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**SALT WASTE PROCESSING FACILITY**

# COGNIZANT SYSTEM ENGINEERING PLAN

**Contract No. DE-AC09-02SR22210**

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## SUMMARY OF CHANGES

| Revision No. | Date | Description of Change |
|---|---|---|
| 0 | 10/15/2008 | Initial Issuance. |
| 1 | 12/13/2010 | Revised per DMR 1577 to update the CSE Organizational Structure (Fig.4-1), add Tables 4-1 and 4-2 in regard to Safety SSCs and assigned CSEs and for periodic review. |
| 2 | 2/27/2013 | Revise per DMR 2336. Revision is to update document to reflect recent changes in CSE assignments and to finalize CSE codes. |
| 3 | 12/02/2013 | Revise per DMR-2644 to align with updated Turnover System codes. |
| 4 | 08/21/2014 | Revise per DMR 2870. Revision to clarify CSE responsibilities in Section 5.5 and update references. |
| 5 | 07/21/2016 | Revised per DMR 3523. Incorporate change from 12 CSE categories to 14 CSE categories to align with System Descriptions. |
| 6 | 05/1/2018 | Revise per DMR-4388. Add brief introduction to NGS scope and to add NGS as a system code to table 4-3. Update from PDSA to DSA. |
| 7 | 02/14/2019 | Revise per DMR-4497, update to address CR-2019-09 (update references and DSA chapter 4 table cross references), per the approved DSA. |

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## LIST OF ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| ADS | Air Dilution System |
| AFF | Alpha Finishing Facility |
| AFP | Alpha Finishing Process |
| APA | Air Pulse Agitators |
| ASDT | Alpha Sorption Drain Tank (TK-601) |
| ASP | Alpha Strike Process |
| CM | Configuration Management |
| CORR | Contractor Operational Readiness Review |
| CPA | Central Processing Area |
| CSE | Cognizant System Engineer |
| CSSX | Caustic-side Solvent Extraction |
| DID | Defense-in-Depth |
| DOE | U.S. Department of Energy |
| DSA | Documented Safety Analysis |
| HEPA | High-Efficiency Particulate Air |
| HVAC | Heating, Ventilating, and Air Conditioning |
| ISOT | Integrated System Operational Test |
| NGS | Next Generation Solvent |
| PBVS | Process Building Ventilation System |
| PVVS | Process Vessel Ventilation System |
| SB | Safety Basis |
| SD | System Description |
| SIS | Safety Instrumented System |
| SME | Subject Matter Expert |
| SOT | System Operational Tests |
| SS | Safety Significant |
| SSC | Structure, System, and Component |
| SWPF | Salt Waste Processing Facility |
| TSR | Technical Safety Requirement |
| USQ | Unreviewed Safety Question |

## 1.0 PURPOSE

The Salt Waste Processing Facility (SWPF) Cognizant System Engineer (CSE) Program is established to assure that the flowdown of SWPF Safety Basis (SB) requirements are appropriately incorporated and maintained in safety significant (SS) and active systems performing defense-in-depth (DID) functions and to ensure the continued operational readiness of each system. A major component of the CSE Program during the SWPF Construction, Testing, Commissioning, and Operations phases is Configuration Management (CM) of the Design and Construction documentation. The CSE Program implements the requirements of the U.S. Department of Energy (DOE) Chapter V of DOE O 420.1C Chg 1, *Facility Safety*[1].

The CSE Program is being phased in, starting with Construction, with applicable elements related to CM control being initiated. The Program will be fully implemented prior to the Contractor Operational Readiness Review (CORR) with the exception of routine system assessments (see Section 5.3). Routine system assessments will commence six (6) months after hot operations begin. This Plan defines sequencing of the CSE Program implementation.

Development and implementation of the CSE Program is assigned to the Deputy Director of Engineering, who is responsible for:

- Identifying CSE Program requirements,
- Defining boundaries of each CSE Assignment,
- Setting the qualifications of the CSEs,
- Selecting the CSEs, and
- Ensuring that adequate and appropriate training is provided.

The Director of Engineering, with assistance from the Director of Configuration Management and the Plant Manager, is responsible to perform periodic assessments of Program implementation to ensure that the CSE Program is appropriately implemented and meets the requirements of Chapter V of DOE O 420.1C Chg 1[1] and DOE-STD-1073-2003, *Configuration Management*[2].

## 2.0 PROGRAM ELEMENTS

The CSE Program consists of the following key program elements:

- Identifying the structures, systems, and components (SSCs) that are included in the scope of the CSE Program;
- Defining the qualifications, training, roles, and responsibilities for the CSEs;
- Addressing CM requirements for the CSE Program;
- Defining CSE support for Operations and Maintenance;
- Applying a Graded Approach for CSE Program implementation; and

- Overseeing phased implementation of the CSE Program.

This CSE Plan also describes how the system engineering functions are incorporated into the SWPF Integrated Safety Management System, including flow down of implementing procedures, and provides the lines of authorities, responsibilities, and accountabilities.

