



ATR Complex and Plant Modifications 2020 2021

January 2022

Changing the World's Energy Future

Brandon G Andrus



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**Idaho National Laboratory
Idaho Falls, Idaho 83415**

<http://www.inl.gov>

**Prepared for the
U.S. Department of Energy
Under DOE Idaho Operations Office
Contract DE-AC07-05ID14517**



ATR Complex and Plant Modifications 2020-2021

TGATR174



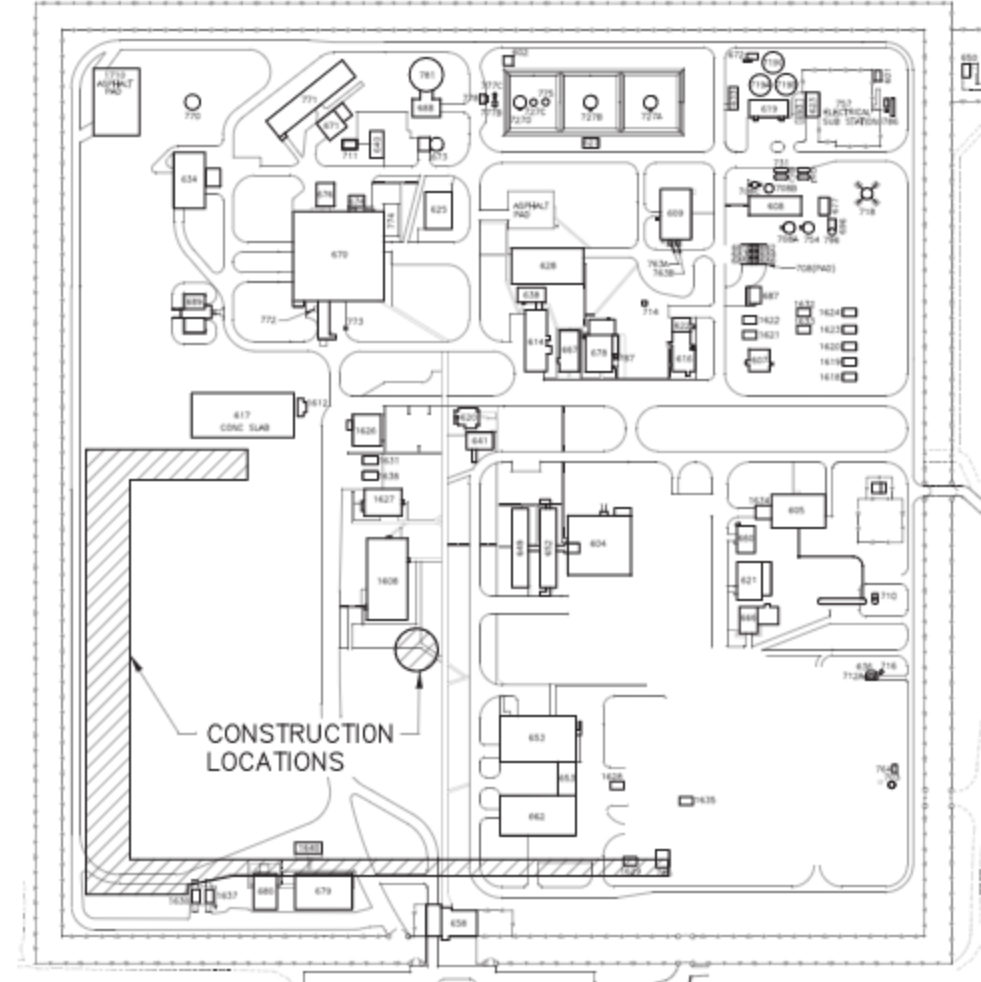


Utility Corridor Upgrade

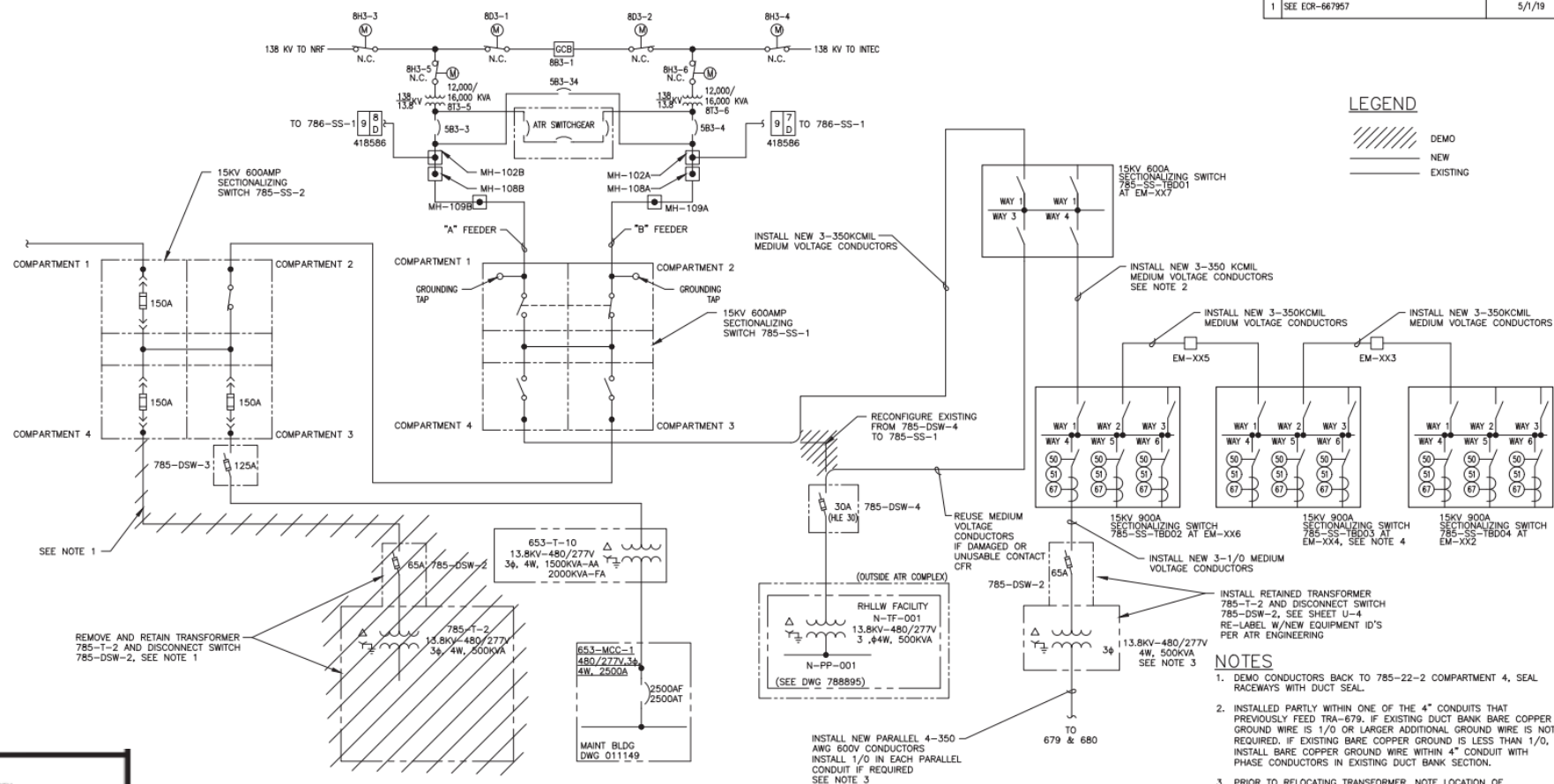



Utility Corridor Upgrade

- The ATR Complex Utility Corridor Upgrade provides reliable and adequate supply and/or use of potable water, firewater, sewer, electrical power, and voice/data capacity to support current and proposed future growth.
- Electrical portion
 - Extended the 13.8 kV electrical from existing TRA-785 along the southern edge of the complex and along the western edge.



