2010 Annual Report on Nuclear Criticality Safety Programs
Office of Environmental Management

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

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

Measure of Nuclear Criticality Safety Performance

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

Contractor Criticality Safety Staffing

The EM contractor criticality safety staff level varies widely from 1 to 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 support from subcontractors. Several of the contractors are now recruiting staff as a contingent action. With the exception of the Portsmouth office, the Federal oversight groups have assessed and affirmed that the current level of staffing is adequate for the current workload. The gaps in staffing at Portsmouth are being addressed via overtime and the contractor is actively recruiting additional resources.

Federal Criticality Safety Staffing

The Federal staffing levels are generally judged to be adequate. The Savannah River Operations Office, however, has two solely assigned to criticality safety rather than the four in their staffing plan, although they get occasional assistance from two qualified staffers currently in other positions. RL has a Memorandum of Understanding with ORP for NCS support until they have a staff that is qualified. Additionally, ORP is increasing their staffing through having two individuals currently in training, achieving qualification.

Federal Assessments of Sites' NCS Programs

EM Headquarters (HQ) assessments of the NCS programs have been conducted for EM sites. The Findings, Recommendations and most of the Opportunities for Improvements resulted in Corrective Action Plans. In addition, site led assessments of NCS programs are performed and these result in corrective actions. The results and common elements of these assessments are shared at meetings of the Federal Criticality Safety Coordinating Team and at the EM-sponsored NCS Workshops. The contractors' self-assessments evaluated were considered adequate with some caveats. The criticality safety evaluations assessed in these activities are generally adequate although some HQ assessments recommended that the hazard assessment part of the evaluations should be strengthened at some sites and at others, the NCS safety basis needed updating. All the site programs evaluated were consistent with Federal and industry requirements.

New Facility Design

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

Trending and Analysis of NCS Occurrences

Each of the sites has a process to identify, record, track, and trend NCS occurrences. The results of the information and analysis are used to focus management attention and resources on solving the identified issues. The issues are usually related to Conduct of Operations.

Follow-Up to Assessments

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

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

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

Contractor	CH2M-Hill Plateau Remediation Company	Washington Closure Hanford	Bechtel National Inc. Waste Treatment Plant	Washington River Protection Solutions Tank Farms	LATAKY Paducah	LATA/Parallax Portsmouth
Field Office	**Richland**	**Richland**	**River Protection**	**River Protection**	**PPPO**	**PPPO**
1. Measure of Contractor NCS Performance						
a. Have metrics been established to monitor contractor performance?	Yes	Yes	No, facility far from operational	Yes	Yes	Yes
b. If so, what are the metrics?	Nonconformances and closure of corrective action	Nonconformances and closure of corrective action	N/A	Nonconformances and closure of corrective action	See Att. 5	See Att. 6
c. If so, what is the contractor's record?	Acceptable, see Att. 1	Acceptable,	N/A	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 Oversight	Acceptable Oversight	N/A	Acceptable Oversight	Acceptable Oversight	Acceptable Oversight
f. What actions have been taken to improve contractor performance?	Surveillances and corrective actions	Surveillances and corrective actions	N/A	Surveillances and corrective actions	Meetings	Meetings and NCS document reviews
2. Contractor Criticality Safety Engineer Program						
a. How many NCS staff needed?	16	1	2	4	1.25	6
b. How many are there?	16	1	2	4	1.25	4
c. Actions to address shortfall, if any?	N/A	N/A	N/A	N/A	N/A	Overtime and recruiting
d. Has DOE Field Management affirmed adequacy?	Yes	Yes	Yes	yes	Yes	See Att. 6
3. Status of Federal Criticality Safety Oversight Program						
a. How many NCS staff are needed?	1		3		0.5	2.5
b. How many are there?	One in training		1 fully qualified, 2 in training		0.5	2.5 with subcontractor
c. Actions to address shortfall, if any?	Support from ORP		N/A		N/A	N/A

d. Has DOE Field Management affirmed adequacy?	Yes		Yes		Yes	Yes
4. Federal Assessments of Site NCS Programs						
a. What NCS assessments have been performed?	See Att. 1	See Att. 2	ORP and CSSG assessments	See Att. 4	See att. 5	See Att. 6
b. What corrective actions were taken as a result of these assessments?	See Att. 1	See Att. 2	See Att. 3	See Att. 4	N/A	See Att. 6
c. What lessons learned were developed?	QA of CSERs	N/A	None	None	N/A	None
d. Were the contractor's self-assessments evaluated for adequacy? What was the conclusion?	Yes/adequate	Yes/adequate	N/A	Yes/adequate	Yes/adequate	Yes/adequate
e. Are criticality safety evaluations deemed adequate?	Yes	Yes	Yes	See Att. 4	Yes	Yes
f. Is the NCS program consistent with requirements?	Yes	Yes	Yes	Yes	Yes	Yes
5. New Facility Design						
a. Are any facilities being designated that will need a criticality safety program?	No; new operations however	No	Yes	yes	No	No
b. Have these received a criticality safety design review by anyone?	N/A	N/A	Yes	yes	N/A	N/A
c. If so, what are the lessons learned? How were these lessons communicated?	N/A	N/A	N/A	none	N/A	N/A
6. Trending and Analysis of Reportable and Non-reportable Nuclear Criticality Occurrences						
a. How are NCS occurrences tracked and trended?	See Att. 1	See Att. 2	N/A	See Att. 4	See Att. 5	See Att. 6
b. Are leading and lagging indicators used to access the program?	No	No	No	No	No	No
c. What were the results?	See Att. 1	See Att. 2	N/A	See Att. 4	See Att. 5	See Att. 6
d. How were the results used to improve performance?	See Att. 1	N/A	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	See Att. 3	N/A	See Att. 5	See Att. 6
b. Were the corrective actions effective?	See Att. 1	See Att. 2	N/A	N/A	Yes	See Att. 6
c. Status of design projects					N/A	N/A
8. Open issues from past reports						
	None	none	See Att. 3	none	none	none

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

Contractor	Idaho Cleanup Project (CWI)	BBWI AMWTP	WAI	BJC	ISOTEK
Field Office	**Idaho**	**Idaho**	**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
b. If so, what are the metrics?	Severity and Adversity Indexes	A nuclear safety index number which includes criticality and nuclear safety violations	Anomalous condition Reports (ACR), number of days to close	New ACRs, 12-month rolling average to close	Condition Reports (CR), timely closure of CRs, completion of NCS annual assessments
c. If so, what is the contractor's record?	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
e. What is the conclusion on contractor performance and what is the basis?	Acceptable Oversight	Acceptable Oversight	Acceptable Oversight	Acceptable Oversight	Acceptable Oversight

f. What actions have been taken to improve contractor performance?	Self-Assessments develop contractor identification of path for improvement	Self-Assessments develop contractor identification of path for improvement	N/A	N/A	N/A
2. Status of Contractor Criticality Safety Engineer Program					
a. How many NCS staff are needed?	4	5	2	9	7
b. How many are there?	4	5	2 PTEs	9 FTEs	6 FTEs, 1 PTE
c. Actions to address shortfall, if any?	N/A	N/A	N/A	N/A	N/A
d. Has DOE Field Management affirmed adequacy?	Yes	Yes	Yes	Yes	Yes
3. Status of Federal Criticality Safety Oversight Program					
a. How many NCS staff are needed?	EM (1) QSD (2)		2		
b. How many are there?	3		1 FTE, 1 PTE		
c. Actions to address shortfall, if any?	N/A		N/A		
d. Has DOE affirmed adequacy?	Yes		Yes		
4. Federal Assessment of Site NCS Programs					
a. What NCS assessments have been performed?	Quarterly surveillances	Quarterly surveillances	NCS program assessment in 08 and ISMS assessment in 10	Segmentation Shop Operations; Work control Corrective actions	NCS Program assessment
b. What corrective actions were taken as a result of these assessments?	N/A	N/A	none	NCSE and work package revisions	none
c. What lessons learned were developed?	None	none	None	None	None
d. Were the contractor's self-assessments evaluated for adequacy? What was the conclusion?	Yes/adequate	Yes/adequate	Yes/adequate	Yes/adequate	Yes/adequate
e. Are criticality safety evaluations deemed adequate?	Yes	Yes	Yes	Yes	Yes
f. Is the NCS program compliant?	Yes	Yes	Yes	Yes	Yes

5. New facility Design					
a. Are any facilities being designated that will need a criticality safety program?	No, SBWF will not need NCS program	No	No	No	Yes
b. Have these received a criticality safety design review by anyone?	yes	N/A	N/A	N/A	Yes
c. If so, what are the lessons learned? How were these communicated?	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?	NCS program tracks and trends non eportables	ORP system used	NCS Program (ACR) and ORPS system	NCS Program (ACR) and ORPS system	None to date
b. Are leading and lagging indicators used to assess the program? If so, what are they?	Yes, see App. 7	Yes/Nuclear safety Index	No data to trend	Yes/ New ACRs trended as leading indicators, time to close ACRs as lagging indicator.	No data to trend
c. What were the results?	The trends affirm current program	No trends identified	N/A	Trending revealed common issues related to NCS control implementation process	N/A
d. How were the results used to improve performance?	N/A	none	N/A	See Att. 10	N/A
7. Follow-up to Assessments					
a. What prior assessments received a follow up review?	No issues to track	No issues to track	none	none	none
b. Were the corrective actions effective?	N/A	N/A	N/A	N/A	N/A
c. Status of design projects.	N/A	N/A			Final completion scheduled for FY 11
8. Status of Open Items					
	none	none	none	none	Staffing issue resolved

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

Contractor	Savannah River Nuclear Solutions	Savannah River Remediation	Parsons
Field Office	**Savannah River**	**Savannah River**	**Savannah River**
1. Measure of contractor NCS Performance			
a. Have metrics been established to monitor contractor performance?	Yes	Yes	No, facility far from operational
b. If so, what are the metrics?	See Att. 12	See Att. 13	N/A
c. If so, what is the contractor's record?	See Att. 12	See Att. 13	N/A
d. If no metrics have been established, what is the method of monitoring performance?	N/A	N/A	Design Reviews
e. What is the conclusion on contractor performance and what is the basis?	Adequate based on metrics and assessments	Adequate based on metrics and assessments	Adequate
f. What actions have been taken to improve contractor performance?	Corrective Action Program from assessments	See Att. 13	N/A
2. Status of Contractor Criticality Safety Engineer Program			
a. How many NCS staff are needed?	Current complement	4	2
b. How many are there?	11 senior CSEs, 7 CSEs, 8 in training	4	2
c. Actions to address shortfall, if any?	Recruitment and subcontractors as contingent staff	N/A	N/A
d. Has DOE Field Management affirmed adequacy?	Yes	Yes	Yes
3. Status of Federal Criticality Safety Oversight Program			
a. How many NCS staff are needed?	4		
b. How many are there?	2		
c. Actions to address shortfall, if any?	Acquire authorization for more staff		
d. Has DOE affirmed adequacy?	No		
4. Federal Assessment of Site NCS Programs			
a. What NCS assessments have been performed?	50 NCS assessment by SRO	50 NCS assessment by SRO	Review of NCS Program Descriptive document
b. What corrective actions were taken as a result of these assessments?	See Att. 12	See Att. 13	None
c. What lessons learned were developed?	Publish lessons learned newsletter	See Att. 13	None
d. Were the contractor's self-assessments evaluated for adequacy? What was the conclusion?	Yes. See Att. 12	Yes	N/A
e. Are criticality safety evaluations deemed adequate?	Yes	Yes	Yes

f. Is the NCS program consistent with requirements?	Yes	Yes	Yes
5. New facility Design			
a. Are any facilities being designated that will need a criticality safety program?	Yes	Yes	Yes
b. Have these received a criticality safety design review by anyone?	Yes	Yes	Yes
c. If so, what are the lessons learned? How were these communicated?	See Att. 12	See Att. 13	See Att. 14
6. Trending and Analysis of Reportable and Non-reportable Nuclear Criticality Occurrences			
a. How are NCS occurrences tracked and trended?	See Att. 12	See Att. 13	N/A
b. Are leading and lagging indicators used to assess the program? If so, what are they?	See Att. 12	See Att. 13	N/A
c. What were the results?	See Att. 12	See Att. 13	N/A
d. How were the results used to improve performance?	See Att. 12	See Att. 13	N/A
7. Follow-up to Assessments			
a. What prior assessments received a follow up review?	See Att. 12	See Att. 13	None
b. Were the corrective actions effective?	Yes	Yes	N/A
c. Status of design projects.	Adequate	Adequate	Adequate
8. Status of Open Items			
	N/A	N/A	N/A

Attachment 1

***CHPRC* Criticality Safety Program Annual Report**

Field/Site Manager: Matt McCormick NCS POC: Tom Nirider

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

The metrics utilized to monitor the CH2MHill Plateau Remediation Company (CHPRC) NCS performance include:

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

Effect on performance

Due largely to the continually evolving status of the site D&D process, particularly at the Plutonium Finishing Plant; the CHPRC has experienced 20 total nonconformance events in the past year. Four nonconformance events were reported at the Waste and Fuels Project involving the labeling, handling, and spacing of waste drums containing fissile material. Additionally, at the Spent Nuclear Fuels Project, problems were discovered in criticality safety evaluation reports (CSERs) supporting operations at the K-Basins Facilities. Three PISAs and two associated nonconformances were declared relating to deficiencies discovered in the CSERs. The impact on operations was significant as several processes were stopped pending closure of these safety issues.