## 3.0 SCOPE AND IDENTIFICATION OF SYSTEMS

Per DOE O 420.1C Chg 1[1], the CSE Program applies to active SSCs that are designated as Safety Class or SS, as defined in the DOE-approved facility SB, as well as other active systems that perform important DID functions or are designated by line management. The SWPF does not have any SSCs that are designated as Safety Class. A list of active Safety Systems is provided in Chapter 4 of S-SAR-J-00002, *SWPF Documented Safety Analysis*[3], (DSA). Chapter 4 of the DSA (S-SAR-J-00002[3]) identifies those SSCs classified as SS whose preventive or mitigative function is a major contributor to DID and/or worker safety and identifies the characteristics and features of each SSC that are necessary to perform their related safety functions. Table 4-1 provides a cross walk from Chapter 4 of the DSA (S-SAR-J-00002[3]) to the CSE area of responsibility. The DSA (S-SAR-J-00002[3]) categorizes components that perform important DID functions as SS. The scope of the CSE Program also includes these DID SSCs and those designated by the SWPF Director of Engineering as requiring a CSE assigned to them.

Chapter 4 of the DSA (S-SAR-J-00002[3]) identifies credited SSCs. Initially, CSEs are assigned to both active and passive SSCs. It is important during the construction and commissioning phases to have CSEs responsible for the configuration management aspects of both the active and passive systems. During operations, the CSE assignments for passive systems will likely be reduced, based on operational needs.

Parsons is also contracted by the DOE to design, construct, and test the Next Generation Solvent (NGS) system at the SWPF. The NGS Project scope includes the addition of a facility to house the new NGS chemical tanks. Flows from the new NGS chemical tanks will tie into the SWPF. V-PMP-J-00060, *Next Generation Solvent Deployment Project Management Plan*[4], provides the overall plan and schedule for completing design, construction, testing, and startup of this new facility. To support the design and construction activities, CSE assignments include NGS. The development of the NGS safety basis and system description (SD) will further define the CSE roles in the future.

## 4.0 COGNIZANT SYSTEM ENGINEER

CSEs are selected based on education and experience. CSE assignments may cover one or more systems, depending on the size and complexity of the system and the individual's education, knowledge, and experience. Assignments are made by the Deputy Director of Engineering and documented on SWPF Qualification Card QS-EN-001.QC0100, *SWPF Interim Cognizant System Engineer*[5], and in a Responsibility Assignment Matrix posted on the Engineering page of the SWPF Project Collaboration Portal. Consistent with the graded approach, more than one technical-level CSE may be assigned to large, complex, or critical systems. Conversely, a single

CSE may be assigned for multiple smaller, less complex systems. During startup of the facility, the goal is to have a minimum of two CSEs assigned to each system.

The CSE maintains overall cognizance of the assigned system and is responsible for system engineering support for Construction, Commissioning and Testing, Operations, and Maintenance. The CSE provides technical assistance in support of line management and ensures that CM is maintained, particularly those SS SSCs identified in the DSA (S-SAR-J-00002[3]) as shown in Table 4-2. The CSE provides direct support to Commissioning and Operations for continued system operational readiness. After the Operational Readiness Review is complete, the CSE continues to support Operations and Maintenance by maintaining the technical baseline design configuration for functional performance of the assigned SSCs and performs periodic assessments of the condition of his/her system.

Figure 4-1 defines the CSEs assigned to SWPF. This figure will be updated, as needed, in future revisions to this plan to reflect the expected organization at the time of the CORR. As noted in Section 3.0, once construction and testing is complete, some CSE positions assigned to passive systems may be reduced and specific boundaries between other CSE positions may be adjusted.

The qualifications, training, roles, and responsibilities of the CSE are further described in the following subsections.

