Department of Energy
Washington, DC 20585

February 5, 2014

The Honorable Peter S. Winokur
Chairman
Defense Nuclear Facilities Safety Board
625 Indiana Avenue, NW, Suite 700
Washington, DC 20004

Dear Mr. Chairman:

In your October 23, 2013, letter to Deputy Secretary Poneman, you requested a report and briefing that details the Program Secretarial Officer's assessment of the metrics relied upon in performing line oversight of criticality safety programs. The Office of Environmental Management (EM) has prepared a report on the following: (1) site metrics used; (2) how often metrics were changed; and (3) the usefulness of the metrics to line oversight. The report begins with a summary and includes 16 attachments (15 from EM contractors and one on behalf of the Office of Science) which provide the requested details.

EM will be sponsoring a special session on criticality safety metrics at the June 2014 meeting of the American Nuclear Society in an initiative to stimulate further discussion on the use of metrics.

We will schedule a briefing to discuss the attached report as soon as possible. If you have any questions, please contact me or Mr. Todd Lapointe, Director, Safety Management, at (202) 586-4653.

Sincerely,

Matthew Moury
Deputy Assistant Secretary for
Safety, Security, and Quality Programs
Environmental Management

Attachment

Attachment

Office of Environmental Management
Report on Nuclear Criticality Safety Metrics

In a letter dated October 23, 2013, the Defense Nuclear Facilities Safety Board requested a report on the metrics that the Department of Energy (DOE) relies upon in performing line oversight of criticality safety programs. Each of the Office of Environmental Management (EM) sites provided a report that addressed the following: (1) site metrics used; (2) how often metrics were changed; (3) the usefulness of the metrics to line oversight; and (4) if infractions comprised the sole metric, an explanation of why this was considered adequate. A summary is provided below, and the appendix, comprising input from 15 EM contractors and one from the Office of Science, provide the details.

What metrics are used?

Sites with fissile material nuclear operations use a variety of criticality safety-related metrics that are characterized as leading (providing insight to future results) or lagging (providing information on past activity). Monitoring non-conformances to criticality safety operational requirements can provide both types of metrics. The number of non-conformances or repeat non-conformances is a lagging indicator, while the proportion of operating personnel who find and report the non-conformances can be a leading indicator. Other metrics in common use include:

- Timely resolution of non-conformances (leading indicator);
- Progress towards program improvement milestones (leading indicator);
- Number of assessment findings (lagging indicator);
- Nuclear Criticality Safety (NCS) engineer training (leading indicator);
- NCS engineer staffing (lagging indicator);
- Percent of NCS engineer time in the field (leading indicator);
- Timely performance of required assessments (lagging indicator);
- NCS engineer professional development (leading indicator); and
- Number and type of DOE comments on contractor criticality safety evaluations (CSE); indicating the apparent quality of CSE (lagging indicator)

One site (Idaho) combines various metric elements into a set of indices covering incident severity, adversity, corrective action effectiveness, assessment effectiveness, and procedural compliance and tracks these as metrics. Facilities that are under construction use other metrics. One at Savannah River uses the professional NCS staffing level and the staff qualification as metrics. Another, the Waste Treatment and Immobilization Plant at Hanford, adds the following: (1) progress towards defined NCS program improvement milestones (leading indicator); (2) timely closure of assessment findings (lagging indicator); (3) timely performance of required assessments (lagging indicator); and (4) the number and type of DOE comments on preliminary Criticality Safety Evaluation Reports (lagging indicator).

How often are the metrics changed?

Some sites change metrics infrequently; others reevaluate and modify metrics on an annual basis.

What utility have the metrics provided?

Metrics are used to keep DOE site and program offices informed on contractor NCS performance and for early identification of criticality safety program areas needing attention. This is communicated formally and informally to the contractor. Both the Department and its contractors focus on needed NCS program upgrades, and some sites use metric data to determine contractor fee.

If only non-conformances are used, why is this adequate?

A few sites had such minimal NCS programs that using an expanded set of metrics would not be valuable.

Conclusion of EM oversight

Good and profitable use is made of metrics at EM sites, but more creativity should be shown. There is little crosstalk between sites on metrics and an overreliance on non-conformances. EM will be sponsoring a special session on criticality safety metrics at the June 2014 meeting of the American Nuclear Society in an initiative to increase discussion on the use of NCS metrics.

CH2M HILL Plateau Remediation Company

Site Office Manager: Matthew McCormick NCS POC: Paul Macbeth

1. What metrics are being used?

The CH2M Hill Plateau Remediation Company (CHPRC) Criticality Safety Program utilizes the following metric:

Number of non-comformances (lagging indicator). The number of non-conformances is reviewed to provide a measure of how actively staff are looking at operations. The level of criticality operations at each facility is taken into consideration when looking at this metric. The contractor's position is to encourage the identification of potential criticality safety non-conformances. If this number drops too low, the concern is that the staff is not adequately demonstrating a questioning attitude.