Utility Corridor Electrical Upgrade



**Idaho National Laboratory**

ATR-COMPLEX
UTILITY CORRIDOR EXTENSION

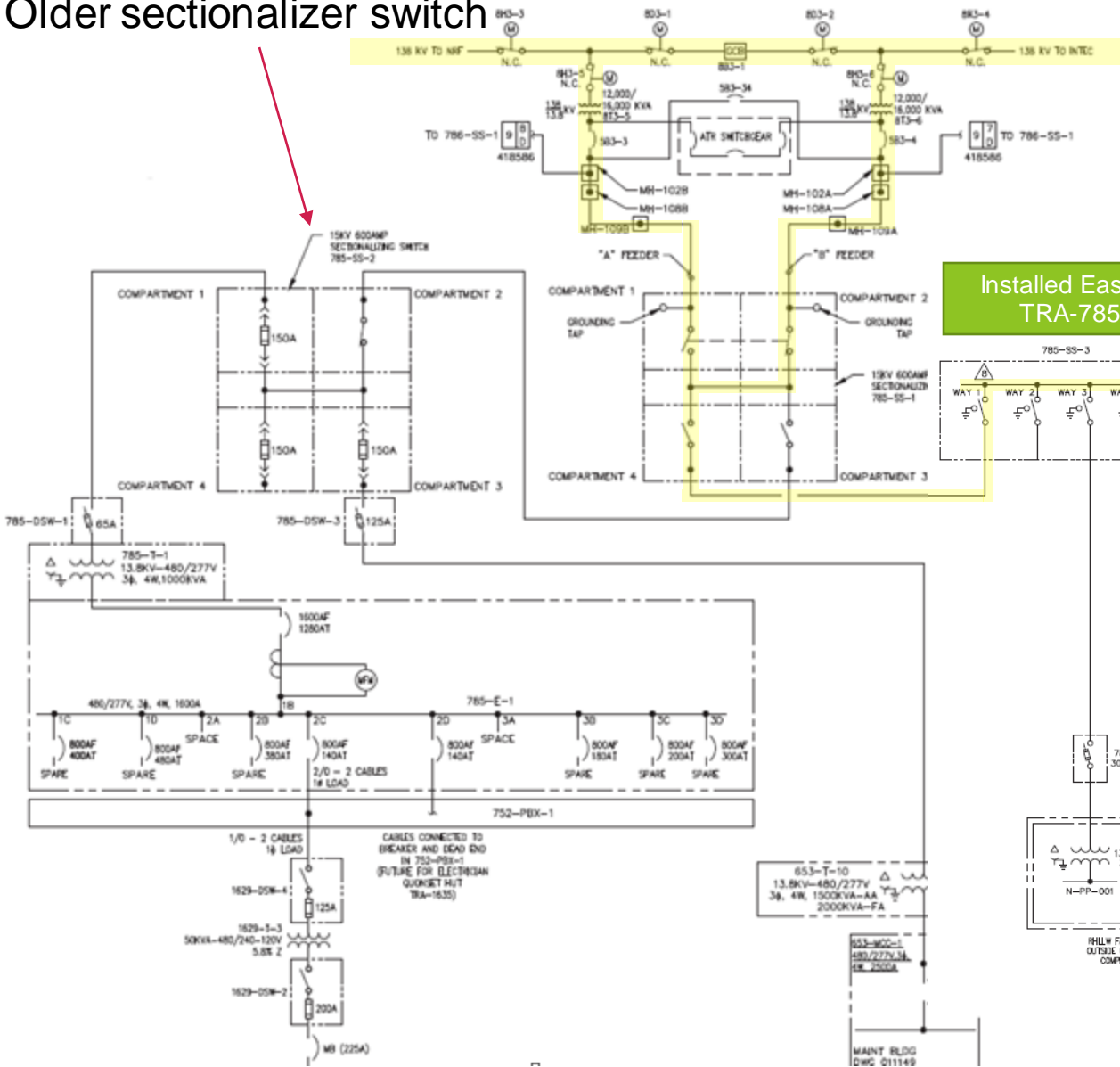
ONE LINE DEMO/INSTALLATION

SIZE	CAGE CODE	INDEX CODE	DATE	DWG NO.	REV
D	01MF3	531	0400	10 081	815576

SCALE: NOTED

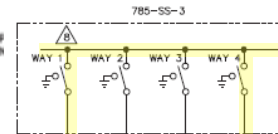
SHEET E-1

Older sectionalizer switch

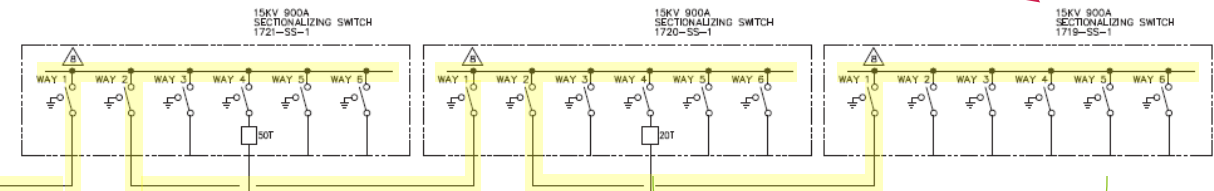


New sectionalizer switches

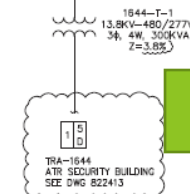
Installed East of TRA-785



Installed North of TRA-679



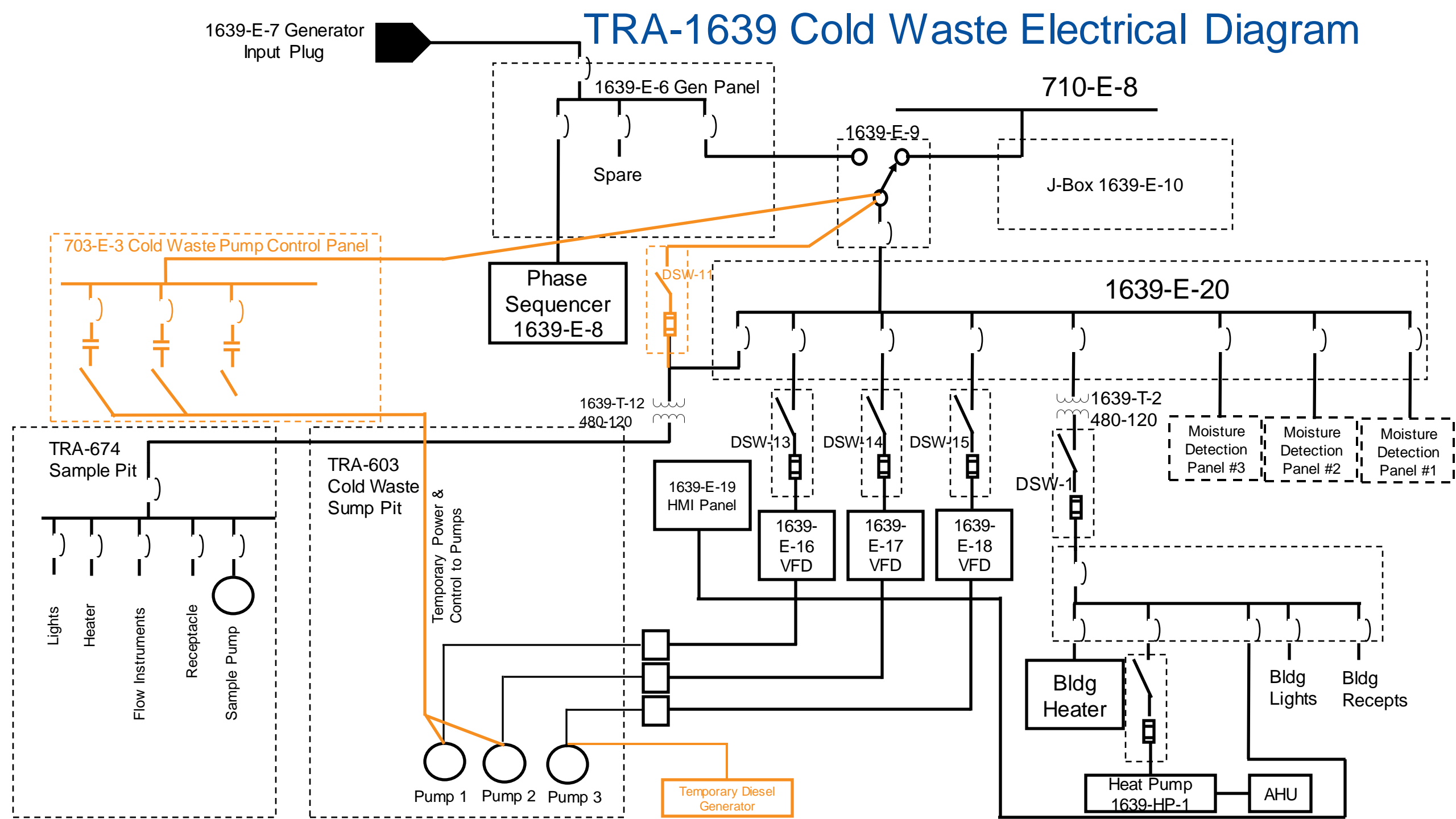
Installed West side of ATR Complex



Cold Waste Upgrade

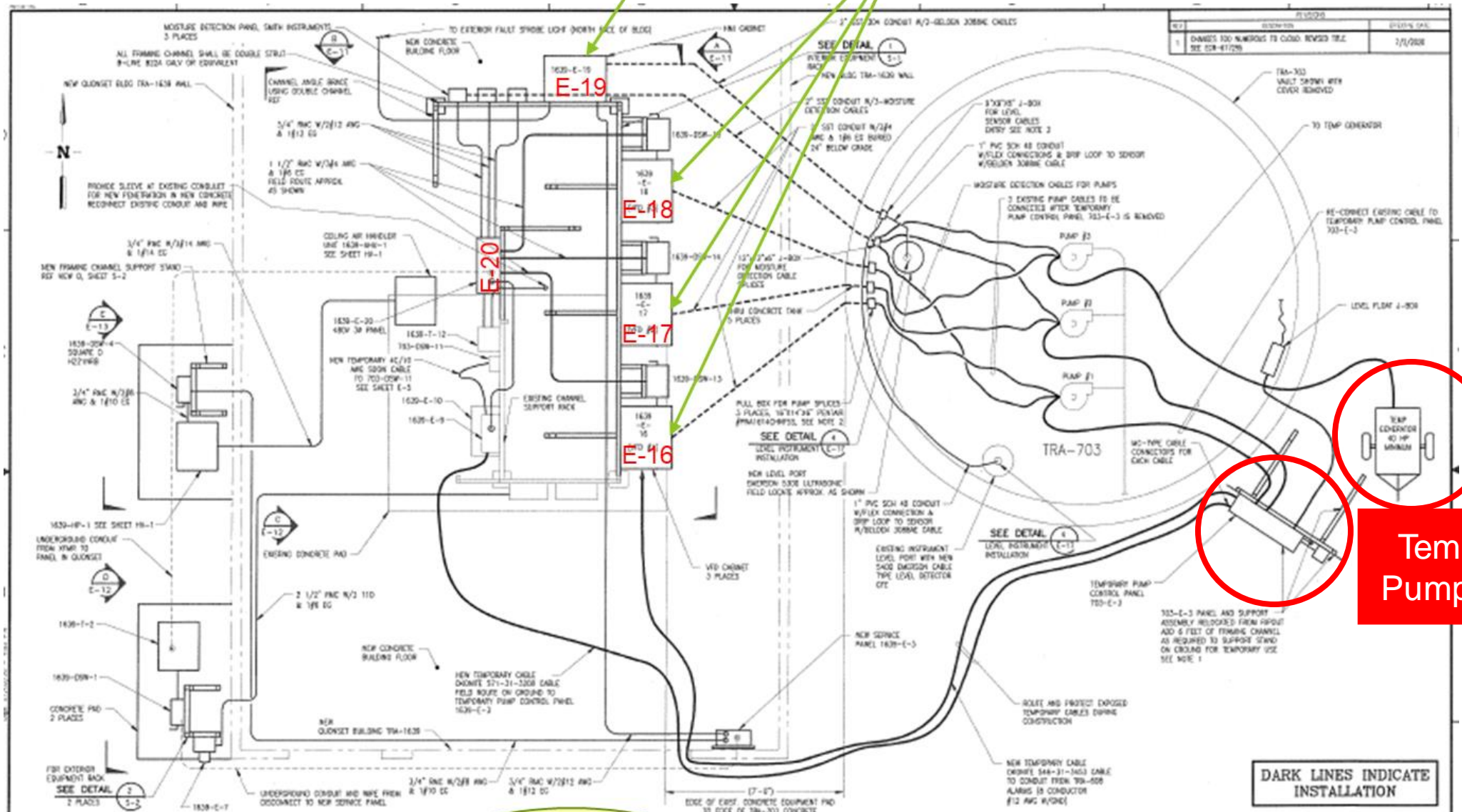


TRA-1639 Cold Waste Electrical Diagram



HMI Cabinet

VFD Cabinet's



NOTES

1. PANEL 303-E-3 WILL ONLY BE PLACED ON SIDE OF PE DURING CONSTRUCTION TO SUPPORT ON-SITE OPERATIONS. ALL TEMPORARY EQUIPMENT WILL BE REMOVED AFTER CONSTRUCTION IS COMPLETE.
2. ALL PULL BOXES INSIDE PE WILL BE STAINLESS STEEL CONSTRUCTION.
3. CONDUIT ROUTING SHOWN FOR REFERENCE ONLY. FIELD ROUTE ACCORDING TO FIELD CONDITIONS.

**BUILDING 1639
INSTALLATION PLAN**
SCALE: 3/4" = 1'-0"



DESIGN NO.	605722
DATE	7/2/2004
DESIGNED BY	SCOTT DESAI
CHECKED BY	SCOTT DESAI
DATE	7/2/2004
PROJECT NO.	605722
PROJECT NAME	ATM COMPLEX COLD WASTE ELECTRICAL UPGRADE
PROJECT LOCATION	ATM COMPLEX COLD WASTE ELECTRICAL UPGRADE
PROJECT OWNER	ATM COMPLEX COLD WASTE ELECTRICAL UPGRADE
PROJECT MANAGER	ATM COMPLEX COLD WASTE ELECTRICAL UPGRADE
PROJECT ENGINEER	ATM COMPLEX COLD WASTE ELECTRICAL UPGRADE
PROJECT ARCHITECT	ATM COMPLEX COLD WASTE ELECTRICAL UPGRADE
PROJECT ELECTRICAL	ATM COMPLEX COLD WASTE ELECTRICAL UPGRADE
PROJECT MECHANICAL	ATM COMPLEX COLD WASTE ELECTRICAL UPGRADE
PROJECT PLUMBING	ATM COMPLEX COLD WASTE ELECTRICAL UPGRADE
PROJECT HVAC	ATM COMPLEX COLD WASTE ELECTRICAL UPGRADE
PROJECT OTHER	ATM COMPLEX COLD WASTE ELECTRICAL UPGRADE

DARK LINES INDICATE INSTALLATION	
BUILDING 1639 INSTALLATION PLAN	
DATE	7/2/2004
PROJECT NO.	605722
PROJECT NAME	ATM COMPLEX COLD WASTE ELECTRICAL UPGRADE
PROJECT LOCATION	ATM COMPLEX COLD WASTE ELECTRICAL UPGRADE
PROJECT OWNER	ATM COMPLEX COLD WASTE ELECTRICAL UPGRADE
PROJECT MANAGER	ATM COMPLEX COLD WASTE ELECTRICAL UPGRADE
PROJECT ENGINEER	ATM COMPLEX COLD WASTE ELECTRICAL UPGRADE
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PROJECT MECHANICAL	ATM COMPLEX COLD WASTE ELECTRICAL UPGRADE
PROJECT PLUMBING	ATM COMPLEX COLD WASTE ELECTRICAL UPGRADE
PROJECT HVAC	ATM COMPLEX COLD WASTE ELECTRICAL UPGRADE
PROJECT OTHER	ATM COMPLEX COLD WASTE ELECTRICAL UPGRADE

1639-E-7 Generator
Input Plug

TRA-1639 Cold Waste Electrical Diagram

1639-E-6 Gen Panel

Spare

Phase
Sequencer
1639-E-8

710-E-8

1639-E-9

J-Box 1639-E-10

1639-E-20

1639-T-12
480-120

DSW-13

DSW-14

DSW-15

1639-T-2
480-120

DSW-1

Moisture
Detection
Panel #3

Moisture
Detection
Panel #2

Moisture
Detection
Panel #1

1639-E-19
HMI Panel

1639-
E-16
VFD

1639-
E-17
VFD

1639-
E-18
VFD

1639-E-3

Bldg
Heater

Heat Pump
1639-HP-1

Bldg
Lights

Bldg
Recepts

AHU

TRA-603
Cold Waste
Sump Pit

Pump 1

Pump 2

Pump 3

TRA-674
Sample Pit

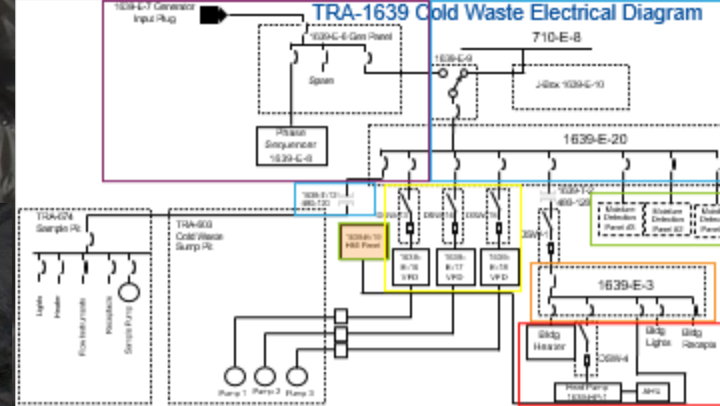
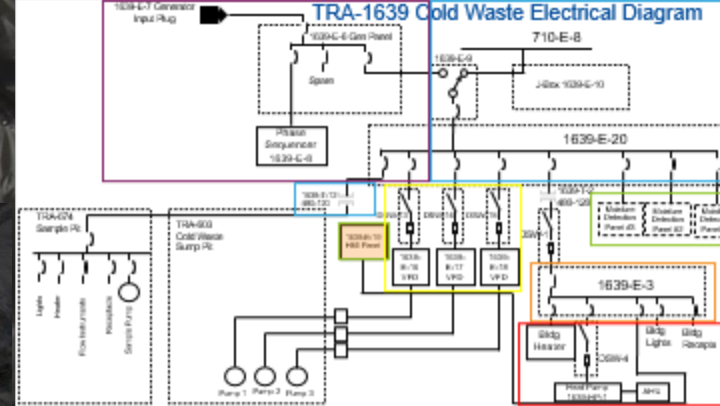
Lights

