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SALTSTONE FACILITY
SYSTEM DESIGN DESCRIPTION (U)
SALTSTONE SUPPORT

Original Document (SS-13) by
Bechtel National, Inc.

Revision Number	**7**
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Savannah River Remediation, LLC
Savannah River Site
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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 (ETP), Salt Waste Processing Facility (SWPF) and Modular Caustic-Side Solvent Extraction Processing Unit (MCU). The Z-Area Saltstone Facility immobilizes the radioactive solution into a concrete-like product (Saltstone) suitable for safe disposal in an aboveground vault. This salt solution is pumped from Tank 50 to the Salt Production Facility (SPF) through an inter-area transfer line. The inter-area transfer line is also shared with the SWPF for SWPF to Concentration, Storage, and Transfer Facilities (CSTF) transfers.

The Saltstone support systems, part of the Z-Area Saltstone Facility, provide supporting services and utilities to other Saltstone systems. They include compressed air, process and domestic water, radiological protection systems, the standby diesel generator, and the process control system.

The Saltstone Process Control System (SPCS) provides the necessary hardware, firmware, and software to perform status monitoring, process control, and data acquisition functions on the processes and activities at the Saltstone Facility.

1.0 FUNCTIONS AND DESIGN REQUIREMENTS

The Saltstone support systems provide the following utilities and services to Saltstone facilities and process systems:

- Plant and instrument air
- Pig launch air
- Process water
- Domestic water
- Radiological and environmental monitoring
- Standby diesel generator
- The SPCS

1.1 PROCESS AND SAFETY FUNCTIONS

The SPCS performs the following process functions:

- Controls and monitors the salt solution transfer from H Area Tank Farm to Saltstone.
- Controls and monitors the Saltstone process.
- Controls and monitors the operation of some building facilities.
- Collects and maintains historical information on Saltstone processes and equipment.

The diesel generator supplies standby electrical power to systems that must operate during a power failure.

The radiological monitoring system monitors employee exposure to radiation, airborne contamination, and radioactive releases.

Monitoring wells are provided to test for migration of saltstone chemical constituents into groundwater.

1.2 DESIGN REQUIREMENTS

1.2.1 Operational Requirements

1.2.1.1 Compressed Air Systems

An air compressor and a dryer shall generate compressed air for Plant Air (PA), Instrument Air (IA), and Pig Launch Air (PIG) services. Compressor and dryer shall be sized to provide extra (future) flow capacity. A booster shall boost air pressure for the PIG service only.

1.2.1.2 Water Systems

Process water systems shall be provided which will hold the amount of process water normally used in 24 hours. Domestic water shall be provided from the site-wide Domestic Water System.

1.2.1.3 Standby Diesel Generator

Standby electrical power shall be provided for the critical loads identified in G-SD-Z-00004, Saltstone Electrical.

1.2.1.4 RCO Monitoring: Air Monitoring System

The air monitoring system shall meet the following requirements:

- Monitor work area airborne contamination levels using portable equipment on an as needed basis.
- Monitor airborne and aqueous radioactive material releases to the environment, including sampling of exhaust stack using portable equipment.

To meet these requirements, the following equipment shall be provided:

- Portable filter paper collection samplers at potential release points of airborne radionuclides to the environment

1.2.1.5 RCO Monitoring: Area Radiation Monitoring (ARM)

Area radiation monitors shall be installed at the Salt Feed Tank (RIT-1180), 210-Z Roof (RIT-1614), Process Room (RIT-1628), Salt Solution Receipt Tank platform (RIT-7519), and SSRT Pump Gallery (RIT-7539). The output signals from dose rate monitoring instrumentation shall be displayed on the DCS.

Upon detecting a high radiation level, dose rate monitoring instrumentation shall actuate alarms located near the GM tube producing the high signal and at the DCS, as appropriate per alarm validation.

1.2.1.6 RCO Monitoring: Other RCO Monitoring

Other RCO monitoring, such as surface contamination and personnel dosimetry are not part of the configuration of the facility. Such monitoring is part of the site radiological control program as described in the Radiological Control Manual (5Q).

1.2.1.7 Saltstone Process Control System

The SPCS shall allow automated or operator control of processes and equipment

The SPCS operator interface shall be located in the Central Control Room (CCR)

The SPCS shall be designed to control the Saltstone process from prestart through normal shutdown with minimal operator action.

◦ The operator shall be able to start and stop equipment, adjust process control points, and perform other operations required for safe, efficient process control.

A variety of visual displays shall be obtainable on a monitor in the Central Control Room (CCR). Displays shall include process variables, setpoints, alarm points, and other required operating information. Audible alarms shall also be provided where needed.

The design shall ensure the automatic transfer of the system to a standby condition at particular setpoints and the ability to carry out a shutdown in the event of equipment or component failure.

In the event of failure of the automatic mode, operators shall be capable of controlling the system from either the CCR or local facilities.

The system shall provide restricted access for functions such as process and equipment controls, alarm setting changes and setpoint changes.

The ability to integrate control of two or more loops shall be provided.

The SPCS shall perform automatic diagnostic tests on all loops, provide malfunction alarms, and identify location and type of malfunction.

1.2.2 Structural Requirements

For structural requirements, see G-SD-Z-00002, Saltstone Structures and Vaults.

1.2.3 Maintenance Requirements

- The process water pumps shall be installed in parallel so that one can be isolated for testing and maintenance without shutting down the system.
- The SPCS shall have the ability to hot-swap I/O modules, rack mounted power supplies and controllers.

1.2.4 Surveillance and In-Service Inspection Requirements

- Air receivers shall have inspection ports.
- The SPCS has no Surveillance or In-Service Test requirements.

1.2.5 Instrumentation and Control Requirements

- Redundant instrumentation and standby or uninterruptible power shall be provided where continuous service and control are essential.
- Electrical and electronic sensing and transmission shall be used whenever possible.

1.2.6 Systems Interfacing Requirements

The systems interfacing with the Saltstone support systems are as follows:

- G-SD-Z-00001, Z-Area Site, provides space for outdoor tanks and equipment and monitoring wells.
- G-SD-Z-00002, Saltstone Structures and Vaults, provides space in buildings for components.
- G-SD-Z-00003, Saltstone Process, provides input signals to the SPCS, receives process control signals from the SPCS, and receives compressed air and water.
- G-SD-Z-00004, Saltstone Electrical, provides power and receives standby power from the diesel generator.

- G-SD-Z-00005, Saltstone HVAC, provides environmental conditioning to areas containing SPCS. It receives control signals from the SPCS and control air from the instrument air system.
- G-SD-Z-00007, Saltstone Product Laboratory, receives hot and cold domestic water.
- G-SD-Z-00008, Saltstone Fire Protection, provides fire protection components and receives makeup water.

1.2.7 Quality Assurance Requirements

Quality assurance requirements for Savannah River Remediation (SRR) activities are outlined in 10CFR830, DOE Order 414.1D, EM-QA-001, ASME NQA-1 2008/2009A, and DOE/RW-0333P. The SRR Quality Assurance Management Plan, G-QP-G-00001, and Saltstone Safety Bases, WSRC-SA-2003-00001, along with Savannah River Site Manual 1Q 2-1A serves as the basis for quality assurance activities for the SS.

1.2.8 Code and Standard Requirements

- National Electrical Code

1.2.9 Reliability Assurance

To achieve desired system reliability, the following items shall be furnished:

- Redundant process water pumps
- Standby power for process water pumps
- UPS for controls and instrumentation
- The SPCS has redundant controllers that provide automatic swap over if the on-line controller fails.

1.3 DESIGN BASIS RATIONALE

1.3.1 Air Monitoring System

1.3.1.1 Flow Rate Requirements

Radiological Control Operations (RCO) department guidelines are established in the Facility Annual Review of Monitoring Systems (FARMS) per Radiological Control Manual (5Q) article 551.4.

1.3.1.2 Effluent Monitoring Requirements

Monitoring requirements including locations and methods (isokineticity, alarm capability, etc.) are established between SRS, EPA and SCDHEC, based on 40CFR61. These requirements are documented in the Environmental Compliance Manual (3Q), Environmental Permits and correspondence between SRS and the regulators.