Other metric-like data used in evaluating and maintaining the CHPRC Criticality Safety Program include:

- *Timely identification and resolution of non-conformances (leading indicator).* Timely identification is defined as establishing a safe boundary from the issue, if associated with a facility condition, and completing a preliminary classification and documentation of the non-conformance within two hours of the identification of the criticality safety issue. While resolution of the non-conformance is tracked, its timeliness depends on several factors, making it difficult to establish criteria whereby the resolution may be judged as timely. Therefore, the resolution is judged on its technical merit to address the issue.

- *Type of criticality safety non-conformance (leading indicator).* The following types of criticality non-conformances are used to bin similar non-conformances together: failure to follow a procedure or control, inadequate Criticality Safety Evaluation Report (CSER) requirement implementation; incorrect assay, engineered safety feature failure, inadequate CSER, inadequate hazards assessment, lost or incorrect posting, and other. Binning non-conformances provides an early warning of potential trends.

- *Number of repeated or similar criticality safety non-conformances (lagging indicator).* The number of repeated or similar criticality safety non-conformances is tracked as part of the quarterly trending activity executed each year. If more than one of the same type of non-conformance occurs within a two-year period, the Criticality Safety Manager identifies a potential trend in the quarterly non-conformance trending work site assessments conducted each quarter. These non-conformances are evaluated to see if corrective actions are required to address a recurring issue.

- *Proportion of criticality safety non-conformances identified by workers, supervisors, criticality safety staff, Department of Energy (DOE) oversight, and external to DOE personnel, in decreasing order of desirability.* These data are gathered as part of the

potential criticality non-conformance response checklist documentation process and reviewed during the quarterly trending review of non-conformances.

- *Timely performance and documentation of required audits or assessments.* Criticality safety operational reviews and assessments are scheduled each year in the CHPRC Integrated Evaluation Plan. Operational reviews are required annually at each project. Programmatic assessments are conducted annually that address lines of inquiry (LOIs) selected from DOE-STD-1158-2010, *Self-Assessment Standard for DOE Contractor Criticality Safety Programs,* and tailored for CHPRC operations, and other programmatic criticality safety LOIs established in HNF-22632, *Process Description for Safety Management Program Implementation Verification.*

- *Systematic identification of, and action taken on, improvement issues.* The systematic identification of improvement issues occurs primarily through the execution of project and program assessments. Data collected from the Occurrence Reporting and Processing System database, the U.S. Nuclear Regulatory Commission, and lessons learned reports relevant to criticality safety are also distributed to all criticality safety staff and reviewed to identify opportunities to improve the program. All corrective actions, including opportunities for improvement, are captured in the CHPRC Condition Reporting and Resolution System, and all condition reports are tracked to closure.

2. How often are the metrics changed?

Metrics have been discussed periodically as part of the CHPRC Criticality Safety Center of Excellence, which was formally established in 2009. Over the years, several metrics have been suggested and evaluated; however, CHPRC believes that the number of nonconformances, along with the metric-like data collected, is most relevant to its criticality safety program.

3. What utility have the metrics provided?

The number of non-conformances remains a useful metric in that CHPRC encourages the reporting of issues at all levels. If the number were to drop below current levels, then there would be a concern that staff were not maintaining a questioning attitude. CHPRC also considers potential non-conformances that are later classified as a conforming condition when evaluating this metric. The amount of fissile work being performed within each project is also considered when evaluating this metric. This metric is routinely discussed with senior management.

Data on the number of repeated or similar criticality safety non-conformances have proven useful in the past to identify trends in non-conformances and resulted in the initiation of corrective actions to correct issues. An example of this utilization was a recurring posting and labeling issue at the Plutonium Finishing Plant in 2010 and 2011 that required corrective actions to mitigate. Other metrics are periodically evaluated as part of the Criticality Safety Center of Excellence, which meets several times each year.

Criticality safety metrics have not been used in fee determinations for CHPRC.

Washington Closure Hanford

Office Manager: Matthew McCormick NCS POC: Paul Macbeth

1. What metrics are used?

The Washington Closure Hanford (WCH) Criticality Safety Program utilizes the following metric:

Number of non-conformances (lagging indicator). The number of non-conformances is reviewed to provide a measure of how actively staff is looking at operations. The level of criticality operations at each facility is taken into consideration when looking at this metric. The WCH corrective action management system (CAMS) provides a mechanism to capture, track, and (in principle) create metrics on a spectrum of criticality safety-related issues that could arise at WCH. The CAMS system can record various criticality safety-related issues such as criticality requirement implementation non-compliances, procedure noncompliances, equipment or design nonconformances, independent assessment findings, and even relatively minor observations intended to improve procedure clarity or enhance compliance by operations. However, at present, WCH has no projects with Department of Energy (DOE) Order (O) 420.1C compliant criticality controls that could be the subject of nonconformance metrics. Only the 618-10 Burial Ground vertical pipe units (VPUs) and the 618-11 Burial Ground VPUs and Caissons are subject to the requirements in DOE O 420.1C, Chapter III. The criticality safety evaluation report for these facilities concludes that no criticality controls are required to ensure that conditions remain subcritical.

