program.

2. Status of Contractor Criticality Safety Engineer Program

- Based on the current level of contractor activity, two NCS Staff Full Time Equivalents (FTE's) are required to support the mission at the Portsmouth site. Currently LPP has 2 NCS Staff FTEs, including a subcontractor employee. To ensure continuity, LPP is in the process of recruiting an NCS engineer to replace the subcontract employee.
- PPPO has affirmed adequacy of the LPP NCS Program staffing.

3. Status of Federal Criticality Safety Oversight Program

- Based on the current level of activity at the Portsmouth site and the planning for D&D, PPPO needs approximately 0.5 FTE.
- PPPO has one Safety Systems Oversight (SSO) lead. He provides oversight for the LPP NCS Program. However, He has multiple responsibilities and has limited time to provide oversight. In addition, PPPO utilizes two Facility Representatives at each site to provide oversight on safety management programs (including the NCS Program). PPPO also has a support contractor that assists in oversight of the contractor.
- PPPO is increasing the number of Federal oversight staff at the Portsmouth and Paducah sites. Positions for additional Facility Representatives have been posted. In addition, positions for PPPO nuclear safety staff are being developed.
- PPPO management is aware of the staffing needs and is taking action to increase oversight capabilities.

4. Federal Assessments of Site NCS Programs

- A DOE assessment of the LPP NCS program was conducted in October 2007. The assessment concluded that the NCS Program is compliant with DOE requirements.
- The DOE assessment identified areas for improvements. LPP developed a Corrective Action Plan (CAP) in response to the DOE assessment. PPPO approved the CAP, and will ensure that the CAP is closed. The CAP includes the following corrective actions:
  - LPP will utilize a consultant(s) to perform functional reviews and perform periodic assessments to determine the overall effectiveness of the NCS program.
  - The NCS Program shall determine the measurement performance to support the assumptions and analysis within the NCSE.
  - A written review of NCSE-SM—ERWM-013R01 General Batching of Solutions shall be completed covering the failure modes associated with the characterization process and the effects that the various failures on NCS could have.
  - Review and identify the appropriate training to encompass "Hazard Identification Methods / Scenario Development" and determine the appropriate method to incorporate this training into NCS staff training requirements.
  - Review data and properly mark drum(s) to ensure compliance to NCSE and storage array and area to ensure all drums are properly labeled.

- Review previous ICATS / Anomalous Condition Reports and identify the corrective measures taken to prevent re-occurrence of improper drum storage and perform a trend analysis, in accordance to LPP-NS-1003 section L, covering FY2006 – 2007.
- Review Nuclear Criticality Safety posting to determine possible improvements for communicating through simplicity and clarity.
- Review the NCSE process to determine the effectiveness and manner in which criticality safety evaluations are performed and written showing that all credible scenarios have been identified and that adequate controls have been developed in order to facilitate effective independent review. What lessons learned were developed? No lessons learned have been developed at this time.

5. New Facility Design

- PPPO is constructing a new facility at the Portsmouth Site. The new facility is designed to process UF6. The UF6 is depleted in the U-235 isotope. The NCS Program for the facility is limited to prohibiting the introduction of fissile material into the facility.
- DOE has approved the design of the facility PPPO has reviewed and approved the design and procurement of the conversion facility through the 10 CFR 830 safety basis process.

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

- LPP utilizes the ACR and Problem Reporting processes to track NCS occurrences. Trending is performed quarterly by LPP QA.
- A review of the ACRs and associated problem reports indicate that the principle weakness in the NCS Program is the adherence to procedures. This is consistent with results of recent LPP trend reporting.
- Corrective actions have been developed and will address the weakness associated with non-compliance with procedures.

7. Follow Up to Assessments

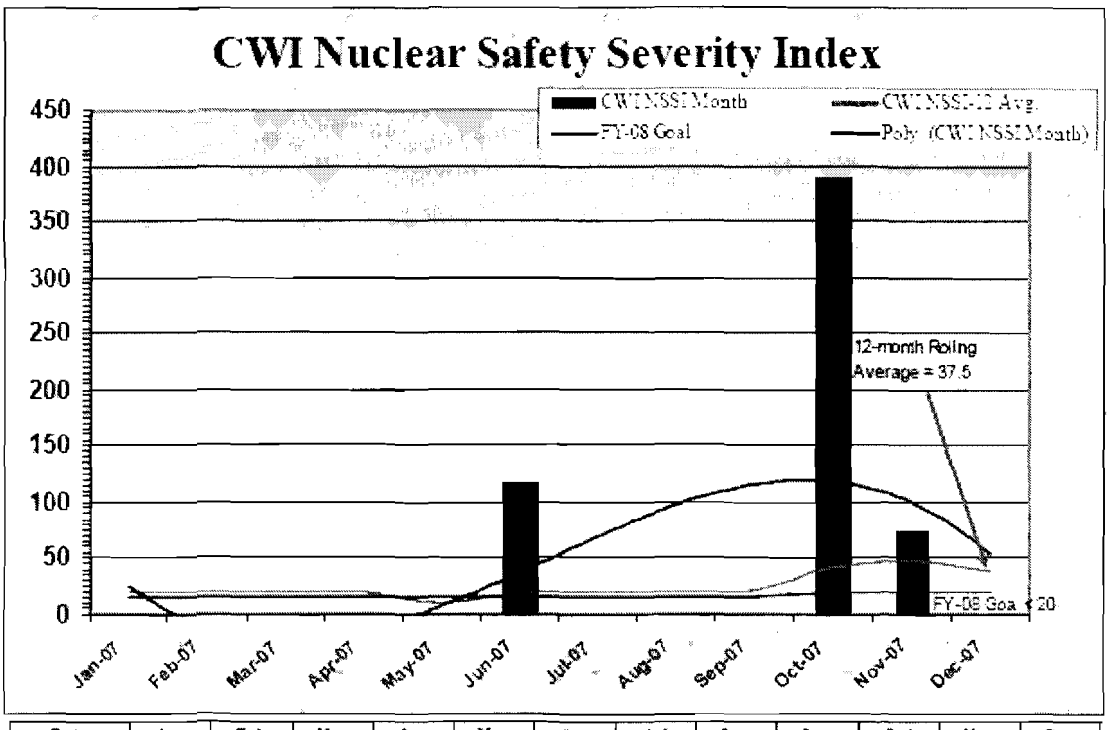
- The LPP contract is for approximately 3 years. PPPO is currently performing follow up on the corrective actions from the first DOE assessment.