1.3.1.3 Requirements for the Placement of Air Samplers and Monitors

RCO department establishes the location of air samplers and continuous air monitors in the FARMS per Radiological Control Manual (5Q) article 551.4. The Radiological Control Manual provides requirements for airborne radioactivity monitoring in article 555.

2.0 DESIGN DESCRIPTION

2.1 DETAILED SYSTEM DESCRIPTION

2.1.1 Plant, Instrument, Pig Launch, and Breathing Air

Located in the Process Building (210-Z), one oil-free, water-cooled, two-stage, rotary-screw air compressor with inlet air filter, Variable Speed Drive (VSD), and aftercooler generates compressed air for PA, IA, and PIG services. Design capacity is 368 scfm @ 150 psig. Oil and oil vapor content of the service is limited to ≤ 0.1 mg/m^3. Compressor discharges into a wet air receiver. All compressed air is dried. Dried, compressed air is distributed from the dryer to PA and IA receivers and to the PIG booster. One oil-free, water-cooled, single-stage reciprocating booster converts 100 scfm of compressed air to 270-350 psig for PIG air service. PIG air is accumulated in two 67 cf receivers. A closed-loop cooling system circulates a 30% propylene glycol/water solution through an air-cooled heat exchanger to the air compressor and booster. See P&IDs W754640, W754642, W754643, M-M6-Z-00111, and M6-Z-00112 for details.

2.1.1.1 Wet Air Receiver and Plant Air Dryer

All compressed air is discharged from the compressor into a 55 cf of wet air receiver with automatic condensate drainage. The wet air receiver provides a buffer to stabilize operations and is protected from over-pressurization with ASME safety relief. The wet air receiver discharges into a dryer. The dryer is a 400 scfm, dual-tower, regenerative, desiccant-type. One tower is in drying mode while the other is in regenerating/standby mode.

All compressed air is dried to a pressure dew point of -40°F for distribution. The dryer is preceded by two parallel coalescing-type pre-filters with automatic drainage to capture water droplets and particulate. Following the dryer are two parallel after-filters to trap desiccant fines. Parallel installation of filters provides redundancy to ensure continuous operations. See P&I W754640 and M-M6-Z-00112 for details.

2.1.1.2 Plant Air

PA is routed from the dryer discharge header to a 36 cf of PA receiver. PA is distributed to hose stations in the maintenance shop and at the saltstone mixer, to cold samplers for the Clean Cap Batch Tank (formerly Salt Solution Hold Tank) and Salt Feed Tank, the Salt Solution Receipt Tanks, to the premix feed bin area, and to the silo vent dust collector. A Pressure control valve sheds non-critical air users from the system in the event of an inadequate compressed air supply. Emergency backup plant air is supplied by the three air blender air compressors, described in G-SD-Z-00003, Saltstone Process. See P&ID W754642 for details.

2.1.1.3 Instrument Air

IA is routed from the dryer discharge header to a 36 cf of IA receiver. IA is distributed throughout Z Area. A Pressure control valve sheds non-critical air users from the system in the event of an inadequate compressed air supply. See P&ID W754642 for details.

2.1.1.4 Pig Launch Air

PIG air is routed from the dryer discharge header through a booster and to two 67 cf air accumulators, described in G-SD-Z-00003, Saltstone Process. Accumulator #2 supplies backup air to the IA system through a pressure control valve. See P&ID W754643 for details. A PIG air backup system consisting of compressed air cylinders is available in the event of booster failure.

2.1.1.5 Breathing Air

A portable diesel-engine-driven breathing air compressor with its own manifold is available as required.

2.1.2 Bottled Gases

Bottles containing compressed gas are used to support radiation monitoring, to inert the Compressor Cooling Water Expansion Tank, and for the Backup Pig Launch Air System.

2.1.3 Process Water

Water for process and fire uses is delivered from the site-wide domestic water system via an underground 4-inch pipeline. Aboveground sections of the pipe are electrically heat-traced and insulated.

A process water system consisting of an outdoor tank and two process water pumps supplies process water to the Salt Feed Tank, the Salt Solution Receipt Tanks, the High Pressure Flush Pump, the Saltstone Mixer area, the Clean Cap Batch Tank (CCBT) area, and hose stations in the unloading and blending areas. Makeup water is also supplied to the Operations Building (704-Z) water chillers, the CCBT, and air compressor closed-loop cooling system in the Process Building (210-Z). The storage tank has a design working capacity of 38,000 gallons of process water. The tank may be operated manually or automatically. In the automatic mode, process water supply valve HCV-1407 opens when the tank level falls below 36,760 gallons and closes when the tank is full. Process water pump operation is also automatic. One pump is continuously running. See P&IDs W754620 and W754622 for details.

Heat tracing of the Process Water Tank and associated piping is provided. See G-SD-Z-00004, Saltstone Electrical, for details.

2.1.4 Domestic Water

Domestic water is provided from the site-wide domestic water system to the Z-Area system consisting of three hot water heaters. The domestic water system supplies water to the Operations Building (704-Z), the Process Building (210-Z), the Substation Building (951-Z), and the Unloading Control Office (205-8Z).

Two independent hot water systems (one for the regulated area and one for the clean area) serve the Operations Building (704-Z). See P&ID M-M6-Z-0055 for details.

2.1.5 Standby Diesel Generator

A diesel generator supplies standby electrical power to systems that must operate during a power failure. The diesel generator fuel tank holds enough fuel for 40 hours of operation. Diesel-generator-backed MCC-B123 supplies standby power to the electrical loads listed in Section 2.3.2 of G-SD-Z-00004, Saltstone Electrical. See P&ID W754550 for details of the diesel engine system.

2.1.6 Radiological and Environmental Monitoring Systems

Portable samplers are used to monitor as needed.

The Area Radiation Monitoring System monitors gamma exposure rates at selected locations within Saltstone Facilities. The system utilizes radiation detectors linked to indicating transmitters and connected to the DCS. All radiation detectors are the GM Tube type. The instruments provide local indication of the local exposure rates, alarm locally, and as dictated by alarm validation, at the DCS on high radiation levels. The DCS displays output from the monitors.

2.1.7 Water Monitoring

Three monitoring wells have been installed at Z-Area for monitoring groundwater, as described below.

ID	Description	North Coord.	East Coord.	Depth (ft)	Install Date
ZBG 1	Background	N76584	E65585	73.5	May-87
ZBG 1A	Background	N76588	E65589	15.0	June-87
ZBG 2	Background	N76170	E67473	75.0	April-87

The locations of the wells are shown in Drawing W780451; details of the wells are shown in Drawing W761301.

Surface stream and groundwater monitoring is performed by the environmental monitoring section of the Environmental Protection Department.

2.1.8 Saltstone Process Control System

The SPCS is a Distributed Control System (DCS) which provides the indication and control function for operation of the Saltstone process and facilities. The system is designed to be continuously energized with control operations taking place as requested by the operator. The system consists of six redundant controller pairs with analog and discrete input and output modules, two operator workstations, one ProPlus/DCS configuration workstation, one application/historian workstation and one engineering workstation connected by an Ethernet network.

2.2 SYSTEM PARAMETERS AND PERFORMANCE CHARACTERISTICS

2.2.1 Plant, Instrument, Pig Launch, and Breathing Air

◦ Compressor capacity	368scfm @ 150 psig
◦ Air dryer capacity	436 scfm @ 140 psig & 100°F pressure dew point @ 14.7 psig
◦ Pig launch booster capacity	102 scfm @ 350 psig
◦ Portable breathing air compressor capacity	as supplied

2.2.2 Process Water

◦ Process Water Tank volume	21 ft dia. x 16 ft high, 38,000 gal nominal
◦ Process water pumps (2) capacity	90 gpm, 130 ft TDH (total differential head)

2.2.3 Domestic Water

◦ Domestic water heater (regulated areas)	4500W/4500W, 50 gal storage
◦ Domestic water heater (clean areas)	36 kW, 120 gal storage

2.2.4 Standby Diesel Generator

◦ Diesel generator electrical output	Nameplate: 425 kW, 480 V, 3-phase, 60 Hz, 0.8 PF Actual: 405 kW, 480 V, 3-phase 60 Hz, 0.8 PF
◦ Diesel generator fuel tank volume	5'-0" dia. x 9'-76" long, 1,370 gal nominal
◦ Diesel engine characteristics	852 in.^{3}, battery-start, air-cooled

2.2.5 Area Radiation Monitoring System

The Area Radiation Monitoring System operates continuously with no operator intervention.

