DOCUMENT REVIEW/APPROVAL

Document: G-SD-Z-00007 **Revision:** 5

Document Type: SYD

Title: SYSTEM DESCRIPTION DOCUMENT FOR SALTSTONE LAB

Description: Various engineering comments incorporated and indicated by revision bars in document

Amendments:

Originator: DAVIS, IRA ALEXANDER **Date:** 6/11/2013

REVIEW

Contributing Reviewers	Org	Date
1. N/A		6/11/2013
2. N/A		6/11/2013
3. N/A		6/11/2013
4. N/A		6/11/2013
5. N/A		6/11/2013
6. N/A		6/11/2013
7. N/A		6/11/2013
8. N/A		6/11/2013
9. N/A		6/11/2013
10. N/A		6/11/2013

APPROVAL

Approvers	Org	Date
1. N/A		6/11/2013
2. N/A		6/11/2013
3. N/A		6/11/2013
4. N/A		6/11/2013
5. N/A		6/11/2013
6. N/A		6/11/2013
7. N/A		6/11/2013
8. N/A		6/11/2013
9. N/A		6/11/2013
10. N/A		6/11/2013

VERIFIER/CHECKER

Verifier/Checker: CLARK, MASON CHRISTOPHER **Date:** 6/11/2013

DESIGN AUTHORITY

Design Authority: CLARK, MASON CHRISTOPHER **USQS Required:** YES

Date: 6/11/2013 **TRP Number:** USQ-SS-2013-00180

CLASSIFICATION

UNCLASSIFIED - Does Not Contain Unclassified Controlled Nuclear Information

DC/RO: N/A

Date: 6/11/2013

Guidance / Exemption:

When separated from the referenced document, this coversheet is : UNCLASSIFIED

G-SD-Z-00007

Revision 5

SYSTEM DESCRIPTION DOCUMENT

For

SALTSTONE PRODUCT LABORATORY

CLOSURE BUSINESS UNIT – WASTE SOLIDIFICATION PROJECTS
SALTSTONE FACILITY

Original Document (SS-14) by
Bechtel National, Inc.

5	5/28/13	Revision bars identify changes made due to engineering comments				
4	9/26/05	Revised for DDA and ARP/MCU processing	BHC	AVS	JWR	
3	9/18/03	Incorporated G-DCF-Z-00012 & LCS Modifications	TDL	TEC	DCS	
2	6/5/01	Reviewed/Revised for Re-start	TDL	JAW	AWW	
1	4/12/95	Reviewed/Revised by WSRC for Issue	TDL	HJC	RS/JFO	SFP
0	6/16/93	Transmitted to WSRC				
Revision	Date	Description	Orig	Rvwr	Mgr	

ENGINEERING DOC. CONTROL–SRS
00760416

TABLE OF CONTENTS

Section	Title	Page
	SUMMARY	1
1.0	FUNCTIONS AND DESIGN REQUIREMENTS	2
	1.1 Process and Safety Functions	2
	1.2 Design Requirements	2
	1.3 Design Basis Rationale	3
2.0	DESIGN DESCRIPTION	4
	2.1 Detailed System Description	4
	2.2 System Parameters and Performance Characteristics	5
	2.3 System Arrangement	5
	2.4 Component Design Descriptions	5
	2.5 Codes and Standards	6
	2.6 Instrumentation and Control	6
	2.7 System Interfaces	7
3.0	OPERATION	9
4.0	SETPOINTS, SYSTEM LIMITATIONS, AND PRECAUTIONS	9
5.0	SYSTEM UPSETS AND RECOVERY SEQUENCES	9
6.0	MAINTENANCE	9
	6.1 Preventive Maintenance, Inspection, and Surveillance	9
	6.2 Corrective Maintenance	9
7.0	APPENDICES	10
	7.1 References	10
	7.2 Parameters List	10
	7.3 Drawings and Specifications	11

TABLES

Table

2.7-1 Saltstone Product Laboratory Primary Interfaces…… **7**

2.7-2 Saltstone Product Laboratory Secondary Interfaces…… **8**

NOTE

The Saltstone Product Laboratory function and design as described in this document do not apply to salt wastes generated from Deliquification, Dissolution, and Adjustment (DDA) process and Actinide Removal Process (ARP)/Modular Caustic Side Solvent Extraction (CSSX) Unit (MCU). Salt wastes fed from these processes to Saltstone will be higher activity wastes (up to 0.2 Ci/gal). Sampling and analyses will be performed upstream of Saltstone by Savannah River National Laboratory (SRNL) and other outside laboratories.

