

**Office of Health, Safety and Security
Independent Review of
Electrical System Configuration Management
and Design Change Control at the
Savannah River Site, Waste Solidification
Building Project**



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**Office of Enforcement and Oversight
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Acronyms

BOP	Balance of Plant
DATR	Design Authority Technical Review Report
DCF	Design Change Form
DOE	U.S. Department of Energy
EEC	Environmental Evaluation Checklist
FDD	Facility Design Description
HSS	Office of Health, Safety and Security
NNSA	National Nuclear Security Administration
PDSA	Preliminary Documented Safety Analysis
PSBCR	Preliminary Safety Basis Change Request
PSBE	Preliminary Safety Basis Evaluation
SDD	System Design Description
SDDR	Supplier Deviation and Disposition Request
SER	Safety Evaluation Report
SRS	Savannah River Site
SSC	Structures, Systems, and Components
WSB	Waste Solidification Building

Independent Review of Electrical System Configuration Management and Design Change Control at the Savannah River Site, Waste Solidification Building Project

1.0 PURPOSE

The Office of Safety and Emergency Management Evaluations, within the Office of Health, Safety and Security (HSS), conducted an independent review of selected engineering processes for the Waste Solidification Building (WSB) safety significant electrical system at the Savannah River Site (SRS). The purpose of this review was to assess the adequacy of the contractor's electrical system configuration management and design change control during construction and initial system turnover activities.

2.0 SCOPE

The independent review was conducted during May 2-6, 2011, by an HSS representative in coordination with the U.S. Department of Energy (DOE), National Nuclear Security Administration (NNSA), WSB Integrated Project Division (NA-266).

This review was limited to the stated purpose and used the Configuration Management section of HSS Criteria Review and Approval Document 64-11, "Essential Systems Functionality," to guide the evaluation. The adequacy of the electrical system design basis was evaluated through review of the WSB facility design description (FDD), the balance of plant (BOP) support system design description (SDD), the preliminary documented safety analysis (PDSA), the DOE-approved safety evaluation report (SER), and the electrical system equipment specifications and one-line diagrams. The adequacy of the SRS/WSB processes for configuration management and design change control was evaluated through review of the WSB Team Execution Plan, WSB Project Configuration Management Plan, selected procedures contained in the Conduct of Engineering Manual, the Facility Safety Document Manual, the Conduct of Project Management and Controls Manual, and the Quality Assurance Manual, the procedure for the WSB Project Change Control Board, and the desktop instructions for Design Authority Form Completion and for Additional Instructions for Processing a Supplier Deviation and Disposition Requests (SDDR). The review included interviews of selected design engineering staff and the electrical system cognizant system engineer, observation of a preliminary turnover walkdown, and reviews of selected Design Change Forms (DCFs) and an SDDR, each with its associated references and review and approval documentation. Nine DCFs were reviewed, which were selected from a listing of electrical system DCFs based on their potential safety significance.

Appendix A provides supplemental information about the review. Appendix B provides detailed information about the documents reviewed and provides specific HSS observations and identified opportunities for improvement.

3.0 BACKGROUND

The WSB is a hazard category 2 nuclear facility and a Low hazard chemical facility currently under construction on the SRS. The mission of the WSB is to treat specific high and low activity liquid waste streams from the SRS Mixed Oxide Fuel Fabrication Facility. The WSB is designed to accept and process the liquid waste streams into solid waste forms acceptable for shipment and disposal as transuranic waste, low level waste, or a liquid waste form that can be further treated at the SRS effluent treatment project.

The WSB electrical system is classified as safety significant and includes normal, uninterruptible, and standby power subsystems. Safety significant loads and associated motor control centers and automatic transfer switches are powered by the standby power subsystem, which receives power from the normal power subsystem or a standby diesel generator when normal power is lost. The standby power subsystem is designed to meet Performance Category-3+ natural phenomena hazard requirements, as required by NNSA.

4.0 RESULTS

SRS/WSB has established an appropriate and adequate framework for configuration management and design change control. That framework includes but is not limited to the WSB Team Execution Plan, WSB Project Configuration Management Plan, Conduct of Engineering Manual, Facility Safety Document Manual, Conduct of Project Management and Controls Manual, Quality Assurance Manual, WSB Project Change Control Board procedure, and related desktop instructions.