Attachment 7

Idaho Environmental Management (ICP/CWI and AMWTP/BBWI) Criticality Safety Program Annual Report

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

- A set of metrics to monitor contractor NCS performance is used to monitor contractor NCS performance.
  - Idaho Cleanup Project (ICP) / CH2M*WG Idaho (CWI): The Safety Performance Objectives, Measures, and Commitments for the ICP include the Nuclear Safety Severity Index (NSSI). ICP is managed by CWI. The NSSI is calculated as follows. Only ORPS reportable events in Group 3, Subgroups A and C and Group 4, Subgroup A, B (2), and B (3) are included. The goal is to maintain the NSSI less than 20. It is reported as a rolling 12 month average (see attached "CWI Nuclear Safety Severity Index" chart.)
  - Advanced Mixed Waste Treatment Project (AMWTP) / Bechtel Babcock-Wilcox Technologies (BBWI): The Safety Performance Objectives, Measures, and Commitments for the AMWTP include the Nuclear Safety Index (NSI). AMWTP is managed by BBWI. The NSI is calculated as follows. Only ORPS reportable events in Group 3, Subgroups A and C and Group 4, Subgroup A, B (2), and B (3) are included. The goal is to maintain the NSI less than 100. It is reported as a rolling 12 month average (see attached "BBWI Nuclear Safety Index" chart).



Date	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
NSSI	0.00	0.00	0.00	0.00	0.00	115.89	0.00	0.00	0.00	388.17	71.06	0.00
Rolling 12	19.13	19.15	19.30	19.44	9.81	19.81	19.98	19.80	20.51	41.59	47.74	37.54
Goa	16	16	16	16	16	16	16	16	16	20	20	20

Definition

This is an index of severity of ORPS reports related to TSR violations, criticality safety events, or degradation of SSCs. NSSI = 1,000,000 * ((Event 1/SigCat.) + (Event 2/SigCat.) + (Event i/SigCat.)...) / Hours Worked. The weighting factors are further described in the SPOMC approval letter EM-NSPD-07-117 dated October 29 2007

Desired performance is below the annual goal of 20.

A third order polynomial is applied to the trendline

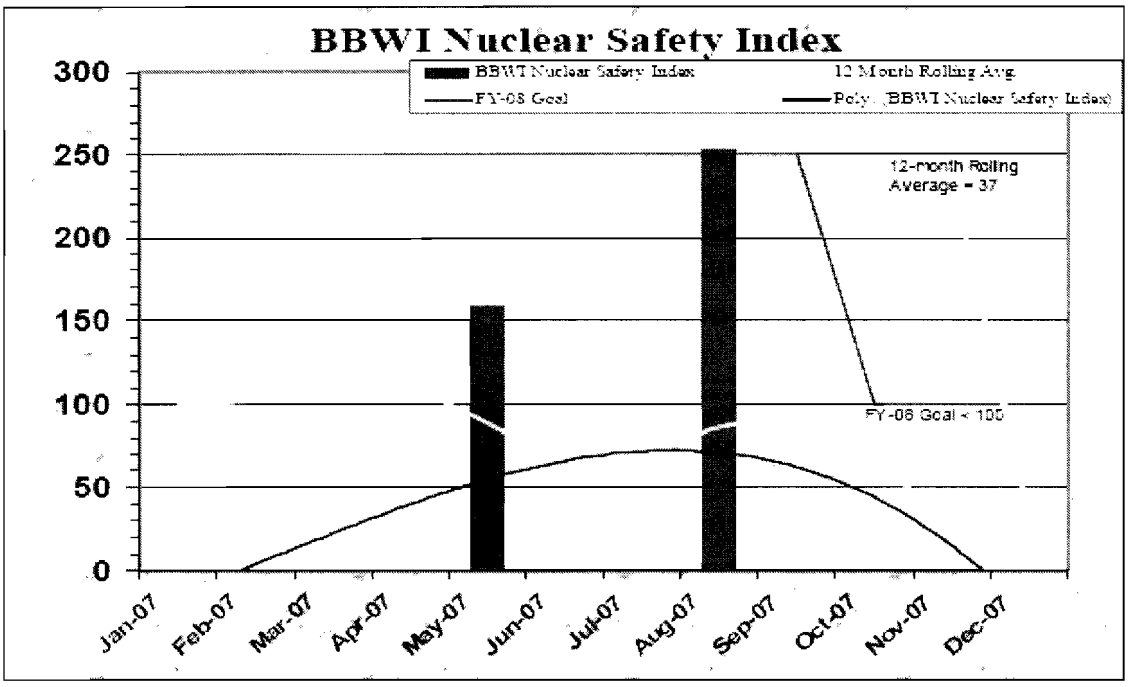
Analysis

No Nuclear Safety events occurred in December. A minor event in November combined with the significant problems that occurred in October resulted in a negative trend in the cumulative average, which reversed in December. The cumulative average remains well above the new higher FY-08 goal.

Actions

CWI has taken action to address the specific causes of the TSR violations that occurred in October, and improved performance has been observed. CWI is implementing a new organization and work control process being developed at NTEC, as well as reorganizing the Operations management structure at RWMC, which are expected to help improve performance. ICP Management will continue to follow the progress with CWI management to determine the effectiveness of this initiative.

Goals	Points of Contact	
Annual Performance Goal is ≤22.00	Responsible Manager:	Rick Provencher (8-7300)
Monthly Grading Criteria: Green (<20.00), Yellow (20 - 60), Red (> 60)	Technical Lead:	Kermit Bunde (8-6188)
Cum Avg: Blue), Green (<18.00), Yellow (19.00-20.00), Red (>20.00).	POC	Brian Anderson (8-0088)



Date	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
NSI	0.00	0.00	0.00	0.00	156.42	0.00	0.00	252.43	0.00	0.00	0.00	0.00
12-Avg.	100.25	102.23	105.91	107.86	88.99	83.59	83.41	86.57	87.59	82.33	37.12	36.96
Goal	250	250	250	250	250	250	250	250	250	100	100	100

Definition

NSI = 1,000,000 x Σ [ORPS Event1 x WF + Event2 x WF ...EventN] / [Hours Worked(actuals by accounting month)]

Severity weighting factors are taken from Group 3, Subgroups A and B and Group 4,Subgroup A, where : Each event is multiplied by severity using a weighting factor (WF) asdefined below

Category 4 = 10
Category 3 = 20
Category 2, R or CE = 40
Category 1 = 100

The desired performance is below the annual goal of 100.

