Technical Safety Requirements

FUNCTIONAL AREA GOAL: Contractor has developed, maintained, and received DOE Field Office Approval for the necessary operating conditions of a facility. The facility has also maintained an inventory of safety class and safety significant systems and components.

REQUIREMENTS:

- 10 CFR 830.205, Nuclear Safety Rule.
- DOE-STD-3009-2002, Preparation Guide for U. S. Department of Energy Nonreactor Nuclear Facility Documented Safety Analyses.
- DOE-STD-1186-2004, Specific Administrative Controls.

Guidance:

- DOE G 423.1-1, Implementation Guide for Use in Developing Technical Safety Requirements.
- NSTP 2003-1, Use of Administrative Controls for Specific Safety Functions.

Performance Objective 1: Contractor Program Documentation

Summarize safety-significant SSCs and other aspects of defense in depth that requires TSR coverage. The scope of the TSR coverage is determined by the degree to which barriers or the facility-safety basis are seriously challenged.

Criteria:

1. Provide for each category 2 or 3 nuclear facility assurance that the TSRs as well as future changes are approved by DOE.
2. Provide for each category 2 or 3 nuclear facility assurance that the TSRs are derived from the documented safety analysis.
3. Provide similar documentation that all safety class and safety significant systems are linked to appropriate TSRs.
4. Provide assurance for each category 2 or 3 nuclear facility that the TSRs have sections on:
    - Safety limits
    - Operating limits
    - Surveillance requirements
    - Administrative controls
    - Design features
    - Use and application

Suggested Lines of Inquiry

- Is the hazard categorization of the facility defined? Is the content of the discussion on derivation of the TSRs commensurate with the hazard categorization?
- Are the codes, standards, regulation, and DOE Directives listed specifically relevant to establishing the TSR controls and the contractor's commitment?
- Is the hazard analysis organized in such a way that it can be judged to be comprehensive, and is the hazard analysis adequate as a basis for TSR development?
- The TSR controls are generally derived from preventive or mitigative features identified in the hazard analysis. Is this derivation clearly shown?
- Are the controls that support front line safety systems identified and included as needed?
- Does Section 1 include a list defining the terms used in the TSR document that require clarification of the intent of their use?

- Are the definitions clear, and are they consistent with standard usage and with the intended use of the terms?
- Does Section 1 include the standard use and application explanations for the following TSR devices:
    - Logical Connectors Completion Tim
    - Frequency Notation Safety Limits
    - LCSs LCOs
    - Surveillance Requirements
    - [Note: Standard use and application explanations are specified in DOE G 423.1 1 and the Defense Programs Document of Example Technical Safety Requirements, Volume I, Examples, November 1993. Explanations may include minor variations to account for unique facility conditions.]
- Do the LCOs/LCSs identified in the TSR agree with those identified in Chapters 3 and 5 of the DSA?
- Is there a commitment to a program for conducting in service inspection and testing, and is it consistent with the commitments in Chapter 10?
- Is there a commitment to configuration control? If the configuration control program is approved by DOE, it may be included by reference (see Chapter 17 for supporting commitments). If the program is not approved by DOE, then the process must be described and committed to and include references to the applicable standards. DSA Chapter 17 describes the configuration control program and should reference the contractor's procedures and standards. Basic elements should be described. [Note: Configuration control for non-facility, nuclear operations must be considered on a case by case basis.]
- Are the facility's procedures addressed? The system that governs the production, review, control, use, and revision of procedures (particularly those procedures required to implement the TSR) should be in the Administrative Control Section as described in DOE G 423.1 1, Section 5.2.4. Does this description include how the TSR is included in the procedures? Are specific procedure types identified that are managed under this control? Do these types encompass all of the TSR commitments that would require a procedure? Are other documents referenced that detail how these commitments are met? Are the discussions consistent with the corresponding discussions in the DSA?
- Is the contractor's organization and management structure addressed? Does the description focus on line authority, responsibility, and communications for the facility, ranging from the operator on the floor to the person ultimately responsible for the facility and its operations? Are lines of authority, responsibility, and communication for critical support functions, if any, identified? These should include fire protection, maintenance, emergency response, security, etc. If independent review groups oversee or audit the facility's operations, identify them, their organization, and the reporting chain. The contractor's program documents should be referenced, as necessary.
- Is there a commitment to and a description of or reference to the facility's document control system? Does this control system support the facility's operations to the most current of important documents, such as the TSR, DSA, operating procedures, facility drawings, manuals, program descriptions, and other similar documents?
- Are reporting requirements for TSR deviations included in the administrative controls? A commitment to report deviations in accordance with the Occurrence Reporting System should be included.
- Are all of the technical bases presented in a clear, logical, and concise manner that follows the format of the Appendix to DOE G 423.1 1?
- For each TSR specified (e.g., Safety Limit, LCO, LCS), are the technical bases directly based on specific Sections (including references) of the hazard or accident analyses contained within the DSA?
- Is the information presented in a clear, logical, and concise manner that follows the format of the Appendix to DOE G 423.1 1?
- Is a detailed description of each vital passive component (including functions, dimensions, design criteria, applicable codes and standards, materials used, in service inspection required, manufacturer, and all of the details that must be considered prior to alteration, modification, or replacement) discussed in a clear and concise manner?
- For cases where the safe operation of the facility is dependent on any component being constructed of a particular material, is the component and system identified, as well as the special material involved, any in service inspections required for the material or component, and any special operational considerations such as maximum/minimum temperature, pressure, flow, or chemical concentration?

