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Revision 8

SYSTEM DESCRIPTION DOCUMENT

For

SALTSTONE ELECTRICAL

LIQUID WASTE (LW)
SALTSTONE FACILITY

Original Document (SS-11) by
Bechtel National, Inc.
# SUMMARY OF CHANGES

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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.

Saltstone electrical system provides for the distribution and control of electrical energy. Also provided are lighting, grounding, lightning protection, and miscellaneous systems such as cathodic protection, heat tracing, and communication systems.

Saltstone electrical system consists of both normal and standby power systems. The standby power system consists of a diesel engine-driven generator connected to a motor control center (MCC) via an automatic transfer switch. For critical services, an uninterruptible power supply is used.

Normal power is fed from H-Area 115kV/13.8kV Primary Substation. A 480 VAC load center, B12, in the Substation Building (951-Z) receives 13.8 kV power from H-Area, and steps it down to 480 V. There are six 480 V MCCs for distribution of power throughout the area.
1.0 FUNCTIONS AND DESIGN REQUIREMENTS

The function of the Saltstone electrical system is to supply electric power and associated services to the Saltstone Facility to carry out the operation of processing salt solutions from H-Area to Z-Area, and transferring the resulting grout to the vault located at the disposal site in Z-Area of the SRS. Design requirements are as specified below.

1.1 PROCESS AND SAFETY FUNCTIONS

This section is not applicable to this SDD.

1.2 DESIGN REQUIREMENTS

The design requirements presented in this section are based on interface requirements, as given in Section 2.7 of this SDD.

1.2.1 Operational Requirements

1.2.1.1 Normal Power

Normal power at 13.8 kV shall be supplied from the 13.8 kV electrical system in H-Area. It shall be capable of supplying all of the normal load needed in Z-Area.

1.2.1.2 Standby Power

Standby power shall be on site to supply power to systems that must operate during a normal power failure. The basis for selection is for protection of equipment or for protection of the environment. The following critical loads shall be connected to standby power:

- Saltstone Mixer
- Salt Feed Tank Pump
- Grout Pump and High Pressure Flush Pump
- Pig Launching Stations
- Plant/Instrument Air Compressor
- Process Water Pumps
- Process Building (210-Z) Supply Fans
- Process Area Exhaust Fans
- Operations Building (704-Z) Exhaust Fans
- Process Vent Blowers
- Electrically Driven Jockey Pump
- Fire Water Pump House (901-Z) Control Panels
1.2.1.3 Uninterruptible Power

Uninterruptible power shall be supplied where continuous service and control are essential. The uninterruptible power supply (UPS) system shall be compatible with the normal and standby power systems. It shall include sufficient battery charging capability to maintain system operation during normal conditions and sufficient battery capacity for an orderly shutdown on loss of normal or standby power. The UPS shall be provided with a dedicated panel for the distribution of UPS power.

1.2.1.4 Lighting

The lighting system shall provide illumination necessary for the indoor and outdoor process area, the Central Control Room (CCR), the equipment rooms, the general area of the Process Building (210-Z), the Substation Building (951-Z), the Operations Building (704-Z), the Fire Water Pump House (901-Z), and the facility environment.

For the security fence area, lighting shall be provided in and around the operating areas, and supplied with backup power. Low-energy, low-maintenance lighting systems and fixtures (such as high-pressure sodium lamps) shall be used.

1.2.1.5 Communication

A communication system shall be provided with power from the standby generator and a standby storage battery system.

Telephone services for onsite, inter-area, and offsite communications shall be provided. In addition, there shall be an emergency telephone, a fire emergency telephone, and an SST (Selective Signaling Terminal) telephone that communicate with all other area patrol headquarters, the CCR, and the Emergency Operating Center (EOC) at the same time.
An area-wide public address (PA) system shall be provided to ensure that information vital to operation and safety reaches all personnel. The PA system shall be capable of being initiated from any of the four types of telephones, with a master override of the system being located in patrol headquarters.

A security radio and weather information display (WIND) system was originally required, but was subsequently dropped as a requirement.

1.2.1.6 Heat Tracing
Heat tracing shall be provided for freeze protection and process needs. Local or remote alarm for monitoring of temperature or power availability shall be provided.

1.2.1.7 Cathodic Protection
Cathodic protection shall be provided for most iron or steel process and service piping in contact with the soil.

1.2.2 Structural Requirements
This section is not applicable to this SDD.

1.2.3 System Configuration and Essential Features
This section is not applicable to this SDD.

1.2.4 Maintenance Requirements
The Saltstone electrical system has no special or unique maintenance requirements.

1.2.5 Surveillance and In-Service Inspection Requirements
All electrical equipment and switching/control devices in the electrical systems shall be accessible for visual inspection and testing.

1.2.6 Instrumentation and Control Requirements
Instruments and controls shall be installed to furnish needed information and controls in the Central Control Room (CCR) for all utilities and services.

1.2.7 Systems Interfacing Requirements
The Saltstone electrical system shall have primary and secondary interfaces with other systems, as described below.
1.2.7.1 Primary Interfaces

Primary interfaces shall be those functions, services, or supports needed by this system from other systems. G-SD-Z-00004 (SS-11) has primary interfaces with the following systems:

- G-SD-Z-00001, Z-Area Site, provides space for the Substation Building (951-Z) electrical equipment, and underground duct banks.
- G-SD-Z-00002, Saltstone Structures and Vaults, provides the Substation Building (951-Z) enclosure and equipment foundation.
- G-SD-Z-00005, Saltstone HVAC, provides HVAC for the Substation Building (951-Z) and the electrical equipment room in the Process Building (210-Z).
- G-SD-Z-00006, Saltstone Support, provides standby power and process control interface.
- G-SD-Z-00008, Saltstone Fire Protection, provides fire protection to the electrical equipment.
- G-SYD-S-00022, DWPF Normal Power (SU-16), provides normal power to G-SD-Z-00004.

1.2.7.2 Secondary Interfaces

Secondary interfaces shall be those functions, services, or supports needed by other systems from this system. G-SD-Z-00004 shall provide power and electrical protection for the following systems:

- G-SD-Z-00001 Z-Area Site
- G-SD-Z-00002 Saltstone Structures and Vaults
- G-SD-Z-00003 Saltstone Process
- G-SD-Z-00005 Saltstone HVAC
- G-SD-Z-00006 Saltstone Support
- G-SD-Z-00007 Saltstone Product Laboratory
- G-SD-Z-00008 Saltstone Fire Protection

1.2.8 Quality Assurance Requirements

Quality assurance requirements for SRS activities are outlined in DOE Order SR-5700.6B. The 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

The Saltstone electrical system shall be designed to meet the applicable sections of the following codes and standards:

- American National Standards Institute (ANSI)
- Insulated Cable Engineers Association (ICEA) Standards
- Institute of Electrical and Electronics Engineer (IEEE) Standards
- National Electrical Code (NEC)
- National Electrical Safety Code (NESC)
- National Electrical Manufacturers Association (NEMA) Standards
- Illumination Engineering Society (IES) Lighting Handbook
- Underwriters’ Laboratories (UL) Standards and Product Directories

1.2.10 Reliability Assurance

Normal, Standby, and Uninterruptible Power Supply (UPS) electrical supply systems are furnished to provide desired power source reliability to Saltstone Facility equipment as specified in this system description.

1.3 DESIGN BASIS RATIONALE

This section is not applicable to this SDD.
2.0 DESIGN DESCRIPTION

Saltstone electrical provides power and control for the operation of the Saltstone process. The power system consists of normal power, standby power, and uninterruptible power. In addition, Saltstone electrical provides for lighting, communication, heat-tracing, cathodic protection, lightning protection, and grounding systems for the operation of the facility.

2.1 DETAILED SYSTEM DESCRIPTION

A simplified single line diagram for the Saltstone electrical system is shown in Figure 1.

2.1.1 Normal Power System

Normal power is fed from H-Area’s 115kV/13.8kV Primary Substation Cubicle 301A (Feeder 7A).

Feeder No. 7A supplies power to Saltstone Facility load center (LC) B12, located in the Substation Building (951-Z). The 13.8 kV power line is a combination of overhead line and underground cable. The overhead line runs to pole #099Z/100Z in Z-Area. Underground cables in duct banks connect this pole line for the remainder of the run. At Pole #099Z/100Z of the overhead line, there is a 15 kV interrupter switch with surge arresters.

Cubicle 407A (Feeder 7B) is the back up to 7A. For Feeder 7B to supply Z-Area a normally open switch at Pole 062G-A must be closed. I&S controls this switch.

480 V MCCs, 480 V bus ducts, and 120/208 VAC three-phase distribution panels are installed at various locations and distribute normal power to all process equipment, utilities equipment, instrumentation, and controls.

2.1.2 Standby Power System

The standby power system consists of a diesel engine generator, generator breaker, control devices, protective relays, and an auto transfer switch. The diesel generator is skid-mounted and is located outdoors next to the Substation Building (951-Z). The nameplate rating on the generator is 425 kW, 480 V, three-phase, 60 Hz, 0.8 PF. However, the diesel engine is rated to supply a maximum short time load of 405 kW and a continuous load of 365 kW. Thus, the capacity of the diesel generator is 365 kW at 480 V three-phase, 60 Hz, 0.8 PF. See G-SD-Z-00006 for generator details.

The main generator breaker, control devices, and protective relays are mounted in the generator control cabinet, which is located in the Substation Building (951-Z). The auto transfer switch is also located in the Substation Building (951-Z).

The generator breaker and LC B12 feeder breaker 2B are connected to the auto transfer switch, N120, which delivers power to standby MCC B123 located in the Process Building (210-Z). Equipment that must operate during a normal power failure is connected to MCC B123.
During normal operation, the transfer switch is connected to LC B12. Upon loss of normal power, an undervoltage relay at the transfer switch signals the diesel generator to start. When the voltage and frequency at the diesel reach their rated values, the switch transfers to the standby source. The diesel generator comes up to speed within 15 seconds, restoring power to the standby MCC bus. After normal power has been restored, the standby diesel generator is manually shut down. The diesel starting circuitry is reset to ensure that it starts immediately and automatically on a subsequent loss of normal power.

