M-SD-J-00006
Revision: 3
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SALT WASTE PROCESSING FACILITY PROJECT

MATERIAL HANDLING

SYSTEM DESCRIPTION

Prepared, reviewed, and accepted by:

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This Document Affected By	
Design Change Document	Initial/Date

SUMMARY OF CHANGES

Revision No.	Date	Description of Change
0	07/09/2008	Initial Issuance.
1	07/16/2015	Revised per DCN-1515, updated to reflect current equipment configuration and operation. Complete rewrite no revision bars shown.
2	10/25/2016	Revised per DCN-1584, DCN-1588, DCN-1596, DCN-1628, DCN-1629, and FCN-1949.
3	08/26/2019	Revised per DCN-1796, DCN-1933, DCN-1993, DCN-2005, DCN-1931, DCN-2101, DCN-2194, and DCN-2241.

TABLE OF CONTENTS

1.0 SCOPE 1

2.0 GENERAL OVERVIEW 2

3.0 PROCESS BUILDING BRIDGE CRANES 10

3.1 System Functions 10
3.2 Operational Overview 10
3.3 Configuration Information 11
3.3.1 Description of System 11
3.3.2 Major Components 12
3.3.3 Physical Location and Layout 13
3.3.4 System Control Features and Interlocks 14
3.4 Operations 15
3.4.1 Initial Configuration 15
3.4.2 System Startup 15
3.4.3 Normal Operations 15
3.4.4 Off-Normal and Recovery Operation 16
3.4.5 System Shutdown 17

4.0 MONORAIL, HOIST, AND MATERIAL HANDLING EQUIPMENT 17

4.1 System Functions 17
4.2 Operational Overview 17
4.3 Configuration Information 20
4.3.1 Description of System 20
4.3.2 Physical Location and Layout 20
4.3.3 System Control Features and Interlocks 20
4.4 Operations 22
4.4.1 Initial Configuration 22
4.4.2 System Startup 22
4.4.3 Normal Operations 22
4.4.4 Off-Normal and Recovery Operation 24

5.0 LABORATORY MATERIAL HANDLING EQUIPMENT 25

5.1 System Function 25
5.2 Operational Overview 25
5.3 Configuration Information 25
5.3.1 Description of System 25
5.3.2 Major Components 26
5.3.3 Physical Location and Layout 26

6.0 REFERENCES 27

TABLE OF CONTENTS (cont.)

List of Figures

Figure 2-1. Operating Deck Crane 7
Figure 2-2. Alpha Finishing Facility Crane 8
Figure 2-3. Hot Cell Crane 9

List of Tables

Table 2-1. Material Handling Equipment 2
Table 3-1. Functional Requirements 10
Table 3-2. Drawings/Diagrams 13

ACRONYMS AND ABBREVIATIONS

%	Percent
AFF	Alpha Finishing Facility
ASME	American Society of Mechanical Engineers
ASP	Alpha Strike Process
CCA	Cold Chemicals Area
CCTV	Closed-circuit Television
CFFMHE	Cross-flow Filter Material Handling Equipment
CMAA	Crane Manufacturers Association of America
CPA	Central Processing Area
CR	Control Room
CSSX	Caustic-side Solvent Extraction
FSA	Facility Support Area
ft	Feet/Foot
HEPA	High-Efficiency Particulate Air
lb	Pound
MCC	Motor Control Center
P&VG	Pump and Valve Gallery
SD	System Description
SLD	Special Lifting Device
SQL	Structured Query Language
STS	Sample Transfer System
SWPF	Salt Waste Processing Facility
WTE	Waste Transfer Enclosure

1.0 SCOPE

This Salt Waste Processing Facility (SWPF) Material Handling System Description (SD) includes the material handling equipment within the SWPF Process Building.

The Material Handling system interfaces with components in the following System Descriptions:

- E-SD-J-00002, *SWPF Electrical System Description*[1].
- F-SD-J-00001, *SWPF Fire Detection/Protection System Description*[2]
- X-SD-J-00001, *SWPF Alpha Strike Process System Description*[3]
- X-SD-J-00002, *SWPF Caustic-side Solvent Extraction System Description*[4]
- X-SD-J-00003, *SWPF Cold Chemicals Area System Description*[5]
- X-SD-J-00004, *SWPF Alpha Finishing Process System Description*[6]
- X-SD-J-00005, *SWPF Drains System Description*[7]
- X-SD-J-00006, *SWPF Sampling System Description*[8]
- X-SD-J-00007, *SWPF Air Pulse Agitators System Description*[9]

The safety analysis requirements related to system functions for this system are documented in Chapter 4 of S-SAR-J-00002, *SWPF Documented Safety Analysis*[10].

The safety analysis requirements related to operability for this system are documented in Chapter 5 of S-SAR-J-00002[10].

The discreet project design requirements for this system are documented in P-DB-J-00002, *SWPF Design Criteria Database*[11].

As part of the maintenance of the SWPF Master Equipment List (see PP-EN-5042, *Master Equipment List*[12]), all permanent plant equipment is assigned a unique tag number. Each component (equipment, instrumentation, specialty item, etc.) is assigned to one (and only one) CSE system code. Structured Query Language (SQL) reports are generated (real time) off the controlled Master Equipment List. These are filterable by CSE system. A complete listing of all components associated with this system can be found using the following reports, and filtering by MHD:

- MEL Cables
- MEL Equipment
- MEL Instruments
- MEL Lines
- MEL Manual Valves
- MEL Specialty Item

Similarly, all essential and support drawings are coded to the appropriate CSE system code (with only one code allowed per drawing). Using the following link: Drawing Category Status, a report may be generated for MHD and selecting the drawing type (Essential, Support). Reference drawings are not assigned System Codes and not required to be maintained current with facility modifications per PP-EN-5001, *Design Control*[12] and P-CDM-J-00001, *Configuration Management Plan*[13].

2.0 GENERAL OVERVIEW

The Process Building material handling equipment includes the top-running and under-hung bridge cranes, enclosed-track manual bridge cranes, monorail systems with hoists, and an equipment lift. This SD also includes other material handling equipment, including Manipulators, Radiohoods and Gloveboxes, and the portable lifting/transportation equipment. Table 2-1 lists the Process and Compressor Building material handling equipment.

Table 2-1. Material Handling Equipment

Equipment Description	Process Area	Tag Number	Capacity (Tons) unless otherwise specified
Bridge Crane	Operating Deck	BC-101	20/7.5/1
Bridge Crane	Laboratory Hot Cells	BC-102	½
Bridge Crane	Alpha Finishing Facility (AFF)	BC-505	5
Bridge Crane / Hoist	South Alpha Strike Process (ASP) Gallery	BC-103A/B BC-108A/B	1
Bridge Crane / Hoist	South ASP Gallery	BC-104 A/B	1
Bridge Crane / Hoist	North ASP Gallery	BC-105 A/B	1.2
Bridge Crane / Hoist	North ASP Gallery	BC-106 A/B	1.2
Bridge Crane / Hoist	North ASP Gallery	BC-107 A/B	1
Bridge Crane / Hoist	Caustic-side Solvent Extraction (CSSX) Pump and Valve Gallery (P&VG)	BC-109 A/B	1
Bridge Crane / Hoist	CSSX P&VG	BC-110 A/B	1
Bridge Crane / Hoist	CSSX P&VG	BC-111 A/B	1
Bridge Crane / Hoist	CSSX P&VG	BC-112 A/B	1
Bridge Crane / Hoist	CSSX P&VG	BC-113 A/B	1
Bridge Crane / Hoist	CSSX P&VG	BC-114 A/B	1
Bridge Crane / Hoist	North ASP Gallery	BC-115 A/B	1
Bridge Crane / Hoist	North ASP Gallery	BC-116 A/B	1.2

Table 2-1. Material Handling Equipment (cont.)