- Are the site characteristics presented (such as the locations of public access roads, collocated facilities, facility area boundaries, site boundaries, nearest residence distances, etc.) if they are pertinent to the design feature function?
- Is recordkeeping addressed? This Section should describe the recordkeeping program, or if there is no formal program, then define how the function is accomplished. Does the discussion include the types of records that are kept, storage requirements, retention times, and retrieveability requirements?

Performance Objective 2: Contractor Program Implementation

2.1 TSRs: Summarize safety-significant SSCs and other aspects of defense in depth that requires TSR coverage. The scope of the TSR coverage is determined by the degree to which barriers or the facility-safety basis are seriously challenged.

Criteria:

1. Provide for each category 2 or 3 nuclear facility assurance that the TSRs as well as future changes are approved by DOE.
2. Provide for each category 2 or 3 nuclear facility assurance that the TSRs are derived from the documented safety analysis.
3. Provide similar documentation that all safety class and safety significant systems are linked to appropriate TSRs.
4. Provide assurance for each category 2 or 3 nuclear facility that the TSRs have sections on:
    - Safety limits
    - Operating limits
    - Surveillance requirements
    - Administrative controls
    - Design features
    - Use and application

Suggested Lines of Inquiry

- Does the hazard analysis identify consequences, likelihood, and mitigators/ preventers for determination of the TSR controls?
- Are all of the items in the hazard analyses with respect to public protection, worker protection, and defense in depth covered by the TSR controls?
- Are safety features identified that are not covered by the TSR controls?
- Do the facility modes reflect the actual cycles of operations/ activities conducted in the facility? [Note: If any facility modes are derived from accident scenarios, this derivation should be presented.]
- Are facility modes established in such a way that the status of safety systems can be distinctively defined?
- Are staffing level requirements or other administrative limits considered in the facility modes?
- If the facility contains several structural segments or multiple activities, are facility modes established to accommodate this situation?
- Are the criteria provided for selecting the Safety Limits, Limiting Control Settings (LCSs), and Limiting Conditions for Operation (LCOs)? Is the evaluation guide from DOE STD 3009, used? If so, is it described?
- Are the assumptions or parameters used in the hazard analysis or the accident analysis identified and included, as needed, for establishing the surveillance requirements and operability?
- Are vendors' specifications identified and included, as needed, for establishing the surveillance requirements?
- Does the Design Features Section identify passive design features and provide the rationale for their selection?