ID is including Criticality Working Requirement violations in this metric as precursor events. This will be proposed as a change to the SPOMC.

Analysis

No events occurred this month. Two major events have occurred this year, including the RTR TSR violation in August and the Storage of MLLW in Type II modules discovered in May. Compares to last year, events are less frequent and less significant, resulting in a drop in the cumulative average, which remains well below the FY-08 goal. The goal for FY-08 was reduced substantially to account for the significant performance improvement and current levels remain well below the new goal.

Actions

Continue to maintain current performance levels

The Annual Performance Goal is ≤100	Responsible Manager	Rick Provencher (6-7300)
Monthly Grading Criteria: Green (≤ 90), Yellow (90 - 120), Red (>120).	Technical SME	Isabelle Wheeler (6-9226)
Cum Avg: Green (≤ 90), Yellow (90 - 100), Red (>100).	POC	Brian Anderson (6-0086)

- For both contractors, the measure indicates improvement over the past few months. This index is a measure of other factors besides criticality safety. None of noted violations were criticality safety violations.

2. Status of Contractor Criticality Safety Engineer Program

- Staffing level of contractor's NCS program
  - ICP/CWI: Three full time CWI engineers, three full time subcontractors, and one full time administrative support.
  - AMWTP/BBWI: One full time BBWI employee (the Criticality Safety Officer), one full time criticality engineer from Nuclear Safety Associates, one part time subcontract criticality engineer, and one on-demand criticality engineer available from CWI. In addition, Nuclear Safety Associates also provides one program staff member on a subcontract basis. Current staffing analysis allows for one criticality safety officer and two criticality engineers.
- DOE Field Management analysis of the adequacy of contractor's NCS staffing.
  - ICP/CWI: The contractor has adequate staffing for current activities.
  - AMWTP/BBWI: The contractor has adequate staffing for current activities. The contractor might have difficulty responding with a criticality engineer in an emergency situation due to the subcontract nature of their staff.
- Plans to address shortfall
  - ICP/CWI: There are no shortfalls in staffing anticipated. ICP is fully staffed for the work planned. No major new work is anticipated. A criticality engineer qualification program is in place if the need arises to hire additional staff.
  - AMWTP/BBWI: BBWI has posted a full time criticality engineer position since April of 2007 with no success. BBWI has interviewed a number of candidates who desired only subcontract work. During July 2007 the CWI on demand criticality engineer almost hired on but decided to remain with CWI. To satisfy the needs of BBWI staffing, BBWI subcontracted for the interim to Nuclear Safety Associates for a full time criticality engineer. BBWI has a Task Baseline Agreement with CWI for emergent work. BBWI is currently preparing to canvas selected regions for a criticality engineer via special newspaper advertisement and in specific trade journals for 2-3 months. If unsuccessful at hiring a full time crit. engineer, BBWI intends to qualify one from within.

3. Status of Federal Criticality Safety Oversight Program

- Idaho EM has one NCS qualified person with 4 more in training.

- Current staffing is adequate for current activities. Ongoing training to ensure that future staffing needs are met has begun. All of the Nuclear Safety Specialists in the Nuclear Safety and Performance Division are undergoing Nuclear Criticality Safety Specialist training.
- Idaho EM began a weekly training session in October 2007 to enable all EM-NSPD personnel to be qualified. Training is scheduled to be completed by June 2008.

4. Federal Assessments of Site NCS Programs

- Quarterly assessments conducted by Adolf Garcia (DOE-ID Criticality Safety Program Manager) and Dave Neil (DOE-ID Criticality Safety Specialist)
- Scheduled surveillances by SSO on selected criticality alarm systems (see table below).
- The contractor's self assessments were evaluated for adequacy. No issue was identified. Contractor Criticality Safety Programs are functioning currently at a level that will ensure facility safety.
- As CSEs are revised or new CSEs are developed with the guidance of DOE-STD-3007-2007 being applied.

5. New Facility Design

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

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

- NCS occurrences are tracked and trended using ORPS and contractor controlled List of Deficiencies.
  - ICP/CWI ORP Reports: The first ORPS report involves a drum of Roaster Oxide material that was not segregated as required (it is not a fissile material but is a reflector). The drum was placed in a segregated storage location. This was a Criticality Deficiency. The second ORPS report is concerned with in correct documentation of criticality safety training. Training records were corrected to show that the individuals affected were not qualified until the correct training was accomplished.

EM-ID--CWI-RWMC-2007-0003	Drum of Roaster Oxide not properly segregated following assay
EM-ID--CWI-WASTEMNGT-2008-0001	Criticality Safety Training Incorrectly Extended

- ICP/CWI List of Deficiencies:
  a. 2/7/2007 – Incorrect markings on drum at RWMC. Drum had an unexpectedly high FGE value.
  b. 10/22/2007 – SAR-103 Violation of Criticality Safety Limit. Limit of 110 grams Pu-239 (per Fissile Mass Limit Area) was exceeded by 12.9 grams. PRD-112 casual factor - "Compliance" Failure to follow procedures.
  c. 10/22/2007 – SAR-103 Violation of Criticality Safety Limit. Failure to perform independent check of fissile material prior to transfer into an FMLA. Failure to follow procedures.

  Note: The last two are for the same event. None of the event was determined to be a Criticality Safety Program infraction so no follow-up actions were tracked.