Field Office assessment of NCS program performance

The operational record has been good from the perspective of reportable nonconformance events in criticality safety but as reported last fiscal year, this is mostly a function of the reduction in work scope involving significant quantities of fissile materials. Some decentralization of the safety functions including criticality safety has been noted and this has the potential to adversely affect safety performance. Over the past decade, efforts have been focused upon organizing and managing a central safety organization in criticality safety. This has been diluted. Operational performance in criticality safety is measured against the record of actual hours worked in handling fissile materials. Recent funding increases due to ARRA work have resulted in a significant ramp-up in D&D activities in high-risk facilities - particularly at the Plutonium Finishing Plant. The work however, involves removal of equipment and gloveboxes that have been largely de-inventoried. As a result, the criticality safety controls are less restrictive and operations enjoy significantly more flexibility than they have in the past. However, this flexibility has not resulted in a reduction in the number of operational nonconformances reported site-wide. CHPRC continues to self-identify, report, and correct criticality safety issues at a relatively low level. This is an excellent practice as it tends to intercept the safety issues early and implement changes before they become larger problems.

It should be noted that the last work scope that potentially involves more significant quantities of fissile material holdup at the PFP (in the Plutonium Reclamation Facility) is planned but has not yet begun. RL expects a corresponding increase in nonconformance

events once that work begins due to the nature of the work and the complexity of the safety controls.

One Significant issue requiring direct action from the Field Office was observed during the Fiscal Year; numerous issues affecting the quality of Criticality Safety Evaluation Reports were identified. These problems were apparent not only at K-Basins as described above, but also in CSERs supporting Waste Operations and the Plutonium Finishing Plant. Corrective actions identified by the contractor have been closed and several programmatic changes completed. Additionally, several oversight activities were conducted and recorded in the Operational Oversight Database system.

2. Status of Contractor Criticality Safety Engineer Staffing

The CHPRC criticality safety staff includes one Manager, nine qualified CSEs and one CSE undergoing qualification. Six qualified CSRs (two are also qualified CSEs) and two CSRs undergoing qualification. This is considered adequate but minimum staffing.

3. Status of Federal Criticality Safety Oversight Program

The Richland Operations Office presently does not retain a qualified Federal Criticality Safety Engineer. However, through an MOA with the Office of River Protection, a qualified senior Federal CSE is available to support RL on an as-requested basis. A single qualified Federal CSE at RL has been the norm for approximately the past decade. RL presently plans to qualify a member of the nuclear safety staff as a CSE. It does not appear that additional support beyond that is necessary in the near future.

4. Federal Assessments of Site NCS Programs

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

Four Management Assessments were conducted by the CHPRC Criticality Safety Organization following lines of inquiry from DOE-STD-1158 and ANSIANS-8.19. This year the focus was on personnel responsibilities and criticality accident alarm systems (PFP only). A Work Site Assessment was conducted to look at criticality safety related issues identified through the Safety Analysis Center (SAC) reports. Six opportunities for improvement and two findings resulted from the four management assessments. The two findings were related to the formal implementation of ANSI/ANS-8.23 requirements into the CHPRC Emergency Management Program. These are currently being addressed.

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

5. New Facility Design

There are no new facilities being designed within the CHPRC that will require a criticality safety program. There are however, new projects that fall under the established criticality safety program that will require criticality safety support for design. The Sludge Treatment Project will require modification of T-Plant to support planned sludge processing. This effort is still in the conceptual design phase. Retrieval of waste from the Alpha Caissons also includes criticality safety support to process and equipment design. This activity is also in the conceptual design phase. Both projects have been assigned contractor CSE support. Additionally, ongoing D&D efforts particularly at the PFP and at 209E have criticality safety concern and involvement.

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

NCS occurrences are tracked and trended within the CHPRC issues management process (Condition Reporting and Resolution System [CRRS]). Non-reportable nonconformances are tracked by the Criticality Safety Program and shared with RL. With the implementation of Revision 19 of HNF-7098, Criticality Safety Manual, all potential nonconformances will be entered into CRRS (beginning FY2011). Additionally, the CHPRC Criticality Safety Organization (central organization) will be responsible for trending the nonconformances on a quarterly basis beginning in FY2011. No trends were noted in the nonconformances across the CHPRC Projects. The PFP project independently examined trends in nonconformances and issued a lessons learned document. However, it is too soon to assess the impact of the corrective actions that were put into place by PFP as a result of this study.

As reported above, due largely to the continually evolving status of the site D&D process, the CHPRC has experienced 20 total nonconformance events in the past year. Four nonconformance issues were reported at the Waste and Fuels Project involving the labeling, handling, and spacing of waste drums containing fissile material. Additionally, at the Spent Nuclear Fuels Project, problems were discovered in criticality safety evaluation reports (CSERs) supporting operations at the K-Basins Facilities. These problems and the associated PISAs resulted in declaration of two nonconformances in criticality safety. The impact of these deficiencies on operations was significant. Several processing operations in the K-Basins were stopped pending closure of these safety issues. The attached Excel Spreadsheet summarizes the nature and extent of CHPRC criticality safety nonconformances recorded this fiscal year. (Attachment 1)

7. Follow-Up to Assessments

At CHPRC, all actions arising from the previous year's management assessment are reviewed during the current year's management assessment. As there were no open action items for the Projects in FY2009, no review was necessary during FY2010.

Attachment 2

Washington Closure Hanford (WCH) Criticality Safety Program Annual Report

Field/Site Manager: Matt McCormick NCS POC: Tom Nirider

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

The metrics utilized to monitor WCH NCS performance include:

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

Effect on performance

No nonconformance events have been reported at WCH, largely due to the nature of the work (burial grounds remediation and building demolition). WCH operates under an incredibility analysis in criticality safety, thus there are no limits or controls. Minor discrepancies have been identified in the past with regard to programmatic aspects. None, however, was reported this fiscal year.

Field Office assessment of NCS program performance

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

2. Status of Contractor Criticality Safety Engineer Staffing

WCH retains a single dual-qualified CSR/CSE who provides support on a part-time basis. An additional criticality engineer is employed by WCH in the engineering department although he has responsibilities outside of the criticality safety discipline. During the summer, WCH retained a third criticality safety engineer as an independent individual to conduct a management assessment.

3. Status of Federal Criticality Safety Oversight Program

The Richland Operations Office presently does not retain a qualified Federal Criticality Safety Engineer. However, through an MOA with the Office of River Protection, a qualified senior Federal CSE is available to support RL on an as-requested basis. A single qualified Federal CSE at RL has been the norm for approximately the past decade. RL presently plans to qualify a member of the nuclear safety staff as a CSE. It does not appear that additional support beyond that is necessary in the near future.

4. Federal Assessments of Site NCS Programs

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

WCH conducted a programmatic management assessment covering their present and planned waste retrieval work in and near the 300 and 400 areas. No significant findings resulted. The DOE-RL criticality safety engineer participated in this management assessment as an oversight activity. Additionally, the RL criticality safety engineer receives copies of completed WCH management assessments and reviews them for completeness and adequacy of corrective actions.

5. New Facility Design

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

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

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

7. Follow-Up to Assessments

There were no follow-up assessment activities at WCH.

Attachment 3

Waste Treatment Plant Criticality Safety Program Annual Report

Field Office Manager: Dave Brockman NSC POC: Tom Nirider

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

As reported for FY 2009, the Waste Treatment Plant project has not advanced to the point where performance metrics specific to operations have been implemented. 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 Office of River Protection, Nuclear Safety Division, is presently developing a criticality safety program and is actively training nuclear safety staff as Federal Criticality Safety Engineers. The program is in its infancy, and as the program develops it will incorporate the programmatic features necessary to conduct oversight of the WTP project. Among those features are; development of appropriate performance metrics applicable to safety documentation, training, assessments, and problem resolution, as well as a Field Office Oversight and Assessment Plan addressing criticality safety.

ORP and CSSG assessments of the WTP criticality safety program have been conducted in 2008 and 2009 (refer to section 4, below). The contractor has prepared and revised several times the, “Preliminary Criticality Safety Evaluation Report” (CSER). DOE-ORP approval of this CSER has been documented in a Safety Evaluation Report (SER) written in 2009. This SER, however, contains nine conditions of acceptance (COAs). These COAs are currently being tracked to completion. Six of the COAs pertain to the PDSA, while the remaining three will require resolution by the time the DSA is finalized.

2. Status of Contractor Criticality Safety Engineer Program

Bechtel National, Inc. retains two criticality safety engineers and a manager who have been with the WTP project for several years. One Bechtel criticality engineer is full-time; a second provides support part-time. In addition, two additional staff members are progressing through the criticality safety engineer qualification process.

A criticality safety assessment of WTP was completed by WTP ORP staff in January 2008. A final assessment report was issued to Bechtel National, Inc. in April 2008. Three findings were issued: (1) lack of evidence of NCS staff involvement in design reviews with process engineering; (2) lack of a criticality safety training program and lack of criticality safety training for technical staff; (3) lack of documented evidence of management assessment of the NCS program.

ORP has closed the first two of these findings. The finding regarding management self-assessments of the WTP Criticality Safety Program (CSP) is still open. ORP determined that the contractor did not meet the intent of ANSI/ANS 8.19 requirements for management participation in criticality safety program self-assessments.

Contractor staffing is presently adequate to support design and construction of the WTP. Addition of one additional staff member (presently in training) is a positive attribute of the Bechtel program.

3. Status of Federal Criticality Safety Oversight Program

The field office retains one senior qualified Federal Criticality Safety Engineer (CSE) to oversee the WTP Criticality Safety Program. In addition to the one qualified Federal CSE, two nuclear safety specialists are in the process of qualification as Federal CSEs. These two staff members will have responsibility for oversight of the Tank Farms nuclear criticality

safety program, but are available to assist with WTP criticality safety issues as needed. Additionally, the Nuclear Safety Division Director is a qualified CSE.

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

4. Federal Assessments of Site NCS Programs

There were no formal assessments of the contractor criticality safety programs conducted during FY2010. ORP conducts assessments of the criticality safety programs on an as-needed basis because WTP is not an operating facility. The previous assessment conducted by ORP staff was completed April 2008. The report contained three findings summarized in section 2 above. Corrective actions have subsequently been implemented for two of the findings; one finding involving Bechtel failure to meet ANSI/ANS 8.19 requirements for conducting management self-assessment remains open. However, the Contractor has committed to management involvement in its criticality safety assessment program in the recent ORP approval of the WTP criticality safety program description document discussed in the next paragraph.