Equipment Description	Process Area	Tag Number	Capacity (Tons) unless otherwise specified
Bridge Crane / Hoist	North ASP Gallery	BC-117 A/B	1.2
Equipment Lift	Controlled Entry Area	EL-101	2.5
Manipulator Lift	Laboratory	ML-101	2
Monorail with Hoist	CSSX Operating Floor Contactor Area	MR-102A	1
Monorail with Hoist	CSSX Operating Floor Contactor Area	MR-102B	1
Monorail with Hoist	CSSX Tank Cell Operating Deck	MR-103	5
Monorail with Hoist	CSSX Contactor Drop Area	MR-104	2
Monorail with Hoist	Sample CSSX P&VG	MR-113	700 lbs
Monorail with Hoist	Truck Bay	MR-116	15
Monorail with Hoist	Waste Transfer Access	MR-117	5
Monorail with Hoist	Labyrinth	MR-120	700 lbs
Monorail with Hoist	Drum-Off Room	MR-121	1
Monorail with Hoist	Cold Chemicals Area (CCA)	MR-301	1
Monorail with Hoist	CCA	MR-302	500 pounds (lbs)
Monorail with Hoist	Compressor Building	MR-401	3
Monorail with Hoist	AFF	MR-501	500 pounds (lbs)
ASP Filter Cask	Central Processing Area (CPA)	CA-101	------
Contactor Transport Cart	CSSX Contactor Drop Area	CTC-101	2
Contactor Transport Cart	South ASP Gallery Contactor Drop Area	CTC-102	2
ASP Cask Transporter	CPA	CTR-101	12.5
Roll Conveyor	Drum-Off Room	CV-006	1
Drum Carrier	CPA	DC-102	1,000 lbs
Dock Leveler	Truck Bay	DL-101	22.5
Dock Leveler	Truck Bay	DL-102	22.5
Drum Tumbler	CCA Warehouse	DT-311	400 lbs/1,000 lbs
Elevated Working Platform	Spare	EWP-101	350 lbs
Elevated Working Platform	CPA	EWP-102	1000 lbs
Elevated Working Platform	CPA	EWP-103	500 lbs

Table 2-1. Material Handling Equipment (cont.)

Equipment Description	Process Area	Tag Number	Capacity (Tons) unless otherwise specified
Forklift	Truck Bay	FL-101A	3
Forklift	CCA	FL-102A	3
Special Lifting Device (SLD)	CPA	SLD-101	2
SLD	CPA	SLD-103	3
SLD	Decontamination Room	SLD-104	3
SLD	Spare	SLD-105	1
SLD	West CSSX Tank Cell	SLD-501	1
SLD	CPA	SLD-107	1
SLD	Spare	SLD-108	1
SLD	Spare	SLD-109	1
Sample Transfer Cart	Laboratory	DC-101	1
Sample Transfer System	Laboratory	STS-101	75 lbs
Transport Cart	CPA	TC-101	1
Transport Cart	CPA	TC-102	1
Transport Cart	AFF	TC-103	1
Transport Cart	CPA	TC-104	2.4
Transport Cart	CPA	TC-105	2
Transport Cart	AFF	TC-106	5
Transport Cart	CPA	TC-108	1.2
Transport Cart	CPA	TC-109	1
Transport Cart	CCA	TC-110	1
Transport Cart	CSSX Tank Cell Area	TC-111	1
Transport Cart	Laboratory Hot Cell	TC-112	100 lbs
Transport Cart	CPA Hot Cell	TC-113	1,400 lbs
Transport Cart	CCA	TC-302	1
Transport Cart	Compressor Building	TC-401	5
Transport Cart	West CSSX Tank Cell	TC-501	1,500 lbs
Contactor Oven Cart	CPA	COC-001	N/A
Contactor Test Stand	CPA	CSTD-001	N/A
Contactor Maintenance Cart	CPA	CMC-001	N/A
Radiohood	CPA, Laboratory	RH-001	N/A

Table 2-1. Material Handling Equipment (cont.)

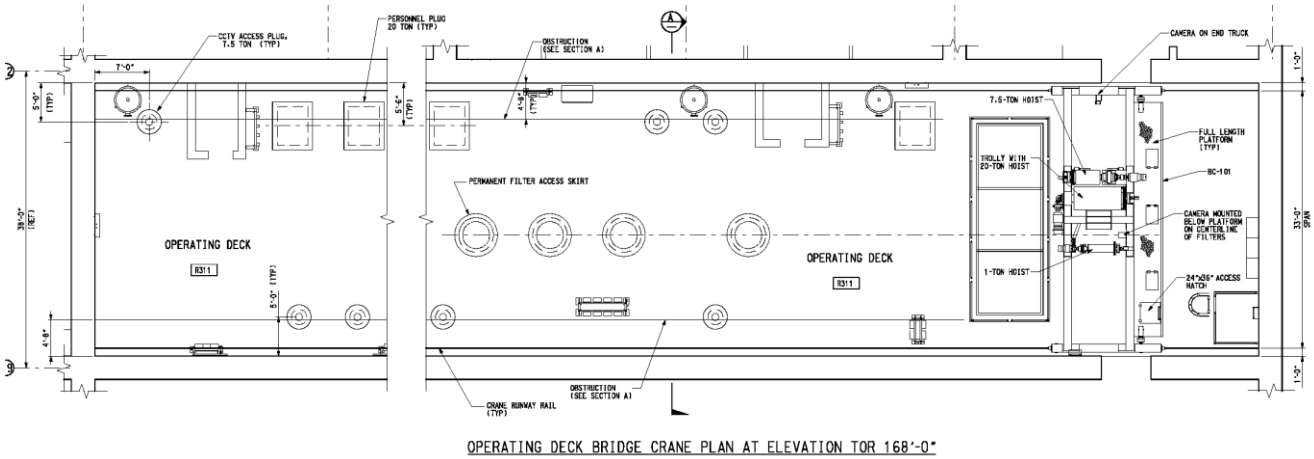
Equipment Description	Process Area	Tag Number	Capacity (Tons) unless otherwise specified
Radiohood	CPA, Laboratory	RH-002	N/A
Radiohood	CPA, Laboratory	RH-003	N/A
Radiohood	CPA, Laboratory	RH-004	N/A
Radiohood	CPA, Laboratory	RH-005	N/A
Radiohood	CPA, Laboratory	RH-006	N/A
Radiohood	CPA, Laboratory	RH-007	N/A
Radiohood	CPA, Laboratory	RH-008	N/A
Radiohood	CPA, Laboratory	RH-009	N/A
Radiohood	CPA, Laboratory	RH-010	N/A
Radiohood	CPA, Laboratory	RH-011	N/A
Radiohood	CPA, Laboratory	RH-012	N/A
Radiohood	CPA, Laboratory	RH-013	N/A
Radiohood	CPA, Laboratory	RH-014	N/A
Radiohood	CPA, Laboratory	RH-015	N/A
Radiohood	CPA, Laboratory	RH-016	N/A
Radiohood	CPA, Laboratory	RH-017	N/A
Fumehood	Cold Chemicals Laboratory	FH-001	N/A
Glovebox	CPA, Laboratory	GB-001	N/A
Glovebox	CPA, Laboratory	GB-002	N/A
Glovebox	CPA, Laboratory	GB-003	N/A
Glovebox	CPA, Laboratory	GB-004	N/A
Glovebox	CPA, Laboratory	GB-005	N/A
Glovebox	CPA, Laboratory	GB-006	N/A
Glovebox	CPA, Laboratory	GB-007	N/A
Glovebox	CPA, Laboratory	GB-008	N/A
Glovebox	CPA, Laboratory	GB-009	N/A
Glovebox	CPA, Laboratory	GB-010	N/A
Glovebox	CPA, Laboratory	GB-011	N/A
Glovebox	CPA, Laboratory	GB-014	N/A
Manipulator	CPA, Laboratory	MSM-001	N/A
Manipulator	CPA, Laboratory	MSM-002	N/A

Table 2-1. Material Handling Equipment (cont.)

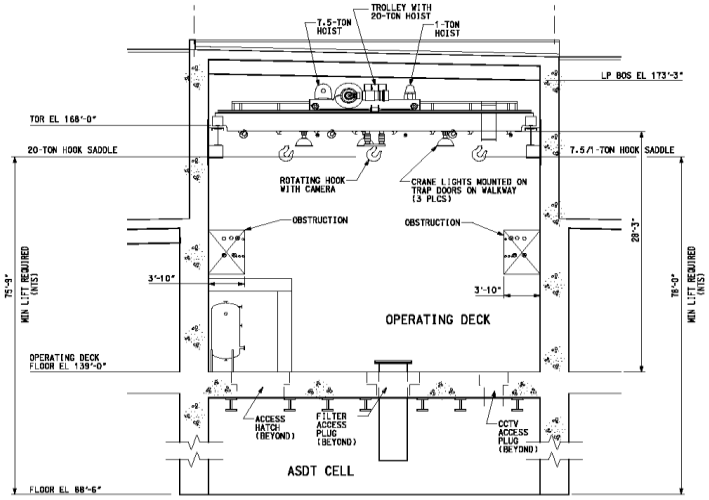
Equipment Description	Process Area	Tag Number	Capacity (Tons) unless otherwise specified
Manipulator	CPA, Laboratory	MSM-003	N/A
Manipulator	CPA, Laboratory	MSM-004	N/A
Manipulator	CPA, Laboratory	MSM-005	N/A
Manipulator	CPA, Laboratory	MSM-006	N/A
Manipulator	CPA, Laboratory	MSM-007	N/A
Manipulator	CPA, Laboratory	MSM-008	N/A
Manipulator	CPA, Laboratory	MSM-009	N/A
Manipulator	CPA, Laboratory	MSM-010	N/A
Manipulator Lift	Laboratory	ML-102	2
Manipulator Transport Cart	Laboratory	MTC-101	2
Manipulator Transport Cart	Laboratory	MTC-102	2
Manipulator Transport Cart	Laboratory	MTC-103	2
Manipulator Transport Cart	Laboratory	MTC-104	2
Manipulator Transport Cart	Laboratory	MTC-105	2

Figure 2-1, Figure 2-2, and Figure 2-3 provide schematic drawings of the Operating Deck Crane, AFF Crane, and Hot Cell Crane, respectively.