- AMWTP/BBWI ORPS: BBWI did not have any criticality safety ORPS reportable events in 2007.
- AMWTP/BBWI List of Deficiencies:
  a. 3/21/200 – Box in Isolated Storage Array (ISA) spaced less than 6-feet from fissile containers adjacent to ISA. Failure to follow procedures.
  b. 3/23/2007 – Puck inadvertently placed in incorrect Bagless Transfer Port (BTP). Computer user interface error, failed to recognize condition.
  c. 4/29/2007 – Drum loaded to >200 Fissile Gram Equivalent (FGE). Operator error.
  d. 5/8/2007 – Manual MAP updates performed at Supercompactor, manual movement triggered Barcode Readers, running Waste Tracking System (WTS)/ over allowed FGE value. Troubleshooting without approved procedure.
  e. 5/14/2007 – Oversized puck event released prior to generation of Virtual Product Drum (VPD). Computer user interface error, procedure step skipped.
  f. 7/17/2007 – Incorrect drum shipped to WIPP (Criticality Working Requirement (CWR) violation because FGE value was not determined for payload). Inadequate work instruction led to omitted verification.
  g. 7/25/2007 – WTS/Fissile Tracking System (FTS) mismatch at Supercompactor due to container bypassing WTS barcode. Manual operations allowed omission of criticality controls.
  h. 9/4/2007 – Method of removing 6-packs from Transuranic Storage Area – Retrieval Enclosure (TSA-RE) stack was modified without prior review from Criticality Safety or Unreviewed Safety Question

(USQ). Procedure didn't specify method (single vs. multiple container retrieval)

i. 12/6/2007 – Failure to perform a Waste Acceptance Criteria (WAC) check on drum incoming to the Treatment Facility. Barcode reader failed, and manual data entry was incorrect. Failure to follow procedures.

7. Follow Up to Assessments

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

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

- No open issues.

Criticality Safety Related Assessments and Surveillances by SSO (EM-ID--CWI-RWMC-2007-0003)

Assessment #	Type	Title	Start	Finish	Responsible SSO Person
AST-EM-10/2/2007-73064	Surveillance	Vital Safety System Surveillance of CPP-651 Criticality Alarm System	10/1/2007	10/31/2007	BUNDE, KERMIT
AST-EM-2/28/2007-88345	Surveillance	Safety System Oversight assessment/surveillance of the CPP-603, Irradiated Fuel Storage Facility (IFSF) Fuel Handling Cave Criticality Alarm System.	3/1/2007	3/30/2007	HARSHBARGER, ROGER
AST-ID-10/24/2007-26682	Assessment	Management Responsibility & Planned Response to Nuclear Criticality Accidents and some limited review of facility Criticality Alarm Systems, as related to Emergency Procedures.	10/1/2007	12/31/2007	GARCIA, ADOLF S
AST-ID-11/20/2007-27536	Surveillance	Management Responsibility & Planned Response to Nuclear Criticality Accidents and some limited review of facility Criticality Alarm Systems, as related to Emergency Procedures.	10/1/2007	12/20/2007	GARCIA, ADOLF S
AST-ID-4/5/2007-67719	Surveillance	BBWI Criticality Safety Program Development and Implementation at AMWTP: Management Responsibilities, Supervisory Responsibilities, and Nuclear Criticality Safety Staff Responsibilities	1/1/2007	3/31/2007	NEIL, DAVID M
AST-ID-4/5/2007-72315	Surveillance	Idaho Nuclear Technology and Engineering Center (INTEC) Criticality Safety (CS) Program Development and Implementation: Management Responsibilities, Supervisory Responsibilities, and Nuclear Criticality	1/1/2007	3/31/2007	GARCIA, ADOLF S
AST-ID-6/19/2007-13861	Surveillance	Idaho Nuclear Technology and Engineering Center (INTEC) Criticality Safety Quarterly Review Q3-07; DOE-STD-1158 Section 4, "Operating Procedures"	4/1/2007	5/30/2007	GARCIA, ADOLF S
AST-ID-9/18/2007-27588	Assessment	Q4/07 CWI Criticality Safety (CS) Program development and implementation: Process Evaluation for Nuclear Criticality Safety and Planned Response to Nuclear Criticality Accidents	7/1/2007	8/30/2007	GARCIA, ADOLF S
AST-ID-9/18/2007-7304	Assessment	Q4/07 BBWI Criticality Safety (CS) Program development and implementation: Process Evaluation for Nuclear Criticality Safety and Planned Response to Nuclear Criticality Accidents	7/1/2007	8/30/2007	NEIL, DAVID M

Attachment 8

Savannah River Criticality Safety Program Annual Report

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

- A set of metrics has been established to monitor contractor NCS performance. The M&O Contractor's 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. Cause codes for each occurrence are also compiled and tracked to determine the major causes of the occurrences. A goal is established by the NCSRC on an annual basis to reduce the number of occurrences in the groupings having the highest number of occurrences.
- 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. A new goal will be established to work on these areas.
- The M&O Contractor's Nuclear Safety Group 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.
- The M&O Contractor's supporting subcontractor Criticality Safety Group (CSG) has developed and implemented the Quality Interactions (QI) Performance Indicator. The QI program was developed as a response to a DOE-HQ Criticality Audit conducted in CY 2000 as a set of six metrics to track the NCS staff interactions with facility staff. The QI report is issued

on a quarterly basis to the Site M&O Contractor Chief Engineer and distributed to site management.

- The purpose of the QI indicator is to measure the level of "quality time" that criticality safety engineers spend in their assigned facilities and the activities the engineers perform. A time-based indicator is not used because a time-based indicator does not provide a good measure of the quality of the interactions that take place between the criticality safety engineer and facility personnel. Instead, the QI indicator tracks the number of "quality interactions" that take place during a given month. The current six metrics are summarized as the following; 1) observations and/or walk-downs of facility operations, 2) learning interactions between the NCS staff and facility personnel, 3) NCS staff participation in an NCSE team meeting (team meetings include the presence of operations and engineering personnel), 4) review of changes involving passive, active, or administrative controls (including elements of incredibility) related to criticality safety, 5) NCS attendance at Plan of the Day, Facility Operations Safety Committee, or shift crew briefings related to criticality safety, and 6) participation in assessments.
- The number of interactions involving Types 2 through 6 has generally been strong. The strong numbers associated with these types of interactions indicate that the NCS staff is interacting with facility personnel and are knowledgeable of work going on in the facility. The number of Type 1 interactions has been less than desired. These types of interactions involve the criticality engineers getting out into the field to observe fissionable material handling operations and/or performing walk-downs of procedures with criticality related steps. The limited presence of criticality engineers in the field is the concern documented in recent DOE-SR assessments. In CY-2006, the number of Type 1 interactions averaged 24 per quarter. In CY-2007, the number of Type 1 interactions averaged almost 35 per quarter. As a part of the Contractor's corrective action plan to increase the number of observations and/ walk-downs, the QI program has been modified to include the expectation that each qualified NCS engineer complete one walk-down per month and document the results of the walk-down in an assessment database.
- In addition to the PI's above, the M&O Contractor has a rigorous and active self-assessment process. Performance is reviewed using the lines of inquiry established in DOE-STD-1158. Although these assessments do identify areas which need improvement, the overall results of this assessment process indicate the contractor has a mature and effective program. Some examples of the types of areas of improvement identified include: 1) facilities could not provide documentation for closure of prior assessment items; 2.) there was a drop in Closure Area Project's QI indicator results 3) drums were identified without "empty" labels attached; 4) an approval sheet for criticality safety training package material could not be located; 5) criticality safety training course does not contain all

training requirements; 6) operators need a refresher course on Specific Administrative Controls; 7) an excessive amount of scrap exists in the basin that should be removed; and 8) a criticality safety engineer did not review design change form as required by the site criticality safety program.