**Table 4-1. DSA Chapter 4 versus CSE Crosswalk**

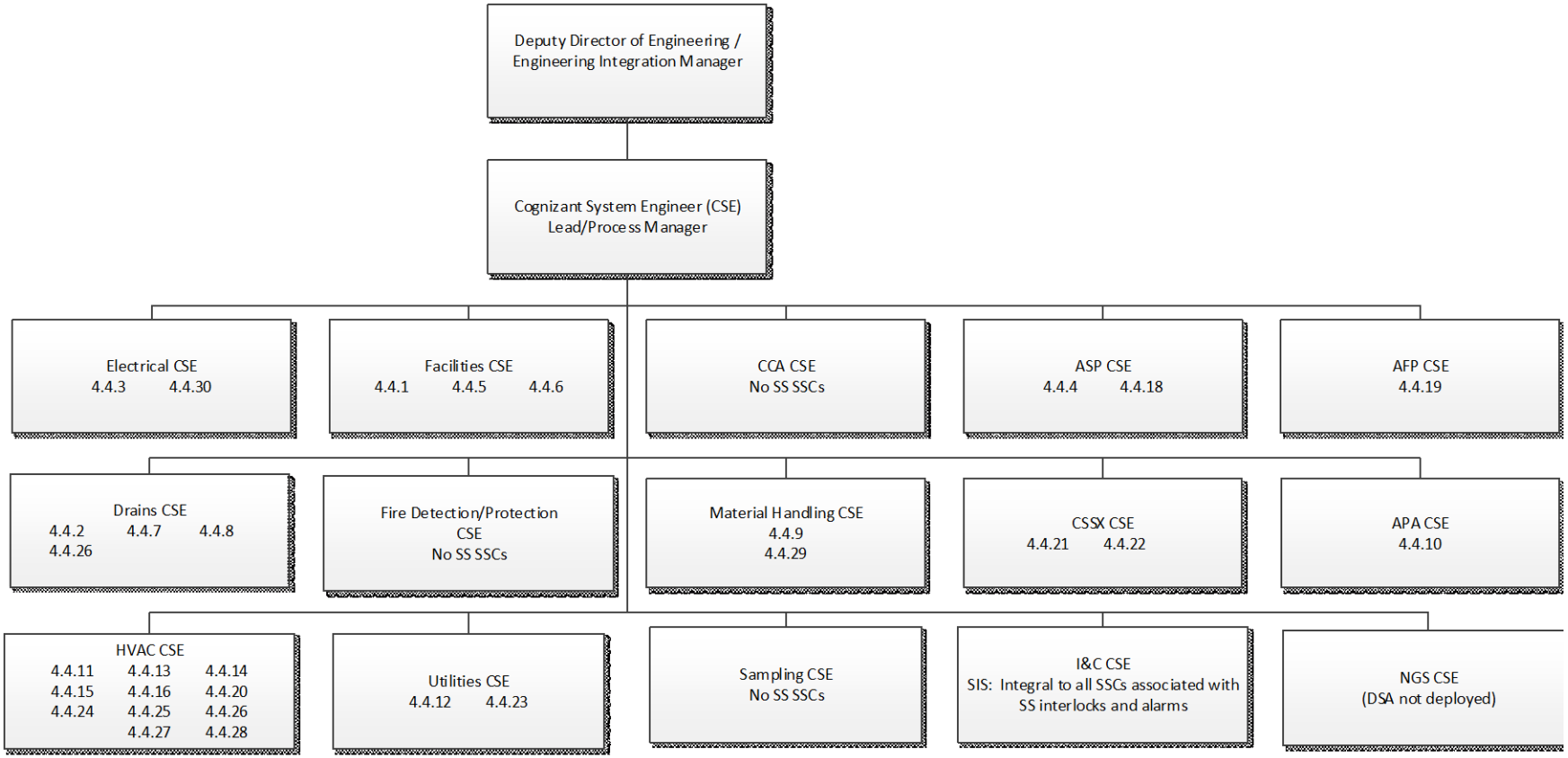
| DSA Sub-Chapter | Applicable Safety SSCs Title | CSE Area of Responsibility |
|---|---|---|
| 4.4.1 | Process Vessels, Tanks, and Cross-flow Filters: Structural (Confinement) | Facilities CSE |
| 4.4.2 | Process Vessels: Overflow Lines | Drains CSE |
| 4.4.3 | Process Vessel Grounding – Central Processing Area (CPA) | Electrical CSE |
| 4.4.4 | Waste Piping | Alpha Strike Process (ASP) CSE |
| 4.4.5 | Process Building: CPA | Facilities CSE |
| 4.4.6 | Process Building Control Room, Cells, Enclosures, Pump and Valve Galleries and Pipe Chases | Facilities CSE |
| 4.4.7 | Spill Containment | Drains CSE |
| 4.4.8 | Drain Lines to Alpha Sorption Drain Tank (ASDT) Cell Tanks (ASDT [TK-601], Solvent Drain Tank [TK-208], and Laboratory Drain Tank [TK-235]) | Drains CSE |
| 4.4.9 | Analytical Laboratory Hot Cells and Alpha Finishing Facility (AFF) Sample Gloveboxes | Material Handling CSE |
| 4.4.10 | Air Pulse Agitators (APAs) and Supporting Plant Air Sub-Systems | APA CSE |
| 4.4.11 | Process Vessel Ventilation System (PVVS) | Heating, Ventilating, and Air Conditioning (HVAC) CSE |
| 4.4.12 | Air Dilution System (ADS) and Supporting Plant Air Sub-System | Utilities CSE |
| 4.4.13 | Process Building Ventilation System (PBVS) | HVAC CSE |
| 4.4.14 | Analytical Laboratory Ventilation System | HVAC CSE |
| 4.4.15 | Waste Transfer Enclosure Vent Line | HVAC CSE |
| 4.4.16 | AFF Ventilation System | HVAC CSE |
| 4.4.17 | Safety Instrumented System Logic Solver | Instrumentation and Controls CSE |
| 4.4.18 | Tank Temperature Interlocks to Filter Recirculation Pumps | ASP CSE |
| 4.4.19 | Filter Feed Tank-B Recirculation Loop Temperature Interlocks | Alpha Finishing Process (AFP) CSE |
| 4.4.20 | Analytical Laboratory Ventilation System: Hot Cell/Glove Box Vacuum Interlock | HVAC CSE |
| 4.4.21 | High-turbidity Interlock | Caustic-side Solvent Extraction (CSSX) CSE |
| 4.4.22 | Barium-137 Decay Tank Gamma Detector and Interlock | CSSX CSE |
| 4.4.23 | ADS Low Pressure Alarms | Utilities CSE |
| 4.4.24 | PVVS Low-Vacuum Alarm | HVAC CSE |
| 4.4.25 | PBVS Instrument and Alarms | HVAC CSE |
| 4.4.26 | PVVS High-Efficiency Particulate Air (HEPA) Filter Instrumentation and Alarms | HVAC CSE |
| 4.4.27 | Analytical Laboratory Ventilation System HEPA Filter Instrumentation and Alarms | HVAC CSE |
| 4.4.28 | AFF Ventilation System Instrument and Alarms | HVAC CSE |
| 4.4.29 | Waste Container Vents | Material Handling CSE |
| 4.4.30 | 13.8 Kilovolt Manual Disconnect Switches\ | Electrical CSE |