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

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

In 2009, the ORP federal CSE conducted a review of the WTP CSER and issued a Safety Evaluation Report (SER) conditionally approving the document with nine (9) conditions of acceptance (COA). The WTP contractor is currently in the process of resolving the COAs. The ORP criticality safety engineer is working closely with the contractor and is tracking the closure of these issues. Notably, the DOE CSSG assessment recommendations and areas for improvement were incorporated into the COAs written for the ORP SER.

5. New Facility Design

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

A significant lesson learned from ORP oversight to date is that federal nuclear safety specialist staff, criticality safety engineers, and WTP federal engineering division staff personnel must be actively involved with the contractor design changes and how they affect the CSER. Also, closer coordination between ORP and WTP contractor NCS staff is necessary in order properly review and assess design changes that potentially affect criticality safety. Staff training plans at ORP are addressing these issues directly. ORP has recently added a qualified Federal criticality safety engineer, and two ORP nuclear safety specialists are in the process of qualifying as CSEs.

Technical issues and questions involving the mixing of the WTP Pretreatment Facility waste feed receipt process vessels using pulse jet mixers are ongoing. These technical issues

involve questions associated with; sample non-representativeness, effect of co-precipitated plutonium and metal absorber agglomerations, the effects of gravity segregation and preferential settling of heavy particles such as PuO_2, solids accumulation in process vessels, and particle size distribution. These are being tracked to closure through a formal process (Comment Resolution Process and Conditions of Approval) and continuous involvement of the ORP Nuclear Safety Division staff.

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

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

7. Follow-Up to Assessments

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

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

There are no specific open issues from previous reports.

Attachment 4

Tank Farms Operations Criticality Safety Program Annual Report

Field Office Manager: Dave Brockman NSC POC: John Harris/Kevin Sandgren

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

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

- Nuclear Criticality Safety Staff participates in professional development activities such as ANSI/ANS-8 standards working groups, nuclear criticality safety workshops (or similar) on an annual basis.
- Perform regular management self-assessment of nuclear criticality safety program implementation. WRPS conducted a Management Assessment of the Criticality Safety Program in May 2009.
- 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 May 2009.
- 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, and interactions with operations.
- Perform quarterly criticality safety inspections of fissionable material storage areas/arrays and laboratory areas.
- Problem Evaluation Reports (PER) are tracked, trended and entered into a corrective action management system.

2. Status of Contractor Criticality Safety Engineer Program

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

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

3. Status of Federal Criticality Safety Oversight Program

Federal oversight staffing appears to be adequate; with two qualified NCS Federal Nuclear Safety Engineers (one assigned to Tank Farms and one assigned to the Waste Treatment Plant acting as backup for Tank Farms), as well as two Federal Nuclear Safety Engineers in the process of qualification.

4. Federal Assessments of Site NCS Programs

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

Because of criticality safety evaluations' infrequent changes, DOE has raised concerns whether the existing technical bases developed many years ago for the CSER are considered adequate. As a result, DOE requested the DOE Criticality Safety Steering Group (CSSG) to assess the technical bases of the Tank Farms criticality safety program. The DOE CSSG reviewed the WRPS criticality safety program in December 2009.

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

In general, the CSSG was satisfied with the criticality safety approach taken at WRPS. There was a potential concern that the program and the technical basis have been stagnant for at least the last decade. With the potential for increased tank transfer and retrieval operations, ORP's concern was focused on whether the technical basis was adequate to current standards and expectations. The current NCS strategy, while protecting criticality safety risks, has become somewhat confusing between the various Criticality Safety Evaluation Reports (CSERs) for new operations that build upon earlier CSERs, Chapter 6 of the Documented Safety Analysis (DSA) and the Criticality Protection Specifications (CPS). The CSSG's opinion was that the WRPS criticality safety program should be aligned to ensure a clear, concise and coherent criticality protection strategy that can be easily communicated to the operations staff and supervision. Special care should be taken to ensure that results of any new sample data is carefully considered and evaluated against the existing assumptions and technical bases for criticality safety.

CSSG recommendations:

- The hazards analysis created by a multi-disciplinary, integrated team of experts in 1996 should be reviewed and/or updated to ensure that all current operations are addressed.
- CSER core assumption that Pu and absorbers could not separate and concentrate could be challenged by current M-3 testing (fluidic transfers approved for tank farm) and SY-102 (2004) sample data. The effect of this data on the CSER needs to be addressed.
- The Tank Farm CSER needs to address natural phenomena hazards.
- Calculations performed with MONK, MCNP, and KENO-V.a give significantly different results, and those that are combined to provide the safety basis, need to be reconciled.
- Computer code validation needs to be updated to 1) address the safety basis of the effect of neutron absorbers, 2) discuss the applicability of the validation to the tank farm application, 3) justify the subcritical margin selected, and 4) meet current regulatory expectations.
- The control strategy for the current sludge inventory needs to be clarified in the CSER. The text states that absorber ratio is most important whereas the Criticality Prevention Specification (CPS) only gives a Pu concentration limit.
- Outdated ANSI/ANS standards listed in WRPS Nuclear Criticality Safety Program (TFC-PLN-49) should be updated to reflect current versions of the ANSI/ANS standards which are applicable to tank farm operations; exceptions to the SHALL requirements from applicable ANSI/ANS standards should be documented; and any exceptions to recommendations from applicable ANSI/ANS standards should be described in the DOE approved Criticality Safety Program Description document (RPP-39991).
- RPP-39991 and TFC-PLN-49 should be aligned to reflect current DOE expectations
- Facility criticality safety inspections should determine whether changes in process conditions could affect the nuclear criticality safety evaluation.

- Tank farms have been in static storage mode. Activity will increase for tank-to-tank sludge transfers/reconfiguration of kg-quantities of Pu in the near future. A CSER and supporting calculations and validation that meet current regulatory expectations would look quite different than the current documentation, in part because WRPS has committed to meet DOE-STD-3007-2007 with the next CSER revision. The CSSG suggests that WRPS not wait until a CSER change is needed to start working on the next revision.
- Opportunities for Improvement:
- The CPS should specify that new sludge samples be analyzed for agreement with absorber properties of the Conservative Waste Model (CWM) or that action be taken if the CWM is not met. (Note that this is being done quarterly but is not required by the CPS.)
- The facility criticality safety inspection program should be robustly defined such that applicable facilities/equipment are identified with a frequency commensurate with criticality risk.
- Communication concerning new sample data could be improved as tank farm contractor developed data on anomalous PuO2 samples 4 years ago but NCS staff was not informed until this year.
- Periodic communication between WRPS and Waste Treatment Plant personnel would help share information and assist in consistency of approach.
- It is appropriate to have a programmatic Criticality Safety program Administrative Control TSR with high level attributes of the program listed.
- Positive Practices observed by the CSSG:
- Sampling data is well managed in Tank Waste Information Network System (TWINS)/Best Basis Inventory (BBI) database.
- Although not required by the CPS, TWINS has been programmed to calculate the absorber properties to determine if the assumption of the CWM is met.

Corrective actions (PERs) were generated for each of these recommendations or areas for improvement, and all were included in a plan for CSP improvements submitted by WRPS to ORP in July 2010. These improvements are currently being reviewed by ORP.

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

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

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

5. New Facility Design

One new facility requiring a criticality safety program is the Interim Disposal Facility (IDF). A criticality safety evaluation for this project was reviewed by DOE, though the IDF is not approved for use.

6. Trending and Analysis of Reportable and Nonreportable Nuclear Criticality Occurrences

WRPS tracks criticality safety issues through the PER system. Fourteen PERs in criticality safety were identified in 2009, and nineteen for 2010. Most were low-level concerns or opportunities for improvement, and were closed through the PER process. Review of new or modified retrieval operations within Tank Farms facilities has not, thus far, resulted in operational nonconformances with existing NCS limits and controls. However, periodic inspections, assessments, etc., have identified several areas for programmatic improvement that result in the generation of the PERs mentioned above. Identified PERs pertain to:

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

Trends are rolled up and reported to senior management semiannually.

Of the 14 PERs identified in 2009, six were identified as part of an overall Integrated Safety Management System (ISMS) review as part of contractor changeover. Of the remaining eight, only one involved a potential criticality safety issue (as opposed to documentation inconsistencies or clarifications) – that one involved the use of potable water (pH a little under 7) rather than raw water (pH above 7) for lubrication of bearings on a waste transfer pump in the Tank Farms without a prior review by the NCS staff. The CSRs reviewed the circumstances after the fact and determined that the resulting chemistry of the waste tank remained within the parameters assumed in the CSER. Of the 19 PERs identified in 2010, fifteen were written to document the findings of the CSSG review discussed above. None of the PERs from 2010 involved other than documentation issues. Two of the PERs from 2010 remain open (one was identified in October 2010). One of these PERs identifies an opportunity to improve a potential ambiguity in the WRPS CPS; the other involves a procedural inconsistency between Tank Farms procedures and the 222-S Laboratory for when a Criticality Safety Representative review is required on work packages. The Tank Farms procedure requires a review if the procedure is not listed on CPS, and 222-S Laboratory does not have a CPS. A clarification in the Tank Farms work control procedure is being drafted to remove the inconsistency.

7. Follow-Up to Assessments

None planned at this time.

8. Status of any open issues identified in previous reports

Presently, there are no open issues.

Attachment 5

Paducah Site Criticality Safety Program Annual Report

Office Manager: William Murphie NCS POC: Tom Hines

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

A formal set of performance metrics is used to track the LATA Environmental Services of Kentucky, LLC (LATAKY) NCS program implementation at Paducah.

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

LATAKY (and previously Paducah Remediation Services [PRS]) provides the information in quarterly NCS metrics reports. These reports included one ACR that was generated by PRS in fiscal year 2010. The ACR involved the discovery of legacy fissile materials.

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

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

PRS contracted with DRC in Oak Ridge, Tennessee to perform an independent assessment of the Paducah NCS Program in February 2010. The independent assessment resulted in no findings or observations and concluded that the Paducah NCS Program is well documented, and the PRS staff is very knowledgeable.

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

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. LATAKY has 1.25 NCS staff FTEs (two senior NCS engineers); therefore, LATAKY has no staffing shortfalls.

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

3. Status of Federal Criticality Safety Oversight Program

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

PPPO has one Nuclear Safety Oversight Lead (NSOL) lead. He provides oversight for the LATAKY NCS Program. However, he has multiple responsibilities and has limited time to provide oversight. In addition, PPPO utilizes three Facility Representatives at Paducah to

provide oversight on safety management programs (including the NCS Program). PPPO also has a support contractor that assists in NCS oversight of the contractor. The level of PPPO oversight for LATAKY NCS Program is deemed adequate.

4. Federal Assessments of Site NCS Programs

The last DOE assessment of the Paducah NCS program was performed in June 2009 while PRS was the contractor.

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

A DOE assessment of the LATAKY NCS Program is tentatively planned in the first quarter of FY 2011.

5. New Facility Design

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

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

6. Trending and Analysis of Reportable and Nonreportable Nuclear Criticality Occurrences

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

Based on the trend analysis, management problems related to prior operations at the site are the leading cause of anomalous conditions. The LATAKY contract scope is to disposition the radiological waste generated from the gaseous diffusion plant (ship to offsite waste disposal facilities). Most ACRs involve the discovery of conditions that differ from prior accepted knowledge. These conditions have generally been assigned to “Management Problems.”

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

7. Follow-up Assessments

PPPO has followed up on the effectiveness of corrective actions for prior assessments. A PPPO assessment of the PRS NCS Program was performed in June 2009 with no new findings or observations.

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

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

Presently, there are no open issues.

Attachment 6

Portsmouth Site Criticality Safety Program Annual Report

Office Manager: William Murphie NCS POC: Tom Hines

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

A formal set of performance metrics have been developed to track the LATA/Parallax Portsmouth (LPP) NCS program implementation at Portsmouth. LPP NCS maintains a schedule of walkdowns and surveillances and tracks open items.

