

**Independent Oversight Review of the
Nevada National Security Site
Criticality Safety Program
Corrective Action Plan Closure**



May 2013

**Office of Safety and Emergency Management Evaluations
Office of Enforcement and Oversight
Office of Health, Safety and Security
U.S. Department of Energy**

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Acronyms

ANS	American Nuclear Society
ANSI	American National Standards Institute
CAP	Corrective Action Plan
CCR	Criticality Control Review
CDNS	Chief of Defense Nuclear Safety
CSL	Criticality Safety Lead
CSP	Criticality Safety Program
CSPM	Criticality Safety Program Manager
CSRC	Criticality Safety Review Committee
DAF	Device Assembly Facility
DOE	U.S. Department of Energy
IA	Independent Assessment
LANL	Los Alamos National Laboratory
LLNL	Lawrence Livermore National Laboratory
NCERC	National Criticality Experiments Research Center
NCS	Nuclear Criticality Safety
NCSE	Nuclear Criticality Safety Evaluation
NCSP	Nuclear Criticality Safety Program
NFO	Nevada Field Office
NNSA	National Nuclear Security Administration
NNSS	Nevada National Security Site
NP	Noteworthy Practice
NSO	Nevada Site Office
NSTec	National Security Technologies, LLC
OFI	Opportunity for Improvement
RCA	Root Cause Analysis
REOP	Real Estate/Operations Permit
RTO	Radiation Test Object
RWMC	Radioactive Waste Management Complex
STD	Standard

Independent Oversight Review of the Nevada National Security Site Criticality Safety Program Corrective Action Plan Closure

1.0 PURPOSE

The U.S. Department of Energy (DOE) Office of Enforcement and Oversight (Independent Oversight), within the Office of Health, Safety and Security, conducted an independent review of the National Nuclear Security Administration (NNSA) Nevada Field Office (NFO) and National Security Technologies, LLC (NSTec) concurrent assessments to confirm the level of compliance with the closure actions of the NSTec corrective action plan (CAP) for nuclear criticality safety. NFO requested the CAP based upon findings from its August 2011 contractor oversight assessment report ASM-AMSS-3.28.2011-334811, *National Security Technologies, LLC (NSTec) Implementation of DOE-STD-3007-2007*. In addition to the CAP closure actions, the NSTec assessment also examined management assessments and reviews based on DOE-STD-1158, *Self Assessment Standard for DOE Contractor Criticality Safety Programs*. The Independent Oversight review, performed on site February 25-27, 2013, focused on shadowing the NFO and NSTec assessments and evaluating their oversight of NSTec's criticality safety program (CSP) at the Nevada National Security Site (NNSS) in accordance with NFO Order 226.XD, *Assessment and Oversight*, and NSTec Core Company Directive CCD-QA09.001, *Management Assessment Program*.

2.0 SCOPE

Independent Oversight shadowed the NFO and NSTec assessors, who followed an approved NFO assessment plan dated February 14, 2013, and an approved NSTec assessment plan dated February 25, 2013, using the NFO Criteria, Review and Approach Document and the NSTec Performance Objectives and Criteria Table shown in Appendices C and D, respectively. The Independent Oversight review also evaluated the adequacy of:

- Approved CAP actions and their closure actions.
- NFO and NSTec assessment programs related to criticality safety.

3.0 BACKGROUND

In May 2011, an NNSA Chief of Defense Nuclear Safety (CDNS) biennial review of the Nevada Site Office (NSO)¹ determined that it failed to meet objectives for the Criticality Safety functional area. Specifically, the CDNS review concluded that the implemented oversight processes and procedures did not ensure that an effective and fully compliant CSP had been implemented at the site. Additionally, in preparation for the CDNS review, NSO conducted a management self-assessment that also identified significant deficiencies in the CSP definition and an inadequate level of oversight of the contractor CSP. NSO then conducted an assessment of the NSTec CSP's implementation of DOE-STD-3007, *Guidelines for Preparing Criticality Safety Evaluations at Department of Energy Non-Reactor Nuclear Facilities*. Based on the results of that assessment, which concluded in August 2011, NSO identified serious issues with NSTec's ability to produce and internally review a process evaluation for criticality safety in accordance with American National Standards Institute/American Nuclear Society (ANSI/ANS)-8.1, *Nuclear Criticality Safety in Operations with Fissionable Material Outside Reactors* and ANSI/ANS-8.19, *Administrative Practices for Criticality Safety*. In September 2011, NSTec submitted a CAP that included completion dates for 17 key actions in response to the NSO assessment. NSTec's closure of

¹ Nevada Site Office became Nevada Field Office in January 2013.

these CAP actions was the focus of the scheduled NFO and NSTec concurrent assessments. One of the CAP actions was for an independent assessment of NSTec's compliance to DOE-STD-1158, which was not completed until January 2013. The significance of the previously identified deficiencies in the 2011 assessment warranted an Independent Oversight review of criticality safety at NNSS and a review of the field office and contractor CSP activities.

4.0 METHODOLOGY

Independent Oversight performed selected document reviews, attended interviews, and made other observations while shadowing the NFO and NSTec assessment teams. In addition to the defined scope of the approved site office and contractor assessment plans, Independent Oversight also evaluated the two assessment teams' performance of compliance oversight of criticality safety at NNSS per NFO and NSTec procedures, as well as the adequacy of their assessment programs related to criticality safety.

5.0 RESULTS

NSTec Management Assessment

The NSTec Criticality Safety Review Committee (CSRC) that performed the assessment found that NSTec has completed and sustained many of the corrective actions. NSTec has made progress on the remaining CAP actions, although the CAP schedule dates are slipping. Two CAP items remained open, both of which depend on issuance of the final assessment report. NSTec has closed all other CAP items, even though the NSTec assessment team did not find enough evidence to support closure of some sub-issues. For instance, several sub-criteria related to the nuclear criticality safety evaluation (NCSE) procedure (OP-NOPS.013) and the Writer's Guide (GDE-NOPS.007) have not been met. In addition, because the full DOE-STD-1158 review to close a CAP item was not completed until January 2013, NSTec had not yet addressed all OFIs in that recently completed review. The NSTec nuclear criticality safety program (NCSP) management places appropriate emphasis on these issues and has assigned specific actions and dates for their completion.