## Table 4-2. Responsible CSE to Applicable Safety SSC

| CSE Area of Responsibility | Applicable Safety SSCs[A] |
|---|---|
| AFP CSE | • Filter Feed Tank-B Recirculation Loop Temperature Interlocks (4.4.19) |
| APA CSE | • APAs and Supporting Plant Air Sub-System (4.4.10) |
| ASP CSE | • Waste Piping (4.4.4)<br>• Tank Temperature Interlocks to Filter Recirculation Pumps (4.4.18) |
| Cold Chemicals Area CSE | • No SS SSCs |
| CSSX CSE | • High-turbidity Interlocks (4.4.21)<br>• Barium-137 Decay Tank Gamma Detector and Interlock (4.4.22) |
| Drains CSE | • Process Vessels: Overflow Lines (4.4.2)<br>• Spill Containment (4.4.7)<br>• Drain Lines to ASDT Cell Tanks (ASDT [TK-601], Solvent Drain Tank [TK-208], and Laboratory Drain Tank [TK-235]) (4.4.8) |
| Electrical CSE | • Process Vessel Grounding, CPA (4.4.3)<br>• 13.8 Kilovolt Manual Disconnect Switches (4.4.30) |
| Facilities CSE | • Process Vessels, Tanks and Cross-flow Filters: Structural (Confinement) (4.4.1)<br>• Process Building: CPA (4.4.5)<br>• Process Building Control Room, Cells, Enclosures, Pump and Valve Galleries and Pipe Chases (4.4.6) |
| Fire Detection/Protection CSE | • No SS SSCs |
| HVAC CSE | • PVVS (4.4.11)<br>• PBVS (4.4.13)<br>• Analytical Laboratory Ventilation System (4.4.14)<br>• Waste Transfer Enclosure Vent Line (4.4.15)<br>• AFF Ventilation System (4.4.16)<br>• Analytical Laboratory Ventilation System: Hot Cell/Glove Box Vacuum Interlock (4.4.20)<br>• PVVS Low-Vacuum Alarm (4.4.24)<br>• PBVS Instrumentation and Alarms (4.4.25)<br>• PVVS HEPA Filter Instrumentation and Alarms (4.4.26)<br>• Analytical Laboratory Ventilation System HEPA Filter Instrumentation and Alarms (4.4.27)<br>• AFF Ventilation System Instrument and Alarms (4.4.28) |
| Instrument and Control CSE | • Safety Instrumented System Logic Solver (4.4.17)<br>• Basic Process Control System: Serves a non-safety related DID function involving multiple plant systems<br>• Safety Instrumented System: Integral to all SSCs associated with SS interlocks and alarms. |
| Material Handling CSE | • Analytical Laboratory Hot Cells and AFF Sample Gloveboxes (4.4.9)<br>• Waste Container Vents (4.4.29) |
| Sampling CSE | • No SS SSCs |
| Utilities CSE | • ADS and Supporting Plant Air Sub-System (4.4.12)<br>• ADS Low Pressure Alarms (4.4.23) |
| NGS CSE | • No SS SSCs. |

A Safety SSCs as defined in Chapter 4 in DSA (S-SAR-J-00002[3]). Number in parenthesis refers to DSA (S-SAR-J-00002[3]) section number.

**Figure 4-1. CSE Organizational Structure**




**NOTE: Numbers refer to SWPF PDSA Section Number**

## 4.1 Qualifications and Training

The CSE is a qualified position, with responsibility for safe facility operation and performing activities associated with maintaining compliance with the facility SB. The CSE is responsible for controlling the configuration of SS and designated DID systems to ensure that system functional performance that is essential to protect workers, the public, and the environment is not compromised.

CSEs are qualified and trained consistent with DOE O 426.2, *Personnel Selection, Training, Qualification, and Certification Requirements for DOE Nuclear Facilities*[6]. Minimum position requirements are specified in Project Position Description-211, *Cognizant System Engineer* developed in accordance with PP-TM-1402, *New Hire and On/Off Boarding*[7], and are consistent with PL-TR-1805, *SWPF Cognizant System Engineer Training Program Description*[8], and V-IM-J-00001, *SWPF Organization, Roles, and Responsibilities Manual*[9].