- Are all controls from other facilities and activities whose operations can impact this facility identified?
- Does Section 1 clearly define the operating modes of the facility in terms of operational conditions? Is there an adequate explanation of the use and application of the operating modes?
- Are the operating modes generally consistent with the standard modes established in DOE G 423.1 1? If not, is the variation justified due to the unique features of the facility or operations?
- Are the Safety Limits included in Section 2 consistent with the hazard and accident analyses and any inferred Safety Limits established in the DSA? If no Safety Limits are required, does Section 2 so state?
- Do the Safety Limits describe (as precisely as possible) the parameters being limited, state each limit in measurable terms, and indicate the applicability of each limit?
- Are the operability requirements for each of the SSCs covered by the LCOs/LCSs clearly identified? Are they unambiguous and concise, so as to not lead to misinterpretation? [Note: LCOs/LCSs that simply state that the SSC has to be operable are not acceptable.]
- Is the mode applicability adequate for each of the LCOs/LCSs?
- Is the facility or activity applicability adequate for each of the LCOs/LCSs?
- Do the LCO/LCS conditions agree with each of the LCO/LCS requirements?
- Are the remedial actions adequate for the conditions; that is, do they become more conservative (safer condition) as they are implemented?
- Does each of the remedial actions have a completion time, and are the times adequate to allow implementation and ensure safety?
- Are there bases for each of the LCOs/LCSs, the mode applicability, the remedial actions, and their completion times?
- Are these bases adequate to support the LCOs/LCSs? [Note: They should not be a regurgitation of the LCOs/LCSs themselves.]
- Are the surveillance requirements explicit enough to ensure that the LCO/LCS requirements are met?
- Does each of the surveillance requirements have a frequency of performance?
- Is each of the frequencies adequate to ensure the operability of the safety SSC covered by the LCO/LCS?
- Are minimum staffing requirements addressed? Are staffing requirements by mode or operation addressed? [Note: This should be covered if the analysis relies on staffing as a safety factor.]
- Is there a specific commitment to personnel qualification and training? Does this commitment identify the program or requirement that will govern qualification and training? Is the commitment consistent with information found in the DSA, particularly Chapters 12 and 14?
- Is fire protection appropriately addressed? Fire protection elements that are important to the identified accident control should be included in an administrative control. Fire detection and suppression equipment may be included in the administrative control as an element of the overall fire protection program. LCOs/LCSs may also exist for selected elements of the fire protection system. Many facilities may rely upon a combustible loading program. If the combustible loading program is credited as important in the accident or hazard analyses, then the document should state a commitment to the program. The combustible loading program should address loading limits (transitory and fixed), as well as the method used to maintain the limits. Commitment to the appropriate National Fire Protection Association standards adopted by the contractor should be noted if they are critical to the safety function of the fire protection program, and they should be consistent with the discussions in the DSA.
- If the requirements of 29 CFR 1910.119 are applicable, does the TSR Administrative Controls Section contain a commitment to process safety management? The administrative control should identify how the requirements are met and reference the program established to satisfy the requirements.
- Is radiological protection addressed? Radiological protection should be included if this program is credited as a significant protection element for the nuclear facility. Provide a list of the major elements associated with the program, such as sampling, dosimeter, training, personal protective equipment, control areas and zones, etc. Reference the applicable contractor and facility programs.
- Is there a description and commitment to the program to control the TSR bases? Does this Section describe how the program works, the management functions for making decisions on bases changes, and the review process? This may be addressed elsewhere in the TSR, such as under document control.
- Are all of the technical bases presented in a clear, logical, and concise manner that facilitates the evaluation of unreviewed safety questions which may arise from investigating changes to operating parameters of safety controls or potential changes to the margin of safety?

- For each TSR specified (e.g., Safety Limit, LCO, LCS) that impacts the operation of a safety SSC, are the technical bases directly based on safety function and system evaluations (including references) contained within the DSA?
- For each TSR specified (e.g., Safety Limit, LCO, LCS), do the technical bases take into account the assumptions or uncertainties that have the potential to impact the hazard/accident analyses?
- For each TSR specified (e.g., Safety Limit, LCO, LCS), are the technical bases for not considering specific operating modes provided?
- For each action statement contained within an LCO/LCS, does the technical bases allow for the conclusion that the margin of safety has not been compromised?
- For each action statement contained within an LCO/LCS, does the technical bases allow for the conclusion that the completion time for an action is acceptable?
- For each action statement contained within an LCO/LCS where actions partially compensate for the loss of a safety function, does the technical bases allow for the conclusion that the margin of safety has not been compromised?
- For cases where it is a safety concern, is the configuration and physical arrangement discussed? Are details pertaining to the design (e.g., configuration or physical arrangement, including dimensions) and the reasoning behind the design provided?
- Are facility radiation monitoring and storage tank radiation monitoring addressed? If these elements are important to the safe operation of the facility (based on the hazards or accident analyses), then an administrative control committing to these programs should be included. These may be included in the radiation protection program. The administrative control should include the physical facility areas involved, the radioactive substances monitored, the monitoring equipment and its locations, the applicable standards, and any associated limits. These discussions should be consistent with the description of radiation protection provided in the DSA.
- Are environmental measurements and control aspects addressed? If environmental measurement and control are relied on to protect the workers or the environment, then an administrative control committing to the program or processes should be included in the TSR. If it is included, a brief description of the program, related equipment, monitored substances, and controls should be provided. The corresponding programmatic and facility descriptions in the DSA should be consistent.

