National Nuclear Security Administration

Department of Energy
National Nuclear Security Administration
Washington, DC 20585

March 12, 2007

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:

In a letter dated August 7, 2003, the Defense Nuclear Facilities Safety Board (Board) closed Recommendation 97-2, *Criticality Safety*, and established an annual reporting requirement. This report synopsizes the activities of the Department of Energy Nuclear Criticality Safety Program (NCSP) for Calendar Year (CY) 2006 and also includes some additional information requested annually by the Board.

Overall, the NCSP, established in response to Recommendation 97-2, is serving the Department well. The funding has been stabilized and the program continues to receive adequate financial support from Defense Programs to execute program task elements focused on maintaining criticality safety capability. A key accomplishment in CY 2006 was the establishment of a Hands-On Criticality Safety Training Course. This training was developed and implemented by the Lawrence Livermore National Laboratory as an interim measure until the Criticality Experiments Facility is operational in Nevada. Five classes were held in CY 2006 and 49 individuals were trained. This training course is specifically designed to meet the formal criticality safety engineer qualification requirements contained in DOE-STD-1173-2003 and DOE-STD-1135-99.

In an effort to increase communication and visibility of the NCSP accomplishments throughout the year, a new section has been added to the NCSP website. The goal is to place almost all of the information about the NCSP on this website to facilitate improved communication with all NCSP stakeholders. This annual report makes liberal use of references to information posted on the NCSP website: http://ncsc.llnl.gov/.

The Department looks forward to continued close collaboration with the Board to ensure that all fissile material operations continue to be performed safely and efficiently from a criticality safety perspective.

If you have any questions, please contact me directly or have your staff contact Jerry McKamy at (301) 903-3081.

Sincerely,

Thomas P. D'Agostino
Deputy Administrator
for Defense Programs

Enclosure

cc (w/enclosure):
M. Whitaker, HS-1.1
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STATUS OF THE DEPARTMENT OF ENERGY NUCLEAR CRITICALITY SAFETY PROGRAM FOR CALENDAR YEAR 2006

1. Introduction

In a letter dated August 7, 2003, the Defense Nuclear Facilities Safety Board (Board) closed Recommendation 97-2, *Criticality Safety*, and established an annual reporting requirement. This report synopsizes the activities of the Department of Energy (DOE) Nuclear Criticality Safety Program (NCSP) for Calendar Year (CY) 2006 and also includes some additional information requested annually by the Board.

The Department ensures continuous improvement in criticality safety with the ongoing advice and assistance of criticality safety experts resident in the Criticality Safety Support Group (CSSG) and the talented cadre of site office Federal Criticality Safety Coordinating Team (CSCT) members working alongside the End-User Group who all support the NCSP Manager. The NCSP Manager is further supported in the specialized area of nuclear data by the Nuclear Data Advisory Group (NDAG) which helps to identify fundamental nuclear data measurement and evaluation needs to improve the accuracy and precision of criticality safety calculations.

In an effort to increase communication and visibility of the NCSP accomplishments throughout the year, a new section has been added to the NCSP website. The goal is to place relevant information about the NCSP on this website to facilitate improved communication with NCSP stakeholders. This annual report summarizes key accomplishments in each of the NCSP Program elements as well as other information requested in the Recommendation 97-2 closure letter. Supplemental information can be found on the NCSP website: http://ncsc.llnl.gov/.

Overall, the NCSP, which was established in response to Board Recommendation 97-2, is serving the Department well. The Department looks forward to continuing its close collaboration with the Board in ensuring that all fissile material operations continue to be performed safely and efficiently from a criticality safety perspective.

2. Updates to the NCSP Five-Year Plan, Status of Individual Program Elements and NCSP Funding

The NCSP Five-Year Plan contains details on the Program structure, budget and scheduled activities. A copy of the latest version of the Plan, dated August 2006, can be downloaded from the NCSP website. A summary of accomplishments for each of the individual Program elements for CY 2006 is provided in Subsections 2.a through 2.g.