The NSTec assessment team found that the CSP at NNSS has substantially improved over the last 18 months as evidenced by a stronger program, a more integrated relationship with secondary Real Estate/Operations Permit (REOP) holders, and additional attention to development of the CSP staff. Because the NSTec staff has generated no NCSEs under the new procedure and Writer's Guide, the CSRC was unable to document that the CSP staff can produce DOE-STD-3007 compliant NCSEs and thus recommended that this issue remain open until the CSRC can review at least three NSTec-generated NCSEs that meet DOE-STD-3007.

The NSTec assessment team identified one Finding, four Opportunities for Improvement (OFIs) and two Noteworthy Practices (NPs):

Finding 1. There was insufficient evidence that all operations with active NCSEs were being evaluated on an annual basis.

OFI 1. CSRC. Activities associated with the NSTec CSRC (meeting frequency, taskings, charter maturity) are not consistent with the stated goal of the CSRC.

OFI 2. Records Management. There is still confusion on the part of the facility managers as to where to get the most up-to-date and active NCSEs and there is a lack of consistency of approach,

documentation and detail associated with the DOE-STD-1158 reviews that have been performed during the previous three-year cycle.

OFI 3. Nuclear Criticality Safety (NCS) Engineer Proficiency. The CSRC could not determine if NCS engineers can write NCSEs in compliance with DOE-STD-3007 because they have not produced an original end-to-end NCSE in the past year; the “regular” re-qualification requirements do not contain a required reading list to ensure the NCS engineer refreshes his knowledge and the re-qualification requirements do not require the NCS engineer to maintain his software/modeling abilities as related to facility/job specific assignments.

OFI 4. Classified Modeling Resources. Criticality safety codes installed on NSTec classified computer platforms have been verified but not validated.

NP 1. The metrics program and NCS Dashboard are very effective and easy to access, with the added capability to dive deeper into individual items to examine them.

NP 2. NSTec Emergency Management has produced an Initial Response Guide (IRG-2120.001) with concise look-up information in few pages and separate detailed information.

NFO Assessment

The NFO assessment team found 16 of the 17 criteria to be fully met, based on the CAP actions taken and the evidence produced by NSTec.

The approved CAP stated that NSTec will demonstrate compliance with DOE-STD-3007-2007. NSTec has implemented many new mechanisms for NCSE development, but the CSRC assessment had no new NCSEs to review. Therefore, the NFO assessment concluded that NSTec cannot demonstrate compliance at this time and the criterion for CAP action #16 is not fully met. This is a key aspect of the program improvement effort since the original assessment that led to the development of the CAP had findings specific to NCSE development.

The NFO assessment team identified one Finding and four OFIs:

Finding 1. Failure to demonstrate compliance to DOE-STD-3007 and applicable ANSI/ANS-8 series standards.

OFI –CS.1-1: The use of validated codes and benchmarks could be explicitly described in both of the NCSE documents (Writer’s Guide and OP-NOPS.013).

OFI-CS.1-2: It may be useful to record all training actions on a single updated qualification card for those personnel that qualified prior to the revision of the qualification.

OFI-CS.1-3: Previously performed CCRs may need to be reviewed to ensure the conclusions are consistent with the new process.

OFI-CS.1-4: The CSRC Charter document needs to be updated with actual roles and responsibilities of the CSRC in the subject areas that are currently listed as To-Be-Determined.

Independent Oversight Assessment

The Independent Oversight assessment team reviewed the plans, execution and final reports of the NSTec

and NFO assessments. Both assessment plans were adequately prepared in accordance with NFO Order 226.XD and CCD-QA09.001, although the NSTec plan was not signed until the day of the assessment. The NSTec assessment plan included the approved CAP actions and their closure actions for DOE-STD-3007; it also appropriately included the closure actions for previous management assessments and DOE-STD-1158 reviews. Both assessment teams performed thorough reviews that included document reviews, interviews with relevant personnel, and some field observations including the receipt and deposition of a shipment of radioactive waste at the Radioactive Waste Management Complex (RWMC).

NFO and NSTec assessment team members were qualified and credible, and their reviews met the expectations of the assessment procedures. The NSTec assessment team was the CSRC, which consists of three experienced technical members from outside NSTec who provide independent review of NCSEs. However, the NFO assessment team consisted of only one individual who is qualified in accordance with the NFO technical qualification program but who has limited technical experience with the subject matter. This individual might not be able to fully evaluate the technical adequacy of some closure actions to resolve the previous findings, which were developed by a larger and more experienced team in the 2011 assessment. (See **OFI-1** in Section 10.)

Both assessment reports were adequately prepared and met expectations and taken together as concurrent reviews with slightly different perspectives, they provide a thorough review of the CSP at NNSS. In fact, based on the numerous issues identified in the two reports, NSTec received a comprehensive review that provides clear direction for future improvements.

In summary, compliance oversight of NSTec's CSP from both the Federal field office and the contractor's perspective is technically adequate and meets the expectations of DOE Order 226.1B, *Implementation of Department of Energy Oversight Policy*, and DOE Order 420.1B, *Facility Safety*.

Independent Oversight also reviewed the adequacy of the numerous closure actions and concurs with most of the results of the NSTec and NFO assessments. Clearly, the primary reason for performing these assessments was to review NSTec's resolution of previously identified serious concerns about their ability to produce and internally review a process evaluation for criticality safety. The fact that NSTec has not produced any NCSEs under their new procedure and Writer's Guide means that this issue remains unresolved. The NFO assessment cited this deficiency as a finding and Independent Oversight concurs with this finding; however, in retrospect this should have been a CAP action item in the 2011 assessment report. After more than 18 months, NSTec management was not sufficiently proactive in demonstrating compliance with DOE-STD-3007, ANSI/ANS-8.1, and ANSI/ANS-8.19, and precluding recurrence of a previous assessment finding. Likewise, NFO management was not proactive in compelling NSTec to demonstrate compliance with requirements sooner and not to tolerate noncompliance for such a lengthy (and continuing) period of time.