Selected equipment or systems are equipped with redundant power sources. During normal operation, each piece of equipment is powered from a normal MCC. If for any reason the normal power source is not available, the equipment can be switched to the redundant source via a manual transfer switch. In general, the redundant power source is from standby MCC B123. Section 5.2 lists all equipment that is provided with a redundant power source. For details, see MCC Single Line Diagrams W774005, W774006, W774008, and W774350, and Panel Schedule Drawings W774012 and W774356.

120/208 VAC dedicated panels fed from the standby MCC bus are installed at locations for power distribution to a single-phase load and for instrumentation and control requiring backup power.

2.1.3 Uninterruptible Power Supply System

All equipment and components of the UPS system are located in the Electrical Control Room (ECR) of the Process Building (210-Z).

The UPS system is normally fed from standby MCC B123 and backed up by a feeder from MCC B124. A static bypass switch and a maintenance bypass switch are provided for backup and isolation of the UPS.

The UPS system distributes power through a 120/208 VAC panel Y146 distribution to critical loads that must operate during a power failure without interruption.

2.1.4 Lighting System

The lighting system consists of four subsystems:

- **Normal lighting.** Normal lighting is fed from the normal power distribution system.
- **Essential lighting.** Essential lighting is fed from the standby power distribution system. There are three essential lighting panels: panel L144 in the Process Building (210-Z), panel L145 in the premix process area, and panel L149 in the Substation Building (951-Z).
- **Emergency portable lighting.** Battery-operated portable lighting is provided in selected areas.
Separated raceways are provided for the first three subsystems.

The lighting system consists of step-down transformers, lighting power distribution panels, raceways, wiring, lighting fixtures, poles (for yard lighting), and controls.

Lighting transformers are fed from nearby MCCs or from standby MCC B123 for essential lighting systems. Major features include:

- Yard lighting and selected area lighting is provided from essential lighting panels.
- High-pressure sodium vapor lighting fixtures are installed for outdoor yard lighting, process, and working area lighting.
- Fluorescent lighting fixtures are installed in the control room, facility room, equipment room, and corridors.
- Emergency portable lighting units are installed at exits, stairways, and selected rooms, e.g., control room, E & I shop, etc.
- Outdoor lighting poles are 30 feet high. The poles are round and tapered and made of aluminum.


2.1.5 Communication System

The Z-Area communication system consists of a telephone system and a PA system. The PA system is powered from the UPS distribution panel Y146.

2.1.5.1 Telephone System

The Z-Area telephone system is extended from the existing Telephone System network. The Z-Area telephone equipment and wiring are supplied and installed by the telephone company. Dedicated raceway is provided for this system. The telephone room is located in the Process Building (210-Z). Telephone outlets are flush- or surface-mounted.

The Telephone system is divided into four subsystems:

- Type 1. Used for interarea communication only
- Type 2. Used for communications essential to facility operations. These types of telephones have integrated switches to select communications within Z-Area or with other areas on the network
- Type 3. Used for interarea and offsite communication
• Type 4. Same as Type 3 except that they are considered nonessential and may be disconnected by local area control during plant emergencies

In addition, the following emergency telephones are provided:

• An emergency telephone – an additional telephone located in the Communications Center to be used for emergencies (Type 3)
• A fire emergency telephone – an additional telephone located in the Communications Center to be used only to report a fire (Type 3)
• An SST telephone providing direct communications with all other Area Patrol Headquarters, the CCR, and the Emergency Operating Center. All SST telephones can be on line at the same time.

Leased telephone lines are provided for fire alarm systems to transmit the fire alarm signals to the CCR and F-Area fire station.

For design detail, see Drawings W771015, W774048, W774066, W774224, W774227, W774228, W774266, W774281, and W774352.

2.1.5.2 Public Address System

The PA system consists of horn-type speakers and amplifiers installed in the buildings and process areas. Cone-type speakers are flush-mounted on the ceiling, with remote volume control in the CCR and corridor in the Process Building (210-Z), the Unloading Control Office (205-Z), and in rooms in the Operations Building (704-Z).

The speaker is controlled by a microphone in the CCR. The Z-Area PA system is operated independently of the S-Area PA system.

The PA system has a selective paging feature with switches, indicating lights and relays for page calls to separate zones or all-page. Zones in Z-Area are:

• Zone 1 Process Building (210-Z)
• Zone 2 Operations Building (704-Z) and Trailers (704-5Z and 704-6Z)
• Zone 3 Substation Building (951-Z) and all remaining outside areas

In addition, the PA system has feature that limit PA/paging by individual zones. A master override in the CCR can override all PA messages, regardless of the source.

The PA system has the capability to be accessed from the Southern Bell Telephone System for individual zone paging and for all-paging. (This feature is presently not being used.)
The Z-Area PA system has a tone generator for warning the public/workers. The tone generator generates a slow warble followed by voice announcements for shelter protection, evacuations, and other required emergencies.

For design details, see Riser Diagrams W774221, W774222, W774266, W774281, and W774352.

2.1.5.3 Weather Information and Display System

A WIND system was designed in accordance with the requirements specified in Section 1.2.1 (shown in Riser Diagram W774222, Rev. 5), but was not installed per IDM S1780-PAT-E821 (2/1/88) and IDM S1780-PAT-E968 (3/22/88). Engineering design was deleted from Drawing W774222, Rev. 6.

2.1.6 Heat Tracing Systems

Heat tracing systems are provided for freeze protection of process equipment and pipe lines, process heat, emergency safety showers, eyewash, and miscellaneous low-pressure water lines.

Three major vendor-supplied heat tracing packages are provided for the following services:

- **Salt feed tank system.** This system includes the Clean Cap Batch Tank (CCBT) formally known as the Salt Solution Hold Tank (SSHT), the Salt Feed Tank (SFT) formerly known as the Flush Water Receipt Tank (FWRT), Salt Solution Receipt Tanks (SSRTs) and associated transfer lines and vent lines.

- **Domestic water and process/ fire water system.** This system includes the Process and Fire Water Tanks, and associated water lines.

- **Process water distribution system and miscellaneous.** This includes the SFT water line, and miscellaneous items such as emergency safety shower, eyewash, and low-pressure water lines.

Each heat tracing package has the following features:

- **Ventilated dry-type power distribution transformer:** This transformer receives 480 V normal power from a nearby MCC. It is rated at 45 kVA and steps down the voltage to 120/208 V.

- **Local control cabinet.** This cabinet includes a 120/208 V power distribution panel for power distribution to the heat tracing circuits and an annunciator panel for monitoring of power failure and low temperature of each heat tracing circuit. A common alarm signal from the annunciator panel is sent to the nearby distributed control system for remote monitoring at the CCR in the Process Building (210-Z).
• **Auto-trace, self-regulating heating cable.** Heat tracing cable is sized to maintain a minimum temperature of 40°F for freeze protection when the ambient temperature is 0°F and the maximum wind speed is 20 miles per hour (mph). A safety factor of 25 percent is applied.

In addition, heat tracing is also provided at the Low Point Drain Tank (LPDT) area for vent lines. Local or remote monitoring is not provided. A heater removes condensate from the vent line.

For design details, see Drawings W774091 through W774094 and W774289 through W774291 and W774293 thru W774299 and E-EH-Z-00006 and E-EW-Z-0001 thru E-EW-Z-0003.

### 2.1.7 Cathodic Protection System

There is a cathodic protection system for the salt solution pipelines from Tank 50 in H-Area through the LPDT to the SFT and SSRTs in Z-Area. This system consists of four rectifier units and 93 impressed current anodes in addition to nine reference electrodes and test stations. Only normal power is supplied to this system. Z-JB42 Retired-OOC per E-DCF-Z-00252.

For design details, see Drawings W774256 and W774257. Drawing W774257 shows the locations of rectifier’s anodes, and anode junction boxes, and the test stations with reference electrodes. Drawings W774015 and W774016 give equipment installation details and describe the method of bonding ductile iron pipes and steel pipes.

### 2.1.8 Lightning Dissipation System

Lightning dissipation is installed in the Process Building (210-Z), Operations Building (704-Z), Fire Water Pump House (901-Z) Storage Silo Structure (205-Z), Domestic/Process water area (980-Z) and Salt Solution Hold Tank area (201-Z).

The lightning protection has its own grounding system and is interconnected at a single point to the facility ground grid.

For design and installation details, see Drawings W771009, W774212, W774213, W774267, W774268, W774357, and E-EG-Z-00010.

### 2.1.9 Grounding System

2.1.9.1 Facility Ground

A grounding grid is installed around each building and around each outdoor process area, electrical substation, and facility fence. Grounding rods are of the sectional type. They are 10 feet long by 1 inch in diameter, are made of copper-clad steel, and are coupled when a longer length is required. The main grounding conductors in the grounding grid are #4/0 bare conductor wire.

Floor-mounted or wall-mounted grounding pads and column-mounted grounding plates are installed to facilitate equipment grounding.

Equipment grounding conductors larger than #6 AWG are bare, soft-drawn, Class A stranded copper wire. Grounding conductors #6 and smaller are Class B stranded copper with a green striped insulated jacket.

For power circuit conductors installed in aluminum cable tray and operated at a system voltage of 480 V, the cable tray acts as the fault current return conductor.

All electrical and mechanical equipment and special facilities (railroad tracks, fences) are provided with equipment grounding for personnel safety.

2.1.9.2 Instrument Ground

All instrument signal loops that require grounding are grounded at the instrument ground bus inside the local panel or at the Saltstone process control system I/O cabinet. From there all of the instrument ground buses tie to a single ground bus which is in turn tied to the equipment (building) ground at one specific point. Instrument ground buses are isolated from the equipment ground system so that there is only one path from an instrument ground bus to the facility ground.

2.1.9.3 Fault Current Return Conductors

Electrical circuits from transformer, switchgear, MCC, and distribution panels are equipped with a ground fault current return path conductor and sized per NEC regulations.

2.2 SYSTEM PARAMETERS AND PERFORMANCE CHARACTERISTICS

The Saltstone electrical system is designed to meet the requirements set forth in Section 1.2, Design Requirements.