2.a International Criticality Safety Benchmark Evaluation Project (ICSBEP)

The ICSBEP Handbook continues to be a valuable resource to criticality safety engineers worldwide. Approximately 500 copies of the Handbook have already been distributed since the release in mid September 2006. A summary of CY 2006 ICSBEP accomplishments includes:

- Approved 26 new evaluations, bringing the total to 442. China was a first-time contributor in this 2006 edition.
- Increased the number and variety of criticality alarm benchmarks.
- Added a new volume entitled, *Fundamental Physics Measurements*. In this volume benchmark specifications for fundamental physics measurements, relevant to Nuclear Criticality Safety (NCS) and nuclear data applications, are provided.
- Added the VNIITF Russian Ti-reflected benchmarks.

2.b Analytical Methods Development and Code Support

Accomplishments in this task area demonstrate that independent, state-of-the-art computational analysis tools and processed nuclear cross-section data are maintained and enhanced by a repository of experts who provide assistance to the user community. New code versions are being made available to the criticality safety community. Research and development activities continue towards use of advanced computational approaches (e.g., sensitivity and uncertainty analyses) to assure an improved understanding of (or improved estimate of) computational bias and uncertainties and to guide design and selection of critical experiments. A summary of CY 2006 analytical methods development and code support accomplishments includes:

- Produced VIM libraries based on ENDF/B-VII nuclear data.
- Presented four-week long, hands-on workshops on the use of SCALE/KENO and SCALE/TSUNAMI in performing criticality safety analyses.
- Released MCNP version 5.1.40 to Radiation Safety Information Computational Center (RSICC) in December 2006. This release included several new features requested by the criticality community, such as source entropy, neutron fission multiplicity distributions, lethargy plots, and a stochastic geometry capability.
- Presented two-week long classes on the effective use of MCNP5 for criticality safety. In addition, several general MCNP training classes and workshops were presented. Such training classes continue to be well attended by criticality safety professionals.
- Incorporated the ERRORJ module into a version of NJOY. This is important in order for NJOY to be able to process the complete suite of covariance formats allowed by the ENDF format. In addition, several NJOY updates were made to enable processing of ENDF/B-VII beta evaluations.
- Added a new S(α, β) thermal scattering treatment to both MCNP5 and MCNP6. The new method uses a continuous treatment of secondary energy/angle so that nonphysical effects of discrete angles on thermal spectra are eliminated.
- Released SCALE 5.1 software and documentation through RSICC.
- Successfully used an advanced version of the AMPX software system capable of processing ENDF/B-VI and –VII data to create SCALE 5.1 libraries.
- Released from RSICC the PUFF-IV package for processing ENDF/B covariance data files.
- Prepared TSUNAMI sensivity files for an extensive set of benchmarks including low- and highly-enriched U-235 systems, plutonium solutions, bare plutonium metal systems, mixed uranium-plutonium oxide (MOX) systems, and U-233 systems.

- Developed a COG code website and made it publicly available at: http://cog.llnl.gov.
- Completed preliminary ENDF/B-VII data testing for U-233 using COG.

2.c Nuclear Data

Overall, nuclear modeling and evaluation accomplishments enable the NCSP to respond to emerging nuclear data needs in the field. Moreover, these research and development efforts serve to maintain highly technical scientific capabilities (*capability maintenance*) and support criticality safety analysis efforts for improving operational efficiencies (*operational cost/efficiency risk*). Completion of the nuclear data evaluations provides improved cross-section and covariance data for nuclides identified as being of high-importance for NCS analyses. A summary of CY 2006 nuclear data accomplishments includes:

- Release of the National Nuclear Data Center's ENDF/B-VII. This is the first major release in 16 years and includes significant improvements that will benefit criticality safety. The NCSP contributed much of the extensive testing and validation work in support of this release.
- Completed the F19 evaluation data measurement at Los Alamos Neutron Science Center.
- Completed the preliminary Mn55, K39, and K41 resonance evaluations.
- Distributed a revised SAMMY manual and code package through RSICC to provide new cross-section evaluations with covariance data in the resonance region.
- Developed, coded, and tested the improved Cauchy principle value method to produce probability tables analytically (without noise) at any temperature.
- Completed substantial enhancement of the EMPIRE-KALMAN code to support current and future covariance needs.