Overall, NSTec failed to meet several of the closure actions: three of the 17 CAP criteria were not met, and seven of the other 13 criteria from previous assessments have still not been met. Independent Oversight concurs with most of the closure actions but does not fully concur with the adequacy of a few of them or has additional concerns with some of the results of the two assessments, specifically the following four OFIs:

- *Criterion 5d: Include an explicit expectation for Operations staff to document the proposed activity or scope of work on a new form that requires a NCSE.*

Procedure OP-NOPS.013 directs the requestor (e.g., facility manager or supervisor) to request NCS support from the Criticality Safety Lead (CSL) or designee when a new operation or a change to an existing operation involving fissile materials is proposed. The note before step 4.1.[1] states that requests

may be submitted via memorandum or email. The Criticality Safety Program Manager (CSPM) stated that NSTec form FRM-1922, *Nuclear Criticality Safety Evaluation Cover Sheet/Summary*, is used to document such requests, but it is not referenced in the procedure. Independent Oversight concurs that the criterion is not met, but has an additional concern. Occasionally, Operations staff may determine that some activities involving significant quantities of fissile material do not require a new or modified NCSE because the proposed change or modification to the operation is bounded by an existing evaluation. In such cases, it is equally important that Operations staff adequately document, and that the CSL or designee concur, that the proposed change to an existing activity is in fact bounded by an evaluation and thus requires no changes to existing criticality safety controls. The procedure for performing NCSEs is not clear on this point, and experience has shown that a mini-evaluation may be needed because some activities that appear to be bounded are occasionally not. (See **OFI-2** in Section 10.)

- *Criterion 6: Has NSTec benchmarked the NCSE development procedure of other organizations (Lawrence Livermore National Laboratory) to document best management practices and incorporate into the NCSE Writer's Guide or OP-NOPS.013 as appropriate?*

The CRSC, whose membership represents many years of NCS experience at several DOE sites, reviewed GDE-NOPS.007, *Nuclear Criticality Safety Evaluation Writer's Guide*, and found that it was acceptable and that it adequately incorporated benchmark comments. However, Independent Oversight's review of the benchmarking report identified some weaknesses, perhaps resulting from its narrow focus on best practices elsewhere; although the intention was good, the report is neither sufficiently detailed in some areas nor attuned to the criticality safety aspects of specific activities conducted at NNSS. Thus, the revised NCSE procedure OP-NOPS.013 and the new NCSE Writer's Guide may not be fully adequate to guide NCSEs of some activities planned at NNSS. Independent Oversight concurs with NFO's OFI – CS.1-1 regarding the use of validated codes; however, one additional concern is that, while OP-NOPS.016, *Validation of Critical Safety Codes*, implements parts of mandatory standard ANSI/ANS 8.1, Sections 4.3.1 through 4.3.3, regarding the establishment of bias and bias uncertainties in analytical models (i.e., criticality safety computer codes) used in NCSEs, the Writer's Guide does not provide sufficient guidance about this. (See **OFI-3** in Section 10.)

Also as a result of weaknesses in the benchmarking effort, several sentences of text in the Writer's Guide pertain to operations with fissile material solutions or safety aspects of certain process equipment (e.g., "instrumentation or active engineered systems that can provide some protection [against accidental criticality]...") that do not apply to activities conducted at NNSS. Including such language in the Writer's Guide may be misleading and inappropriate. Additionally, evaluations governing tests with Radiation Test Objects (RTOs) are another special case at NNSS that should be specifically addressed. For example, NSTec personnel indicated that multi-part RTO tests are always conducted using engineered controls to maintain adequate spacing between the parts for criticality safety. However, there is no such requirement or guidance in either the revised NCSE procedure or the new Writer's Guide, and misleading text in the Writer's Guide makes it unclear whether the instrumentation associated with RTO tests is relied on to provide "some" protection or full protection. Also, neither document specifically addresses how NCSEs should evaluate the transition from criticality safety controls to reactor safety controls (and back) when setting up and disassembling critical assemblies. OP-NOPS.013 and/or GDE-NOPS.007 should clarify these matters. (See **OFI-4** in Section 10.)

- *Criterion 18: In light of infrequent preparation of end-to-end NCS Evaluations, does the NCSP management have in place a program to maintain proficiency of NCS Engineers in Evaluations?*

NCSP management understands the concern with proficiency reflected in OFI#1 of the management assessment of the NSTec NCSP (Report NSEP-2013-001, completed in January 2013) and has preliminary plans for addressing it. NCSP management also recognizes that NSTec criticality safety

engineers are reviewing external NCSEs performed by Los Alamos National Laboratory (LANL) and Lawrence Livermore National Laboratory (LLNL), so they are exposed to how other organizations perform NCSEs. Independent Oversight does not concur that the criterion is met because there is insufficient evidence to demonstrate that NSTec has an effective program in place. Since NSTec has not produced any NCSEs under the new procedure and Writer's Guide, this issue remains unresolved. (See **OFI-5** in Section 10.)

- *NSTec Finding 1: There was insufficient evidence that all operations with active NCSEs were being evaluated on an annual basis.*

This finding is based on OP-NOPS.012, *Performance of Nuclear Criticality Safety Inspections and Walkthroughs*, and reviews of the 2012 walkdown schedule and activities in active operations. Independent Oversight concurs with the finding, but has an additional concern beyond what was discussed in the NSTec assessment report. An important consideration is that secondary REOP holders perform operations at NNSS under their criticality safety evaluations and perform their own inspections. For example, PD-NOPS.003, *Integrated Nuclear Criticality Safety Program Description*, section 4.10 states: "Walkthroughs and inspections by Criticality Safety Engineers are conducted in accordance with requisite NCSPs. Observations and relevant information resulting from the conduct of walkthroughs will be shared between NSTec, LANL, and LLNL. Issues will be tracked in each organization's issues management system." Criticality safety staff shortages at LANL and LLNL may pose a challenge to properly integrating the program at NNSS and performing these inspections and addressing issues. NFO and NSTec should review secondary REOP holder procedures and performance of compliance oversight of criticality safety at NNSS as well as the adequacy of their assessment programs related to criticality safety. (See **OFI-6** in Section 10.)