The typical DCS indicator for the area radiation monitors has a low scale and a high scale. The calibrated scaling range is 0.1 to 1000 mR/hr.

- RIT-1180, Salt Feed Tank Area.
- RIT-1614, Premix Feed Bin Roof Area
- RIT-1628, Process Room
- RIT-7519, On SSRT Platform
- RIT-7539, SSRT Pump Gallery

2.3 SYSTEM ARRANGEMENT

2.3.1 Plant, Instrument, and Pig Launch Air

The plant air and pig launch compressors and supporting equipment are located in the Process Building (210-Z) utilities room.

2.3.2 Bottled Gases

Bottled gases are located at their in-service locations (e.g. the hand and foot counters in the 704-Z hallway, outside the 210-Z compressor room and the maintenance shops). Flammable welding gases are not typically stored in the area

2.3.3 Process and Domestic Water

The Process Water Tank, the Fire Water Tank, and associated equipment are located in the yard.

2.3.4 Standby Diesel Generator

The standby diesel generator and its fuel tank are mounted on a pad adjacent to the Substation Building (951-Z). The diesel generator breaker, controls, and protective circuitry are mounted in the generator control cabinet in the Substation Building (951-Z).

2.3.5 Area Radiation Monitoring System

Area radiation monitors and their associated local radiation monitoring panels are located in the Salt Feed Tank Area, Salt Solution Receipt Tank Area, Premix Feed Bin Roof Area, and Process Room. The following drawings show the arrangement of this system.

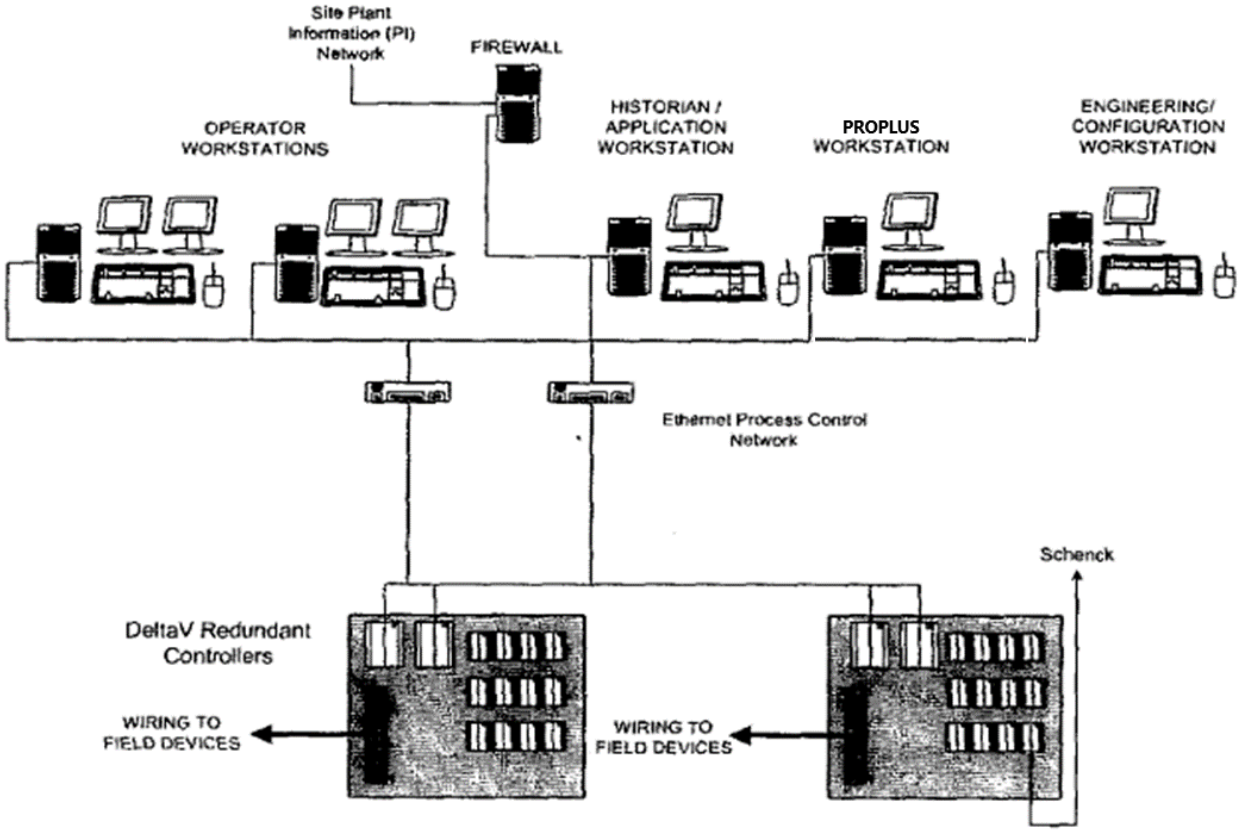
- W775554 (Salt Feed Tank)
- W776850 (Premix Feed Bin Roof)
- W776851 (Process Area)
- M-M6-Z-00109 (SSRT Process Area)

Area radiation monitors and their associated instruments and local alarms receive electrical power from their respective local radiation monitoring panel. Table 2.3-1 provides a list of the electrical power feeds for the local radiation monitoring panels servicing the Area Radiation Monitoring System.

TABLE 2.3-1 AREA RADIATION MONITORING SYSTEM ELECTRICAL POWER SUPPLIES

Local Radiation Monitoring Panel	Electrical Power Source
Fusebox TBA 1001	**Fuse #8**
Fusebox TBA 1001	**Fuse #10**
Fusebox TBC 1003	**Fuse #5**
Fusebox TBA 1006	**Fuse #2 & 5**

2.3.6 Saltstone Process Control System(SPCS)



The major components and arrangement of the SPCS are shown above.

2.4 COMPONENT DESIGN DESCRIPTIONS

2.4.1 Plant Air Compressor and Dryer

The PA Compressor is an oil-free, two-stage rotary-screw type with a capacity of 368 scfm @ 150 psig discharge pressure. At design conditions, cooling fluid removes 300,000 Btu/hr of unit heat. Aftercooler discharge temperature is 115°F. A closed-loop packaged cooling water system supplies about 25 gpm of 30% glycol/water coolant to the unit. The compressor is equipped with a 3-micron inlet air filter/silencer. The air dryer is a dual-tower, regenerative, desiccant-type dryer. It is preceded by a pair of coalescing-type pre-filters (one on-line, one in reserve), which remove oil, water droplets, and particulates. Dryer thru-put is 400 scfm air, with a design pressure dew point of -40°F. The dryer towers are ASME Section VIII pressure vessels with design pressure and temperature of 300 psig and 450°F, respectively. Regeneration is by dried air purge. Following the dryer is a pair of after-filters (one on-line, one in reserve) that remove vagrant desiccant fines. Both filters collect essentially 100 percent of 3-micron and larger particles. Compressed air is delivered from the compressor to one of two 36 ft^3 capacity carbon steel air receivers. Air receivers are ASME Section VIII pressure vessels 2 ft 6 in. dia. by 6 ft 0 in. high. One receiver is dedicated to instrument air, one to plant air. See P&IDs W754640, W754642, W754645, M-M6-Z-00111, and M-M6-Z-00112 for details.

