**DEFENSE NUCLEAR FACILITIES SAFETY BOARD**
Washington, DC 20004-2901

August 7, 2020

The Honorable Dan Brouillette
Secretary of Energy
US Department of Energy
1000 Independence Avenue, SW
Washington, DC 20585-1000

Dear Secretary Brouillette:

The enclosed Technical Report, DNFSB/TECH-45, *Violations of the Nuclear Safety Basis*, discusses implementation of technical safety requirements (TSRs) at defense nuclear facilities, specifically declaration and reporting of violations. The report analyzes events and issues from defense nuclear facilities across the complex related to TSR violations, and highlights several root cause issues. This report is provided for your information and use.

Furthermore, on June 11, 2020, the Department of Energy responded to Defense Nuclear Facilities Safety Board Recommendation 2020-1, *Nuclear Safety Requirements*, which is intended to strengthen DOE's regulatory framework. Sub-recommendation 4.d of Recommendation 2020-1 addressed elevating key guidance on TSRs to clearly identified requirements. Your response to this sub-recommendation stated that DOE was aware the Board was reviewing implementation of TSRs in the DOE complex and that DOE looked forward to considering the results of the review to inform DOE's path forward on sub-recommendation 4.d. DNFSB/TECH-45 presents the results of this review and outlines potential areas for DOE improvements to address the root cause issues.

The Board is continuing its review of DOE's response to Recommendation 2020-1.

Yours Truly,

Bruce Hamilton
Chairman

Enclosure

c: Mr. Joe Olencz

# Violations of the Nuclear Safety Basis

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## Defense Nuclear Facilities Safety Board

## Technical Report


## May 2020

# Violations of the Nuclear Safety Basis

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## EXECUTIVE SUMMARY

On February 21, 2020, the Defense Nuclear Facilities Safety Board issued Recommendation 2020-1, *Nuclear Safety Requirements*, which was intended to strengthen the Department of Energy's regulatory framework. Specifically, sub-recommendation 4.d stated that key guidance on technical safety requirements (TSR) should be elevated to clearly identified requirements, either in a DOE order or via inclusion in 10 CFR 830. This technical report describes the impact of a lack of such requirements. Specifically, it describes differing interpretations across the complex by DOE and contractor personnel on precisely what constitutes a violation of TSRs, and more generally, what constitutes a violation of the nuclear safety basis. Violations represent periods of time when a facility is not operating in compliance with its safety basis, and therefore is operating outside of the risk envelope approved by DOE.

Due to the importance of recognizing when this occurs, the staff initiated a complex-wide review on this topic, focusing on evaluating DOE and contractor implementation of DOE directives related to TSRs, TSR violation criteria, and occurrence and reporting processing system (ORPS) reportability. The staff analyzed the collected data to assess the adequacy of applicable DOE directives in supporting safe operation of defense nuclear facilities.

Based on the staff's analysis, detailed throughout this report, the staff identified two fundamental concerns:

1. *The current DOE directives framework for TSR implementation provides limited guidance and narrow federal authority.*

   10 CFR 830 contains the requirement that TSR violations be reported to DOE, but contains no other requirements concerning TSR violations. The criteria for TSR violations and other guidance on TSRs is found in a DOE guide, which contains no requirements, rather than an order that would be more appropriate for defining requirements. During the course of the review, the majority of sites stated that since DOE Guide 423.1-1B was only a guide, they are authorized to develop alternative approaches. Additionally, DOE personnel also stated that the lack of requirements limited their ability to challenge the content and structure of proposed TSRs. Clear requirements enable DOE personnel responsible for approving TSRs to more easily hold contractors to an appropriate standard for TSR development. Finally, due to a lack of requirements, decisions in the field about what constitutes a violation can sometimes be expert-based rather than standards-based, resulting in various interpretations based on the site and experience of personnel.

   In addition to a lack of requirements, current TSR guidance is vague or contains gaps. In some cases, the vague guidance has led to differing interpretations across the complex, resulting in inconsistencies in how violations of the safety basis are addressed and reported. In other cases, the directives contain little to no guidance on certain key concepts, which has led contractors to develop guidance more appropriately provided by DOE.

2. *DOE does not ensure that all operations outside the approved safety basis are recognized and addressed.*

According to Title 10 CFR 830.201, contractors at DOE nuclear facilities "must perform work in accordance with the safety basis…in particular, with the hazard controls that ensure adequate protection of workers, the public, and the environment" [1]. Any time a contractor operates a facility outside its approved safety basis, the contractor is incurring risk beyond what DOE has accepted. Ultimately, in its role as owner and regulator of nuclear facilities, it is incumbent upon DOE to ensure that contractors fulfill the requirement to operate in compliance with their approved safety basis.

The staff has identified areas in which operations outside the approved safety basis are not always recognized and reported as violations. Specifically, the staff found this to be the case primarily with the current approach to time of declaration, as well as the approach at some sites for specific administrative controls, violations of safety basis initial conditions and assumptions, and surveillance requirements. In these areas, the staff has found allowance for facilities to operate for potentially unlimited periods of time outside of their approved safety bases, which undermines the primary method DOE uses to ensure adequate protection – by ensuring contractors operate facilities consistent with approved safety bases.

It is important to note that the issues discussed throughout this report were primarily the result of the lack of clear requirements and guidance provided by DOE. Personnel across the complex were focused on safety and wanted to properly implement the nuclear safety basis. However, to ensure operation of defense nuclear facilities does not incur undue risk, DOE should strengthen its requirements and guidance concerning implementation of the nuclear safety basis.

This technical report begins by explaining the fundamental concepts related to implementation of the nuclear safety basis, and the importance of recognizing and reporting when a facility violates its safety basis. Following the background section, the report goes through each of the areas analyzed. These sections provide additional detailed background information, data related to the topic collected from across the complex, and, where applicable, discuss related Nuclear Regulatory Commission guidance, which helped to inform the staff analysis. Finally, the report presents the overall concerns and analysis in greater detail.

Overall concerns identified in this report that should be addressed by DOE can be summarized as follows:

- Violations of the nuclear safety basis are not currently defined as any operation outside of the approved safety basis,
- DOE lacks specific requirements related to violations of the nuclear safety basis,
- DOE lacks guidance in DOE directives in areas such as operability determinations, time of discovery, and treatment of design features, and

- ORPS reporting criteria do not address all violations of the nuclear safety basis, and other issues related to implementation of the approved safety basis.

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## BACKGROUND

Title 10 Code of Federal Regulations (CFR) Part 830, Subpart B, *Safety Basis Requirements*, requires the contractor responsible for a Department of Energy (DOE) nuclear facility to analyze the facility, the work to be performed, and the associated hazards. The rule then requires the contractor to identify the conditions, safe boundaries, and hazard controls necessary to protect workers, the public, and the environment from adverse consequences. These analyses constitute the safety basis upon which the contractor and DOE rely to conclude that the contractor can operate the facility safely. The contractor submits the safety basis to DOE for review and approval. Appendix A of 10 CFR 830, Subpart B, states, "Performing work consistent with the safety basis provides reasonable assurance of adequate protection of workers, the public, and the environment" [1]. Noncompliance with the safety basis undermines adequate protection.

In order to operate a facility consistent with the safety basis, the contractor develops technical safety requirements (TSR), which are part of the approved safety basis. TSRs are the instructions for operating the facility safely, written primarily for operations personnel responsible for operating the facility. Compliance with TSRs ensures that facilities maintain important operating parameters within approved and acceptable limits, and that safety structures, systems, and components (SSC) and administrative controls are available and able to perform their intended safety functions under normal, abnormal, and emergency conditions. TSRs include:

- Safety limits[1],
- Limiting control settings (LCS)[1],
- Limiting conditions for operations (LCO),
- Surveillance requirements,
- Specific administrative controls (SAC),
- Programmatic administrative controls (e.g., safety management programs), and
- Design features.

Additionally, compliance with the approved safety basis includes compliance with *all* elements of the nuclear safety basis, which encompasses TSR controls; controls identified in a DOE approved safety evaluation report (SER); justification for continued operation (JCO); an evaluation of the safety of the situation (ESS); and all documented safety analysis (DSA) and basis for interim operations assumptions and initial conditions.

### DOE Requirements for TSRs

In the 1990s, DOE maintained requirements for TSRs in DOE Order 5480.5, *Safety of Nuclear Facilities*, and DOE Order 5480.22, *Technical Safety Requirements*. Using DOE Orders to establish requirements highlighted the importance of TSRs. DOE Order 5480.5 required the identification of operational safety requirements and setting general limits for safe operation.

[1] Safety limits and LCSs rarely appear in DOE facilities' TSRs, and therefore were not part of the staff's review. The report does not discuss these further.

DOE Order 5480.22 required more formalized, structured, and detailed safety controls in the form of TSRs. In the early 1990s, DOE proposed revising its directives system to establish more of its nuclear safety requirements in a federal rule. The December 9, 1991, notice of proposed rulemaking for 10 CFR 830 stated:

> *During the past several years, DOE has made a concerted effort to review and improve all aspects of DOE operations and facility safety. This effort was a result of concerns about facility aging, specific operational occurrences, the formality with which DOE operations were conducted, and the rigor and consistency with which DOE Orders were implemented.*
>
> *The results of this effort highlighted several areas warranting review, including…specific guidance for nuclear facilities, and for a better system for assessing the adequacy of implementation of specific requirements.* [2]

In February 2001, DOE finalized the 10 CFR 830 rule and moved some of the existing general TSR requirements from DOE orders into the rule. DOE then canceled the existing DOE orders related to TSRs and developed additional DOE directives to aid with implementing the rule's requirements and expectations, but these directives did not contain additional requirements. 10 CFR 830.205 contains the following requirements related to TSRs:

> *§ 830.205 Technical safety requirements.*
>
> *(a) A contractor responsible for a hazard category 1, 2, or 3 DOE nuclear facility must:*
>
> *(1) Develop technical safety requirements that are derived from the documented safety analysis;*
>
> *(2) Prior to use, obtain DOE approval of technical safety requirements and any change to technical safety requirements; and*
>
> *(3) Notify DOE of any violation of a technical safety requirement.* [1]

Appendix A to 10 CFR 830, Subpart B describes DOE's expectations for the safety basis requirements of 10 CFR 830, acceptable methods for implementing these requirements, and criteria DOE will use to evaluate compliance with these requirements. Appendix A to 10 CFR 830, Subpart B does not create any new requirements. The appendix states, "DOE Guide 423X, *Implementation Guide for Use in Developing Technical Safety Requirements,* provides a complete description of what technical safety requirements should contain and how they should be developed and maintained" [1]. However, DOE Guide 423.1-1B contains no requirements unless contractually obligated by DOE. Thus, the only current requirements related to TSRs are those three requirements highlighted earlier in 10 CFR 830.205.

**Development of TSRs**

Developing an adequate safety basis requires developing clear boundaries of initial conditions, assumptions, and hazard controls that are relied upon to ensure safe operation. These

boundary conditions provide an operational framework within which to safely operate, and should be flowed into the TSRs. DOE Standard 3009-2014, *Preparation of Nonreactor Nuclear Facility Documented Safety Analysis*[2], provides DOE expectations for developing a contractor's safety basis at nonreactor nuclear DOE facilities, which includes guidance on selecting a control set and developing TSRs for those controls.

Most DOE sites currently implement the 1994 version (with subsequent change notices) of DOE Standard 3009. This is due to the fact that the majority of site contractors are working under contracts that have not been updated to require meeting the 2014 version of the standard. Regarding identification of controls in the TSRs, DOE Standard 3009-94 states on page 8:

> *In accordance with nuclear safety precepts, a special level of control is provided through use of TSRs. DOE Guide 423.1-1 provides screening criteria for converting existing Technical Specifications and Operational Safety Requirements into TSRs. For the purposes of this Standard, the screening criteria are considered a generally reasonable set of criteria to designate TSRs for defense in depth. The safety items identified in the hazard analysis are examined against those criteria to identify a subset of the most significant controls that prevent uncontrolled release of hazardous materials and nuclear criticality.* [3]

Regarding the application of the graded approach to the identification of TSRs, DOE Standard 3009-94 states on page 64:

> *The application of graded approach for TSR designation is, however, still significant. Hazard Category 2 facilities include process operations that have traditionally made limited use of TSR limits. These facilities have few scenarios where one failure directly leads to large hazardous material releases, and therefore do not warrant a large number of TSRs. Defaulting all controls to TSR coverage will create a regulatory environment that is difficult to manage and would downplay needed emphasis on the most significant controls. This could produce a negative impact on facility safety.* [3]

This guidance allows the contractor to place a subset of approved nuclear safety basis initial conditions, assumptions, and hazard controls into TSRs, while leaving some without TSR-level controls. Further, the screening guidance in DOE Guide 423.1-1B allows for flexibility in determining which initial conditions, assumptions, and hazard controls should be elevated to the TSRs.

In contrast, the 2014 version of DOE Standard 3009 specifies that all specific attributes of every safety class and safety significant nuclear safety control that requires protection should be identified and described by TSRs. DOE Standard 3009-2014 no longer contains the screening

[2] DOE Standard 3009-94, Change Notice 3, has the title *Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Documented Safety Analyses*.

language from previous versions, and additionally emphasizes protecting significant assumptions with TSR controls.[3]

TSRs are the primary mechanism by which operations personnel are aware of controls. Therefore, the 2014 version of DOE Standard 3009 represents an improvement in the level of DOE's expectation regarding the elevation of all credited controls to the TSRs, and the protection of significant assumptions. However, DOE does not contractually require the use of the 2014 version of DOE Standard 3009 at most sites. Nevertheless, regardless of whether or not all initial conditions, assumptions, and hazard controls are elevated to the TSRs, operating the facility in compliance with its safety basis requires compliance with *all* of these elements.

DOE Standard 1104-2016, *Review and Approval of Nuclear Facility Safety Basis and Safety Design Basis Documents*, contains DOE federal requirements for approving a contractor's safety basis, including TSRs. The standard requires DOE to ensure that "TSRs provisions are clear, implementable and consistent with DOE G 423.1-1B" [4]. However, even though DOE Standard 1104 invokes DOE Guide 423.1-1B, DOE guides do not contain any requirements; therefore, contractor personnel will sometimes deviate from the guidance contained in them. Additionally, because DOE Guide 423.1-1B does not contain any requirements, it is more difficult for DOE personnel to consistently ensure implementation of the language contained in the guide when approving a safety basis in accordance with DOE Standard 1104. There are diverse facilities and missions across the DOE complex, and thus flexibility needs to be allowed in the development of controls contained in the TSRs. However, in a similar manner to the development of a documented safety analysis, the overall structure, content, and mechanisms for implementing TSRs should be consistent across the complex to ensure operations remain within the boundaries of the safety analysis. As shown in the report, the lack of clearly defined requirements has contributed to inconsistent implementation and reporting of events in which facilities operated outside of the safety basis.

**Violations of the Nuclear Safety Basis**

10 CFR 830.205(a)(3) requires contractors to "notify DOE of any violation of a technical safety requirement" [1]. However, the rule does not define the criteria for a TSR violation, and is silent on violations of the nuclear safety basis outside of TSRs. Additionally, DOE Standard 3009 is mostly silent regarding TSR violations, and DOE Standard 1186-2016, *Specific Administrative Controls*, only states that a violation of a directive action SAC is a TSR violation [5]. Therefore, nearly all DOE guidance on TSR violations comes from DOE Guide 423.1-1B, which only contains limited guidance on TSR violations:

*Violations of a TSR occur as a result of the following four circumstances:*

- *Exceeding an SL [safety limit].*

[3]Several statements from DOE Standard 3009-2014 support this expected TSR coverage, including: "the initial conditions and assumptions for the analysis are required to be documented and evaluated to determine if controls need to be put in place to ensure the evaluation will remain valid," and "The accident analysis relies upon well-founded assumptions that are protected at a level commensurate with their importance. TSRs are used to protect the validity of significant assumptions" [33].