The CSEs are initially selected based on their education, experience, and specific knowledge, skills, and abilities. Once selected, CSE candidates are assigned completion of the training and qualification requirements appropriate to the current project phase, as described in PL-TR-1805[8].

## 4.2 Roles and Responsibilities

The CSE is responsible for maintaining each assigned system(s) within the confines of its safety envelope and shall be the primary point-of-contact for responding to engineering assistance requests from the Procurement, Construction, Commissioning and Testing, Operations, and Maintenance Organizations. The CSE is responsible for maintaining CM for assigned SSCs both during and after Construction. The CSE serves as the technical advisor to facility management, once the facility is in operation, to assess impacts to and continued operational readiness of assigned SSCs.

Where required, the CSE solicits support from Subject Matter Experts to evaluate information or develop solutions to identified problems. However, the CSE retains overall responsibility to concur with and implement Subject Matter Expert recommendations. The CSE also interfaces with the SWPF Technical Representative and/or Procurement Representative where tasks are performed by subcontractors. The CSE does not provide management direction for subcontractor work activities.

Specific CSE roles and responsibilities prior to and during Operations include:

- Serving as primary point-of-contact for responding to engineering assistance requests per PP-EN-5039, *Plant Request for Information*[7];
- Responding to Subcontractor Requests for Information, Deviation Requests, or Nonconformance reports for assigned SSCs per PP-PR-6021, *Supplier/Subcontractor Deviation, Information or Nonconformance Requests*[7];
- Reviewing and concurring on any case-by-case and all as-built Field Change Notices (see PP-EN-5034, *Field Change Notices [FCNs]*[7]);

- Ensuring that the SDs are prepared and maintained consistent with the Design Basis, SB, Environmental Permits, and other functional performance requirement documentation per PP-EN-5017, *Development and Maintenance of System Descriptions*[7];
- Reviewing and remaining cognizant of any Environmental Permit requirements specific to their respective assigned systems;
- Developing and/or approving Design Change Notices (PP-EN-5012: *Design Change Notices*[7]) for their respective assigned system(s);
- Identifying documents (e.g., drawings, calculations, applicable portions of documented hazard and accident analyses, and vendor manuals) that support SD development per PP-EN-5017[7];
- Managing engineering work performed in support of the testing for assigned SSCs;
- Reviewing and approving test documents for issue, in accordance with responsibilities outlined in PP-CM-8107, *Joint Test Group*[7];
- Reviewing and recommending approval of completed test data/reports through participation as a member of the Joint Test Group;
- Recommending or evaluating SWPF design changes based on the test results, and coordinate preparation of design change documentation (see PP-EN-5012[7]);
- Support all System Operational Tests (SOTs) and Integrated SOTs (ISOTs), including reviewing all Test Deficiency Reports to confirm actions for closure are adequate;
- Providing technical assistance in obtaining spare and replacement parts and components;
- Providing technical assistance to correct out-of-specification conditions and resolve design-related equipment issues;
- Identifying potential inadequacies in the SB for assigned SSCs;
- Providing input to development and acceptance of Non-Conformance Report dispositions related to system performance for assigned SSCs per PP-QA-4703, *Nonconforming Items*[7];
- Ensuring that system configuration is being managed effectively (both temporary and permanent modifications) consistent with P-CDM-J-00001, *Configuration Management Plan*[10];
- Controlling set points;
- Initiating actions to correct problems;
- Remaining cognizant of system-specific construction and testing history and industry operating experience;
- Assigning Drawing Designation System Codes, using coding shown in Table 4-3, to each assigned drawing per PP-EN-5001, *Design Control*[7];
- Reviewing proposed DSA (S-SAR-J-00002[3]) SB Change Notices and Technical Safety Requirement (TSR) (see S-TSR-J-00001, *SWPF Technical Safety Requirements Savannah River Site*[11]) changes associated with their respective assigned system;

- Supporting determination of start-up operational readiness;
- Remaining cognizant of manufacturer and vendor recommendations and any product warnings regarding safety SSCs in their assigned systems; and
- Ensuring receipt and adequacy of vendor manuals and other vendor-supplied data needs.

Additional CSE roles and responsibilities will commence prior to the CORR or during Cold Commissioning in support of Operations which include:

- Remaining cognizant of assigned SSC operational status by regularly reviewing system/component logs, trends, work releases, surveillances, and inspections;
- Identifying potential deterioration (physical or performance) of assigned SSCs;
- Supporting investigation of occurrences or operating events, perform system trouble shooting, and assist in preparing associated reports and root cause analyses;
- Assisting operations review of key system parameters and evaluating system performance;
- Identifying trends for operations;
- Reviewing TSR (S-TSR-J-00001[11]) Limiting Conditions of Operation Surveillance results;
- Providing assistance in determining operability, correcting out-of-specification conditions, and evaluating questionable data;
- Providing or supporting analysis when the system is suspected of inoperability or degradation;
- Performing technical reviews and concur with Design Change Notices and Field Change Notices, including temporary modifications, to ensure that potential impacts to assigned SSCs are appropriately considered; and
- Remaining cognizant of system-specific maintenance and operations history and industry operating experience.