2.2.1 System Parameters

- The primary system is 13.8 kV, 60 Hz, three-phase, delta-connected, and ungrounded, and the phase sequence is A-B-C.
• The secondary system is 480 V AC, three-phase, delta-connected, grounded at B phase.
• Distribution voltage is 480 VAC for three-phase motors.
• Distribution voltage is 120/208 VAC, three-phase, four-wire for the lighting system.
• Distribution voltage is 120/240 VAC, single-phase, for essential distribution panels.
• Instrumentation and control voltage is 120 VAC.

2.2.2 Performance Characteristics
• System voltage and frequency operates within the range as specified in Section 7.2, Parameters List.
• The power system is able to withstand a momentary voltage dip (of not more than 20 percent of the nominal voltage) due to starting of a motor or a lightning strike.
• The automatic transfer switch (ATS-N120) circuitry detects the loss of normal power and sends a signal to start the standby diesel generator. When the diesel generator is at rated voltage and frequency, the ATS transfers operation from the normal source to the standby diesel generator source.
• Fuses, circuit breakers, and lightning arresters isolate a fault, so that other parts of the system will not be affected and the power outage is minimized.
• The motor circuits have overload and overcurrent protection.
• The feeder circuits have overcurrent protection.
• The electrical equipment can withstand the available fault current.

2.3 SYSTEM ARRANGEMENT
The Saltstone electrical system arrangement is based on the Saltstone facility arrangement and load requirements. Major electrical power and distribution equipment is located in the Substation Building (951-Z), Process Building (210-Z), Operations Building (704-Z), Fire Water Pump House (901-Z), Vault #4 Area, and SDU 2, 3, 5 and 6 Area to achieve a satisfactory Saltstone electrical power distribution system.

The 480 V electrical equipment includes: one 480 V load center B12 and seven 480 VAC MCCs, designated as MCCs B121, B122, B123, B124, B126, B127 and B156 (located at SDU 6). Only MCC B123 is backed by a diesel engine generator.

Distribution transformers and panels are located near the loads they service. The detailed system arrangement is shown in Figure 2.
2.3.1 Primary and Secondary Substation Power Distribution

The Saltstone Primary/Secondary Substation is located within the Substation Building (951-Z) southwest of the Process Building (210-Z). South of this building is a skid-mounted standby diesel engine generator.

The Primary and Secondary Substation receives the 13.8 kV primary power from H-Area, steps down the voltage to 480 VAC, and distributes the 480 VAC power. In addition, it is the local control station for the diesel engine generator.

The 13.8 kV power line from H-Area enters the Substation Building (951-Z) through an underground duct bank via manhole No.5.

LC B12 and MCCs B121 and B122 are located in this building. The generator control cabinet is located at the southeast corner of the room and the standby power transfer switch N120 is mounted on the east wall.

MCC B121 and B122 supply 480 VAC normal power to the bulk material unloading/handling, heat tracing of Process and Fire Water Tanks, cathodic protection, and miscellaneous loads in the Substation Building (951-Z).

480-120/208 VAC distribution transformer ratings and associated distribution panels are shown in Drawings W774003, W774004, W774054, and W774235. Lighting panel L141, fed from MCC B121, supplies normal power to the building lighting. Essential lighting panel L149, fed from essential panel L144 located in the Process Building (210-Z), supplies standby power to selected area lighting. Dedicated single-phase power panel Y162, backed by standby power, provides 120/240 VAC power for controls and single-phase loads. 120/208 VAC spare panel Y140 is fed from MCC B122.

2.3.2 Process Building (210-Z) Power Distribution

The Process Building (210-Z) is located northeast of the Substation Building (951-Z) and contains normal, standby, and UPS power equipment.

An Electrical Control Room (ECR) is located on the ground floor in the southwest part of this building. MCCs B123 and B124 and the UPS system are installed in the ECR.

MCC B124 supplies normal power to the loads for the process of premix blending and premix feed systems, and HVAC systems for this building.

MCC B123 is the only 480 V power distribution equipment backed by the standby diesel engine generator. It supplies power to all loads that must operate to maintain the integrity of the facility. Major items of essential equipment on standby power are as follows (see Drawing W774005):

- Saltstone Mixer
• Salt Feed Tank Pump
• Grout Pump and High Pressure Flush Pump
• Pig Launching Stations
• Hopper Agitator
• Clean Cap Batch Tank Pump
• Plant/Instrument Air Compressor
• Process Water Pumps
• Process Building (210-Z) Supply Fans
• Process Area Exhaust Fans
• Operations Building (704-Z) Exhaust Fans
• Process Vent Blowers
• Electrically Driven Jockey Pump
• Fire Water Pump House (901-Z) Control Panels
• Uninterruptible Power Supply
• Diesel Generator Starting Battery Charger
• Essential Lighting
• Instrumentation and Control Power, Regulated Voltage
• Instrumentation and Health Protection Monitors in controlled areas
• Communications and Alarm System
• Dedicated power distribution panel for distributed control system (DCS) and miscellaneous control stations

• Vault 4 (451-4Z) Fusible Panel Board (Leachate Pumps)
• Vault 1 (451-4Z) Fusible Panel Board

Load ratings are identified in Drawing W774005.

For complete standby power loads, see MCC B123 Single Line Diagram W774005.

UPS panel Y146 provides single-phase power to loads that must be operated without interruption when normal power is lost. The UPS load list is as follows:
• Distributed control system and I/O interface cabinets
• Communication and alarm system
• Fire alarm system
• Halon control panel
• Public address system
• PLC Train A&B

For a detailed description of the UPS power distribution, see UPS system single line Diagram W774008.

A 480 V bus duct in the maintenance room is used to meet the power requirement of maintenance tools. Lighting panels and dedicated panels are located close to the loads they service. Outdoor essential lighting panel L145 is installed at the bulk material process area.

2.3.3 Operations Building (704-Z) Power Distribution

480 V MCC B126 is installed in the ECR located on the ground floor in the northwest corner of the building. MCC B126 receives power from LC B12 and distributes 480 V normal power to the building lighting and miscellaneous HVAC loads.

Primary exhaust fan of the Operations Building (704-Z) is powered from standby MCC B123. Standby exhaust fan is powered from normal power MCC B124 located in the Process Building (210-Z) and is also supplied with redundant power from standby MCC B123 via manual transfer switch N-002).

120/208 VAC lighting panel L165 and dedicated panels Y164, Y166, and Y167 are provided for the building lighting system, laboratories, and controls. They are installed close to the loads they service. Panel Y164 is normally powered from standby MCC B123. Panel Y164 furnishes power to the emergency lighting system, the water chiller, the HVAC control station, the radiation monitoring system, and the fire alarm system for this building.

2.3.4 Fire Water Pump House (901-Z) Power Distribution

The Fire Water Pump House (901-Z) is equipped with an electrically driven fire pump and a diesel engine fire pump. 480 V MCC B127, located at the west side near the wall and close to the electrically driven fire pump, supplies normal power to the loads in this building.

Distribution panels are installed close to the loads they service. Power panel Y330, powered from MCC B127, supplies single-phase normal power to the building exhausters and unit heaters. Lighting panel L310, powered from Y330, supplies power to the building lighting and outdoor lighting at the water storage tanks. Dedicated panel Y300, backed by standby power, provides power for essential lighting, control, and single-phase loads in this building.
2.3.5 Vault #4 Area Power Distribution

Within the vault area, two 480 VAC fusible panel boards (BD-0123 and BD-MDB4) and two 3-phase 120/280 VAC distribution panels (Y410 and Y426) are provided for the power and control in this area. The power source is from standby power MCC B123.

Power distribution for the Vault #4 Organic Modifications provided via

- Pole 112Z
- Z-451004-ELNH-XFMR-B15, 150 KVA 13.8KV/480V 3 Phase Transformer
- Z-451004-ELNH-DISC-B151, 200A Service Disconnect Switch
- Z-451004-ELNH-MCC-B151, MCC B151
  (See E-EZ-Z-00020 for additional details)

2.3.6 SDU 2, 3, 5 and 6 Area Power Distribution

SDU 2, 3, 5 and 6 Area receives the 13.8kV primary power from H-Area, steps down the voltage to 480VAC, and distributes the 480VAC power to the SDUs.

Power distribution for SDU 2 Area

- Pole H124Z
- 112.5 kVA 13.8kV-480/277V 3 Phase Pole Mounted Transformers
- Z-451002-ELNH-DISC-0202, 200A Service Disconnect Switch
- Z-451002-ELNH-PNL-0201, 480V Distribution Panel Board

Power distribution for SDUs 3 and 5 Area

- Pad Mounted Disconnect Switch Z-451005-ELNA-DISC-0001
- Z-451005-ELNA-XFMR-0001, 300 kVA 13.8kV-480/277V 3 Phase Transformer
- Z-451005-ELNH-DISC-0001, 400A Service Disconnect Switch
- Z-451005-ELNH-PNL-0001, 480V Distribution Panel Board

Power distribution for SDU 6 Area

- Pad Mounted Disconnect Switch Z-451005-ELNA-DISC-0001
- Z-451006-ELNA-XFMR-0001, 300 kVA 13.8kV-480/277V 3 Phase Transformer
- Z-451006-ELNH-DISC-0001, 400A Service Disconnect Switch
• Z-451006-ELNH-MCC-B156, 480V MCC

2.4 COMPONENT DESIGN DESCRIPTION

2.4.1 15 kV Load Interrupter Switchgear Z953-138-004-00-A

The 15 kV load interrupter switchgear is an outdoor, free-standing type. All disconnect switches are rated 15 kV, three-pole, and 600 A continuous and 40 kA momentary. The incoming main switch is unfused. Three feeder switches are all fused with 150E fuses.

2.4.2 13.8kV-480 VAC Load Center Switchgear B12

The 13.8kV-480 VAC load center switchgear is an indoor, metal-enclosed, Westinghouse secondary unit substation, simple radial distribution system. It consists of a fused primary load interrupter switch, a dry-type power transformer (X12), a 480 VAC main breaker, and eight 480 VAC feeder breakers. Essential features are described below. For design details, see load center single line meter and relay Diagram W774002.