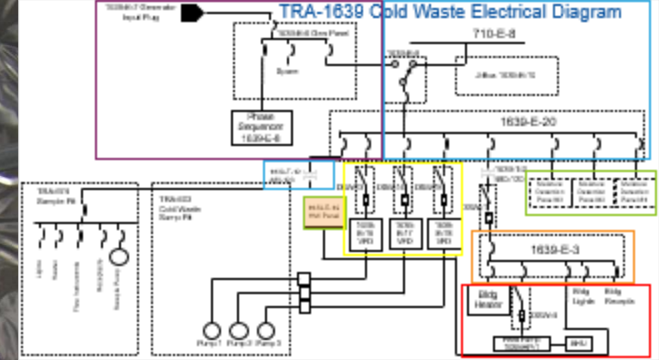
Heater

Flow Instruments

Receptacle

Sample Pump







1639-E-19
HMI PNL
FED FROM: 1639-E-3 BKR 6
120V 1PH

INL
120VAC/ 1PH/ 60 Hz
FED FROM: 1639-E-3 OKT#6
FLA: 4.2 AMPS
SCOR: N/A
DRAWING#: 605719

MI-22-10
703-M-1 Bump Pump Motor
Moisture Detector Panel
Fed From: 1639-E-20 Bks-16, 20

SMITH INSTRUMENT
I.D. Gailoup Company
800.877.4289 www.smithinstrument.com

PUMP MOTOR
MOISTURE DETECTOR

SEAL LEAK WARNING SYSTEM TEST SYSTEM OPERATIONAL

MI-22-11
703-M-2 Bump Pump Motor
Moisture Detector Panel
Fed From: 1639-E-20 Bks-17, 19

SMITH INSTRUMENT
I.D. Gailoup Company
800.877.4289 www.smithinstrument.com

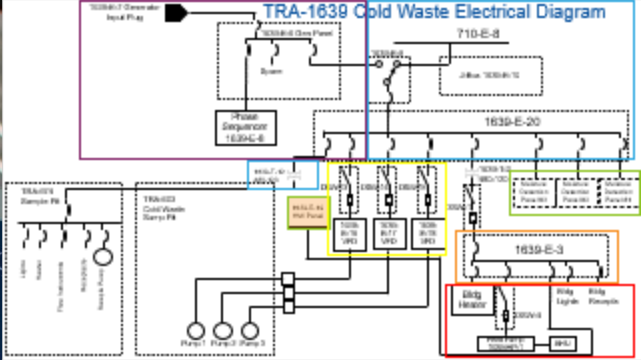
PUMP MOTOR
MOISTURE DETECTOR

SEAL LEAK WARNING SYSTEM TEST SYSTEM OPERATIONAL

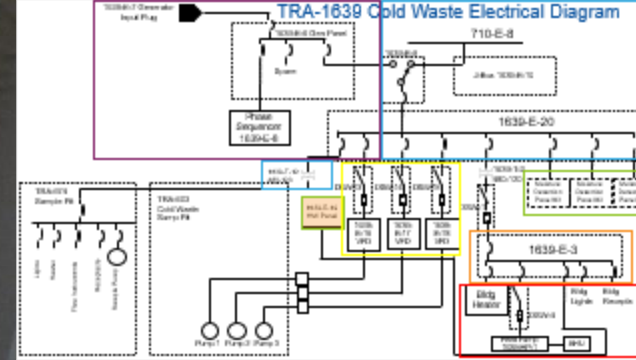
MOISTURE DETECTOR

SEAL LEAK WARNING SYSTEM TEST SYSTEM OPERATIONAL

1639-JBX-21
703-M-1,2 and 3 Pump Motor
Moisture Detectors
(Pull-Thru Only)







1639-
DSW-4

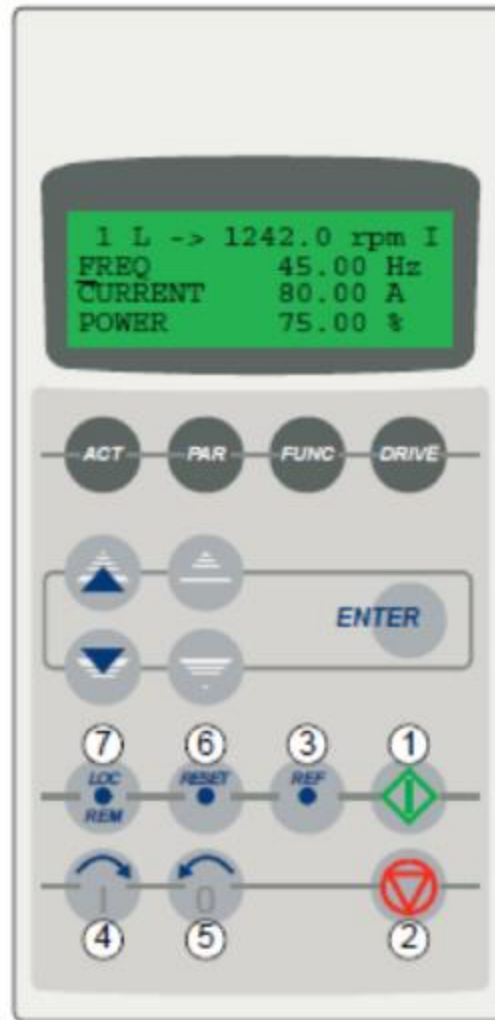
1639-
HP-1

1639-
DSW-1

1639-T-2

VFD Control Panel

No.	USE
1	Start
2	Stop
3	Activate reference setting
4	Forward direction of rotation
5	Reverse direction of rotation
6	Fault reset
7	Change between Local/Remote



	USE
ACT	Actual Signal Display Mode
PAR	Parameter Mode
FUNC	Function Mode
DRIVE	Forward direct of rotation

HMI (Red Lion Graphite Series G10S000)

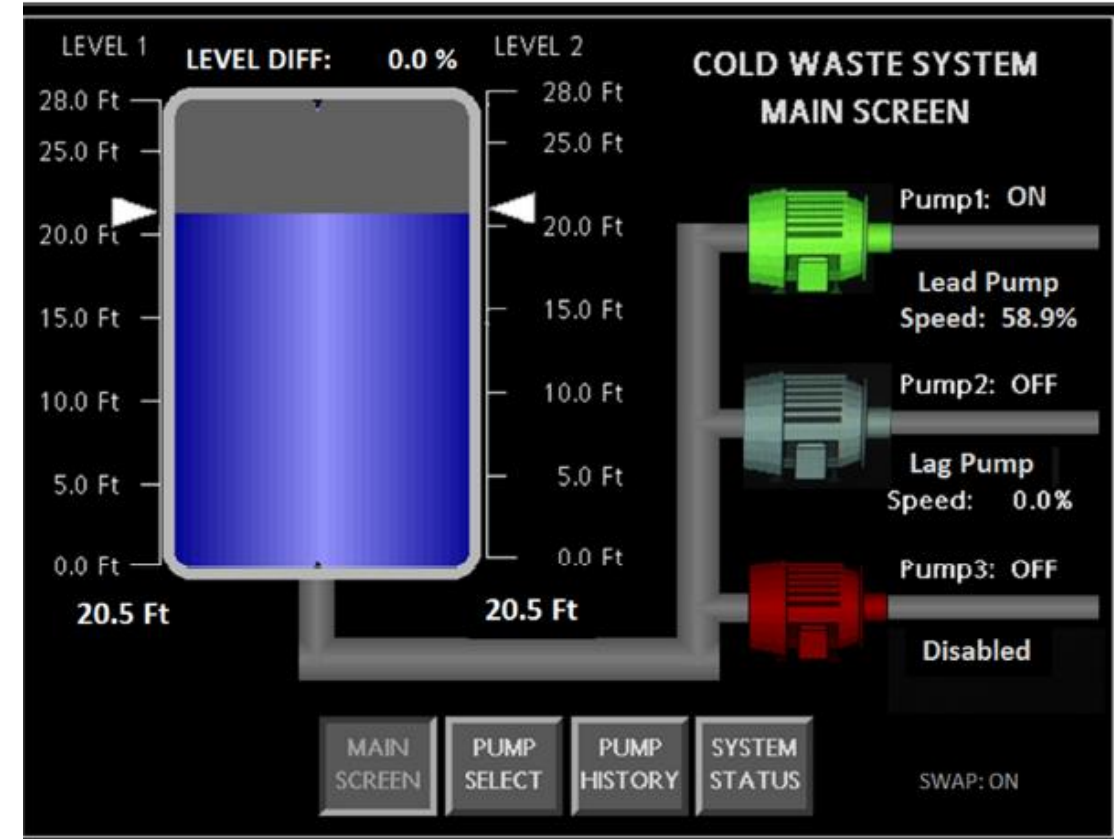
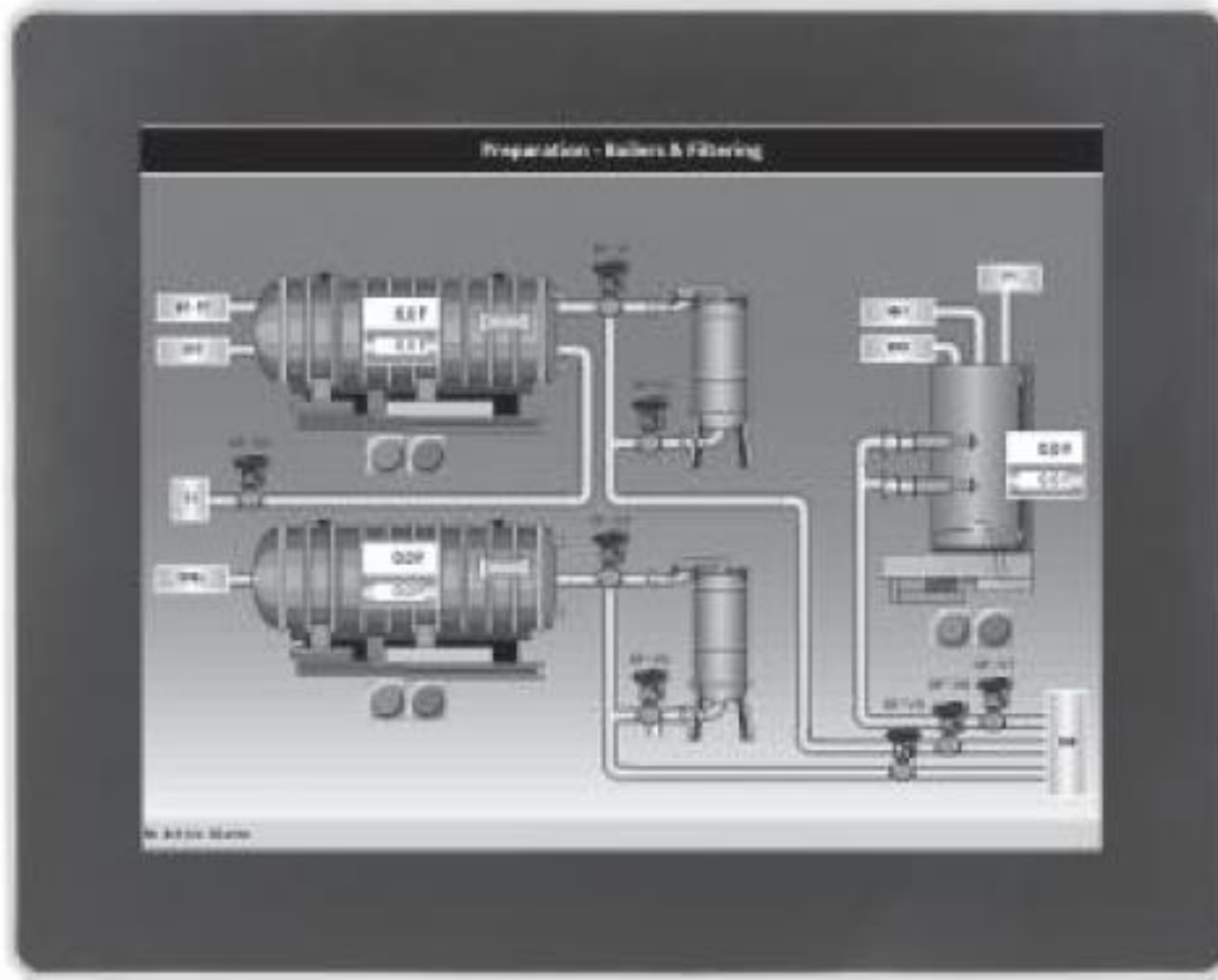
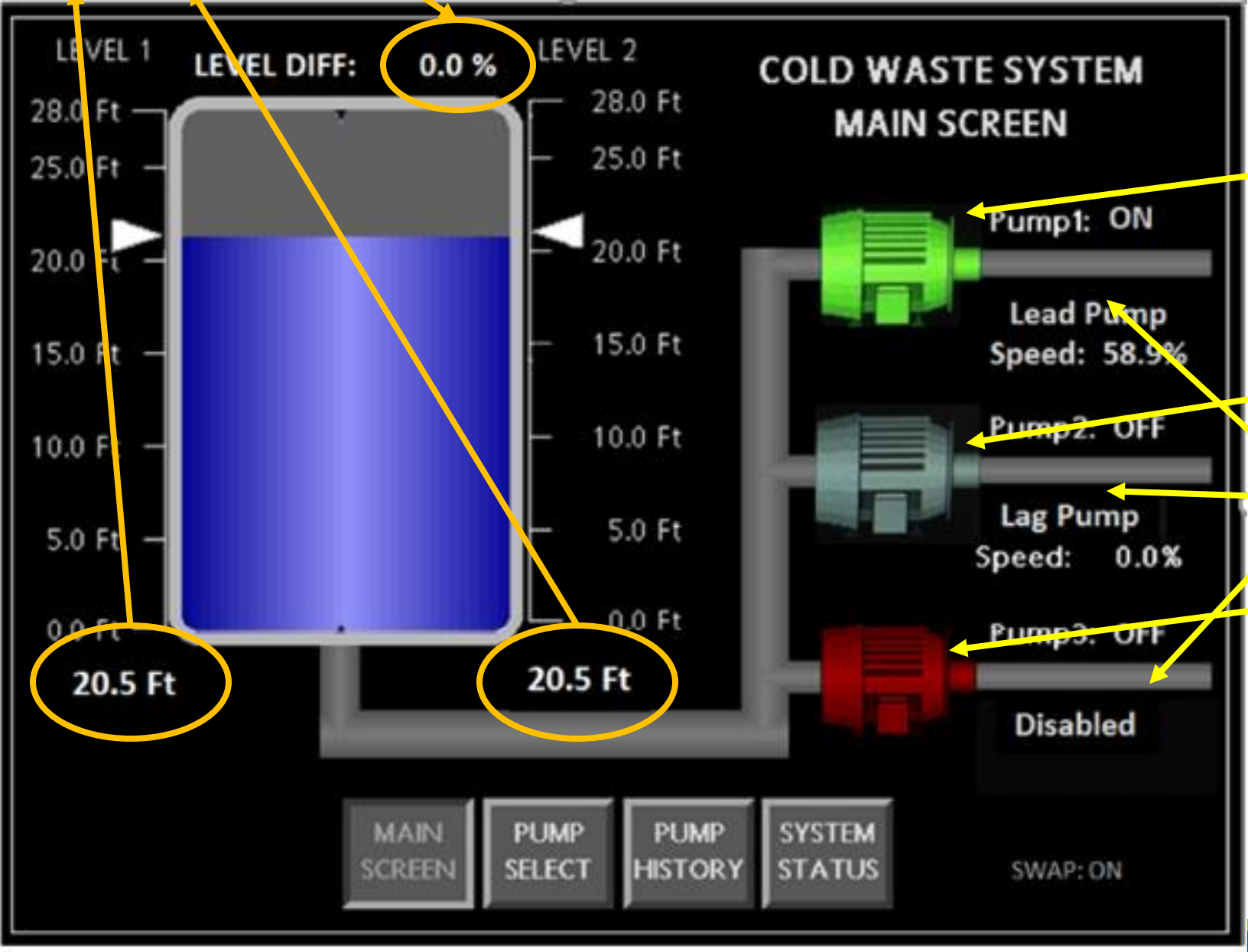