The CSE will also support development/establishment of:

- SOTs/ISOTs;
- Maintenance Procedures;
- Operations Procedures;
- Systems Training Documents;
- Performance Monitoring and Criteria;
- Outage Plans and Procedures;
- Surveillance Procedures;
- Retest/Return to Service;

- Unreviewed Safety Questions (USQs) Screenings, Evaluations, and Determinations; and
- Like-for-Like Determinations.

The crosswalk from CSE to Drawing/system codes and to SDs is provided in Table 4-3. The system codes are used in various databases and systems to identify the CSE area. This includes crosswalking system codes to essential and support drawings and master equipment list commodities.

**Table 4-3. Drawing System Designation Codes and Crosswalk to System Descriptions***

| CSE Area of Responsibility | System Designation Code | System Description |
|---|---|---|
| Alpha Finishing Process | AFP | • X-SD-J-00004, *SWPF Alpha Finishing Process System Description*[12] |
| Air Pulse Agitators | APA | • X-SD-J-00007, *SWPF Air Pulse Agitators System Description*[13] |
| Alpha Strike Process | ASP | • X-SD-J-00001, *SWPF Alpha Strike Process System Description*[14] |
| Cold Chemicals Area | CCA | • X-SD-J-00003, *SWPF Cold Chemicals Area System Description*[15] |
| Caustic-side Solvent Extraction | CSSX | • X-SD-J-00002, *SWPF Caustic-Side Solvent Extraction System Description*[16] |
| Instrumentation and Controls | DCS | • J-SD-J-00002, *SWPF Instrumentation and Controls System Description*[17] |
| Drains | DRAIN | • X-SD-J-00005, *SWPF Drains System Description*[18] |
| Electrical | ELEC | • E-SD-J-00002, *SWPF Electrical System Description*[19] |
| Facilities | FACIL | • No system description. Covers buildings, communications systems, access control and external grounds (roads, etc.) |
| Fire Detection/Protection | FD_FS | • F-SD-J-00001, *SWPF Fire Detection/Protection System Description*[20] |
| Heating, Ventilating and Air Conditioning | HVAC | • M-SD-J-00004, *SWPF Heating, Ventilating, and Air Conditioning System Description*[21] |
| Sampling | LAB | • X-SD-J-00006, *SWPF Sampling System Description*[22] |
| Material Handling | MHD | • M-SD-J-00006, *SWPF Material Handling System Description*[23] |
| Next Generation Solvent | NGS | • V-PMP-J-00060, Next Generation Solvent Deployment Project Management Plan** |
| Utilities | UTIL | • M-SD-J-00005, *SWPF Utilities System Description*[24] |
| General (Affects multiple systems or cannot be tied to a specific system.) Assigned to Lead CSE or CSE Manager. | GEN (Only used for Support Drawing Change Control Category) | • Not applicable. |

*Two additional designation codes (NA-TempTrailers and NA-PTC) to capture non-permanent plant equipment in temporary trailers and at the Parsons Technology Center (off-site) that require periodic maintenance or corrective maintenance. These do not fall under the CSE program but are controlled equipment.

**NGS will have a SD developed prior to design/construction complete. In the interim, the system designation code is established to allow cross referencing for drawings and equipment.

## 5.0 CONFIGURATION MANAGEMENT

A key objective of the CSE Program is to maintain CM throughout procurement, construction, and startup and ensure operational readiness of the systems within the scope of the Program. The principles of CM are applied to these systems as the means to maintain configuration of the system to ensure that the SWPF Design and SBs are not compromised. CM is also used to integrate and maintain consistency among SSC requirements and performance criteria, documentation, and physical configuration through implementation of documentation control, change control, system assessments, and work control.

The guidance provided in DOE-STD-1073-2003[2], is used to implement the SWPF CM Program, which is documented in P-CDM-J-00001[10]. P-CDM-J-00001[10] establishes the processes used for the SWPF Project to ensure that critical SSC characteristics are maintained within established performance ranges. The CM Program includes:

- Establishing design basis information;
- Controlling changes;
- Conducting periodic system assessments;
- Controlling system maintenance and repair; and
- Testing after system modifications are made.

### 5.1 Design Basis Information

The design basis is documented in P-DB-J-00003, *SWPF Process Basis of Design*[25]; P-DB-J-00004, *SWPF Balance of Plant Basis of Design*[26]*;* and P-DB-J-00006, *Next Generation Solvent Deployment at Salt Waste Processing Facility Basis of Design*[27], which specify the design requirements and design codes and standards used for the SWPF. P-DB-J-00002, *SWPF Design Criteria Database*[28], and P-DB-J-00005, *Next Generation Solvent Deployment at Salt Waste Processing Facility Design Criteria Database*[29], provides a consolidated list of the codes and standards used to design the SWPF and NGS. Procedure PP-EN-5001[7] defines those specific design documents that must be under CM.