2.4.2 Pig Launch Air Booster

The pig launch air booster is an oil-free, single-stage reciprocating air unit with a capacity of 100 scfm at 350 psig discharge pressure. At design conditions, cooling fluid removes about 53,000 Btu/hr of unit heat. Aftercooler discharge temperature is 115°F. A closed-loop packaged cooling water system supplies about 2 gpm of 30%/glycol/water coolant to the unit in building 210-(Z).

2.4.2.1 Backup Pig Launch Air

A backup system consisting of two racks containing six compressed air cylinders each is located outside the 210-Z air compressor room and is available to pressurize the pig launch accumulators in the event of compressor failure.

2.4.3 Breathing Air Compressor

A breathing air compressor, when required, is obtained from Construction or PECMC.

2.4.4 Process Water

The Process Water Tank is a 21 ft dia. by 16 ft high outdoor tank fabricated of carbon steel per AWWA D100. The nominal capacity of the tank is 38,000 gallons. Two process water pumps, 1x1-1/2-8 end suction centrifugal pumps, are rated to deliver 90 gpm @ 130 ft TDH each. The standby pump starts automatically when required and stops when process water flow decreases. Motor drivers are 3,500 rpm, 7.5 hp, 480 V, 3-phase, TEFC (totally enclosed fan-cooled).

2.4.5 Domestic Water

There are two hot water systems in the Operations Building (704-Z). A domestic water storage-type heater supplies hot water to the regulated areas. Power supply to the heater is 480V, 3-phase, 60 Hz cycle. Heater rating is 4500W (i.e., 4500W upper element & 4500W lower element, based on non-simultaneous operation).

Non-regulated area hot water supply is provided by another domestic water storage-type heater. Power supply is 480 V, 3-phase, 60 Hz. Heater rating is 36 kW at a total load of 43 A. Heater capacity is 148 gph, with an inlet temperature of 40°F and a variable outlet temperature normally set at 140°F. Storage capacity is 120 gallons.

2.4.6 Area Radiation Monitors

The area radiation monitors are gamma sensitive monitors designed to monitor and transmit area radiation levels continuously to the DCS. Each monitor is equipped with an audiovisual alarm to go off in or near the monitored area and at the DCS per alarm validation.

2.4.6.1 Basic component functions

2.4.6.1.1 Safety Class (SC) functions

The area radiation monitors have no Safety Class functions

2.4.6.1.2 Safety Significant (SS) functions

The area radiation monitors have no Safety Significant functions

2.4.6.1.3. Production Support (PS) functions

The area radiation monitors measure beta-gamma dose rates.

2.4.6.1.4 General Service (GS) functions

The area radiation monitors have no General Service functions

2.4.6.2 Performance Requirements

The area radiation monitors shall be gamma sensitive

2.4.6.3 Electrical Requirements

The area radiation monitors have no unique electrical requirements

2.4.6.4 Mechanical Requirements

The area radiation monitors have no unique mechanical requirements

2.4.6.5 Instrumentation and Control Requirements

The instrumentation and controls are the same for each area radiation monitor.

2.4.6.5.1 The area radiation monitors shall have acute local alarms and alarms at the DCS per alarm validation

2.4.6.5.2 The area radiation monitors must have appropriate sensitivities and ranges for their intended use.

2.4.6.6 Interfaces (Component)

The area radiation monitors have no unique interfaces

2.4.7 Standby Diesel Generator

The standby diesel generator is driven by an 852 in.^{3}, 1,800 rpm diesel engine. The diesel engine is battery-started and air-cooled. The diesel engine is rated to supply a maximum short time load of 405 kW and a continuous load of 365 kW. The nameplate rating on the generator is 425 kW, 480 V, 3-phase, 60 Hz, 0.8 PF. However, the capacity of the diesel generator is limited to that of the diesel engine, or 365 kW. The diesel generator is skid-mounted and is located outdoors next to the Substation Building (951-Z). The diesel generator fuel tank holds 1,370 gallons, enough for 40 hours of operation.

2.4.8 SPCS

For information on SPCS components, see supplier drawings J-JC-Z-0001 through J-JC-Z-0005, J-JC-Z-00010, and SRRA015424-2.

- Controllers -A controller is a microprocessor that contains the necessary firmware and configuration software for the connected analog and discrete input and output modules to monitor and control the process. Controllers are mounted in redundant pairs and provide automatic swap over in event of a failure of one controller. The SPCS has six controller pairs, one located in I/O Cabinet 1, second located in I/O cabinet 3, third located in LOS-302, fourth located in I/O Cabinet 3, fifth is located in Z-451005-DCS-PNL-0002, and the sixth is located in Z-451006-DCS-PNL-0001.

- The I/O hardware furnishes isolated discrete and analog inputs and outputs. Discrete outputs are fused externally from the module, and each I/O cabinet has redundant 24 Vdc power supplies with adjacent power failure indicator lights to ensure a high level of system reliability.

- Operator Workstations – Two operator workstations are located in the CCR. An operator workstation consists of a commercial-off-the-shelf PC with specialized application software that provides the operator interface to the control system. Dual monitors on the workstations provide the operator with a visual representation of the processes and systems. A keyboard and mouse or trackball are provided to allow the operator to interface with the system.

- ProPlus Workstation – The ProPlus workstation serves as the central repository for all DCS configuration data. The ProPlus workstation is a commercial-off-the-shelf PC with specialized application software that is used to download software configurations for the controllers and operator workstations. A single monitor, keyboard and trackball or mouse are included in the workstation. The Proplus workstation is located in the CCR.

- Application Workstation – The application workstation is a commercial-off-the-shelf PC with specialized application software that monitors and stores historical information and serves as the interface to other (non-DCS) systems not connected to the SPCS networks. The Application workstation is located in the CCR.

- Engineering Workstation – The engineering workstation is a commercial-off-the-shelf PC with specialized application software similar to that of the ProPlus workstation, the only difference being that it can access and modify, but doesn't store, the DCS configuration data stored on the ProPlus workstation. The Engineering workstation is located in the ICR.

- Ethernet Network – The ethernet based communication network links the major SPCS components to each other. It is composed of two separate and redundant networks consisting of fiber optic cables and network switches. A firewall interfaces with the SRSNet network for data transfer to non-SPCS applications.
- Modbus Network – A modbus sub network is provided to facilitate data transfer between the SPCS and the Dry Material System Controller.

For detailed information refer to B-DD-Z-00002 and B-RS-Z-00001.

2.5 CODES AND STANDARDS

2.5.1 General

- National Electrical Code
- OSHA 1910.219, “Mechanical Power Transmission Apparatus”

2.5.2 Plant, Instrument, and Pig Launch Air

- ANSI B31.3, “Chemical and Petroleum Refinery Piping”
- ASME “Boiler and Pressure Vessel Code Section VIII”
- “TEMA Class C Tubular Exchanger Manufacturers Standards”

2.5.3 Process Water System

- AWWA D100-79 “Welded Steel Tanks for Water Storage”
- ”Hydraulic Institute Standards”

2.5.4 Domestic Water System

- ASME “Boiler and Pressure Vessel Code Section IV”
- “Hydraulic Institute Standards”

2.5.5 Standby Diesel Generator

- ASME PTC-17-1973, “Performance Test Codes for Internal Combustion Engines”
- ASME PTC-26-1962, “Speed Governing Systems for Internal Combustion Engines”
- IEEE 387, “Criteria for Diesel Generator Units Applied as Standby Power Supplies for Nuclear Power Generating Stations”
- DOE 6430.1A, “General Design Criteria”

2.5.6 Radiological Monitoring System

- ANSI N13.1, "Guide to Sampling Airborne Radioactive Materials in Nuclear Facilities"
- IEEE N42.18, "American National Standard Specification and Performance of On-Site Instrumentation for Continuously Monitoring Radioactivity in Effluents"
- 10CFR835, "Occupational Radiation Protection"
- DOE O 420.1C, "Facility Safety"

2.5.7 SPCS

- IEEE (Institute of Electrical and Electronics Engineers)

  C37.90 "Relays and Relay Systems Associated with Electrical Power Apparatus," 2005
- NEMA (National Electrical Manufacturers Association)

  ICS6 "Industrial Controls and Systems: Enclosures," 1993
- NFPA (National Fire Protection Association)

  70 "National Electric Code (NEC)," 2017

2.6 INSTRUMENTATION AND CONTROL

2.6.1 Air Systems

The PA Compressor is started or stopped at Local Operating Station LOS-0315 by the operator using local hand switch HIS-3291. The local operating station includes controls to monitor and automatically shut down the compressor in case of trouble. The local operating station and compressor are vendor-supplied as a packaged unit.