Figure 3. ATR Cold Waste HMI Display and Control Panel.

LEVEL DIFF= 20.5Ft .If >10% Numbers turn yellow with red background

Colors



Green: ON

Grey: Not Running
Grey: Disabled Backup
Lead Pump
Lag Pump
Disabled
(Disabled Backup)
Red: VFD Fault

COLD WASTE SYSTEM - PUMP SELECT SCREEN

Looks like a slider
Acts like a button

LEAD PUMP SELECT		LAG PUMP SELECT
<input checked="" type="checkbox"/> PUMP3	Lead Pump: 1	PUMP3 <input checked="" type="checkbox"/>
<input checked="" type="checkbox"/> PUMP2	Lag Pump: 2	PUMP3 <input type="checkbox"/>
<input type="checkbox"/> PUMP1	Disabled Pump: 3	PUMP2 <input checked="" type="checkbox"/>
	SWAP: ON	

MAIN
SCREEN

PUMP
SELECT

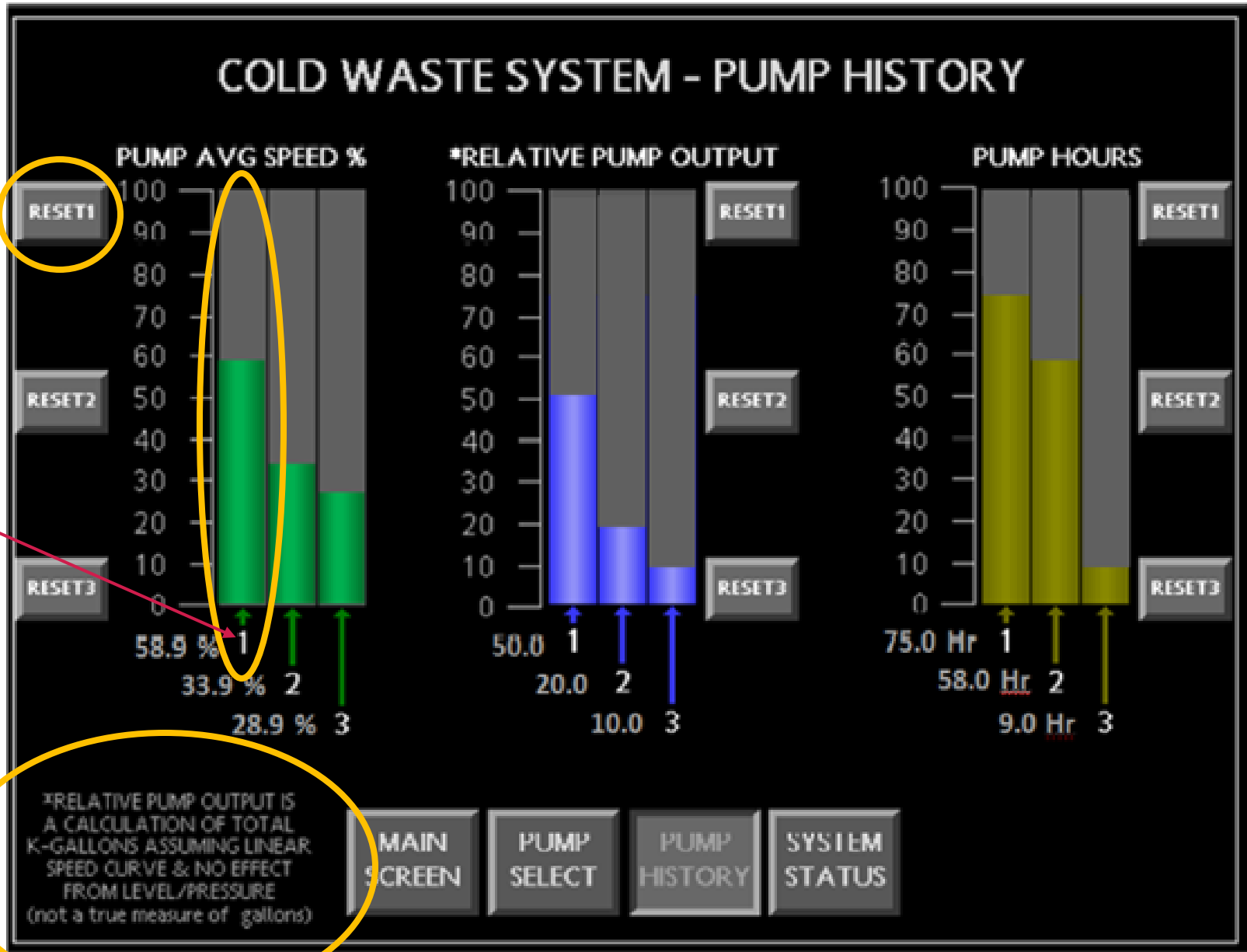
PUMP
HISTORY

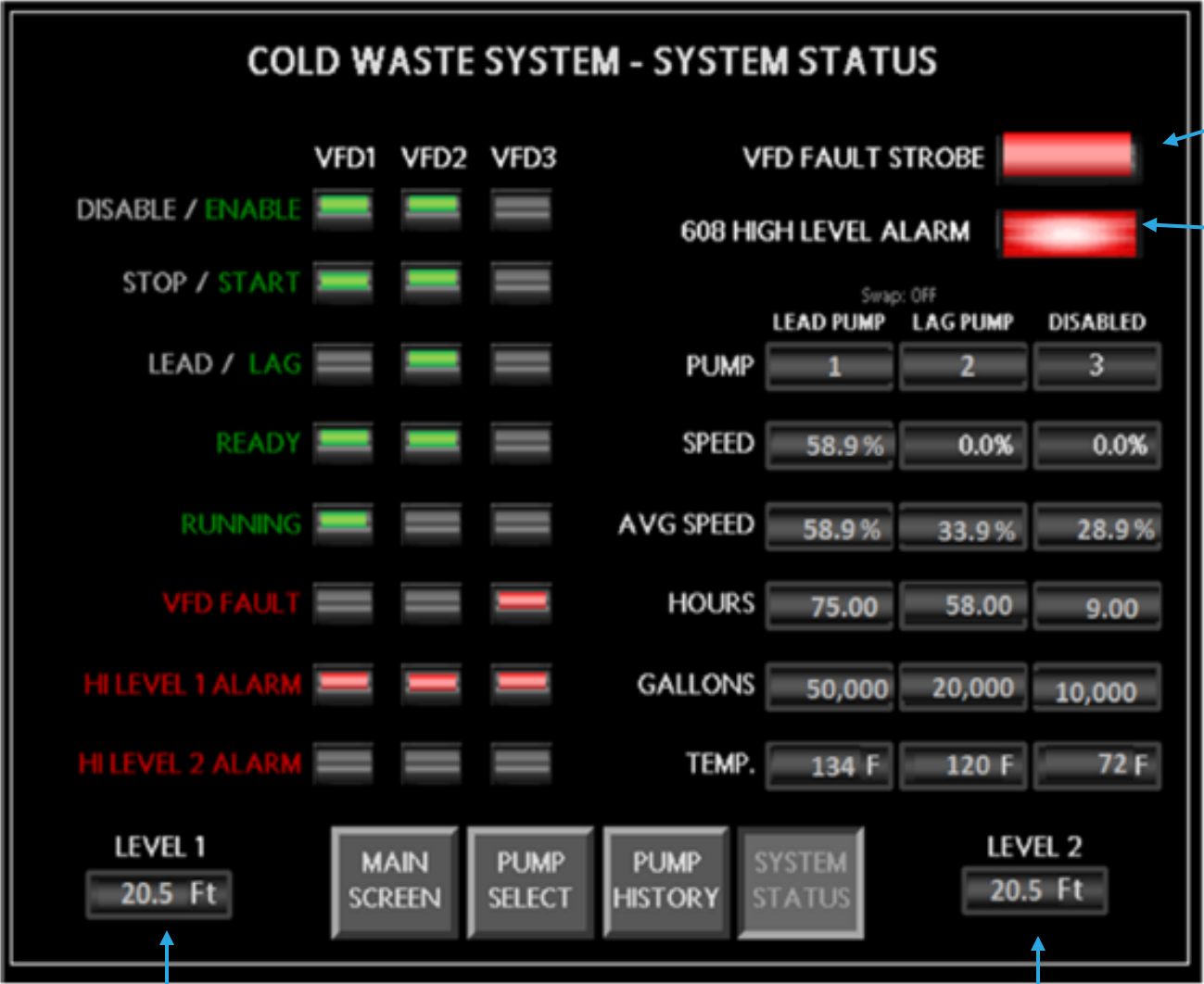
SYSTEM
STATUS



Reset Pump 1
Data

Pump 1





Fault Strobe (Entrance to Cold Waste Building)