- *Failure to complete an action statement within the required time limit following exceeding an LCS or failure to comply with an LCO.*
- *Failure to perform a surveillance within the required time limit.*
- *Failure to comply with an AC [administrative control] statement.* [6]

Additionally in terms of formal requirements, DOE uses DOE Order 232.2A, *Occurrence Reporting and Processing of Operations Information*, to require contractors to report all "TSR and other hazard control violations" to DOE [7]. Specifically, TSR and other hazard control violations are reportable under occurrence reporting and processing system (ORPS) criteria Group 3A in Attachment 2 of DOE Order 232.2A. DOE maintains ORPS to inform DOE personnel of significant events and to promote organizational learning in the complex, both of which are important with respect to TSR and other nuclear safety basis violations. The order contains no further requirements related to TSRs.

**DOE Enforcement of the Safety Basis**

Once nuclear safety basis violations are identified, DOE has clear and comprehensive enforcement mechanisms it can exercise. This enforcement process is described in 10 CFR 820, *Procedural Rules for Nuclear Activities*, which was created in part in response to the Defense Nuclear Facilities Safety Board's (Board) Recommendation 91-1, *Strengthening the Nuclear Safety Standards Program for DOE's Defense Nuclear Facilities*.

In DOE's response to the Board's Recommendation, DOE stated "A draft Rule, 10 CFR 820, has also been prepared by DOE to articulate the Department's enforcement process which could result in civil penalties for contractor violations of Technical Safety Requirements depending on the safety significance involved. Violations of Technical Safety Requirements will subject contractors to potential civil penalties" [8]. For many years, 10 CFR 820 specifically mentioned TSRs, until DOE instituted the broader more inclusive term, "nuclear safety requirements." This history simply highlights the importance of DOE enforcing compliance with the safety basis to ensure safe operation of facilities.

**Staff Review Scope and Strategy**

Through the Board's oversight activities[4], the staff became aware of differing interpretations across the complex from DOE and contractor personnel on precisely what constitutes a violation of the TSRs, and more generally, a violation of the nuclear safety basis. Due to the importance of correctly recognizing when violations occur, the staff initiated a complex-wide review on this topic.

The review focused on evaluating DOE and contractor implementation of DOE directives related to TSRs, TSR violation criteria, other nuclear safety basis violations, and ORPS reportability. The Board's staff analyzed the collected data to assess the adequacy of applicable DOE directives in supporting safe operation of defense nuclear facilities. The analysis focused

[4] Board Letter, *Conduct of Operations Safety Management Program at the Savannah River Site*, January 4, 2018.

on inconsistent implementation areas that could lead to underreporting of nuclear safety basis violations. The review's lines of inquiry (LOI) focused on site-specific procedures, facility TSRs, and other site guidance related to TSR implementation, including declaration of TSR violations. Additionally, LOIs focused on events related to safety basis implementation, the majority of which were ORPS reportable events over the last two to three years. These ORPS reportable events tripped some threshold of ORPS criterion (most often Group 3A).

From August 2019 through October 2019, the staff interacted with personnel at the following federal and contractor entities:

- **Y-12 National Security Complex**
  - Consolidated Nuclear Security, LLC
  - National Nuclear Security Administration (NNSA) Production Office
- **Savannah River Site**
  - Savannah River Remediation
  - Savannah River Nuclear Solutions
  - DOE Savannah River Operations Office
  - NNSA Savannah River Field Office
- **Pantex Plant**
  - Consolidated Nuclear Security, LLC
  - NNSA Production Office
- **Los Alamos National Laboratory (LANL)**,
  - Triad National Security, LLC
  - Newport News Nuclear BWXT-Los Alamos, LLC
  - NNSA Los Alamos Field Office
  - Environmental Management Los Alamos Field Office
- **Hanford Site**
  - Hanford Richland Operations Office
  - Hanford Office of River Protection
  - CH2M Hill Plateau Remediation Company
  - Washington River Protection Solutions

Additionally, the staff attended DOE's National Training Center pilot course, *SBA-240 Technical Safety Requirements Review,* in November 2019. This pilot course interaction aided the staff's understanding of how DOE training is used to provide additional clarity and guidance on implementing DOE requirements. The staff also reviewed guidance from the Nuclear Regulatory Commission (NRC) as a basis for comparison. The purpose of reviewing current NRC guidance is not to endorse NRC methodology for use by DOE, but rather to understand how another federal agency with comparable processes is meeting similar challenges.[5]

[5] DOE Guide 423.1-1B Section 1.3 states, "Many of the concepts found in this rule [10 CFR 830] are based on regulatory approaches developed by the Atomic Energy Commission and later by the Nuclear Regulatory Commission (NRC). Those familiar with NRC's safety regulations will note that DOE's documented safety analysis (DSA) parallels NRC's safety analysis report. Similarly, DOE's TSRs parallel NRC's technical specifications" [6].

## COMPLETION TIMES AND TIME OF DECLARATION

### Background

As stated in Appendix A to Subpart B of 10 CFR 830, TSRs "are developed to ensure the operability of the safety structures, systems, and components and define actions to be taken if a safety structure, system or component is not operable" [1]. The mitigated consequence analysis in the DSA assumes that all safety SSCs are operable and perform their credited safety function(s) to prevent and/or mitigate the associated accident scenarios. However, DOE understood that safety SSCs will not always be available. For instance, maintenance or surveillances on equipment "may compromise or degrade a system's capability" [6].

To address this anticipated loss of safety function, LCOs contain required actions that an operator must complete. These action statements "simply provide for the adverse condition being corrected in a certain time frame and for further action if this impossible" [1]. A key aspect of developing these action statements is precisely defining the length of time an operator has to complete each action (i.e., completion time). DOE Guide 423.1-1B, defines a completion time as "the amount of time allowed for completing a required action," and further notes that "the safety importance of the lost safety function...and the risk of continued operations while the condition is not met (as described in the DSA) are important considerations in determining a proper completion time" [6].

The total length of a completion time represents a period of additional risk for a facility, where there is a loss of a safety function, prior to restoring the function or implementing additional actions to compensate for the loss of function. By approving the TSRs, DOE is accepting additional risk, but only for a limited time period represented by the completion times.

General LCOs and general surveillance requirements (SR) establish rules generally applicable to all LCOs and SRs. Because these rules provide a framework for applying the facility-specific LCOs and SRs, the contractor should consider and use these rules when developing specific LCOs and SRs. These rules cause the specific LCO requirements to be applied uniformly and to function effectively. In addition, these rules and their specific wording are based on extensive experience and thus should be used as presented unless specific circumstances dictate otherwise [6]. The general LCOs given in DOE Guide 423.1-1B are modeled after the generic LCOs developed by NRC for its standard technical specifications.

In order to operate a facility in compliance with the approved safety basis, a facility must comply with all general LCOs, including LCOs 3.0.1 and 3.0.2. [6] To be in compliance with

[6] General DOE LCO 3.0.1 and 3.0.2 contained in DOE Guide 423.1-1B are as follows: "LCO 3.0.1 – LCOs shall be met during the MODES or other specified conditions in the Applicability, except as provided in LCO 3.0.2," and "LCO 3.0.2 – Upon discovery of a failure to meet an LCO, the associated ACTIONS shall be met, except as provided in LCO 3.0.5 and LCO 3.0.6. If the LCO is restored or is no longer applicable before the specified completion time(s) expires, completion of the ACTION is not required, unless otherwise stated. The Completion Time(s) for Required Action(s) are also applicable when a system or component is intentionally removed from service. Acceptable reasons for intentionally entering Required Action(s) for an LCO include, but are not limited to, performance of SRs, preventive maintenance, corrective maintenance, or investigation of operational problems" [6].

LCO 3.0.1, when a condition occurs ('time of occurrence') that results in an LCO not being met (e.g., due to an inoperable SSC), the applicable required actions contained within that LCO must be completed from the time of occurrence of condition. This ensures that contractor personnel do not operate a facility for longer than the approved period of additional risk, represented by the length of the completion time. If this is not done, perhaps because facility personnel are not aware of the condition, then there is a potential violation of LCO 3.0.1.

When facility personnel declare an LCO not met, facility personnel must execute required actions within the specified completion times. The time facility personnel discover an LCO not met may be concurrent with the time of occurrence of the condition (e.g., the time maintenance personnel remove a system from service). If personnel do not execute required actions within the specified completion times from the time they discover an LCO not met, then there is a violation of LCO 3.0.2.

DOE Guide 423.1-1B and other applicable DOE directives do not contain discussion on the distinction between compliance with LCOs 3.0.1 and 3.0.2. As these LCOs in Guide 423.1-1B are almost verbatim to the generic LCO 3.0.1 and LCO 3.0.2 in NRC's standard technical specifications [9], applicable NRC enforcement manual guidance is cited later in this chapter to clarify how NRC enforces this concept. DOE Guide 423.1-1B does contain discussion on completion times, thus the review focused discussions with site personnel on the site's implementation of this guidance.

**Site Implementation**

*Time of Declaration Definitions*

Completion times begin at the 'time of declaration,' according to DOE Guide 423.1-1B, however definitions of this term vary among the sites. Most often, individual facility TSRs define the term, usually as part of the definition of completion time. DOE Guide 423.1-1B, Appendix B, defines 'time of declaration,' as:

> *The actual time when the Facility Operations Director or designee determines that a CONDITION exists that requires entry into the ACTION statement of an LCO. As soon as possible upon notification of a problem, the problem should be evaluated and the Facility Operations Director or designee should make this declaration if it is determined that an LCO is not met.* [6]

However, this definition is contained in an example definitions table in Appendix B of DOE Guide 423.1-1B with the note that "definitions should be tailored to the specific facility." Facilities are therefore able to develop their own definitions, even for a fundamental concept such as 'time of declaration.'

Several facilities and sites across the complex do use a similar definition to the one in DOE Guide 423.1-1B. For example, the TSRs for Technical Area 54 (Area G) at LANL, and the Solid Waste Operations Complex facility at Hanford use this definition. Y-12 facilities' TSRs use a more succinct version of this definition and do not include the provision to evaluate

problems "as soon as possible." In addition, Y-12 uses the term 'time of discovery' rather than 'time of declaration.'[7]

Several sites did not define 'time of declaration' or a similar term in their facility TSRs, although there was some discussion of the concept in the completion time definition within the TSRs.[8] [9] For these facilities, such as Pantex and Plutonium Facility 4 (PF-4), that did not include any definition of 'time of declaration,' the limited discussion provided in their TSRs was unclear as to what "the time of discovery of the situation," precisely meant. In follow-up discussions, the relevant personnel stated similar understandings as other sites; the 'completion time' begins when facility personnel declare an LCO not met, rather than the time personnel discover the condition, as the wording in their TSRs implies and as is consistent with the definition in DOE Guide 423.1-1B.

DOE Guide 423.1-1B does use both the term 'discovery' and 'declaration,' which may contribute to varying lexicon usage across the complex. For the purposes of this report, the term 'time of declaration' will be defined as the actual time when the facility operations director or designee determines that an LCO is not met consistent with the definition in the DOE Guide 423.1-1B.

DOE guidance does not address a few key definitions related to 'time of declaration', and thus individual facility TSRs generally do not contain these definitions. The first is the 'time of occurrence,' which is the actual time when a condition occurs that causes a loss of safety function. Second, the 'time of discovery,' which is specifically the point at which *any* facility personnel become aware of the condition. This could occur concurrently with the 'time of occurrence,' or at some latter point. Both of these times usually occur prior to the 'time of declaration.' The exception would be instances in which operations personnel preemptively declare an LCO not met ahead of an expected loss of safety function (e.g., a planned maintenance activity) making all three times equivalent. The 'time of occurrence' and 'time of discovery' are not clearly defined, nor are their implications to completion times addressed in DOE Guide 423.1-1B.

As a result of this lack of clear guidance, DOE and contractor personnel declare TSR violations based on compliance with general LCO 3.0.2, rather than compliance with *both* LCO 3.0.1 and LCO 3.0.2. In other words, site personnel focus on compliance with the TSRs from the

[7] Multiple Y-12 facility TSRs define TIME OF DISCOVERY as "The actual time when the FACILITY Operations Manager or designee determines the existence of a condition requiring entry into the ACTION statement of an LCO" [46] [12].

[8] The Pantex TSRs states, "The Completion Time starts when it is determined that the FACILITY no longer meets an LCO statement and a Condition Statement is entered….When in multiple Conditions, separate Completion Times are tracked for each Condition, starting from the time of discovery of the situation that required entry into the Condition" [19].

[9] The TSRs for TA-55 and PF-4 at LANL, states, "The COMPLETION TIMES is the amount of time allowed to complete a required ACTION. It is referenced to the time of discovery of a situation (for example, inoperable equipment or variable not within limits) that requires entering an ACTION(S) Condition….When in multiple Conditions, separate COMPLETION TIMES are tracked for each Condition starting from the time of discovery of the situation that required entry into the Condition" [45].

'time of declaration' (compliance with 3.0.2), rather than also focusing on when the condition occurred to determine the total amount of time an LCO was not met, to ensure compliance with 3.0.1. The industry guidance section of this chapter explains this concept in greater detail, using applicable NRC guidance.

*'Should Have Known' Evaluations*

The current guidance in DOE Guide 423.1-1B, as well as the method in which it is being implemented at the sites, places the start of completion times at the time at which the facility operations manager (or equivalent position at a facility) or designee, determines that an LCO is not met, rather than the 'time of occurrence' of the condition, or even the 'time of discovery.'

Per the SRS TSR methodology manual guidance, it is only when operations personnel become aware of the activity that the time to complete any required actions would go into effect.[10] However, whether operations personnel are aware of the activity or not, the risk to the facility with inoperable safety systems is the same.

Recognizing that personnel can only take actions once they become aware of a limiting condition and should have the full completion times to execute required actions to avoid a violation of LCO 3.0.2, current DOE directives do not require a subsequent evaluation to determine if the facility personnel *should* have been aware of the condition earlier than originally identified. Performing this evaluation helps determine the amount of additional risk the facility incurred by not being aware of facility conditions. It is appropriate to place the start of completion times when personnel *should have known* an LCO was not met for evaluating compliance with LCO 3.0.1. In the example of maintenance personnel performing work on a system that causes a loss of safety function, personnel *should have known* the LCO was not met at the time of work authorization.

In all cases in which facility personnel were responsible for the inoperability of the SSC, this would be a clear case in which the completion times (for the purpose of evaluating a violation of LCO 3.0.1 not LCO 3.0.2) would begin at the time personnel rendered the system inoperable, whether or not it was the 'time of declaration' as described in DOE Guide 423.1-1B. The goal of using the *should have known* concept is to encourage operations and other facility personnel to identify conditions causing a loss of safety function in a timely manner, and ensure facilities are operated in compliance with general LCO 3.0.1.

The staff asked site personnel across the complex if they consider whether operations personnel *should have known* to declare an LCO not met, when determining the beginning of completion times. The staff received mixed responses from the sites. First, the site personnel

[10] For example, the SRS TSR methodology manual states, "If Operations authorizes the safety system to be rendered incapable of performing its safety function and the Required Action is not completed in the associated Completion Time (based on when the safety system was rendered inoperable, regardless of whether Operations entered the LCO or not), this would result in a TSR violation. Finally, if Operations is not cognizant of a safety system being rendered incapable of performing its safety function (e.g., equipment failure or removed from service without Operations authorization) but upon Time of Discovery [i.e., 'Time of Declaration' as defined in DOE Guide 423.1-1B] enters the Required Action and completes it within the associated Completion Time, this would not result in a TSR violation" [30].

stated that they do not evaluate the total amount of time an SSC was inoperable. Further, other than SRS's TSR Methodology Manual, sites did not have approved written procedures discussing personnel rendering a safety system inoperable, when considering when to begin TSR required action completion times. Therefore, DOE and contractor personnel discussed this concept with the review team based on their knowledge and experience with TSRs, rather than on formal site or facility procedures.

For many sites, personnel stated that adjusting the start of the completion time to when personnel *should have known* an LCO was not met would be situationally dependent, and would be determined during the fact finding process. Consolidated Nuclear Security, LLC (CNS) is developing an enterprise-wide procedure on operability determinations, which includes discussion on *should have known* in its definition of 'time of discovery' [10]. This procedure, if approved and implemented, would be applicable to Y-12 and Pantex. The draft procedure allows operators the full completion time to complete the actions based on when qualified personnel become aware of the condition (compliance with general LCO 3.0.2). However, the draft procedure contains a definition of 'time of discovery' that includes the potential to have the start of the completion time *prior* to the 'time of declaration,' if it can be demonstrated that personnel "reasonably should have known" that a degraded condition results in an LCO not being met, which would result in an evaluation of compliance with general LCO 3.0.1 [10].