- The Contractor receives 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; 2007 DOE-SR Field Office DOE-STD-1158 based assessments of H-Canyon, HB-Line, and L-Area facilities; and DOE-SR Field Office focused assessment of specific topics.
- The 2006 DOE-EM assessment stated that "The team observed no ongoing unsafe operations from a criticality safety perspective. SRS has a well documented criticality safety program with a strong qualification program for its criticality safety professionals. The strength of the system in developing criticality safety controls for nuclear operations is the team approach to uncovering accident scenarios that require controls; the weaknesses are the apparent de-emphasis of the defense-in-depth measures and a diffuse control implementation system."
- DOE-SR Field Office assessments have concluded that the contractor has a mature and healthy criticality safety program. DOE-SR has noted some findings related to adequacy of field audits/assessments being conducted by the contractor's NCS staff, inadequate documentation of controls for some scenarios, the need for updates/corrections in the contractor criticality safety manual, and the need for improved documentation of the criticality safety of legacy over-mass TRU waste drums. Again, more information is provided in Item 4 below.
- Corrective actions are developed, tracked and implemented in response to identified deficiencies and, often, 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, definitions of terms. Some examples would include (additional examples provided in Item 4 below):
  - Improvement of the site criticality safety program manual to 1) incorporate ANS-8.19 revision and ANS-8.23 requirements, improve configuration management of credited criticality safety controls, improve documentation and review requirements for derived controls, and clarification of single failure requirements;
  - The Contractor has worked with DOE-SR and DOE-EM to prepare a draft Criticality Safety Program Description Document & Program Plan to Review existing single parameter scenarios;
  - Use of a more formalized HAZOP approach for contingency analyses;

- Increase criticality safety engineer direct involvement in facility self-assessments;
- Require criticality safety engineer to perform at least one field observation/month;
- Self-Assessments continue review of design changes to ensure they received adequate NCS review;
- Improved identification criticality controls in implementing procedures; and
- Developing improved analysis for legacy drums.

2. Status of Contractor Criticality Safety Engineer Program

- In support of the site's M&O Contractor and the vast majority of DOE-EM activities at SRS, there are currently 15 qualified engineers with 9 in training and a need for 2 additional NCS Engineers. A separate contractor responsible for the design and construction of a new high level waste processing facility has its own full time CSE staff at a level commensurate with the limited need.
- Interviews with selected candidates are taking place to add to staff in support of the M&O Contractor.
- The DOE Field Management has not performed an explicit analysis of the contractor's NCS staffing level. However, another method for determining whether adequate staffing has been provided can be based on whether the NCS staff is adequately discharging all their assigned responsibilities. In this regard, DOE-SR has identified specific examples of program requirements which have not been met (See item 4 below). Based on these, DOE-SR is concerned that adequate staffing levels has not been provided. However, an explicit evaluation in this area has been impractical due to the limited Federal NCS staffing during much of 2007 (see Item 3 for more information on Federal staffing). Moving forward, the increased qualified federal staffing level should permit a more rigorous review of the contractor's NCS staffing level.

3. Status of Federal Criticality Safety Oversight Program

- At the time of the 2006 report, DOE-SR had a single qualified NCS engineer and had initiated a plan to address staffing issues in this area. In 2007, DOE-SR established a Nuclear Criticality Safety Program Manager position at the GS-14 level and filled the position with a qualified NCS engineer obtained from outside DOE-SR. In addition, another experienced DOE-SR engineer completed the NCS qualification in 2007. Finally, another experienced engineer is in training and should complete the NCS qualification in the 2008. Thus, DOE-SR has four federal employees assigned full time to the criticality safety program, with three being fully qualified.

- 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 will require 4 full time equivalent (FTE) positions through the time period addressed in the analysis.
- A Support Service Contract was also put in place at DOE-SR in 2007, which provided two non-federal NCS qualified engineers to perform criticality safety program assessments of the M&O Contractor per DOE-STD-1158 on behalf of DOE-SR. This contract is expected to end in 2008 after completion of the reviews of the relatively high hazard facilities on site and after the fourth Federal employee finishes his qualification.

4. Federal Assessments of Site NCS Programs

- In 2007, DOE-SR assessment activities have included program assessments per DOE-STD-1158, safety system assessments, fissionable material operations observations, and numerous CSP document reviews. Specifically, DOE-STD-1158 program reviews were completed in the 3 highest risk facilities on site (H-Canyon, HB-Line and Spent Fuels Project). A system level assessment was conducted for the CAAS system in H-Canyon and HB-Line, as well as a more targeted reactive assessment related to the failure of a CAAS component. Separate of the observations conducted as part of the DOE-STD-1158 reviews, reactor fuel handling and fissile material dissolving operations were also observed to ensure proper flow down of NCS requirements and consistency of operations with the associated evaluations. Finally, at least fifty NCSEs, safety basis documents (criticality safety related portions), and other criticality safety related documents were reviewed during 2007.
- When assessments identified deficiencies (i.e. requirements were not met), the issues were forwarded to the M&O Contactor for action. The contractor then developed a corrective action plan (CAP) to address each deficiency. For example, for the three DOE-STD-1158 reviews, each identified instances where ANS-8.19 requirements were not being met. Each was forwarded to the contractor for development of a CAP. The contractor has provided CAPs for the H-Canyon and HB-Line Facilities (the Spent Fuel Facility CAP was not due in 2007). In addition to deficiencies, observations (a.k.a. opportunities for improvement) were identified and provided to the contractor for evaluation and development of possible program improvements. Finally, noteworthy practices were also identified. Where other program or system level assessments identified deficiencies and observations, these were similarly provided to the M&O Contractor for action.
- Some of the more significant issues identified, and corrective actions taken, are summarized below:

- Wording of the M&O Contractor's CSP manual could be interpreted to allow operations in which a credible single failure could result in a criticality event without DOE approval. Such an interpretation would not meet ANSI/ANS 8.19 and DOE Order 420.1B requirements. The contactor revised its program manual. An extent of condition review was conducted in the three facilities with mitigated credible inadvertent criticality hazards exist to ensure no single failure vulnerabilities existed. None were found. Facility NCSEs will be improved to clearly document the basis for concluding no single failure vulnerability exists.
- There is no documented evidence that NCS staff is doing audits of the operations as required by ANS-8.19. The contractor has increased emphasis on NCS staff spending time in the field and established a minimum goal via its performance metrics. In addition, each qualified NCS engineer is required to complete, and document, at least one walk-down per month. Finally, NCS staff will take a more active role in facility self assessments based on DOE-STD-1158, which are currently performed by non-NCS qualified safety technicians.
- Operations are not being reviewed annually by individuals knowledgeable in nuclear criticality safety as required by ANS-8.19. In addition to the actions described in number 2 above, the contractor will evaluate the development of a checklist to aid in ensuring appropriate operations are reviewed annually.
- Numerous issues related to the adequacy of NCSE documentation including: they do not document that the entire process will remain subcritical for all credible upsets; they do not identify all associated limits upon which nuclear criticality safety depends; and they do not provide sufficient detail to allow independent judgment of the results. NCSEs have been, or will be, revised to address any specific issues identified. The CSP Manual has been revised to provide clearer expectations concerning acceptable methods to document limits. Finally, based on the recent DOE-SR review results, as well as prior review results which continually identify issues with NCSE documentation, the M&O Contractor recommended a complex wide workshop be held to identify the best practices in this area and develop an improved format and content guide for NCSE.
- No formalized method is in place to ensure NCS staff review of modifications to engineered controls that are credited in justifying a scenario as incredible as required by ANS-8.19. The CSP Manual has been revised to more clearly delineate the process for ensuring NCS staff review these modifications. In addition, a review of the affected facility NCSE will be conducted to ensure all such engineered controls are adequately identified and controlled in safety basis documentation space.
- The NCS staff is not maintaining familiarity with all operations requiring criticality safety controls. See number 2 above for corrective actions.

  - One facility's process for procedure changes does not ensure that all procedure steps that are credited as supporting the basis for incredibility of scenarios will be reviewed by NCS staff as required by ANS-8.19. The CSP Manual has been revised to more clearly delineate the process for ensuring NCS staff review these procedure changes.

- In response to the 2006 DOE-EM assessment, the contractor also provided a Corrective Action Plan to address Findings, as well as the Opportunities for Improvement. The status of the corrective actions has been reviewed periodically, most recently during January, 2008. The majority of corrective actions have been completed; those remaining should be completed in the next few months. DOE reviews to-date of the corrective actions has found them to be generally effective at improving the contractor's CSP.
- Copies of completed assessments are provided to DOE-SR. During the DOE-STD-1158 reviews, performance of self assessments is validated. The conclusions to date have been they are effective and adequate. However, the capacity to do a detailed evaluation of these self assessments for adequacy during 2007 has been minimal due to the limited Federal NCS staffing. Moving forward, the increased qualified federal staffing level should permit a more rigorous review of the contractor's self assessment performance.
- As indicated above, at least fifty NCSEs, safety basis documents (criticality safety related portions), and other criticality safety related documents were reviewed during 2007. At least half of these documents were NCSEs completed in accordance with DOE-STD-3007. Overall, they were compliant with ANS-8.xx and DOE-STD-3007 requirements, and were technically adequate. Specific issues are occasionally identified during document reviews and unusually resolved in a timely fashion. Several more generic issues continue to nag NCSEs and a CAP has been issued to try to address these more holistically (see bullet above for more information).
- Some of the more significant comments which were identified in 2007 are summarized below. However, no attempt has been made to include all issues in this summary report. These comments are normally forwarded to the Contractor for action and are adequately resolved prior to DOE-SR approving an associated safety basis document.
  - The NCSE, or other related CSP documents, did not include a relevant or correct reference identifying the basis for included information.
  - The NCSE failed to consider or document credible abnormal events which were relevant from DOE-SR's perspective.
  - The NCSE failed to clearly identify all controls relied upon to ensure safety.

- The NCSE was not up-to-date with respect to the current operating condition or the fissionable material content of the facility.
- The NCSE utilized an ANS-8.1 single parameter subcritical limit to a situation were it was not applicable (or even conservative).

5. New Facility Design

- In the past few years, new facilities/modifications to existing facilities include K-Area Interim Storage (KIS), K-Area Container Surveillance and Storage Capability (CSSC), Liquid Waste Actinide Removal Process/Caustic Side Solvent Extraction, F-Canyon TRU Waste Repackaging Project, and Salt Waste Processing Facility.
- Many new facilities/projects are 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 pre-conceptual design phase or conceptual design phase depending on the availability of information. The NCSE is revised throughout the design process as the design evolves.
- As part of the review process for the above facilities, Management Self Assessments, Operational Readiness Reviews, and DNFSB reviews were performed. Discussions were held regarding such things criticality safety related steps in operating procedures, criticality safety limits, potential accident scenarios, and the need for Criticality Accident Alarm Systems. Improvements to procedures and design changes were made as necessary. As an example, both KIS and CSSC were reviewed by DOE-HQ and the DNFSB. There were two formal presentations on CSSC to DOE-EM HQ staff. DNFSB noted that CSSC should be evaluated against DOE O 420.1B which led to the reevaluation of the need for CAAS within the facility. A whitepaper on the need for CAAS in CSSC was developed by the Contractor and provided to DOE. It was subsequently reviewed and concurred with by DOE-EM and Chief of Nuclear Safety staff.
- Lessons learned from the reviews described above include:
  - identification of credible abnormal conditions is best performed using a team approach involving criticality safety engineers in conjunction with facility and operations personnel;
  - procurement drawings must be reviewed by a criticality safety engineer and must indicate the appropriate functional classification of the equipment;
  - if there is any reasonable potential for the need of a criticality accident alarm system, it should be included initially in the project cost/schedule, instead of adding the cost/schedule later in design; and

- operating procedures must be carefully reviewed during development to ensure that all criticality safety related procedure steps are captured and that they meet the intent of the controls as described in the criticality safety evaluation.