The reviewed DCFs were appropriately completed. They described the proposed changes and the reasons they were needed; identified the functional classification of impacted structures, systems, and components (SSCs); specified approved technical baseline documents that would be revised; identified the associated Design Authority technical review report (DATR) that documented the scope of the Design Authority's (i.e., the cognizant system engineer's) review and basis of approval; and appropriately evidenced the additional required reviews and approvals including representatives of stakeholder organizations. Further, most of the reviewed DCFs included "before and after" proposed change excerpts or pen-and-ink edits of the impacted technical baseline documents, thereby facilitating the required technical review and approval processes.

The reviewed SDDR effectively documented the specifications of concern, proposed an appropriate disposition, and evidenced the same level of review and approval as required for a DCF.

The reviewed DATR forms effectively summarized the reviews performed and the basis for approval of the associated DCF or SDDR. They listed the DCF/SDDR and related preliminary safety basis evaluation (PSBE), demonstrated that the scope of the proposed changes and facility

impacts were understood, identified any additional documents that would require revision, and evidenced the Design Authority's determination that all required technical agency, safety basis, system acceptability, and system interface reviews were completed.

The reviewed PSBEs were generally effective in determining that DCF/SDDR proposed changes were consistent with the WSB PDSA as modified by an approved preliminary safety basis change request (PSBCR), U-PSBCR-F-00006, and the SER and its addendum. The subject PSBCR reflects needed PDSA revisions for consistency with the revised standby diesel generator procurement specifications. However, the PSBCR identified only two of at least three PDSA sections that required complementary revisions (e.g., PDSA Section 4.4.9.2).

The observed 5/2/2011 preliminary walkdown of the status of the WSB electrical system Switchgear and Motor Control Center installations versus system specifications, although limited in scope, was an appropriate configuration management activity. The walkdown was effectively performed by the electrical system Design Authority/cognizant system engineer and representatives of the project staff and construction contractor. Several installation deficiencies were identified that require corrective actions and were appropriately documented on comprehensive Turnover Package Punchlist Forms customized for the required electrical system deliverables.

Interviews of the WSB electrical system Design Authority/cognizant system engineer and limited discussion with other representatives of the engineering design staff confirmed their comprehensive knowledge of SRS/WSB requirements for configuration management and design change control.

The review resulted in no findings. Four opportunities for improvement were identified for line management consideration. The opportunities for improvement identify changes in desktop instructions, the WSB Configuration Management Plan, and a PSBCR that would clarify guidance and/or resolve inconsistencies.

5.0 CONCLUSIONS

Interviews and reviewed WSB Project Electrical System DCFs, an SDDR, and associated DATR forms, PSBE and referenced documents demonstrate configuration management was effectively implemented. Overall, WSB electrical system configuration management and design change control were effectively implemented.

6.0 FINDINGS AND ITEMS FOR FOLLOW-UP

None.

Appendix A Supplemental Information

Dates of Review

Onsite Data Collection: May 2-6, 2011

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Appendix B

Documents Reviewed and Observations

Configuration Management and Design Change Control Requirements

The following plans, procedures, and desktop instructions were reviewed to understand the configuration management and design change control processes applicable to the WSB electrical system:

- WSB Team Execution Plan, Rev-0
- WSB Configuration Management Plan, Rev-5
- WSB Project Change Control Board procedure, NNSA-WSB-004, Rev-0
- SRS Technical Baseline Identification procedure, Rev-4
- SRS Design Change Form procedure, Rev-13
- SRS Design Change Package procedure, Rev-7
- SRS Technical Reviews procedure, Rev-13
- SRS PDSA Configuration Management procedure, Rev-0
- SRS Project Change Control procedure
- SRS Project Trend Program procedure, Rev-8
- SRS Control of Nonconforming Items procedure, Rev-16
- WSB Engineering Desktop Instructions for Design Authority Form Completion, Rev-0
- WSB Engineering Desktop Instructions for Additional Instructions for Processing a Supplier Deviation and Disposition Request, Rev-0.