2.d Differential Measurements

Restoration of the Oak Ridge Electron Linear Accelerator (ORELA) operation for performing nuclear data measurements is a significant accomplishment that will enable the NCSP to respond to current and emerging nuclear data needs for criticality safety applications. A summary of CY 2006 differential measurements accomplishments includes:

- Successful operation of the ORELA for ~180 hours since April 2006.
- Corrected the intermittent vacuum problem in Section 4 of the accelerator.
- Replaced one thyratron and repaired several electrical problems.
- Completed the K41 capture measurement.

2.e Integral Experiments

As the Criticality Experiments Facility (CEF) project prepares the Device Assembly Facility (DAF) in Nevada to accommodate TA-18 activities, interim operations are being conducted to maintain the capability to conduct integral experiments. Los Alamos National Laboratory (LANL) completed preliminary work that will allow for subcritical integral experiments at the DAF in CY 2007 and experimentalists will participate in critical integral experiments in CY 2007 as provided in the bulleted list of this subsection. This will enable the NCSP to

maintain some continuity of integral experiment capability and will ensure that technical staff members maintain some level of proficiency during the transition period. The NCSP is committed to make this transition as smooth as possible. A summary of CY 2006 integral experiments accomplishments includes:

- Received approval for the startup of nuclear materials handling in the DAF.
- Conducted CEF/DAF nuclear measurements successfully on nuclear material outside of shipping containers (precursor to conducting subcritical measurements).
- Began groundwork and coordination to permit CEF experimenters to participate in critical experiments in France, Russia, and Sandia National Laboratories (SNL).
- Issued the CEF/TA-18 Staffing Transition Plan by LANL.

2.f Information Preservation and Dissemination

The NCSP continued to preserve and disseminate information important to criticality safety. A summary of CY 2006 information preservation and dissemination accomplishments includes:

- Completed a beta version of software (CritView) to facilitate searching and displaying the ARH600 data.
- Entered all 2006 American Nuclear Society papers into a searchable database bringing the total to over 500 in the Hanford NCSP database.
- Installed a new Dell server and upgraded the operating system to Red Hat Linux for the Lawrence Livermore National Laboratory (LLNL) NCSP website.
- Upgraded the LLNL NCSP database with an additional 3,640 entries.
- Upgraded the search engine (searching by value index, document date, Office of Science and Technology Information document number, and category) for both LLNL Bibliographic and Hanford databases.
- Began editing Oak Ridge National Laboratory Heritage videotapes.

2.g Training and Qualification

The NCSP restarted its hands-on training courses and continued to provide quality training materials. A summary of CY 2006 training and qualification accomplishments includes:

- Reestablished the hands-on criticality safety engineer training and qualification course at LLNL. This course meets the requirements of DOE-STD-1173-2003 and DOE-STD-1135-99.
- Conducted five hands-on training courses in CY 2006 and trained 49 students.
- Developed a web-based online registration form which is available at: http://ncsp.llnl.gov/HS3201/registration.html.
- Completed the second of two-hand calculation NCS engineer training modules.

2.h NCSP Funding

NCSP funding has been stabilized and the program continues to receive adequate financial support from Defense Programs to execute program task elements focused on maintaining criticality safety capability. Table ES-1 of the NCSP Five-Year Plan (below) contains the planned funding levels for Fiscal Year (FY) 2007 through FY 2011. This level of funding is adequate for maintaining capability in NCSP Program task elements and addressing identified requirements. Defense Programs is committed to continue providing adequate support for the NCSP.

NCSP Base Funding, FY 2007 – 2011

	FY 2007 ($K)	FY 2008 ($K)	FY 2009 ($K)	FY 2010 ($K)	FY 2011 ($K)
International Criticality Safety Benchmark Evaluation Project	1,935	1,975	2,015	2,055	2,095
Analytical Methods Development and Code Support	3,330	3,400	3,470	3,335	3,405
Nuclear Data	1,842	1,649	1,681	1,713	1,745
Differential Measurements	950	970	350	360	370
Integral Experiments	1,250	1,600	2,300	2,400	2,500
Information Preservation and Dissemination	233	239	245	251	257
Training and Qualification	300	285	270	365	375
NCSP Support	355	375	390	405	420
TOTAL	10,195	10,493	10,721	10,884	11,167