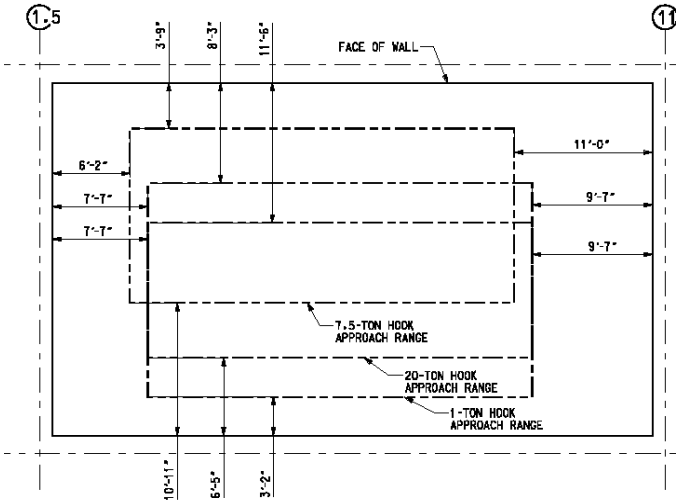
Figure 2-1. Operating Deck Crane



Plan View

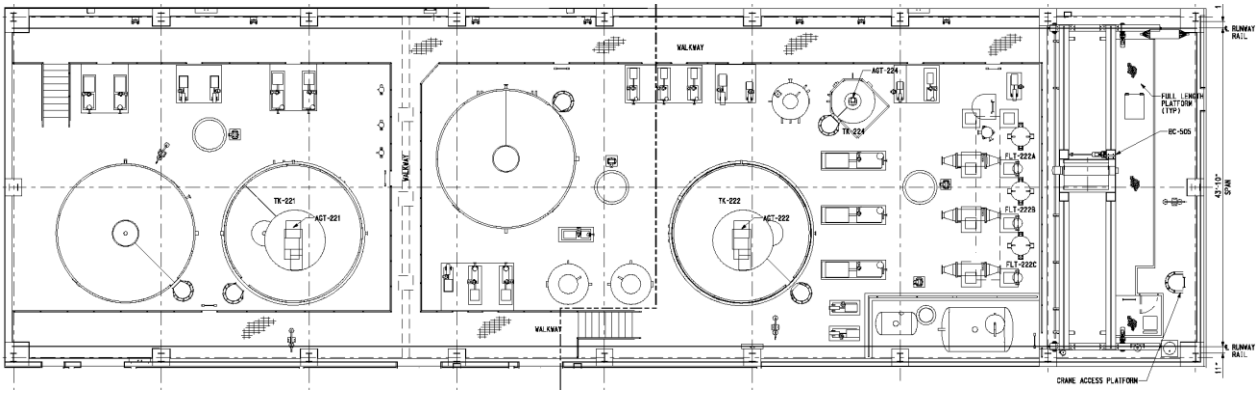


Section A: Elevation View

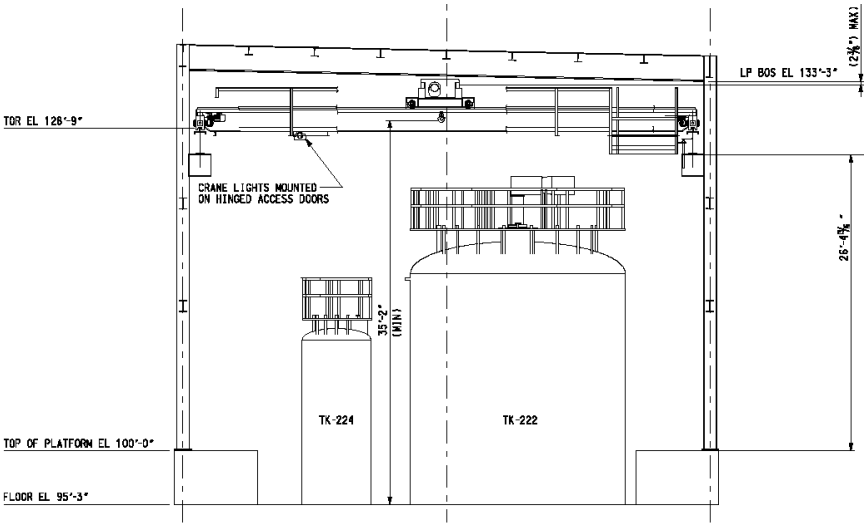


Operating Deck Bridge Crane Hook Approach

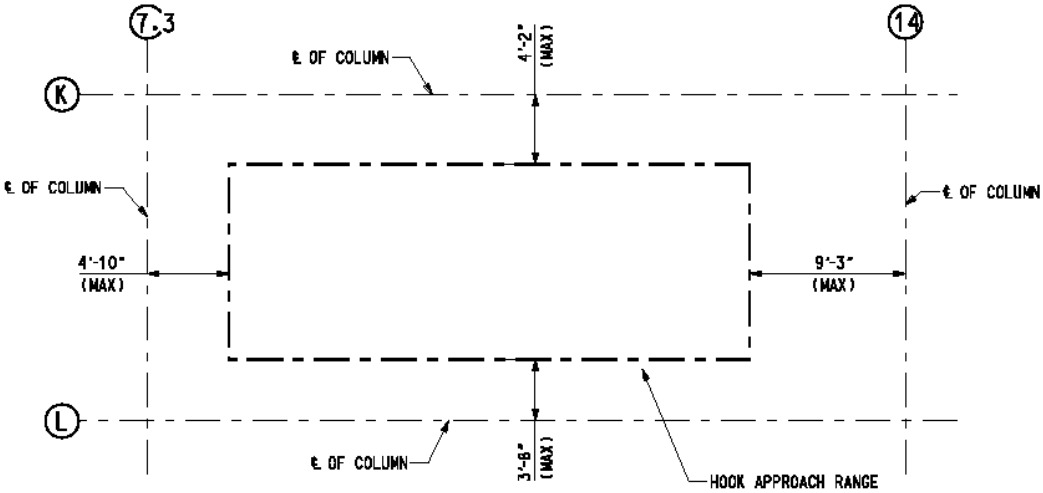
Figure 2-2. Alpha Finishing Facility Crane