The functions and design of the Saltstone Product Laboratory may be used as currently described in this SDD for lower activity (0.005 Ci/gal) wastes. The Salt Waste Production Facility (SWPF), which will be sending wastes to Saltstone after DDA and ARP/MCU, is projected to send lower activity wastes. Since there is a possibility of using the Saltstone laboratory for future sampling and analysis, lab functions and design have been preserved in this document for informational purposes as to the type of analyses and system interactions that are involved in the lab.

SUMMARY

The Saltstone Facility in Z-Area processes and disposes of radioactive salt solution from the H-Area tank farm. The salt solution consists of low-level mixed waste primarily from the Effluent Treatment Project, Low Curie Salt, and Actinide Removal Project. The Z-Area Saltstone facility immobilizes the low activity salt solution into a concrete-like product (saltstone) suitable for safe disposal in an aboveground vault.

The laboratory is located in the Operations Building (704-Z). A sample hood has been installed in the Process Room (210-Z) for preparation and storage of higher activity samples. The lab also used to prepare samples for shipment to outside laboratories for more sophisticated analyses, such as composition, radionuclide content, and TCLP (toxicity characteristic leaching procedure) testing.

The 704-Z product test laboratory is designated for use in the preparation and analysis of samples typical of decontaminated salt solution (nominal 0.005 Ci/gallon). For Low Curie Salt waste (nominal 0.05 Ci/gallon and higher), the 704-Z product test laboratory is not used. Feed sampling is performed at tank 50H and recipe formulation takes place, remotely, at SRTC.

1.0 FUNCTIONS AND DESIGN REQUIREMENTS

The function of the Saltstone product test laboratory is to test and analyze process material samples to ensure product quality.

1.1 PROCESS AND SAFETY FUNCTIONS

The system shall:

- Support the preparation of samples for shipment to laboratories outside of Z-Area or Savannah River Site (SRS) for additional analyses
- Limit exposure of laboratory workers to hazardous chemicals and radioactivity

1.2 DESIGN REQUIREMENTS

1.2.1 Operational Requirements

- The laboratory shall be equipped to prepare samples for shipment to a laboratory outside of Z-Area or SRS for more sophisticated analyses.
- Analyses of hazardous materials shall be performed in ventilated hoods or enclosures. (The original BDR requirement was to provide two regulated hoods, one suitable for permeability test equipment. The requirement was changed because the compressive strength test is now performed in a plastic enclosure using double-bagged samples, and the permeability test has been replaced with a TCLP test that is done at an offsite lab.)
- Minimum airflow into a hood shall be 150 linear ft/min with the window fully open.
- A sink that drains to the regulated drain system shall be provided.
- There shall be a minimum of 10 linear feet of counter top.
- A safety shower and eyewash shall be provided.

1.2.2 Structural Requirements

There are no specific structural requirements for this system.

1.2.3 System Configuration and Essential Features

Radiation exposure rates shall be less than 0.5 mrem/hr for continuous exposure and less than 5 mrem/hr for intermittent exposure for all lab work in 704-Z.

1.2.4 Maintenance Requirements

There are no specific maintenance requirements for this system.

1.2.5 Surveillance and In-Service Inspection Requirements

Airflow velocity into the fume hood shall be measured periodically to ensure it meets the minimum velocity requirement.

1.2.6 Instrumentation and Control Requirements

There are no specific maintenance requirements for this system.