3. Criticality Experiments Facility Status

The CEF project was initiated in 2004 to relocate the LANL CEF activities to the DAF at the Nevada Test Site (NTS). The project received an approval of the performance baseline (Critical Decision 2) on December 2, 2005, and is now scheduled for completion in CY 2010. The approved baseline of $145,202,926 for the CEF project is provided through a congressional line item construction account. The Deputy Secretary wrote a letter to the Board providing an update on the status of the CEF project in October 2006. In December 2006, the CEF Mission Need

Statement was validated and approved by the National Nuclear Security Administration (NNSA) Deputy Administrator for Defense Programs. Thus far, the CEF project is proceeding on schedule and within budget. Preparatory work supporting construction on the DAF began in the fall of 2006. Monthly updates on the progress of the CEF project are available on the NCSP website.

4. Summary of Criticality Safety Support Group Activities and Reviews

The CSSG performed several specific reviews and activities during 2006 at the direction of the NCSP Manager. The formal activities included holding four major meetings and providing deliverables for seven formal taskings. The four meetings of the CSSG included the two held in conjunction with the June and November meetings of the American Nuclear Society (ANS). The other two meetings are annual meetings called by the NCSP Manager to provide CSSG expertise in development and execution of the NCSP tasks described in the Five-Year Plan. The CSSG provided review and validation of the prioritization of the FY 2007 NCSP task proposals at the March meeting in Nevada. The CSSG provided the NCSP Manager with input regarding final execution plans for the funded FY 2007 tasks at meetings held in Washington, D.C., during September. Unabridged versions of the CSSG taskings and responses can be found on the NCSP website.

In addition to formal CSSG taskings, the NCSP Manager issued three formal taskings to the NDAG. These three taskings and the NDAG responses can be found on the NCSP website.

The CSSG did not perform any reviews of site Criticality Safety Programs (CSPs) or review any new facility designs. Various CSSG members individually participated in site reviews as noted in Section 6.

A summary of each of the seven CSSG taskings and responses is presented as follows:

CSSG Tasking 2006-1: Provide a plan, including schedules and review responsibilities, for performing the tracking, trending, and lessons learned review of criticality safety infractions and deficiencies that have occurred during the past 12 months at the sites identified as priority sites in the Headquarters (HQ) Criticality Safety Monitoring Program. The plan should also discuss how lessons learned will be documented and shared with other sites and HQ. The reviews should be led at each site by a CSSG member but may utilize CSCT members as well.

> CSSG Response: The CSSG provided a schedule to the NCSP Manager for final approval. The response identified the sites (Savannah River [SR], Portsmouth, East Tennessee Technology Park [ETTP], Hanford Plutonium Finishing Plant and Office of River Protection, Nevada Test Site, SNL, and Y-12 National Security Complex) and noted that based on relative risk, reviews of some sites may be eliminated from the formal schedule, but will be done whenever a CSSG member has an occasion to visit the those sites.
>
> On August 29, 2006, the CSSG published the results of its review and analysis of

occurrences and deficiencies at eight DOE Sites (SR, Y-12, LANL, SNL, K-25/K27 Site, Portsmouth, NTS, and Hanford) that occurred in calendar year 2005. A summary of the conclusions follows:

- There have been no occurrences that have led to significant reductions in defense-in-depth of actual criticality safety margins.
- All sites seek out, collect, and document non-ORPS-reportable events, however, the reporting threshold, degree of casual analysis, and upward reporting of this information varies widely.

CSSG Tasking 2006-2: Identify the reports or types of reports documenting criticality safety related research that should be available as full documents on the LLNL NCSP website or as a link from that site per the inquiry from EH in support of the DOE Nuclear Safety Research Program.

CSSG Response: The CSSG recommended that a link be placed on both NCSP database web pages that would allow someone to register a request to the web site manager. Requests will be reviewed, and if approved, and the document can be found, it will be added to the web site.

CSSG Tasking 2006-3: Participate in the review and development of the LLNL Hands-On Criticality Safety Training Course syllabus to be used in the interim while CEF is transitioning to the DAF.