The number of Anomalous Condition Reports (ACRs) and NCS related Problem Reports (PRs) are tracked and trended. Additionally, field support time, continuing education, assessments and reviews, NCS-related document reviews, and lessons learned are tracked.

ACRs and NCS-related Problem Reports were reported in FY 2010. Four ACRs were generated in FY 2010. The four ACRs involved changing information on legacy fissile materials.

The LPP Nuclear Facility Safety Manager, Independent NCS Assessors, and the LPP Quality Assurance (QA) program assessed and evaluated the effectiveness and performance of the NCS Program during 2010. DOE oversight also includes routine monitoring of program implementation by the three Facility Representatives.

PPPO continued its increased oversight of the LPP contractor during FY-2010. PPPO performed readiness assessments for several new operations that involved limited processing of fissile bearing materials. DOE EM HQ staff were also invited to assist in the assessment process and review the LPP NCS Program Document prepared in compliance with DOE O 420.1B. After two NCS Program reviews by DOE-EM HQ staff, it was concluded that the LPP NCS Program Description Document describes a full and adequate NCS Program and provides sufficient detail of the NCS Program necessary to meet the requirements of DOE Order 420.1B, *Facility Safety*.

2. Status of Contractor Criticality Safety Engineer Program

LPP NCS staff was aligned with the workload at the beginning of FY-2010 with three FTEs. Recently, the scope of work requiring NCS support has significantly increased as LPP is performing a number of pre-D&D projects in preparation for the transition to the D&D Contractor in March 2011. As a result of this increased scope, the LPP NCS staff is not currently sufficient. Based on the current level of contractor activity, six NCS Staff Full Time Equivalents (FTEs) are required to support the mission at the Portsmouth site. Currently LPP has three NCS engineer FTEs and one Nuclear Criticality Safety Officer (CSO), including subcontractor staff. LPP currently has a posting for an NCS Engineer and a CSO. The LPP NCS Staff are filling the gap by working overtime.

PPPO recognizes that there is a temporary increase in the need for LPP NCS support, that LPP is meeting the minimum requirements by utilizing the present resources by scheduling overtime, and that LPP is actively recruiting additional resources.

3. Status of Federal Criticality Safety Oversight Program

Based on the current level of activity at the Portsmouth site and the planning for Decontamination and Decommissioning (D&D), PPPO needs approximately 2.5 FTEs.

PPPO has one Nuclear Safety Oversight Lead (NSOL). He provides oversight for the LPP NCS Program. However, he has multiple responsibilities and has limited time to provide

oversight. PPPO also has a support contractor that assists in oversight of the LPP NCS Program with 2.5 FTEs that report to the NSOL.

In addition, PPPO utilizes three Facility Representatives at PORTS to provide oversight on safety management programs (including the NCS Program).

4. Federal Assessments of Site NCS Programs

A DOE assessment of the LPP NCS program was conducted in July 2009. The assessment concluded that the NCS Program is compliant with DOE requirements.

The DOE assessment identified the NCS Program had improved and identified one finding and three observations. LPP developed a Corrective Action Plan (CAP) in response to the DOE assessment. PPPO approved the CAP and is ensuring that the CAP is being adequately implemented. The CAP includes the following corrective actions:

- LPP will review and revise the X-345 Facility South Vault NCS Posting for the UF_6 Cylinder Storage Area to ensure it clear and easily understood.
- LPP will reinforce the Superintendents' responsibility for the NCS Program in their areas.
- LPP will update the NCS Posting for the DMSA #12 Area as prescribed in the NCSE.
- LPP will prepare a consistent NCS Exempt definition to be applied in all fissile material operations.

A DOE EM HQ assessment of the LPP NCS program was conducted in March 2010. A follow-up assessment conducted in July 2010 concluded that the NCS Program as described in the LPP NCS Program Description Document is compliant with DOE requirements.

5. New Facility Design

PPPO has constructed a new facility at the Portsmouth Site. The new facility is designed to process UF_6 depleted in the ^{235}U isotope. The NCS Program for the facility is limited to prohibiting the introduction of fissile material into the facility. The facility is in startup phase; PPPO NSOL and supporting NCS contractor have performed multiple reviews of the process to ensure that criticality is not credible in the facility.

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

6. Trending and Analysis of Reportable and Nonreportable 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 planning for legacy issues that arise. LPP developed an NCSE to cover legacy materials of greater than expected normal mass limits in the process building, which reduced the number of ACRs in the process buildings. As LPP is moving into final stages of environmental clean-up and waste preparation and shipment, some legacy containers have been discovered outside the process buildings that have greater than safe mass conditions. Most of the ACRs in 2010 are due to these conditions.

7. Follow-Up to Assessments

PPPO has been performing follow up on the corrective actions from the first DOE assessment in 2007. PPPO determined that the corrective actions for NCS have been effective.

PPPO has been reviewing and assessing the LPP Program in preparation for the transition to the D&D Contractor, Fluor-B&W Portsmouth, LLC.

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

There are no open issues.

Attachment 7

CWI Criticality Safety Program Annual Report Topics

Field/Site Manager: Richard Provencher/ James Cooper

NSC POC: Kermit Bunde/ Roger Harshbarger

1. **Measure of Contractor Nuclear Criticality Safety (NCS) Performance**
   The Idaho Cleanup Project (CWI) has developed two criticality safety metrics. The first metric is called the Nuclear Safety Severity Index (NNSI) and is reported monthly to DOE-ID as part of the Safety Performance Objectives, Measures and Commitments (SPOMC) report. This is an index of severity of ORPS reports related to TSR violations, criticality safety events (i.e., loss of double contingency), or degradation of SSCs. The second metric is called the Criticality Safety Adversity Index (CSAI). This metric is a weighted index of criticality safety noncompliances. The 12-month average for both of these metrics show improving trends that are well within the established goals.

   Graphs are presented in the following pages illustrating the status of the metrics for twelve months through September 2010 for CSAI and October 2010 for NNSI.
   The Idaho Field Office has concluded that the NCS performance has been satisfactory. The contractor has a well-developed criticality safety program. The criticality safety program appears to have a well-developed self-assessment program. This has been observed during quarterly CSP oversight surveillances conducted by the DOE SME for criticality safety throughout the reporting period.

2. **Status of Contractor Criticality Safety Engineer Program**
   The staffing level of contractor's NCS program includes two full time CWI engineers, one full time subcontractor, and a Criticality Safety Program Manager.

   The Idaho Field Office has concluded that the contractor has adequate staffing for current activities.

3. **Status of Federal Criticality Safety Oversight Program**
   ID/EM has one qualified Criticality Safety Specialist (Roger Harshbarger) overseeing the contractor's program and ID/QSD has two qualified Criticality Safety Specialists (Adolf Garcia and Kermit Bunde). The Idaho Field Office considers this staffing to be sufficient.

4. **Federal Assessments of Site NCS Programs**
   Quarterly surveillances of the contractor's NCS program are conducted by QSD (Kermit Bunde) and EM (Roger Harshbarger). No issues were identified. The contractor Criticality Safety Program is functioning currently at a level that will ensure facility safety. As part of the quarterly surveillances, the contractors' self-assessments are reviewed. Recent self-assessments have been found to be in-depth and accomplished with appropriate rigor.

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

5. **New Facility Design**
   No new EM-funded facilities at Idaho will need a criticality safety program. The IWTU will process liquids with a criticality risk that is beyond extremely unlikely without criticality safety controls.

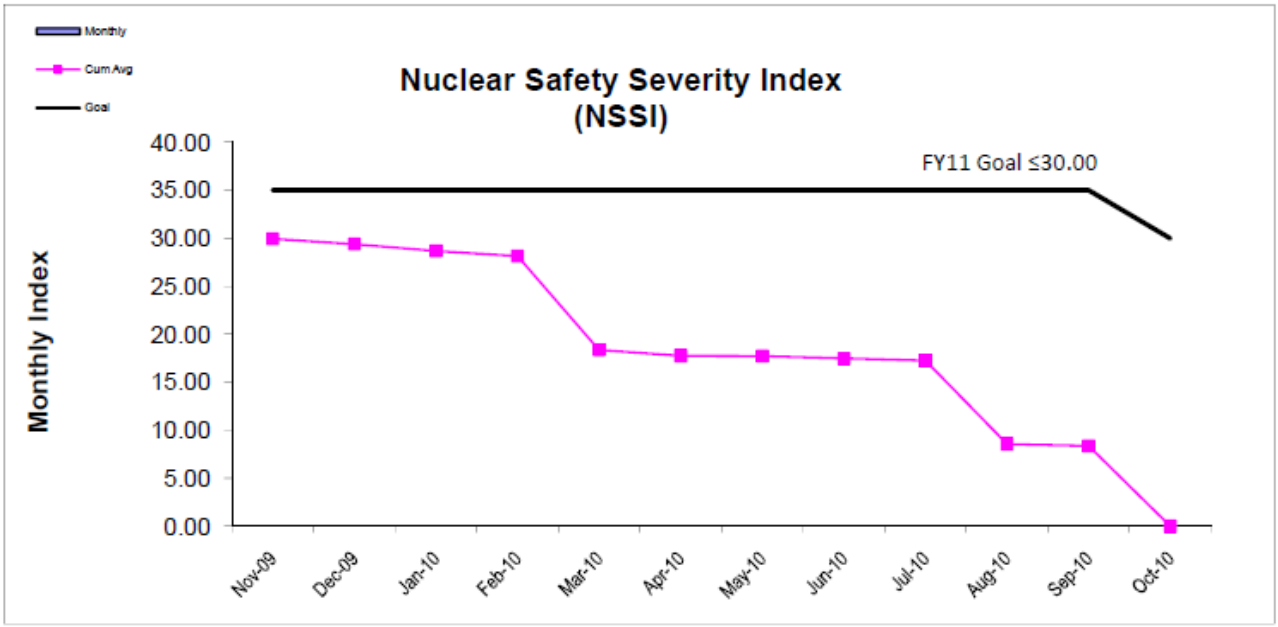
6. **Trending and Analysis of Reportable and Non-reportable Nuclear Criticality Occurrences**
   The ICP criticality safety group tracks and trends NCS occurrences. The results are reviewed semiannually by senior management.

   Leading and lagging indicators are used to access the program and they are seen in the following graphic.

   The trending and indicators help assure the health of the Criticality Safety Program and help to identify areas that can improve NCS performance.

7. **Follow-Up to Assessments**
   None of the prior assessments identified any shortcomings so no follow-up assessments were scheduled.

8. **Open issues identified in previous reports**.
   No open issues were identified.



	Nov-09	Dec-09	Jan-10	Feb-10	Mar-10	Apr-10	May-10	Jun-10	Jul-10	Aug-10	Sep-10	Oct-10
Goal	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	30.00
Monthly	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cum Avg	29.94	29.40	28.69	28.15	18.38	17.75	17.74	17.48	17.25	8.54	8.37	0.00

Definition

This is an index of severity of ORPS reports related to TSR violations, criticality safety events, or degradation of SSCs. NSSI = $10^6 \sum wf_i$/hours worked. The weighting factors are further described in the SPOMC submittal letter, CCN 310792 of September 27, 2010.