Other metric-like data that could be used in evaluating and maintaining the WCH Criticality Safety Program include:

- *Timely identification and resolution of non-conformances (leading indicator).* Timely identification is defined as establishing a safe boundary around the issue, if associated with a facility condition, and completing a preliminary classification and documentation of the non-conformance within two hours of the identification of the criticality safety issue. There have been no non-conformances in the WCH criticality safety program to track.

- A few WCH projects not subject to the requirements in DOE O 420.1C (i.e., 618-10 Burial Ground Trench Remediation, 618-11 Burial Ground Trench Remediation, and the Environmental Restoration Disposal Facility) have lower-level, defense-in-depth controls labeled Field Verification Requirements (FVRs). No FVR compliance issues have been recorded in CAMS. Only a few criticality safety program-related issues have been recorded in CAMS since 2007, and they fall under the category of Opportunity for Improvement (OFI). Most of the OFIs are suggested improvements to NS-1-1.1, *Washington Closure Hanford Criticality Safety Program*, and NS-1-2.2, *Criticality Safety Reviews*, resulting from a 2007 independent assessment. There are a few other OFIs related to procedure implementation at the 618-10 Burial Ground. The OFIs are relatively minor and infrequent, and have not risen to the level necessitating use of metrics for tracking or trending.

2. How often are the metrics changed?

Metrics are discussed periodically with the Richland Operations Office. No additional metrics have been identified that would provide more useful information concerning the health of the WCH Criticality Safety Program. The metric discussed above in Section 1 remains relevant to the WCH program.

3. What utility have the metrics provided?

The lack of nonconformances associated with the WCH Criticality Safety Program demonstrates that the program as implemented is robust and adequate for the very limited inventories associated with WCH facilities being remediated at Hanford.

Except as covered by general nuclear safety criteria, criticality safety metrics have not been used in fee determinations for WCH.

Bechtel National, Inc. – Waste Treatment and Immobilization Plant

Office Manager: Kevin Smith NCS POC: Tom Nirider

1. What metrics are being used?

- Progress towards program improvement milestones (leading indicator);
- Type of assessment findings (leading indicator);
- Timely closure of assessment findings (lagging indicator);
- Timely performance of required assessments (lagging indicator);
- Number and type of Department of Energy (DOE) comments on criticality safety evaluation reports (CSERs) and the quality of CSERs (lagging indicator);
- Number of assessment findings (lagging indicator); and
- CSE staffing and training (lagging indicator).

2. How often are the metrics changed?

Changes to these metrics are infrequent, although they are reexamined as the mission needs change and the Waste Treatment and Immobilization Plant (WTP) moves toward operational commissioning. Metrics are reviewed on a periodic basis by DOE criticality staff or after issuance of an assessment or criticality safety evaluation.

3. What utility have the metrics provided?

Judgment is used in combining each metric into an overall measure of performance. Biweekly criticality program status meetings serve to reinforce performance expectations with the contractors. Any identified weaknesses or trends identified by the DOE criticality staff are immediately communicated to the contractor. This communication may be formal or informal depending on the severity of the issue. In general, the contractor is appropriately responsive to discussions associated with suggested improvements.

Nuclear Criticality Safety Metrics

Washington River Protection Solutions –Tank Farms

Site Office Manager: Kevin Smith NCS POC: Tom Nirider

1. What metrics are being used?

- Timely identification and resolution of non-conformances (leading indicator);
- Progress towards program improvement milestones (leading indicator);
- Type of assessment findings (leading indicator);
- Type of non-conformances (leading indicator);
- Number of repeated non-conformances (lagging indicator);
- Timely performance of required assessments (lagging indicator);
- Number and type of Department of Energy (DOE) comments on contractor criticality safety evaluations (CSE) and the quality of CSE (lagging indicator);
- Number of assessment findings (lagging indicator); and
- Number of non-conformances (lagging indicator).

2. How often are the metrics changed?

Changes to these metrics are infrequent. Waste feed preparation and delivery operations, which were added to the currently authorized storage and retrieval operations, will affect the metrics. Metrics are reviewed by DOE criticality staff after identification of a non-conformance or after issuance of an assessment or CSE.

3. What utility have the metrics provided?

Judgment is used in combining each metric into an overall measure of performance. Biweekly criticality program status meetings serve to reinforce performance expectations with the contractor. Any identified weaknesses or trends identified by the DOE criticality staff are immediately communicated to the contractor. This communication may be formal or informal depending on the severity of the issue. For example, a review of a draft CSE identified a weak technical justification for the resultant conclusions. This was judged sufficient to be transmitted formally, requiring a formal response. These metrics are considered in Federal staff attendance at biweekly criticality safety staff meetings with the contractor, in quarterly contractor performance evaluations, and in year-end fee determinations.

DOE considers criticality safety performance in its evaluation of the contractor's nuclear safety performance, which is tied to approximately $1,400,000 in fee. Slow progress towards program improvement milestones negatively impacted the fiscal year 2013 year-end fee determination. In general, the Office of River Protection considers the contractor to be appropriately responsive to discussions associated with suggested improvements.