2.4.2.1 Primary Load Interrupter Switch and Power Transformer X12

The switch is rated 15 kV, 600 A interrupting, 40,000 A momentary, three-phase, 95 kV BIL, with a 150E fuse. The power transformer is 2,000 kVA, self-cooled (AA rating), 2,667 kVA at forced-air-cooling (FA rating), 13.8 kV-480 VAC, three-phase, 60 Hz, Z = 5.75%, with a maximum temperature rating of 150°C. The transformer high-temperature signal is wired to the Saltstone process control system for remote alarm in the CCR.

2.4.2.2 Load Center Main Breaker and Bus

The main breaker is 3,200 A frame size, with a 2,400 A solid-state current-sensing device, and is manually operated. The solid-state sensor detects the incoming current and provides a long time delay (LTD) and a short time delay (STD) trip for the protection of downstream cable and equipment. The low-voltage bus is 480 VAC, 3,200 A, with an 85 kA brace rating, and is made of aluminum. Electrical transducers transmit the incoming current, voltage, and power parameters to the Saltstone process control system for data acquisition in the CCR.

2.4.2.3 Feeder Breakers

All feeder breakers are of the drawout type, 800 A frame size, integrated with adjustable solid-state current-sensing devices and current-limiting fuses. Devices are rated at 800 A, and fused at 1600 A.

Eight feeder breakers are installed, six of which deliver power to six 480 VAC MCCs. These breakers are manually operated, and a current-sensing device is provided with LTD and STD for tripping the breaker. Two spare electrically operated feeder breakers are provided with current-sensing tripping devices; however a 125 VDC source is currently not available to support their
operation. A space is provided for a future feeder breaker. An ammeter is provided for each of the eight feeder breakers to indicate the feeder current.

Feeder breaker and main breaker position (open or closed) and tripped status are transmitted to the Saltstone process control system for status indication in the CCR.

2.4.3 13.8kV Transformers

SDUs 2, 3, 5 and 6 receive 13.8 kV primary power from H-Area and the voltage is stepped down to 480VAC using 13.8kV – 480/277V transformers. SDU 2 is supplied using three single pole mounted 37.5 kVA transformers with a total capacity of 112.5 kVA. The SDU 3/5 and 6 transformers are pad mounted transformers with a capacity of 300 kVA.

2.4.4 480 VAC Motor Control Centers

The primary Saltstone electrical system 480 VAC MCCs are Allen-Bradley, indoor type. Main buses are rated at 480 VAC, 800 A, three-phase, 3 W, 60 Hz, with a brace rating of 65 kA. Magnetic combination starters are provided for motor loads. The minimum size of the starter is NEMA Size 1. Starters and overload heaters are sized as per NEC regulations. Fused disconnect switches are provided for branch feeders. Fuse rating is sized per NEC regulations. Reversing starters, two-speed starters, and variable-speed controllers are provided to meet equipment control requirements. See Specification E-19 for MCC details.

- MCCs B123, B124, and B126, remote from the location of LC B12, are equipped with main breakers. Each main breaker is an ITE molded case breaker, 800 A frame, KM-type with symmetrical bracing that can withstand 30,000 A RMS without a tripping unit.

- MCC B127 is equipped with a main line load interrupter switch, rated at 480 VAC, 400 A, 65 kA RMS symmetrical bracing.

The SDU 6 Area MCC B156 480 VAC MCC is an Rockwell Automation (Allen-Bradley) with a NEMA 3R enclosure. Main bus is rated at 480 VAC, 600 A, three-phase, 60 Hz, with a brace rating of 42 kA. Full voltage non-reversing motor starters equipped with E3Plus overload relays are provided for motor loads. The starters are NEMA Size 1. Fused disconnect switches are provided for branch feeders. Fuse rating is sized per NEC regulations.

2.4.5 Standby Diesel Generator Transfer Switch (ATS-N120)

The standby diesel generator system is described in G-SD-Z-00006, Saltstone Support. Control of the diesel generator is covered by this SDD. Automatic transfer switch N120 transfers normal power to standby power to MCC B123. The transfer switch is an ASCO 940 series, three-pole, 800 A, 480 VAC, 42,000 A RMS. It consists of a transfer switch assembly and a microprocessor control panel, with an undervoltage relay for the normal source, voltage and frequency detection.
for the standby source, and a manual reset switch for switching the standby source back to the normal source. The transfer switch position is monitored by the Saltstone process control system.

2.4.6 480 Volt Bus Duct
The 480 V bus duct is a totally enclosed, non-ventilated type with a 100 percent internal ground bus, rated at 325 A. Fusible, plug-in disconnect switches protect the feeder circuits. Fuse ratings are 30 A, 60 A, or 100 A. The bus duct is powered from nearby MCC B124, with a 200 A fused disconnect switch.

2.4.7 Uninterruptible Power Supply (UPS) Package
The UPS system consists of UPS package Y100, 125 VDC battery bank D-75, disconnect switch DS-100, maintenance bypass switch N-100, and 120/208 VAC distribution panel Y146. A UPS and battery charger trouble alarm and the position of the maintenance bypass switch are input to the Saltstone process control system and are monitored at the CCR.

The UPS package consists of a battery charger, an inverter, a static switch, and monitoring meters. UPS Y100 is rated at 30 kVA, requires an input of 480 VAC ± 10%, three-phase, three-wire, 60 Hz, and has an output power of 120/208 VAC ± 5%, three-phase, four-wire, 60 Hz.

The UPS is rated at 30 kVA and has a battery sized to supply power for a minimum of 15 minutes. This provides enough time to manually start the diesel generator, if auto starting fails. For UPS design details, see Specification E-14.

2.4.8 Power Distribution Transformers
Distributions transformers are of the indoor or outdoor dry type. They are rated at 480-120/208 VAC, three-phase, four-wire, or 480-120/240 VAC single-phase, three-wire. The three-phase transformer has a delta connection at the primary side and a wye connection at the secondary side. Transformer capacities are 9 kVA, 15 kVA, 25 kVA, 30 kVA, and 45 kVA.

2.4.9 Power Distribution Panels
Distribution panels for lighting, single-phase power and control are 120/208 VAC three-phase, four-wire, or 120/240 VAC single-phase. In general, a 100 A main breaker or a main lug is provided, with 20 A branch circuit breakers for lighting panels, and 15 A for power or dedicated panels. Some are fuse panels with 100 A main and 15 A branches. Panel interrupting capacity is 10,000 A.

2.4.10 Instrument Fuse Boxes
Fuse boxes are installed to provide instrumentation power. Fuses are rated at 3 A.
2.4.11 Outdoor Poles, Underground Duct Bank and Manhole

Outdoor poles support the 13.8 kV overhead power lines and telephone lines. See Drawings W774241 through W774244 for detail design and installation.

Underground duct banks and manholes are installed for the 13.8 kV power lines and for communication cables. See Drawings W774236 through W774240 and W774245 for detailed design and installation information.

2.4.12 Raceway and Wiring

2.4.12.1 Raceway

Raceway includes conduits, cable trays, fittings, supports, and pull boxes. For material and installation details, see Drawings W771010, W771011, W771012, and W771013, and Specification E-35. Essential features include:

- Rigid steel conduit is zinc-coated, in accordance with ANSI C80.1 and UL-6.
- Intermediate metal conduit and couplings are zinc-coated inside and outside, in accordance with UL-1242.
- Liquid-tight, flexible steel conduit is Sealtite type.
- Cable tray is of the ventilated, ladder-type construction, heavy-duty, aluminum type, 12 or 24 inches in width, consisting of two longitudinal side rails with cross members. All main sections and fittings are made of aluminum alloy 6063-T6.
- The indoor pull box is NEMA Type 12, dust-tight and drip-tight, and galvanized as per ASTM A525.
- The outdoor use pull boxes are NEMA Type 4, water-tight and dust-tight and hot-dipped galvanized after fabrication as per ASTM A386.
- NEMA Type 4X pull boxes are used in corrosive locations.

2.4.12.2 Wiring

Wiring includes power cable, control cable, instrumentation cable, and terminations. For grounding rod and wiring see Section 2.1.9. For details on materials and installations, see Specifications E-38 and E-39. Essential features include:

- Medium voltage power cable is rated at 15 kV.
- Low-voltage power cable is rated at 600 V; minimum cable size is #12 AWG.
- Control cable is rated at 600 V; minimum cable size is #14 AWG.
- Instrumentation cable is rated at 300 V.
• Terminal lugs for #2/0 AWG through #8 AWG power, control, and instrumentation cables are insulated locking spade or ring tongue, compression type.

• Terminals for #6 AWG through 500 kcmil cables are long-barrel compression type with blind ends. Terminals are made of high-conductivity electrolytic copper, electro-tinted plated.

• Cable splices are made using Raychem “thermofit” WCSF tubing.

• Cable ties and cable markers are non-conducting, nonflammable, and self-extinguishing.

• Cable markers are white opaque tags marked with indelible black ink pens.

2.5 CODES AND STANDARDS

The Saltstone electrical system design complies with the following codes and standard. Code of Record for the SSRT Facility can be found in U-TC-Z-00001. Code of Record for the SDU 6 Facility can be found in G-ESR-Z-00013.