Plan View

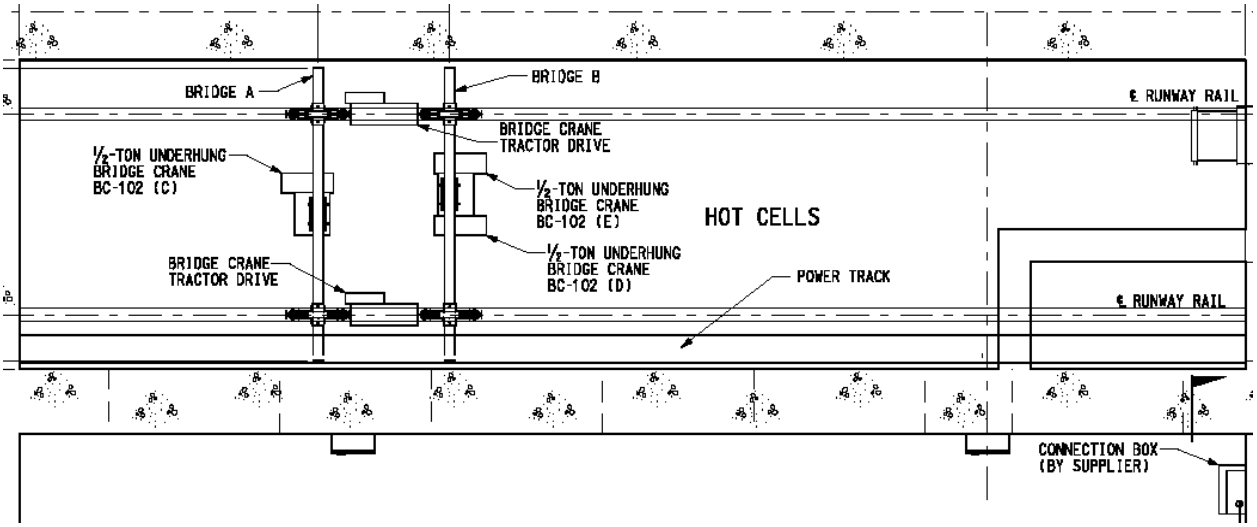


Elevation View

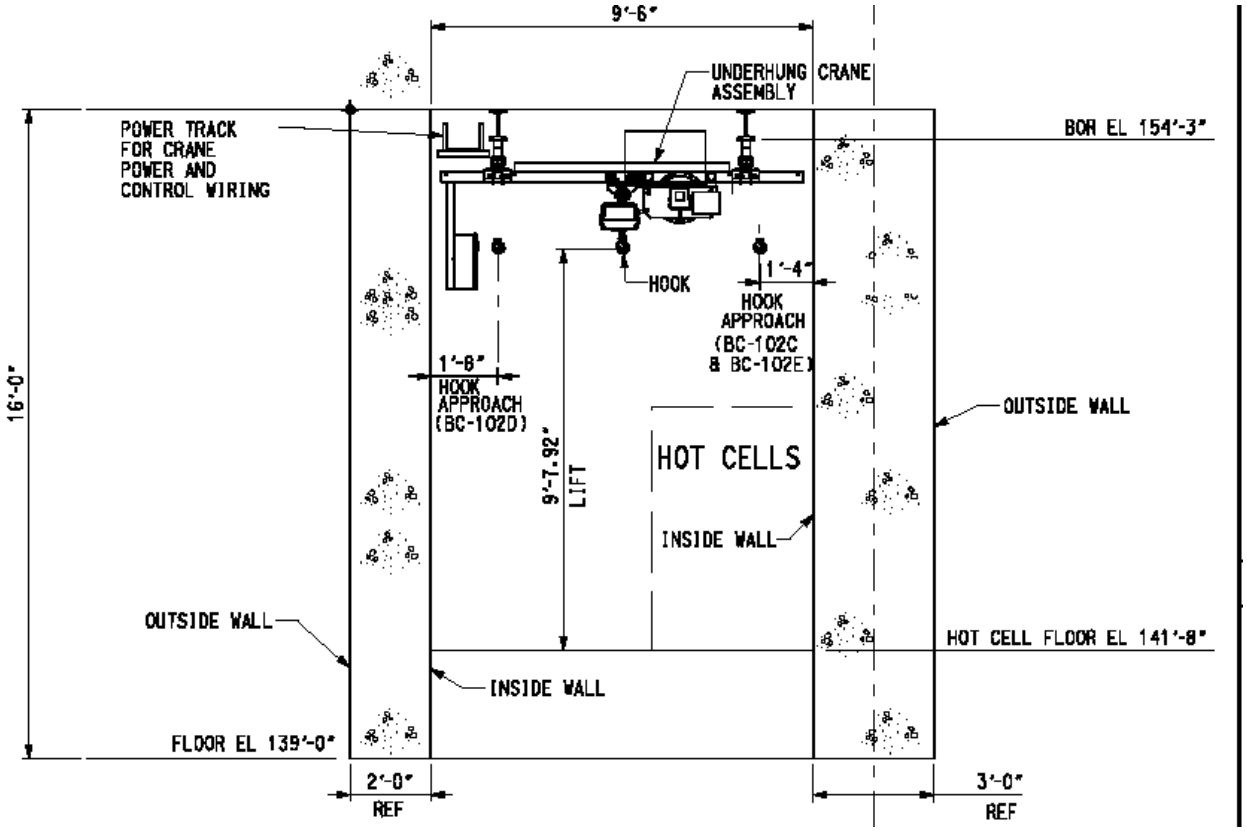


AFF Bridge Crane Hook Approach

Figure 2-3. Hot Cell Crane



Plan View



Elevation View

3.0 PROCESS BUILDING BRIDGE CRANES

3.1 System Functions

The Process Building Bridge Cranes provide lifting capability during maintenance and/or repair functions.

3.2 Operational Overview

The Bridge Cranes provide lifting services for the AFF, Hot Cell, and Labyrinths and Operating Deck process areas. The Operating Deck Crane (see Figure 2-1) is operated by radio control from the Operating Deck or remotely using the Control Room (CR) crane console from the CR or the Safe Shutdown Panel Room during operations that have significant radiation exposure potential. The Labyrinth bridge cranes are completely manually operated. The AFF Crane (Figure 2-2) is radio-controlled from the deck. The Hot Cell Crane (Figure 2-3) is radio-controlled from locations next to each Hot Cell window.

The Bridge Cranes are designed per Crane Manufacturers Association of America (CMAA) requirements. The Operating Deck Crane is designed and certified as an American Society of Mechanical Engineers (ASME) NOG-1 Type 1 crane (see ASME NOG-1-2002, *Rules for Construction of Overhead and Gantry Cranes*[14]).

Table 3-1 provides functional requirements and bases for the cranes discussed above.

Table 3-1. Functional Requirements

Bridge Crane Location	Service Class	Maximum Design Lifting Capacity (Tons)	Maximum Required Lifting Height in feet (ft)
Operating Deck	C (Moderate Service)	20 / 7.5, 1	Approximately 75 ft / 78 ft
Labyrinths	Severe Usage (Continuous Service)	1	Approximately 10 ft
AFF	D (Heavy Service)	5	35 ft
Laboratory Hot Cell	D (Heavy Service)	0.5	Approximately 10 ft

<u>Operating Deck Bridge Crane</u>

The Operating Deck Bridge Crane is designed to be highly reliable and handle the following loads:

- The shield deck access plugs (e.g., Closed-circuit Television [CCTV], ASP Filter);
- ASP Filter Material Handling Equipment (i.e., Cask, Pallet and other associated equipment);
- ASP filter bundle;
- Failed valve internals inside the dark cell under the Operating Deck;

- Valve actuators; and
- 116 ft and 139 ft elevation floor deck plates.

Labyrinths

The Labyrinth bridge cranes are designed to be highly reliable and to handle the following process items:

- Shielding;
- Pumps and Heat Exchangers;
- Valves, valve actuators, and internals; and
- Flow meters and pipe work.

AFF Bridge Crane

The AFF Bridge Crane is designed to be highly reliable and to handle the following process items:

- AFF tank agitators;
- Pumps;
- Valves and internals;
- Valve actuators; and
- AFF filter housings.

Laboratory Hot Cell Bridge Crane

The Laboratory Hot Cell Bridge Crane handles the equipment, shielded and can transport samples inside the Hot Cells. The Laboratory Hot Cell Bridge Crane handles the following process items:

- Hot Cell equipment;
- Tank Farm shielded sample units (i.e., Tank Farm Sample Cask);
- Miscellaneous waste items; and
- Remote maintenance hardware.

3.3 Configuration Information

3.3.1 Description of System

The Process Building Bridge Cranes provide lifting services for the Laboratory Hot Cell, Labyrinths, and Operating Deck while the AFF Crane provides lifting services for the AFF.

3.3.2 Major Components

Operating Deck Bridge Crane

The Operating Deck Bridge Crane serves the area of the Operating Deck as shown in Figure 2-1.

The Operating Deck Bridge Crane positioning is assisted by a crane-mounted CCTV that provides for detailed placement of the crane lifting hook and crane-mounted equipment. The crane is moved into the crane maintenance area on the far eastern wall during periods of inactivity. Scheduled maintenance for the crane is also performed along the eastern wall. All crane maintenance will be accomplished on a "contact-handled" basis because radiation levels on the Operating Deck are expected to be low.

The Operating Deck Bridge Crane has dual bridge girder beams designed to lift 20 tons of weight via its hoist, driven by electric motors. The trolley is configured to ride atop the dual bridge girders (i.e., top-running trolley). The bridge girders are attached to the two-wheeled end trucks. The crane is equipped with one 20-ton main hoist, as well as one independent 7.5 ton and one 1 ton auxiliary hoists. The crane power supply is fed from Motor Control Center (MCC)-203, which is located in the Facility Support Area (FSA) Electrical Room. The crane power supply can be fed from the Standby Diesel Generator, when necessary.

Labyrinth Process Areas

These areas are characterized as wall barriers to prevent line-of-sight gamma radiation. The bridge cranes and their hoists are all manual and installed for moving, removing, or replacing equipment that is likely radioactive.