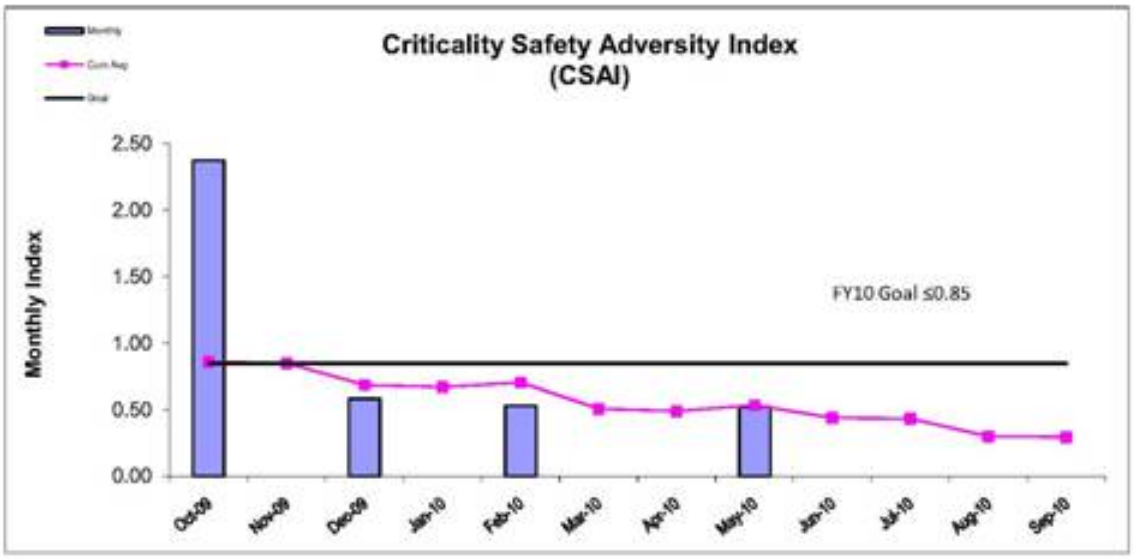
Analysis

There were no events related to TSR violations, criticality safety events, or degradation of SSCs during the reporting period.

Actions

Continue to integrate with operations personnel to validate proper implementation of documents is occurring so that Nuclear Safety events do not occur.

Goals	Points of Contact	
Annual Performance Goal is ≤30.00. Monthly Grading Criteria: Blue ≤37.50, Green (37.51-45.00), Yellow (46.00-52.50), Red >52.50. Cum Avg: Blue ≤27.00, Green (28.00-30.00), Yellow (31.00-33.00), Red >33.00.	Responsible Manager: SME: POC:	J. L. Harvey (3-0849) R. G. Peatross (520-6662) M. D. Allred (3-6294)



Data	Oct-09	Nov-09	Dec-09	Jan-10	Feb-10	Mar-10	Apr-10	May-10	Jun-10	Jul-10	Aug-10	Sep-10
Goal	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Monthly	2.37	0.00	0.58	0.00	0.53	0.00	0.00	0.52	0.00	0.00	0.00	0.00
Cum Avg	0.86	0.85	0.69	0.67	0.70	0.51	0.49	0.53	0.44	0.43	0.30	0.29

Definition

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

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

Analysis

There were no criticality safety deficiencies or infractions for this reporting period.

Actions

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

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

Attachment 8

Advanced Mixed Waste Treatment Project Criticality Safety Program Annual Report

Field/Site Manager: Richard Provencher/ James Cooper

NSC POC: Kermit Bunde/ Roger Harshbarger

1. **Measure of Contractor Nuclear Criticality Safety (NCS) Performance**
   Advanced Mixed Waste Treatment Project (AMWTP) continues to track and trend all events and deficiencies that impact or potentially impact NCS, regardless of severity. This tracking and trending utilizes AMWTP's formal issues tracking system, Trackwise, and is included in the AMWTP self-assessment of the NCS program. In addition, starting in October 2009, AMWTP piloted a leading indicator metric for NCS issues, which is included in the Safety Performance Objectives, Measures, and Commitments (SPOMC) report to DOE-ID. A graph presented at the end of the report illustrates the status of the metric for eleven months through October 2010.

   The Idaho Field Office has concluded that the criticality safety program has a well-developed self-assessment program. This has been observed during quarterly CSP oversight surveillances conducted by the DOE SME for criticality safety throughout the reporting period.

2. **Status of Contractor Criticality Safety Engineer Program**
   AMWTP NCS staffing is three full-time AMWTP employees (two criticality safety officers, one criticality safety engineer). In addition, AMWTP employs four criticality safety engineers on a subcontracted basis (sharing 80 hours per week). The Idaho Field Office considers that the contractor has adequate staffing for current activities.

3. **Status of Federal Criticality Safety Oversight Program**
   ID/EM has one qualified Criticality Safety Specialist (Roger Harshbarger) and ID/QSD has two qualified Criticality Safety Specialists (Adolf Garcia and Kermit Bunde). Management considers this staffing level to be adequate.

4. **Federal Assessments of Site NCS Programs**
   Quarterly surveillances of the contractor are conducted by QSD (Kermit Bunde) and EM (Roger Harshbarger) and this is supplemented by periodic surveillance of AMWTP Criticality Alarm System by Roger Harshbarger. No corrective actions were deemed necessary as the contractor Criticality Safety Program is functioning currently at a level that will ensure facility safety.

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

5. **New Facility Design**
   No facilities are being designed that will need a criticality safety program.

6. **Trending and Analysis of Reportable and Non-reportable Nuclear Criticality Occurrences**
   NCS occurrences, like all AMWTP reportable occurrences, are tracked and trended through the ORPS system and the AMWTP issues tracking system (Trackwise).

AMWTP piloted a leading indicator metric for NCS issues, which is included in the Safety Performance Objectives, Measures, and Commitments (SPOMC) report to DOE-ID. Lagging indicators are used extensively at AMWTP across all disciplines. Examples of lagging indicators relative to Nuclear Criticality Safety are:

- ORPS Reports
- CWR Violations
- Fact-finding minutes
- Periodic assessments
- Annual assessments

Results have been used to make minor changes to the Criticality Safety Program and results shared and discussed with criticality safety staff.

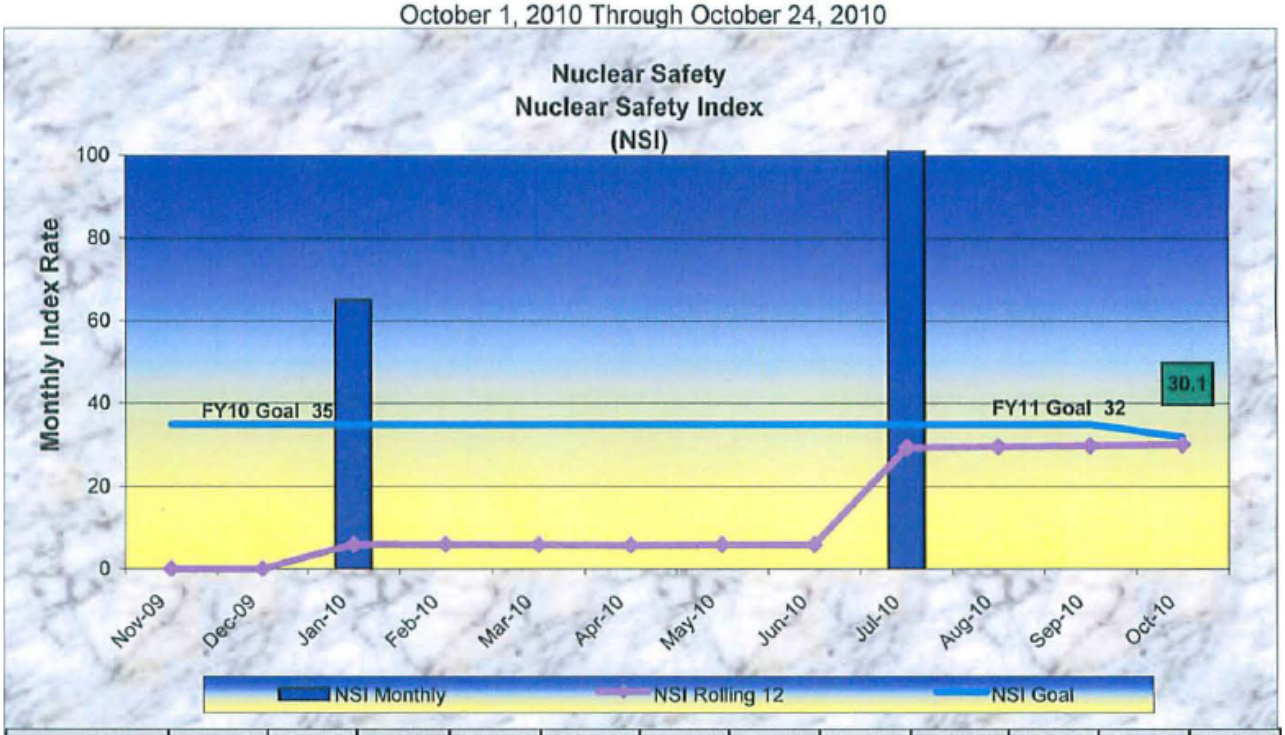
7. Follow-Up to Assessments

None of the prior assessments identified any shortcomings, so no follow-up was scheduled.

8. Status of any open issues identified in previous reports.

No open issues were identified.

AMWTP Detailed SPOMC Metrics
Measurement Period Covering:
October 1, 2010 Through October 24, 2010



Data	Nov-09	Dec-09	Jan-10	Feb-10	Mar-10	Apr-10	May-10	Jun-10	Jul-10	Aug-10	Sep-10	Oct-10
NSI Monthly	0	0	65	0	0	0	0	0	260	0	0	0
NSI Rolling 12	0.0	0.0	6.0	6.0	5.9	5.8	5.9	5.9	29.5	29.6	29.8	30.1
NSI Goal	35	35	35	35	35	35	35	35	35	35	35	32

Definition

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

Analysis

There were no ORPS events impacting the Nuclear Safety Index for the October reporting period:

The NSI is reflecting performance and is less than the annual goal of ≤ 32.

Note: The FY11 Goal was revised, per the AMWTP SPOMC, AMWTP-RPT-057, of September 2010.

No specific actions required at this time.

Goals

FY 11 Performance Goal = ≤ 32

NSI Grading Criteria:		Monthly		Rolling 12
Positive	≤ 125%	(≤ 40)	≤ 90 %	(≤ 29)
Acceptable	>125 - 150%	(> 40 - 48)	> 90 - 100%	(> 29 - 32)
Marginal	> 150 - 175%	(> 48 - 56)	> 100 - 110%	(> 32 - 35)
Negative	> 175%	(> 56)	> 110%	(> 35)

Point of Contacts

Responsible Manager: Rod Arbon (557-6303)

POC: Rick Moore (557-7147)

Attachment 9

TWPC (WAI) Criticality Safety Program Annual Report

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

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

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

TWPC has had two ACRs since the inception of the limited scope NCS program three years ago. One ACR (2008) involved 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 other ACR (2009) was associated with the improper acceptance of a drum due to an error in reading the identification number. The error was identified by independent review and resolved within a few days of the error. Procedures were modified to enhance the receipt inspection process. There were no ACRs in FY 2010.

The performance of the contractor is exceptional. Management attention to issues is prompt and appropriate. No improvement has been deemed necessary at this time.

2. Status of Contractor Criticality Safety Engineer Program

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

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

3. Status of Federal Criticality Safety Oversight Program

Oak Ridge has one Federal NCS Engineer who is currently the Quality Assurance Director. One additional full time subcontract NCS Engineer was brought in to assist the Federal NCS Engineer. With the addition of the subcontract NCS Engineer, the Oak Ridge NCS staffing level is adequate.

4. Federal Assessments of Site NCS Programs

A DOE O 420.1B NCS programmatic assessment was conducted in 2008 that resulted in no findings and three observations, all of which have been dispositioned. One proficiency was listed regarding the graded/scaled nature of the NCS Program.

TWPC self-assessments are being performed using DOE-STD-1158 as a guide. In FY 2010, there was one finding that non-conformance reports not related to NCS were not being distributed to the NCS organization for review. This has been corrected. There were six observations regarding improvements to the NCS program. The observations, recognized by TWPC as NCS program enhancements, were entered into TWPC's issues tracking system. Three of the observations are complete and the remaining three are being tracked until they are fully implemented.

Nuclear Criticality Safety (NCS) was part of the scope of the DOE ORO Integrated Safety Management System Combined Phase I and II Verification Assessment performed August

30 to September 3, 2010, at the TWPC. The areas reviewed during the assessment included:

1. TWPC NCS Program Description compliance with DOE O 420.1B, *Facility Safety*;
2. Appropriate procedures to implement the TWPC NCS Program;
3. Adequate implementation of the TWPC NCS Program;
4. Evaluation of closure of corrective actions from the DOE verification and validation of the SCALE 5.1 code. This area was determined to be not applicable to TWPC at this time.