1.2.7 System Interfacing Requirements

The Saltstone Product Laboratory interfaces with the following systems:

- G-SD-Z-00002, Saltstone Structures and Vaults, provides space for laboratory equipment.
- G-SD-Z-00003, Saltstone Process, provides samples and receives analytical results.
- G-SD-Z-00004, Saltstone Electrical, provides electrical power, lighting, and grounding.
- G-SD-Z-00005, Saltstone HVAC, provides ventilation.
- G-SD-Z-00006, Saltstone Support, provides domestic water.

Outside laboratories (external interface) receive samples and provide analytical results.

1.2.8 Quality Assurance Requirements

Quality assurance requirements for SRS activities are outlined in DOE Order SR-5700.6B. Savannah River Quality Assurance Plan DPW 82-111-2 and the DWPF Project Quality Assurance Plan serve as the basis for quality assurance activities for the DWPF. A QA assessment program was performed for the Saltstone facilities. All systems and components were determined to be non-Q.

1.2.9 Code and Standard Requirements

There are no specific code and standard requirements for this system.

1.2.10 Reliability Assurance

There are no specific reliability assurance requirements for this system.

1.3 DESIGN BASIS RATIONALE

This section is not applicable to this SDD.

2.0 DESIGN DESCRIPTION

2.1 DETAILED SYSTEM DESCRIPTION

2.1.1 Product Test Lab

The product test lab is a 12-foot by 34-foot room located in the regulated portion of the Operations Building (704-Z). The lab has 2 fume hoods, a sink, about 18 linear feet of counter top, and miscellaneous furniture. There is an eyewash/safety shower station nearby in the regulated corridor outside of the lab.

The fume hoods are vented to the regulated area HVAC system. Cold process water is piped to the hoods. The hoods have cup sinks that drain into the regulated drain header, which discharges into the Salt Feed Tank (SFT).

The laboratory sinks are supplied with cold process water. The sinks drain to the regulated drain header.

2.1.2 Salt Solution Samples

Deleted

2.1.4 Saltstone Grout Samples

Deleted

2.1.5 Raw Material Samples

Flyash, slag, and cement samples may be taken from the bulk material trucks. The samples may be packaged and shipped to a laboratory outside of Z-Area or SRS for analysis to ensure that all applicable specifications are being met by the vendor.

2.1.6 Solution Analyses

Deleted

2.1.7 Saltstone Grout Analyses

Deleted

2.1.8 Preparation of Samples for Outside Laboratories

More sophisticated analyses are performed in laboratories outside of Z-Area. The samples are received in the product test lab or process room hood and prepared for shipment. This preparation includes filling and sealing the sample bottle, and placing the bottle in secondary container (e.g., plastic bag, can, or drum). The sample bottles and containers are tested for radioactive contamination to verify that they are clean prior to shipment. The specific analyses required are requested in writing, and the sample is shipped out. The outside laboratories include other SRS labs such as the F-Area lab or commercial laboratories outside of SRS.

2.2 SYSTEM PARAMETERS AND PERFORMANCE CHARACTERISTICS

Fume hood face velocity: 150 linear ft/min

2.3 SYSTEM ARRANGEMENT

The product test lab is in the regulated portion of the Operations Building (704-Z). Ventilation airflow is from the regulated corridor into the lab, and from the lab into the fume hood. A hood is installed in the Process Building (210-Z) for handling higher activity samples.

2.4 COMPONENT DESIGN DESCRIPTIONS

2.4.1 Fume Hoods

The fume hoods are 4 foot and 8 foot wide respectively, and are designed for general radiochemical use. The interiors of the hoods are stainless steel and have covered corners and a smooth finish to facilitate cleaning. The windows are laminated safety glass. The hoods are provided with lighting, 120 V electrical receptacles, cold water outlets, and cup sinks. The hood in the Process Room is provided with 120 V electrical receptacles, but no water service or drains.

2.4.2 Gel Strength Tester

Deleted

2.4.3 Compressive Strength Tester

Deleted

2.4.4 Miscellaneous Equipment

Deleted

2.5 CODES AND STANDARDS

There are no special codes and standards for this system.