Some site personnel responded that they would never evaluate if personnel *should have known* an LCO was not met, and that the completion time begins *only* when the appropriate operations personnel are actually aware of the condition, complete their evaluation of the condition, and make the declaration. However, even at these sites, as demonstrated during discussion of ORPS events later in this chapter, the start of the completion time does not always coincide with the 'time of declaration' in practice.

*Operability Determinations*

Related to 'time of declaration' is the completion of operability determinations (called operability evaluations at some sites), which sometimes follows the discovery of a degraded condition. In order for a declaration of inoperability to occur, the facility operations manager or designee must evaluate the condition and determine whether or not it causes the affected safety SSC to be inoperable. Once the facility operations manager has completed the evaluation, he or she can make a declaration of inoperability. In some cases, it is immediately apparent that a degraded condition results in the inoperability of an SSC. In particular, this is true when personnel remove an SSC from service for planned maintenance activities. However, in some cases it is not obvious if a degraded condition (e.g., a leak, high vibrations, abnormal noise) is indicative of SSC inoperability. In those cases, an operability determination may be warranted.

Current DOE guidance on completion of operability determinations is limited. The guidance is primarily contained in DOE Guide 424.1-1B, *Implementation Guide for Use in Addressing Unreviewed Safety Question Requirements*, and limited to conditions associated with potential inadequacies of the safety analyses (PISA). One site indicated the desire for additional DOE guidance, as the majority of its operability determinations are for evaluation of degraded conditions to determine LCO compliance, and not for conditions associated with a PISA. Several sites used NRC guidance on operability determinations, although they had to adapt it for

DOE facilities. The sites that used NRC guidance had detailed operability determination procedures, while those sites that did not had comparatively brief site procedures.

The main focus in reviewing site procedures on operability determinations centered on the timeliness of completing the operability determinations. In particular, the staff was interested in determining during what part of the process, from discovery of a degraded condition to completion of the operability determination, sites would declare an LCO not met and begin the completion time for required actions. Some sites indicated they would conservatively declare the LCO not met if there was a need to perform an operability determination. However, the site procedures did not contain this guidance, and in fact, it was at times incompatible with the written guidance in the procedures.

For example, a procedure at the Hanford site stated that operability evaluations would be performed after the discovery of a degraded, out-of-spec, or non-conforming condition on an SSC, if there was an immediate determination by Operations that there was reasonable assurance that the SSC was operable even with the degraded condition [11]. It was therefore not clear if there was "reasonable assurance that the SSC was operable" that operations personnel would still conservatively declare an LCO not met, and start the completion time for required actions prior to performing an operability determination.

At most sites however, the declaration of an LCO not met would not occur until completion of the operability determination. Therefore, the timeliness requirements for completion of operability determinations were evaluated. The staff asked if the time limit to complete an operability determination was tied to the associated LCO completion times. For instance, if a degraded condition resulted in an inoperable SSC with a required action completion time of 24 hours, would personnel complete the operability determination within 24 hours? With the exception of Y-12, sites indicated completion times played no factor in determining how quickly they would complete an operability determination.[11]

At most sites, the operability determination procedures had a suggested (not required) time limit of completion within 72 hours. At these sites, there is flexibility to adjust the time limit. Some procedures had no written guidance on time limits.

Without defined requirements on timeliness for completing these operability determinations, the potential exists for safety SSCs to be inoperable for potentially unlimited periods of time, prior to completion of required actions. However, if operations personnel immediately declared an LCO not met at the time of discovery for any degraded condition, this potential concern with respect to delayed operability determinations would be obviated.

[11] The Y-12 procedure, which refers to operability determinations as operability/functional evaluations (OFE), states, "There is no explicit time limit for completing an OFE. Nevertheless, timeliness is important and should depend on the safety significance of the issue….This evaluation should normally be completed within up to one-half of the allowed out-of-service time [completion time], but not to exceed 48 hours, unless the [Shift Manager] SM requires the OFE to be completed sooner" [47].

*ORPS Events*

In compiling ORPS event reports to discuss with applicable sites with regard to 'time of declaration,' the staff focused on identifying events over the last approximately three years that met the following criteria: the time between occurrence of the condition and the time at which required actions were completed (if at all) exceeded the total completion time for the associated required action.

It is important to note, per current DOE guidance and actual site implementation, there is no requirement to evaluate when a condition occurred or evaluate when an LCO should have been declared not met. Completion times begin at the 'time of declaration,' per DOE guidance and current site practices. Therefore, if sites implemented the guidance, there would have been no events to analyze. However, these ORPS reports represented events in which management chose to declare a TSR violation or management concern.

- **Pantex Plant** – *Performed Preventative Maintenance Without Proper Work Authorization* [12]

  Radiation alarm monitoring system (RAMS) technicians performed a monthly test beginning at approximately 1630, which the facility representative authorized for two bays, and personnel entered the appropriate LCO and completed required actions for those bays. However, the RAMS technicians completed the monthly test in an additional bay, which the facility representative had not authorized. Therefore, for this bay the LCO was not entered, and the required action was not completed. The required action was to verify that there were no severe weather warnings in effect, *prior to* performing an activity. The craft supervisor notified the facility representative at 1830 of completion of the activity, at which point the facility representative recognized the LCO had not been entered for that bay and the required action had not been completed beforehand.

  Per the current DOE guidance, the official completion time for the required actions does not begin until the appropriate operations personnel (in this example, the facility representative) "determines that a CONDITION exists that requires entry into the ACTION statement of an LCO*"* and that time was not until 1830, at which point the condition no longer existed [6]. Prior to 1830, the facility representative was unaware of the work being performed in the third bay. However, in declaring this a TSR violation and reporting it as such in ORPS, Pantex personnel determined operations personnel should have been told of the work in the third bay, and thus *should have known* to declare the LCO not met at 1630, when work began. Therefore, the required action was not completed within the completion time based on the time work began and the site determined that they had violated their TSRs.

- **Hanford Site** – *Technical Safety Requirement Non-Compliance Due to Delayed Entry in Limiting Condition for Operation* [13]

On January 29, 2018, a nuclear chemical operator (NCO) documented an unsatisfactory condition for a container on a TSR inspection checklist, and reported it to the shift duty operator (SDO). On January 30, the SDO reviewed the checklist sheet and "red-flagged" it with a red post-it for review with the operations manager. However, a facility emergency preparedness drill scheduled for that morning impacted time and resources, and the SDO did not review it with the operations manager that day. On February 1, the SDO met with the operations manager to discuss the inspection checklist. The operations manager and SDO recognized there was a need to enter the applicable LCO condition, and contacted the facility manager, who directed entry into the LCO, and initiated the required actions. One of those actions was to *immediately* terminate activities in the affected facility area, which they did upon entry into the LCO condition on February 1.

Per current DOE guidance and the TSRs for the facility where this event occurred, the completion time for the required actions officially begins at the 'time of declaration' by the facility manager (on February 1 in this example). Therefore, the required action completion time of immediately terminating activities in the affected facility area was officially met. However, Hanford personnel determined that personnel *should have known* that an LCO was not met due to the unsatisfactory condition that was identified when the inspection was completed on January 29. Based on the completion time beginning on January 29, the required action was not completed in the required time frame (immediately), therefore site personnel declared a TSR violation. Hanford personnel conducted an extent-of-condition review, and identified two additional times when inspection checklists had marked unsatisfactory conditions and the LCO had not been entered and required actions were not completed. However, while the site reported these additional times in the extent-of-condition section of this ORPS report, the site did not separately report these instances as TSR violations.

- **LANL** – *WCRRF Remediated Nitrate Salt Waste Container Inventory Limit Exceedance* [14]

  A remediated nitrate salt (RNS) waste container was shipped on June 1, 2017, to the Waste Characterization Reduction and Repacking Facility (WCRRF). The assay data associated with this container was not uploaded to the Waste Compliance and Tracking System (WCATS) until June 5. When the data was uploaded to WCATS, the material-at-risk (MAR) value was re-calculated using the assay data, and resulted in a higher value than the value of record. Personnel checked the RNS inventory limit for WCRRF, and realized that the limit had been exceeded on June 1. However, due to the fact that RNS material had been processed in the interim, and the inventory in the facility on June 5 was below the facility limit, the facility operations director (FOD) delayed review and verification of RNS waste container inventory limit exceedance until the next day. On June 6, following further review, the FOD concluded the RNS waste container inventory MAR limit had been exceeded from 1120 on June 1, 2017, to 1456 on June 2, 2017, due to the delay of uploading the additional MAR for this waste container.

During the time that the limit was exceeded (June 1 – June 2), there was no recognition of the condition, and thus no declaration that the inventory limit was not met. The WCRRF TSRs state the completion time "is referenced to the time a situation (e.g., INOPERABLE equipment or variable not within limits) *is declared* that requires entering an ACTION condition (emphasis added)" [15]. Therefore, per this definition, and per DOE guidance, at the 'time of discovery' on June 6, the inventory was not exceeded, and there was no need to declare the LCO not met. There is no DOE guidance or requirements on declaring violations for historical situations that are discovered, similar to this event. At the time of the event (June 1–2) the FOD was not aware the inventory was exceeded, did not declare an LCO not met, and did not complete any associated required actions. However, at the time of the event report, facility personnel made the decision to declare a TSR violation, as the required action completion time was exceeded during the time period the inventory was above the limit.

In discussing the event with the review team, DOE personnel indicated that they did not believe this met the criteria for a TSR violation, and that if it occurred today, it would not be reported as a TSR violation. DOE personnel indicated at the time the event occurred, they made an overly conservative determination to classify the event as a TSR violation.

None of the above events would classify as TSR violations, per current DOE guidance or individual site procedures and facility TSR definitions. In all the events, the completion time for the associated required actions was exceeded prior to the 'time of discovery' by operations personnel. Involved personnel at the time made the decision to report these events as TSR violations, which is why the staff was able to discuss them here. However, any time an LCO is declared not met, there is a possibility the condition could have existed for an amount of time greater than the accepted risk of its associated completion time.

**Industry Guidance**

The review team considered NRC guidance as part of its analysis to contrast with current DOE guidance and practices at the various DOE sites. For the NRC enforcement model, in determining if a licensee violated an LCO due to exceedance of completion times for required actions, the completion time begins at the time the licensee should have known the LCO was not met.[12]

NRC acknowledges that it may not be possible to determine *precisely* when a condition occurred that resulted in safety SSC inoperability. Therefore, the NRC Enforcement Manual includes criteria that the licensee *should have* identified it earlier. In explaining how NRC would cite a violation, the manual first explains the general technical specifications usage rules. DOE developed a similar set of general LCOs, modeled after NRC's general technical specifications

[12] The NRC Enforcement Manual states, "Potential enforcement should be considered based on the total duration that a condition may have existed. i.e., when the time of occurrence and the extent to which the licensee should have identified the condition earlier, is readily determined" [16].

usage rules. The DOE equivalent is given in Appendix B of DOE Guide 423.1-1B. In fact, the DOE general LCO 3.0.1 and 3.0.2 are almost verbatim to NRC's general technical specification (TS) usage rules. The NRC enforcement manual explains there is a distinction between compliance with the action statement of an LCO, and the LCO itself. "The determination of whether an action statement (LCO 3.0.2) is met is based on when the condition is discovered. Once discovered the question is whether the actions are completed on time" [16]. However, "while a licensee may be in compliance with the action statement," depending on when the condition actually occurred, they may not be in compliance with LCO 3.0.1.[13]

The distinction is important when contrasting DOE's current guidance. At the 'time of discovery', or in DOE terminology, the 'time of declaration,' the required actions should be met. Both DOE and NRC recognize the completion times for required actions may be based on the actual time required to perform an action (e.g., one hour). As a result, it may not be possible to safely perform the action any faster. Therefore, LCO 3.0.2 allows workers the full completion time to perform the required action after the 'time of declaration'. Thus, the licensee only violates LCO 3.0.2 if it takes workers longer than the full completion time to perform the required action once they become aware that the LCO is not met. This puts the emphasis on promptly executing the appropriate required actions within the given completion times to place the facility into a safe configuration, rather than evaluating when the condition first existed, and attempting to rush through required actions.

If operators do not perform the required actions within the completion time based on 'time of declaration,' NRC and DOE would both conclude a violation of LCO 3.0.2 exists. DOE's current guidance on TSR violation criteria focuses *only* on this type of violation (not meeting the required action completion times from the 'time of declaration').

However, as noted in the NRC enforcement manual, NRC may still consider a violation of LCO 3.0.1, (which is verbatim with LCO 3.0.1 in DOE Guide 423.1-1B) even if no violation of 3.0.2 exists. NRC establishes that a TSR violation can exist for inoperable safety SSCs, which are inoperable for durations longer than the completion times, even though operators may neither be aware of the condition nor have declared the LCO not met. To determine whether a violation of LCO 3.0.1 exists, NRC requires an evaluation to determine when operators should have known an LCO was not met (e.g., the actual occurrence of the condition) and comparing the actual time period the LCO was not met with completion time allowances.[14]

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[13] "The distinction between the TS ACTION statement and the TS LCOs is evident in the general TS usage rules in the improved [Standard Technical Specifications] STS….The determination of whether an action statement (LCO 3.0.2) is met is based on when the condition is discovered. Once discovered, the question is whether the actions to be completed are completed on time. While a licensee may be in compliance with the action statement of a TS based upon the discovery of the violation, a licensee may not be in compliance with the TS LCO (3.0.1) based on when the violation occurred" [16].

[14] "The following guidelines should be used for cases where the time of occurrence can be established and the licensee should have discovered the condition sooner:

• If the time between the occurrence of the condition and the discovery of the condition is greater than the [allowed outage time] AOT for that condition, then the licensee should be cited for a failure to satisfy the TS LCO [LCO 3.0.1]. If the licensee otherwise satisfied the TS Required Action(s) from the time of discovery of the condition, the citation and enforcement correspondence should acknowledge this.

Based on its data collection and analysis for this review, it is clear DOE does not have comparable criteria for declaring TSR violations against LCO 3.0.1. As long as from the 'time of declaration,' the required actions are done within their completion times (satisfying LCO 3.0.2), it does not matter how long the equipment was inoperable prior to the declaration. The staff discussed this concept with DOE and contractor personnel during this review. For instance, during the review a DOE manager explained to the staff that even if a credited control was inoperable for years, as long as when personnel discovered the inoperability they fixed it within the required timeframe in the TSR (in one example 30 days), the facility had operated in compliance with its safety basis and there was no violation.

To illustrate the significance of this concept, consider an NRC example. NRC identified a technical specifications violation at Brown's Ferry Nuclear Plant Unit 1 during an inspection completed December 31, 2010. The violation was associated with a red significance determination process finding (i.e., the most significant level for an NRC finding) [17].

In this NRC example, the emergency core cooling system (ECCS) was inoperable from March 13, 2009, until October 23, 2010, while in a mode that required it to be operable. Per the associated LCO condition A, the required action was to restore the system to operable within seven days. If condition A was not met, condition B required the unit be placed in Mode 3 within 12 hours, and in Mode 4 within 36 hours. For the time period from March 13, 2009, until October 23, 2010, the unit was not in Mode 3 or 4, and the ECCS was inoperable.

Personnel did not discover the fact that the system was inoperable until October 23, 2010, during maintenance on the system. Even though the condition causing the system inoperability (in this case, an inoperable valve) was not discovered by plant personnel until October, NRC determined for a variety of reasons (detailed in its inspection report) that the licensee should have known prior to October [17]. NRC could not find any evidence that indicated the valve was inoperable prior to March 2009, when the system was placed in service.

This example illustrates the significance of the difference between NRC guidance and DOE guidance. If NRC followed the DOE guidance, there would be no reporting of a TSR violation. This is despite the fact that one of the systems most important to safety at Brown's Ferry was inoperable for an entire refueling cycle, and had an accident occurred, it would not have been able to perform its credited safety function. It is for this reason—importance to safety—that NRC determined this violation constituted a red finding.