CSSG Response: Two CSSG members reviewed the proposed course classroom materials and examined the hands-on apparatus and laboratory location at LLNL on March 8, 2006. Comments were given to the LLNL staff to improve the course at that time. The classroom material was given to CSSG members at the March NCSP review meeting along with a brief presentation on the course outline and the comparison between the LANL courses and the proposed LLNL course. No additional comments were generated at the NCSP review meeting. These reviews affirmed that the LLNL criticality safety group did an outstanding job in a short time to pull the course, apparatus and people together.

CSSG Tasking 2006-4: Review and prioritize the proposed NCSP tasks submitted to the NCSP Manager for possible inclusion in the FY 2007 Five-Year Plan.

CSSG Response: The CSSG provided input to the NCSP task prioritization process at the March 2006 NCSP review in Nevada and a table with their prioritization of the FY 2007 NCSP tasks in May 2006 for consideration by the NCSP Manager. Its contents were factored into the NCSP Manager's approval of the tasks that appear in the Five-Year Plan which can be found, along with this table, on the NCSP website.

CSSG Tasking 2006-5: Identify needs in the broad areas of criticality safety support and nuclear data that can only be filled by a 'Super-SHEBA' capability. For each need, identify a specific

DOE program/project/facility that would benefit from the information. Such capability will be restricted to pure uranyl nitrate solution experiments, including the ability to perform in burst mode (i.e., prompt critical experiments).

> CSSG Response: The CSSG unanimously supported the need for re-establishing a uranyl nitrate solution critical assembly capability in the United States. The response included the need to retain the capability to test criticality alarms, to further understand the dynamics of fissile solution criticality accidents and the formation of radiolytic gas, and the validation of spent nuclear fuel disposition processes and nuclear cross sections.

CSSG Tasking 2006-6: Identify needs in the broad areas of criticality safety support and nuclear data that can only be filled by a facility capable of achieving solution criticality with other than pure uranyl nitrate. Identify the types of solutions and experimental capabilities required to address the gaps that remain once the global situation is considered.

> CSSG Response: Within the CSSG, there was a consensus that there are needs for actinide solution critical experiment capability to support the Global Nuclear Energy Partnership and Advanced Fuel Cycle initiatives. However, until these programs are more clearly defined, it is difficult to specify exactly what solution-criticality requirements might be needed.

CSSG Tasking 2006-7: Review the draft document, *Preclosure Criticality Analysis Process Report,* for Yucca Mountain with a focus on the technical content of the document based on the requirements of 10 CFR 63, the guidance found in the Yucca Mountain Review Plan (YMRP, NUREG-1804) and the Integrated Issue Resolution Status Report (IIRSR, NUREG-1762).

> CSSG Response: The CSSG reviewed the subject report and made the following recommendations:

- ANS/ANSI 8-19, *Administrative Practices for Nuclear Criticality Safety*, be added to the list of standards being followed with a description of how it will be implemented.
- The double-contingency principle should be retained as a core safety philosophy.
- The vulnerability associated with dependence on multiple-shipper records should be factored into the risk equation.

5. NCSP Feedback and Improvement Initiatives

For several years the NCSP has hosted a full-day working session at the end of the two major ANS meetings to foster feedback and dialog between the criticality safety community, the CSSG, and the NCSP Manager. At the November 2005 winter meeting of the ANS, and subsequent ANS meetings, the structure of this activity was substantially altered in an attempt to further enhance the dialog between the user community and the NCSP service providers. It was restructured under the leadership of the End-User Group Chair working with the NCSP Manager to be a NCSP focus group with specific topics. The purpose was to solicit 'customer' feedback on the specific 'product lines' of the NCSP and to identify new initiatives for consideration for

inclusion in the NCSP. The NCSP Manager and members of the CSSG evaluated the effectiveness of these meetings and concluded that further improvements were warranted. Toward that end, the NCSP Manager established a liaison to the DOE End-User Group who reports directly to the NCSP Manager. The NCSP Manager, working with the new End-User Chair, used the winter 2006 ANS NCSP meeting to hold a forum on how to improve the communication and cooperation between the NCSP and the End-Users. The meeting was well attended and several ideas were suggested for improving the link between the End-Users and the NCSP. Suggestions included soliciting End-User input into planning critical experiments and establishing a NCSP 'rapid response' capability to bring NCSP infrastructure technical capabilities to bear on emerging operational criticality safety issues. The notes and actions generated from this meeting can be found on the NCSP website.