6.0 CONCLUSIONS

Independent Oversight shadowed the NFO and NSTec assessments of NSTec's CSP at NNSS and determined that their performance was adequate and meets the expectations for compliance oversight per NFO Order 226.XD and CCD-QA09.001. Overall, the NFO and NSTec assessment programs related to criticality safety are adequate and capable of identifying issues. However, Independent Oversight identified a few additional opportunities for improvement in regard to some criticality procedures and with NFO and NSTec criticality oversight.

The approved CAP actions that were the subject of the assessments were adequate. However, NSTec failed to meet several of the closure actions. Of particular concern, more than 18 months have passed since NSO identified serious issues with NSTec's ability to produce and internally review a process evaluation compliant with criticality safety standards, and NSTec has still not produced any NCSEs under the new NSCE procedure and Writer's Guide to demonstrate compliance.

7.0 FINDINGS

None.

8.0 UNRESOLVED ITEMS

None.

9.0 ITEMS FOR FOLLOW-UP

Independent Oversight will monitor the closeout of corrective actions from the two CSP assessments, previous assessments, and this independent review.

10.0 OPPORTUNITIES FOR IMPROVEMENT

This Independent Oversight review identified the following OFIs. These potential enhancements are not intended to be prescriptive or mandatory. Rather, they are offered to the site to be reviewed and evaluated by the responsible line management organizations and accepted, rejected, or modified as appropriate, in accordance with site-specific program objectives and priorities.

OFI-1: NFO Order 226.XD should include additional guidance for assessment team composition and qualifications to ensure that team members are qualified and, using a graded approach, also possess sufficient subject matter expertise to adequately scrutinize areas in the appropriate depth.

OFI-2: OP-NOPS.013 should include additional steps for conducting a mini-evaluation for a proposed change to an existing operation involving fissile materials that is fully bounded by an existing NCSE, to confirm and document that no changes to existing criticality safety controls are necessary.

OFI-3: GDE-NOPS.007 should discuss requirements of ANSI/ANS-8.1-1998, Sections 4.3.1 and 4.3.3, regarding the establishment of bias and bias uncertainties in the analytical models or techniques used to perform NCSEs, as implemented per OP-NOPS.016. The use and range of applicability of such models or techniques should also be described in the safety basis for nuclear facilities as applicable.

OFI-4: OP-NOPS.013 and/or GDE-NOPS.007 should clarify operations with fissile material solutions and RTOs, and the applicability of instrumentation or active engineered systems for criticality safety, as well as operations involving the transition to and from reactor safety controls. Additionally, NSTec should conduct a follow-on benchmarking effort that includes subject matter experts in Operations, Reactor Operations and RTO operations, focusing on the specific conditions and situations that apply at NNSS.

OFI-5: NSTec should demonstrate that it has an effective program in place to maintain the proficiency of NCS engineers. This issue should remain open until the CSRC determines that NSTec has completed at least three NCSEs that meet DOE-STD-3007, consistent with the recommendation.

OFI-6: NSTec and NFO oversight should follow up on criticality safety inspections and walkthroughs performed by secondary REOP holders to assess the effectiveness of information sharing between NSTec, LANL and LLNL, the issues management process, and corrective actions.

Appendix A Supplemental Information

Dates of Review

Onsite Review: February 25-27, 2013

Office of Health, Safety and Security Management

Glenn S. Podonsky, Chief Health, Safety and Security Officer
William A. Eckroade, Principal Deputy Chief for Mission Support Operations
John S. Boulden III, Director, Office of Enforcement and Oversight
Thomas R. Staker, Deputy Director for Oversight
William E. Miller, Deputy Director, Office of Safety and Emergency Management Evaluations

Quality Review Board

William Eckroade
John Boulden
Thomas Staker
William Miller
Michael Kilpatrick
George Armstrong
Robert Nelson

Independent Oversight Site Lead

William Macon

Independent Oversight Reviewers

William Macon – Lead
Ivon Fergus

Appendix B

Documents Reviewed, Interviews, and Observations

Documents Reviewed

- ANSI/ANS-8.1-1998, *Nuclear Criticality Safety in Operations with Fissionable Material Outside Reactors*
- ANSI/ANS-8.19-2005, *Administrative Practices for Criticality Safety*
- CCD-QA09.001, *Management Assessment Program*, Rev. 4, 11/1/12
- CCD-QA10.001, *Independent Assessments*, Rev. 2, 11/1/12
- CD-NOPS.001, *Nuclear Criticality Safety Program*, Revision 2, 8/10/10
- CD-NOPS.012, *Performance of Nuclear Criticality Safety Inspections or Walkthroughs and Responding to Conditions Adverse to NCS*, Revision 1, 7/28/09
- CHTR-NOPS.001, *Criticality Safety Review Committee*, Rev. 0, 12/15/11
- DOE Order 226.1B, *Implementation of Department of Energy Oversight Policy*
- DOE Order 420.1B, *Facility Safety*
- DOE-STD-1158-2010, *Self Assessment Standard for DOE Contractor Criticality Safety Programs*
- DOE-STD-3007-2007, *Guidelines for Preparing Criticality Safety Evaluations at Department of Energy Non-Reactor Nuclear Facilities*, 2/07
- GDE-NOPS.007, *Nuclear Criticality Safety Evaluation Writer's Guide*, Rev. 0, 12/8/11
- Letter, Baker to Dionizio, *Criticality Safety Review Committee (CSRC) Review of Senior and Criticality Safety Engineer Qualifications*, 4/18/12
- Letter, Baker to Piburn, *Criticality Safety Review Committee (CSRC) Assessment of the National Nuclear Security Technologies, LLC (NSTec) Nuclear Criticality Safety Program (NCSP) Compliance to U.S. Department of Energy Standard 3007-2007*, 3/28/13
- Letter, Mellington to Younger, *Transmittal of National Nuclear Security Administration Nevada Site Office (NNSA/NSO) Contractor Oversight Report ASM-AMSS-3.28.2011-334811, National Security Technologies, LLC (NSTec) Implementation of DOE-STD-3007-2007*, 8/15/2011
- Letter, Younger to Mellington, *Corrective Action Plan (CAP) for National Nuclear Security Administration Nevada Site Office (NNSA/NSO) Contractor Oversight Report of National Security Technologies, LLC (NSTec) Implementation of DOE-STD-3007-2007*, 9/30/2011
- NCSR-DAF-2011-001, *Criticality Control Review for the Device Assembly Facility*, Rev. 10, 11/20/12
- NCSR-RWMC-2011-03, *Criticality Control Review for the Radioactive Waste Management Complex*, Rev. 1, 11/6/12
- NSO Contractor Oversight Assessment Report ASM-AMSS-3.28.2011-334811, *Nevada Site Office Criticality Safety Assessment Report*, June 2011
- NSO Oversight Assessment ASRP-AMSS-8.9.2011-369863, *DOE-STD-3007 Implementation*, 12/8/11
- NSTec Form FRM-1922, *Nuclear Criticality Safety Evaluation Cover Sheet/Summary*, Rev. 1, 1/10/12
- NSTec Form FRM-2316, *NCS Evaluation Independent Review Checklist*, Rev. 1, 12/28/11
- NSTec Independent Assessment IA-10-AD40-001, *Report of the Criticality Safety Assessment for the Device Assembly Facility*, August 2010
- NSTec Independent Assessment IA-11-W200-012, *Nuclear Criticality Safety Program (NCSP)*, 9/29/11
- NSTec Joint Assessment MA-11-S000-006, *Nevada National Security Site Criticality Safety Program Assessment*, September 2011