**Analysis and Concerns**

If completion times begin only at the 'time of declaration,' then the total time of equipment inoperability from the 'time of occurrence' until 'time of declaration' can be

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• If the time between the occurrence of the condition and the discovery of the condition is less than the AOT for that condition, and upon discovery the Required Actions are completed within the AOT or the shutdown track is satisfied, there is not an LCO violation. This would be true even if the time between the occurrence of the condition and the completion of Required Actions is greater than the AOT. However, there may be a root cause issue outside of the TS issue warranting appropriate enforcement action." [16]

unlimited, without declaring a TSR violation. In other words, a loss of safety function can exist for years, and, as long as the completion time is met from 'the time of declaration,' not result in a violation, even if the associated completion time is immediately.

Fundamentally, this practice allows for facilities to operate with additional risk that was not approved by DOE. In approving the TSRs, DOE formally accepts the risk of operating a facility with inoperable safety SSCs for the duration of the associated LCO completion times. DOE has not accepted operating with inoperable safety SSCs for an unlimited amount of time.

Anytime an LCO is declared not met, DOE would benefit from attempting to formally determine the 'time of occurrence' of the condition, and when operators "should have known" the LCO was not met. DOE could then determine violations of general LCO 3.0.1 based on that information, as discussed in these examples:

- If the time of between when operators "should have known" the LCO was not met, and the 'time of declaration,' is greater than the LCO condition required action completion time, then the contractor has violated LCO 3.0.1 for failure to meet the LCO. At the 'time of declaration,' the contractor is still required to perform the LCO required actions within the completion time based upon the 'time of declaration,' in order to ensure compliance with LCO 3.0.2.

- If the time between when operators "should have known" the LCO was not met, and the 'time of declaration,' is less than the LCO condition required action time, then there is no violation of LCO 3.0.1. If upon 'time of declaration,' the required actions are completed within the completion time, there is also not a TSR violation of 3.0.2. This would be true even if the time between when operators "should have known" the LCO was not met and the completion of the required actions is greater than the LCO completion time.

This approach to completion times is important for two reasons. First, the current paradigm does not incentivize operations personnel to be aware of or discover inoperable conditions. Without awareness (even in the case of maintenance personnel intentionally performing work on a safety system), no required action is necessary. Second, it is important for contractor and DOE personnel to recognize when facilities are operated with inoperable safety SSCs for periods of time longer than the completion times (i.e., not complying with general LCO 3.0.1). That recognition is achieved by classifying these events as TSR violations, which will inform DOE oversight of facilities across the complex that have operated with this increased risk profile.

If there is a question of operability, such that an operability determination evaluation is needed, the conservative response is to declare the LCO not met and begin the process of completing required actions as necessary. If the operability determination finds the SSC is operable, the LCO condition can be exited prior to required actions with longer completion times being performed. However, for those with shorter completion times (e.g., immediately or hours), the shorter completion times indicate a potential safety importance to completing those actions without waiting for results of an operability determination.

## CONDUCT OF OPERATIONS AND ADMINISTRATIVE COMPLIANCE

During the course of the staff's review, the staff analyzed events related to administrative compliance with the safety basis that did not represent periods of time that actual facility operation was outside of the approved safety basis. The staff has grouped these events into two main categories, discussed in detail in the remainder of this chapter: cognizance of facility status by operations personnel and required documentation of facility status. This chapter also includes a related discussion on the use of recovery plans.

### Background

*Cognizance*

Appendix A to Subpart B of 10 CFR 830 describes DOE expectations for LCOs as "the limits that represent the lowest functional capability or performance level of safety structures, systems, and components required to perform an activity safely." In addition, the LCO is "the lowest functional capability or performance level of equipment required for continued safe operation of the facility" in conjunction with the actions to be taken to address a condition not meeting the LCO. Normally, actions to correct an adverse condition must be completed in a certain time frame. [1]

DOE Guide 423.1-1B, Section 4.3.4.5, states "Action statements should describe the actions to be taken in the event that an LCO is not met" [6]. It is important to understand that while the facility can be within its approved safety basis by meeting the required actions when an LCO is not met, the facility is still operating with additional risk. The mitigated consequence analysis in the DSA that determines the effectiveness of the control set assumes that safety systems are always available. Thus, appropriately identifying LCO conditions when required is essential to the safe operation of the facility.

Some LCO required action completion times are based on an analyzed condition. A common example of this is purge gas used to prevent the accumulation of hazardous gases. Should the purge air system become inoperable, the LCO allowed completion times require restoration of the system prior to the calculated time needed to accumulate enough of these gases to be of concern. Cognizance of system operability is important for these types of LCOs, because the safety analysis is based on identifying the start of the accumulation of gases, which begins as soon as the system becomes inoperable.

Having cognizance requires the ability to recognize all facility conditions that could result in the inoperability of safety-related SSCs, and relies on operators having sufficient knowledge to make these determinations. This cognizance applies to identifying whether an SSC is inoperable and an LCO is not met, as well as whether subsequent required actions are completed.

DOE Guide 423.1-1B notes the importance of appropriately entering LCOs when limiting facility conditions exist. DOE Guide 423.1-B, Section 4.3.5.3 lists "Failure to complete an action statement within the required time limit following exceeding an LCS or failure to comply

with an LCO" as one of the TSR violation criteria [6]. The guide later provides an example for "failure to comply with an LCO" stating it is when a "safety system is rendered incapable of performing its safety function (e.g., by maintenance) *without entering the applicable LCO*" (emphasis added) [6]. One possible interpretation of this guidance is that failure to enter into an LCO, regardless if subsequent required action times are met or not, is a TSR violation according to DOE Guide 423.1-1B. The staff discussed this interpretation of TSR violation criteria with personnel across the complex, and the results are presented later in this chapter.

*Documentation*

TSR implementation related to determining whether an LCO is met and completing associated required actions requires both cognizance and documentation. For example, documenting via an official record (e.g., facility logbook) the time a facility LCO is not met both provides evidence of "cognizance" and allows for timely tracking and completion of required actions. Documenting subsequent required action completion times provides a record that the facility has operated within its approved safety basis. Failure to document TSR-related implementation could indicate a lack of cognizance of the facility operational status.

DOE Order 422.1, *Conduct of Operations*, Attachment 2, Appendix A, provides a Conduct of Operations (ConOps) matrix table to help implement requirements. Section 2.k.(3) of this table lists the type, scope, and format of required log entries and it includes "Entering and exiting Limiting Conditions for Operations" and "Starting and completing surveillance tests" [18]. DOE Guide 423.1-1B Section 2.3.1 also references the importance of record keeping, stating "Records need to be kept of all information supporting the implementation of the TSR. To this end, a records retention program should be established that determines which records are to be kept, in what format, for how long, and under what storage requirements" [6]. DOE Order 422.1 does allow for late log entries, but it is not clear if there is a maximum time allowance for these late entries or the level of evidence needed to substantiate the accuracy of a late entry.

*Response Plans*

As discussed before, when an LCO is not met, the facility is at a greater safety risk. DOE approves the LCOs and their associated action statements with quantified completion times (e.g., 72 hours). Ultimately, operators may not be able to fully complete the required actions within the DOE-approved completion time after exhausting all attempts to restore or mitigate the limiting condition for operation. General LCO 3.0.3 described in DOE Guide 423.1-1B attempts to provide operators the next step, "This LCO delineates the time limit to initiate ACTION for placing the facility in a safe operating configuration when operation cannot be maintained within the limits for safe operation, as defined by the LCO and its ACTIONS" [6].

However, some LCO action statements include a blanket action to develop and implement a response plan after all other efforts have failed in lieu of using LCO 3.0.3. This response plan requires DOE to approve a path forward that has not previously been identified and approved in the TSR. Since these response plans have such flexibility, DOE can accept an

undefined amount of additional risk depending on the circumstances. DOE Guide 423.1-1B does not discuss the concept of using response plans as part of LCO action statements.

**Site Implementation**

*Cognizance*

During discussions with DOE sites, the staff discovered inconsistency with the way the sites addressed failing to identify conditions when an LCO is not met. Pantex's TSRs considered a failure to enter an LCO as a TSR violation, regardless of any extenuating circumstances, by clearly stating that violations of a TSR are the result of "Failure to enter an LCO when required by entry conditions," and "Failure to complete an ACTION within the required Completion Time after: Failing to meet an LCO Statement" [19].

Some sites agreed with this concept although the sites did not clearly articulate it in TSR violation criteria as Pantex did. Other sites' TSRs did not include "failure to enter an LCO" as a TSR violation. These sites indicated that failing to identify when an LCO is not met could lead to a TSR violation if a required action completion time was subsequently exceeded. For these cases, the chapter on "Completion Times and Time of Declaration" provides additional detail on how this time is determined. Therefore, these sites would not declare a TSR violation when personnel did not appropriately identify that an LCO was not met if they either 1) fortuitously never exceeded a required action completion time or 2) fortuitously completed the required action through other activities.

These sites allow for this concept of "compliance by luck" believing that they are still within the approved safety basis since they did not miss any required actions associated with the LCO (a similar concept is discussed later in the SAC chapter). For example, SRS's TSR Methodology Manual clarifies that a TSR violation would not occur due to failure to provide notification, failure to document LCO entry, or not being cognizant that the required action was performed. Furthermore, a TSR violation would not occur if the LCO was subsequently met within the required completion time following the time of discovery that the system was incapable of performing its safety function.

One of these sites stated that it has rigorous processes (e.g., ConOps programs) in place to ensure that it takes actions deliberately such that complying by luck is not an expected practice. Other sites said that they would not call this issue a TSR violation but something else (e.g., a management concern) and would still address the problem in their corrective action programs. EM-LA discussed that while its TSR violation criteria did not specifically describe this situation, it would weigh several factors in determining whether a TSR violation occurred on a case-by-case basis. This is an example of when it chose to declare a TSR violation:

- **LANL –** *TSR Violation: Equipment Operator Observed Performing Snow Removal Without the Presence of a Spotter East of Dome 375 in TA-54* [20]

  The shift operations manager (SOM) notified the facility operations manager of an equipment operator performing snow removal without a spotter present. The

contractor had requested and received approval for a variance to the TSR requirements to allow the use of heavy equipment to conduct snow removal in support of emergency response. The high-risk location vehicle barriers in the area had been declared inoperable due to the as-built configuration of the attachment not meeting the design requirements. As a result, vehicle traffic was restricted per the TSRs. The variance to the TSR requirements allowed the snow removal operation with heavy equipment to proceed. A required mitigation was to have a spotter in radio contact with the heavy equipment operators in the area. As the SOM observed, the equipment operator was performing snow removal efforts without a spotter present while within the restricted and roped off area. The equipment operator was traveling from east to west, away from the inoperable barriers. Stored waste was not impinged upon.

Site personnel stated that in this event they believed the TSR requirements were technically met since operators fortuitously had radio contact with spotter. However, they did not believe it met the intent of the TSR since the spotter had no visual contact. Thus, they declared a TSR violation for this event.

SRS recently changed its site specific guidance to clarify that failing to enter an LCO is only a TSR violation if a required action completion time is exceeded. SRS provided the staff with a matrix of previously reported TSR violations that they would no longer consider TSR violations. An example is summarized below:

- **SRS** – *Exited LCO for 254-19H A Train Diesel While C-Train Diesel is Aligned* [21]

  The facility exited a condition and restored an A-Train diesel generator back to service following successful completion of the monthly load test. However, the alternate diesel generator (C-Train) was still aligned to the A-side emergency switchgear. When the alternate diesel generator is aligned to the switchgear, the normal diesel generator is disconnected and is inoperable. The site determined that inappropriately exiting the LCO did not place the facility in an unsafe configuration at any time and that this was purely an administrative error in LCO tracking. Since C-Train was aligned to the A-side switchgear emergency power was available if there had been a loss of power. Also, while the SOM was not cognizant that the appropriate required action remained active since the SOM inappropriately exited the LCO, the required actions continued to be met within the associated completion times, which had not expired. Since no required action times actually expired, the site would no longer consider this event a TSR violation. However, as the event does represent significant issues with ConOps and procedures implementation, the site would instead consider reporting it as a 10(1) management concern in ORPS.

*Documentation*

Further staff discussions focused on how documentation could impact whether a site declared a TSR violation. For example, if a site claimed that an operator was cognizant of an LCO entry and was completing the appropriate required actions but never documented anything,

would that be a TSR violation? Some sites stated failure to document entry into an LCO is only an administrative error, not a TSR violation. Other sites were adamant that if an operator does not document his or her actions (e.g., time an LCO is not met or required action completion times), then the operator cannot take credit for them. One site proclaimed that "if you don't document it, then it didn't happen." TSRs for the Nuclear Environmental Sites at LANL state, "Entry into a LCO ACTION and LCO ACTION COMPLETION TIMES SHALL be documented. If compliance with TSR requirements is not formally documented, then compliance to the TSRs cannot be demonstrated and a violation may exist" [22].

However, TSRs for another facility under that same contractor did not include this language. Most sites said documentation errors are situationally dependent and fall under judgment space. Since all sites allow for late entries into log books, the staff discussed how this allowance applies to TSR compliance. Most sites said that it would depend on the age of the log entry and what objective evidence they had as to whether they would use it to claim prior TSR compliance absent of timely documentation. None of the sites have codified any of these expectations in their TSRs or related guidance documents. However, the staff did find an instance where SRS declared a TSR violation regarding lack of documentation [23].

*Response Plans*

Regarding the development of response plans, most sites did not have any specific guidance on how to develop and implement response plans. DOE guidance does not have any standardization on the timeliness of development and implementation of response plans. Not all sites incorporate response plans into their LCO action statements.

**Industry Guidance**

*Cognizance and Documentation*

NRC also discusses the importance of entering and exiting LCOs. The NRC Enforcement Manual, Part II, Section 2.1.1 states:

> *LCO 3.0.1 - LCOs shall be met during the modes or other specified conditions in the applicability, except as provided in LCO 3.0.2.*
>
> *LCO 3.0.2 - Upon discovery of a failure to meet an LCO, the Required Actions of the associated conditions shall be met, except as provided in LCO 3.0.5 and LCO 3.0.6. If the LCO is met or is no longer applicable prior to expiration of the specified completion time(s), completion of the Required Action(s) is not required unless otherwise stated….*
>
> *While a licensee may be in compliance with the action statement of a TS based upon the discovery of the violation, a licensee may not be in compliance with the TS LCO (3.0.1) based on when the violation occurred.* [16]

NRC has issued findings related to the failure to enter an LCO as illustrated in the 2002 Indian Point Inspection Report finding that states, "The human performance (post-event) issue involves an operator knowledge deficiency with respect to a lack of recognition that the unit was in TS 3.0.1 for one hour and 53 minutes, while the 138 kilovolt station auxiliary transformer was out-of-service" [24].

Even though Indian Point did not exceed any required action completion times in the applicable LCO, NRC cited this as a performance deficiency[15] resulting in a finding. It should be noted that the NRC enforcement framework has a significance determination process associated with every finding. For findings of failing to appropriately enter an LCO that do not exceed required action times such as this example, the significance of the finding is usually low. This is because the additional risk incurred by not entering an LCO for these cases is not as significant as those for which there was a longer duration of time where operators lacked appropriate TSR cognizance. NRC can also escalate enforcement based on repetition of similar findings regardless of risk [24].

NRC has attempted to address these situations of lack of cognizance and documentation through enforcement; however, DOE only has limited guidance related to this area compared to the NRC enforcement manual requirements with clear examples.

*Response Plans*

Like DOE, NRC has generic TS 3.0.3 to address any time an operator has exhausted an LCO action statement and needs to place the plant in a safe condition. NRC does not address the use of "response plans" within a set of LCO action statements. However, NRC does have a process of requesting NRC enforcement discretion if an LCO will not be met for longer than its action statement completion times.