6. Headquarters Criticality Safety Monitoring Program Accomplishments

The Department worked to develop an overarching, comprehensive DOE Criticality Safety Monitoring Program (CSMP) for CSPs at all sites. The NCSP Manager coordinates with the two Chiefs of Nuclear Safety and other Departmental Elements (e.g., EM and the CSCT) whose collective activities involving monitoring of criticality safety comprise the CSMP.

NCS staff from the Environmental Management (EM) Office of Licensing (EM-61) conducted site reviews at SR and Hanford in 2006. These reviews were led by an EM CSSG member and were staffed with CSCT members. The reviews assessed both the contractor and DOE site office NCSPs. The full reports are available from EM-61 as well as any corrective action plans developed by the respective EM site offices. The primary conclusions from the Executive Summaries of these reports are quoted below.

<u>DOE Savannah River Operations Office (DOE-SR)</u>

In general, the review team found weaknesses in the staffing level of the [DOE-SR] *Office. Many of the concerns identified and discussed are compounded by insufficient staff to execute the expectations of the DOE-SR Senior Management. The current DOE NCS Engineer is trying his best to juggle all the responsibilities and meet all expectations; however, due to the magnitude of the requirements and expectations it is not possible for him to achieve alone. It was encouraging to the review team to find the* [DOE-SR] *Senior Management aware and engaged in the resolution of the NCS Engineer staffing issue at the time of the review. The review team hopes this report further supports the efforts of the* [DOE-SR] *to acquire both a Senior NCS Engineer and an entry level NCS Engineer to ensure succession of a long term commitment by DOE at the SRS.*

The review team discussed the implementation of the new DOE Order 420.1B, Facility Safety, with the [DOE-SR] *staff. The implementation of this DOE Order could have an impact on the DOE staffing situation and further stress an already undesirable condition. The reason for a potential significant impact at SRS is the level of reliance the contractor's NCS program places on single parameter control of their operations.*

Savannah River Site (SRS) NCSP

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.

Hanford Site NCSP

[Fluor Hanford] *(FH) has a well documented criticality safety program and a strong qualification program for its criticality safety professionals. The Criticality Safety Representative system is a longstanding and valuable program to strengthen implementation of necessary controls.*

Reviews Performed by the Chief of Nuclear Safety Organizations

The two Chiefs of Nuclear Safety conducted site reviews during 2006. The NNSA Chief of Defense Nuclear Safety (CDNS) conducted reviews of Y-12, SNL and LANL. The CDNS teams were typically augmented with at least one CSCT member. The LANL review performed by the NNSA CDNS was a follow-up review at the LANL to validate closure of the three Safety Recommendations from the October 2005 review. The DOE Chief of Nuclear Safety's criticality safety staff conducted a review at the Idaho National Laboratory (INL). The reports are available from the respective office that performed the review.

These reviews generally reported that the contractor CSPs were performing adequately. The NNSA CDNS validation review at LANL concluded that the contractor adequately addressed the three Safety Recommendations and that criticality risks for ongoing operations were acceptably low.

Criticality Safety Coordinating Team Activities

The CSCT held teleconference call meetings on roughly a monthly schedule. The CSCT worked over several months to develop meaningful NCS performance metrics. The CSCT drew upon lessons learned with the application of various specific performance metrics in diverse operating environments. Based on sharing past lessons learned, two sets of metrics were drafted corresponding to a laboratory environment and a production plant environment. Several sites subsequently incorporated NCS performance metrics explicitly in contract language. The other major item of discussion through the year was the implementation of DOE Order 420.1B relative to criticality safety. The primary subject of discussion relative to 420.1B was DOE approval of the contractor CSP description document. By the end of CY 2006 no CSP description document had been approved by a site office. Based on the CSCT's interest in the CSP description document, the approach the INL is using to address the requirement was presented at the NCSP Friday meeting at the conclusion of the winter ANS meeting in November 2006. In addition,

some guidance clarifying the intent of the requirement for a CSP description document approval was issued in a NNSA Technical Bulletin which was posted on the NCSP website.