2.2 Administrative Controls: Administrative controls can be used to address specific accident scenarios to establish limiting conditions of operation (LCO).

Criteria:

1. Provide ACs to prevent inadvertent criticality developed by qualified personnel, reviewed by competent reviewers, and correctly incorporated and implemented in facility procedures.

2. TSRs may also be provided for safety management programs in the form of TSR ACs to support adequate defense-in-depth. Such all-encompassing TSRs should be used in lieu of individual TSRs for numerous specific aspects of programs unless the control is significant to specific accident risk reduction.

3. Identify specific administrative controls (SAC) needed to prevent or mitigate an accident scenario as appropriate. In general, SAC designation based on worker safety are limited to those administrative controls that would have been safety-significant had that safety function been provided by a safety-significant SSC. The established hierarchy of hazard controls requires that engineering controls requires that engineering controls with an emphasis on safety-related SSCs be preferable to ACs or SACs due to the inherent uncertainty of human performance.

Suggested Lines of Inquiry

- Does the Administrative Controls Section include all of the administrative controls identified in the hazard analysis?

- Are the administrative controls covering the safety management program tailored for any facility or activity specific situations?
- If criticality safety is applicable, is there a commitment to criticality safety, including the physical and administrative controls essential for the program? Is the criticality safety program briefly described? Is the description consistent with Chapter 6 of the DSA?
- Are material inventory controls addressed in the Administrative Controls Section? [Note: In some cases, an LCO might cover some aspects of this control.] Does this Section identify all of the materials which require control to satisfy basic accident assumptions, categorization limits, regulatory limits, etc., that are necessary to remain within the hazard category (typically fissile, radioactive, toxic, explosive, etc.)? Do the material controls identify where the limits apply (total facility, wing, operation, etc.)? Do the material limits address how the limits will be controlled?
- Are radiological effluent control and ventilation filter testing addressed? These may be addressed through administrative controls if they are necessary for worker protection or are used to limit radiological material releases. If they are included, then the applicable programs, facility areas, mechanical systems, testing programs, sampling, monitoring systems, and standards should be identified or referenced.
- Is emergency planning addressed? Emergency planning should be included in the administrative controls. Is there a specific commitment to an emergency plan, and is this commitment consistent with the emergency planning programmatic discussion in the DSA?
- Are explosive gas and toxic substances monitoring programs addressed? If these programs are relied on in the hazard or accident analyses, the programs should be committed to and referenced in the Administrative Controls Section. The discussion in the TSR should be consistent with the discussion of the same topics in the programmatic discussions in the DSA.
- Are facility radiation monitoring and storage tank radiation monitoring addressed? If these elements are important to the safe operation of the facility (based on the hazards or accident analyses), then an administrative control committing to these programs should be included. These may be included in the radiation protection program. The administrative control should include the physical facility areas involved, the radioactive substances monitored, the monitoring equipment and its locations, the applicable standards, and any associated limits. These discussions should be consistent with the description of radiation protection provided in the DSA.
- Are environmental measurements and control aspects addressed? If environmental measurement and control are relied on to protect the workers or the environment, then an administrative control committing to the program or processes should be included in the TSR. If it is included, a brief description of the program, related equipment, monitored substances, and controls should be provided. The corresponding programmatic and facility descriptions in the DSA should be consistent.
- Are the safety programs committed to in the DSA and relied on for worker or public safety in the hazard and accident analyses addressed in the Administrative Control Section, as appropriate? Descriptions of programs, equipment, and controls should be consistent with the DSA.
- Is there a commitment to the unreviewed safety question program as required by 10 CFR 830, Subpart B? Is the program summarized, including the basic elements?
- Unless the TSR consists of only administrative controls, is the OPERABILITY definition and implementing principles described? This topic may be included in the Use and Application Section instead of the Administrative Controls Section.
- If criticality safety is applicable, is there a commitment to criticality safety, including the physical and administrative controls essential for the program? Is the criticality safety program briefly described? Is the description consistent with Chapter 6 of the DSA?
- Are material inventory controls addressed in the Administrative Controls Section? [Note: In some cases, an LCO might cover some aspects of this control.] Does this Section identify all of the materials which require control to satisfy basic accident assumptions, categorization limits, regulatory limits, etc., that are necessary to remain within the hazard category (typically fissile, radioactive, toxic, explosive, etc.)? Do the material controls identify where the limits apply (total facility, wing, operation, etc.)? Do the material limits address how the limits will be controlled?
- Is fire protection appropriately addressed? Fire protection elements that are important to the identified accident control should be included in an administrative control. Fire detection and suppression equipment may be included in the administrative control as an element of the overall fire protection program. LCOs/LCSs may also exist for selected elements of the fire protection system. Many facilities may rely