Design Change Forms

The following DCFs were selected for review to judge implementation of the configuration management and design change control processes; each review included the DCF and associated DATR, PSBE, and referenced technical baseline documents:

- E-DCF-F-02834 & 02916, WSB Standby Diesel Generator Specification changes
- E-DCF-F-02981, Rev-1, Relocation of Embedded Wall Electrical Conduit
- E-DCF-F-02890, Changes to 15KV Cable Brand Specifications
- E-DCF-F-02890, Rev-1, Changes to 15KV Cable Brand and Testing Specifications
- E-DCF-F-02919, Revise SS MCC Procurement Specification in Response to Bid Proposal
- E-DCF-F-02948, Permits Modified Conduit Spacing and Point Contact with Rebar
- E-DCF-F-02963, Align WSB Procurement Specifications with Multiple Approved EDRs
- U-DCF-F-00135, WSB BOP Electrical System SDD Periodic Review and Update.

Supplier Deviation and Disposition Request

The SDDR and associated DATR, PSBE, and referenced documents were reviewed for BCCI-SDDR-235, Resolve Electrical Conduit Interference with Existing Blockout and Rebar.

Key Technical Baseline Documents

The following key technical baseline documents were reviewed in comparison to the reviewed DCFs, DATRs, and PSBEs to verify the effectiveness of implementation of the configuration management and design change control process:

- WSB PDSA, Rev-1
- DOE SER for the PDSA, Rev-0, Addendum 1
- PSCBR, U-PSBCR-F-00003
- WSB Environmental Evaluation Checklist (EEC), PBU-F-2006-002, Rev-0
- WSB Consolidated Hazard Analysis, WSRC-TR-2007-00134
- WSB FDD, Rev-6
- WSB BOP Support System SDD, Rev-5.

Observations

- Interviews and the review of WSB project electrical system DCFs, an SDDR, and associated DATRs, PSBEs, and referenced documents demonstrated that configuration management and design change control requirements were understood and were being effectively implemented.
- The reviewed DCFs described the proposed changes and the reasons they were needed, identified the functional classification of impacted SSCs, specified approved technical baseline documents that would be revised, identified the associated DATR that documented the scope of the Design Authority's (i.e., cognizant system engineer's) review and basis of approval, and appropriately evidenced the additional required reviews and approvals including representatives of stakeholder organizations. Further, most of the reviewed DCFs included "before and after" proposed change excerpts or pen-and-ink edits of the impacted technical baseline documents, thereby facilitating the required technical review and approval processes.
- The WSB Engineering desktop instruction for SDDR modifies the requirements for review and approval of WSB design changes appropriately documented in SDDRs. For the SDDR to take the place of a DCF, it must document the approved change with appropriate technical justification, identify impacted technical baseline documents, document completion of all reviews required for approval of a DCF, and be accompanied by a PSBE (where appropriate) and an approved DATR. The reviewed SDDR effectively documented the specifications of concern, proposed an appropriate disposition, and evidenced the same level of review and approval as required for a DCF.
- SRS Manual E7, procedure 2.60, Technical Review, provides guidance on performing required technical reviews and using the DATR form. Expectations for completion of WSB Design Authority Forms are also specified in Desktop Instruction NNP-WSB-2009-00003, in recognition that the unmodified form is better suited for use with a facility in operation. This desktop instruction indicates that the unreviewed safety question process does not apply until the facility becomes a nuclear facility and receives an authorization agreement. Therefore, configuration management of the safety basis, as defined in the PDSA, is ensured by completion of a PSBE that must be referenced in the DATR form associated with the technical change. The desktop instruction indicates that the question in Section 2.3 of the

DATR form relative to whether the change modifies a nuclear facility should be answered “NO” and a reference made in Section 2.4 of the DATR to the completed PSBE. As a result, the WSB DATR Section 2.3 question has no function under current facility conditions. However, the intent of the Section 2.3 question was met for the reviewed DATR forms by the narrative in Section 2.4, which stated that the changes had been evaluated against the PDSA by a referenced PSBE. Although the reviewed Section 2.4 narratives did not match that proposed by the desktop instruction, the narrative was a more comprehensive affirmation that the changes did not impact the key technical baseline documents listed above.