The compressor stops automatically when the compressor cooling water flow is low, lube oil pressure is low-low, lube oil temperature is high-high, discharge air pressure is high-high.

Common trouble alarm UA-1468 and shutdown alarm UA-3290 warn the operator of compressor trouble and shutdown. Instrument air header pressure low alarm PAL-1476 is actuated by instrument air header low-pressure switch PSL-1476. Air temperature high alarm TAH-6089 is actuated by air temperature high switch TSH-6089.

The following instrument faults from the Plant Air Compressor provides a shutdown alarm of UA-3290 and warn the operator of compressor shutdown. PALL-7318, TAHH-7319, TAHH-7316, PALL-7315,

PAHH-7313, TAHH-7314, TAHH-7311, PAHH-7309 and TAHH-7310, PDAH-7309.

The following instrument faults from the Plant Air Compressor provides a Common Trouble Alarm UA-1468 during operation, PDAH-7317, UA-7319, TAH-7316, PAL-7315.

For further details, see P&ID W754640.

The plant air dryer is energized or de-energized at Power Panel Y-168. An electrical reset button is provided at Local Operating Station LOS-317 which contains the internal controls to monitor and automatically operate the dryer cycles. The local operating station and the air dryer are vendor-supplied as a packaged unit.

Air dryer common trouble alarm UA-1469 warns the operator of air dryer trouble.

The operator can open and close the air dryer bypass valve, HCV-3550, by using open/reset/close software switch HIS-3550. The air dryer bypass valve not fully closed position is indicated (ZA-3550). Air dryer bypass valve HCV-3550 is automatically opened by an interlock from air dryer differential pressure switch high PDSH-3550.

For further details, see P&ID M-M6-Z-00112.

The plant air header isolation valve PCV-1471 is controlled by pressure indicating controller PIC-1471. The instrument air header isolation valve PCV-1472, is controlled by pressure indicating controller PIC-1472. Successively lower setpoints close PCV-1471 first, which is followed by closure of PCV-1472, to isolate non-essential air users. The instrument air header pressure is monitored by pressure transmitter PT-1476 and indicated (PI-1476) to the operator. Software low pressure switch PSL-1476 activates instrument air header low pressure alarm PAL-1476.

For further details, see P&ID W754642.

The pig launch air booster can be started or stopped by the operator by operating local hand switch HIS-1522 on Local Operating Station LOS-316. The local operating station contains the internal controls to monitor and automatically operate the pig launch air booster.

Booster trouble alarm UA-1520 and compressor shutdown alarm UA-1521 warn the operator of compressor trouble and shutdown.

Compressor running indication (HI-1522A) is also provided for operator information. Pig launching air temperature high alarm TAH-1535 is driven by air temperature switch high TSH-1535.

For further details, see P&ID W754643

A portable breathing air compressor is provided, as needed.

2.6.2 Process Water

The Process Water Tank level is monitored by level transmitter LT-1408. The tank level is maintained by domestic water supplied from the site-wide domestic water system through HCV-1407. The valve is opened by software level switch low LSL-1408 and closed by software level switch high LSH-1408. The level is displayed by LI-1408. Software level switch low-low LSLL-1408 and software level switch high-high LSHH-1408A generate alarm low-low (LALL-1408) and alarm high-high (LAHH-1408A). An additional level switch low-low-low, LSLL-1408B, provides an alarm (LALL-1408B) and an interlock to trip both process water pumps.

Process water pump #1 is energized by the operator through software switch HIS-1409, and process water pump #2 is energized by the operator through software switch HIS-1410. The operator energizes a primary pump and places the other pump in standby through software switch HSA-1409. Process water flow is monitored (FT-1413) and displayed (FI-1413). Process water flow is maintained by cycling the standby pump on and off. Software flow switch low FSL-1413 energizes the selected standby pump, and software flow switch high FSH-1413 de-energizes the selected standby pump. The process water head pressure is monitored (PT-1412), displayed (PI-1412), and alarmed (PAL-1412) on low pressure by software switch PSL-1412.

For further details, see P&ID W754620 and LLD G-PLC-Z-00001.

2.6.3 Deleted

2.6.4 SPCS

System display configurations, setpoints, and process values can be changed from the operator's workstation with appropriate password protection. System control operations are selected, started, or stopped from the operator console.

Instrumentation that inputs to the SPCS and control outputs to equipment are discussed with the associated systems.

2.7 SYSTEM INTERFACES

Table 2.7-1 SALTSTONE SUPPORT PRIMARY INTERFACES

Interfacing System	Interfacing Location	Requirement
G-SD-Z-00001 Z-Area Site	Yard	◦ Provide space for outdoor tanks and equipment
G-SD-Z-00002 Saltstone Structures and Vaults	SPCS equipment	◦ Provide environmentally controlled location for SPCS equipment in the Process Building (210-Z).
	Yard	◦ Provide foundations for outdoor tanks and equipment
	Equipment	◦ Provides space for equipment
G-SD-Z-00003 Saltstone Process	SPCS I/O cabinet	◦ Provide process instrumentation and equipment status and alarm input signals for information and control
G-SD-Z-00004 Saltstone Electrical	SPCS equipment	◦ Provides 120 V AC uninterruptible power supply (UPS) power to SPCS equipment
	SPCS I/O cabinet equipment	◦ Provide breaker status input information ◦ Provide power to equipment
	Water tanks area	◦ Provide grounding and lightning protection ◦ Provide lighting systems – normal power
	MCC B123 (210-Z)	◦ Provide standby power for process water pumps
	MCC B122 (951-Z)	◦ Provide normal power for process and domestic water heat tracing
	MCC B123 (210-Z)	◦ Provide electrical components and wiring to connect diesel generator system to the electrical standby power system.
G-SD-Z-00005 Saltstone HVAC	CCR	◦ Provide room conditioning for SPCS equipment
	SPCS I/O cabinet	◦ Provide system status and alarm input signals for information
G-SD-Z-00008 Saltstone Fire Protection	**CCR**	◦ Provide fire protection for SPCS equipment
	SPCS I/O cabinet	◦ Provide system status and alarm input signals for information

TABLE 2.7-2 SALTSTONE SUPPORT SECONDARY INTERFACES

Interfacing System	Interfacing Location	Requirements
G-SD-Z-00002 Saltstone Structures and Vaults	Operations Building (704-Z)	◦ Provide domestic water to restrooms and showers
G-SD-Z-00003 Saltstone Process	SPCS I/O cabinet Process equipment	◦ Provide control signal outputs to process equipment ◦ Provide process water ◦ Provide instrument air ◦ Provide compressed air for samplers and pig launchers ◦ Provide compressed air for pump seal buffer fluid pressurization
G-SD-Z-00004 Saltstone Electrical	Substation Building (951-Z) and yard	◦ Provide standby electrical power ◦ Provide interface to the SPCS
G-SD-Z-00005 Saltstone HVAC	Water chiller HVAC equipment	◦ Provide makeup cooling water ◦ Provide control air to instruments and dampers
G-SD-Z-00007, Saltstone Product Laboratory	Lab sink	◦ Provide hot and cold domestic water
G-SD-Z-00008 Saltstone Fire Protection	Fire Water Tank Piping	◦ Provide makeup water ◦ Provide instrument air
Salt Solution Transfer	SPCS I/O Cabinet	◦ Provide control signal outputs to transfer system equipment

3.0 OPERATION

3.1 STARTUP

3.1.1 Plant Air

The plant air compressor is started from LOS-315 per SOP 210-Z-4270. The plant air dryer is operated manually from LOS-317 in accordance with SOP 201-Z-4271.