**Analysis and Concerns**

The varying interpretation and implementation of DOE guidance about reporting issues related to identifying and documenting when an LCO is not met indicate a need to clarify and improve the current DOE guidance. The staff determined that DOE could provide clearer requirements on violation criteria related to failing to identify when an LCO is not met. In addition, DOE could provide clear requirements on documenting TSR compliance to include when the facility no longer meets an LCO as well as required action completion times. Additional guidance is also needed to support the implementation of these requirements. Providing clear examples, similar to what NRC has done, allows for consistent implementation. The staff notes the following examples:

1. Operations personnel fail to be cognizant that an LCO is not met; however, the condition causing the LCO to not be met is resolved prior to exceeding any LCO required action completion times. For example, equipment is taken out of service for maintenance and restored without operations personnel recognizing an LCO was not

[15] NRC defines a performance deficiency as "The licensee's failure to satisfy one or more regulatory requirements or self-imposed standards where such failure was reasonably foreseeable and preventable" [49].

met for that period of time, and the related required action completion time duration was longer than the total amount of time the LCO was not met.

2. Operations personnel fail to be cognizant that an LCO is not met; however, the associated LCO required action is fortuitously met (i.e., non-deliberate) due to other activities. For example, if the LCO required action was a fire patrol watch that was executed for another reason and the site takes credit for its completion.

3. Operations personnel are cognizant that an LCO is not met but fail to document entry into the LCO condition.

4. Operations personnel are cognizant that an LCO is not met, document entry into the LCO, complete required actions, but fail to document completion of required actions.

The safety consequence of the above four examples may not be as significant as other TSR violations typically categorized in ORPS under the 3A(1) category. Therefore, these cases could more appropriately fall under a lower significance category, but still warrant reporting in ORPS. Similarly, entry into response plans as currently allowed in some TSRs, is effectively a new risk acceptance path forward with DOE since these plans are reviewed and approved by DOE. Reporting these entries in a low significance category in ORPS would allow for tracking and trending the frequency of such requests.

## SURVEILLANCE REQUIREMENTS

### Background

Table 4 in Appendix A of 10 CFR 830, Subpart B, "sets forth DOE's expectations concerning acceptable" TSRs, and includes the following discussion regarding surveillance requirements:

> *Requirements relating to test, calibration, or inspection to assure that the necessary operability and quality of safety structures, systems, and components is maintained; that facility operation is within safety limits; and that limiting control settings and limiting conditions for operation are met. If a required surveillance is not successfully completed, the contractor is expected to assume the systems or components involved are inoperable and take the actions defined by the technical safety requirement until the systems or components can be shown to be operable. If, however, a required surveillance is not performed within its required frequency, the contractor is allowed to perform the surveillance within 24 hours or the original frequency, whichever is smaller, and confirm operability.* [1]

The criteria for a TSR violation, per DOE Guide 423.1-1B includes "failure to perform a surveillance within the required time limit" [6]. There is additional guidance on the required time limit provided in Appendix B of DOE Guide 423.1-1B, contained within the general requirements for surveillance requirements (i.e., SR 4.0.1 through SR 4.0.4).

For reporting purposes, DOE Order 232.2A uses criterion 3A(1) and criterion 3A(3) that set the reporting level depending on the nature of the missed surveillance.[16] A missed surveillance always constitutes a TSR violation. However, if the SSC is ultimately found to be capable of performing its specified safety function, criterion 3A(3) would be used to report the event. If the SSC was found during a missed surveillance to be incapable of performing its specified safety function, criterion 3A(1) would be used to report the event.

However, the period of time allowed to determine if the SSC can perform its specified safety function is limited. The bases for SR 4.0.1 in DOE Guide 423.1-1B explains "Failure to meet a SURVEILLANCE REQUIREMENT within the specified FREQUENCY, in accordance with SR 4.0.2, constitutes a failure to meet an LCO" [6]. SR 4.0.3 also gives flexibility upon

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[16] The 3A(1) criterion: "Any violation or noncompliance of a Technical Safety Requirement (or Operational Safety Requirement) Safety Limit, Hazard Category 1, 2, or 3 nuclear facility's Technical Safety Requirement (or Operational Safety Requirement) Limiting Control Setting, Limiting Condition for Operation, Specific Administrative Control, or Surveillance Requirement. Exception: An event consisting solely of a surveillance test (to include any periodic activity explicitly captured in the Documented Safety Analysis that is used to ensure operability or viability of a structure, system, or component) performed after the prescribed surveillance period, and in which the structure, system, or component was found to be capable of performing its specified safety function" [7].

The 3A(3) criterion: "An event consisting solely of a surveillance test (to include any periodic activity explicitly captured in the Documented Safety Analysis that is used to ensure operability or viability of a structure, system, or component) performed after the prescribed surveillance period, and in which the structure, system, or component was found to be capable of performing its specified safety function" [7].

discovery of a missed surveillance, to not immediately declare the affected equipment inoperable. Instead, as the bases for SR 4.0.3 in DOE Guide 423.1-1B explain "24 hours or the time limit of the specified SURVEILLANCE FREQUENCY, whichever is less, is allowed to complete the SURVEILLANCE before taking the required ACTION of the LCO" [6]. However, "this extension also does not preclude notification of a VIOLATION of SR 4.0.2" [6].

It is important to understand the reasoning for the delay period allowance, to understand how to classify a missed surveillance as a 3A(1) or a 3A(3) per DOE Order 232.2A. In establishing surveillance requirements, there is a "recognition that the most probable result of any particular SURVEILLANCE being performed is the VERIFICATION of conformance with the SURVEILLANCE REQUIREMENTS," or in other words, the most probable result of any surveillance requirement would be finding the equipment operable [6]. Additionally, DOE Guide 423.1-1B informs DOE and its contractors to assume SSCs are operable when surveillance requirements are met. However, DOE Guide 423.1-1B does not attempt to imply that SSCs are operable when they are known to be inoperable or the requirements of a surveillance are not met [6].

As will be discussed with ORPS events later in this chapter, performing a surveillance requirement incorrectly (such that it does not verify operability) does not mean the LCO was met and the SSC was operable. Therefore, even if there is no TSR violation for a missed surveillance, there may exist a TSR violation for an LCO not being met.

Additionally, DOE is not approving the length of time that an SSC can be inoperable when it approves the frequency of performing a surveillance requirement. The length of time the SSC can be inoperable without taking additional actions is defined by the associated LCO required action completion time, which is often shorter than the associated surveillance requirements frequencies. As stated above, it is possible for an SSC to meet its SR, and fail in between performances of the surveillance requirements, and operability should not be implied solely based on successful performance of a surveillance requirement.

This second point is particularly important in the classification of missed surveillances. If the surveillance is confirming a fixed parameter, performing the surveillance late and finding the parameter acceptable could indicate that the requirements of the surveillance were met during the entire time period between the last successful performance of the surveillance, and this late one. For example, if a surveillance consists of a check for leaks on a component and several instances of the surveillance requirement are missed, but when it is performed late no leaks are discovered, one can reasonably conclude that no leaks existed for the entire time frame as leaks do not repair themselves. However, if the surveillance is on a variable parameter that would not necessarily be the case. For example, a daily surveillance that confirms temperatures in a room are not below freezing. If the surveillance were missed, performing it late and finding temperatures above freezing would not necessarily demonstrate that during the missed timeframe temperatures were always above freezing.

The staff's review and analysis of this topic focused on implementation via site procedures, and on a selection of events across the complex in the last several years. In some cases, there is a lack of understanding of when a missed or incorrectly performed surveillance

would result in a 3A(1) TSR violation for an LCO not being met. This ambiguity could lead to classifying the event as a 3A(3), rather than a 3A(1), in ORPS. The staff has found a selection of events, which highlight this inconsistent implementation.

**Site Implementation**

*ORPS Events*

In compiling ORPS event reports to discuss with applicable sites with regard to surveillance requirements, the staff focused on identifying events over the last approximately three years in which a surveillance was missed or performed in such a manner that the staff thought could be categorized as a 3A(1), and was not.

- **Pantex** – *Uncalibrated Equipment Used to Take a Safety-Related Measurement in the [High Pressure Fire Loop] HPFL Pump Houses* [25]

  On March 6, 2017, a TSR violation was reported when personnel discovered that an uncalibrated piece of equipment was used to take a safety-related measurement in the high pressure fire loop pump houses. The discovery on March 6 however was not the first time that the measurement had been taken with uncalibrated equipment. For "many years" personnel had taken the pump room temperature from an uncalibrated wall thermometer. This event was classified as a 3A(3) informational level report.

  However, the staff believes the appropriate categorization would be a 3A(1), high level, as it is difficult to ascertain that the LCO was met for all previously uncalibrated measurements. At the time of discovery, personnel re-performed the surveillance and found the temperature in the pump house was above freezing. However confirming that the temperature was above freezing at the time of discovery does not provide confirmation that the temperature was indeed above freezing for the *entire* time period ("many years") the surveillance was performed incorrectly.

- **Hanford** – *Quarterly Technical Safety Requirement Surveillance Performed Late* [26]

  On June 12, 2019, the SOM discovered that the Central Waste Complex quarterly combustible surveillance performed on March 19, 2019, was incomplete. The fire protection engineer responsible for performing the surveillance did not document two zones. However, the engineer signed the procedure as completed, and operations personnel responsible for the review of the procedure did not notice the error. At the time of discovery, on June 12, the associated LCO was declared not met, the applicable LCO condition entered, and the combustible surveillance was performed with satisfactory results. This event was categorized as a 3A(3) informational level report.

  However, similar to the above Pantex example, the staff believes the appropriate categorization would be as a 3A(1) high level, as it represents a period of

time during which the LCO was not demonstrated to be met due to the surveillance requirements not being performed. Although the combustible loading at the time of discovery met the surveillance requirements, the performance of the surveillance satisfactorily in June does not indicate that the combustible limits were met back in March.

- **Hanford** – *Differential Pressure Transmitter Set Points for Verifying TSR Limits Represents a Positive USQ [Un-reviewed Safety Question]* [27]

  In March 2016, personnel discovered that there were two errors in the procedure for performing SR 3.1.2, which requires verifying the headspace of each tank in the tank farm is below a limit every 36 hours. The errors included both listing instruments to meet the surveillance requirements that should not have been used, and listing an uncertainty for the instruments that was incorrect. Per the ORPS report, "if at any time the instrument was used to demonstrate LCO compliance, the determination would have been in error," and "in lieu of reviewing three years of daily round sheets from multiple tank farms, the Tank Operations Contractor concedes that a condition where the wide range instrument was used to meet the LCO 3.1.2 SR likely existed."

  This event was classified only as a positive USQ, and not as a TSR violation for a missed surveillance. However, for the three years this surveillance was performed (at a frequency of every 36 hours), the performance of the surveillance did not meet the intent of the surveillance requirements, as the ORPS report states. Therefore, the staff believes this event should have been categorized as a 3A(1) TSR violation.

  In discussing this event with site personnel, the reasoning for not classifying it as a 3A(1) TSR violation was that personnel had performed the surveillance requirements per their approved procedures, and therefore it could not be a violation. This represents a fundamental misunderstanding of the intent of surveillance requirements in demonstrating LCO compliance. As SR 4.0.1 states, "Surveillances are performed to verify the operability of systems and components" [6]. Although personnel had performed SR 3.1.2 as written and within the required frequency, the method they used to perform it did not verify operability, and thus represents a violation of SR 4.0.1.

The staff contrasts these ORPS events with an event that occurred recently at Y-12 that was originally classified as 3A(3), and subsequently reclassified as 3A(1):

- **Y-12** – *Inadequate TSR Surveillance for Accountable Steam Condensate (ASC) Units* [28]

  During a nuclear criticality safety operational review, an engineer discovered an error in the method that personnel were using to perform a surveillance requirement related to a conductivity probe measurement on all four ASC units. After discovering the error, additional field measurements confirmed that the location of the probe did not

meet the TSR required measurement, which necessitated declaring the four ASC units inoperable.

It was determined there was a 3A(1) TSR violation, due to the fact that the surveillance requirement had been marked "satisfactory" when the field measurements showed it was "unsatisfactory." Personnel had performed the surveillance requirement on time at its required periodicity, and had performed it according to the procedure. The procedure however was unclear regarding the measurement requirements, and the individual performing the procedure would not have readily known the surveillance requirement was not met. Additional field measurements at the time of discovery of the error confirmed that the surveillance requirement had not been met, and showed that the measurement did not meet the TSR requirements. Each time personnel had performed the surveillance requirement incorrectly, the operability of the units was not confirmed, and thus represented a violation of SR 4.0.1.

*Procedures*

The staff found one site, Y-12, which had developed significant additional guidance beyond that which is contained in DOE directives, regarding surveillance requirement failures. The document, *Surveillance Requirement Performance – Threshold for Failure,* provides "more definitive guidelines on what constitutes an adequate performance" of surveillance requirements and "what level of errors constitute their failure for the purpose of meeting General Application SR 4.0.1…[and] SR 4.0.2" [29]. The guidance articulates the distinction between TSR violations for a missed performance of an SR (referencing SR 4.0.2) and TSR violations for inadequate SRs which do not demonstrate operability of the SSC (referencing SR 4.0.1).

The guidance focuses on cases in which, while personnel performed the surveillance requirements per applicable procedures, the actual performance did not meet the intent of confirming operability. The staff found that several of the scenarios discussed in the Y-12 guidance were directly applicable to the ORPS events analyzed in this chapter. For example, failures of measurement and test equipment (M&TE), such as the examples at Pantex and at the Hanford Site. The Y-12 guidance states "using the incorrect M&TE could result in a failure to meet the SR… or a failure to perform the SR" [29]. Additionally, applicable to the Hanford Site example of a missed section of the combustible loading surveillance, the Y-12 guidance document states "mistakes made during completion of steps in performance of a surveillance procedure only constitute a failure to meet the SR if the error invalidates demonstrating compliance with the SR" [29].

The staff found the guidance helpful in describing many of the issues related to SRs encountered in this review. However, the document is contractor developed and approved, and it was not clear to the staff the level of DOE involvement in developing the guidance. Further, the document is only applicable at the Y-12 site, although, as discussed above, it addresses questions which are faced across the complex.

**Analysis and Concerns**

Based on events analyzed from the last several years, the staff identified some cases where there is a lack of understanding of when inadequate performance of surveillance requirements, such that operability of SSCs was not assured, constitutes a violation of SR 4.0.1. Further, due to this lack of understanding, some violations are incorrectly reported at the informational level rather than the high level.

## SPECIFIC ADMINISTRATIVE CONTROLS

According to DOE Standard 1186-2016, *Specific Administrative Controls*, a SAC is an administrative control that is identified to prevent or mitigate a hazard or accident scenario and provides a safety function that would be safety significant or safety class if provided by an SSC. SACs come in two formats – directive action and LCO.

### Directive Action SAC Violations and Recovery Actions

*Background*

Directive action SACs are often invoked to protect initial conditions and safety analysis calculation assumptions. Section 4.2 of DOE Standard 1186-2016 states, "The Directive Action format should be used when it is essential that the SAC be performed when called upon every time and without any delay (e.g., hoisting limits for nuclear explosives, MAR limits, or expected responses during criticality safety infractions not covered by an LCO) or when definitive requirements for specific activities can be stated" [5]. Because directive actions SACs are important in ensuring that personnel conduct operations within the analyzed and approved safety basis, DOE Standard 1186-2016 states that "a violation of a Directive Action SAC is a TSR violation" [5]. Section 4.3.5.2 of DOE Guide 423.1-1B, reiterates this expectation, "a violation of a Directive Action SAC is an immediate TSR violation" [6].

In Section 4.3.5.3 of DOE Guide 423.1-1B, one of the four TSR violation criteria is a "failure to comply with an AC [administrative control] statement" [6]. The guide explains that there are two types of violations considered failure to comply with an AC statement, the first of which is "any single instance of a failure to comply with a requirement in a directive action SAC" [6].

*Site Implementation*

During the team's discussions with site personnel, nearly all personnel indicated that any violation of a directive action SAC would be a TSR violation. SRS was the exception. Section 5.3.3.3.1.2 of the *SRS Technical Safety Requirements Methodology Manual* states that there may be unique situations where a recovery action may be appropriately justified to be included as part of a directive action SAC [30]. The manual used the following example of a directive action SAC with a recovery action:

> *All TRU [transuranic] waste drums stored on the second level shall be banded together per pallet upon initial placement. Damaged bands shall be IMMEDIATELY replaced upon discovery* [30].