SB documentation starts with the approved DSA (S-SAR-J-00002[3]), which describes the design features of SS SSCs that are required to prevent or mitigate identified hazards. Maintaining the safety envelope defined by the DSA (S-SAR-J-00002[3]) ensures protection of workers, the public, and the

environment. The CSE shall be thoroughly familiar with the DSA (S-SAR-J-00002[3]) for assigned SSCs, and use the information provided in the DSA (S-SAR-J-00002[3]) as the basis to control system changes and assess system performance. The CSE reviews DSA (S-SAR-J-00002[3]) proposed changes (i.e., SB Change Notices and new revisions) and TSR (S-TSR-J-00001[11]) changes that affect assigned SSCs. The CSE shall also complete USQ training since USQ reviews are typically required for Design Changes and Procedures (Operations, Testing and Maintenance) involving their assigned systems. When USQ trained, the CSE supports Nuclear Safety staff in performing any SB reviews.

SDs for SSCs were generated during Design and will be updated as required prior to Operations. These SDs are under configuration control in accordance with PP-EN-5017[7] and PP-EN-5012[7]. The CSE is responsible for periodically reviewing and updating the SDs for assigned SSCs.

## 5.2 Change Control

The CSE is responsible for supporting and coordinating any design/configuration change to assigned SSCs. The CSE reviews and approves case-by-case Field Change Notices and Design Change Notices for assigned SSCs. Design and technical control for the SWPF design/technical inputs, design interfaces, design processes, design verifications, records, and design/technical output is performed in accordance with PP-EN-5001[7].

With the facility turned over from Construction to Commissioning/Operations, physical configuration and associated documentation changes are tracked and monitored until changes are completed. Upon completion, the changes are verified against the approved change documentation. The CSE is responsible to ensure that drawings and technical basis documents are maintained current for their assigned SSCs.

Once the SWPF is in operation, the CSE is responsible to define which drawings for his or her assigned systems are needed for operations (e.g., support drawings) that must be maintained under CM and which construction or fabrication drawings are for ‘information only’ in the historical record. During operations, the CSE is involved in screening/reviewing all major maintenance per PP-MN-8740, *Maintenance Control Work*[7].

## 5.3 System Assessments

Prior to the CORR, the system health assessment process was defined per PP-EN-5035, *System Health Reporting and Operability Assessments*[7], including the types of data to be collected and assessed and sample reports to be generated. All CSE systems for SWPF have SSC-specific Performance Reporting Basis documented per PP-EN-5035[7]. The CSEs have demonstrated their understanding of the expectations and reporting requirements, such that they will be able to establish a baseline and start collecting data once operations of the SWPF commences.

Once the SWPF is in operation, periodic reviews will be conducted by the responsible CSE to determine SSC operability, reliability, and material condition. Each system will be reviewed to ensure that intended design and safety functions can be performed, verify physical configuration to baseline design and safety documentation, and confirm that system performance is within

established limitations. The CSE is expected to physically inspect as much of his/her system each quarter as possible. The inspections should occur throughout the quarter and be captured in a quarterly system health report, due each quarter, starting six (6) months after operations have commenced.

CSEs will also support operations and maintenance in any formal reviews, including TSR (S-TSR-J-00001[11]) compliance reviews, as necessary for their assigned system(s).

### 5.4 Work Control

Work on safety-related SSCs including maintenance, repairs, and modifications is accomplished under controlled processes to ensure that system performance and safety functions are not inadvertently compromised. The specific responsibilities, authorities, and interfaces will be defined in applicable Work Control processes, including procedures.

The Plant Manager is responsible for work activities, including maintenance, in assigned facilities. The CSE will review and comment on work procedures. The CSE will also receive maintenance logs and observe repair work as required, for their assigned system(s). The CSE maintains knowledge of work activities including maintenance, testing, repairs, and modifications for assigned systems and components.

### 5.5 Testing

The CSE is a member of the Joint Test Group when testing impacts that CSE's system and supports execution of the Testing and Commissioning Program (i.e., Calibration, Grooming, and Alignment, SOT, ISOT, Cold Commissioning, and Hot Commissioning) for their assigned system. The CSE will participate in and support the Operational Readiness Reviews for assigned SSCs to obtain Critical Decision-4 approval for Hot Operations.

Performance and safety functions of an SSC will also be tested, as required, when major repairs or modifications are made. The CSE will assist in developing test objectives and procedures, assessing test results, and approving "Return to Service" documentation.

## 6.0 GRADED APPROACH

Implementation of the CSE Program is tailored to the characteristics and attributes of the systems and components that are contained in the DSA (S-SAR-J-00002[3]) and the associated facilities. SWPF uses these characteristics and attributes to apply a graded approach in implementing the CSE Program, which primarily involves development of SDs, development of roles and responsibilities, and selection and assignment of CSEs. The key characteristics and attributes considered include:

- Facility hazards and safety significance of SSCs (as addressed in the DSA (S-SAR-J-00002[3]), including consideration of nuclear criticality, releases of radioactive material, fire hazards, safety interlocks, and mitigating actions;
- Complexity and physical locations of the SSCs;

- Facility work activities such as deactivation, and decontamination, and decommissioning that may involve frequent changes, modifications, and/or removal of systems as being no longer needed to support the SB of those operations; and
- Planned or expected facility life cycle and associated schedules.