LATA Environmental Services of Kentucky Paducah

Site Office Manager: William Murphie NCS POC: Tom Hines

1. What metrics are being used?

- Number of Nuclear Criticality Safety (NCS) non-compliances (lagging indicator);
- Who identified the non-compliance: Operations or oversight? (leading indicator);
- The severity levels* of the non-compliances (leading indicator);
- Number of lessons learned from trends in noncompliances (leading indicator);
- Criticality safety engineer staffing and training (leading indicator);
- Percent of NCS engineer time in the field (leading indicator); and
- Timely performance of required assessments (lagging indicator).

2. How often are the metrics changed?

The metrics have not changed for more than seven years, as they have proven effective in monitoring the quality and health of the LATA Environmental Services of Kentucky (LATAKY) NCS program.

3. What utility have the metrics provided?

The LATAKY metrics are monitored by the Department of Energy Portsmouth/Paducah Project Office on a quarterly basis. The metrics are informally analyzed to determine if program improvements are needed. There have been no non-compliances in more than two years, and no corrective actions required from assessments in more than one year.

The LATAKY NCS metrics are not used as a part of the award fee determination.

* Levels 1-4, with 4 being the least severe; DOE reporting required for levels 1, 2, and 3.

Appendix
Nuclear Criticality Safety Metrics

Fluor-Babcock & Wilcox Portsmouth

Site Office Manager: William Murphie NCS POC: Tom Hines

1. What metrics are being used?

- Number of Nuclear Criticality Safety (NCS) non-compliances (lagging indicator);
- Who identified the non-compliance - Operations or oversight? (leading indicator);
- The severity levels* of the non-compliances (leading indicator);
- Number of lessons learned from trends in non-compliances (leading indicator);
- Criticality safety engineer staffing and training (leading indicator);
- Percent of NCS Engineer time in the field (leading indicator); and
- Timely performance of required assessments (lagging indicator).

2. How often are the metrics changed?

The metrics have not changed for more for three years, as they have proven effective in monitoring the quality and health of the FBP NCS program.

3. What utility have the metrics provided?

The Fluor-Babcock &Wilcox Portsmouth (FBP) metrics are monitored by the Department of Energy (DOE) Portsmouth/Paducah Project Office (PPPO) on a quarterly basis. The metrics are informally analyzed to determine if program improvements are needed.

There was an upward trend in non-compliances in spacing fissile containers that led to FBP issuing a lessons-learned bulletin to Operations. The majority of the non-compliances were reported by oversight and not by Operations. This area of non-compliance will be a review area for the fiscal year (FY) 2014 NCS assessment of FBP by PPPO. None of the FY 2013 non-compliances challenged double contingency, and all were scored at level 4* severity.

An improvement in responses by NCS Engineers to Operations in the field was noted in the metrics by DOE PPPO and also noted in discussions with Operations personnel. An adequate number of qualified NCS staff was also noted in the metrics and confirmed by timely and appropriate response in the field.

DOE oversight reviews of the FBP NCS program are performed each year through NCS assessments, periodic walkdowns, corrective action closeout reviews, NCS document reviews, periodic meetings, regularly scheduled teleconferences, and as a part of the annual safety basis update process.

The FBP NCS metrics are not used as a part of the award fee determination.

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* Levels 1-4, with 4 being the least severe; DOE reporting required for levels 1, 2, and 3.

Babcock &Wilcox Conversion Services Portsmouth/Paducah Project Office

Site Office Manager: William Murphie NCS POC: Tom Hines

1. What metrics are being used?

The Babcock & Wilcox Conversion Services, LLC (BWCS) Nuclear Criticality Safety (NCS) Program for Paducah and Portsmouth is a limited-scope program since production consists only of converting tails (non-enriched uranium) material. The BWCS NCS Program exists to prevent criticality safety issues involving cylinders that may contain enriched material in the uranium cylinder storage yards does not enter the production facilities and to ensure NCS in the storage yards. Therefore, there are no NCS metrics for BWCS at this time.

2. How often are the metrics changed?

Not applicable to BWCS.

3. What utility have the metrics provided?

Not applicable to BWCS.

Nuclear Criticality Safety Metrics

Idaho Cleanup Project CH2M*WG Idaho, LLC

Site Office Manager: James Cooper NCS POC: Kermit Bunde

1. What metrics are being used?

- The Nuclear Safety Severity Index (NSSI) is an index of severity of Occurrence Reporting and Processing System (ORPS) reports related to Technical Safety Requirement (TSR) violations, criticality safety events (i.e., loss of double contingency), or degradation of safety structures, systems, and components (SSCs). The 12-month average is within set goals.

- The Criticality Safety Adversity Index (CSAI) monitors criticality safety non-compliances as a weighted average based on the severity of the non-compliance. All non-compliances are trended from the most minor program noncompliance up to loss of double contingency. The 12-month average shows a negative trend and is slightly above the set goal. No common causes are identified at this time. Causes include poor equipment design, inadequate implementation, and human failure.