- NSTec Management Assessment MA-12-S200-002, *DOE-STD-3007 Criticality Safety Control Assessment*, 3/27/12
- NSTec Management Assessment MA-13-S200-012, *Compliance of CSP to DOE-STD-3007*, 3/28/13
- NSTec Management Assessment Plan MA-13-S200-012-Plan, *Compliance of CSP to DOE-STD-3007*, 2/25/13
- NNSA Headquarters Biennial Review of Site Nuclear Safety Performance Final Report for the Nevada Site Office, May 2011
- NFO Assessment Plan ASM-AMSS-10.2.2012-469539, *Criticality Safety Program Corrective Action Plan Closure*, 2/14/13
- NFO Assessment Report ASRP-AMSS-3.4.2013-497638, *Criticality Safety Program Corrective Action Plan Closure*, 5/13
- NFO Order 226.XD, *Assessment and Oversight*, Rev. 0, 11/2/2011
- OP-2151.450, *Radioactive Waste Management Operations Review Committee*, Rev. 3, 12/20/12
- OP-NOPS.012, *Performance of Nuclear Criticality Safety Inspections and Walkthroughs*, Rev. 2, 10/8/12
- OP-NOPS.014, *Deriving and Using Criticality Safety Indexes for NCS Control*, Rev. 1, 11/27/12
- OP-NOPS.015, *Nuclear Criticality Safety Posting and Labeling*, Rev. 1, 11/1/12
- OP-NOPS.013, *Nuclear Criticality Safety Evaluation*, Rev. 2, 12/28/11
- OP-NOPS.016, *Validation of Critical Safety Codes*, Rev. 1, 8/18/11
- OP-NOPS.017, *Criticality Accident Alarm Systems*, Rev. 0, 4/5/11
- OP-NOPS.018, *Integration of Nuclear Criticality Safety Evaluations with Safety Basis Documents*, Rev. 2, 10/8/12
- OP-NOPS.019, *Nuclear Safety Software Management and Control*, Rev. 0, 3/30/09
- OP-NOPS.028, *Responding to Conditions Adverse to Nuclear Criticality Safety*, Rev. 0, 10/8/12
- PD-NOPS.003, *Integrated Nuclear Criticality Safety Program Description*, Rev. 0, 12/20/12
- PY-NOPS.001, *Nuclear Criticality Safety Policy*, Rev. 3, 6/21/12
- Report NSEP-2013-001, *Report on the Independent Assessment of the NSTec Nuclear Criticality Safety Program*, 1/31/13

Interviews

- Nuclear Safety Division Manager
- Nuclear Criticality Safety Program Manager
- Exercise and Facility Preparedness Programs Supervisor
- Emergency Management Coordinator
- Fissile Material Handling Program Manager
- Fissile Material Handling Deputy Program Manager
- Fissile Material Handling Training Officer
- RWMC Facility Manager
- RWMC Supervisor
- DAF Deputy Manager, Operations & Maintenance
- Senior Criticality Safety Engineer
- Criticality Safety Engineer

Observations

- Onsite visit to RWMC to observe the receipt of a shipment of radioactive waste including its inspection, offloading, and deposition in a waste trench

- Onsite visit to the Device Assembly Facility (DAF) to observe criticality safety postings at the National Criticality Experiments Research Center (NCERC) vault and fissile material handling from the vault to another building at DAF.

Appendix C
NFO Criteria, Review and Approach Document
Criticality Safety
February 2013

OBJECTIVE

CS.1 NSTec has successfully performed the actions identified in the approved NSTec *Corrective Action Plan (CAP) for NNSA/NSO Nuclear Criticality Safety (NCS) Assessment Report*.

CRITERIA

1. Issue root cause analysis (RCA) for Contractor Oversight Assessment Report ASM-AMSS-3.28.2011-334811, *National Security Technologies, LLC Implementation of DOE-STD-3007*, dated June 2011.
2. Issue memorandum documenting results of prior meeting with Facility Management not to use the present versions of NCSEKNS-2010-01 and NCSE-RNCTEC-2010-01 for operations and formally designate these Nuclear Criticality Safety Evaluations (NCSEs) as well as NCSE-LIS-2009-001 as being inactive.
3. Update and issue CAP as necessary based on RCA and submit finding specific action plans to the NNSA/NFO Deputy Assistant manager for Safety.
4. Develop a NCSE Writer's Guide based on the U.S. Department of Energy Nuclear Criticality Safety Program (NCSP) training module 12, "*Preparation of Nuclear Criticality Safety Evaluations*."
5. Incorporate the specific expectations into the NCSE Writer's Guide and/or OP-NOPS.013, "*Nuclear Criticality Safety Evaluation*."
6. Benchmark the NCSE development procedure of other organizations (i.e., Lawrence Livermore National Laboratory) to document best management practices and incorporate into the NCSE Writer's Guide or OP-NOPS.013 as appropriate.
7. Develop a procedure for Independent Peer Review of criticality safety related documents.
8. Review and revise the qualification program as needed for Senior Nuclear Criticality Safety (NCS) Engineer and NCS Engineers based on revised approaches for the completion of NCSEs (i.e., NCSE Writer's Guide and/or OP-NOPS.013 revision).
9. Develop qualification card for NSTec Criticality Safety Program Manager (CSPM) that includes as appropriate relevant portions of the U.S. DOE NCSP training program for Criticality Safety Engineers.
10. Gain concurrence from the Criticality Safety Review Committee (CSRC) on the following deliverables: NCSE Writer's Guide and/or OP-NOPS.013 revision, Adequacy of Senior NCS Engineer and NCS Engineer qualification programs, Adequacy of the CSPM qualification card, and Adequacy of the Independent Peer Review procedure.