The portable breathing air compressor is set up and operated manually, as described in SOP GEN-SZ-4716.

3.1.2 Bottled Gases

Backup pig launch air system is maintained and operated in accordance with SOP 210-Z-4196.

3.1.3 Process Water

Operation of the Process Water Tank is controlled and monitored from the control computer in the Z-Area CCR. The Process Water Tank is normally filled in the manual mode. The operating process water pump is selected using the control computer. The standby pump automatically starts when required and stops when flow decreases. Startup procedures are documented in SOP 980-Z-4260.

3.1.4 Deleted

3.1.5 Standby Diesel Generator

The standby diesel generator is started automatically on loss of normal power or manually from control panel Z-956-510-050-00-G. Startup procedures are documented in SOP 956-Z-4290. See also SDD SS-11, Saltstone Electrical, for information on electrical operation of the diesel generator unit.

3.1.7 SPCS

The SPCS is started by energizing the system components in the sequence as described in Saltstone Operating Procedure 210-Z-4294.

3.2 NORMAL OPERATION

3.2.1 Plant, Instrument, and Breathing Air

During normal operation, the plant air compressor and pig launch air booster run without operator intervention. The plant air dryer regenerates the off-line tower without operator intervention.

The breathing air compressor must be continuously monitored in accordance with SOP GEN-SZ-4716.

3.2.2 Bottled Gases

During normal operation, the backup pig launch air system is isolated from the pig launch accumulators, but available for use, if required.

3.2.3 Process Water

If the Process Water Tank is not in the automatic mode, an operator has to initiate tank filling from the CCR, as described in SOP 980-Z-4260. In the automatic mode, no operator intervention is required.

3.2.4 Deleted

3.2.5 Standby Diesel Generator

Operator intervention is not required for normal operation.

3.2.6 Area Radiation Monitoring

The Area Radiation Monitoring System is designed to operate continuously without operator intervention

3.2.7 SPCS

The SPCS normally operates continuously with no operator intervention required. Control operations such as starting the Saltstone process and administrative operations such as printing a report are accomplished through simple operator commands at the appropriate control console.

3.3 SHUTDOWN

3.3.1 Plant and Breathing Air

To shut down the plant air compressor, the STOP button on LOS-315 in the utilities room is pressed and also if the DCS Stop button is pressed. To shut down the plant air dryer, the electrical disconnect switch in Y-168 Circuit 28 is placed in the off position. (Y-168 is located in the 210-Z ECR.)

3.3.2 Process Water

The process water pumps are controlled from the control computer in the Z-Area CCR, and are shut down using HIS-1409 and HIS-1410.

3.3.3 Deleted

3.3.4 Standby Diesel Generator

After the generator has been started, either manually or automatically, it must be manually shut down. See Procedure SOP 956-Z-4290, Section 4.6, for detailed shutdown procedures. See also G-SD-Z-00004, Saltstone Electrical, for information on electrical operation of the diesel generator unit.

3.3.5 SPCS

The SPCS is not normally shut down. If the system must be shut down for some reason, the Saltstone process must be completely shut down first and any remaining control tasks of the SPCS must be turned over to local control. The system may be shut down by de-energizing

equipment in the sequence recommended by the supplier in the System Operation Manual, 210-Z-4294.

3.4 INFREQUENT OPERATIONS

3.4.1 Breathing Air and Pig Launch Air

When breathing air is required, the portable breathing air compressor is started and monitored as described in SOP GEN-SZ-4716. When backup pig air supply is required, manifolds are valved in to the accumulators in accordance with SOP 210-Z-4196.

3.4.2 Standby Diesel Generator

The diesel generator is periodically tested by manual starting to ensure readiness in the event of loss of normal power. See SOP 956-Z-4290, Section 4.3, for manual startup procedures and G-SD-Z-00004, Saltstone Electrical, for information on electrical operation of the diesel generator unit.

3.4.3 Monitoring Wells

Monitoring wells are periodically sampled for contamination. These wells are monitored by the environmental monitoring section of the Environmental Protection Department. Results are reported in a quarterly publication, “The Savannah River Site’s Groundwater Monitoring Program.”

3.4.4 SPCS

Changes in the system configuration (such as adding new I/O addresses) or control logic, require updating the system configuration table and control logic program in the DCS. Changes to the system configuration must be made with the SPCS online with the process in a standby, shutdown or stable mode.

4.0 SETPOINTS, SYSTEM LIMITATIONS, AND PRECAUTIONS

4.1 SETPOINTS

Tables 4.1-1 through 4.1-4 list support systems instrumentation. Setpoint values are documented in the WSRC Scaling and Setpoint Sheets maintained by Engineering. See Saltstone Instrument Index for additional instrument information including instrument type and range.

TABLE 4.1-1 PLANT AIR COMPRESSOR & DRYER; WET AIR, PLANT AIR & INSTRUMENT AIR RECEIVERS

Tag No. (Prefix Z210)	Description	Function
IA-PSV-0262	Instrument air receiver relief	Pressure relief
IA-PSV-0263	Instrument air receiver relief	Pressure relief
PA-PSV-0260	Plant air receiver relief	Pressure relief
PA-PSV-0261	Plant air receiver relief	Pressure relief
PA-PSV-0285	Plant air dryer relief	Pressure relief
PA-PSV-0286	Plant air dryer relief	Pressure relief
PA-PSV-0287	Plant air dryer relief	Pressure relief
PA-PSV-0288	Plant air dryer relief	Pressure relief
PA-PSV-1174	Plant air compressor aftercooler relief	Pressure relief
PA-PSV-1173	Plant air compressor intercooler relief	Pressure relief
PA-PSV-1175	Wet air receiver relief	Pressure relief
PA-PSV-1176	Wet air receiver relief	Pressure relief
PSH-7306	Plant Air Discharge Pressure	Alarm interlock to stop compressor
Deleted		
Deleted		
Deleted		
Deleted		
PSL-1476	Instrument air header pressure low	Alarm
TSH-6089	Air temperature high	Alarm

Tag No. (Prefix Z210)	Description	Function
PDSH-3550	Air dryer differential pressure high	Interlock to HCV-3550 to open
PIC-1471	Plant air pressure	Control to PCV-1471
PIC-1472	Instrument air pressure	Control to PCV-1472

TABLE 4.1-2 PIG LAUNCH AIR BOOSTER

Tag No. (Prefix Z210)	Description	Function
PIG-PSV-1161	Aftercooler relief	Pressure relief
PIG-PSV-1162	Aftercooler relief	Pressure relief
Deleted		
Deleted		
Deleted		
TSH-7507	High outlet air temperature switch	Alarm
TSHH-7509	High outlet air temperature switch	Shutdown compressor
TSH-1535	Pig launch air temperature high	Alarm

TABLE 4.1-3 STANDBY DIESEL GENERATOR

Tag No. (Prefix Z956)	Description	Function
PSV-1225	Oil cooler bypass pressure relief	Pressure relief
PSV-1226	Oil filter bypass pressure relief	Pressure relief

Tag No. (Prefix Z956)	Description	Function
PSV-1227	Oil pump pressure regulation	Pressure regulation

TABLE 4.1-4 PROCESS WATER SYSTEM

Tag No.	Description	Function
LSL-1408	Process Water Tank level low	Interlock to open HCV-1407
LSH-1408	Process Water Tank level high	Interlock to close HCV-1407
LSLL-1408	Process Water Tank level low-low	Alarm
LSLL-1408B	Process Water Tank level low-low	Interlock to stop process water pumps
FSL-1413	Process water flow low	Interlock to start standby pump
FSH-1413	Process water flow high	Interlock to stop start standby pump
PSL-1412	Process water head pressure low	Alarm and interlock to stop pump
LSHH-1408A	Process Water Tank level high-high	Alarm