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

- The 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 Field Office 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 contractor Nuclear Safety Group 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 Field Office.
- The results of the contractor NCSRC data indicate that the majority of reportable and non reportable occurrences over the past several years are low consequence events (i.e., less severe than violation of a procedural limit). There were some cases in which a procedural limit was violated, but the actual higher level Criticality Safety Limit was not challenged. In a few cases, a control credited in protecting the double contingency principle was violated, but other controls remained in place such that actual violation of the double contingency principle was never an issue.
- DOE O 232.1 reporting criteria were revised effective in 2003. The M&O Contractor's database for reportable and non-reportable events came on line about the same time. However, full site-wide implementation of the database did not occur until 2005. Therefore, a consistent set of data is available for calendar years 2005 through 2007. The indicator score for 2005 included 62 total events (4 criticality alarm system issues, 37 minor events < procedure limit, 20 procedure limit violations, 1 TSR level; total score = 144). The results for 2006 showed improvement with 49 events (3 criticality alarm system issues, 31 minor events < procedure limit, 12

procedure limit violations, 3 TSR level; score = 119) - a reduction in total score of approximately 20%. For 2007, indicator results approved again with 43 events (5 criticality alarm system issues, 31 minor events < procedure limit, 6 procedure limit violations, 1 TSR level; score = 91) - a reduction of about 24% compared to 2006.

- The results of the contractor 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. A new goal will be established to work on these areas.
- The results of the criticality safety Performance Assessment were used to inform facility management and engineering of the need to continue to perform management observed evolutions and procedure improvement initiatives. Results also were used to increase the number of contractor criticality safety engineer facility walk-throughs and participation in facility criticality safety self-assessments.

7. Follow Up to Assessments

- The M&O Contractor 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.
- DOE-SR considers many of the same issues both during its development of the yearly assessment plan and during the definition of the scope of planned assessments. However, due to the limited Federal NCS staffing, the capacity to do follow-up reviews has been limited until recently. As federal oversight resources grew during the year, emphasis was placed on performing baseline program assessments versus effectiveness reviews. It is expected that the increased qualified federal staffing now in place will permit more efforts in this area. Accordingly, the DOE-SR annual assessment plan for fiscal year 2008 explicitly includes an effectiveness review scheduled in the 2nd quarter of the fiscal year. The scope of the review is to look at the contractor's corrective actions taken in response to the 2006 DOE-EM assessment. Although the status of these corrective actions has been reviewed periodically in the past, the review scheduled for the 2nd fiscal quarter is intended to be more comprehensive. It is worth noting the review is underway at the time of this writing (although not in 2007). The Team Lead for the 2006 DOE-EM assessment has

visited SRS to review the current state of the Contractor's corrective actions (as well as DOE-SR's corrective actions). While the results of this effectiveness review have not been finalized, it indicates that the array of corrective actions taken is a mature, comprehensive, and should be sufficient. Separately, DOE-SR reviews corrective actions plans submitted in response to DOE-SR assessments (as describe in Item 4 above) for adequacy. In general, the plans submitted in 2007 were found to be acceptable. Follow-up effectiveness will be conducted in the future.

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

- The primary issue related to Savannah River identified in the previous report relates to the Federal NCS staffing level. As discussed in Item 3 above, this issue has been addressed.

Attachment 9

EnergX Criticality Safety Program Annual Report

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

- Metrics established to monitor EnergX NCS performance include the number of ACRs and the number of days an ACR is open (goal is 30 days average time to close).
- TWPC has had one ACR since the inception of the limited scope NCS program. That ACR was with respect to the discovery that an "empty" tank actually had solution in it. The solution was characterized, and the ACR was closed the same day of discovery.
- The performance of the contractor is exceptional based on this one data point. Management attention to the issue was prompt and appropriate. No improvement has been deemed necessary at this time.

2. Status of Contractor Criticality Safety Engineer Program

- EnergX has two FTEs supporting the criticality safety program. 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 contracting mechanism in place to prevent any shortfall in the future.
- DOE has affirmed the adequacy of contractor NCS staffing. An assessment was conducted that resulted in no findings and three observations. One proficiency was listed regarding the graded/scaled nature of the NCS Program.

3. Status of Federal Criticality Safety Oversight Program

- Oak Ridge needs and has staffed with one person to provide NCS oversight of EM operations, with one technical support from the matrix organization.
- There was an independent assessment performed of the Federal NCS staff in August 2006 with no findings for EM.

4. Federal Assessments of Site NCS Programs

- DOE performed an assessment of the TWPC Nuclear Criticality Safety Program 10/07 and routine daily 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.
- The contractor's self assessments were evaluated for adequacy. The conclusion was the planned contractor's process for self assessments was adequate. Since the program is new, performance could not be evaluated. The contractor did perform and independent assessment of their program prior to the DOE assessment.
- The NCS program is consistent with DOE Order 420.1B and applicable ANSI/ANS standards for the for the scope of material and activities allowed.

5. New Facility Design

- New facilities that need a criticality safety program receive a criticality safety design review.

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 have only been one NCS infractions and no reportable events. The discovery that caused the ACR did not warrant a change to the current operating practices.

7. Follow Up to Assessments

- The assessments were the last quarter of 2007. The Federal Criticality Safety Oversight person has reviewed the corrective actions which closed the observations.
- The corrective actions were effective. The observations that were noted by the assessment have been resolved.

Attachment 10

Bechtel Jacobs Company (BJC) Criticality Safety Program Annual Report

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

- Metrics established to monitor contractor NCS performance include the number of New ACRs, and the 12 month rolling average time to close ACRs (goal is 30 days average time to close).
- One to two new ACRs occurred per month. The average time to close ACRs has reduced and most ACRs were closed within 10 days.
- Contractor performance has been good, as evidenced by the Feb. 2007 DOE HQ assessment and independent Criticality Safety Review Committee meeting results.
- An increased senior NCS engineer staffing has occurred as a result of earlier assessments.