608 Alarm

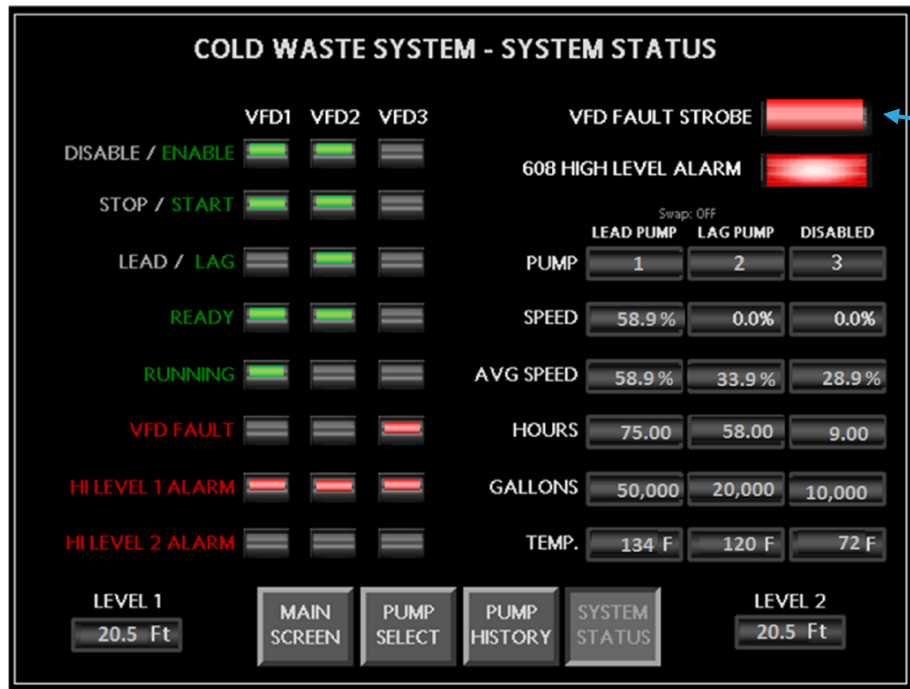
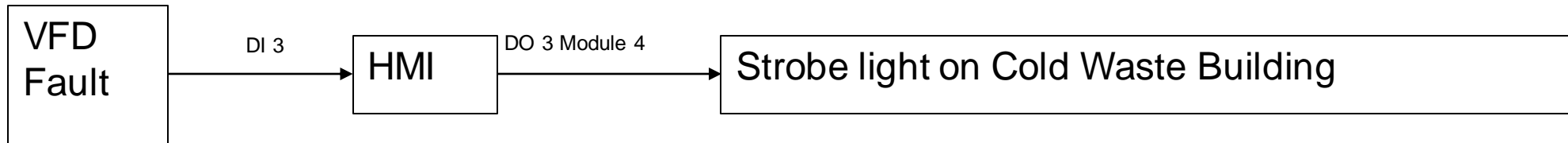
Analog values received from VFD, and calculated historic data

Cold Waste Tank Level Indication



Loss of Power to HMI

- VFD fault strobe locked in
- HI Water Level alarm locked in
- Level indication will still be sent to VFD to allow for long term local control.





TRA-604

Automatic Transfer Switch

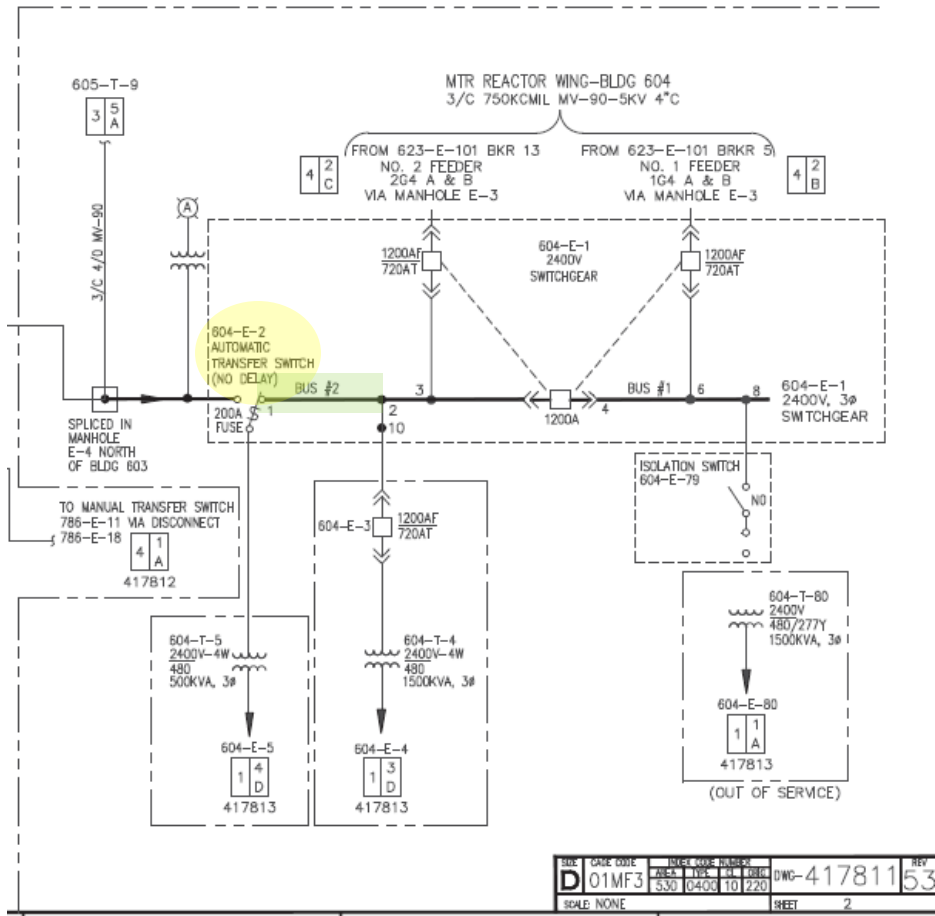


What is the function of the TRA 604 Automatic Transfer Switch

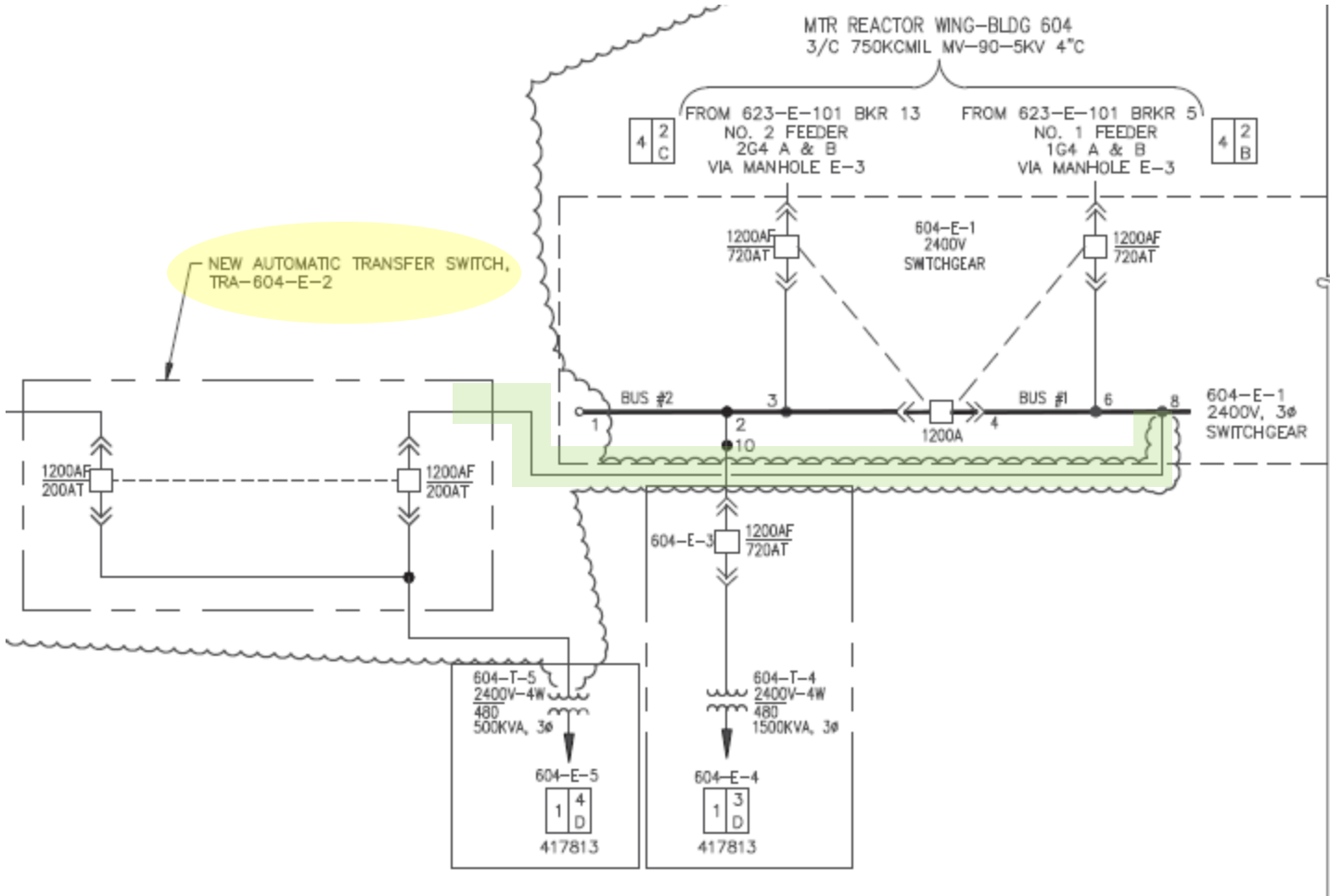
- ATS function: Provide diesel-commercial power to transformer 604-T-5. when commercial power is interrupted and power availability is sensed from the diesel source, the ATS changes its upstream power source from a commercial-powered feeder to a diesel-power feeder.
- Loss of commercial power to the outer area: Results in ATS switching to diesel power (assuming commercial power remains unavailable)
 - 0 sec: TRA-604-E-2 (ATS No.1)
 - 2 sec: TRA-609 compressor room
 - 4 sec: TRA-605 Warm Waste (ATS No. 3)
 - 6 sec: TRA-619-E-2 Raw Water Pumphouse (ATS No. 4)

The new ATS derives its commercial power from the right-hand side of 604-E-1 switchgear

Old ATS (417811)

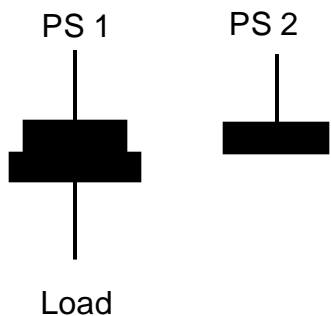


New ATS (825137)

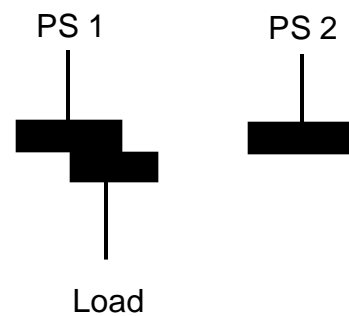


New ATS

- Replaces antiquated switch that required commercial power outage to switch the ATS back to its normal commercial feed after transferring to diesel power
- Transfer from normal to standby
 - Break-before-make
- Two selected modes for transfer from standby to normal
 - Mode No 1 is manual and permits break-before-make.
 - Mode No 2 is automatic whereby an automatic synchronization check feature initiates make-before-break



Make before Break



Break before Make



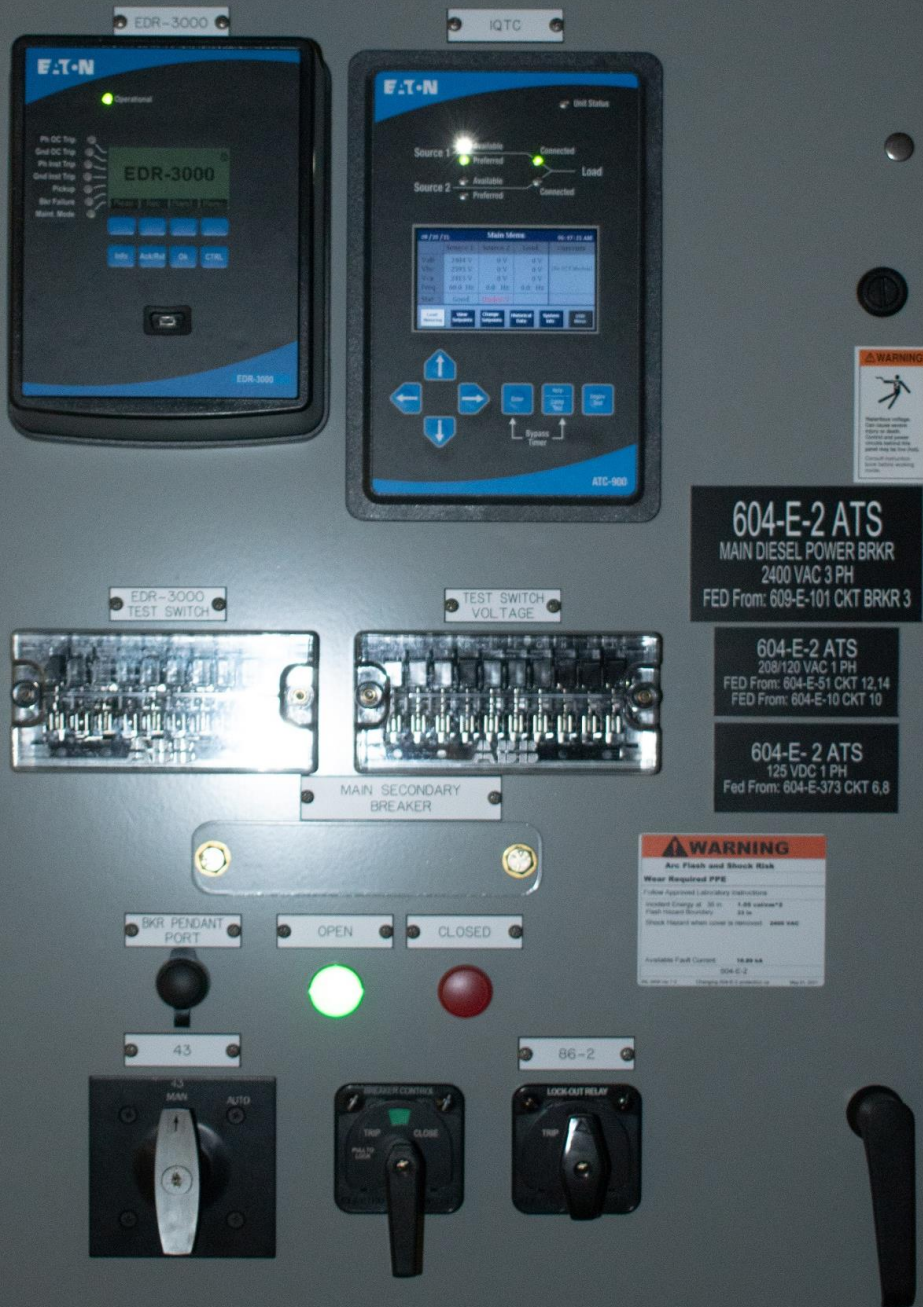
604-E-2 ATS

- Top Left
 - Diesel Feed from 609-E-101
- Bottom Left
 - Commercial Feed from 604-E-1