The assessment team concluded that TWPC adequately implemented all elements of the NCS program as described in the DOE approved TWPC NCS Program Description document (CM-A-AD-017).

5. New Facility Design

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

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

NCS occurrences are tracked and trended by ACRs. When the Occurrence Reporting Criteria is met, they are tracked via the Occurrence Reporting and Processing System (ORPS) in addition to the ACR process. There was no data in FY 2010 to trend.

7. Follow-Up to Assessments

None.

8. Status of Open Issues Identified in previous reports.

There are no open issues.

Attachment 10

Bechtel Jacobs Company (BJC) Criticality Safety Program Annual Report

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

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

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

Less than two new ACRs occurred per month (19 ACRs during FY 2010). The average time to close ACRs has decreased and most ACRs were closed within 10 days. Only one has been open longer than 90 days.

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

2. Status of Contractor Criticality Safety Engineer Program

The BJC NCS program currently has nine FTEs. The DOE NCS oversight continues to monitor the contractor's staffing level for adequacy. The BJC Criticality Safety Officers are not included in the total FTE count but are vital to the BJC NCS Program as applied specifically to the K-25 Project. The DOE NCS oversight will continue to observe the CSO staffing levels for adequacy, as well.

3. Status of Federal Criticality Safety Oversight Program

Oak Ridge has one Federal NCS Engineer who is currently the Quality Assurance Director. One additional full time subcontract NCS Engineer was brought in to assist the Federal NCS Engineer. With the addition of the subcontract NCS Engineer, the Oak Ridge NCS staffing level is adequate.

4. Federal Assessments of Site NCS Programs

Criticality Safety was included as a functional area in a DOE Management Self-Assessment (MSA) for bulking, splitting and grouting uranium-bearing materials in the K-2500-H Segmentation Shop (REV-KM2-6/7/2010-68872). Two Priority 3 Findings (i.e., Observations) specific to NCS were identified during the MSA (no Priority 1 or 2 Findings). Corrective actions have been completed for one of the observations, and are in progress for the second observation.

DOE ORO conducted an assessment of the corrective actions related to work control issues experienced at the K-25 Project and issued a final report in the 2nd quarter FY2010 (REV-PDF-11/13/2009-22432). Although not specific to the BJC NCS Program, the work control issues were in part revealed due to a number of ACRs experienced by the K-25 Project in FY2009. The assessment resulted in one Priority 2 Finding related to inconsistencies between specific NCSEs and the implementing work package. Corrective actions for the finding have been completed, involving revision to the subject NCSEs and changes to the implementing work package.

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

5. New Facility Design

There are no new facilities being designed. However, there are design aspects associated with existing facilities undergoing either cleanup/decommissioning/decontamination (e.g. Tank W1A), or modification (i.e., EMWMF Cell Expansion), to which the existing BJC NCS Program will be applied.

There were no formal lessons learned.

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

All ACRs are tracked and trended internally by the BJC I/CATS, as required by the NCS program. All Level 1, 2, and 3 ACRs are also tracked through the Occurrence Reporting system, which is independent of the NCS Program. The NCS Review Board evaluates the ACR tracking and trending when they meet.

Trending has revealed a few common issues that have resulted in a request for a specific management assessment of the BJC NCS control implementation process (MA will be conducted during 1st quarter FY2011).

7. Follow-Up to Assessments

None.

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

There are no open issues.

Attachment 11

Isotek Criticality Safety Program Annual Report

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

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

Metrics established to monitor contractor NCS performance include:

- Number of Level 1 and 2 Condition Reports (CRs)
- Timely Closure of CRs
- Completion of NCSE Annual Assessments
- New Condition Reports with NCS Implications (Quarterly)
- Open/Unresolved Condition Reports with NCS Implications (Quarterly)
- Completed NCS Surveillances (Quarterly)
- Number of UNSAT Surveillance Conditions (Quarterly)
- Completed NCS Assessments (Quarterly)
- Number of UNSAT Assessment Conditions (Quarterly)
- NCS Engineer Professional Development Activities (Quarterly)

There have been no infractions since Isotek took over operations in February 2007. Isotek is only authorized to perform storage operations for fissile material. The primary NCS activities engaged in by the Isotek NCS staff are developing evaluations that support design and reviewing work packages to confirm there are no NCS implications. As a result, there are few measurable activities at this stage of the project.

2. Status of Contractor Criticality Safety Engineer Program

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

3. Status of Federal Criticality Safety Oversight Program

Oak Ridge has one Federal NCS Engineer who is currently the Quality Assurance Director. One additional full-time subcontract NCS Engineer was brought in to assist the Federal NCS Engineer. With the addition of the subcontract NCS Engineer, the Oak Ridge NCS staffing level is adequate.

4. Federal Assessments of Site NCS Programs

A Contractor NCS Program Assessment was conducted in August 2010 in accordance with DOE O 420.1B. Primary conclusions from this review were:

1) The team observed no ongoing unsafe operations from a criticality safety perspective.
2) AII NCS program elements were found to be adequate for the currently limited scope of fissile material activities (i.e., surveillance and maintenance activities).
3) The methods used for NCS design input, and the processes for tracking the design as it relates to NCS, were found to be adequate.

No findings, observations, or proficiencies were documented as a result of this review.

The Federal NCS Staff has also initiated frequent (approximately weekly) informal assessments of Contractor NCS progress and issues to enable timely identification of concerns. There are currently no open items with respect to these reviews.

5. New Facility Design

New facility design is nearing completion. The Contractor has prepared draft NCSEs for anticipated fissile material operations to facilitate integration of NCS. The Federal NCS Staff has examined various draft NCSEs and confirmed the Contractor's integration of NCS into project design.

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

No NCS-related occurrences have been identified during the reporting period to establish trends or indications. Fissile material operations are limited to storage only.

7. Follow-Up to Assessments

Although no formal issues remain open for the Contractor's NCS Program, weekly informal assessments have examined the means by which the Contractor resolves NCS design review comments. Numerous comments had been raised by the NCS Staff at various stages of design development, but timely resolution was not being obtained. The Contractor has since taken effective action to ensure that the NCS-related concerns are being given timely and appropriate consideration.

8. Status of Open Issues Identified in previous reports.

There are no open issues for this reporting period.

Attachment 12

Savannah River Nuclear Solutions Criticality Safety Program Annual Report

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

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

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

SRNS and SRR have a central criticality safety oversight committee, the Nuclear Criticality Safety Review Committee (NCSRC). The NCSRC maintains a criticality safety indicator based on reportable and non-reportable occurrences that are submitted into a site database. The database includes items from M&O facilities as well as LW facilities. A rating scale is used to score each reportable and non-reportable occurrence. On a quarterly and annual basis, the cumulative score, and the number of reportable and non-reportable occurrences in each rating bin, are presented to and reviewed by the NCSRC. Cause codes for each occurrence are also compiled and tracked to determine the major causes of the occurrences. A goal is established by the NCSRC on an annual basis to reduce the number of occurrences in the groupings having the highest number of occurrences.

DOE O 232.1 reporting criteria were revised effective in 2003. The M&O/LW database for reportable and non-reportable events came on line about the same time. However, full site-wide implementation of the database did not occur until 2005. Therefore, a consistent set of data is available for calendar years 2005 through the 2010.

For M&O and LW facilities, the indicator score for 2005 included 62 total events (4 criticality alarm system issues, 37 minor events < procedure limit, 20 procedure limit violations, 1 TSR level; total score = 144).

The results for 2006 showed improvement with 49 events (3 criticality alarm system issues, 31 minor events < procedure limit, 12 procedure limit violations, 3 TSR level; score = 119) - a reduction in total score of approximately 20%.

For 2007, indicator results improved 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 and communication problems increased during 2007. Management recognized that human performance was a general site issue that required continuing efforts for improvement. Therefore, during 2007 and 2008, a series of Human Performance Improvement training sessions were provided to site management and engineers.

For 2008 there were 40 events related to criticality safety (6 criticality alarm system issues, 24 minor events < procedure limit, and 10 procedure limit violations; score = 84) – a small improvement versus 2007 results. Only one event (< procedure limit violation) occurred in a LW facility. For 2007 and 2008, the Human Performance Improvement (HPI) training and HPI tools appear to have reduced human performance problems related to criticality safety.

For the 2009, there were 56 events (2 criticality accident alarm system issues, 52 minor events < procedure limit and 2 procedure limit violations; score = 112). The events primarily involve minor documentation issues, minor instrument calibration issues, human performance problems and communication issues. Equipment problems related to charging fissile material to the H-Canyon dissolver also occurred. No events occurred in LW facilities.

While the number of minor issues increased, the number of procedure limit violations decreased substantially. The use of HPI tools continues to be emphasized in facility operations.

For the first three quarters of 2010, there have been 36 events (5 criticality alarm system issues, 33 minor events < procedure limit, and 1 procedure limit violation; score = 71). One event occurred in a LW facility. The minor events < procedure limit violation are being identified during facility self-assessments, readiness assessments, and criticality engineer walkdowns. Identifying problems prior to actual operation prevents the occurrence of more serious events. These assessments have increased during 2010 due to preparation for new missions and new facility operations. The use of HPI tools continues to be emphasized.

The M&O Contractor's Criticality Safety Program organization also prepares a quarterly criticality safety Performance Assessment (PA) using the same data (including both M&O and LW facilities). However, the PA examines the data more closely on a facility-by-facility basis. If a facility is experiencing an unusually high number of reportable or non-reportable occurrences, or a higher than expected number of the same type of problem, or unusually special or severe problems, the facility is placed on the "watch list" or a recurring event is declared. One "watch list" item, which occurred during 2009 (H Material Disposition Area Criticality Safety Committee not functioning) was remedied by reinstituting the committee with a new chairman early in 2010. During 2010, no "watch list" items or recurring events were identified.

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

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

Several facilities have undergone Facility Evaluation Board (FEB) reviews during 2010 that included criticality safety as a review topic. These facilities were: H-Canyon, F/H Lab and HB-Line. Findings are included as part of the criticality safety indicator discussed above. Also, Readiness Assessments were performed for H-Canyon resumption of spent fuel processing, SRNL Radioactive Evidence Evaluation Facility, K-Area shuffler project, and the L-Area to H-Area spent fuel shipment project. Reportable and nonreportable items are included in the criticality safety indicator discussed above.

Trained SRNS criticality safety technicians and at least one criticality safety engineer, working together with facility engineers, perform criticality safety facility self-assessments. Reportable and/or non-reportable items are included in the criticality safety indicator discussed above.

In addition to its self-assessment program, the M&O Contractor received feedback on its program from Federal assessments. These assessments include assessment activities such as the March/April 2006 DOE-EM program assessment; DOE-SR Field Office, DOE-STD-1158 based assessments during 2009, DOE-HQ Central Technical Authority technical observation of NDA measurements in K-Area during 2009, and the DOE Central Technical Authority HB-Line assessment in July 2010, based on DOE-STD-1158 LOIs.

The 2006 DOE-EM assessment stated, "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." Corrective actions identified to respond to the DOE-EM appraisal were completed during 2007 and early 2008. The DOE-EM Criticality Safety Program Manager reviewed corrective action closures during January 2008. All actions have been closed.

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

The DOE Assessment, which included DOE HQ Criticality Safety Subject Matter Experts of the HB-Line facility during July 2010, did not result in any findings, but did identify two Opportunities for Improvement (OFIs). Both OFIs were based on contractor self-identified opportunities for improvement. M&O Contractor Criticality Safety Program improvements were underway and will continue based on these OFIs.