- The Corrective Action Effectiveness Index (CAEI) evaluates implemented corrective actions for recurring or repeat issues, quality of corrective actions, and timeliness of corrective actions. The 12-month average is within set goals.

- The Assessment Effectiveness Index (AEI) is an index that evaluates the timely completion of assessments, sources of issues (assessment, external, or event), and quality of assessments performed. The 12-month average is within set goals.

- The Procedure Compliance Element Index (PCI) is an index that measures the number of procedure violations entered into the Issue Communication and Resolution Environment (ICARE) database during the month. The 12-month average is within set goals.

- The conduct of operations performance indicator tracks and trends conduct of operations events and non-compliances, which provides a leading indicator of possible criticality safety violations. The 12-month average is within set goals.

2. How often are the metrics changed?

Metrics are changed as necessary to ensure that goals are realistic and challenging. Metrics are reviewed with the Executive Safety Review Board (ESRB) and revised as necessary, at least semiannually. Also, the Criticality Safety Manager monitors performance continually and may initiate changes to the metrics at any time. The Safety Performance Objectives, Measures, and Commitments (SPOMC) metrics are evaluated and reviewed as needed, or at least annually. Goals and metrics are approved by the Department of Energy (DOE) Idaho Operations Office.

3. What utility have the metrics provided?

Metrics are reviewed semiannually with the ESRB to determine program performance. Trends and issues are identified and discussed, and corrective actions identified during these reviews. Since other safety management programs (such as conduct of operations, maintenance, fire protection, and configuration management) could affect criticality safety, they have metrics as well, which are also reviewed with the ESRB. Improvement actions are identified and tracked at ESRB meetings.

DOE and the Defense Nuclear Facilities Safety Board have acknowledged that the 12-month rolling average serves as a leading indicator for all SPOMC metrics. These metrics provide a timely indication of program issues so that corrective actions can be taken.

- The NSSI is a lagging indicator.

- The CSAI is both a leading and lagging indicator. Tracking and trending of minor program non-compliances (such as expired training, missed assessments, or defense-in-depth criticality safety controls) provides a leading indicator to potentially more serious events where double contingency may be lost. This metric provides a timely indication of program issues so that corrective actions can be taken.

- The CAEI is a leading indicator. This metric evaluates implemented corrective actions for recurring or repeat issues, quality of corrective actions, and timeliness of corrective actions. Monitoring the effectiveness of corrective actions aids in preventing future infractions that could lead to loss of double contingency. This metric does provide a timely indication of program issues so that corrective actions can be taken.

- The AEI is a leading indicator. A robust assessment program strengthens the Criticality Safety Program by identifying strengths, weaknesses, and opportunities for improvement. Monitoring the effectiveness of assessments provides a leading indicator that strengthens the Criticality Safety Program. This metric does provide a timely indication of program issues so that corrective actions can be taken.

- The PCI is a leading indicator. Because a large percentage of criticality safety infractions are due to procedure compliance issues, monitoring procedure compliance across the board provides a leading indicator for future procedural non-compliances that could result in a loss of double contingency. This metric does provide a timely indication of program issues so that corrective actions can be taken.

- The Conduct of Operations performance metric that provides a leading indicator of possible criticality safety violations. This metric does provide a timely indication of program issues so that corrective actions can be taken.

The contract that CH2M*WG Idaho, LLC has with DOE is a cost-plus-incentive–fee contract that includes cost and schedule performance incentives. Metrics are not used as part of the fee

determination. There were no Conditional Payment of Fee actions taken during fiscal year 2013 that resulted from criticality safety performance issues.

Idaho Treatment Group – Advanced Mixed Waste Treatment Project

Site Office Manager: James Cooper NCS POC: Kermit Bunde

1. What metrics are used?

- The Advanced Mixed Waste Treatment Project (AMWTP) continues to track and trend all events and deficiencies that impact or potentially impact Nuclear Criticality Safety (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, AMWTP utilizes a lagging indicator metric, Nuclear Safety Index, for NCS issues. Department of Energy (DOE) Idaho Operations Office (ID) line management identified a negative trend of NCS violations in fiscal year (FY) 2013. In response, AMWTP initiated a Conduct of Operations Improvement Plan. This corrective action should preclude further issues. This metric is included in the Safety Performance Objectives, Measures, and Commitments (SPOMC) report.

- The Corrective Action Effectiveness Index measures the timeliness and effectiveness of corrective action implementation to prevent the recurrence of issues and events. This metric is included in the SPOMC report.

- The Assessment Effectiveness Index (AEI) measures the effectiveness of management assessments and worker feedback in identifying issues. The AEI includes completions of scheduled management assessments; evaluations of assigned risk levels for scheduled management assessments; and evaluations of sources of TrackWise issues relative to management assessments, worker feedback, and external assessments. This metric is included in the SPOMC report.