TABLE 4.1-5 AREA RADIATION MONITORING SYSTEM INSTRUMENTS

Tag No.	Description	Function
Z201-HM-RE-1180	ARM	Monitor area radiation levels in the Salt Feed Tank area
Z201-HM-RIT-1180	Radiation Indicating Transmitter	Transmit Salt Feed Tank area radiation levels to DCS for indication and alarm and local indication

Tag No.	Description	Function
Z201-HM-RSH-1180	High Radiation Switch	Actuate local alarm in the Salt Feed Tank area
Z210-HM-RE-1614	ARM	Monitor area radiation levels at the Premix Feed Bin area
Z210-HM-RIT-1614	Radiation Indicating Transmitter	Transmit Premix Feed Bin area radiation levels to DCS for indication and alarm and local indication
Z210-HM-RSH-1614	High Radiation Switch	Actuate local alarm in the Premix Feed Bin area
Z210-HM-RE-1628	ARM	Monitor area radiation levels at the Process Room area
Z210-HM-RIT-1628	Radiation Indicating Transmitter	Transmit Process Room area radiation levels to DCS for indication and alarm and local indication
Z210-HM-RSH-1628	High Radiation Switch	Monitor area radiation levels at the Process Room area
Z-201001-SSRT-RE-7519	ARM	Monitor area radiation levels above the SSRT platform
Z-201001-SSRT-RIT-7519	Radiation Indicating Transmitter	Transmit SSRT platform area radiation levels to DCS for indication and alarm and local indication
Z-201001-SSRT-RSH-7519	High Radiation Switch	Actuate local alarm in the SSRT platform area
Z-201001-SSRT-RE-7539	ARM	Monitor area radiation levels in the SSRT pump gallery
Z-201001-SSRT-RIT-7539	Radiation Indicating Transmitter	Transmit SSRT pump gallery radiation levels to DCS for indication and alarm and local indication
Z-201001-SSRT-RSH-7539	High Radiation Switch	Actuate local alarm in the SSRT pump gallery

4.2 SYSTEM LIMITATIONS AND PRECAUTIONS

Access to the area within 20 feet of the breathing air compressor must be controlled to prevent introduction of toxic fumes to the breathing air system.

5.0 SYSTEM UPSETS AND RECOVERY SEQUENCES

5.1 STANDBY DIESEL GENERATOR

After automatic startup, the standby diesel generator must be manually taken off line and stopped. See SOP 956-Z-4290, Section 4.6, for shutdown procedures.

5.2 SPCS

The SPCS is powered from the uninterruptible power supply (UPS) system (see G-SD-Z-00004) to ensure an uninterrupted supply of power, even during a power failure. Each I/O cabinet is supplied with redundant 24 Vdc power supplies to ensure a reliable source of power for analog circuits. The system also does self-monitoring and activates display alarms if power is lost to I/O cards and other I/O system components.

6.0 MAINTENANCE

6.1 PREVENTIVE MAINTENANCE, INSPECTION, AND SURVEILLANCE

The DWPF Performance Monitoring program will cover in-service inspection and maintenance of equipment. A schedule for preventive maintenance for each piece of equipment will be developed.

All equipment will be serviced by contacting maintenance. Routine maintenance will be performed when systems are idle.

Because of the industrial quality of the SPCS, little maintenance is required. It is recommended that the status of the 24 Vdc power supplies and hardware status indications be checked every day.

6.2 CORRECTIVE MAINTENANCE

Equipment that has failed will be repaired in place or removed for repair. If equipment cannot be repaired, it will be replaced.

7.0 APPENDICES

7.1 REFERENCES

7.1.1 Calculations

Calculation No.	Title
Z201-M-01	Plant and Instrument Air
Z980-M-02	Process and Domestic Water System
Z980-M-09	Process Water Pump Sizing
Z980-M-10	Process Water Tank Fill Funnel
M-CLC-Z-00084	Plant Air, Instrument Air & Pig Launch Air SCFM Requirements
M-CLC-Z-00085	Plant Air Compressor & Pig Launch Air Booster Cooling Water Req.
N-CLC-Z-00021	Salt Solution Receipt Tank (SSRT) Dose Rate and Shielding Evaluation
N-CLC-Z-00023	Gamma Source Strength, Inhalation Dose Potential, Heat Rate and Hydrogen Generation Rate for Saltstone Processing

7.1.2 Startup and Operating Procedures

Procedure No.	Title
SOP 201-Z-4272	Compressor Cooling Water System Operation
SOP 201-Z-4271	Plant Air Dryer Operation
SOP 210-Z-4270	Plant Air Compressor Operation
SOP 956-Z-4290	Standby Diesel Generator Manual/Auto Operation
SOP 980-Z-4260	Process Water Tank Operation
SOP GEN-SZ-4716	DWPF Portable Breathing Air Compressor Operation
210-Z-4294	Saltstone Process Control System Hardware Operation

7.2 PARAMETERS LIST

Equipment No.	Description	Capacity
Z-210000-PA-CMP-0001	Plant Air Compressor	368 scfm @ 150 psig
Z-210000-PIG-CMP-0001	Pig Launch Air Booster	102 scfm @ 350 psig
Z-201000-ECW-HTEX-0001 Z-201000-ECW-HTEX-0002	Heat Exchangers for Compressor & Booster Cooling Water	374.2 MBtu/hr (Total)
Z-210000-ECW-HCU-0001	Cooling Water Pump Skid	Dual, 50 gpm pumps
Z-210000-ECW-TK-0001	Compressor Cooling Water Expansion Tank	210 gal
Z-210000-ECW-P-0001 Z-210000-ECW-P-0002	Compressor Cooling Water Circulating Pumps	50 gpm @ 156ft tdh, 5hp
Z-210000-PA-DRY-0002	Plant Air Dryer	436 scfm @ 140 psig, -40°dp
Z-210000-PA-RCVR-0060	Wet air Receiver	50 ft^3
Z-210000-PA-RCVR-0070	Instrument Air Receiver	36 ft^3
Z-210000-PA-RCVR-0080	Plant Air Receiver	36 ft^3
Z-980-PWS-TK-0001	Process Water Tank	38,000 gallons, 21 ft dia. x 16'H
Z-980-PWS-P-0001/0002	Process Water Pump (2)	90 gpm, 130 ft TDH
Z-704-DW-HTR-0001	Domestic Water Storage Type Heater (Regulated Area)	90 kW, 480V
Z-704-DW-HTR-0002	Domestic Water Storage Type Heater (Clean Area)	30 kW, 480 V, 680 gallons storage
Z-956-EEP-DG-0001	Standby Diesel Generator	425 kW, 0.8 PF (Nameplate) 405 kW, 0.8 PF (Actual)
Z-956-EEP-TK-0001	Fuel Oil Day Tank	1,370 gal

7.3 DRAWINGS AND SPECIFICATIONS

7.3.1 Piping and Instrument Diagrams

Drawing No.	Title
W754550	Standby Diesel Generator
W754620	Process Water Storage & Supply
W754622	Process Water Distribution
W754630	Domestic Water Storage and Supply
W754640	Plant & Instrument Air Compressor
W754642	Plant and Instrument Air Distribution
W754643	Compressed Air System for Pig Launching Station
M-M6-Z-00112	Plant and Instrument Air Dryer and Filtration System
W776850	Process Building – Process Area HVAC Supply System
W776851	Process Bldg 210Z – Process Area HVAC Exhaust System