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

- The M&O Contractor, in cooperation with LW contractor, has worked with DOE-SR and DOE-EM to prepare a Criticality Safety Program Description Document (CSPDD). This document was approved by DOE-SR in June 2009. As part of the CSPDD, an improved functional classification methodology has been developed that is consistent with DOE-STD-3009. Additional functional classification improvements are being developed as part of the CSPDD, rev. 1.
- Improvement of the site criticality safety manual, SCD-3, to provide clarification of required control designation for incredible scenarios, more specific guidance of what is involved in a facility walk down, and incorporation of ANS-8.10, ANS-8.12, ANS-8.20, ANS-8.24, and ANS-8.26;
- Continued implementation of more a formalized HAZOP approach for contingency analyses;
- Preparation of an SRNS criticality safety engineer qualification program in compliance with ANS-8.26 and DOE-STD-1135, and qualification of SRNS and SRR criticality safety engineers to the plan; and
- Monthly criticality safety DOE-SR/SRNS/SRR interface meetings are scheduled to review performance and identify upcoming issues.

2. Status of Contractor Criticality Safety Engineer Program

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

The site's M&O Contractor (SRNS) manages the majority of DOE-EM activities at SRS. SRNS currently has 11 fully qualified Senior CS Engineers, 7 fully qualified CS Engineers, 5 working to complete the CS Engineer qualification, and 3 CS Engineers in training. Sixteen of the qualified Senior CS and CS engineers are also qualified as Criticality Safety Officers in various facilities. Two persons are qualified as Criticality Safety Officers, but not as a CS engineer. SRNS also has three Criticality Safety Technicians that serve as qualified assessors. SRNS currently utilizes the services of a number of subcontractors to provide an additional six qualified NCS engineers (some only part time). A Basis of Estimate (BoE) for the SRNS managed activities has been prepared and has identified a need for approximately three additional CS Engineers. The current level of support appears adequate; however, there is little room for changing needs.

A DOE review based on DOE-STD-1158 Management Responsibilities Lines of Inquiry confirmed the adequacy of the contractor's criticality safety staffing for one of the M&O facilities (HB-Line). This staffing is typical for the M&O facilities. DOE reviews of criticality safety basis documents for facility Documented Safety Analysis and Technical Safety Requirement changes for the M&O contractor facilities and activities indicate that adequate criticality safety support is being provided.

While adequate criticality safety engineer resources exist for the M&O Contractor (SRNS), SRNS continues to explore the hiring of additional NCS staff. SRNS has established a program to incentivize the staff to achieve the appropriate qualifications. As a compensatory measure, SRNS continues to use qualified subcontractor criticality safety engineers to provide staff augmentation, particularly to provide criticality safety support for ARRA activities. It is expected that the use of subcontractors will continue while SRNS hires and qualifies additional criticality safety resources.

3. Status of Federal Criticality Safety Oversight Program

DOE-SR has two federal employees assigned full time to the criticality safety program. One qualified Criticality Safety Engineer is acting as the DOE-SR Criticality Safety Program Manager while the other employee is in training for the Federal Technical Qualification for Criticality Safety. One qualified Criticality Safety Engineer working as a Facility Engineer provides some part time assistance and another qualified Criticality Safety Engineer working for NNSA provides assistance for facilities of concern for NNSA.

In January 2008, DOE-SR issued an updated *5-Year Workforce Management Plan, Fiscal Years 2008 – 2013*. The purpose of the plan to ensure DOE-SR has the appropriate skill mix to safely accomplish its mission. The plan specifically addresses federal NCS staffing and indicates DOE-SR requires four FTE positions, which means SR has a shortfall. DOE-SR currently has the authority and is actively seeking to hire an additional Criticality Safety Engineer.

4. Federal Assessments of Site NCS Programs

In Fiscal Year 2010, DOE-SR Criticality Safety Related assessment activities included more than fifty assessments. The distribution of the different types of assessments was as follows: Three of the assessments were programmatic and included two contractor Criticality Safety Program assessments and one self-assessment of the DOE-SR Program. Twenty assessments dealt with reviewing changes to Documented Safety Analysis and/or Technical Safety Requirements relating to criticality safety. Eleven assessments were field

observations. Sixteen assessments were of criticality safety evaluations and implementing documents. One assessment was of a criticality alarm system problem. One assessment was for criticality safety related to onsite transportation activities.

Where assessments identified significant deficiencies or concerns, comments are provided to the contractor either formally for deficiencies or informally for some concerns. Contractor responses are provided. For comments that identify deficiencies, Corrective Actions Plans are provided. These Plans are controlled through a site database and require DOE-SR approval for closure. Generally for comments supporting Documented Safety Analysis and Technical Safety Requirement, acceptable resolution is required before DOE approval of the document itself or in the case of criticality safety evaluations before DOE approval of the document that the evaluation supports.

The following are examples of some of the comments identified and results:

1) Review identified a requirement from the Nuclear Criticality Safety Evaluation (NCSE) that blocking devices be used to control the geometry of fuel bundles in a shipping cask were inadvertently left out of the implementing document. The document was revised prior to use to require the proper blocking devices to be used.

2) Comment requesting the use of new implementation of guidance for criticality control classification resulted in a design feature that was previously classified as “General Service” being upgraded to be “Safety Significant”.

3) Review determined that calculations used erroneous H/X values that were non-conservative. Calculations were redone resulting in a higher Keff but still significantly less than K-safe.

4) Review of NCSE for Onsite Transportation Activities for TRU waste, that claimed to have performed evaluations of the 10CFR71 Normal Conditions of Transport and Hypothetical Accident Conditions, determined that if the evaluations were performed they were not adequate documented. As a result of the comment, the contractor determined to revise the methodology for evaluation of onsite transportation to look at the normal and credible abnormal conditions that could be experienced in onsite transportation rather than the 10 CFR Part 71 Conditions.

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

Copies of completed contractor's self-assessments are provided to DOE-SR. The results of these assessments are subjects for the monthly Interface Meetings between the DOE Criticality safety Program Manager and the Contractor Criticality Safety Program Management. The purpose of these meetings is to provide the contractor Criticality Safety Programmatic feedback and to exchange information on criticality safety related activities. The capacity for DOE-SR to do a detailed evaluation of these assessments is limited due to staffing issues, the need to address higher priority activities and emerging issues.

Numerous nuclear criticality safety evaluations and safety basis documents (criticality safety related portions) were reviewed by SR during 2010. Most of these documents were NCSEs completed in accordance with DOE-STD-3007-2007. Overall they were compliant with the applicable ANS and DOE requirements and were technically adequate. Specific issues are occasionally identified during the reviews and are resolved in a timely fashion.

5. New Facility Design

The M&O contractor is progressed with the following designs.

- K-Area shuffler modification, which is undergoing calibration testing. Criticality Safety has been integrated into the design process and facility self-assessment. Also, the K-

Area Criticality Safety Committee has performed a walk-through of the shuffler facility during calibration testing.

- K-Area Pit Disassembly and Conversion Project, for which recent design review included criticality safety.
- SRNL Radioactive Evidence Evaluation Facility, for which criticality safety considerations were evaluated as part of facility design, facility self-assessment, and readiness review.
- The Waste Solidification Building design effort continues. A preliminary NCSE has been prepared.

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

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

The major lessons learned from new project work include:

- the importance of getting criticality safety engineers involved early in the project;
- the importance of determining the credibility/non-credibility of a criticality accident;
- the identification of a control strategy early in the project; and
- the importance of evaluating the functional classification of controls.

Implementation of DOE-STD-1189, *Integration of Safety into Design Process*, helps to reinforce these lessons learned.

6. Trending and Analysis of Reportable and Nonreportable Nuclear Criticality Occurrences

As also indicated in section 1, the M&O and LW contractor site Nuclear Criticality Safety Review Committee (NCSRC) maintains a criticality safety indicator based on reportable and non-reportable occurrences. A rating scale is used to score each reportable and non-reportable occurrence. On a quarterly and annual basis, the cumulative score and the number of reportable and non-reportable occurrences in each rating bin, are presented to and reviewed by the NCSRC. The DOE-SR NCS staff participates in the NCSRC review and discussion of the criticality safety indicator results. Cause codes, derived from INPO information, for each occurrence are compiled and tracked to determine the major causes of the occurrences. A goal is established by the NCSRC on an annual basis to reduce the number of occurrences in the groupings having the highest number of occurrences.

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

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

DOE O 232.1 reporting criteria were revised effective in 2003. The M&O/LWO database for reportable and non-reportable events came on line about the same time. However, full site-wide implementation of the database did not occur until 2005. Therefore, a consistent set of data is available for calendar years 2005 through the 2010. See the response for Question 1 for details of the indicator results.

During 2009 and the first three quarters of 2010, there was an increase in the number of minor events (< procedure limit violation) and the simultaneous decrease in the number of procedure limit violations. During this period, the frequency and depth of reviews (e.g., facility self-assessments, management assessments, criticality engineer walkdowns, readiness assessments) has increased. The result is that problems are being identified during the planning and preparation of a proposed activity, before more serious upsets can occur.

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

The results of the M&O contractor's NCSRC indicator are used to establish goals to reduce occurrences in specific causal areas. Based on 2006 results, a goal was established for 2007 to reduce the number of instrument problems and human performance problems by 20%. The goal was met. However, the number of management problems and communication problems increased during 2007. Human Performance Improvement (HPI) training for managers, engineers, and operators began in 2007 and continued into 2008. The result was a modest reduction in the number of management and communications problems during 2008 and 2009. Human Performance Improvement techniques continue to be emphasized in an effort to improve the reliability of administrative controls. During 2009 and the first three quarters of 2010, the number of minor events < procedure limit violation increased, while the number of procedure limit violations simultaneously decreased.

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

7. Follow-Up to Assessments

The M&O/LW contractors have a well-defined and mature self-assessment process. The process requires consideration of many issues during the development of the scope of self-assessment activities. This includes historical information such as corrective action open and completed items, current performance information such as facility performance

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

Likewise, DOE-SR considers many of the same issues both during its development of the yearly assessment plan and during the definition of the scope of planned assessments. However, due to the limited Federal NCS staffing, the capacity to do follow-up reviews has been limited. In 2010, follow-up of previous assessment concerns relative to seismic induced criticality consideration in DSAs was completed and the DSAs evaluated now adequately address seismic induced criticalities. Additionally previous assessments in HB-Line were considered as an SR Program assessment in HB-Line was being developed. All the previous assessment concerns dealing with management were determined to be completed.

8. Status of any open issues identified in previous reports.

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

Attachment 13

Savannah River Remediation Criticality Safety Program Annual Report

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

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

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

SRNS and SRR have a central criticality safety oversight committee, the Nuclear Criticality Safety Review Committee (NCSRC). The NCSRC maintains a criticality safety indicator based on reportable and non-reportable occurrences that are submitted into a site database. The database includes items from M&O facilities as well as LW facilities. A rating scale is used to score each reportable and non-reportable occurrence. On a quarterly and annual basis, the cumulative score, and the number of reportable and non-reportable occurrences in each rating bin, are presented to and reviewed by the NCSRC. Cause codes for each occurrence are also compiled and tracked to determine the major causes of the occurrences. A goal is established by the NCSRC on an annual basis to reduce the number of occurrences in the groupings having the highest number of occurrences.

DOE O 232.1 reporting criteria were revised effective in 2003. The M&O/LW database for reportable and non-reportable events came on line about the same time. However, full site-wide implementation of the database did not occur until 2005. Therefore, a consistent set of data is available for calendar years 2005 through the 2010.

For M&O and LW facilities, the indicator score for 2005 included 62 total events (4 criticality alarm system issues, 37 minor events < procedure limit, 20 procedure limit violations, 1 TSR level; total score = 144).

The results for 2006 showed improvement with 49 events (3 criticality alarm system issues, 31 minor events < procedure limit, 12 procedure limit violations, 3 TSR level; score = 119) - a reduction in total score of approximately 20%.

For 2007, indicator results improved 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 and communication problems increased during 2007. Management recognized that human performance was a general site issue that required continuing efforts for improvement. Therefore, during 2007 and 2008, a series of Human Performance Improvement training sessions were provided to site management and engineers.

For 2008 there were 40 events related to criticality safety (6 criticality alarm system issues, 24 minor events < procedure limit, and 10 procedure limit violations; score = 84) – a small improvement versus 2007 results. Only one event (< procedure limit violation) occurred in a LW facility. For 2007 and 2008, the Human Performance Improvement (HPI) training and HPI tools appear to have reduced human performance problems related to criticality safety.