- 604-E-2 ATS Commercial Breaker Panel
 - Breaker Control
 - Lockout Relay Control
 - Breaker status lights
 - Open
 - Closed
 - EDR-3000
 - EDR-3000 Test Switch
 - BKR Pendant Port



- 604-E-2 ATS Diesel Breaker Panel
 - AUTO/MANUAL Selector Switch
 - Breaker Control Switch
 - Lockout Relay Control Switch
 - Breaker status lights
 - Open
 - Closed
 - EDR-3000
 - EDR-3000 Test Switch
 - Test Switch Voltage
 - Unit Status Panel (IQTS)
 - BKR Pendant Port



09 / 20 / 21

Main Menu

06:56:47 AM

	Source 1	Source 2	Load	Currents
V _{ab}	2404 V	0 V	0 V	(No DCT Module)
V _{bc}	2391 V	0 V	0 V	
V _{ca}	2410 V	0 V	0 V	
f _{ren}	60.0 Hz	0.0 Hz	0.0 Hz	
Stat	Good	Under-V		

Load Metering

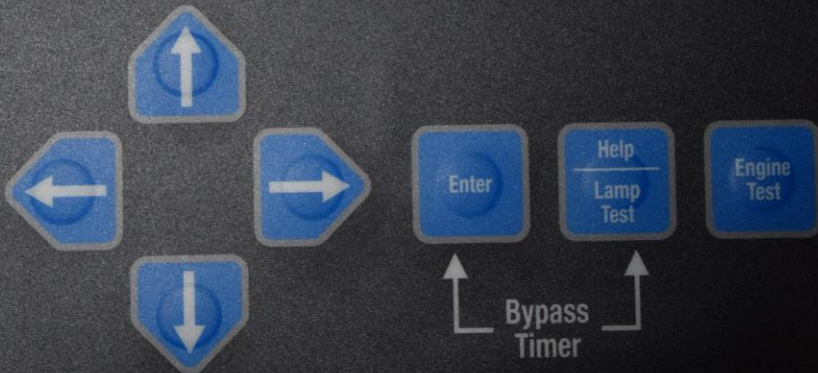
View Setpoints

Change Setpoints

Historical Data

System Info

USB Menu



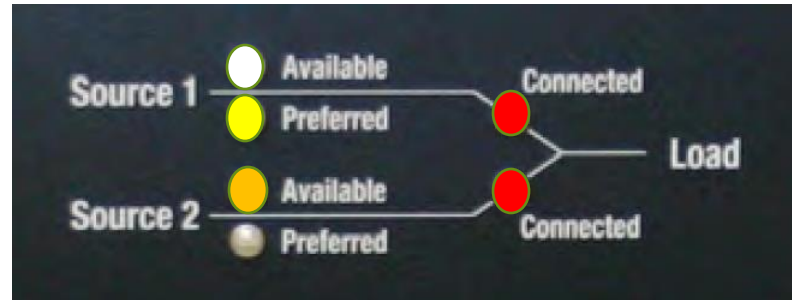
604-E-2 Unit Status Panel

- Unit Status Panel
 - Provides voltage of three phases for both sources of power
 - Provides frequency for both sources of power
 - Provides current status of both sources of power

ATS selected to Commercial then Commercial is lost

Waiting on M-6 to start

M-6 starts and loads



OPEN



CLOSED



Breaker for Diesel

OPEN



CLOSED



Breaker for Commercial

ATS selected to Commercial then Commercial is lost



ATS selected to Diesel with Commercial not available

Commercial Source Returns



OPEN



CLOSED



Breaker for Diesel

OPEN



CLOSED



Breaker for Commercial

ATS selected to Diesel with Commercial not available





LOCS DCS Upgrade

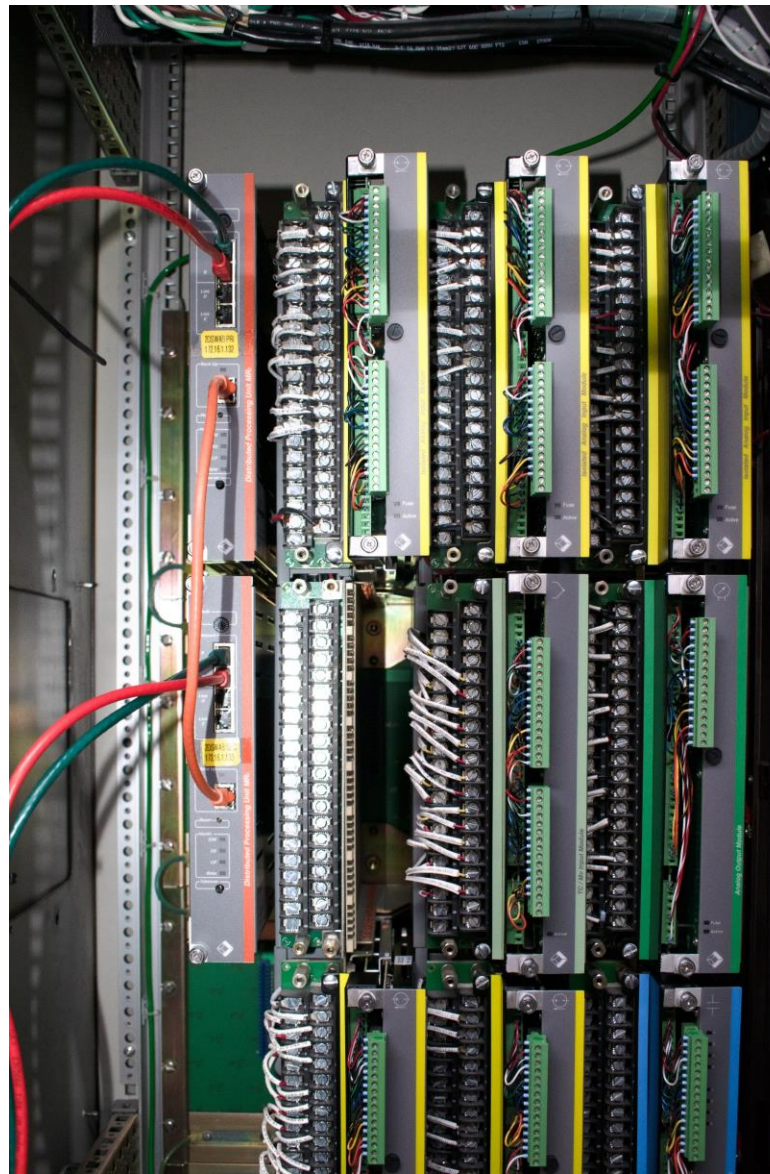
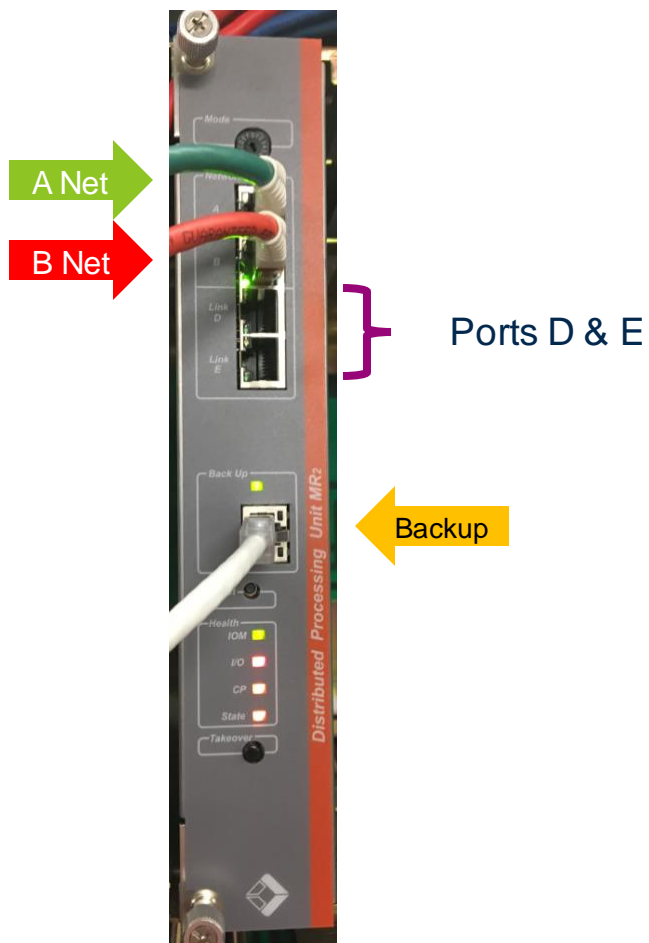


LOCS DCS Upgrade

RPU Cabinet 1
DPU and I/O Modules

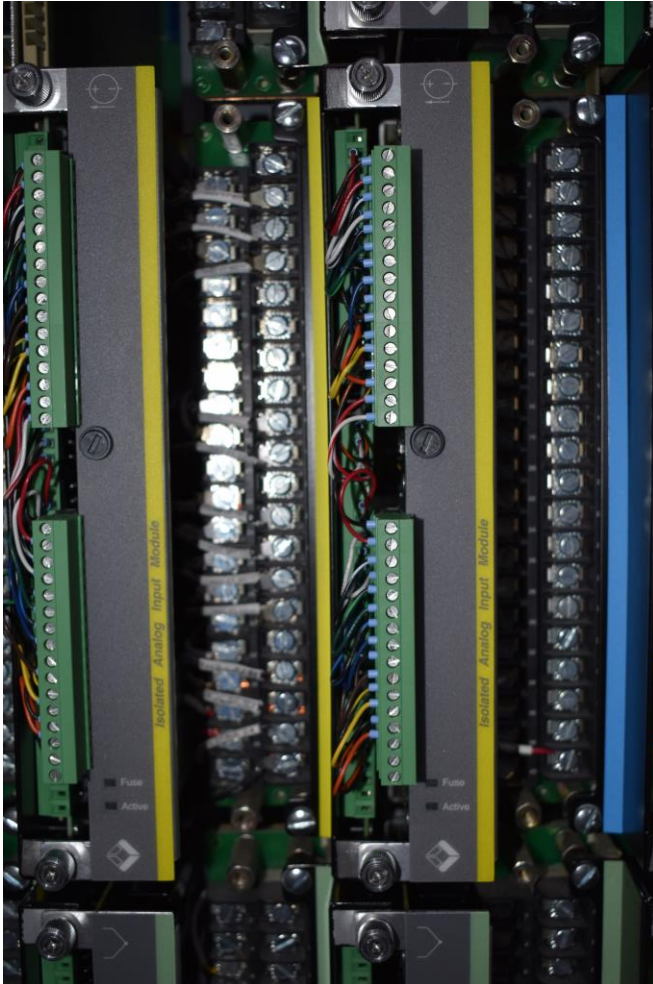
RPU Cabinet 2
A/B Network Switches

DPU MR2

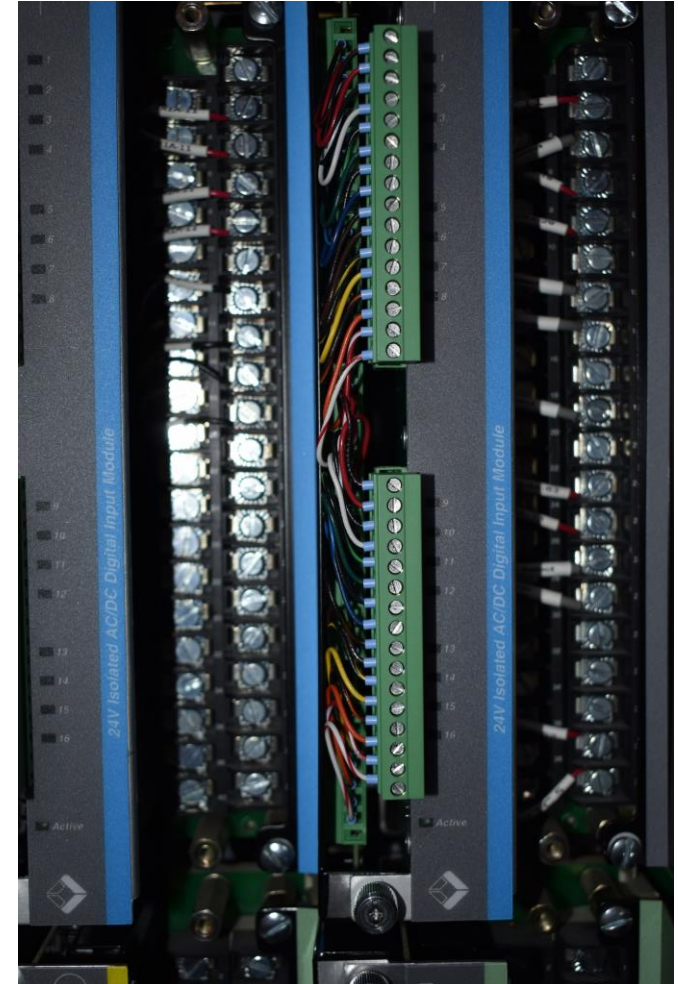


LOCS DCS Upgrade

Analog I/O
Modules



Digital I/O
Modules





SAFE 1 (Front View)	
SECURITY NETWORK SWITCH	
DPU NETWORK SWITCH A	
DPU NETWORK SWITCH B	
LOCSENG1	
LOCS6	
LOCS5	
LOCS4	
LOCS3	
LOCS2	
LOCS1	