ANSI – American National Standard Institute

C34.2-1968  Semiconductor Power Rectifiers, Practices and Requirements (Reaffirmed 1973)

C37.13-1981  Low-Voltage AC Power Circuit Breakers Used in Enclosures

C37.16-1980  Preferred Ratings, Related Requirements and Application Recommendations for Low-Voltage Power Circuit Breakers and AC Power Circuit Protectors


C37.46-1969  Power Fuses and Fuse Disconnecting Switches


C37.90a-1974  Supplement to C37.90

C57.12.01-79  General Requirements for Dry-Type Distribution and Power Transformers

C57.12.70-78  Terminal Markings and Connections for Distribution and Power Transformers
C57.12.91-79  Test Code for Dry-Type Distribution and Power Transformers
C80.1-1983  Rigid Steel Conduit, Zinc Coated

ANSI/ASTM  ANSI /American Society for Testing and Materials
B3-1974  Soft or Annealed Copper Wire
B8-1981  Concentric-Lay-Stranded Copper Conductors
B33-1981  Tinned Soft or Annealed Copper Wire for Electrical Purposes

IEEE – Institute of Electrical and Electronic Engineers
219-1975  Recommended Practice for Loudspeaker Measurements
281-1968  Service Conditions for Power System Communication Apparatus
74-1958  Test Code for Industrial Control (600 V or less) (1974 Rev)

IES – Illumination Engineering Society Lighting Handbook

LPI – Lightning Protection Institute
175-1983  Installation Standard

NACE – National Association of Corrosion Engineers

NEMA / ICEA – National Electrical Manufacturers Association/
Insulated Cable Engineers Association
NEMA  Rubber-insulated Wire and Cable for the Transmission and Distribution of Electrical Energy
WC-3-1980  (Rev. 1-1983)
ICEA S-19-1981
NEMA Thermoplastic-insulated Wire and Cable for the Transmission and Distribution of Electrical Energy
WC-5-1980
NEMA Cross-Linked-Thermosetting-Polyethylene Insulated Cable for Transmission and Distribution of Electrical Energy
WC-7-1971
ICEA S-66-52A

NEMA Molded Case Circuit Breakers
AB-1-1975 (1981 Rev)

NEMA Panel boards
PB-1-1977 (1978 Rev)

NEMA Dry Type Transformers for General Applications
ST-20-1972 (1978 Rev)

NEMA Transformer, Regulators and Reactors
TR-1-1980 (Rev. 2, April 83)

NESC – National Electrical Safety Code (NESC)

NFPA – National Fire Protection Association

70-1984 National Electrical Code (NEC)
78-1983 Lightning Protection Code

OSHA – Occupational Safety and Health Administration Standards

UL - Underwriters’ Laboratories, Inc.

83-1983 Thermoplastic-insulated Wires
6-1981 Rigid Metal Conduit
1242-1983 Standard for Intermediate Metal Conduit
2.6 INSTRUMENTATION AND CONTROL

2.6.1 Instrumentation

Major pieces of power distribution equipment are equipped with local meters. 480 VAC load center B12 displays the incoming system voltage, current, and power, and the current for each of the individual feeders. Transducers are provided for LC B12 incoming line 480 VAC power, current, and voltage for data input to the Saltstone process control system (SPCS).

2.6.2 Control

The Saltstone electrical system provides controls as follows:

- The 480 V load center is equipped with main and feeder breakers, which are closed manually and tripped automatically by a solid-state current-sensing device upon feeder overload or a system fault.
- 480 V MCC motor feeder circuits are equipped with combination starters which consist of a fused disconnect switch and a contactor. The contactor is controlled by signals initiated from SPCS and is protected by an overload heater. The fuse will blow out on a system fault and protect the feeder from damage.
- 480 V MCCs are equipped with fused disconnect switches for feeder circuits such as distribution transformers or packaged systems. The fuses will blow out on a system fault.
- Automatic and manual transfer switches switch the power source from normal to standby.
- 120 VAC or 208 VAC systems are provided with breakers or fuses for control and protection of the feeders.
- Local control switches are provided for the lighting systems.

In addition, the Saltstone electrical system provides input to SPCS, for alarm, indication of system status, and data acquisition in the CCR. Electrical data input to the SPCS includes the following and is shown in Drawing W774059:

- Primary and secondary power system
  - Main transformer high temperature: for alarm
  - Load center 480 V bus undervoltage: for alarm
- 480 V load center B12 incoming line 480 VAC power, current, and voltage: for data acquisition.
- Main and feeder breaker closed or overcurrent trip: for status/alarm

• Standby Generator System
  - Undervoltage relay detects undervoltage from the normal power source at transfer switch ATS-N120: for alarm, signal to start standby generator and transfer of switch position
  - Transfer switch ATS-N120 position: for status with indication of normal or standby source connection

• UPS System
  - UPS Y-100 common trouble: for alarm
## 2.7 SYSTEM INTERFACES

Table 2.7-1 Saltstone Electrical Primary Interfaces

<table>
<thead>
<tr>
<th>Interfacing System</th>
<th>Interfacing Location</th>
<th>Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>G-SD-Z-00001 Z-Area Site Yard</td>
<td>Provide space for construction of a primary and secondary substation. Provide space for installation of electrical equipment and underground duct banks.</td>
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</tr>
<tr>
<td>G-SD-Z-00005 Saltstone HVAC ECR (Bldg. 210-Z) Substation Bldg. (951-Z)</td>
<td>Provide a ventilation system to remove the heat generated by equipment in the electrical equipment room.</td>
<td></td>
</tr>
<tr>
<td>G-SD-Z-00006 Saltstone Support Substation yard</td>
<td>Provide standby power. Provide electrical system interface to the SPCS.</td>
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<tr>
<td>G-SD-Z-00008 Saltstone Fire Protection Substation Bldg. (951-Z)</td>
<td>Provide fire protection to equipment and components of electrical systems.</td>
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</tr>
<tr>
<td>G-SYD-S-00022 DWPF Normal Power S-Area SWGR A2 (951-S)</td>
<td>Provide 13.8 kV normal power.</td>
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### Table 2.7-2 Saltstone Electrical Secondary Interfaces

<table>
<thead>
<tr>
<th>Interfacing System</th>
<th>Interfacing Location</th>
<th>Requirements</th>
</tr>
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<tr>
<td>G-SD-Z-00001</td>
<td>Yard</td>
<td>Provide yard grounding</td>
</tr>
<tr>
<td>Z-Area Site</td>
<td>Security fence Yard</td>
<td>Provide security fence grounding</td>
</tr>
<tr>
<td></td>
<td>L145 (yard) Yard</td>
<td>Provide lighting system</td>
</tr>
<tr>
<td></td>
<td>Y146</td>
<td>- Standby power</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Provide PA systems</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Provide fire alarm system</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- UPS power</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Provide lighting systems with:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Normal power</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Standby power</td>
</tr>
<tr>
<td></td>
<td></td>
<td>All buildings and vault Y146</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Provide telephone &amp; PA systems</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- UPS power</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Provide equipment grounding</td>
</tr>
<tr>
<td>G-SD-Z-00003 Saltstone Process</td>
<td>MCC B121 &amp; B122</td>
<td>Provide normal power to cement/fly ash area equipment</td>
</tr>
<tr>
<td></td>
<td>MCC B124</td>
<td>Provide normal power to premix feed systems</td>
</tr>
<tr>
<td></td>
<td>MCC B124 &amp; B123</td>
<td>Provide normal and standby power to Saltstone transfer system</td>
</tr>
<tr>
<td></td>
<td>MCC B123</td>
<td>Provide speed controllers to grout pump</td>
</tr>
<tr>
<td>Interfacing System</td>
<td>Interfacing Location</td>
<td>Requirements</td>
</tr>
<tr>
<td>--------------------</td>
<td>----------------------</td>
<td>--------------</td>
</tr>
<tr>
<td>G-SD-Z-00003</td>
<td>Process area</td>
<td>Provide lighting system</td>
</tr>
<tr>
<td>Saltstone Process</td>
<td>L142 (210-Z)</td>
<td>- Normal power</td>
</tr>
<tr>
<td>(Cont’d)</td>
<td>L160</td>
<td>- Normal power</td>
</tr>
<tr>
<td></td>
<td>(unloading area)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>L144 (210-Z)</td>
<td>- Standby power</td>
</tr>
<tr>
<td></td>
<td>L145</td>
<td>- Standby power</td>
</tr>
<tr>
<td></td>
<td>(201-Z area)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MCC B124</td>
<td>Provide normal power to CCBT and SFT equipment and heat tracing system</td>
</tr>
<tr>
<td></td>
<td>Process area</td>
<td>Provide power for instrument and control</td>
</tr>
<tr>
<td></td>
<td>Y168 (210-Z)</td>
<td>- Standby power</td>
</tr>
<tr>
<td></td>
<td>Y121 (210-Z)</td>
<td>- Normal power</td>
</tr>
<tr>
<td></td>
<td>Y146 (210-Z)</td>
<td>- UPS power</td>
</tr>
<tr>
<td></td>
<td>Equipment</td>
<td>Provide equipment grounding</td>
</tr>
<tr>
<td></td>
<td>MCC B124 &amp; B123</td>
<td>Provide normal and standby power for the Process Building (210-Z) HVAC</td>
</tr>
<tr>
<td>Saltstone HVAC</td>
<td>Y168 &amp; Y146</td>
<td>Provide standby and UPS power for the Process Building (210-Z) HVAC control</td>
</tr>
<tr>
<td></td>
<td>MCC B126</td>
<td>Provide normal power to the Operations Building (704-Z) HVAC</td>
</tr>
<tr>
<td></td>
<td>MCC B124 &amp; B123</td>
<td>Provide normal and standby power for Operations Building (704-Z) exhaust fans</td>
</tr>
<tr>
<td></td>
<td>Y164</td>
<td>Provide standby power for the Operations Building (704-Z) HVAC control</td>
</tr>
<tr>
<td></td>
<td>MCC B127 &amp; Y300</td>
<td>Provide normal and standby power for the Fire Water Pump House (901-Z) unit heaters and roof exhausters</td>
</tr>
<tr>
<td></td>
<td>MCC B122 &amp; L141</td>
<td>Provide normal power for Substation Building (951-Z) AHU, fan, and strip heaters</td>
</tr>
<tr>
<td></td>
<td>Equipment</td>
<td>Provide equipment grounding</td>
</tr>
</tbody>
</table>
Table 2.7-2 Saltstone Electrical Secondary Interfaces (Cont’d)