7.3.2 Ladder Logic and Control Logic Diagrams

Drawing No.	Title
W768595	Compressed Air Sys for Pig Launching Station

7.3.3 Arrangement Drawings

Drawing No.	Title
W761301	Monitoring Wells Sections and Details
W774358	Operations Building Radiation Monitor – Plan
W775540	Saltstone Process Building - 210Z - Plan - Shielding & Radiation Zoning Diagram
W775541	Salt Sol. Hold (CCBT) & Flush Water Recpt (SFT)Tanks - Sections - Shielding & Radiation Zoning Diagram
W775542	Saltstone Process Building - 210Z - Plan - Rad. Monitoring & Instrument Location Diagram
W775543	Salt Sol. Hold (CCBT) & Flush Water Recpt (SFT) Tanks - Rad. Monitoring & Instrument Location Diagram
W775545	Saltstone Disposal Vault - Radiation Shielding Zone and Radiation Monitor Location Drawing
W775900	Saltstone Process Bldg 210Z – Plan
W775901	Saltstone Process Bldg 210Z - Plans El. 364'-9 1/2", 334'- 9 1/2", Part. Plan – Grade
W775902	Saltstone Process Bldg 210Z - Sect. A
W775903	Saltstone Process Bldg 210Z - Sect. B
W775904	Saltstone Process Bldg 210Z - Sect. C
W775905	Saltstone Process Bldg 210Z - Sect. D
W775907	Saltstone Process Bldg 210Z - Plan Roof
W775908	Saltstone Process Bldg 210Z - Part. Plan and Sections
W775940	Process Water Storage Tank General Arrangement/Equipment Location-Plan & Sections
W779835	Standby Diesel Generator Fuel Storage Tank

7.3.3 Arrangement Drawings, (Cont'd)

Drawing No.	Title
W779850	Process Water Storage Tank
W780431	Operations Building 704Z - Floor Plan
W780442	Operations Building 704Z - Plumbing & Piping
W780451	Z Area Site Plan
E-ER-Z-00019	SPF-SSRT System Equipment, Instrumentation and Raceway Plan and Cable Tray Sections Electrical

7.3.4 Electrical Schematic Drawing

Drawing No.	Title
W774042	Process and Domestic Water Treatment - Make-up Valves
W774043	Process and Domestic Water Treatment - Process Water Pumps 1 & 2
W774047	Standby Electrical Generation - Standby Generator
W774087	Saltstone Mixing, Transfer & Placement - Air Compressor
W774088	Saltstone Mixing, Transfer & Placement - Air Dryer

7.3.5 Specifications

Specification No.	Title
Deleted	Deleted
Deleted	Deleted
M-068	Horizontal Centrifugal Pumps
M-351	Standby Diesel Generators
M-444	Saltstone Shop Fabricated Tanks
M-445	Saltstone Field Erected Tanks

7.3.6 Other References

Document No.	Title
B-DD-Z-00002	Saltstone Facility Modifications for 0.2 Ci/gal Low Curie Salt Process & Control Service (P&CS) Software Design Description (SDD)
B-RS-Z-00001	Saltstone Process Control System (SPCS) – Requirements Specification for Software (RSS)

7.4 TRAPPED HYDROGEN LOCATIONS

NAME	COMPONENT ID	DRAWING
SALT FEED TANK DSS FROM TK-50	SSP4-P48-4 / SSP30-P117-4 FROM PEN2351-P224 TO V-1046-2 & V-1046-3	M-M6-Z-0074
SALT FEED TANK LEVEL BUBBLER	INSTRUMENT AIR PIPING FROM V-1051-1 THRU INSTRUMENTS TO SFT	M-M6-Z-0074
CCBT SUMP PUMP PIPING	FSW41-P258-2 FSW39-PS101C-2	M-M6-Z-0074 W775554
SFT COLD SAMPLER PIPING	PLA569-P4B-1 & PLA569-P4B-1/2 FROM PA-V-0033 THRU SAMPLER TO SFT	M-M6-Z-0074 W754642
SFT TRANSER PUMP PIPING	PUMP SUCTION: FSW268-P258-3 FROM SFT TO SF PUMP (including LPW506-P64A-2 to Seal Pot & SRK99-P215-1/2 from HCV-7019 to HCV-1183) PUMP DISCHARGE: SFT01-P117-3 & SFT03-P117-3 FROM SF PUMP TO HCV-1055 (including SFT02-P117-2 to PCV-1054, RDD1194-P255-3/SAP9-255-3, SSP20-P258-3, SAP20A-P258-1/2 & LPW 455-P64A-3 to Seal Pot) PIG Launch #1 to SFT – RDD1197-P255-3 SFT-V-0001 to SFT – SSRT18-P117-1	M-M6-Z-0073 M-M6-Z-0074
EAST SIDE LEACHATE COLLECTION SYSTEM	SSD1-P224-2 FROM V-0004L, SSD2-P224-2 FROM V-0004K, SSD3-P224-2 FROM V-0004J, SSD13- P224-2 FROM V-0004H, SSD4- P224-1 1/2, SSD11-P224A-1, SSD11-P224-1, SSD5-P224A-1, SSD2- P224A-1 UP TO MOV-0008	M-M6-Z-0095 M-M6-Z-0045
WEST SIDE LEACHATE COLLECTION SYSTEM	SSD9-P224-2 FROM V-0004F, SSD6-P224-2 FROM V-0004E, SSD10-P224-2 FROM V-0004D, SSD14-P224-2 FROM V-0004B, SSD8-P224-1 1/2, SSD12-P224A-1, SSD12-P224-1, SSD7-P224A-1, SSD6-P224A-1 UP TO MOV-0009	M-M6-Z-0095 M-M6-Z-0045

SALT SOLUTION RECEIPT TANK SYSTEM	SSRT01-P117 from V-0050 to V-7580-2 SSRT03-P117 from V-7580-2 to SSRT #1 SSRT02-P117 from SSRT03-P117-4 to SSRT #2 SSRT17-P255 from Spectacle Blind Flange to HCV-7583 SSRT13-P117 from V-0060 to SSRT14-P255 SSRT14-P255 from HCV-7583 to SSRT20-P255 SSRT20-P255 from SSRT14-P255 to SSRT #1 SSRT21-P255 from SSRT14-P255 to SSRT #2 FSW01-P008 from P-0003 to SSRT #1 SSRT42-P117 from SSRT #1 to SSRT08-P117 SSRT04-P117 from SSRT #1 to P-0001 SSRT05-P117 from P-0001 to SSRT08-P117 SSRT07-P117 from V-0076 to V-0096 SSRT06-P117 from SSRT05-P117 to SSRT #1 SSRT12-P117 from V-0065 to V-0085 SSRT45-P117 from SSRT06-P117-2 to V-0248 SSRT24-P117 from SSRT06-P117 to SSRT26-P117 SSRT27-P117 from SSRT26-P117 to SSRT #1 SSRT26-P117 from V-0130 to SSRT28-P117 SSRT28-P117 from SSRT26-P117 to SSRT #2 SSRT25-P117 from SSRT26-P117 to SSRT11-P117 SSRT16-SP202R from SNK-0001 to SSRT #1 Enclosure Sump FSW03-P008 from P-0004 to SSRT #2 SSRT41-P117 from SSRT #2 to V-0056 SSRT09-P117 from SSRT #2 to P-0002 SSRT10-P117 from P-0002 to SSRT08-P117 SSRT11-P117 from SSRT10-P117 to SSRT #2 SSRT46-P117 from SSRT11-P117 to V-0249 SSRT08-P117 from SSRT05-P117 to V-0052 SSRT22-P117 from SSRT04-P117 to V-7512-2 SSRT23-P117 from SSRT09-P117 to V-7532-2 SSRT30-SP202R from P-0001 to V-0133 SSRT33-SP202R from P-0002 to V-0153 SSRT44-P117 from SSRT24-P117 to V-0130	M-M6-Z-00109
SDU 6 Drainwater Return Lines	L-607-P224-2 from P-0007 to HCV-6118 L-606-P224-2 from P-0006 to HCV-6119 L-604-P224-2 from P-0004 to HCV-6121 L-603-P224-2 from P-0003 to HCV-6123 L-608-P224-2 from P-0008 to HCV-6125 L-605-P224-2 from P-0005 to HCV-6120 L-602-P224-2 from P-0002 to HCV-6122 L-601-P224-2 from P-0001 to HCV-6124	M-M6-Z-00129

	L-622-P224-1 from 2X1 Reducer (High Point) to VB-6001 L-608-P224-2 from HCV-6125 to HCV-6126 L-608-P224-2 from HCV-6125 to VACB-0505	M-M6-Z-00118
SDU 3A Leak Detection Sump	Leak Detection Sump (including LE-3110)	M-M6-Z-00117