SAFE 2 (Front View)	
SECURITY NETWORK SWITCH	
QNAP NAS	
SECONDARY SECURITY SERVER	
PRIMARY SECURITY SERVER	
AUTO TRANSFER SWITCH	
AUTO TRANSFER SWITCH	
LOCSENG2	
LOCSHIST2	
LOCSHIST1	



LOCS DCS Upgrade

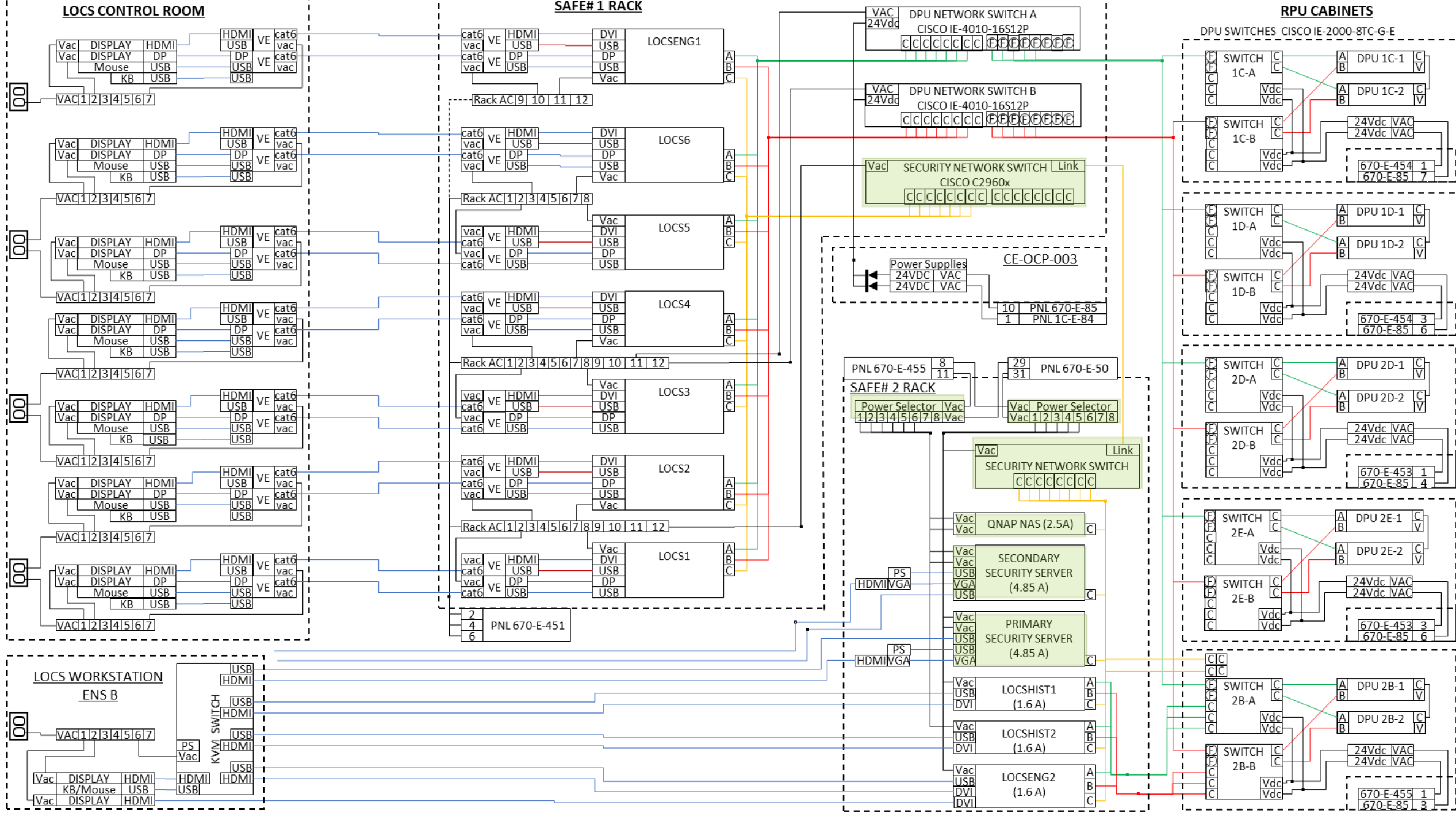
Power Supply Upgrade to Workstation Safe #2

- The current power supply to Safe #2 is Diesel/Commercial from E-18 through ATS 670-E-345 with UPS backup.
- Power is routinely lost during outages for PMs and UPSs would run down.
- Two automatic power transfer switches are being installed
 - Power will be supplied to both power transfer switches from 670-E-455 (Diesel/Commercial) and 670-E-50 (LP-10 Commercial)

LOCS CONTROL ROOM

SAFE#1 RACK

RPU CABINETS



2E-NW 1D-N

1C-W 2D-SW 2B-SE

Copyrights as described in the About Box. Version 1.0

Version: 6

2D - Pzr Heater Measurements

E1 - E5		E6 - E10	
PZR Htr 1A 454.1 DegF	PZR Htr 1B 454.1 DegF	PZR Htr 6A 458.1 DegF	PZR Htr 6B 458.1 DegF
PZR Htr 2A 454.1 DegF	PZR Htr 2B 454.1 DegF	PZR Htr 7A 458.1 DegF	PZR Htr 7B 458.1 DegF
PZR Htr 3A 456.1 DegF	PZR Htr 3B 456.1 DegF	PZR Htr 8A 458.1 DegF	PZR Htr 8B 458.1 DegF
PZR Htr 4A 456.1 DegF	PZR Htr 4B 456.1 DegF	PZR Htr 9A 459.1 DegF	PZR Htr 9B 459.1 DegF
PZR Htr 5A 456.1 DegF	PZR Htr 5B 456.1 DegF	PZR Htr 10A 459.1 DegF	PZR Htr 10B 459.1 DegF

M10 SCR Currents

PZR Cur A 4.4 AMPS	PZR Cur C 4.4 AMPS
-----------------------	-----------------------

2D-p-Pressurizer-Makeup-System.mn

The screenshot displays a complex industrial control interface. At the top, a '1D - Primary Pumps' section shows three pump units (M1, M2, M3) with various status indicators like 'Com', 'No RTD', and flow/temperature readings. A 'Master Off Pumps, PZR & Line Htrs' button is visible. Below this, a 'Pump Suction Xmt'r' section shows pressure readings for PZR and PT-3. The interface includes multiple data tables for currents (PHA, PHB, PHC) and UVR status. A '1DFCVLOOP' section shows flow control parameters. The bottom of the screen features a 'PRIMARY SUPPLIED BY' and 'SECONDARY SUPPLIED BY' section with a 'RECTIFIER' and 'INVERTER' diagram, and a 'BATTERY' status. The right side of the screen contains a vertical navigation bar with buttons for '1D Main', 'System', 'Print', 'Alarm Summary', 'System & Priority 5', 'P4', 'P3', 'P2', 'P1', 'Snap Shot', 'Restore', 'Ack Top', 'Silence', 'Logo', and 'System'. The bottom navigation bar includes buttons for '1C Main Overview', '1D Main Overview', '2B Main Overview', '2D Main Overview', '2E Main Overview', 'Alarm Test', and '1cupseacon'.

[illegible]

LOCOS Network Status

Network Color Code: Good (Green), Warning (Yellow), Bad (Red)

LOCOSOPER1, LOCOSOPER2, LOCOSOPER3, LOCOSOPER4, LOCOSOPER5, LOCOSOPER6, LOCOSOPER7

SWWS A/B

SW1CW A/B, SW1DN A/B, SW2BSE A/B, SW2DSW A/B, SW2ENW A/B

1CWAB (DPU Pair), 1DNAB (DPU Pair), 2BSEAB (DPU Pair), 2DSWAB (DPU Pair), 2ENWAB (DPU Pair)

Security: Logos, System, Print, Summary, Snap Shot, Restore

1cupseacon

1C Main Overview, 1C Trend Menu, 1D Main Overview, 1D Trend Menu, 2B Main Overview, 2B Trend Menu, 2D Main Overview, 2D Trend Menu, 2E Main Overview, 2E Trend Menu, Alarm Test

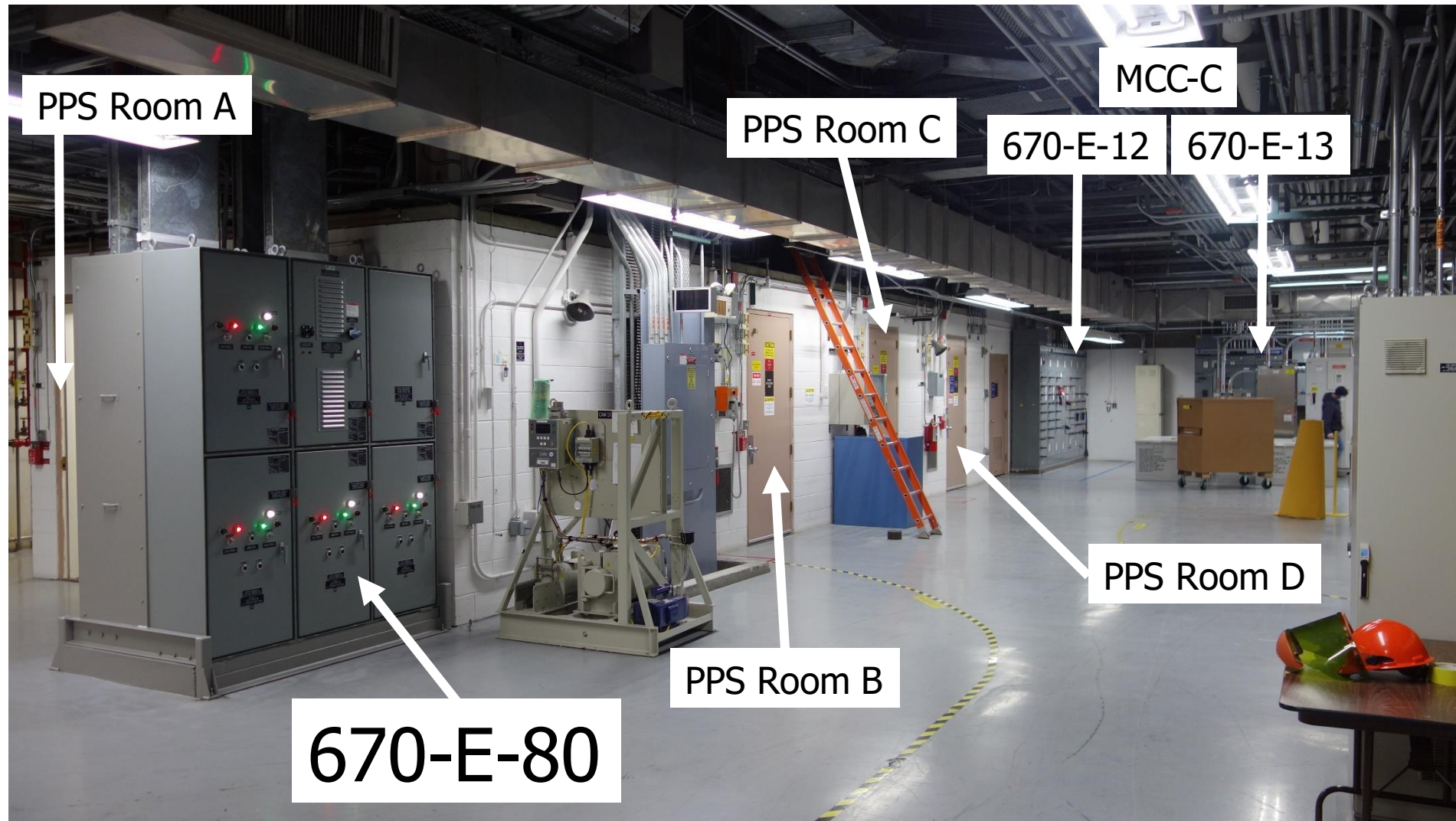
[illegible][illegible]