8. Status of Contractor Criticality Safety Engineer Program

- The BJC NCS program needs and has 16 FTEs. The 2007 DOE assessment affirmed the adequacy of BJC criticality safety staffing. The DOE NCS oversight will continues to monitor contractor's staffing level for adequacy.

3. Status of Federal Criticality Safety Oversight Program

- Oak Ridge needs and has staffed with one person to provide NCS oversight of EM operations, with one technical support from the matrix organization.
- There was an independent assessment performed of the Federal NCS staff in August 2006 with no findings for EM.

4. Federal Assessments of Site NCS Programs

- DOE HQ performed an Assessment of the BJC program in February 2007, focusing on implementation at K25/K27. The assessment did not identify any findings. DOE also performed an assessment of K-302-2 Declaration of Criticality Incredibility Assessment. Criticality safety was assessed during various ORRs and RAs (e.g. shipment of mined material at K25/K27, ORR at MSRE).
- Various NCS document and work package revision were developed and implemented to correct ORR/RA observations, NDA program corrective actions, etc.

- The DOE review of the declaration of criticality incredibility did not find any issues with the NCS Program. However, the review did have findings with the declaration of criticality incredibility.
- The contractor's self assessments were evaluated for adequacy. The conclusion is that their self assessments are adequate.
- Criticality safety evaluations were deemed adequate, and the NCS program is consistent with DOE Order 420.1B and applicable ANSI/ANS standards.

5. New Facility Design

- There are facilities being designed (e.g. K-25 external segmentation shop) that will need a criticality safety program. Design of new facilities received criticality safety design review.
- There were no formal lessons learned. However, the one concept that was noted is that it is best to get NCS involved early in the design and planning stages. This was communicated by BJC at the NCS EM Workshop.

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

- All ACRs tracked and trended internally by the NCS program. All Level 3 and higher ACRs are also tracked through the Occurrence Reporting system, which is independent of the NCS Program. The NCS Review Board evaluates the ACR tracking and trending when they meet.
- Trending has revealed a few common issues that have resulted in modifications in the field.
- ACRs are reviewed to determine repeat occurrences, and corrective actions are taken to prevent recurrence. Changes to work packages, modifications in training of operators, and modifications in NCS control wording have been implemented to improve performance.

7. Follow Up to Assessments

- The February 2007 DOE HQ assessment received a follow up review. The Federal Criticality Safety Oversight person has reviewed actions taken as a result of the various assessments/ORR/RA.
- All but the corrective action(s) related to NDA Data Quality Objectives, which were deemed inadequate in a follow up review (NDA Data Quality Objectives are not within the direct purview of the NCS Program)

Attachment 11

ISOTEK Criticality Safety Program Annual Report

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

- Metrics established to monitor contractor NCS performance include the number of infractions 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 (MSRE trap movement and training). The contractor is working on their Nuclear Criticality Safety Description Document and enhancements in the program.
- Isotek recently reorganized and a Nuclear Safety Organization was added. Nuclear Safety includes Facility Safety, Nuclear Criticality Safety, and Fire Protection. An NCS program description document has been drafted and procedures are being revised. Also, Quality Assurance has been reorganized and the metric process is being revised.

2. Status of Contractor Criticality Safety Engineer Program

- The Isotek NCS program needs six FTEs. Currently there are two FTEs on board. Additional personnel are being aggressively recruited.
- DOE and Isotek realize that the contractor's criticality safety staffing is not sufficient at this time. Due to the changing nature of the scope of activities (e.g., design, construction, operation), the number of NCS Engineers and their specialty will change over the life of the project. DOE is working with the new Nuclear Safety Manager on the level of staffing.

3. Status of Federal Criticality Safety Oversight Program

- Oak Ridge needs and has staffed with one person to provide NCS oversight of EM operations, with one technical support from the matrix organization.
- There was an independent assessment performed of the Federal NCS staff in August 2006 with no findings for EM.

4. Federal Assessments of Site NCS Programs

- A formal NCS assessment has not been completed but NCS was reviewed as part of the DOE 60% design review of the U-233 Material Down-blending and Disposition Project. NCS was reviewed as part of the contractor readiness assessment for receipt of MSRE traps.

- NCS has been formally added to the design change board.
- Isotek is finalizing the NCS description document and updating procedures. Additional resources are being recruited.
- The contractor is still in the process of formal NCS program development. Isotek only took possession of operations in February 2007and fissile operations have been 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.
- Criticality safety evaluations do not meet format required by DOE-STD-3007-93 and replacement schedule has been developed as part of the DOE O 420.1b implementation. The recent design review found that the NCS documentation supporting design was not adequate. The NCS evaluation for movement of the MSRE traps was reviewed and deemed adequate for the activity. The storage NCSE was evaluated and while it is not adequate the content was deemed adequate for current storage activities.
- The NCS program is really in the process of being fully implemented in accordance with DOE Order 420.1B and applicable ANSI/ANS standards. Both the contractor and DOE recognize improvements in the overall program are needed and the contractor is on board with making the necessary changes and has an adequate program for current level of operations.

5. New Facility Design

- New facility design is still being formalized. As noted by the DOE design review, the NCS reviews during the design process were less than adequate. New Isotek management has been put in place to correct this issue.
- No formal lessons learned have been developed. One lesson that was learned is that NCS needs to formally be part of the design review team. This lesson learned was presented at the DOE EM NCS Workshop. Isotek has changed the design review board to make NCS a formal member.

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 will track and trend NCS ACRs when applicable. If the condition is reportable via the occurrence reporting process they will be tracked as part of the occurrence reporting/condition process.

7. Follow Up to Assessments

- Additional Design reviews are being planned at various level of design. DOE has formed an oversight "support" team. Once the Isotek NCS Description Document is approved by DOE, DOE will schedule overall NCS program review(s).
- It cannot be determined if the corrective actions for the NCS program are effective at this time. Once the new Nuclear Safety Manager declares his NCS program corrected, DOE will perform an assessment to evaluate the effectiveness. The effectiveness in the design process will be followed during design and confirmed during the formal DOE review at specified completion levels.

cc: T. D'Agostino, NA-1 (without enclosure)
R. Smolen, NA-10 (without enclosure)
M. Whitaker, HS-1.1
R. Lagdon, CNS
D. Nichols, CDNS
J. Rispoli, EM-1