11. Complete Senior NCS Engineer & NCS Engineer requalification as needed based on updated qualification cards.
12. Qualify CSPM to established qualification card.
13. Issue CCR document for the Device Assembly Facility (including Nuclear Criticality Experiments Research Center) and Radioactive Waste Management Complex based on a review of current NCSEs needed for current or future fissionable material operations.
14. Complete corrective action verification of integrated CAP and individual finding action plans.
15. Complete scheduled Independent Assessment of compliance to DOE-STD-1158.
16. Complete CSRC committee external assessment to demonstrate compliance to DOE-STD-3007 and applicable ANSI/ANS-8 series standards.
17. Submit letter to NNSA/NFO Manager documenting the satisfactory compliance to DOE-STD-3007 and applicable ANSI/ANS-8 series standards.

APPROACH

The Lines of Inquiry for the criteria above are given here, with the principle method of investigation.

1. **Criteria:** Issue root cause analysis (RCA) for Contractor Oversight Assessment Report ASM-AMSS-3.28.2011-334811, *National Security Technologies, LLC Implementation of DOE-STD-3007*, dated June 2011. (Document Review)
 - Has an issue root cause been performed and documented?
 - Was the root cause performed per procedure CCD-QA03.001?
2. **Criteria:** Issue memorandum documenting results of prior meeting with Facility Management not to use the present versions of NCSE-KNS-2010-01 and NCSE-RNCTEC-2010-01 for operations and formally designate these Nuclear Criticality Safety Evaluations (NCSEs) as well as NCSE-LIS-2009-001 as being inactive.
 - Has a memorandum been issued suspending the use of the NSCEs in question?
3. **Criteria:** Update and issue CAP as necessary based on RCA and submit finding specific action plans to the NNSA/NFO Deputy Assistant manager for Safety.
 - Did the RCA result in new actions?
 - If so, was the CAP revised accordingly and submitted.
4. **Criteria:** Develop a NCSE Writer's Guide based on the U.S. Department of Energy Nuclear Criticality Safety Program (NCSP) training module 12, "*Preparation of Nuclear Criticality Safety Evaluations.*"
 - Was a NCSE Writer's Guide issued through the contractor's electronic data management system (EDMS)?
 - Does the NCSE Writer's Guide based upon training module 12?
5. **Criteria:** Incorporate the specific expectations into the NCSE Writer's Guide and/or OP-NOPS.013, "*Nuclear Criticality Safety Evaluation.*"
 - Does the revision address the following expectations?

- Require the incorporation of a “What-If Table” in NCSEs (use NCSP training module 12 Appendix A as an example).
- Require the documented identification of credible contingencies using a systematic approach (e.g., What-If Table) and a documented justification for explaining why a contingency is not credible.
- Incorporate guidance for performing NCSEs based on the amount of fissionable material needed to support programmatic activities vice excessively bounded or unrealistic quantities of fissionable material.
- Include an explicit expectation for Operations staff to document the proposed activity or scope of work on a new form that requires a NCSE.
- Include an explicit expectation to interview Operations staff and conduct walk-downs as part of NCSE development to ensure a full understanding of the inventory of fissionable material and the scope of work associated with this material.
- Clarify who in Operations management will review and sign-off of all process related NCSEs to ensure appropriate activity and management level review.
- Reemphasize the use of documented benchmarks where available, and establish and use exempt quantity limits for radionuclides when benchmarks are not available until a methodology for this situation is incorporated into the NNSA/NFO approved Nuclear Criticality Safety Program (NCSP).
- Reemphasize the use of only validated codes to determine the reactivity of the system or perform k_{eff} [neutron multiplication factor] calculations, and incorporate documentation expectations for the use of other codes that may be used to perform independent supporting calculations not impacting the validated result.
- Provide a clear distinction between Nuclear Criticality Safety Reports and NCSEs based on DOE-STD-3007.
- Require Criticality Safety Program Manager (CSPM) or Nuclear Safety Manager sign-off of all completed NCSEs.

6. **Criteria:** Benchmark the NCSE development procedure of other organizations (i.e., Lawrence Livermore National Laboratory) to document best management practices and incorporate into the NCSE Writer’s Guide or OP-NOPS.013 as appropriate.

- Is there documented evidence of benchmark activity from other sites?
- Were any best management practices incorporated into the NCSE writer’s guide?

7. **Criteria:** Develop a procedure for Independent Peer Review of criticality safety related documents.

- Was a procedure developed for Independent Peer Review?
- Does the procedure cover all aspects germane to criticality safety?