For the 2009, there were 56 events (2 criticality accident alarm system issues, 52 minor events < procedure limit and 2 procedure limit violations; score = 112). The events primarily involve minor documentation issues, minor instrument calibration issues, human performance problems and communication issues. Equipment problems related to charging fissile material to the H-Canyon dissolver also occurred. No events occurred in LW facilities.

While the number of minor issues increased, the number of procedure limit violations decreased substantially. The use of HPI tools continues to be emphasized in facility operations.

For the first three quarters of 2010, there have been 36 events (5 criticality alarm system issues, 33 minor events < procedure limit, and 1 procedure limit violation; score = 71). One event occurred in a LW facility. The minor events < procedure limit violation are being identified during facility self-assessments, readiness assessments, and criticality engineer walkdowns. Identifying problems prior to actual operation prevents the occurrence of more serious events. These assessments have increased during 2010 due to preparation for new missions and new facility operations. The use of HPI tools continues to be emphasized.

The M&O Contractor's Criticality Safety Program organization also prepares a quarterly criticality safety Performance Assessment (PA) using the same data (including both M&O and LW facilities). However, the PA examines the data more closely on a facility-by-facility basis. If a facility is experiencing an unusually high number of reportable or non-reportable occurrences, or a higher than expected number of the same type of problem, or unusually special or severe problems, the facility is placed on the "watch list" or a recurring event is declared. One "watch list" item, which occurred during 2009 (H Material Disposition Area Criticality Safety Committee not functioning) was remedied by reinstituting the committee with a new chairman early in 2010. During 2010, no "watch list" items or recurring events were identified.

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

The 2006 DOE-EM assessment stated, "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." Corrective actions identified to respond to the DOE-EM appraisal were completed during 2007 and early 2008. The DOE-EM Criticality Safety Program Manager reviewed corrective action closures during January 2008. All actions have been closed.

The M&O and the LW contractors have the same criticality safety program and the LW contractor uses the M&O contractor's criticality safety training and qualification program. DOE-SR Field Office assessments have concluded that the M&O and LW contractors have a mature and healthy criticality safety program.

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

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

- Improvement of the site criticality safety manual, SCD-3, to provide clarification of required control designation for incredible scenarios, more specific guidance of what is involved in a facility walk down, and incorporation of ANS-8.10, ANS-8.12, ANS-8.20, ANS-8.24, and ANS-8.26;
- Continued implementation of more a formalized HAZOP approach for contingency analyses;
- Preparation of an SRNS criticality safety engineer qualification program in compliance with ANS-8.26 and DOE-STD-1135, and qualification of SRNS and SRR criticality safety engineers to the plan;
- Monthly criticality safety DOE-SR/SRNS/SRR interface meetings are scheduled to review performance and identify upcoming issues

2. Status of Contractor Criticality Safety Engineer Program

SRR currently uses three fully qualified Criticality safety engineers. One additional criticality safety engineer is in the process of becoming qualified. These engineers are qualified under the SRNS program. Additional personnel are being trained to perform criticality reviews for added flexibility.

DOE reviews of criticality safety basis documents for facility Documented Safety Analysis and Technical Safety Requirement changes for the SRR facilities and activities indicate that adequate criticality safety support is being provided. Continuing training activities and expanding the personnel involved in criticality reviews will provide added flexibility so that resources can be used efficiently.

3. Status of Federal Criticality Safety Oversight Program

DOE-SR has two federal employees assigned full time to the criticality safety program. One qualified Criticality Safety Engineer is acting as the DOE-SR Criticality Safety Program Manager while the other employee is in training for the Federal Technical Qualification for Criticality Safety. One qualified Criticality Safety Engineer working as a Facility Engineer provides some part time assistance and another qualified Criticality Safety Engineer working for NNSA provides assistance for facilities of concern for NNSA.

In January 2008, DOE-SR issued an updated *5-Year Workforce Management Plan, Fiscal Years 2008 – 2013*. The purpose of the plan to ensure DOE-SR has the appropriate skill mix to safely accomplish its mission. The plan specifically addresses federal NCS staffing and indicates DOE-SR requires four FTE positions. Criticality Safety Staffing is an issue for DOE-SR. DOE-SR currently has the authority and is actively seeking to hire a Criticality Safety Engineer.

4. Federal Assessments of Site NCS Programs

In Fiscal Year 2010, DOE-SR criticality safety related assessment activities included more than fifty assessments. Six of these assessments were for Liquid Waste. Two were programmatic related to the approval and implementation of the SRNS/SRR CSPDD. Two were of criticality safety evaluation summary documents [including the criticality safety evaluations (NCSEs) supporting these documents]. One assessment was of the criticality safety portion of the Documented Safety Analysis and Technical Safety Requirements. One assessment was an Operational Awareness Activity of the SRR Criticality Safety Committee.

No significant deficiencies or concerns were identified. Questions and comments were resolved through discussions with the criticality safety engineers involved with the documents reviewed. It is noted that monthly Interface Meetings with the contractor's

criticality safety management allow profitable discussions and sharing of information relative to lessons learned.

The results of contractor's self-assessments subjects for the monthly Interface Meetings with the contractor's criticality safety management. The purpose of these meetings is to provide the contractor Criticality Safety Programmatic feedback and to exchange information on criticality safety related activities. The capacity for DOE-SR to do a detailed evaluation of these assessments is limited due to staffing issues, the need to address higher priority activities and emerging issues.

Nuclear criticality safety summary documents (including supporting NCSEs) and safety basis documents (criticality safety related portions) were reviewed by DOE-SR during 2010. The NCSEs were completed in accordance with DOE-STD-3007-2007. Overall they were compliant with the applicable ANS and DOE requirements and were technically adequate. Specific issues are occasionally identified during the reviews and are resolved in a timely fashion.

5. New Facility Design

Facilities being designed for SRR that will need a criticality safety program include the following:

- Liquid Waste Salt Disposition Integrated Project continues. This project is intended to provide all modifications needed to process high-level salt waste (currently stored in the tank farms) through the tank farms, through the SWPF, and to the Defense Waste Processing Facility. Since more than one contractor is involved, criticality safety engineers continue to interface on this project. Early in the design process, barriers and nature of process conditions have been identified that prevent a criticality accident.
- Liquid Waste Fluidized Bed Steam Reformer, for which a preliminary NCSE was prepared.

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

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

The major lessons learned from new project work include:

- the importance of getting criticality safety engineers involved early in the project;
- the importance of determining the credibility/non-credibility of a criticality accident;
- the identification of a control strategy early in the project; and
- the importance of evaluating the functional classification of controls.

Implementation of DOE-STD-1189, *Integration of Safety into Design Process*, helps to reinforce these lessons learned.

6. Trending and Analysis of Reportable and Nonreportable Nuclear Criticality Occurrences

As discussed in section 1, the M&O and LW contractor site Nuclear Criticality Safety Review Committee (NCSRC) maintains a criticality safety indicator based on reportable and non-reportable occurrences. A rating scale is used to score each reportable and non-reportable occurrence. On a quarterly and annual basis, the cumulative score and the number of reportable and non-reportable occurrences in each rating bin, are presented to and reviewed by the NCSRC. The DOE-SR NCS staff participates in the NCSRC review and discussion of the criticality safety indicator results. Cause codes, derived from INPO information, for each occurrence are compiled and tracked to determine the major causes of the occurrences. A goal is established by the NCSRC on an annual basis to reduce the number of occurrences in the groupings having the highest number of occurrences.

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

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

DOE O 232.1 reporting criteria were revised effective in 2003. The M&O/LW database for reportable and non-reportable events came on line about the same time. However, full site-wide implementation of the database did not occur until 2005. Therefore, a consistent set of data is available for calendar years 2005 through the 2010. See the response for Question 1 for details of the indicator results.

During 2009 and the first three quarters of 2010, there was an increase in the number of minor events (< procedure limit violation) and the simultaneous decrease in the number of procedure limit violations. During this period, the frequency and depth of reviews (e.g., facility self-assessments, management assessments, criticality engineer walkdowns, readiness assessments) has increased. The result is that problems are being identified during the planning and preparation of a proposed activity, before more serious upsets can occur.

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

The results of the M&O contractor’s NCSRC indicator are used to establish goals to reduce occurrences in specific causal areas. Based on 2006 results, a goal was established for 2007 to reduce the number of instrument problems and human performance problems by

20%. The goal was met. However, the number of management problems and communication problems increased during 2007. Human Performance Improvement (HPI) training for managers, engineers, and operators began in 2007 and continued into 2008. The result was a modest reduction in the number of management and communications problems during 2008 and 2009. Human Performance Improvement techniques continue to be emphasized in an effort to improve the reliability of administrative controls. During 2009 and the first three quarters of 2010, the number of minor events < procedure limit violation increased, while the number of procedure limit violations simultaneously decreased.

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

7. Follow-Up to Assessments

The M&O/LW contractors have a well-defined and mature self-assessment process. The process requires consideration of many issues during the development of the scope of self-assessment activities. This includes historical information such as corrective action open and completed items, current performance information such as facility performance parameters and observation program results, reports from past audits and self-assessments, and feedback from external groups. Thus, the process requires consideration of prior assessments.

Likewise, DOE-SR considers many of the same issues both during its development of the annual 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.

8. Status of any open issues identified in previous reports.

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

Attachment 14

Parsons Criticality Safety Program Annual Report

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

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

The project is currently scheduled for early startup in 2013. Therefore, the project has not progressed to the stage for metrics for criticality safety performance.

2. Status of Contractor Criticality Safety Engineer Program

The SWPF project has one full time engineer and one part time engineer for criticality safety staff. Both were qualified as Senior Criticality Safety Engineers in accordance with DOE-STD-1135. This staffing for a relatively small liquid waste processing facility is adequate.

3. Status of Federal Criticality Safety Oversight Program

DOE-SR has two federal employees assigned full time to the criticality safety program. One qualified Criticality Safety Engineer is acting as the DOE-SR Criticality Safety Program Manager while the other employee is in training for the Federal Technical Qualification for Criticality Safety. One qualified Criticality Safety Engineer working as a Facility Engineer provides some part time assistance and another qualified Criticality Safety Engineer working for NNSA provides assistance for facilities of concern for NNSA.

In January 2008, DOE-SR issued an updated *5-Year Workforce Management Plan, Fiscal Years 2008 – 2013*. The purpose of the plan to ensure DOE-SR has the appropriate skill mix to safely accomplish its mission. The plan specifically addresses federal NCS staffing and indicates DOE-SR requires four FTE positions. Criticality Safety Staffing is an issue for DOE-SR. DOE-SR currently has the authority and is actively seeking to hire a Criticality Safety Engineer.

4. Federal Assessments of Site NCS Programs

The SWPF Criticality Safety Program Description Document (CSPDD) was reviewed and approved by DOE-SR in late 2009. Additionally a review of a preliminary Nuclear Criticality Safety Evaluation (NCSE) has been performed.

Comments provided on the CSPDD document were resolved prior to approval. The review of the NCSE concluded that it was done in accordance with DOE-STD-3007-2007.

Criticality safety evaluations are deemed adequate based on the NCSE review.

5. New Facility Design

The SWPF project is a new facility design and requires a criticality safety program. The CSPDD which describes the Criticality Safety Program for the SWPF project has been reviewed and approved by DOE-SR. In 2008, a 90% design review was performed by DOE that included review of the Preliminary Documented Safety Analysis (PDSA). DOE comments were incorporated in Chapter 6 of the PDSA, which summarized the preliminary analysis (NCSE) results, important limits, and controls.

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

- Importance of getting criticality safety engineers involved early in the project
- Importance of determining credibility/noncredibility of a criticality accident

- Identification of a control strategy early in the project
- Importance of evaluating the functional classification of controls

6. Trending and Analysis of Reportable and Nonreportable Nuclear Criticality Occurrences

N/A

7. Follow-Up to Assessments

N/A

8. Status of any open issues identified in previous reports.

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