- The Integrated Safety Management System (ISMS) Work Control Performance Index is an index of severity and weighting factors that measures work performed in accordance with the AMWTP work control system and involves an ISMS work-control breakdown that results in an Occurrence Reporting and Processing System (ORPS) reportable event and non-reportable events. This metric is included in the SPOMC report.

2. How often are the metrics changed?

The SPOMC report metrics are evaluated and reviewed as needed, or at least annually. Goals and metrics are approved by ID. The SPOMC is updated monthly.

3. What utility have the metrics provided?

Metrics are reviewed monthly by Operations, Quality Assurance, and Nuclear Safety/Criticality Safety management. Trends are identified, and corrective action reports are initiated and tracked through Trackwise. Significant issues rise to the level of ORPS reportability.

These metrics are lagging indicators. In lieu of leading indicators, criticality safety staff attend planning meetings and review all process modifications prior to implementation. Lower-level criticality safety-related deficiencies (i.e., non-ORPS reportable) are addressed in fact-finding and management meetings, and corrective actions are also tracked through Trackwise. Trending of all criticality safety-related deficiencies is performed during the annual Criticality Safety Program assessment. These metrics provide timely indication of program issues so that corrective actions can be taken.

The contract that Idaho Treatment Group has with DOE is a cost-plus-award–fee contract that includes performance incentives. One Conditional Payment of Fee action during FY 2013 included issues with independent verification of drum labeling and failure to verify expert technical review of waste box data, and was related to compliance with criticality safety requirements:

- September 23, 2013: $150,000 reduction in fee due to Technical Safety Requirement-level violations, recurring events, and demonstrated lack of improvement in worker safety and health.

AMWTP has not determined effective leading indicators. The mission of the AMWTP is to process transuranic waste for shipment to the Waste Isolation Pilot Plant. This waste stream does not present a significant criticality risk. The use of a lagging indicator has provided sufficient indication of program health over the past several years and should continue to provide adequate indication of program health. AMWTP staff have reviewed metrics used at other sites, but have not identified any that will provide an increased indication of program health.

URS/CH2M Hill – Oak Ridge

Site Office Manager: Mark Whitney NCS POC: Jay Mullis

1. What metrics are used?

URS/CH2M Hill Oak Ridge (UCOR) uses unweighted, individual metrics to make qualitative determinations of its overall Nuclear Criticality Safety (NCS) program performance. The metrics used are:

Anomalous Conditions

This metric includes the number of new and total Anomalous Condition Reports (ACRs) by Project Organization, ACR severity levels (Levels 1-5, with 5 being the least severe), the severity level of all open ACRs by Project, the age of all open ACRs by Project, and the ACR Primary Causes. An increase in the number of lower severity level ACRs is a leading indicator that more severe non-compliances may be expected to occur. A number of ACRs with similar causes is a lagging indicator of potential issues within conduct of operations or other supporting safety management programs. Timely closure of ACRs (as reflected by the age of all open ACRs) is a leading indicator of project management and operations attention to NCS.

NCS Field Time and Continuing Education

This metric is the average number of field hours for each of the engineers in the NCS organization, and the total accumulated number of hours of continuing education amongst all engineers. These metrics are leading indicators of project management support of the NCS program, by encouraging NCS engineer presence in the field and continuing education/professional development of the NCS staff.

Surveillances

This metric measures timely performance of required NCS surveillances. The number of findings and anomalous conditions discovered during performance of the surveillances (if any) is also reported.

This metric is a lagging indicator of issues that affect the NCS program (e.g., discovery of pre-existing non-conformances or management inattention to the NCS program, thereby causing overdue surveillances).

2. How often are the metrics changed?

The metrics are rarely changed, as they have proven effective in monitoring the quality and health of the NCS program.

3. What utility have the metrics provided?

The UCOR metrics are routinely monitored by the Department of Energy field office (frequency of monitoring is between quarterly to semiannually). The metrics are informally analyzed to determine where program improvements may be warranted. No adverse programmatic trends or programmatic strengths or weaknesses were identified during this reporting period. As a result, no improvement actions have been directed. However, the contractor identified similar or common causes in several of the ACRs involving noncompliance with procedures or work packages. The UCOR NCS staff met with all of the decontamination and decommissioning fissile material workers and reiterated basic NCS controls, the proper use of safe geometry containers, and the need for compliance with procedure and work documents.

The use of metrics as leading/lagging indicators is discussed in Item 1 above. Indications from the metrics (particularly anomalous condition metrics) allow timely response to potential program weaknesses so that preventive actions or corrective actions can be taken as needed.

These metrics are not used in fee determinations.

Isotek Systems, LLC – Oak Ridge

Site Office Manager: Mark Whitney NCS POC: Jay Mullis

1. What metrics are being used?

Isotek uses unweighted, individual metrics to make qualitative determinations of its overall Nuclear Criticality Safety (NCS) program performance. The metrics used are:

- *Number and severity level (Levels 1-5, with 5 being the least severe) of Condition Reports (CRs) with NCS implications.* The CR System is the issues and corrective actions tracking system. An increase in the number of lower severity level CRs is a leading indicator that more severe noncompliances may be expected to occur.