<table>
<thead>
<tr>
<th>Interfacing System</th>
<th>Interfacing Location</th>
<th>Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>G-SD-Z-00006</td>
<td>Water tanks</td>
<td>Provide grounding and lightning protection</td>
</tr>
<tr>
<td>Saltstone Support</td>
<td>Water tanks area</td>
<td>Provide lighting systems</td>
</tr>
<tr>
<td></td>
<td>L310 (901-Z)</td>
<td>- Normal power</td>
</tr>
<tr>
<td></td>
<td>MCC B123 (210-Z)</td>
<td>Provide standby power for process water pumps</td>
</tr>
<tr>
<td></td>
<td>MCC B122 (951-Z)</td>
<td>Provide normal power for process and domestic water system heat tracing</td>
</tr>
<tr>
<td></td>
<td>MCC B123 (210-Z)</td>
<td>Provide electrical components and wiring to connect diesel generator system to the electrical standby power system</td>
</tr>
<tr>
<td></td>
<td>SPCS I/O cabinet</td>
<td>Provide status and alarm input to the SPCS</td>
</tr>
<tr>
<td></td>
<td>Y146</td>
<td>Provide 120 VAC uninterruptible power to SPCS equipment</td>
</tr>
<tr>
<td>G-SD-Z-00007</td>
<td>All labs rooms</td>
<td>Provide lighting system</td>
</tr>
<tr>
<td>Saltstone Product</td>
<td>L.165 (704-Z)</td>
<td>- Normal power</td>
</tr>
<tr>
<td>Laboratory</td>
<td>Y166</td>
<td>Provide normal power to lab equipment</td>
</tr>
<tr>
<td></td>
<td>Y164</td>
<td>Provide standby power to lab equipment</td>
</tr>
<tr>
<td>G-SD-Z-00008</td>
<td>MCC B 124 &amp; B123</td>
<td>Provide normal and standby power</td>
</tr>
<tr>
<td>Saltstone Fire</td>
<td>Y146 &amp; Y164</td>
<td>Provide UPS and standby power for the fire alarm system</td>
</tr>
<tr>
<td>Protection</td>
<td>Equipment</td>
<td>Provide equipment grounding</td>
</tr>
<tr>
<td></td>
<td>MCC B125 &amp; Y161</td>
<td>Provide normal power for salt solution transfer line equipment and control</td>
</tr>
<tr>
<td>Salt Solution</td>
<td>MCC B122 &amp; B125</td>
<td>Provide cathodic protection for salt solution transfer pipelines</td>
</tr>
<tr>
<td>Transfer</td>
<td>Equipment</td>
<td>Provide equipment grounding</td>
</tr>
</tbody>
</table>
3.0  OPERATION

The Saltstone electrical system operation includes normal, standby, and shutdown modes. A brief description of the electrical system initial configuration, startup, and operations of the electrical system is given below.

3.1  INITIAL CONFIGURATION

The Saltstone Electrical initial configuration is as follows:

- All electrical equipment and components of the Saltstone electrical system are installed and connected in accordance with single lines and installation drawings.
- The electrical circuit continuity and functional test for equipment and controls are completed in accordance with the design criteria.
- The normal power system is ready to receive normal power from H-Area.
- The standby diesel engine generator system is ready to start, once the starting signal has been initiated.
- All power transfer switches are in the position to receive normal power.
- For the UPS system, backup feed is provided via the UPS Side Car Cabinet. Normal configuration is: BIB closed, MBP Open, MIS closed.
- Z-210000-UPS-BKR-Y100-BIB, Bypass Input Breaker.
- Z-210000-UPS-BKR-Y100-MBP, Maintenance Bypass Switch Breaker
- Z-210000-UPS-BKR-Y100-MIS, Maintenance Isolation Switch Breaker
- All control switches for the process, HVAC, and facility supporting systems are in the off position.

3.2  STARTUP

The Saltstone electrical system startup includes energization of load center B12 at the Substation Building (951-Z), and their associated 480 V MCCs.

3.2.1  Primary and Secondary Power Startup

- Verify that initial configuration requirements are met including 13.8kV power supply from H-Area via Feeder 7A.
- Close 13.8 kV interrupter switch Z953-138-007-00-A.
- Close LC B12 primary 13.8 kV fused interrupter switch Z951-138-001-00-A.
- Close LC B12 main breaker (B12-1B).
- Close LC B12 feeder breakers 2B, 2C, 2D, 4B, 4C, & 4D.
• Close the main breakers at MCCs B123, B124, and B126.
• Close the main disconnect switch at MCC B127.
• Energize required equipment fed from MCCs B121, B122, B123, B124, B126, and B127.

The normal power distribution of the Saltstone electrical system other than in the LPDT area is ready and energized.

3.2.2 Standby Generator Startup

Standby generator startup must be in manual mode, and the generator circuit breaker located on control panel in Substation Building (951-Z) must be in the off position. For detail steps, see Z-Area Saltstone Operating Procedure SOP 956-Z-4290, Section 4.1, Loaded Startup.

3.3 NORMAL OPERATION

Normal operation conditions are as follows:
• LC B12 receives 13.8 kV power and steps down the voltage to 480 VAC.
• MCCs B121 through B127 are energized.
• Standby MCC B123 is energized by the normal power.
• All power transfer switches are in the position for receiving normal power.
• All distribution panels are energized.
• The diesel engine generator is not in operation. Diesel engine and generator are both in the automatic mode (Ref: Saltstone Operating Procedure SOP 956-Z-4290) and the generator breaker is in the closed position.
• UPS power is operated by MCC B123. UPS Y100 static bypass switch is in the closed position and the maintenance bypass switch is in the normal position (i.e., UPS distribution panel Y146 receives power from the UPS).

3.4 SHUTDOWN

Standby diesel generator shutdown mode is detailed in Saltstone Operating Procedure SOP 956-Z-4290, Section 4.3 Diesel Shutdown.

3.5 INFREQUENT OPERATIONS

Infrequent operation is defined as the electrical system operation following the loss of power, from S-Area.
The standby generator control cabinet and the automatic power transfer switch (ATS-N120) are located in the Substation Building (951-Z). When S-Area power source is lost, the undervoltage relay at transfer switch ATS-N120 initiates the following actions:

- All loads from MCC B123 bus are dropped.
- The diesel generator starts automatically and comes up to the rated speed within 15 seconds.
- When the voltage and frequency at the diesel generator reach their rated values, ATS-N120 switches to the standby source and restores power to MCC B123 bus.
- Sequencing loading on the MCC B123 bus starts from a 0-second to a 50-second time delay as specified in Drawing W768591.
- Lighting systems in each building and process area are on the diesel generator power without time delay for selected lighting groups.
- Heat tracing and cathodic protection systems are de-energized.

There is no operational impact on the grounding and the lighting protection systems.

When normal power is restored, switching back to normal power is done manually, as per Shutdown-Automatic Mode, Saltstone Operating Procedure (SOP) 956-Z-4290.
4.0 SETPOINTS, SYSTEM LIMITATIONS, AND PRECAUTIONS

4.1 SETPOINTS

Table 4.1-1 Electrical Device Setpoints

<table>
<thead>
<tr>
<th>Device Tag No.</th>
<th>Description</th>
<th>Setpoint</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>SST-BKR 1B</td>
<td>LC B12 incoming breaker solid state current-sensing and trip device.</td>
<td>LTD*</td>
<td>Trip BKR 1B</td>
</tr>
<tr>
<td>(Westinghouse</td>
<td></td>
<td>STD</td>
<td></td>
</tr>
<tr>
<td>Ampdector, II-A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Typical</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SST-BKR 2B</td>
<td>LC B12 feeder breaker (to transfer switch ATS-N120) solid state current-sensing and trip device</td>
<td>LTD*</td>
<td>Trip BKR 2B</td>
</tr>
<tr>
<td></td>
<td></td>
<td>STD</td>
<td></td>
</tr>
<tr>
<td>SST-BKR 2C</td>
<td>LC B12 feeder breaker (for MCC B126) solid state current-sensing and trip device</td>
<td>LTD*</td>
<td>Trip BKR 2C</td>
</tr>
<tr>
<td></td>
<td></td>
<td>STD</td>
<td></td>
</tr>
<tr>
<td>SST-BKR 2D</td>
<td>LC B12 feeder breaker (for MCC B124) solid state current-sensing and trip device</td>
<td>LTD*</td>
<td>Trip BKR 2D</td>
</tr>
<tr>
<td></td>
<td></td>
<td>STD</td>
<td></td>
</tr>
<tr>
<td>SST-BKR 3B</td>
<td>LC B12 feeder breaker (SPARE) solid state current-sensing and trip device</td>
<td>LTD*</td>
<td>Trip BKR 3B</td>
</tr>
<tr>
<td></td>
<td></td>
<td>STD</td>
<td></td>
</tr>
<tr>
<td>SST-BKR 3C</td>
<td>LC B12 feeder breaker (SPARE) solid state current-sensing and trip device</td>
<td>LTD*</td>
<td>Trip BKR 3C</td>
</tr>
<tr>
<td></td>
<td></td>
<td>STD</td>
<td></td>
</tr>
<tr>
<td>SST-BKR 4B</td>
<td>LC B12 feeder breaker (for MCC B121) solid state current-sensing and trip device</td>
<td>LTD*</td>
<td>Trip BKR 4B</td>
</tr>
<tr>
<td></td>
<td></td>
<td>STD</td>
<td></td>
</tr>
<tr>
<td>SST-BKR 4C</td>
<td>LC B12 feeder breaker (for MCC B122) solid state current-sensing and trip device</td>
<td>LTD*</td>
<td>Trip BKR 4C</td>
</tr>
<tr>
<td></td>
<td></td>
<td>STD</td>
<td></td>
</tr>
<tr>
<td>SST-BKR 4D</td>
<td>LC B12 feeder breaker (for MCC B127) solid state</td>
<td>LTD*</td>
<td>Trip BKR 4D</td>
</tr>
<tr>
<td></td>
<td></td>
<td>STD</td>
<td></td>
</tr>
<tr>
<td>Device Tag No.</td>
<td>Description</td>
<td>Setpoint</td>
<td>Function</td>
</tr>
<tr>
<td>---------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>-----------------------------------------------</td>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>26-X12</td>
<td>current-sensing and trip device</td>
<td>220 deg C/428 deg F EE-22007-117/W774059</td>
<td>Alarm at CCR</td>
</tr>
<tr>
<td>51V-DG (GE IFCV51)</td>
<td>Voltage-controlled overcurrent relay at the diesel generator terminal (located at the generator control panel in 951-Z)</td>
<td>TAP 5.000 TD 3.000 (E-EC-Z-0002)</td>
<td>Trip diesel generator BKR on phase fault</td>
</tr>
<tr>
<td>ATS-N120 (ASCO)</td>
<td>Transfer switch with voltage- and frequency-sensing device and timer</td>
<td>See note below</td>
<td>Start DG and ATS-N120 to standby power</td>
</tr>
</tbody>
</table>

**Note:**
- Voltage sensing: Normal P.U. in % (90), D.O. in % (85)
- Emergency: P.U. in % (90)
- Frequency sensing: Emergency: P.U. in % (95)
- Time delay: Override: in sec (1)
  - Retransfer: in min (not used)
  - Cool down: in min (not used)
  - Transfer to emergency: in min (0) (E-EC-Z-0002)

*See E-EC-Z-0001 for setpoints*

4.2 SYSTEMS LIMITATIONS AND PRECAUTIONS

The Saltstone electrical system is designed to provide sufficient electric energy for the Saltstone Facility. There are no electrical limitations during normal operation. However, there are restrictions when an electrical system upset occurs. Electrical system upsets are described in Section 5.0.
5.0 SYSTEM UPSETS AND RECOVERY SEQUENCES

The Saltstone electrical system is designed to tolerate upsets occurring at the process, HVAC, and other supporting systems. System upsets and recovery sequences are described below.