Opportunity for Improvement: Revise Section 5.2.3 of the desktop instruction for completion of the DATR to change the proposed narrative in Section 2.4 of the DATR form to reflect the more comprehensive narrative currently in use.

- The reviewed DATRs effectively summarized the reviews performed and the basis for approval of the associated DCF or SDDR. They listed the DCF/SDDR and related PSBE form reviewed, demonstrated that the scope of the proposed changes and facility impacts were understood, and identified any additional documents that would require revision. The DATRs also documented determinations that no new environmental issues were raised, that the changes were not modifications to a nuclear facility (see discussion regarding Engineering desktop instruction expectations for completion of the DATR forms while the facility is under construction), and that all impacted Design Authority reviews were identified and completed. Each DATR also indicated that there were no impacts on Revision 1 of the PDSA as modified by an approved PSCBR (U-PSBCR-F-00006), the DOE SER as modified by its addendum, and the WSB EEC or consolidated hazards analysis for the WSB. Finally, each reviewed DATR stated that the changes complied with the WSB FDD and SDD for BOP support systems.
- All reviewed DATRs answered “NO” to the potential environmental impact questions under Section 2.2, for which even one “YES” answer would indicate a requirement for an EEC. Neither the desktop instruction nor Manual E-7 provides guidance on how to respond to the questions on the need for an EEC. Literal interpretations of several of the questions in this section appear to warrant a “YES” answer for the reviewed DCFs. For example, the question that asked “Will the proposed activity result in a change in emissions, generation rates, or new discharges of... pollutants from a facility or process” would appear to warrant a “YES” answer for the DCF proposing changes in the standby diesel generator procurement specifications, given the proposed change of the diesel fuel oil specifications. However, the Design Authority’s “NO” response to this question was based on the fact that the existing EEC (PBU-F-2006-002) already identifies the need for National Environmental Policy Act review and environmental permits. Additional guidance in the DATR desktop instructions appears warranted to provide appropriate guidance on responding to the environmental impact questions in DATR Section 2.2.

Opportunity for Improvement: Revise the desktop instruction for completion of the DATR form to provide specific guidance on answering DATR Section 2.2 questions regarding potential environmental impacts in light of an existing EEC.

- The reviewed PSBE forms referenced the associated DCF/SDDR and DATR and indicated that they evaluated the proposed changes against the PDSA, PSBCR, SER, and its addendum. Each PSBE also documented the Design Authority's determination that the changes did not affect any safety SSC's ability to perform required safety functions, did not change any system boundaries or support systems, did not affect any parameters used or assumed in the preliminary safety analysis, did not result in any hazardous conditions not already considered, did not degrade any hazard controls, and did not result in changes in process or equipment descriptions in the PSDA. Further, each PSBE provided a brief statement of the basis for each conclusion based on the specifics of each proposed change and the content of the impacted technical baseline document.
- The SRS WSB project contractor has not yet established a Facility Operations Safety Committee per Manual 1B, procedure 4.19, because the WSB is not yet a facility. However, the project does have a Safety of Design Integration Team that does many of the functions of a Facility Operations Safety Committee.
- Section 6.2 of the WSB Project Configuration Management Plan does not recognize the use of a design change package, per Manual E7, Procedure 2.38, as a way to change the technical baseline.

Opportunity for Improvement: Revise Section 6.2 of the WSB Project Configuration Management Plan to encompass the use of design change packages to change technical baseline documents, particularly when required in cases where the modification impacts multiple systems.

- Finally, this review confirmed that the reviewed proposed changes were appropriate and complied with the FDD and SDD. Further, the changes complied with the PDSA as modified by PSBCR (U-PSBCR-F-00003); however, at least one section of the PDSA (PDSA Section 4.4.9.2) that should have been revised for consistency with the other PDSA changes was not addressed in the PSBCR.

Opportunity for Improvement: Revise the PSBCR to encompass all the sections of the PDSA requiring change to reflect the change in the standby diesel generator procurement specifications.