8. **Criteria:** Review and revise the qualification program as needed for Senior Nuclear Criticality Safety (NCS) Engineer and NCS Engineers based on revised approaches for the completion of NCSEs (i.e., NCSE Writer's Guide and/or OP-NOPS.013 revision).
- Were any changes required to the qualification program based upon the Writer's Guide revision?
 - Does the training cover the new aspects of the Writer's Guide?
9. **Criteria:** Develop qualification card for NSTec CSPM that includes as appropriate relevant portions of the U.S. DOE NCSP training program for Criticality Safety Engineers.
- Was an NSTec CSPM qualification card developed?
 - Does the CSPM qualification include relevant portions of the CSE qualification?
10. **Criteria:** Gain concurrence from the Criticality Safety Review Committee (CSRC) on the following deliverables: NCSE Writer's Guide and/or OP-NOPS.013 revision, Adequacy of Senior NCS Engineer and NCS Engineer qualification programs, Adequacy of the CSPM qualification card, and Adequacy of the Independent Peer Review procedure.
- Was CSRC concurrence documented for each of the deliverables?
11. **Criteria:** Complete Senior NCS Engineer & NCS Engineer requalification as needed based on updated qualification cards.
- Was qualification completed for NCS Engineer and Senior NCS Engineer?
 - Was qualification based upon updated qualification cards?
12. **Criteria:** Qualify CSPM to established qualification card.
- Did CSPM complete the updated qualification card requirements?
13. **Criteria:** Issue the Criticality Control Review (CCR) document for the Device Assembly Facility (DAF), including the Nuclear Criticality Experiments Research Center (NCERC), and Radioactive Waste Management Complex (RWMC) based on a review of current NCSEs needed for current or future fissionable material operations.
- Were CCR documents for DAF/NCERC and RWMC issued?
 - Are the CCR documents based upon current NCSEs or future operations?
14. **Criteria:** Complete corrective action verification of integrated CAP and individual finding action plans.
- Was the action verification performed per procedure?
15. **Criteria:** Complete scheduled Independent Assessment of compliance to DOE-STD-1158.
- Was the assessment completed?
 - Was the assessment per the DOE-STD-1158 Criteria?
 - What level of independence did the assessment exhibit?
16. **Criteria:** Complete CSRC committee external assessment to demonstrate compliance to DOE-STD-3007 and applicable ANSI/ANS-8 series standards. (Note: This review is taking place concurrent to this assessment. The contractor's final report is required before this assessment can be finalized.)
- Does the assessment scope allow for the demonstration of compliance with DOE-STD-3007 and applicable ANSI/ANS-8 series standards?
 - Did the assessment evaluate the effectiveness of the corrective actions?
 - Was the performance of the assessment per applicable procedure?
 - Were assessment team members experienced in Criticality Safety?

17. **Criteria:** Submit letter to NNSA/NFO Manager documenting the satisfactory compliance to DOE-STD-3007 and applicable ANSI/ANS-8 series standards. (Note: Pending assessment results from 16 above.)

- Was the letter developed and submitted?
- Are the conclusions of the letter supported by the assessment report?

Record Review:

- NCS Engineer, Senior Engineer and Manager Qualification Cards
- CCR Documents for DAF/NCERC and RWMC
- NCSE Writer's Guide (OP-NOPS.013)
- Root Cause Analysis
- Independent Peer Review Document
- Memorandum discontinuing use of select NCSEs
- Corrective Action Plan
- DOE-STD-1158 Assessment Report
- Documents showing benchmark activities against other NSCE programs.
- CaWeb issue tracking documents (verification and correspondence).

Interviews: Interviews of NSTec Nuclear Criticality Safety and training personnel may take place. Additionally, interviews of the contractor's assessment team may be interviewed as part of Criteria 16.

REFERENCES:

- ANSI/ANS-8.1-1998, *Nuclear Criticality Safety in Operations with Fissionable Material Outside Reactors*
- ANSI/ANS-8.19-2005, *Administrative Practices for Nuclear Criticality Safety*
- DOE O 420.1B, *Facility Safety*
- DOE-STD-1158-2010, *Self-Assessment Standard for DOE Contractor Criticality Safety Programs*
- NFO O 226.XD, *Assessment and Oversight*

Appendix D
NSTec Performance Objectives and Criteria Table
Management Assessment Plan
February 2013

Performance Objectives and Criteria Table		
#	Criterion (Performance Criterion, Performance Objective, Line of Inquiry, Question, and/or Expectation)	Source of Criterion (e.g., CD-4000.001, 4.2.1.a)
1	Has NSTec issued a root cause analysis (RCA) for Contractor Oversight Assessment Report ASM-AMSS-3.28.2011-334811, National Security Technologies, LLC Implementation of DOE-STD-3007 dated June 2011?	CAP #1, E000-SY-11-0163, 9/30/11.
2	Has NSTec issued a memorandum documenting results of prior meeting with Facility Management not to use the present versions of NCSEKNS- 2010-01 and NCSE-RNCTEC-2010-01 for operations and formally designate these Nuclear Criticality Safety Evaluations (NCSEs) as well as NCSE-LIS-2009-001 as being inactive?	CAP #2, E000-SY-11-0163, 9/30/11.
3	Has NSTec updated and issued a CAP as necessary based on RCA and submitted finding-specific action plans to the NNSA/NFO Deputy Assistant manager for Safety?	CAP #3, E000-SY-11-0163, 9/30/11.
4	Has NSTec developed a NCSE Writer's Guide based on the U.S. Department of Energy Nuclear Criticality Safety Program (NCSP) training module 12, " <i>Preparation of Nuclear Criticality Safety Evaluations?</i> "	CAP #4, E000-SY-11-0163, 9/30/11.
5	Has NSTec incorporated the following expectations into the NCSE Writer's Guide and/or OP-NOPS.013, " <i>Nuclear Criticality Safety Evaluation?</i> " a) Require the incorporation of a "What-If Table" in NCSEs (use NCSP training module 12 Appendix A as an example). b) Require the documented identification of credible contingencies using a systematic approach (e.g., What-If Table) and a documented justification for explaining why a contingency is not credible. c) Incorporate guidance for performing NCSEs based on the amount of fissionable material needed to support programmatic activities vice excessively bounded or unrealistic quantities of fissionable material. d) Include an explicit expectation for Operations staff to document the proposed activity or scope of work on a new form that requires a NCSE. e) Include an explicit expectation to interview Operations staff and conduct walk-downs as part of NCSE development to ensure a full understanding of the inventory of fissionable material and the scope of work associated with this material. f) Clarify who in Operations management will review and sign-off	CAP #5, E000-SY-11-0163, 9/30/11.