AFF Bridge Crane

The AFF Bridge Crane provides lifting capability over the AFF process floor space as shown in Figure 2-2. The AFF Bridge Crane is radio-controlled. The crane will be moved to the east end of the AFF into the crane maintenance area during periods of inactivity or for crane maintenance. All crane maintenance will be accomplished on a contact-handled basis because radiation levels are expected to be low in the AFF.

The Crane Hoist has a five-ton lifting capability and is powered by an electric motor. The crane has a top-running trolley design that runs on double bridge girders. The double bridge girders mount onto a two-wheeled end truck on each end of the bridge. The crane electrical power is fed from MCC-210, located in the AFF Electrical Room. MCC-210 is fed from double-ended unitized substation STA-201 located south of the AFF Electrical Room.

Laboratory Hot Cell Bridge Crane

The Laboratory Hot Cell Bridge Crane provides the handling capability for Laboratory equipment and aides in remote maintenance activities (e.g., isolok samplers) within the Hot Cells. The Laboratory Hot Cell Bridge Crane Hoist has ½-ton lifting capacity and is powered by electric motors. The crane has a front and rear bridge girder design with two under-hung ½-ton hoists on

the front and one under-hung ½-ton hoist on the rear girder. Its positioning is assisted by a crane-mounted CCTV that provides for detailed placement of the crane lifting hooks. Each bridge girder is attached to two end trucks (each with four wheels) that run on the crane runways which are under-hung from the runway beams.

3.3.3 Physical Location and Layout

Physical locations for the cranes are provided in the drawings/diagrams listed in Table 3-2.

Table 3-2. Drawings/Diagrams

Diagram Number	Diagram Title
P-PL-J-0008	*SWPF Process Building Material Handling Flow Diagram Pump & Valve Gallery Monorails Floor Plan – EL 100'-0" (U)*[15]
P-PL-J-0009	*SWPF Process Building Material Handling Flow Diagram HEPA Filter and Exhaust Fan Rooms Floor Plan – EL 108'-0" & 116'-0" (U)*[16]
P-PL-J-0010	*SWPF Process Building Material Handling Flow Diagram Monorails For Contactors and Hatches Floor Plan – EL 124'-0" (U)*[17]
P-PL-J-0011	*SWPF Process Building Material Handling Flow Diagram Operating Deck and Filter Rooms Floor Plan – EL 139'-0" (U)*[18]
P-PL-J-0012	*SWPF Process Building Material Handling Flow Diagram Handling of ASP Filters Sections and Details (U)*[19]
P-PL-J-0013	*SWPF Process Building Material Handling Flow Diagram ASP Filter Transporters Floor Plan – EL 100'-0" (U)*[20]
P-PL-J-0014	*SWPF Process Building Material Handling Flow Diagram Truck Bay Floor Plan – EL 100'-0" (U)*[21]
P-PL-J-0015	*SWPF Process Building Material Handling Flow Diagram Cold Chemicals Area Floor Plan – EL 100'-0" (U)*[22]
P-PL-J-00054	*SWPF Process Building Material Handling General Arrangement AFF Area Bridge Crane Plan and Section (U)*[23]
P-PL-J-00051	*SWPF Process Building Material Handling General Arrangement Hot Cells Bridge Crane Plan and Sections (U)*[24]
P-PL-J-00057	*SWPF Compressor Building Material Handling General Arrangement Plan and Section (U)*[25]
P-PL-J-00058	*SWPF Process Building Material Handling General Arrangement Truck Bay and Dock Area Monorail Plan and Sections (U)*[26]
P-PL-J-00059	*SWPF Process Building Material Handling General Arrangement Waste Transfer Access Room Monorail Plan and Sections (U)*[27]
P-PL-J-00061	*SWPF Process Building Material Handling General Arrangement Cold Chemicals Area Monorail Plan and Sections (U)*[28]
P-PL-J-00062	*SWPF Process Building Material Handling General Arrangement Operating Deck Crane Plan and Section (U)*[29]

Table 3-2. Drawings/Diagrams (cont.)

Diagram Number	Diagram Title
P-PL-J-00063	*SWPF Process Building Material Handling General Arrangement North ASP Pump and Valve Gallery Monorails Plan and Section (U)*[30]
P-PL-J-00064	*SWPF Process Building Material Handling General Arrangement South ASP Pump and Valve Gallery Monorails Plan and Section (U)*[31]
P-PL-J-00065	*SWPF Process Building Material Handling General Arrangement CSSX Pump and Valve Gallery Monorails Plan and Section (U)*[32]
P-PL-J-00066	*SWPF Process Building Material Handling General Arrangement Contactor Area Monorails Plan and Sections (U)*[33]
P-PL-J-00067	*SWPF Process Building Material Handling General Arrangement Drum/Off Area Monorail and Conveyor Plan and Section (U)*[34]

3.3.4 System Control Features and Interlocks

3.3.4.1 Control Functions

The AFF Bridge Crane is radio-controlled directly from the AFF process deck and the control system can be programmed with "no fly" zones to stay clear of any critical equipment or known interferences using highly accurate distance-measuring laser sensor instruments and rotary position sensors. The crane's bridge has two motors, each with a set of brakes, one on each end truck. The trolley and bridge braking systems are designed to stop on loss of power by engaging the brake. The hoist system has a motor control brake and a mechanical holding brake that engage on loss of power.

The Laboratory Hot Cell Bridge Crane is controlled by way of a radio control system. The end truck that runs on the crane runway and the trolley has brake units that engage on loss of electrical power. The hoist system has a motor control brake and a mechanical holding brake that engage on loss of power.

The Operating Deck Bridge Crane is controlled by two different methods. The first method is radio-controlled directly from the Operating Deck (i.e., local control). The second method is direct hard-wired cable control using the CR crane console from Operating Deck or, for remote operation, from the CR or the Safe Shutdown Panel Room. The crane hoists, trolley, and bridge may be operated at normal and micro speed modes. Normal mode allows full speed operation and micro mode allows 10 percent (%) of the rated hoist speed and 25% of the rated travel speed for the trolley and bridge. The trolley and bridge braking systems each have two motors and each motor has a set of disc brakes that engage on loss of electrical power. The hoist system has a disc, shoe, and ratchet brake that each engages on loss of power.

3.3.4.2 Key Interlocks

On all hoists, two independent methods of braking the load against gravity are provided, electrical or mechanical. Hoist brakes shall perform the following functions:

- Stop and hold the hook load when the controls are released;
- Limit speed of the load during lowering, with or without power, to a maximum speed of 120% of the rated lowering speed for the load being handled; and
- Stop and hold the hook load in case of a complete power failure.

An additional interlock on most of the cranes (except the Laboratory Hot Cell Bridge Crane) is an "overloading interlock" that secures electrical power to the hoist and engages the hoist braking system if either the hoist motor overheats or the lifting capacity of the crane is exceeded by a pre-determined value, up to 125% of its rated lifting capacity.

An up-limiting switch interface with an interlock installed on the hoist electrical power circuit shall prevent the hook (at any vertical speed) from contacting the bridge load block.

The Operating Deck Crane portable remote control and the CR remote control are interlocked, so that only one control is active at any time.

3.4 Operations

3.4.1 Initial Configuration

All the bridge cranes are vendor-supplied equipment. Consequently, these units will be vendor-tested and inspected by the supplier prior to receipt inspection by the SWPF personnel and installation within the SWPF. After installation, these units will be tested and inspected to ensure compliance with specification requirements.

3.4.2 System Startup

Newly installed, modified, or repaired cranes shall be tested by a designated qualified person prior to initial Facility use to verify compliance with the applicable ASME and CMAA standards. Furthermore, procedures and instructions will be developed for operating the cranes, including lifts, based on direction in DOE-STD-1090, *Hoisting and Rigging*[35]; equipment specifics; and manufacturer's recommendations.

3.4.3 Normal Operations

The cranes major operational priorities are the handling of process equipment previously discussed in Section 3.2. This equipment may be located near other mission-sensitive equipment/tanks. Therefore, all lifts will be evaluated per the applicable procedures and instructions. Lift categories will be designated as: Critical Lifts, Pre-Engineered Production Lifts, or Ordinary Lifts.

Operating Deck Equipment Removal

Operating Deck material handling is provided by Bridge Crane BC-101. This traveling crane system is provided to lift and remove failed equipment (e.g., filters, etc.) in addition to other ancillary equipment (e.g., filter cask, etc.) used in support of these operations. Bridge Crane BC-101 travels on rails above the Operating Deck. The crane hoist hook is located at 29 ft-6 inches above the Operating Deck, with no significant objects that reside on the deck itself with the exception of some potential mission-sensitive equipment on the edges of the Operating Deck; therefore, Bridge Crane BC-101 has few inherent material handling interferences. The Operating Deck Bridge Cranes will utilize the center of the deck for all ordinary lifts to preclude dropping any load on any mission-sensitive equipment. The SWPF ordinary lifting mode is all lifting operations not designated as Critical or Pre-Engineered Production Lifts.