Furthermore, the manual states:

> *Typically, a single violation of a SAC written in the AC section of the TSR constitutes a TSR violation. However, SACs written in the AC section of the TSR can be written with a recovery action to limit that potential. The recovery actions*

> *should be immediate, simple and straightforward and by complying with the recovery action the facility remains within the analyzed safety envelope* [30].

SRS has incorporated the use of recovery actions in its criteria for TSR violations, a practice the staff concludes to be unique in the DOE complex. The *SRS Technical Safety Requirements Methodology Manual* limits TSR violations involving SACs to occur when either, "The SAC that does not have an associated recovery action is not met, or [t]he SAC that has an associated recovery action is not met and there is failure to complete the recovery action within the required time limit" [30].

These TSR violation criteria are inconsistent with the TSR violation criteria in DOE Standard 1186-2016 and DOE Guide 423.1-1B. In fact, DOE Standard 1186-2016 directly addresses this situation by specifically stating, "The distinguishing feature of a Directive Action SAC is that it does not specify actions to take within a defined completion time if the SAC requirement is not met (as there are for an LCO SAC)" [5]. In addition, "a violation of a Directive Action SAC is a TSR violation, and timely actions would be required if violated to ensure the facility is in an analyzed safe condition" [5].

Recovery actions, or 'timely actions' per DOE Standard 1186-2016 are necessary "to ensure the facility is in an analyzed safe condition." However, taking those actions does not preclude declaring a TSR violation. Some sites, including SRS, invoke the previous revision of DOE Standard 1186 in contracts, but DOE Standard 1186-2004 includes similar expectations:

> *Because of the importance of controlling MAR to within the bounds of the analyzed consequence and hazard analyses, and the need for unequivocal MAR limits in a TSR, a directive action Specific AC is preferred. However, directive action SACs do not support action times to allow the facility some time to correct the MAR exceedance. For the case involving the use of SACs, directive language should be used in the form of a SHALL statement which sets the maximum MAR limit. A violation of this Specific AC limit is an immediate TSR violation in this case* [5].

Prior to the staff's most recent review, the staff had identified that a proposed directive action SAC for the SRS tank farms included a recovery action. The SAC prohibited combustible fueled engines and fuel containers within 20 feet of a specified area during certain operations and the recovery action was to remove any such items if discovered. In this case, the contractor removed the recovery action following the staff's review.

In addition, a staff review of directive action SACs at SRS identified SACs in the K-Area Complex TSRs that prohibited transient combustibles and compressed gas cylinders from certain locations. These directive action SACs also included a recovery action to remove such items if personnel found them. However, without any time limit to remove the prohibited items, personnel could remove the prohibited items at any time after discovery and the SAC would be satisfied. When the staff team pointed out this scenario, the contractor's response was to add a completion time to the SAC rather than removing the recovery action altogether.

In addition to SRS, the staff identified a SAC at Hanford's tank farms that required personnel to immediately de-energize any equipment they discovered installed in any inactive tank, vault, facility, etc., which did not meet required ignition controls. During discussion with the staff review team, site personnel stated that implementing this recovery action would avoid the need to declare a TSR violation (although Hanford personnel made it clear to the staff that there would be a TSR violation if such equipment were found in an active tank).

*Analysis and Concerns*

Recovery actions represent an undefined risk acceptance by DOE when directive action SACs are not met. By approving directive action SACs with recovery actions, DOE is approving safety bases that allow for the accumulation of unquantified risk during the time period the directive action SAC is not met, and allow for doing so without declaring a violation or depending on how the recovery action is written, without any defined time period for completion. Additionally, such use of recovery actions can diminish the reliability of SACs.

For example, a directive action SAC may prohibit flammable liquids around transuranic waste drums or processing equipment. If the lack of flammable liquids was assumed to be an initial condition, fire scenarios may have been assumed to be prevented and subsequently fire scenarios involving flammable liquids may not be included in the mitigated hazards analysis. By adding a recovery action to "immediately remove flammable liquids when discovered," without declaring a TSR violation, the SAC is implying that flammable liquids may be present for an unlimited amount of time (prior to discovery), thus invalidating the initial condition and essentially permitting operation of the facility outside of its approved safety basis for an unlimited amount of time.

When directive action SACs are not implemented, the cause is often a ConOps issue or deficiency. By not identifying and reporting these occurrences as violations, there is a greater likelihood that ConOps deficiencies will not be investigated, tracked for trending purposes, or have corrective actions developed to prevent recurrence. Not taking these actions can downplay the importance of these SACs and ultimately decrease their reliability.

DOE guidance clearly states that any violation of a directive action SAC is an immediate TSR violation. Furthermore, DOE directives could be modified to clarify that while taking a recovery action (whether defined ahead of time or in response to an event) is appropriate, the TSR is still violated.

**Deliberate Action to Comply with SACs**

The staff's review of past ORPS reports identified two events involving deliberate action (or lack thereof) and SAC compliance.

- **SRS** – *Less Than Adequate Transfer Line Walkdown Prior to Performing a Waste Transfer* [31]

The Defense Waste Processing Facility (DWPF) at SRS has a SAC that requires that the facility walk down the transfer path prior to transfers, identify any in-progress excavation work with the potential to breach the transfer line core pipe, and discontinue excavation during the transfer. Due to imprecise communications, a control room operator mistakenly believed that a walk down had been performed prior to transferring the contents of a DWPF tank to a low point pump pit tank. The implementing step in the transfer procedure allowed the operator to record the name of the person who performed the walk down, rather than requiring the person to sign the step off as complete. At the time of the transfer, there was an excavation over the transfer lines where workers were present during the transfer. The transfer was completed without notifying the workers. Although it was later determined that an evaluation had been previously performed that concluded there were no potential radiological consequences to workers in this excavation from any liquid waste transfers due to the soil coverage, the decision was made to declare a TSR violation because the required walk down had not been conducted prior to starting the transfer.

- **LANL** – *Flanged Tritium Waste Container Movement Results in Procedural Noncompliance* [32]

  At LANL, the Weapons Engineering Tritium Facility (WETF) safety basis addendum that supports flanged tritium waste container movement and venting includes SACs associated with a lift height restriction and lookout in order to preclude toppling and possible ignition of potentially flammable headspace mixtures of oxygen and hydrogen isotopes. WETF management implements these SACs using two procedures. In this case, workers needed to rearrange the containers in preparation for venting operations. The work crew determined that the flanged tritium waste container movement procedure did not support rearrangement and chose to use an inappropriate work document that did not include the SACs; however, the crew stated that they nonetheless implemented the SACs. Subsequent to commentary from a member of the NNSA Field Office, WETF management concluded that this event did not constitute a violation of the TSRs because of the verbal statement that the SACs were implemented. Instead, management concluded that movement of the flanged tritium waste containers constituted a procedural noncompliance since the work crew used a procedure that did not include the SAC requirement. This event was reported as a management concern, not as a TSR violation.

These cases illustrate the debates that can occur after the fact. In the first case, while a walk down was not performed and there were workers present in an excavation, the soil coverage present protected the workers during the transfer. In the second case, the requirements for having a lookout person and pallet jack operator present during the transit and keeping the pallet less than two inches from the floor were reported to be implemented. In the first case, however, management chose to report the event as a TSR violation because the SAC clearly stated personnel were to perform a walk down prior to the transfer and did not. In the second case, management concluded it was adequate to rely on verbal statements that the controls were implemented.

DOE guidance would benefit from an explicit discussion of whether SAC compliance must be a deliberate act or whether it can be achieved by happenstance. Similarly, the existing occurrence reporting criteria does not explicitly address ConOps or lack of rigor with implementing SACs. This concept of requiring deliberate action or "compliance by luck" is covered in more detail in the ConOps section of this report.

**Subjective SAC Language**

SACs are intended to clearly define the specific action to be taken. The staff noted a number of SACs at Pantex that were subjective in nature, making it hard to determine when the SACs were violated. Examples include:

- Technician shall only lift the storage container as high as required to safely complete the operation,
- Forklift drivers are required to keep the forklift tines as low as possible,
- Operating procedures shall have safety requirements that state the following: Approach the unit slowly and cautiously, and
- During inclement weather such as icy roads, snow-packed roads, snow and blizzard conditions, rain, dense fog, windy conditions or dust storms, the operations manager has the responsibility to determine when TRANSPORTATION operations must be curtailed. [19]

Pantex personnel stated they were undertaking efforts to rewrite several SACs. Guidance for developing TSRs would be improved if it explicitly called for developers and reviewers of SACs to ensure that the proposed SACs were sufficiently specific that compliance and non-compliance are readily apparent.

Addressing the SAC-related implementation inconsistencies identified in this report will ensure that contractors are reporting all TSR violations and allow DOE to properly enforce these violations consistent with the federal regulations outlined in the Background section of this report.

## UNREVIEWED SAFETY QUESTIONS

### Background

10 CFR 830 Section 203 defines the USQ process. Appendix A to Subpart B of 10 CFR 830 states that the "USQ process is an important tool to evaluate whether changes affect the safety basis," and is used to "ensure that the safety basis…is not undermined by changes in the facility, the work performed, the associated hazards, or other factors that support the adequacy of the safety basis" [1]. According to 10 CFR 830, a USQ process must be implemented for situations in which there is temporary or permanent change to the facility or procedures described in the DSA, a test or experiment that is not described in the DSA, and when there is a PISA because the DSA analysis may not be bounding or may otherwise be inadequate.

Further, 10 CFR 830 provides additional requirements when a PISA is discovered or personnel are made aware of a PISA. These requirements are to take action, as appropriate, to place the facility in a safe condition; notify DOE; perform a USQ determination; and submit an ESS to DOE prior to removing any operational restrictions that were put in place immediately to put the facility in a safe condition. 10 CFR 830 references "DOE Guide 424.X, *Implementation Guide for Addressing Unreviewed Safety Question (USQ) Requirements*," to provide additional implementation guidance [1].

The review focused on those events in which (1) a PISA was declared and subsequently determined to represent a positive USQ, (2) the event also represented a period of time the facility operated outside of its approved safety basis, and (3) the event may or may not have also been reported in ORPS as a violation.

While the USQ process and the reporting of safety basis violations often capture different types of events, there are some circumstances in which both processes may be applicable. For example, repetitive violations of a TSR control would call into question the reliability of the control. Repetitive violations may trigger the need to declare a PISA, and further evaluation may demonstrate a need for potential development of an alternate control to ensure the associated accident is prevented or mitigated as described in the DSA. Another example would be if personnel find radioactive or hazardous material in a facility that assumes it to not be present as an initial condition for the safety analysis. There are several examples of this type of event discussed later in this chapter.

DOE Standard 3009-2014, *Preparation of Nonreactor Nuclear Facility Documented Safety Analysis*, contains discussion on initial conditions and assumptions, and the need to develop TSR level controls to protect them:

> *ICs [initial conditions] are specific assumptions regarding a facility and its operations that are used in defining accident scenarios….It is important to define and document ICs carefully to ensure they are appropriately controlled, classified as SC [safety class] or SS [safety significant] and preserved via TSR operating limits, design features or SACs as appropriate…the initial conditions and*

*assumptions for the analysis are required to be documented and evaluated to determine if controls need to be put in place to ensure the evaluation will remain valid.* [33]

While it is not required that every initial condition or other assumption is protected with a TSR control, if there is a positive USQ for an invalidated initial condition or assumption, it should trigger consideration of whether a new control is warranted.

The staff focused this portion of the review on discussion of ORPS reportable events in which the staff concluded there was both a nuclear safety basis violation and a positive USQ, even though the categorization of the event may have been one or the other. DOE Order 232.2A allows for multiple ORPS reporting categories. The focus of the review was to ensure that all nuclear safety basis violations are reported under proper reporting criteria that highlight the failure to implement the safety basis as required by 10 CFR 830. This proper reporting category also aids DOE in taking appropriate enforcement as required by 10 CFR 820 as discussed earlier in this report.

**Site Implementation – ORPS Events**

- **Y-12** – *Unanalyzed Material in Building 9720-82* [34]*, Positive USQ – Unanalyzed Material in Building 9720-82* [35]*, Unprotected HES [hazard evaluation study] Assumption Results in a Positive USQ* [36]

  A PISA was declared on March 1, 2018, for the discovery of material not analyzed in the Highly Enriched Uranium Materials Facility (HEUMF) safety basis. On March 12, 2018, a positive USQ was declared. The accident analysis specifically states that uranium chips, fines, and turnings are not stored in the facility. The initial data gathering showed that these materials had been received by the facility during 2010 and 2011, when the facility was first operational and receiving material for storage. An additional positive USQ was declared in April 2018 as a result of the extent-of-condition review of materials in HEUMF for the discovery of metal fines that were assumed not to be present. Another positive USQ was declared in August 2018, with the discovery that a criticality safety evaluation document in 2014 was modified to allow storage of chips and fines in tube vaults, which the hazard evaluation study assumed would not be present.

  These events were all classified only as positive USQs, and thus reported in ORPS under criterion 3B(2) "determination of a positive Unreviewed Safety Question (USQ) that reveals a currently existing inadequacy in the Documented Safety Analysis" [7]. However, they represent a long period of time in which the facility operated outside of its approved safety basis, and should have been reported as violations under 3A criteria, in addition to being reported as positive USQs. Revising the written safety basis to ensure the facility is able to continue to store these items may not address the operational factors that led to the presence of the material in the first place. Fundamentally, the facility did not have appropriate controls to protect

the assumptions that this material would not be present, and thus these assumptions were violated multiple times, for long periods of time.

- **LANL** – *Positive USQD [unreviewed safety question determination]: Heat-Source Plutonium Storage in Safes Noncompliant with DSA* [37]

  The USQ process was utilized to evaluate storage of heat source plutonium (HS-Pu) in safes in TA-55. On March 13, 2018, it was determined that the USQD was positive, as the TA-55 DSA describes the storage of HS-Pu bulk feed materials in the vault, and storage in safes was contrary to the DSA description. The USQD indicated that the materials in question were not considered safety class encapsulated heat sources, which the DSA describes as located outside of the vault. Therefore, the HS-Pu container storage in the safes, rather than the vault, was not consistent with the assumptions in the relevant accident analyses. Subsequent review found that HS-Pu material had been stored in safes on February 15, 2017, and by May 17, 2017, the HS-Pu material had been processed and removed from the safes.

  This event was not classified as a violation under 3A(1) or 3A(2) criteria in ORPS, but was classified only as a positive USQ under 3B(2) criteria. However, for the time period that the materials had been present in safes (February through May 2017), the facility was operated outside of its approved safety basis and this event would warrant reporting as a violation under 3A criteria, in addition to reporting as a positive USQ.

- **LANL** – *Positive USQD: Storage of Magnesium Perchlorate Waste Noncompliant with DSA* [38]

  The TA-55 DSA prohibited storage or processing of perchlorates. However, contrary to this prohibition, legacy magnesium perchlorate was stored in the facility. The material was kept in a designated location that was separate from other materials for approximately three years. The storage of the material was evaluated and declared to represent a positive USQ on December 20, 2018. The event was also reported in ORPS as a violation under 3A(2), safety basis non-compliance, in contrast to previous ORPS examples, which were only reported as positive USQs. The ORPS reporting of the legacy material storage under the ORPS violation and positive USQ criteria was warranted and appropriate.

**Analysis and Concerns**

As evidenced by the examples discussed in this chapter, there have been multiple instances in which contractors have operated facilities outside of their approved safety basis. While these events were reported as positive USQs, they were not reported as nuclear safety basis violations. Current ORPS criteria only state that violations of TSRs should be reported under 3A(1), and noncompliance with other "credited hazard controls" should be reported under 3A(2). Therefore, under the current guidance wording, if a facility did not protect an assumption or initial condition with a distinct engineered or administrative control, it need not report a non-compliance as a violation under 3A criteria. However, if these events are not classified as

violations, it could lead to personnel not addressing the appropriate root causes, including ConOps issues and failure to implement controls to protect initial conditions or assumptions. In addition, it does not allow DOE to properly enforce, track, and trend nuclear safety basis violations.