5.1 LOSS OF 13.8 KV NORMAL POWER

Loss of 13.8 kV normal power may be caused by a loss of source power at H-Area, an electrical system fault that trips the LC B12 main breaker, or a failure of main transformer X12. Upon loss of normal power, the standby electrical system takes over, as described in Section 3.5, Infrequent Operation.

5.2 ELECTRICAL SYSTEM FAULT

An electrical fault in the distribution circuit is isolated by tripping the associated MCC feeder breaker at the load center B12, or by a blown fuse at the associated feeder at the MCC. Thus, loss of power is localized, and only the associated process is shut down. For selected equipment, the system provides redundant power to ensure reliability of operation. Transfer to redundant power is achieved by means of a transfer switch. Equipment, normal power, redundant power, and transfer switch number configuration are given in Table 5.2-1 “List of Equipment with Redundant Power Source.”
<table>
<thead>
<tr>
<th></th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Z-210-EEP-UJX-0100 Uninterruptible Power Supply, Y100</td>
<td>B123-7C</td>
<td>B124-6E</td>
<td>N/A</td>
</tr>
</tbody>
</table>
6.0 MAINTENANCE
Saltstone electrical equipment maintenance will follow the SRS maintenance practices.

6.1 PREVENTIVE MAINTENANCE, INSPECTION, AND SURVEILLANCE
The Saltstone electrical system does not have totally redundant electrical equipment. Normal preventive maintenance can be performed between batch processing. For UPS maintenance procedures, see Saltstone Operation Procedure SOP 210-Z-4385, “Uninterruptible Power Supply Operation.”

6.2 CORRECTIVE MAINTENANCE
There are no specific corrective maintenance requirements in the design features.
Figure 1 Simplified Saltstone Electrical Single Line Diagram
Figure 2 Saltstone Electrical Power Flow Block Diagram
7.0 APPENDICES
7.1 REFERENCES

7.1.1 Saltstone Electrical Operation References

SOP 956-Z-4290  Standby Diesel Generator Manual/Auto Operation
SOP 200-Z-3100  Saltstone Facility Planned Power Outage
SW24.4-AOP-12  Saltstone Response to an Area Power Failure
SOP 210-Z-4385  Uninterruptible Power Supply Operation

7.1.2 Saltstone Electrical Design References

The Saltstone electrical system design studies and calculations are as follows:

13239-E-21  Load Summary
13239-E-22 (a)  Short Circuit Study for LC B12
13239-E-22 (b)  Short Circuit Study for MCC B125
13239-E-23 (a)  LC B12 Voltage Regulation Study
13239-E-23 (b)  MCC B125 Voltage Regulation Study
13239-E-24  Relay Coordination
13239-E-25  Grounding Calculation for Z-Area

7.1.3 Other

E-DCF-Z-00408  PLACE SFT AGITATOR INTO LONG-TERM ISOLATION
E-DCF-Z-00414  SDU 7 Utilities Re-route SDD Modification
E-DCF-Z-00419  CHANGE TO SALTSTONE ELECTRICAL SYSTEM DESCRIPTION
G-DCF-Z-00039  Saltstone Facility System Description Document Updates
### 7.2 PARAMETERS LIST

Table 7.2-1 Saltstone Voltage and Frequency Regulation Requirements

<table>
<thead>
<tr>
<th>Load Classification</th>
<th>Nominal Voltage</th>
<th>Nominal Frequency</th>
<th>Voltage Regulation</th>
<th>Frequency Regulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medium-Voltage Power</td>
<td>13,800 VAC</td>
<td>60 Hz</td>
<td>+5% -10%</td>
<td>+1.0 Hz -1.0 Hz</td>
</tr>
<tr>
<td>Low-Voltage Power</td>
<td>480/208/120 V, 240 VAC</td>
<td>60 Hz</td>
<td>+5% -10% +10% -15%</td>
<td>+1.0 Hz -1.0 Hz +1.0 Hz -1.0 Hz</td>
</tr>
<tr>
<td>Lighting</td>
<td>208 V, 120 VAC</td>
<td>60 Hz</td>
<td>+5% -10% +10% -15%</td>
<td>+1.0 Hz -1.0 Hz +1.0 Hz -1.0 Hz</td>
</tr>
<tr>
<td>Unregulated Instrument Power</td>
<td>120 VAC</td>
<td>60 Hz</td>
<td>+5% -10% +10% -15%</td>
<td>+1.0 Hz -1.0 Hz +1.0 Hz -1.0 Hz</td>
</tr>
<tr>
<td>Regulated Instrument Power</td>
<td>120 VAC</td>
<td>60 Hz</td>
<td>+2% -2% +2% -2%</td>
<td>+1.0 Hz -1.0 Hz +1.0 Hz -1.0 Hz</td>
</tr>
<tr>
<td>UPS Power</td>
<td>120 VAC</td>
<td>60 Hz</td>
<td>+2% -2% +2% -2%</td>
<td>+0.1% -0.1% +0.1% -0.1%</td>
</tr>
</tbody>
</table>

Note: These requirements do not apply to transients caused by switching operation, large motor starting, etc.
7.3 DRAWINGS AND SPECIFICATIONS

7.3.1 Saltstone Electrical Reference Drawings

**Site Drawings**
- W780450  Z-Area Master Plan
- W780451  Z-Area Site Plan

**Power Distribution System Drawings**
- W770090  Symbols & Legend of Electrical S/L & Schematic Diagrams
- W771010  General Area – Raceway Symbols Notes & Details, Sheet 1 of 4
- W771011  General Area – Raceway Symbols Notes & Details, Sheet 2 of 4
- W771012  General Area – Raceway Symbols Notes & Details, Sheet 3 of 4
- W771013  General Area – Raceway Symbols Notes & Details, Sheet 4 of 4
- W771635  Electrical Distribution Lines 13.8 kV Saltstone & Low Pt. Drain Tk. Power Distribution
- W774001  Saltstone Process Facilities Primary and Secondary Substation Main Single Line Diagram
- W774002  Primary & Secondary Substation Bldg. S/L Meter & Relay Diagram 480 V Load Center B12 & Standby D/G G050
- W774003  Primary & Secondary Substation Bldg. S/L Diagram 480 V MCC B121
- W774004  Primary & Secondary Substation Bldg. Single Line Diagram 480 V MCC B122
- W774005  Process Building Single Line Diagram 480 V MCC B123 (Standby Power)
- W774006  Process Building Single Line Diagram 480 V MCC B124, Sheet 1
- W774008  Saltstone Process Bldg. Single Line Diagram 120/208 VAC UPS System
- W774010  Process Building Single Line Diagram 480 V MCC B124 Sheet 2
- W774011  Fire Pump House Single Line Diagram 480 V MCC B127
- W774012  Fire Pump Building Panel Schedules & Block Diagram
- W774059  Schematic Diagram Electrical System PC Input
- W774340  Operations Building Single Line Diagram 480 V MCC B126
- W774350  Operations Building Single Line Diagram 480 V MCC B126
- W774356  Operations Building Panel Schedules
- W774236  Electrical Distribution Lines Yard Duct Bank Plan
- E-E2-Z-00023  SDU 3 and 5 Main Single Line Diagram
7.3.1 Saltstone Electrical Reference Drawings (Cont’d)

<table>
<thead>
<tr>
<th>Drawing Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>E-ER-Z-00022</td>
<td>SDU 5, Pad 4 Plan &amp; Bom</td>
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<tr>
<td>E-E2-Z-00021</td>
<td>Vault 2A/2B Main Single Line Diagram</td>
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<td>E-E2-Z-00022</td>
<td>Salt Solution Receipt Tank Main Single Line Diagram</td>
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<td>E-E2-Z-00024</td>
<td>SDU 6 Main Single Line Diagram</td>
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Power Distribution System Drawings (Cont’d)

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<td>W774237</td>
<td>Electrical Distribution Lines Yard Duct Bank Sections</td>
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<td>W774238</td>
<td>Electrical Distribution Lines Underground Manhole Developed Plan</td>
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<td>W774239</td>
<td>Electrical Distribution Lines Manhole and Tele Manhole Developed Plan</td>
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<td>W774240</td>
<td>Electrical Distribution Lines Manhole and Detail</td>
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<td>W774241</td>
<td>Electrical Distribution Lines Yard Pole Line Plan, Sheet 1 of 2</td>
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<td>W774245</td>
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Lighting System Drawings