Alpha Finishing Facility Equipment Removal

Material handling in the AFF is provided by Bridge Crane BC-505. This traveling crane system is provided to lift and remove failed equipment (e.g., agitator motors) from the AFF tanks and equipment. There are very few clear paths to move any elevated loads above the AFF process floor; therefore, the crane can be programmed with “no fly” zones, thru the use of its control and positioning system, to reduce the likelihood of damaging any equipment/tanks if and when repetitive activities (i.e., with identical path and load) are to be performed. Two of the AFF tanks (Alpha Sorption Tank-B [TK-221] and Filter Feed Tank-B [TK-222]) have agitators within the tanks to mix process solutions and slurries.

Labyrinth Process Area Equipment Removal

The bridge crane systems serving these process areas are required to cover and maintain heat exchangers, flow meters, shield capes, pipe work, and pumps within the various labyrinths. The transport carts are loaded by the bridge cranes within the labyrinths and the carts are then maneuvered through the labyrinth passageways into the corridors for equipment disposition.

Laboratory Hot Cell Equipment Removal

Laboratory Hot Cell material handling is provided by Bridge Crane BC-102. This traveling crane system is provided to lift and remove sample casks and general equipment within Hot Cells. Operation of the Laboratory Hot Cell Bridge Crane requires only one operator, who is local to the Hot Cell. The crane hoist hook is located approximately 10 ft above the laboratory Hot Cell Deck.

3.4.4 Off-Normal and Recovery Operation

Planned Engineered Lifts may be required on a limited basis for specific purposes per DOE-STD-1090[35] where the planned lift exceeds the rated load. Planned Engineering lifts shall be limited to hoists with minimum load rating of 5 tons. The most likely off-normal event for the bridge crane is a loss of power event. The three bridge cranes are electric-powered and designed to engage load braking on loss of power. Both the bridge and trolley braking systems are designed to stop on loss of power by engaging the load brake. The hoist system has redundant braking units that engage

the brake on loss of power. However, Bridge Crane BC-101 power is fed from a source with available standby power**;** a total long-term loss of power event is extremely unlikely. In case of loss of normal utility power, the braking systems will engage and hold any suspended loads during the short-term event as standby power sources are being made available. When standby sources become available, the load may be safely lowered and positioned until normal power sources return**.**

3.4.5 System Shutdown

There are no specific shutdown actions for the bridge cranes other than to de-energize the cranes' electrical power. Idle or shutdown periods of one month or longer shall require a "frequent inspection", while crane and/or hoist inactivity periods of greater than one year will require the crane and/or hoist to undergo a more robust "periodic inspection" prior to use, in accordance with ASME B30.16, *Overhead Hoists (Underhung)*[36] and ASME B30.2, *Overhead and Gantry Cranes (Top Running Bridge, Single or Multiple Girder, Top Running Trolley Hoist)*[37].

4.0 MONORAIL, HOIST, AND MATERIAL HANDLING EQUIPMENT

4.1 System Functions

The Process Building Monorail Systems with hoists and other material handling equipment (i.e., Cross-flow Filter Material Handling, Manipulator Lift, Elevated Work Platforms, Transport Carts, Forklifts, and SLD) provide for frequent lifting and moving capability during maintenance and/or repair functions. The Laboratory contains the Sample Transfer System (STS) which is located inside of Glovebox 14. The function of the STS is to allow transport of samples via a shuttle from/to any of the 11 stations in the glovebox processing line.

4.2 Operational Overview

The Process Building Monorail Systems provide lifting services for the CCA, Truck Bay Area, Waste Transfer Access Room, CSSX Contactor Operating Deck, Contactor Drop Area, Labyrinths, and Decontamination Room. The Compressor Building also has a Monorail System (MR-401). All powered hoists on these Monorail Systems are radio-controlled. Transport carts work in conjunction with the Monorail Systems and other material handling equipment such as the Elevated Work Platform and SLD to service most areas of the CPA and Compressor Building. SLD consist of six portable A-frame type gantry cranes and two davit cranes that allow maintenance of equipment that cannot be accessed with the bridge cranes or monorails.

The Elevated Work Platforms, EWP-102 and EWP-103, are used in the CPA at the 139 ft and 116 ft elevations, respectively, to aid in the installation/removal of high-efficiency particulate air (HEPA) filters. Elevated Work Platform EWP-102 is also used to access Bridge Crain BC-101 for maintenance. Elevated Work Platform EWP-103 is also used to aide in the installation/removal of HEPA filters in the AFF.

Equipment/Parts removed for maintenance or to be installed can then be transported to different elevations via the Equipment Lift (EL-101). The Equipment Lift serves the CPA at the 100 ft, 116 ft and 139 ft elevations.

Other material handling equipment such as the Manipulator Lift or the Cross-flow Filter Material Handling Equipment (CFFMHE) is used to remove and transport contaminated equipment (i.e., Manipulators and Cross-flow Filters) located in the Laboratory Hot Cells or in the Dark Cells under the Operating Deck Floor, respectively. This equipment is then used to install replacement items.

CFFMHE

The CFFMHE consists of the following components that are used in the removal, transportation, and installation of Cross-flow Filter Tube Bundles:

- Cask,
- Spool Piece,
- Catch Tray,
- Cleaning Tools,
- Zip-Lift,
- Tube Bundle Stand,
- Cask Hoist,
- Transportation Pallet/Cart,
- Work Platform Tools,
- Common Tool Stand, and
- Lifting Beams.

The truck bay forklift (FL-101A) will be used to tow the Transportation Pallet/Cart (CTR-101) to/from the filter drop access area on the 100 ft level to the dock area. Refer to P-PL-J-0012[19] and P-PL-J-0013[20] for details of the CFFMHE operation.

Manipulator Removal and Installation System

The Laboratory Hot Cell has eight manipulators, two in each of the hot cell window areas. In the event that anyone of these manipulators malfunctions and needs to be replaced, the Manipulator Lift (ML-101/102) and the Manipulator Transport Cart (MTC-101/102/103/104/105) will be used for removal and installation. Removed manipulators will be transported via the Manipulator Transport Cart for repair or preparation for disposal. Spare Manipulators will be stored on MTC-101/102/103/104/105.

Labyrinths Monorail System

The Monorail System (MR-113 and MR-120) hoist lifting capability is necessary to lift the following process items:

- Failed sample pumps,
- Failed valve internals,
- Failed valve actuators, and
- Shielding.

CCA Monorail System

The CCA has two Monorail Systems (MR-301 and MR-302). Monorail System MR-301 has a powered hoist that is attached to the overhead of the CCA and routed so as to position the monorail hoist directly over major process equipment that may need replacement. Monorail System MR-302 is a manual hoist and is mounted at a much lower elevation (110 ft) in the Nitric Acid Pump Area of the CCA. These hoists material lifting capability is necessary to lift the following process items:

- Failed pumps, motors, valves, and
- Failed tank agitators.

Truck Bay Monorail System

The Truck Bay Monorail System is mounted to the overhead of the Eastern FSA and is provided to load and offload equipment from trucks onto the dock area. Operations that involve the waste handling and loading may also use the Truck Bay Monorail System, including loading failed equipment (e.g., Cross-flow Filter Cask, etc.) for transport to the disposal site.

Waste Transfer Access Room Monorail System

The Waste Transfer Access Room Monorail System is mounted to the overhead above the Waste Transfer Enclosure (WTE) shield plug. This hoist's main purpose is to lift the shielded plug to gain access to the WTE and the valve actuators.

CSSX Tank Cell Monorail System

The CSSX Tank Cell Monorail (MR-103) is mounted in the CSSX Tank Cell Operating Deck Area on the 124 ft level over the access shield plug. This hoist's main purpose is to lift the shielded plug to gain access to the East CSSX Tank Cell on the 100 ft level.

Contactor Monorail System

The Contactor Monorail System consists of monorails MR-102A, MR-102B, and MR-104. The Contactor Transport Cart (CTC-101) is used to transport contactors removed via monorails MR-102A and MR-102B to the Contactor Drop Area. From this location monorail MR-104 is used to lower the contaminated contactor to the South ASP P&VG Corridor on the 100 ft level where it is then moved via another Contactor Transport Cart (CTC-102) to the Contactor Rebuild Room for reprocessing. Alternately, the contactor can be lowered to the 116 ft elevation and then moved to the 100 ft level via the Equipment Lift (EL-101). Replacement contactors are transferred from the Spare Contactor Storage Area via Contactor Transport Cart CTC-101 to the west end of the Contactor Room where either monorail MR-102A or MR-102B will be used to install the new or rebuilt contactor.