6.a(1) Contractor Criticality Safety Staffing, Training, and Qualification

The Board requires that the NCSP report on contractor criticality safety engineer staffing, training, and qualification status annually as part of this report. Based on a data call to the End-User Group, the information is provided in Table 1. It can also be found on the NCSP website as well as the status of Criticality Safety Officer staffing.

6.a(2) Federal Criticality Safety Staffing, Training, and Qualification

The status of Federal NCS staffing at the end of 2006 is improved over 2005. The three sites that were noted as having staffing deficiencies in the 2006 Annual Report were Los Alamos Site Office (LASO), Nevada Site Office (NSO), and SR. The LASO position has been filled and the individual is in the process of completing an accelerated mentoring/qualification program developed by the NNSA CSCT members. The NSO attempted, unsuccessfully, to fill the vacant NCS position with the posting of a GS-14 position. NNSA management subsequently approved a GS-15 position for the NSO NCS position for which the recruitment process has begun. In the meantime, NSO continues to be supported technically by the NNSA Service Center and HQ criticality safety staff. Finally, SR is addressing their staffing issues according to a SR Plan forwarded to EM HQ following the EM NCS review. Currently DOE-SR has one qualified NCS engineer. A second engineer is to complete qualifications by September 30, 2007, and a third engineer is to begin qualification shortly. A Support Service Contract to provide two qualified NCS engineers to do contractor CSP review in accordance with DOE-STD-1158 has been awarded and reviews will begin in March 2007. An entry level NCS engineer position was advertised in February 2007 and candidates are currently being evaluated. A needs assessment for a Criticality Safety Expert has been completed and it was determined that an excepted service position would be needed. This position is tied to the budget process and the year-long Continuing Resolution passed. Additionally, SR is utilizing a qualified NCS engineer at DOE-HQ to assist in reviews when this can be arranged. The complete listing of CSCT members can be found on the NCSP website.

6.b Planned Site Reviews

The CSMP calls for baseline reviews of priority sites. The remaining baseline reviews are expected to occur in 2007. These are the final three sites requiring baseline reviews as planned under the auspices of the CSMP.

- ETTP (K-25 Project) (EM)
- Portsmouth (EM)
- Y-12 (NNSA)

TABLE 1. CONTRACTOR "PERMANENT" CRITICALITY SAFETY ENGINEER (CSE) STAFFING, TRAINING, AND QUALIFICATION

Site/Contractor	Qualified to Standard 1135	In Training	Additional CSE's Needed	Open Positions	CSE Staff Needing LLNL Course	Comments/Plans/Interim Compensatory Measures
Idaho Closure Project (ICP)	5	2	0	0	1	
LLNL (Univ. of California)	8	0	2	2	2	New hires will be trained to 1135 including "hands-on" experiments.
Hanford (Fluor)	12*	0	0	0	1	*Quals are consistent w/1135. Implementation of 420.1B will require changes.
Hanford (CH_2M Hill)	0*	0	0	0	0	*1 subcontractor supports the Tank Farm work and interfaces with the permanent Criticality Safety Officer as provided in the Contractor CSO Staffing table.
INL (Battelle Energy Alliance, BEA)	8	0	1	1	0	
LANL (LANS)	7	3	5	5 (4 contractor)	5	Staff will be trained to an equivalent or better overall content, excluding hands-on experiments.
SNL (Lockheed Martin)	4*	3	0	0	2	*1 subcontractor of the 5 currently qualified personnel is retired, but continues to support the program on a part-time basis. All CSEs work part-time on nuclear criticality safety projects. The actual full-time employee level is 4 but there are 8 CSEs filling the 4 FTE support in 2007.
Pantex (BWXT Pantex)	2	0	0	0	0	
Y-12 (BWXT Y-12)	29	3	6	6	6	Number needing course does not include open positions.
East Tennessee Technology Park (ETTP) (BNFL)	N/A	N/A	N/A	N/A	N/A	ETTP 3 Bldg. D&D Project completed and no fissile operations exist.
ETTP (BJC and its major subs)	18	0	1	1	2	
Portsmouth	1*	0	0	0	0	*ER contract with LPP since June 2005. CSE support augmented by 1 subcontractor.
Paducah	3	0	0	0	1	Information does not include 2 CSEs based on nuclear fuel services that provide work on an as-needed basis.
ORNL (UT-Battelle)	3*	0	0	0	0	*1 CSE support contractor; 3 UT-Battelle employees.
SR (WSMS)	13*	5*	2	2	2	Qualified personnel augmented by 2 experienced subcontract personnel having completed the program. The number in training includes 2 experienced subcontract personnel going through the program.
Oak Ridge (WSMS)	3	0	4	4	2*	*Waiting on clearances.
WIPP	0*	0	0	0	0	*1 CSE support subcontractor; all criticality safety support for the WIPP is supplied by subcontract personnel.
ANL	3	1	0	0	0	