2.6 INSTRUMENTATION AND CONTROL

Deleted

2.7 SYSTEM INTERFACES

System interfaces are shown in Tables 2.7-1 and 2.7-2.

Table 2.7-1 Saltstone Product Laboratory Primary Interfaces

Interfacing System	Interfacing Location	Requirements
G-SD-Z-00002 Saltstone Structures and Vaults	Bldg. 704-Z Bldg. 210-Z	Provide building space and supports for laboratory equipment. Provide regulated drain piping from sinks. Provide space for hood in Process Room
G-SD-Z-00004 Saltstone Electrical	Power panel, equipment, and lighting panel	Provide normal and standby electrical power for equipment Provide lighting system with normal power Provide grounding for equipment
G-SD-Z-00005 Saltstone HVAC	HVAC duct	Provide ventilation for fume hoods and enclosures
G-SD-Z-00006 Saltstone Support	Branch line from header	Provide cold process water
Outside Laboratories (External)	Product Test Laboratory	Provide analyses of samples

Table 2.7-2 Saltstone Product Laboratory Secondary Interfaces

Interfacing System	Interfacing Location	Requirements
G-SD-Z-00002 Saltstone Structures and Vaults	Bldg. 704-Z	Receive lab furniture and equipment
G-SD-Z-00003 Saltstone Process	Sampling points	Provide samples and receive analytical results

3.0 OPERATION

The laboratory tests are described in Section 2.1, and the lab operating procedures are listed in Section 7.1.1.

4.0 SETPOINTS, SYSTEM LIMITATIONS, AND PRECAUTIONS

Deleted

5.0 SYSTEM UPSETS AND RECOVERY SEQUENCES

Deleted

6.0 MAINTENANCE

6.1 PREVENTIVE MAINTENANCE, INSPECTION, AND SURVEILLANCE

Deleted

6.2 CORRECTIVE MAINTENANCE

Deleted

7.0 APPENDICES

7.1 REFERENCES

7.1.1 Z-Area Operating Procedures

Operating Procedure No.	Title
SOP 201-Z-4230 (Cancelled)	Sampling Salt Solution Hold Tank
SOP 201-Z-4231 (Cancelled)	Sampling Salt Feed Tank
SOP 201-Z-4233 (Cancelled)	Verification of Tank 50H Salt Solution Analyses
SOP 201-Z-4233-1 (Cancelled)	Verification of Quarterly Chemical Analyses of Salt Solution
SOP 201-Z-4233-2 (Cancelled)	Verification of Quarterly Radioisotope Analyses of Salt Solution
SOP 704-Z-4384	Operational Check of Laboratory Balance
704-Z-4392-A (Cancelled)	Saltstone Regulatory Sampling Analysis Data Sheet
SOP-704-Z-4400 (Cancelled)	Saltstone Grout Lab Analyses
SOP-704-Z-4400-A (Cancelled)	Saltstone Grout Lab Analyses Data Sheet
Manual Reference SS20.2	Standard Lab Practices

7.2 PARAMETERS LIST

This section is not applicable to this SDD.

7.3 DRAWINGS AND SPECIFICATIONS

7.3.1 Piping and Instrument Diagrams

Drawing No.	Title
W776832	Operations Building – Regulated Area HVAC System Diagram

7.3.2 General Arrangement/Equipment Location Drawings

Drawing No.	Title
W780431	Operations Building Floor Plan
W780438	Operations Building – Plumbing Fixture Schedule and Diagrams
W780442	Operations Building – Plumbing Piping, Sheet 4 of 4

7.3.3 Specifications

Specification No.	Title
A40	Laboratory Equipment
A47	Operations Building

Date: 06/11/2013

COMMENT REPORT

COMMENT	DISPOSITION
Document No.: G-SD-Z-00007	Rev: 5
CLARK, MASON CHRISTOPHER —— 6/11/2013 Approved for S.Carpenter per telecom for ver/checker on 6/11/13	——

END OF COMMENT REPORT