## ADDITIONAL TOPICS

### Mode Violations

*Background*

Per DOE Guide 423.1-1B, modes can be defined in facility TSRs to represent the facility SSC configurations that preserve safety in different phases, or modes, of facility operations. Mode distinctions are determined by differences in process parameters or needed safety controls and equipment for different operational states. Modes may be defined as needed based on the minimum number required to distinguish between different facility conditions as dictated by required equipment operability and needed parameter limits.

DOE Guide 423.1-1B notes example modes, such as operations mode, standby mode, shutdown mode, and repair mode, that illustrate operational distinctions that can be made. For example, a TSR requirement may apply only when specific facility mission operations are underway, and thus does not apply when these operations are shut down. For some nuclear facilities, it may not be possible to define a mode where TSRs do not apply, as the hazard is always present.

For those situations where an operation is performed that is prohibited by the mode the facility is in (e.g., performing a facility mission operation when in the shutdown mode) and applicable TSR requirements (safety systems or other hazard controls) are not in place, then such operation is outside the approved safety basis and there is a violation of the nuclear safety basis.

DOE Guide 423.1-1B, Section 4.3.5.3, Violation of Technical Safety Requirements, contains guidance relating to such mode violations stating:

> *Failure to complete an action statement within the required time limit following exceeding an LCS or failure to comply with an LCO….*
> *The following are two examples of "failure to comply with an LCO:" (1) an operation is performed that is prohibited by the mode the facility is in* [6].

The DOE Guide 423.1-1B guidance on the concept of an operation being performed that is prohibited by the mode the facility is in is noted as one of two examples of "failure to comply with an LCO." The example guidance as written can be interpreted to be distinct from the second listed TSR violation circumstance of "failure to complete an action statement within the required time limit following…failure to comply with an LCO." With the guidance as written, if the facility has not failed "to complete an action statement within the required time limit," the concept of such mode violations being a TSR violation is not applicable and is not explicitly captured in DOE Guide 423.1-1B.

*Site Implementation*

Facility TSRs and related procedures that the staff reviewed did not include the concept that performing an operation prohibited by the mode the facility is in constitutes a TSR violation.

Despite not having language related to mode violations in their TSRs, some sites stated that personnel performance errors leading to such mode violations should be a TSR violation. Additionally, some sites have submitted ORPS reports regarding mode violations or mode change issues:

- **Pantex** – *Facility Shifted to Operational Mode with Fire Suppression System Impaired* [39]

  The facility was shifted to operations mode without a verification that the fire suppression system was not impaired. While material had been moved to the entrance of the facility, the movement was stopped based on signage indicating an impairment of the fire suppression system. As such there was no operation performed that was prohibited by the mode the facility is in. Pantex classified this event as a 10(1) management concern.

- **Nevada National Security Site (NNSS)** – *TSR Violation: Safe Drawer Containing Radioactive Material Opened in Warm Standby Mode* [40]

  Workers at the Device Assembly Facility opened a safe drawer containing nuclear material while the building was in warm standby mode. The ORPS report noted that such opening of the drawer was considered to be a prohibited operation in that mode per language in the TSR regarding maintaining the material in a safe and stable configuration. NNSS classified this event as a 3A(1) TSR violation.

- **NNSS** – *TSR Violation: Material Movement in Wrong Facility Operational Mode* [41]

  Operators discovered that they had not entered hot operations mode prior to moving nuclear material containers at the Device Assembly Facility per the applicable TSR. During this evolution, the facility operational mode was "warm standby." While the report notes that all required facility systems were operable to support the operational mode change if it had been requested, the event was classified as a 3A(1) TSR violation.

*Analysis and Concerns*

Current DOE guidance regarding reporting of mode violations is problematic as written in DOE Guide 423.1-1B and has generally not been included in facility TSRs, although certain sites have declared mode violation issues as TSR violations under 3A(1), or management concerns under 10(1). As previously noted, a safety basis violation exists for those situations where an operation is performed that is prohibited by the mode the facility is in and applicable TSR requirements (safety systems or other hazard controls) are not in place. DOE TSR violation guidance and potentially ORPS reporting criteria could be modified to properly address such violations.

**Design Features**

*Background*

Per Appendix A to Subpart B of 10 CFR 830, design features are "the design features of a nuclear facility specified in the Technical Safety Requirements that, if altered or modified, would have a significant effect on safe operation" [1]. Design features are normally passive characteristics of the facility, not subject to significant alteration by operations personnel, which accomplish their function without a change of state. Examples include radiation shielding, structural walls, relative locations of major components, and significant passive safety SSCs such as piping, vessels, supports, and containers. Some design features are subject to degradation or alteration and in certain cases TSRs include in-service inspections with required frequencies to ensure the ability of the design features to perform their intended safety functions.

DOE Guide 423.1-1B does not contain clear, explicit TSR violation criteria for design features. In the context of the guide, the Section 4.3.5.3 criterion on "failure to perform a surveillance within the required timeframe" can be interpreted as applying to only surveillance requirements for active SSCs that are addressed by limiting conditions for operation. In contrast, the DOE Order 232.2A ORPS reporting criteria regarding TSR and other hazard control violations states the following regarding "surveillance tests" performed after the prescribed time limit:

> *An event consisting solely of a surveillance test* ***(to include any periodic activity explicitly captured in the Documented Safety Analysis that is used to ensure operability or viability of a structure, system, or component)*** *performed after the prescribed surveillance period, and in which the structure, system, or component was found to be capable of performing its specified safety function* (emphasis added) [7].

The parenthetical description of a surveillance test noted above would include in-service inspections for design features that are explicitly captured in the TSR.

*Site Implementation*

LANL and Hanford have developed criteria for violations specific to design features in their TSRs. For example at Hanford, the TSR for the tank farms includes explicit criteria regarding failure to perform a design feature's in-service inspection/test within the required time limit specified in the TSR and failure to have verified important attributes of a design feature when the design feature is first required. However, most site TSRs do not have criteria for violations specific to design features.

*Analysis and Concerns*

The current DOE guidance for TSR violations does not explicitly address design features. The staff believes the DOE TSR violation criteria could be modified to clearly and explicitly address violations of design features for cases in which in-service inspections were not performed as specified by the TSR, and for cases in which personnel modified design features

intentionally or inadvertently in such a way that they would not perform their credited safety function.

**Justification for Continued Operation/Evaluation of the Safety of the Situation Controls**

*Background*

Per DOE Guide 424.1-1B, in situations where a PISA results in a positive USQ determination, an ESS or JCO may be submitted to DOE for approval of a "temporary change to the facility safety basis that would allow the facility to continue operating in view of a specific and unexpected situation" [42]. The ESS or JCO submitted to DOE would define specific operational restrictions or other compensatory measures (temporary hazard controls) that will be maintained and implemented. When DOE approves such an ESS or JCO, the ESS or JCO and any DOE imposed conditions of approval become temporary additions to the nuclear safety basis that would permit operations to continue under the conditions specified. DOE Guide 423.1-1B, Section 4.3.5.3, Violation of Technical Safety Requirements, does not explicitly mention ESS/JCO controls in the criteria for TSR violations.

*Site Implementation*

Site TSRs reviewed do not explicitly address implementation of ESS or JCO controls. The staff review team discussed ORPS events that involved violation of JCO or ESS controls. At some sites, violations of these controls were reported under ORPS criterion 3A(2), safety basis non-compliance, as JCOs and ESS controls are not explicitly listed in 3A(1). However, some sites stated they believed violations of these controls should be equivalent in significance as violations of TSR controls. At other sites, violations of these controls were categorized under ORPS criterion 3A(1), TSR violation, with the reasoning that they are equivalent to TSR controls, while not explicitly called out by 3A(1). Illustrating this variance was the following event at LANL discussed below.

- **LANL** – *TSR Violation: Workers Entered Exclusion Area without Proper Authorization* [43]

  This event in 2017 involved maintenance workers entering an exclusion area near flanged tritium waste containers in storage without written authorization as required by an effective ESS. The ORPS report notes that the event was originally categorized as a hazard control non-compliance, 3A(2) in the current ORPS order, but that LANL later decided to upgrade the categorization to a TSR violation, 3A(1) in the current ORPS order. The ORPS report states that the decision was based on the conclusion that the controls in the ESS should be considered TSR-level controls with a violation of such controls constituting a TSR violation.

*Analysis and Concerns*

The DOE TSR violation criteria of DOE Guide 423.1-1B and ORPS reporting criteria do not clearly and explicitly address violations of ESS/JCO controls. The DOE TSR violation

criteria of DOE Guide 423.1-1B and/or ORPS reporting criteria could be modified to clearly and explicitly address violations of ESS/JCO controls.

## CONCLUSIONS

On February 21, 2020, the Board issued Recommendation 2020-1, *Nuclear Safety Requirements*, which was intended to strengthen DOE's regulatory framework. Specifically, sub-recommendation 4.d stated that key guidance on TSRs should be elevated to requirements, either in a requirements document or via inclusion in 10 CFR 830. The staff team analyzed the issues related to violations of the nuclear safety basis discussed in the previous sections for larger trends and issues, which provide evidence of the impact of a lack of requirements, detailed in Recommendation 2020-1. The analysis identified two fundamental concerns.

### Overall Concerns

*The current DOE directives framework for TSR implementation provides limited guidance and narrow federal authority.*

10 CFR 830 contains the requirement for TSR violations to be reported, but contains no other requirements for TSR violations. Further, the rule is silent on violations of the safety basis that are not TSR violations. The criteria for TSR violations and all other guidance on TSRs is found in a DOE guide, rather than an order. While guides provide an approach that will comply with the Nuclear Safety Management rule, they contain no requirements. During the course of the review, the majority of sites stated DOE Guide 423.1-1B was a guide, and they were allowed to develop alternate approaches. Additionally, DOE personnel stated that the lack of DOE requirements about TSRs limited their ability to challenge the content and structure of proposed TSRs. For instance, if a contractor developed TSRs that did not match the guidance contained in DOE Guide 423.1-1B, some DOE personnel did not believe they could ask the contractor to modify their TSRs, as there were no hard requirements to point to. Finally, with the lack of requirements, decisions in the field on what events represent a violation can sometimes be expert-based rather than standards-based.

DOE could improve the guidance provided in DOE Guide 423.1-1B. While the current guidance on TSR violation criteria may appear fairly straightforward, and may be easy to apply for simple situations, this is not always the case for more complex situations. In contrast, the NRC Enforcement Manual provides several pages of discussion on TS violations, and related topics including equipment inoperability and time of discovery. The data and analysis conducted in all areas discussed in this report demonstrate the inconsistent implementation and differing interpretations of DOE's guidance across the complex. Finally, the guide is silent on violations of the safety basis that are not specifically TSR violations.

Prior to this review, the Board's resident inspectors have observed a number of cases where contractor and DOE nuclear safety personnel have spent hours or days debating whether a particular event should or should not be declared a TSR violation. Time used to debate the declaration can lead to exceeding the requirement in DOE Order 232.2A to categorize and provide initial notification of occurrence reports within two hours of the discovery time. In some cases, DOE has directed the contractor to declare an event to be a

TSR violation days after the event initially occurred. The regularity of these debates provide anecdotal evidence that the current guidance regarding TSR violation criteria does not definitively address many situations that personnel in the field routinely encounter. For years, the Board's resident inspectors have heard contractors and federal staff express a desire for additional guidance so that facility operations staff can make more timely determinations of whether a TSR violation has occurred without the need for extensive management discussions.

When these more complex situations arise, the decision about whether to declare a TSR violation often relies on contractor and federal subject matter experts. As a result, the criteria for when to declare a TSR violation can become dependent on specific individuals and those criteria can change when those individuals are no longer involved. For example, SRS declared a number of TSR violations related to the lack of documentation of LCO entries and mode changes between 2016 and 2017, however the site's TSR Methodology Manual now states that failure to document LCO entry is not a TSR violation.

In the absence of DOE guidance, some sites have developed site procedures to provide additional guidance on TSR violations and related topics. In some cases, site personnel have used NRC requirements as a source of guidance. The content of these site procedures varies from site to site and often there is an attempt to address the ambiguities in TSR implementation encountered at a particular site. For example, SRS has provided additional guidance on LCO entry documentation and notifications, operator cognizance of required actions, time of discovery, and modes. Y-12 has developed a detailed procedure on operability determinations. However, much of this site guidance is contained in procedures that only the contractor approves. There is a possibility that the contractor may insert provisions that could artificially reduce the number of TSR violations. In addition, when DOE directives do not establish the expected standard, sites may develop local guidance that is not as rigorous as the norm. Even when the additional guidance in site procedures is beneficial, it is more appropriate to handle this type of guidance at the DOE complex-wide level so DOE can provide it for all the sites to use.

As part of this review, the staff team asked site personnel where they felt additional guidance would be beneficial on topics that relate to violations of the safety basis. Some personnel were satisfied with the current guidance or believed it would be difficult to develop additional guidance that would be applicable across the complex. Personnel at several sites provided suggestions for where they believed additional guidance would be helpful in the directives. These include:

- Operability determination,
- Time of discovery,
- "Should have known" evaluations and the total length of time an SSC is unavailable,
- Occurrence reporting of 3A(1) versus 3A(2),

- When failures of design features/in service inspections become TSR violations, and

- Example safety basis violations for elements of the safety basis that do not have a TSR control.

The staff also had a number of observations about ORPS reportability. First, some sites took a narrow interpretation of 3A(1) high level report, TSR violation, and excluded violations of controls found in ESSs, JCOs, and other parts of the approved safety basis, or only required a 3A(2) low level report, safety basis non-compliance, for these violations. Second, the report level did not always reflect the safety significance of the event. Operations personnel are sometimes reluctant to declare a 3A(1) high level TSR violation for an event that is mostly administrative in nature or that did not result in an unsafe condition.

The current ORPS criteria do not include a criterion to report instances where the rigor in the implementation of the nuclear safety basis was inadequate. This includes failure to document entry into an LCO condition, failure to document the completion of a required action or SAC, or events where compliance with the nuclear safety basis did not result from a deliberate action. Even though these types of events may not result in operations outside the approved safety basis, it is important to report, investigate, and develop corrective actions to prevent recurrence before the rigor of TSR implementation worsens. The inconsistencies in declarations of TSR violations and weaknesses in the ORPS criteria also complicate efforts to compare TSR violation data among sites to determine any complex-wide trends.

*DOE does not ensure that all operations outside the approved safety basis are recognized and addressed.*

Per 10 CFR 830.201, contractors at DOE nuclear facilities "must perform work in accordance with the safety basis…in particular, with the hazard controls that ensure adequate protection of workers, the public, and the environment" [1], and failure to do so means that adequate protection is not assured. When facilities are not operated in accordance with the safety basis, contractors need to report those events as violations, so that appropriate measures can be taken to correct and address the causes that led to the event. Ultimately, in DOE's role as owner and regulator of nuclear facilities, it is incumbent upon its oversight to ensure contractors fulfill the requirement to operate in compliance with their approved safety bases.

Through its complex-wide review, the staff has identified several areas in which operations outside the approved safety bases are not consistently recognized, and therefore not reported as violations of the nuclear safety basis. For example, the current approach to late discoveries of inoperable safety-related SSCs, as well as the approaches at some sites to directive action SACs, failure to adhere to initial conditions and assumptions, and surveillance requirements may allow facilities to be operated outside of the approved safety basis for longer than DOE has accepted. When site personnel discover conditions resulting in operations outside of the approved safety basis, personnel correct these conditions in a timely manner, but sometimes fail to recognize or report these conditions as violations. Furthermore, they may fail to conduct additional analyses to determine how long these

conditions existed in order to understand how long the facilities were operating outside of their approved safety bases.

Any time a facility is operating outside the approved safety basis, the facility is incurring risk beyond that which DOE has accepted. The mitigated consequence analysis in the approved safety basis assumes that all controls are in place, and able to perform their credited safety functions. By not recognizing and reporting all operations outside the approved safety bases as violations, DOE and contractor personnel may not understand the additional risk facilities are incurring across the complex. For instance, during the review a DOE manager explained to the staff that even if a credited control was inoperable for years, as long as when personnel discovered the inoperability they fixed it within the required timeframe in the TSR (in this case 30 days), the facility had operated in compliance with its safety basis. However, operating a facility for years without an operable credited control undermines the primary method by which DOE ensures adequate protection – thus ensuring that contractors operate facilities consistent with approved safety bases.