6.c Status of Implementation Challenges Noted in 2006 Report

Listed below are various challenges and self-identified weaknesses that the NCSP Manager identified in the 2006 Annual Report. A brief summary status for each is provided as follows:

- Establishing Hands-On Criticality Safety Training Courses. **This training was developed and implemented by LLNL as an interim measure until the CEF is operational at the DAF. Five classes were held in CY 2006 and 49 individuals were trained. Eight classes are planned for CY 2007. This training course is specifically designed to meet the formal criticality safety engineer qualification requirements contained in DOE-STD-1173-2003 and DOE-STD-1135-99.**
- Formalization of the DOE CSMP to get formal concurrence from DOE Elements (Line Management, Chief of Defense Nuclear Safety; Energy and Environment Chief of Nuclear Safety, and the two Central Technical Authorities). **As the year progressed, there seemed to be no advantage to pursuing this as all the needed offices were cooperating and accomplishing the tasks as planned. This can always be done if problems arise in execution in the future. The task is tabled indefinitely.**
- Work with the Office of Engineering and Construction Management (MA-50) to formally require CSSG reviews in the design process under the DOE Order 413.3 framework. The NCSP Manager and CSSG will support the Chiefs of Nuclear Safety relative to incorporating CSSG criticality safety reviews as part of the analyses to support critical decisions for relevant projects. **The DOE formed a team to prepare a new standard, DOE-STD-1189, to address this issue. The NCSP Manager will work with the two Chiefs of Nuclear Safety to ensure that appropriate criticality safety reviews occur.**
- Funding challenges relative to executing non-NNSA baseline site reviews. **N/A; No problems to date.**
- Maintaining Critical Experimenter Qualification and Proficiency. **Working per Five-Year Plan.**
- Following Up on End-User Focus Group Recommendations. **Ongoing Activity.**
- Implementing the CSCT monitoring activity of the program. **Ongoing Activity.**
- Keeping CEF on course. **Ongoing Activity.**
- Long-term planning for hands-on criticality safety training. **Ongoing Activity with mission options and timing TBD dependent upon the long-term future of the nuclear mission of LLNL.**
- U.S. (LANL) participation in Russian critical experiments. **Ongoing per Five-Year Plan (Subsumed under Maintaining Critical Experimenter Qualification and Proficiency).**
- Development and implementation of criticality safety performance metrics. **CSCT Actions Completed.**
- Development of a DOE Standard for DOE Site Office Criticality Safety Oversight Programs. **Under Consideration by CSCT for 2007 Action.**
- Completion of DOE-STD-3007 major revision. **Action Complete. DOE-STD-3007-2007 was formally issued in February 2007.**
- Tracking and trending of crit infractions/deficiencies; annual CSSG reviews. **Ongoing Activity (see summary in Section 4.)**

- Improved methods for promulgating lessons learned. **Several criticality-safety related lessons learned and interpretations of orders and DOE standards were published in NNSA Technical Bulletins and posted on the NCSP website. The Friday NCSP meetings associated with the ANS meetings continue to be a vehicle used to promulgate lessons learned and best practices. The NCSP website will receive increased use as a medium of communication.**