## 7.0 PROGRAM MANAGEMENT AND OVERSIGHT

The Deputy Director of Engineering is responsible for management of the CSE Program. The CSEs are consolidated under a CSE Lead within the Engineering Group.

CSE assignments will be periodically reviewed and adjusted, as needed, to ensure continued operational readiness of SSCs. For example, certain SSCs that undergo frequent changes may require more attention than would be the case for SSCs in normal operating mode.

Commencing with the turnover to Operations, periodic assessments will be performed to ensure that the Program is being implemented appropriately. Assessments will include self-assessments by the Deputy Director of Engineering and management assessments, and independent assessments conducted by the Director of Engineering, with assistance of the Plant and Configuration Managers.

## 8.0 INTEGRATED SAFETY MANAGEMENT SYSTEM

The CSEs perform duties consistent with SWPF Integrated Safety Management System throughout Construction and Operations. They define work necessary to maintain their systems within the specified SB, review changes and operating conditions for hazards, develop necessary controls and corrective actions for any deficiencies noted, and will provide systematic review and system health assessments on a periodic basis.

## 9.0 REFERENCES

[1] DOE O 420.1C Chg 1, *Facility Safety*. U.S. Department of Energy, Washington, D.C. Approved December 04, 2012. Last Updated February 27, 2015.

[2] DOE-STD-1073-2003, *Configuration Management*. U.S. Department of Energy, Washington, D.C. October 2003.

[3] S-SAR-J-00002, *SWPF Documented Safety Analysis*, Parsons, Aiken, South Carolina

[4] V-PMP-J-00060, *Next Generation Solvent Deployment Project Management Plan*. Parsons, Aiken, South Carolina.

[5] QS-EN-001.QC0100, *SWPF Interim Cognizant System Engineer*. Parsons, Aiken, South Carolina.

[6] DOE O 426.2, *Personnel Selection, Training, Qualification, and Certification Requirements for DOE Nuclear Facilities*. U.S. Department of Energy, Washington, D.C. April 21, 2010.

[7] *Salt Waste Processing Facility Project Procedures Manual*. Parsons, Aiken, South Carolina.

[8] PL-TR-1805, *SWPF Cognizant System Engineering Training Program Description*. Parsons, Aiken, South Carolina.

[9] V-IM-J-00001, *SWPF Organization, Roles, and Responsibilities Manual*. Parsons, Aiken, South Carolina.

[10] P-CDM-J-00001, *SWPF Configuration Management Plan*. Parsons, Aiken, South Carolina.

[11] S-TSR-J-00001, *SWPF Technical Safety Requirements Savannah River Site*. Parsons, Aiken, South Carolina.

[12] X-SD-J-00004, *SWPF Alpha Finishing Process SWPF System Description*. Parsons, Aiken, South Carolina.

[13] X-SD-J-00007, *SWPF Air Pulse Agitators System Description*. Parsons, Aiken, South Carolina.

[14] X-SD-J-00001, *SWPF Alpha Strike Process System Description*. Parsons, Aiken, South Carolina.

[15] X-SD-J-00003, *SWPF Cold Chemicals Area System Description*. Parsons, Aiken, South Carolina.

[16] X-SD-J-00002, *SWPF Caustic-Side Solvent Extraction System Description*. Parsons, Aiken, South Carolina.

[17] J-SD-J-00002, *SWPF Instrumentation and Controls System Description*. Parsons, Aiken, South Carolina.

[18] X-SD-J-00005, *SWPF Drains System Description*. Parsons, Aiken, South Carolina.

[19] E-SD-J-00002, *SWPF Electrical System Description*. Parsons, Aiken, South Carolina.

[20] F-SD-J-00001, *SWPF Fire Detection/Protection System Description*. Parsons, Aiken, South Carolina.

[21] M-SD-J-00004, *SWPF Heating, Ventilating, and Air Conditioning System Description*. Parsons, Aiken, South Carolina.

[22] X-SD-J-00006, *SWPF Sampling System Description*. Parsons, Aiken, South Carolina.

[23] M-SD-J-00006, *SWPF Material Handling System Description*. Parsons, Aiken, South Carolina.

[24] M-SD-J-00005, *SWPF Utilities System Description*. Parsons, Aiken, South Carolina.

[25] P-DB-J-00003, *SWPF Process Basis of Design*. Parsons, Aiken, South Carolina.

[26] P-DB-J-00004, *SWPF Balance of Plant Basis of Design*. Parsons, Aiken, South Carolina.

[27] P-DB-J-00006, *Next Generation Solvent Deployment at Salt Waste Processing Facility Design Criteria Database*. Parsons, Aiken, South Carolina.

[28] P-DB-J-00002, *SWPF Design Criteria Database*. Parsons, Aiken, South Carolina.

[29] P-DB-J-00005, *Next Generation Solvent Deployment at Salt Waste Processing Facility Design Criteria Database*. Parsons, Aiken, South Carolina.