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<td>E-E1-Z-00015</td>
<td>Saltstone Facility SDU 7 Permanent Power 13.8kv &amp; 208v Overhead and Underground Plan Pole Lighting &amp; Grounding Details/Materials</td>
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<td>E-E4-Z-00119</td>
<td>SDU 6 Balance of Plant, Schematic Diagram - Lighting</td>
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<td>E-E4-Z-00141</td>
<td>SDU 7 Balance of Plant, Schematic Diagram - Lighting</td>
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<td>E-EB-Z-00027</td>
<td>SDU 6, Balance of Plant, Cable Block Diagram - Lighting - Electrical</td>
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<td>E-EB-Z-00045</td>
<td>Z Area Saltstone Disposal Area SDU 7 Balance of Plant Cable Block Diagram Lighting - Electrical (U)</td>
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<td>E-EG-Z-0002</td>
<td>Saltstone Vault No 4 Grounding, Lighting and Receptacle Plan (U)</td>
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<td>E-EL-Z-00015</td>
<td>Z Area Saltstone Disposal Unit SDU 6 Balance of Plant Lighting Plan</td>
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<td>E-EL-Z-00017</td>
<td>Z Area Saltstone Disposal Unit SDU 7 Balance of Plant Lighting Plan</td>
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<td>E-EL-Z-00018</td>
<td>SDU 7 Roadway Lighting Plan</td>
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<td>E-EL-Z-00019</td>
<td>Z-Area Support Trailer Complex Lighting Schematic and Block Diagram</td>
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E-EL-Z-00020  Z-Area Support Trailer Complex - Lighting and Routing Plans
E-ER-Z-00019  SSRTs Equipment, Raceway, Instrument, and Raceway Plan and Cable Tray Plan
E-ER-Z-00020  Saltstone Facility - SDU 3 CCTV, Lighting, TMS & Miscellaneous Equipment Tray and Raceway Plan Electrical (U)
E-ES-Z-00018  Saltstone Facility SDU 3 and 5, Pads 4 and 5 Power Distribution and Lighting Panels ELLV-PNL-0001, 0002, 0003 Panel Schedules - Electrical (U)
E-ES-Z-00029  SDU 7 BOP 208v Lighting Panels 1 & 2 Panel Schedules
W771003  General Area – Lighting Symbols Notes & Details, Sheet 1 of 3
W771004  General Area – Lighting Symbols Notes & Details, Sheet 2 of 3
W771005  General Area – Lighting Symbols Notes & Details, Sheet 3 of 3
W771022  General Area – Lighting Fixture Schedule, Sheet 2 of 3
W771023  General Area – Lighting Fixture Schedule, Sheet 3 of 3
W774208  Saltstone Process Building – 210-Z Lighting Plan
W774209  Saltstone Process Building – 210-Z Lighting Plan
W774212  Saltstone Process Building-210Z & Admixture Feed Tank Area Grounding and Lighting Protection Partial Plan E&I Electrical
W774214  HEPA Filter and Admixture Tank Area Lighting Plan
W774217  Process Building & Holding Tanks Area Lighting Panel Schedules SRS-200Z Area DWPF-Saltstone E&I Electrical
W774232  Domestic and Process Water Storage Tanks Grounding and Lighting Protection Plan
W774233  Bulk Material Handling Unloading Shed and Control Office Lighting Plan
W774234  Bulk Material Handling Unloading Cement & Flyash Silos Platforms Lighting Plan
W774235  Saltstone Unloading Area, Substation, LPDT & Disposal Vault #1 Lighting Panel Schedules E&I Electrical (U)
W774251  Site Facilities Security Fence Lighting Plan
W774252  Site Facilities Yard Lighting Plan
7.3.1 Saltstone Electrical Reference Drawings (Cont’d)

**Lighting System Drawings (Cont’d)**

- W774266 Z-Area Pump House Lighting, Comm, Fire Alarm and Telephone Plan
- W774267 Z-Area Pump House Grounding and Lighting Protection Plan
- W774272 Clean Cap Batch and Salt Feed Tanks Area Lighting Plan
- W774285 Bulk Material Handling Unloading Shed & Control Office Grounding and Lighting Protection Plan
- W772354 Operations Building Lighting Plan
- W774356 Operations Building Lighting & Distribution Panel Schedules SRS-200Z Area-Saltstone E&I Electrical

**Communication System Drawings**

- W771015 General Area – Comm & Alarm Systems, Symbols, Notes & Details, Sheet 1 of 2
- W771016 General Area – Comm & Alarm Systems, Symbols, Notes & Details, Sheet 2 of 2
- W774048 Communication and Fire Alarm System, 210-Z Building
- W774066 Communication & Fire Alarm System Schematic & Connection Diagram Area 205Z & 951Z Fire Alarm System (U)
- W774221 Process Building Layout Plan Communication System (U)
- W774222 Communication and Alarm System Riser Diagram – PA System
- W774224 Communication & Alarm System Riser Diagram Fire Alarm System (U)
- W774227 Communication and Alarm System Riser Diagram – Telephone System
- W774228 Primary and Secondary Substation Fire Alarm and Communication Layout (U)
- W774266 Z Area Pump House Lighting, Comm, Telephone Plan & Riser Diagrams
- W774281 Bulk Mat Handling Unloading Shed & Control Office__(U) Communication & FA System Layout
- W774352 Communication and Telephone and Alarm System Riser Diagram – Operations Building

**Heat Tracing System Drawings**

- W771050 General Area – Heat Tracing Symbols Notes & Details, Sheet 1 of 3
- W771051 General Area – Heat Tracing Symbols Notes & Details, Sheet 2 of 3
W771052  General Area – Heat Tracing Symbols Notes & Details, Sheet 3 of 3
W774091  Heat Tracing System Diagram
W774092  Heat Tracing System Diagram
W774093  Heat Tracing System Diagram
W774094  Heat Tracing – Eng. Requirements
W774289  Z-Area Fire Pump House Heat Tracing Diagrams
W774290  Domestic (abandoned in place) & Process Water Storage Tanks Heat Tracing Diagrams Low Pressure & Domestic Water Lines
7.3.1 Saltstone Electrical Reference Drawings (Cont’d)

Heat Tracing System Drawings (Cont’d)

W774291 Salt Solution Tank/Feed Pump/Vent Mist Eliminator Heat Tracing Diagrams – Low Pressure Process/Salt Solution Process
W774293 Admixture Feed Tank and Gas Area Heat Tracing Diagram Set Retardant Lines
W774294 Salt Solution Hold Tank/Vent Mist Eliminator Heat Tracing Diagram Saltstone Process Vent Lines
W774295 Inter-area Lines & Auxiliary Facility Heat Tracing Diagram Saltstone Process Vent Lines
W774296 Heat Tracing Circuit Schedules
W774297 Heat Tracing System Diagram
W774298 Heat Tracing System Diagram
W774299 Heat Tracing System Diagram
E-EH-Z-00006 SSRT System Heat Tracing and Schematic Diagram

Cathodic Protection System Drawings

W774015 Underground Cathodic Protection System Symbols, Notes & Details
W774016 Underground Cathodic Protection System Details
W774256 Z-Area In-Plant Cathodic Protection System Plan
W774257 Inter-area Pipeline Cathodic Protection System Plan & Distribution Diagrams

Grounding & Lightning Protection System Drawings

W771006 General Area – Grounding Symbols Notes and Details, Sheet 1 of 3
W771007 General Area – Grounding Symbols Notes & Details, Sheet 2 of 3
W771008 General Area – Grounding Symbols Notes & Details, Sheet 3 of 3
W771009 General Area – Lighting Protection Symbols Notes & Details
W774211 Saltstone Process Building-210Z Grounding Plan (U)
W774212 Saltstone Process Bldg. – 210-Z & Admixture Feed Tank (abandoned in place) Area Grounding and Lighting Protection Partial Plan
7.3.1 Saltstone Electrical Reference Drawings (Cont’d)

Grounding & Lightning Protection System Drawings (Cont’d)

- W774213 Saltstone Process Bldg. – 210-Z & Lighting Protection Plan Roof Elevation
- W774253 Site Facilities Yard Grounding Plan
- W774254 Site Facilities Security Fence Grounding Plan
- W774260 Saltstone Disposal Vault Grounding Plan
- W774263 Primary and Secondary Substation Grounding Layout
- W774273 SSHT & FWRT (SFT) Area Grounding Plan
- W774285 Bulk Material Handling Unloading Shed & Control Office Grounding and Lightning Protection Plan
- W774286 Bulk Material Handling Unloading Area Storage Silos Grounding and Lightning Protection Plan
- W774357 Operations Building Lightning Protection and Grounding Plan
- E-EG-Z-00008 CBU Waste Solidification Projects Saltstone Vaults 2A and 2B - Pad 1 And Pad 2 Grounding Details Electrical (U)
- E-EG-Z-00009 CBU Waste Solidification Projects Saltstone Vaults 2A and 2B Pad 3 Grounding Details (U) Electrical
- E-EG-Z-00010 SSRT Enclosure Grounding and Lightning Protection
- E-EG-Z-00012 CBU Waste Solidification Projects Saltstone SDU 3 Pad 5 Grounding Details Electrical (U)
- E-EG-Z-00013 CBU Waste Solidification Projects, Saltstone SDU 5, Pad 4 Grounding Details, Electrical (U)
- E-EG-Z-00014 SDU 6 Balance of Plant Grounding Plan
- E-EG-Z-00015 SDU 3 and 5 Balance of Plant Grounding Plan

7.3.2 Saltstone Electrical Specifications

- 13239-E-6 Technical Specification for 480 V Load Center Unit Substations
- 13239-E-8 Technical Specification for Public Address and Warning System
- 13239-E-9 Technical Specification for 600 V Power and Control Cable
- 13239-E-14 Technical Specification for Uninterruptible Power Supply Systems
- 13239-E-19 Technical Specification for Motor Control Centers – 600 V Class
7.3.2 Saltstone Electrical Specifications (Cont’d)

13239-E-33 Technical Specification for Furnishing and Installation of Yard/Fence Lighting

13239-E-35 Technical Specification for Furnishing and Installation of Raceway System and Miscellaneous Devices

13239-E-39 Technical Specification for Furnishing and Installation of Grounding System

13239-E-40 Technical Specification for Furnishing and Installation of Lighting System

13239-E-41 Technical Specification for Installation of Electrical Equipment

13239-E-42 Technical Specification for Furnishing and Installation of Inter-area Cathodic Protection System


7.3.3 Saltstone Electrical Equipment List

A current list of Saltstone electrical equipment is identified in the site Asset Information Management System database.