Performance Objectives and Criteria Table		
#	Criterion (Performance Criterion, Performance Objective, Line of Inquiry, Question, and/or Expectation)	Source of Criterion (e.g., CD-4000.001, 4.2.1.a)
	<p>of all process related NCSEs to ensure appropriate activity and management level review.</p> <p>g) Reemphasize the use of documented benchmarks where available, and establish and use exempt quantity limits for radionuclides when benchmarks are not available until a methodology for this situation is incorporated into the NNSA/NFO approved Nuclear Criticality Safety Program (NCSP).</p> <p>h) Reemphasize the use of only validated codes to determine the reactivity of the system or perform k_{eff} calculations, and incorporate documentation expectations for the use of other codes that may be used to perform independent supporting calculations not impacting the validated result.</p> <p>i) Provide a clear distinction between Nuclear Criticality Safety Reports and NCSEs based on DOE-STD-3007.</p> <p>j) Require Criticality Safety Program Manager (CSPM) or Nuclear Safety Manager sign-off of all completed NCSEs.</p>	
6	Has NSTec benchmarked the NCSE development procedure of other organizations (i.e., Lawrence Livermore National Laboratory) to document best management practices and incorporate into the NCSE Writer's Guide or OP-NOPS.013 as appropriate?	CAP #6, E000-SY-11-0163, 9/30/11.
7	Has NSTec developed a procedure for Independent Peer Review of criticality safety related documents?	CAP #7, E000-SY-11-0163, 9/30/11.
8	Has NSTec reviewed and revised the qualification program as needed for Senior Nuclear Criticality Safety (NCS) Engineer and NCS Engineers based on revised approaches for the completion of NCSEs (i.e., NCSE Writer's Guide and/or OP-NOPS.013 revision)?	CAP #8, E000-SY-11-0163, 9/30/11.
9	Has NSTec developed a qualification card for NSTec CSPM that includes as appropriate relevant portions of the U.S. DOE NCSP training program for Criticality Safety Engineers?	CAP #9, E000-SY-11-0163, 9/30/11.
10	<p>Has NSTec gained concurrence from the Criticality Safety Review Committee (CSRC) on the following deliverables?</p> <p>a) NCSE Writer's Guide and/or OP-NOPS.013 revision</p> <p>b) Adequacy of Senior NCS Engineer and NCS Engineer qualification programs.</p> <p>c) Adequacy of the CSPM qualification card.</p> <p>d) Adequacy of the Independent Peer Review procedure.</p>	CAP #10, E000-SY-11-0163, 9/30/11.
11	Has NSTec completed Senior NCS Engineer & NCS Engineer requalification as needed based on updated qualification cards?	CAP #11, E000-SY-11-0163, 9/30/11.

Performance Objectives and Criteria Table		
#	Criterion (Performance Criterion, Performance Objective, Line of Inquiry, Question, and/or Expectation)	Source of Criterion (e.g., CD-4000.001, 4.2.1.a)
12	Has NSTec qualified a CSPM to an established qualification card?	CAP #12, E000-SY-11-0163, 9/30/11.
13	Has NSTec issued CCR document for the Device Assembly Facility (including Nuclear Criticality Experiments Research Center) and Radioactive Waste Management Complex based on a review of current NCSEs needed for current or future fissionable material operations?	CAP #13, E000-SY-11-0163, 9/30/11.
14	Has NSTec completed corrective action verification of integrated CAP and individual finding action plans?	CAP #14, E000-SY-11-0163, 9/30/11.
15	Has NSTec completed scheduled Independent Assessment (IA) of compliance to DOD-STD-1158?	CAP #15, E000-SY-11-0163, 9/30/11.
16	Has NSTec completed a CSRC committee external assessment to demonstrate compliance to DOE-STD-3007 and applicable ANSI/ANS-8 series standards?	CAP #16, E000-SY-11-0163, 9/30/11.
17	Has NSTec submitted a letter to NNSA/NFO Manager documenting the satisfactory compliance to DOE-STD-3007 and applicable ANSI/ANS-8 series standards?	CAP #17, E000-SY-11-0163, 9/30/11.
18	In light of infrequent preparation of end-to-end NCS Evaluations, does the NCSP management have in place a program to maintain proficiency of NCS Engineers in Evaluations?	OFI#1 of Report NSEP-2013-001, FY13 DOE-STD-1158 Assessment, January 31, 2013
19 CS	Has the NCSP management developed a plan to increase the professional involvement of NCSEs to insure they are cognizant of activities ongoing in the NNSA NCS Program and in the broader criticality safety community and that they support the continued development of NCS technology and practices?	OFI#3 of Report NSEP-2013-001, FY13 DOE-STD-1158 Assessment, January 31, 2013
20	Is there adequate documentation of NCS staff periodic oversight of fissile material operation at least annually?	IA-10-AD40-001 Concern #1
21	Are there sufficient and effective classified resources (computing/storage) to support review and analysis of classified operations/projects?	IA-10-AD40-001 Concern #2
22	Is there documentation that all fissile material procedures that have criticality safety significance are being reviewed by NCS prior to approval?	IA-10-AD40-001 Concern #3
23	Is there clear understanding and implementation of the joint criticality safety program between NSTec, LANL and LLNL in	IA-10-AD40-001 Concern #4

Performance Objectives and Criteria Table		
#	Criterion (Performance Criterion, Performance Objective, Line of Inquiry, Question, and/or Expectation)	Source of Criterion (e.g., CD-4000.001, 4.2.1.a)
	CD-NOPS.001 and OP-NOPS.013.?	
24	Is there a clear understanding and documentation of event response (accident or suspected infraction) for secondary REOP holder activities at NNSS?	IA-10-AD40-001 observation #2
25	Are metrics being developed, maintained and populated to identify trends in the performance of work?	CD-NOPS.001, 4.1
26	Has the NCSP management established and committed resources to an independent CSRC to review NCSEs and to provide guidance to NSTec?	IA-11-W200-012 Finding 20319 & CD-NOPS.001
27	Does the NCSP management have a plan to insure that the CSRC remains constituted and active throughout the year?	OFI#2 of Report NSEP-2013-001, FY13 DOE-STD-1158 Assessment, 1/31/13
28	Do Criticality Safety Assessments meet the requirements for Independent Assessments; do the IA Plan and the IA Report conform to documentation requirements?	IA-11-W200-012 Finding 20320 & CCD-QA10.001
29	Are the NCS performance metrics identified, placed on the NSTec Dashboard, populated, and maintained?	IA-11-W200-012 Finding 20321 & CCD-QA03.001
30	Is the records management system for NCSEs effective in assuring availability, applicability and current state (approved, draft, superseded, and retired)?	IA-11-W200-012 Finding 20322 & CCD-QA04.003