**Possible Methods for Addressing Concerns**

As part of the analysis of the issues described in this report, possible methods to address the concerns were considered, and are presented below. These methods may also serve to help clarify further the issues in the report. They are not intended to be prescriptive, and only represent one possible solution set.

*Define Violations of the Nuclear Safety Basis as any Operation outside of the Approved Safety Basis*

Under DOE's current approach, not all operations outside of the approved safety basis are recognized and reported as violations. Therefore, DOE could better define the criteria for these violations. The discussion about how to improve the criteria must first address what constitutes a violation of the nuclear safety basis.

Developing an adequate safety basis requires developing clear boundaries of what initial conditions, assumptions, and hazard controls are relied upon to ensure safe operation. These boundary conditions provide an operational framework within which to safely operate. Compliance with the nuclear safety basis is often referred to as operating within the approved safety basis. The purpose of operating within the safety basis is to ensure that operations are within the parameters in the DSA that DOE has approved. This supports the primary method DOE ensures adequate protection – by ensuring that contractors operate facilities consistent with approved safety bases.

Compliance with the approved safety basis includes compliance with *all* elements of the nuclear safety basis, which encompasses TSR controls; controls identified in a DOE approved SER, JCO, ESS; and all DSA and basis for interim operations assumptions and initial conditions. Thus, a violation of the nuclear safety basis, would include violations of TSRs, as well as violations of any of these elements. Operations outside the approved safety basis, representing violations, would include the following:

- Not meeting the lowest functional capability of SSCs (including design features) as defined in the LCOs or other sections of the TSR, as applicable.

- When a planned or unplanned action renders the safety function of a SSC inoperable, failing to perform the actions to correct this adverse condition in the required time frame, based upon when personnel should have been aware that the SSC was inoperable.[17]

- Upon discovery of an inoperable SSC due to equipment degradation, through a failed surveillance or other indicators, failing to perform the actions to correct this adverse condition in the required time frame or failing to take further action if this is impossible.[5]

- Performing an activity that is prohibited by the mode the facility is in and applicable TSR requirements (safety systems or other hazard controls) are not in place.

- Intentionally or inadvertently failing to perform in-service inspections as specified by the TSR for design features, or, modification of design features, in such a way that they could not perform their credited safety functions.

- Failing to perform a surveillance within the required frequency, or performing a surveillance incorrectly (such that it does not verify operability).

- Failure to comply with a requirement in a directive action SAC regardless of whether any recovery actions were performed. Not complying with a SAC written in LCO format by failing to complete the required action within the completion time.

- Not complying with the initial conditions and assumptions in the DSA.

- Failure to meet the intent of a referenced safety management program that is significant enough to render the DSA summary invalid.

- Not complying with the controls identified in an ESS, JCO, or a DOE issued SER.

The above items can help form the basis of more inclusive criteria to identify violations of the nuclear safety basis and would help to address several of the gaps and inconsistencies the staff identified earlier in this report. This also puts the focus on operations outside the approved safety basis rather than administrative, documentation, or

[17] In general, the concept of "should have known" primarily applies to personnel actions that render an SSC incapable of performing its credited safety functions. The intent is not for SSC degradation to lead to a TSR violation. The exception would be when such degradation should have been recognized earlier, for instance, a notification from an equipment alarm, during performance of a surveillance or operator round.

other ConOps breakdowns. These latter events may be significant and would warrant reporting and investigation, but do not represent a violation of the nuclear safety basis.

*Additional DOE Requirements*

It would be beneficial to review the current TSR guidance and identify which guidance on safety basis violations and other related topics DOE could turn into requirements in an order. For example, the criteria for determining violations of the nuclear safety basis should be consistent across the complex, and elevating this criteria to requirements would ensure the consistency needed to meet 10 CFR 830.205. DOE would need to revise 10 CFR 830 to reference a new TSR order, but directives referenced by the rule would be more appropriate as a DOE order rather than a DOE guide. Additionally, while the scope of the review focused on violations of the nuclear safety basis and related topics, identifying requirements from Guide 423.1-1B on implementation of TSRs more generally would be beneficial.

*Additional DOE Guidance*

This report provides many examples where sites would benefit from new or supplemental guidance on topics related to violations of the nuclear safety basis that may not need to be included in an order. These may include:

- Additional guidance on the process for completing operability determinations;
- Additional clarification on the time of occurrence of a condition resulting in an LCO not being met, time of discovery of the condition, and time of declaration, and their relationship to compliance with general LCOs 3.0.1 and 3.0.2;
- Treatment of failures of design features/in service inspections, and when that rises to a violation of the safety basis; and
- Example safety basis violations for elements of the safety basis that do not have a TSR control.

*Revise Safety Basis Violations ORPS Criteria*

Changes may be warranted to DOE Order 232.2A, which may include the following:

- Clarification that any violation of the nuclear safety basis needs to be reported, not just TSR violations.
- Focus high level report items on operations that are outside the approved safety basis.
- Addition of a new criterion to report events where a facility did not properly implement the nuclear safety basis, but operations were still within the approved

safety basis as a low level report. This may include inadequate rigor of conduct of operations or be administrative in nature.

- Addition of a new criterion to document when the contractor needs to submit a recovery plan to DOE to maintain compliance with the TSRs, either as the final required action in an LCO statement, or in compliance with general LCO 3.0.3. Because this sometimes occurs due to factors beyond a contractor's control (e.g., spare part availability), this could be an informational level report and would allow trending to determine if additional action was later required.

As an example, the following suggested revised ORPS criteria would incorporate the above points, and simple case examples are provided in Appendix A, to demonstrate how personnel could use the criteria:

**Group 3: Nuclear Safety Basis**
**Subgroup A: Implementation of the Nuclear Safety Basis**

- (1) [High] Any violation or noncompliance of the approved nuclear safety basis for a Hazard Category 1, 2, or 3 nuclear facility that results in operation outside of the approved safety basis. The approved safety basis includes, but is not limited to, DSA, a basis for interim operations, TSRs, operational safety requirements, ESSs, JCOs, or DOE-issued SERs. This includes violations of initial conditions and assumptions resulting in a positive USQ.

  Exception: An event consisting solely of a surveillance test (to include any periodic activity explicitly captured in the DSA that is used to ensure operability or viability of an SSC) performed after the prescribed surveillance period, and in which the SSC was found to be capable of performing its specified safety function. (See separate criterion for late surveillance tests below.)

- (2) [Low] An event where the implementation of the approved nuclear safety basis in a Hazard Category 1, 2, or 3 nuclear facility was not implemented as written and/or did not meet the standards expected for implementing the nuclear safety basis, but which did not result in operations outside the approved safety basis. This would include a failure to enter an LCO that did not result in exceeding an LCO-required action based upon when personnel should have known to enter such LCO. It would include failure to adequately document entry or exit of an LCO or any associated required action completion time. It would also include events where an LCO required action or SAC was not met by a deliberate action by facility personnel, but rather because the action was moot, already satisfied by the current configuration, or otherwise met by happenstance. Finally, it would include violations of initial conditions and assumptions not resulting in a positive USQ.

- (3) [Info] An event consisting solely of a surveillance test used to ensure operability or viability of an SSC performed after the prescribed surveillance period, and in which the SSC was found to be capable of performing its specified safety function

and could also reasonably be demonstrated to have been capable of performing its safety function since its previous successful surveillance.

- (4) [Info] Any time a response plan is developed, and approved by DOE.

## APPENDIX A: EXAMPLES OF DECLARING AND REPORTING VIOLATIONS OF THE NUCLEAR SAFETY BASIS

The purpose of this appendix is to provide simple and straightforward examples illustrating the use of the proposed criteria for declaring and reporting violations of nuclear safety basis controls. The examples are grouped by topics that correspond to the chapters in this report. All references to Occurrence and Reporting Processing System (ORPS) reporting criteria in this appendix are using the proposed criteria discussed in the Conclusions section.

### Completion Times and Time of Declaration

1. A shift operations manager (SOM) authorizes maintenance personnel to conduct maintenance on a safety system, but does not identify at the time that this work will render the system inoperable. The applicable limiting conditions for operation (LCO) condition requires that the affected process area be placed in STANDBY mode within four hours. At 0800, maintenance personnel notify the control room they are beginning their work.

    a. The SOM realizes his or her mistake at 1230 and enters the applicable LCO condition. Maintenance personnel complete the work and restore the system to operable status at 1400. Following an evaluation, facility management later determines that the SOM should have known the system was inoperable at the time work began on the system (0800). Therefore, it is a technical safety requirements (TSR) violation of LCO 3.0.1 for failure to meet the LCO, as the required action completion time was exceeded at 1200. This is a TSR violation and should be reported as 3A(1).

    b. The SOM realizes his or her mistake at 1100 and upon discovery, (s)he enters the applicable LCO condition and places the affected process area in STANDBY within the four hours. This event would not be a TSR violation. This would be true even if the mode change were not completed until after noon. This event would be reported as 3A(2) because the LCO was not properly entered at the time the system was rendered inoperable.

    c. In both of the above cases, at the time of discovery, the SOM is still required to place the process area in STANDBY within four hours based upon the time of discovery of the condition. If he or she does not, a violation of LCO 3.0.2 would occur, and this would be reported as 3A(1), per the current and proposed criteria.

2. While performing a quarterly TSR required surveillance, an operator discovers a degraded condition on a safety system at 0800, and informs the SOM at 0830. The SOM determines at 0900 the degraded condition results in the system being inoperable, and enters the applicable LCO condition, which requires the system be restored to operable status within 14 days, or the facility be placed in STANDBY

mode. Personnel perform corrective maintenance, and the system is restored to operable status at 1600.

a. Following an evaluation, facility management determine that the degraded condition was noted on the prior quarter's TSR surveillance paperwork, but it was not communicated to the SOM, and the LCO condition was not entered. Therefore, it is a TSR violation of LCO 3.0.1 for failure to meet the LCO, as the condition had existed for three months, greater than the required action completion time of 14 days. This should be reported as 3A(1).

b. Following an evaluation, facility management determine that the prior quarter's TSR surveillance paperwork was satisfactory, and there had been no other opportunity to discover the condition between performances of the TSR surveillances. Therefore, the required action completion time was not exceeded, and no TSR violation exists.

**Conduct of Operations and Administrative Compliance**

1. The SOM authorizes maintenance personnel to conduct maintenance on a safety system rendering it inoperable at 0800, but does not identify at the time that this work will render the system inoperable. The applicable LCO condition requires all transfers be stopped immediately. At 1100 a second operator recognizes the safety system is inoperable, declares the LCO not met, and enters the LCO condition. No transfers were in progress from 0800 to 1100. This event is not a TSR violation, as the required action to immediately stop all transfers was not applicable. Therefore, no required actions were missed. However, it is reportable under 3A(2) for failure to declare the LCO not met at 0800.

2. The SOM authorizes a mechanic to perform maintenance on a safety system, which renders it inoperable at 0800. The applicable LCO condition requires that a fire patrol occur within one hour, and every four hours thereafter. Operators perform the required fire patrol at 0830, but the SOM becomes distracted and fails to document entry into the LCO condition, or completion of the fire patrol in the logbook. He or she makes a late entry into the logbook at 1130. This is not a TSR violation, however failure to document completion of entry into an LCO and completion of required actions is reportable under 3A(2).

3. An LCO condition is entered because a failed part renders a safety system inoperable. The required action is to restore the system to operability within 30 days, or submit a response plan to the Department of Energy (DOE). The system is not returned to service within 30 days because the part is on back order. The contractor submits a response plan to DOE reflecting a one week extension based on the expected delivery date. The TSR is not violated, and this event is reported for information only as a 3A(4).

**Surveillance Requirements**

1. A weekly TSR surveillance requires several rooms to be inspected for transient combustibles. An audit determines that one room was not inspected for several weeks. Upon discovery, the TSR surveillance is performed for the room, and transient combustible loading is acceptable. However, a TSR violation is declared and reported as 3A(1) because it cannot be determined whether the transient combustible load was kept within limits during the entire affected period.

**Specific Administrative Controls**

1. A directive action specific administrative control (SAC) prohibits the presence of flammable liquids within an exclusion zone surrounding process equipment. Upon discovery of a gasoline can within the exclusion zone, an operator notifies the SOM, who then directs him or her to move the can outside the exclusion zone. A violation of a directive action SAC is an immediate TSR violation. This event would be reported as a 3A(1).

2. A directive action SAC requires that an operator walk down the planned transfer route prior to initiation of a waste transfer to ensure there are no excavations that could expose the transfer pipe along the transfer route. If the transfer is initiated without performing this walk down, the SAC is violated because the required action was not performed, regardless of whether there are any excavations in progress. A violation of a directive action SAC is an immediate TSR violation. The violation is reported as a 3A(1).

**Un-reviewed Safety Questions**

1. An older documented safety analysis specifically states that a certain material is not stored in a facility. This prohibition is listed as an assumption, but is not captured in the TSRs. A drum containing this material is identified. This situation is subsequently determined to represent a positive un-reviewed safety question (USQ) and is reported as a 3B(2). This is also a violation of the nuclear safety basis and is reportable as a 3A(1) violation.

**Additional Topics**

1. Operations personnel perform an operation that is explicitly prohibited for the current mode and applicable TSR requirements (safety systems or other hazard controls) are not in place. This violation is reported under 3A(1).

2. An SOM completes the mode checklist to change from standby to operations mode with applicable TSR controls in place, but forgets to document the mode change in the logbook which is the official record. He or she begins processing shortly thereafter. This is not a TSR violation, however failure to document entry into a mode is reportable under 3A(2).

3. An engineer determines that recent construction work modified a credited design feature to such an extent that it can no longer perform its credited safety function. A violation is reported under 3A(1).

4. Facility personnel do not implement a compensatory action in an evaluation of the safety of the situation. This violation is reported under 3A(1).

## APPENDIX B: ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| Accountable Steam Condensate | ASC |
| Allowed Outage Time | AOT |
| Code of Federal Regulations | CFR |
| Conduct of Operations | ConOps |
| Consolidated Nuclear Security, LLC | CNS |
| Defense Nuclear Facilities Safety Board | Board |
| Defense Waste Processing Facility | DWPF |
| Department of Energy | DOE |
| Documented Safety Analysis | DSA |
| Emergency Core Cooling System | ECCS |
| Environmental Management Los Alamos Field Office | EM-LA |
| Evaluation of the Safety of the Situation | ESS |
| Facility Operations Director | FOD |
| Highly Enriched Uranium Materials Facility | HEUMF |
| Heat source plutonium | HS-Pu |
| Justification for Continued Operation | JCO |
| Limiting Conditions for Operation | LCO |
| Limiting Control Setting | LCS |
| Line of Inquiry | LOI |
| Los Alamos National Laboratory | LANL |
| Material-at-Risk | MAR |
| Measurement and Test Equipment | M&TE |
| Nuclear Chemical Operator | NCO |
| National Nuclear Security Administration | NNSA |
| Nevada National Security Site | NNSS |
| Nuclear Regulatory Commission | NRC |
| Operability/Functional Evaluations | OFE |
| Occurrence and Reporting Processing System | ORPS |
| Pantex Plant | Pantex |
| Plutonium Facility 4 | PF-4 |
| Potential Inadequacies in the Safety Analyses | PISA |
| Radiation Alarm Monitoring System | RAMS |
| Remediated Nitrate Salt | RNS |
| Specific Administrative Control | SAC |
| Safety Evaluation Report | SER |
| Surveillance Requirement | SR |
| Savannah River Site | SRS |
| Shift Duty Operator | SDO |
| Shift Operations Manager | SOM |

| | |
|---|---|
| Structures, Systems, and Components | SSC |
| Technical Safety Requirement | TSR |
| Technical Specification | TS |
| Un-reviewed Safety Question | USQ |
| Un-reviewed Safety Question Determination | USQD |
| Waste Characterization Reduction and Repacking Facility | WCRRF |
| Waste Compliance and Tracking System | WCATS |
| Weapons Engineering Tritium Facility | WETF |
| Y-12 National Security Complex | Y-12 |

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