- *Timely closure of CRs.* Timely closure of CRs is a leading indicator of project management and operations attention to NCS.

- *Self-reporting of CRs by Operations.* The number of CRs self-reported by Operations is a leading indicator of Operations personnel's understanding of NCS requirements and attention given to the NCS program.

- *Completed NCS surveillances of operations and NCS assessments.* Along with unsatisfactory conditions metric discussed below, this metric is a lagging indicator of issues that affect the NCS program (e.g., management inattention to the NCS program, thereby causing overdue surveillances).

- *Number and status of unsatisfactory surveillance or assessment conditions.* Along with the NCS surveillance metric discussed above, this metric is a lagging indicator of issues that affect the NCS program (e.g., discovery of pre-existing nonconformances).

- *NCS engineer professional development activities.* This metric is a leading indicator of project management support of the NCS program by encouraging continuing education and professional development of the NCS staff.

2. How often are the metrics changed?

The metrics are rarely changed, as they have proven effective in monitoring the quality and health of the NCS program.

3. What utility have the metrics provided?

The Isotek metrics are routinely monitored by the Department of Energy field office (quarterly to semiannually). The metrics are informally analyzed to determine where program improvements may be warranted. No adverse programmatic trends or programmatic strengths or weaknesses were identified during this reporting period. As a result, no improvement actions have been directed.

The use of metrics as leading/lagging indicators is discussed in Item 1 above. Indications from the metrics (particularly anomalous condition metrics) allow timely response to potential program weaknesses so that preventive actions and corrective actions can be taken as needed.

Metrics are not used in fee determinations.

Wastren Advantage, Inc. – Oak Ridge Transuranic Waste Processing Center

Site Office Manager: Mark Whitney NCS POC: Jay Mullis

1. What metrics are being used?

Wastern Advantage Inc. (WAI) applies a Department of Energy (DOE) approved, graded approach to the Transuranic Waste Processing Center (TWPC) Nuclear Criticality Safety (NCS) program. As such, only anomalous condition NCS metrics are employed. Anomalous conditions are tracked according to cause and days to closure. Tracking based on cause helps identify weak areas in the program, and tracking days to closure measures management attention to resolving NCS issues.

Occurrences of NCS anomalous conditions at WAI have been extremely infrequent. None were identified during this reporting period. Therefore, no trending analysis can be done. Also, no programmatic strengths or weaknesses were identified during this reporting period, and no improvement actions have been directed.

2. How often are the metrics changed?

The metrics are rarely changed, as they have proven effective in monitoring the quality and health of the graded-approach NCS program.

3. What utility have the metrics provided?

The infrequency of anomalous conditions at the TWPC is such that the anomalous conditions are reviewed as they occur, and trending and analysis of them is not currently practical.

Metrics are not used in fee determinations.

4. Discuss using only infraction rate as a metric.

The graded approach NCS program applied by WAI at the TWPC, as approved by Oak Ridge Environmental Management Office, warrants the use of NCS anomalous condition causes and days to closure as the only required metrics. This provides an adequate measure of the effectiveness of the TWPC NCS program.

Savannah River Nuclear Solutions (SRNS)

Site Office Manager: Dr. David Moody NCS POC: Connie Blanton

1. What metrics are being used?

Data related to the following parameters are collected and analyzed for Savannah River Nuclear Solutions (SRNS) facilities:

- Number of non-conformances (lagging indicator);
- Type of non-conformances (leading indicator);
- Severity level of criticality safety non-conformances (leading indicator);
- Number of self-initiated tracking/verification non-conformances (leading indicator); and
- Proportion of criticality safety non-conformances identified by various sources (e.g., through self-evaluation, the Occurrence Reporting and Processing System (ORPS) database, Readiness Assessment (RA), Department of Energy (DOE)) (leading indicator).

Additional parameters monitored to assess the health of the SRNS NCS program include:

- Criticality safety engineering staff level (leading);
- Criticality safety staff qualification level (leading);
- Number and type of Savannah River (SR) comments identified during NCS evaluations (NCSEs) and safety basis document reviews (leading); and
- Number and type of SR findings or opportunities for improvement during criticality safety-related activity assessments (leading).

2. How often are the metrics changed?

Prior to fiscal year (FY) 2013, a composite metric, based on significance-weighted infraction data, was used as the primary indicator of criticality safety performance at Savannah River Site. In FY 2013, an initiative was begun to develop a more comprehensive set of metrics, one including both leading and lagging indicators. As part of this effort, SRNS NCS staff developed an electronic workbook that provides comparison and trending charts based on Site Tracking and Reporting data to facilitate the monitoring of criticality safety performance in SRNS facilities. Further development of data collection and analysis processes is anticipated throughout FY 2014 and into FY 2015, including the incorporation of additional data sources.

3. What utility have the metrics provided?

The criticality safety metrics workbook is provided to SR criticality safety staff on a monthly basis for detailed review, and performance measurement is included as a regular topic in the SR/SRNS criticality safety monthly interface meeting to facilitate early identification and communication of potential performance concerns.