Compressor Room Monorail System

The Compressor Room Monorail (MR-401) is mounted directly above all three plant air compressors to allow for their maintenance. Transport cart (TC-401) is also located in this room to handle items to be removed and installed with the Monorail System.

Central Processing Area Entry Access Room Equipment Lift

The Equipment Lift Material Handling System is provided for vertical lifts of loads between the 139 ft, 116 ft, and ground-level 100 ft elevations. The lift is locally controlled from the three operating levels and utilizes disc brakes that are electrically released. The carriage is typically raised or lowered by means of four heavy-duty chains. Waste handling operations will also frequently use this device to dispose of the plant's waste material and failed equipment. A forklift is also available at the 100 ft level to assist in equipment handling. The equipment lift is solely for material transfer (no personnel are allowed to travel inside the equipment lift).

Laboratory STS

The Laboratory STS is located in Glovebox 14 (GB-014) and is provided for movement of the various samples to be analyzed in the Laboratory Hot Cell or in the various Laboratory gloveboxes or radiohoods. Samples can be received into or transferred from Glovebox GB-014 to/from offsite locations (see EQIP-MHD-003, *GB-014 Main Assembly*[38])

4.3 Configuration Information

4.3.1 Description of System

The Monorail System is an I-beam configuration that permits the hoist trolley to run on the lower web of the beam. Monorails are strategically positioned over major equipment units that may require maintenance during the 40-year design life of the SWPF. This, in addition to the equipment lift, forklifts, transport carts, elevated work platforms, and SLD, make up a material handling system that can support the maintenance and operations needs of the facility on a normal basis. Other more specific maintenance activities, such as replacement of Cross-flow filters and manipulators, utilize the CFFMHE and Manipulator Lift Cart.

4.3.2 Physical Location and Layout

Physical locations for the layout of the monorails, equipment lift, STS, forklifts, transport carts, elevated work platforms, and SLDs are provided in the drawings/diagrams listed in Table 3-2.

4.3.3 System Control Features and Interlocks

All electrically powered monorail hoist systems are radio controlled. Additionally, every unit is also equipped with limit switches that automatically stop the hook at any predetermined point when lifting or lowering.

Electrically Powered Hoists

The CCA Hoist (MR-301), Contactor Monorail System Hoists (MR-104, MR-102A, MR-102B), and Compressor Building Hoist (MR-401) have one set of electric brakes on the trolley and one on the hoist unit, both of which will engage on loss of power. The Truck Bay Monorail System (MR-116), CSSX Tank Cell Monorail System (MR-103) and Waste Transfer Access Room Monorail System (MR-117) have one set of electric brakes on the trolley, and two sets of brakes, electrical and mechanical, on the hoist unit. The electric brakes engage on loss of electrical power.

Equipment Lift

The Equipment Lift (EL-101) is designed as a Vertical Reciprocating Conveyor that is governed by ASME B20.1, *Safety Standard for Conveyors and Related Equipment*[39]. The desired lift elevation can be selected from the local pushbutton panel. A local pushbutton panel with an emergency stop button is located at each of the three levels and placed so that they may not be accessed while standing on the lift carriage. If the access gate is open at any level, an interlock prevents the lift from operating. On a loss of power, the brakes will engage. Travel is controlled with mechanical limit switches at each floor elevation. Additionally, an over-travel limit switch is located approximately 6 inches above the top level limit switch. Other interlocking switches, such as the counterweight and slack chain limit switches are provided for safety. The counterweight limit switch is mounted to the top of one of the counterweight tubes to stop carriage movement in the event that the counterweight carriage has somehow reached the top of its running tube while the carriage is traveling downward. The slack chain limit switches are mounted on the drive base to sense whether the chain is tight or slack and are wired to turn off the motor and hold the position of the carriage whenever a slack chain status is sensed.

CFFMHE Lift Control System

The CFFMHE is designed with an internal hoist and Zip-Lift grapple system that lifts a failed, contaminated tube bundle into a shielded cask. The hoist control system has a series of sensors and monitors which measure load, vertical positioning, and detection of an overload condition. Interlocks are included to prevent the hoist from being operated when the Emergency Stop is enabled, when an overload condition is present, or when the hoist is outside its travel limits. In addition, an interlock is included to prevent the Cask Zip-Lift actuation solenoid from being enabled while a lift is being conducted.

Laboratory STS

The Laboratory STS (STS-101) has pushbutton control panels on the side of the glovebox GB-014 at 11 locations to call or send the shuttle with the samples to the required glovebox or radiohood line. The control system consists of an E-Stop circuit. The E-Stop circuit has 12 E-stop actuators and one monitoring relay. All E-Stop actuators must be “reset” before the E-Stop system can be rearmed. If the E-Stop is actuated, the shuttle will stop.

4.4 Operations

4.4.1 Initial Configuration

All equipment will be vendor-supplied and will have undergone testing prior to receipt inspection by the SWPF. Some equipment, such as the STS and the Equipment Lift, will be tested and inspected upon installation within the Facility with the assistance of the vendor.

4.4.2 System Startup

All equipment will be verified, prior to its initial use, to have all maintenance and/or inspections completed as required per the applicable codes, vendor manuals, and/or SWPF procedures.

4.4.3 Normal Operations

Equipment Lift (EL-101) Transport

Small equipment requiring replacement on the 116 ft and 139 ft elevation levels will be transported on Equipment Lift EL-101. Transport of equipment from these process areas will be limited by the 94.75 inch wide by 96 inch high access equipment lift door width. Equipment Lift EL-101 will accommodate an item that is 118 inches in length; therefore, the largest single piece of equipment that can be transported on Equipment Lift EL-101 is 94.75 inches wide, 96 inches high, and 118 inches long. The largest single transport item is expected to be a B-25 waste box (6 ft wide by 4 ft long by 4 ft high). The weight capacity for Equipment Lift EL-101 is 2.5 tons.

Waste Transfer Access Room

Material handling for the Waste Transfer Access Room is provided by monorail MR-117. This Monorail System is provided to lift and remove the shield plug from the Waste Transfer Access Room floor, and place the plug in the adjacent laydown area. This monorail section is basically straight and without any handling restrictions. No equipment is installed within the enclosure; therefore, this access hatch opening is simply for personnel access. The access hatch is a rectangular 60 inch by 48 inch opening for operations personnel. The weight capacity for monorail MR-117 is five tons.

CCA Equipment Removal

Material handling for the CCA is provided by monorail MR-301. This Monorail System is provided to lift and remove failed equipment (e.g., agitator motors) from the CCA tanks and equipment. This monorail section forms a general loop above important process tanks. The monorail is attached to the ceiling, which is 35 ft above the CCA floor. The handrail on the highest tank in the CCA is 121 ft 3 inches on the Caustic Dilution Feed Tank (TK-108). This differential in elevation (approximately 13 ft) between the ceiling and handrail provides adequate working clearance for lifting operations without any handling restrictions. The weight capacity for monorail MR-301 is one ton.

Compressor Maintenance

Material handling for the Compressor Building is provided by monorail MR-401. This Monorail System is provided to lift and remove failed equipment related to the compressors. The monorail is attached to the ceiling, which is 20 ft above the floor. The weight capacity for monorail MR-401 is 3 tons. Transport cart (TC-401) is located in the building to handle items to be removed and installed with the Monorail System.

Truck Bay Material Handling

Material handling for the Truck Bay Area is provided by monorail MR-116. This Monorail System is provided to lift and load equipment onto transport trucks. This monorail section forms a straight line down the center of the Truck Bay Area. The monorail is attached to the ceiling approximately 22 ft above the Truck Bay dock giving total reach height of approximately 16 ft between the bottom of the hook and the floor, which provides adequate working clearance for lifting operations without any handling restrictions. The weight capacity for monorail MR-116 is 15 tons. The truck bay also contains two 22.5 ton dock levelers, DL-101 and DL-102, which can be raised or lowered to assist in unloading materials from transport trucks.