upon a combustible loading program. If the combustible loading program is credited as important in the accident or hazard analyses, then the document should state a commitment to the program. The combustible loading program should address loading limits (transitory and fixed), as well as the method used to maintain the limits. Commitment to the appropriate National Fire Protection Association standards adopted by the contractor should be noted if they are critical to the safety function of the fire protection program, and they should be consistent with the discussions in the DSA.

- If the requirements of 29 CFR 1910.119 are applicable, does the TSR Administrative Controls Section contain a commitment to process safety management? The administrative control should identify how the requirements are met and reference the program established to satisfy the requirements.
- Are radiological effluent control and ventilation filter testing addressed? These may be addressed through administrative controls if they are necessary for worker protection or are used to limit radiological material releases. If they are included, then the applicable programs, facility areas, mechanical systems, testing programs, sampling, monitoring systems, and standards should be identified or referenced.
- Is radiological protection addressed? Radiological protection should be included if this program is credited as a significant protection element for the nuclear facility. Provide a list of the major elements associated with the program, such as sampling, dosimeter, training, personal protective equipment, control areas and zones, etc. Reference the applicable contractor and facility programs.
- Is emergency planning addressed? Emergency planning should be included in the administrative controls. Is there a specific commitment to an emergency plan, and is this commitment consistent with the emergency planning programmatic discussion in the DSA?
- Are explosive gas and toxic substances monitoring programs addressed? If these programs are relied on in the hazard or accident analyses, the programs should be committed to and referenced in the Administrative Controls Section. The discussion in the TSR should be consistent with the discussion of the same topics in the programmatic discussions in the DSA.

Performance Objective 3: DOE Line Management Oversight

Criteria:

1. Line management should be committed to manage and maintain up to date TSRs.

Suggested Lines of Inquiry

- Is it stated that the contractor must obtain DOE's authorization to restart the facility following the violation of a Safety Limit?
- Are the actions required to be taken if a Safety Limit is exceeded described, and do they maintain or otherwise achieve a safe, stable state?
- Is there at least a one to one correspondence between the LCO/LCS requirements and the surveillance requirements? That is, there should be at least one surveillance requirement per LCO/LCS requirement.
- Do the bases provide enough information to support the surveillance requirements and their frequencies?
- Is there a commitment to a conduct of operations program driven from the hazards and accident analyses, as appropriate?
- Is there a commitment to the appropriate quality assurance program?
- Is the safety review and audit process addressed? Does the discussion address the review of all safety items? Are those items that require review identified? Do these items include proposed changes to the TSRs and procedures, operational occurrences and Occurrence Reports, unreviewed safety questions, and quality control concerns?
- Is there a description of the process for revising the TSRs? Does this description include required contractor reviews and approvals? This description may be included in another Section of the administrative controls dealing with facility and organization and management.