The expanded analysis of criticality safety-related non-conformance and issue tracking data has afforded greater insight into the distributions of non-conformances and tracking issues across severity classifications, facilities, functional types, and identification sources (internal and external), supporting broad conclusions regarding aspects of NCS program health. The analysis helped to inform the criticality safety performance evaluation process, supplementing the conclusions drawn during assessments of criticality safety documents and activities throughout the year.

Savannah River Remediation

Site Office Manager: Dr. David Moody NCS POC: Connie Blanton

1. What metrics are being used?

Data related to the following parameters are collected and analyzed for Savannah River Remediation (SRR) facilities:

- Number of non-conformances (lagging indicator);
- Type of non-conformances (leading indicator); and
- Self-assessment performance (leading indicator).

Additional parameters monitored to assess SRR Nuclear Criticality Safety (NCS) program health include:

- Criticality safety engineering staff level (leading);
- Criticality safety staff qualification level (leading);
- Number and type of Department of Energy Savannah River (SR) comments identified during Nuclear Criticality Safety Evaluations (NCSEs) and safety basis document reviews (leading); and
- Number and type of SR findings and opportunities for improvement during criticality safety-related activity assessments (leading).

2. How often are the metrics changed?

Prior to fiscal year (FY) 2013, a composite metric, based on significance-weighted infraction data, was used as the primary indicator of criticality safety performance at Savannah River Site. In FY 2013, an initiative was begun by Savannah River Nuclear Solutions (SRNS) to develop a more comprehensive set of metrics. Initial efforts in this area produced an electronic workbook that provides comparison and trending charts based on Site Tracking and Reporting data to facilitate the monitoring of criticality safety performance in SRNS facilities. Inclusion of SRR facilities data in that workbook or development of a similar workbook for SRR facilities will be considered as an improvement to existing SRR metrics in FY 2014.

3. What utility have the metrics provided?

The criticality safety metrics is included as a regular topic in the SR/SRR criticality safety monthly interface meeting to facilitate early identification and communication of potential performance concerns.

Parsons – Salt Waste Processing Facility

Site Office Manager: Dr. David Moody NCS POC: Connie Blanton

1. What metrics are being used?

The Salt Waste Processing Facility (SWPF) project is currently in the construction phase and has not yet commenced hot operations. There are non-conformance or self-assessment data to collect, and the development of Nuclear Criticality Safety (NCS) evaluations is limited; therefore, quantitative performance metrics have not been developed. Parameters monitored to assess Parsons' NCS program health include:

- Criticality safety engineering staff level (leading); and
- Criticality safety staff qualification level (leading).

2. How often are the metrics changed?

When SWPF becomes operational, it is expected that performance metrics comparable to those used at other Savannah River Site liquid waste processing facilities will be utilized.

Pacific Northwest National Laboratory – Pacific Northwest Site Office

Site Office Manager: Roger Snyder NCS POC: Joe Christ

1. What metrics are being used?

The Department of Energy (DOE) Pacific Northwest Site Office (PNSO) has utilized a series of specific metrics to monitor contractor criticality safety performance of Building 325 at Pacific Northwest National Laboratory (PNNL). These metrics are graded primarily due to the current security posture preventing Building 325 from possessing any significant quantity of fissile material. Consistent with the requirements in American National Standard Institute/American Nuclear Society 8.19, *Administrative Practices for Nuclear Criticality Safety,* PNSO relies primarily on DOE facility safety directives implemented through the contract and the contractor's assurance system as the primary methods for monitoring oversight of the PNNL criticality safety program. PNSO ensures satisfactory safety performance of the PNNL Nuclear Criticality Safety (NCS) program by the following mechanisms:

- DOE led triennial NCS program assessments: the number and status of nonconformances is a documented performance criterion in periodic program and line manager assessments. Timely closure of issues and their recurrence and severity are tracked and managed in the PNNL issues management system;

- DOE led annual criticality alarm system Safety System Oversight assessments performed by an individual qualified to DOE-STD-1173-2009, *Criticality Safety Functional Area Qualification Standard*;

- Biweekly nuclear safety interface meetings with PNNL. At these meetings, PNNL actions to address DOE criticality safety assessment findings and other issues are tracked and discussed;

- Assignment of a full-time Facility Representative to Building 325 to oversee fissile material handling activities, training, general conduct of operations, and criticality safety program walkthroughs;

- Review and approval by DOE of PNNL's Criticality Safety Program Description; and

- Monitoring of criticality safety infractions and violations, neither of which has occurred within the past year.

2. How often are the metrics changed?

All of the above metrics are used and do not change; however, additional oversight of the criticality safety program is warranted if PSNO determines criticality safety performance has diminished. In light of the NCS staffing issues at the Los Alamos National Laboratory within

the past year, PNSO will also be including depth and qualifications of contractor criticality safety engineers as a new metric.

3. What utility have the metrics provided?

The metrics are used to determine the necessary degree of oversight by PNSO.