Contactor Operating Deck

The Contactor Operating Deck is served by monorail hoists MR-102A and MR-102B. Both monorail hoists (MR-102A and MR-102B) are installed on the same monorail beam. The monorail is U-shaped configuration, with long straight runs that are positioned directly over the sub-floor contactors. An equipment pallet truck with a transfer box container will be positioned under the monorail/hoist and will exit via the Operating Deck door; therefore, the door size is the limiting dimension for equipment removal. The smallest Contactor Operating Deck doorway is 44 inches wide and 84 inches tall. The hoist hook height will be at least 119 inches above the floor. The contactor will be loaded and unloaded from a transfer container box; the combination of the two is 30 inches wide by 80 inches tall. The weight capacities for monorail hoists MR-102A and MR-102B are one ton each.

CSSX Tank Cell Operating Deck Material Handling

The CSSX Tank Cell Operating Deck is served by monorail MR-103. This monorail is a short, straight run that is positioned directly over the CSSX Tank Cell Operating Deck access hatch, which is 30 inches wide. The hoist can extend down to the East CSSX Tank Cell at the 100 ft elevation giving it approximately 32 ft 8 inches in reach height. The access hatch will be lifted from the deck and placed directly adjacent to the hatch opening on the floor east of the hatch opening. The weight capacity for the CSSX access hatch monorail/hoist (MR-103) is five tons.

CSSX Contactor Drop Area Material Handling

The CSSX contactor drop area is served by monorail MR-104. This monorail is a short, L-shaped run that is located on the 124 ft elevation level, so as to position the monorail directly over the 116 ft elevation level access hatch. This handling device is the egress path for new/failed contactors

to/from the 124 ft elevation. Therefore, the egress of equipment (if any) from this process area will be limited by access hatch width on the 116 ft elevation, which is 42 inches square. The hoist hook height will be at the 132 ft elevation or above, thus providing approximately 8 ft of floor access for equipment above the 124 ft elevation. There is a one ton concrete plug on the 116' level that will be lifted and placed on the floor adjacent to the spare contactor storage area near the east end of monorail MR-104. The weight capacity for the CSSX access hatch monorail/hoist (MR-104) is two tons.

Laboratory Sample Moving Equipment

Normal operations are performed by use of the Laboratory STS (STS-101), which is a rail system enclosed in a glovebox GB-014 to move samples from glovebox GB-014 to any of the glovebox or radiohood lines, as required or to the Laboratory Hot Cell via glovebox GB-001. The STS is capable of supporting loads up to 75 lbs.

Cross-flow Filter Removal and Installation

Replacement of a cross-flow filter is a complex, detailed process that uses numerous components and equipment, including the Operating Deck Bridge Crane (BC-101), to safely remove a contaminated cross-flow filter into a sealed, shielded cask. These details to this process can be found in the documents previously referenced in Section 4.2. However, in general, the removal/installation process consists of the following sequences: temporary staging of CFFMHE on Operating Deck, filter removal, filter housing cleaning, new filter installation, spent filter transportation and disposal, and return of CFFMHE to storage.

Manipulator Removal & Installation

The Manipulator Lift Cart system consists of a lift table assembly and a transport cart assembly. The electrically-operated hydraulic lift table provides 47 inches of vertical lift for the transport cart assembly. Once the transport cart assembly is raised into position to remove the manipulator from the hot cell, the master and slave lifting jacks can then be positioned laterally, longitudinally and vertically to facilitate the removal or installation of the manipulator. Each lifting jack is hand-operated and has a lift range of approximately 15 inches. Detail instructions for this process can be found in the Installation and Operation Manual for the Transport Cart (see EQIP-MHD-004 *Manipulator Cart Installation and Operation Manual*[40]).

4.4.4 Off-Normal and Recovery Operation

The most likely off-normal event for the electric hoist units or conveyor is a loss of power event. All the electric hoists are designed to stop and secure their movement in the event of power loss. The trolley braking system is designed to stop on loss of power by engaging the brake. Therefore, all suspended loads will remain suspended until resumption of normal electrical power.

There are no specific shutdown actions for the hoist units, other than to simply de-energize the electric hoists' electrical power. Shutdown periods of one month or longer shall require a frequent

inspection in accordance with ASME B30.16-2007[36]. Inactive hoist activity periods of greater than one year will require the hoist to undergo a more robust periodic inspection prior to use.

5.0 LABORATORY MATERIAL HANDLING EQUIPMENT

5.1 System Function

The gloveboxes and radiohoods are used to protect workers and the environment from radiological and chemical contaminations, while performing required analyses that support the qualification of the SWPF product based upon the Waste Acceptance Criteria (WAC). The gloveboxes and radiohoods are located the Analytical Laboratory, which is divided into three sections (i.e., Radiochemistry, Inorganic and Organic), and the Cold Chemical Laboratory. The Hot Cell Laboratory contains manipulators that are used to assist in process sampling activities and maintenance activities for equipment/instrumentation in the Hot Cell.

5.2 Operational Overview

The purpose of the Hot Cell manipulators is to assist Laboratory Operators in obtaining, analyzing and processing samples within the Hot Cell and moving samples for further analysis and processing to the gloveboxes and radiohoods via GB-001 and STS-101, which conveys the samples within an enclosure connecting all glovebox and radiohood lines. Samples may also originate in GB-008 and GB-009 as these gloveboxes contain Isolok samplers that obtain samples directly from the AFF. The gloveboxes and radiohoods then serve to provide containment of these radiological samples and chemical processing materials used in analytical methods to determine the chemical and radiological composition of process samples for WAC compliance. Specific equipment and instrumentation is located within the gloveboxes and radiohoods to perform these analytical methods.

5.3 Configuration Information

5.3.1 Description of System

Radiochemistry Laboratory: The Radiochemistry Laboratory has five (5) stations along GB-014 that connect with eight (8) other gloveboxes (GB-002 thru GB-009) and four (4) other radiohoods (RH-001 thru RH-004). Additionally, Radiochemistry Laboratory has two (2) other radiohoods (RH-005 & RH-006) that are not connected with the glovebox line. The gloveboxes and radiohoods may contain equipment and instrumentation that is connected to a Laboratory Information Management Systems (LIMS), which consists of hardware and software that provides identification, retrieval and tracking of samples and analytical data obtained from these instruments.

Inorganic Laboratory: The Inorganic Laboratory has three (3) stations along GB-014 that connect with two (2) other gloveboxes (GB-010 & GB-011) and four (4) other radiohoods. Additionally, Inorganic Laboratory has one other radiohood (RH-011) that is not connected with GB-014. The gloveboxes and radiohoods may contain equipment and instrumentation that is connected to a Laboratory Information Management Systems, which consists of hardware and

software that provides identification, retrieval and tracking of samples and analytical data obtained from these instruments.

Organic Laboratory: The Organic Laboratory has three (3) stations along GB-014 that connect with six (6) other radiohoods (RH-012 thru RH-017). The radiohoods may contain equipment and instrumentation that is connected to a Laboratory Information Management Systems, which consists of hardware and software that provides identification, retrieval and tracking of samples and analytical data obtained from these instruments

Hot Cell Laboratory: The Hot Cell Laboratory has eight (8) manipulators, two (2) at each of the four (4) Hot Cell windows, that are used assist in operation and performance of process sampling and maintenance activities for equipment/instrumentation in the Hot Cell.

Cold Chemicals Laboratory: The Cold Chemical Laboratory has one Fumehood (FH-001) that will be used to periodically perform independent analyzes of chemical receipts or prepared solutions.

5.3.2 Major Components

5.3.2.1 Gloveboxes

Gloveboxes provide a primary barrier, which has been leak tested per industry standards, from radiological and chemical hazards. Operations are performed inside gloveboxes using sealed glove openings for the protection of the worker. Equipment and instrumentation may also be located inside these gloveboxes for processing and analyzing samples.

5.3.2.2 Radiohoods

Radiohoods, which are also called fume hoods, are designed to capture, confine and exhaust fumes, vapors and particulate matter produced or generated within the enclosure. These hoods may contain specialized analytical equipment and instrumentation for sample analysis, the configuration of which is documented in P-PB-J-0007, 0008, 0009 and 0016. These hoods are certified and tested yearly under this configuration (i.e., equipment/instrumentation contained within the radiohood) using the applicable industry standards.

5.3.2.3 Manipulators

Manipulators are used for remotely performing tasks in a high-radiation environment by extending the dexterous manipulative capabilities of a human operator. They consist of a master arm, slave arm and through-the-wall tube assembled as on unit. Stainless steel tapes and cables are used to transmit motions from the master to the slave arm in continuous closed loops.

5.3.3 Physical Location and Layout

Physical locations for the radiohoods and gloveboxes are provided in P-PL-J-0011, which is listed in Table 3-2.

6.0 REFERENCES

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

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

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

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

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

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

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

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

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

[10] S-SAR-J-00001, *SWPF Preliminary Documented Safety Analysis*. Parsons, Aiken, South Carolina.

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

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