670-E-80 Upgrade



670-E-80 Rod Drive Power – 1st Basement East Side



670-E-80 Rod Drive Power – 1st Basement East Side

Cubicle 1A	Cubicle 2A	Cubicle 3A
Cubicle 1B	Cubicle 2B	Cubicle 3B



670-E-80 Rod Drive Power – Cubicle 2A

Idaho National Laboratory

Form 412.09 (Rev. 00)

OSCC MOVEMENT FAILURE	Identifier:	AOP-1.2
	Revision:	10
	Effective Date:	09/17/20
Page: 4 of 7		

Appendix A

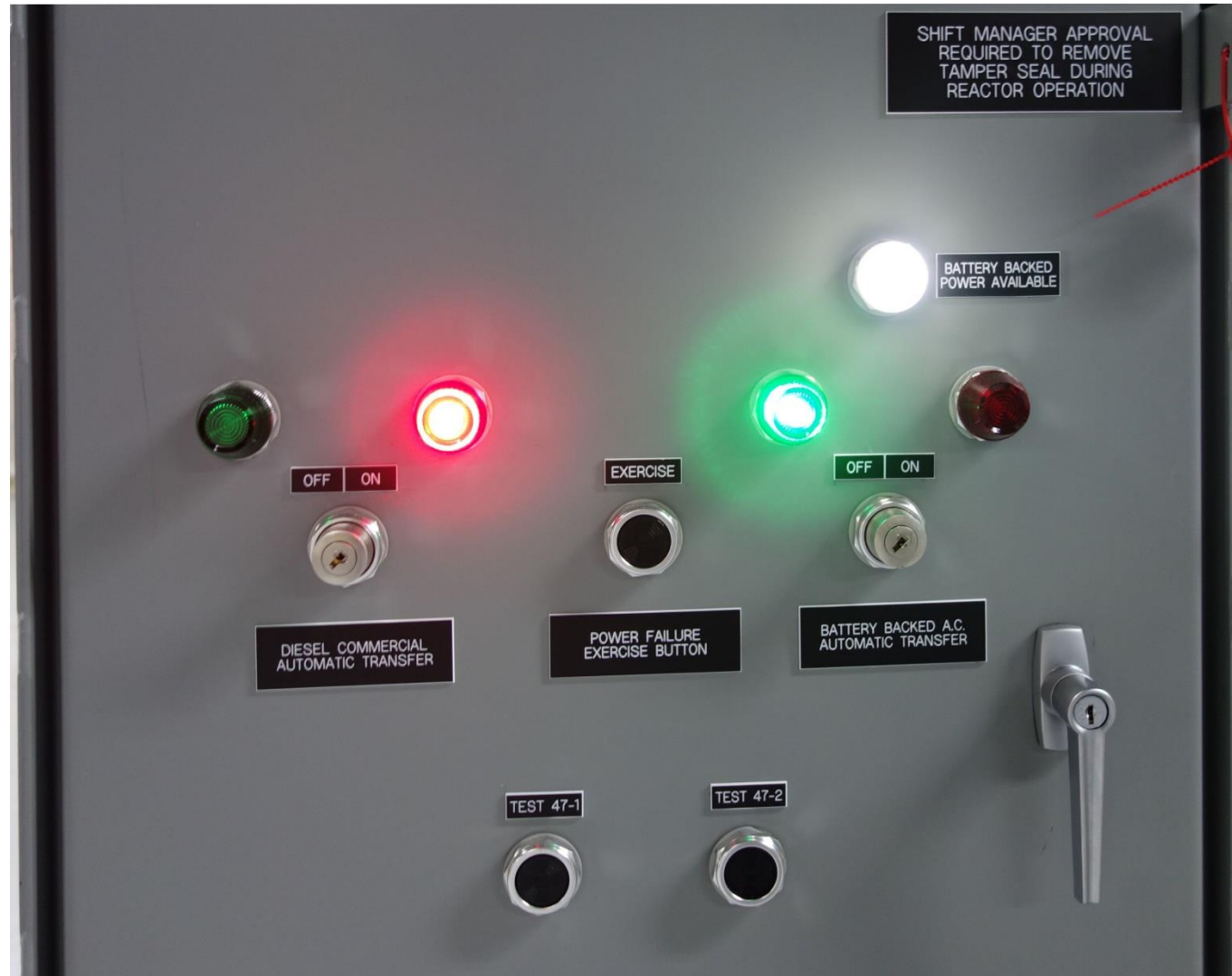
OSCC Motor Current Measurement

1. Using a digital multimeter (Fluke Model 8020A or equivalent), SET the meter to the appropriate range to measure a max 10 Vdc signal.
2. CONNECT the multimeter to pin jacks just below the "OSCC Motor Current Selector Switch and Monitoring Points" label on MCC [E-80].

Objectives #2, 3, and 8



670-E-80 Rod Drive Power – Switches

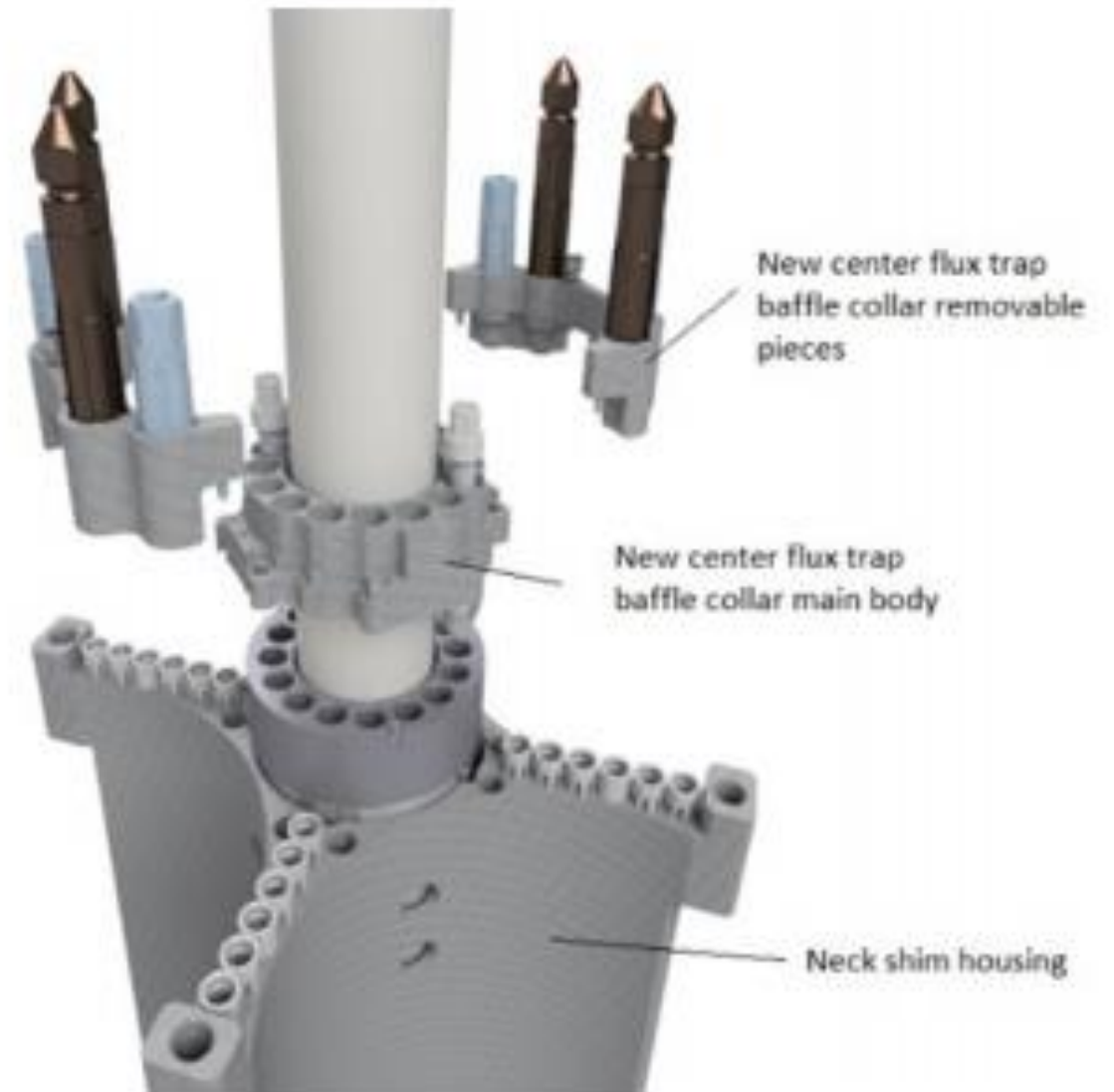
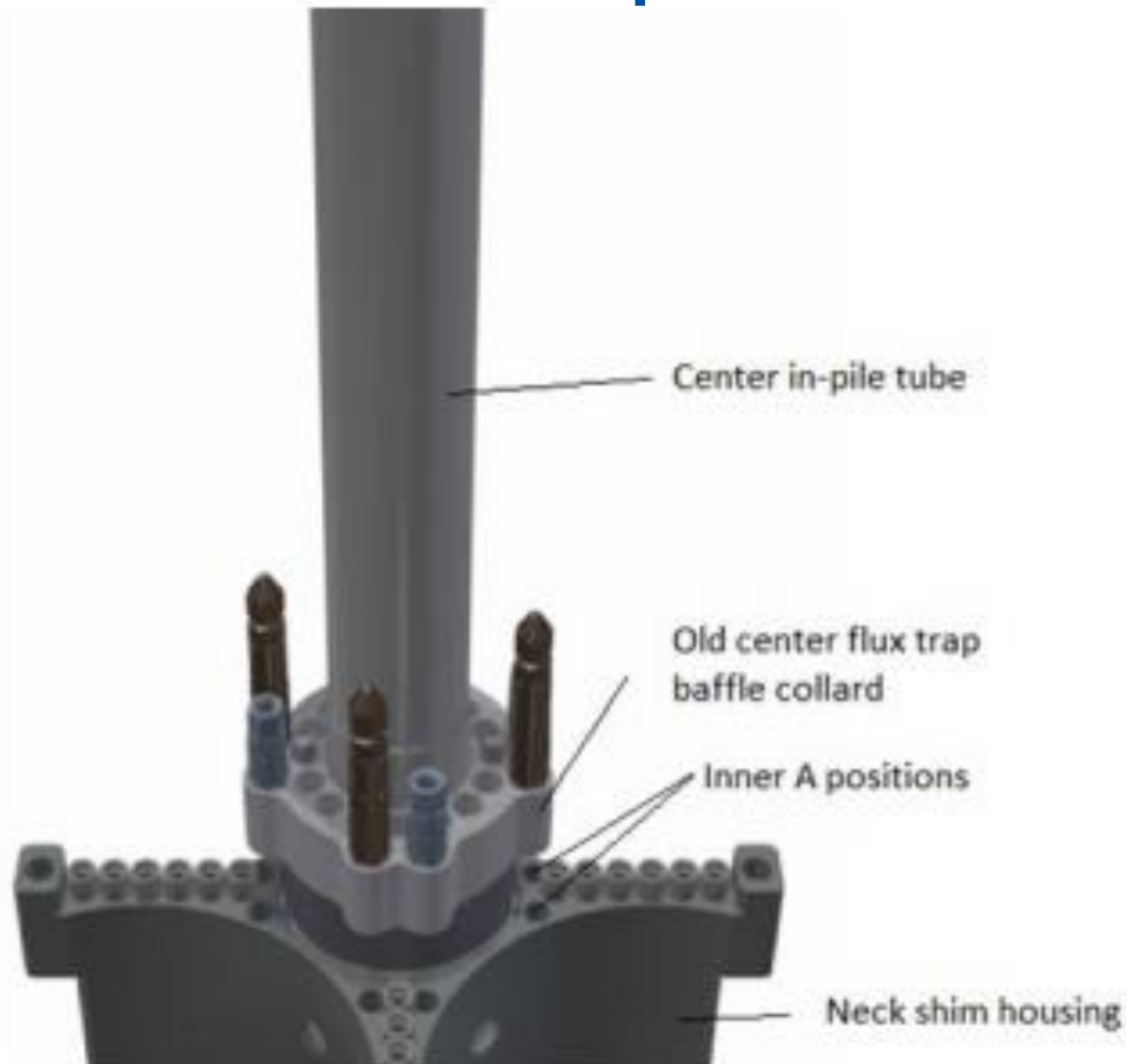


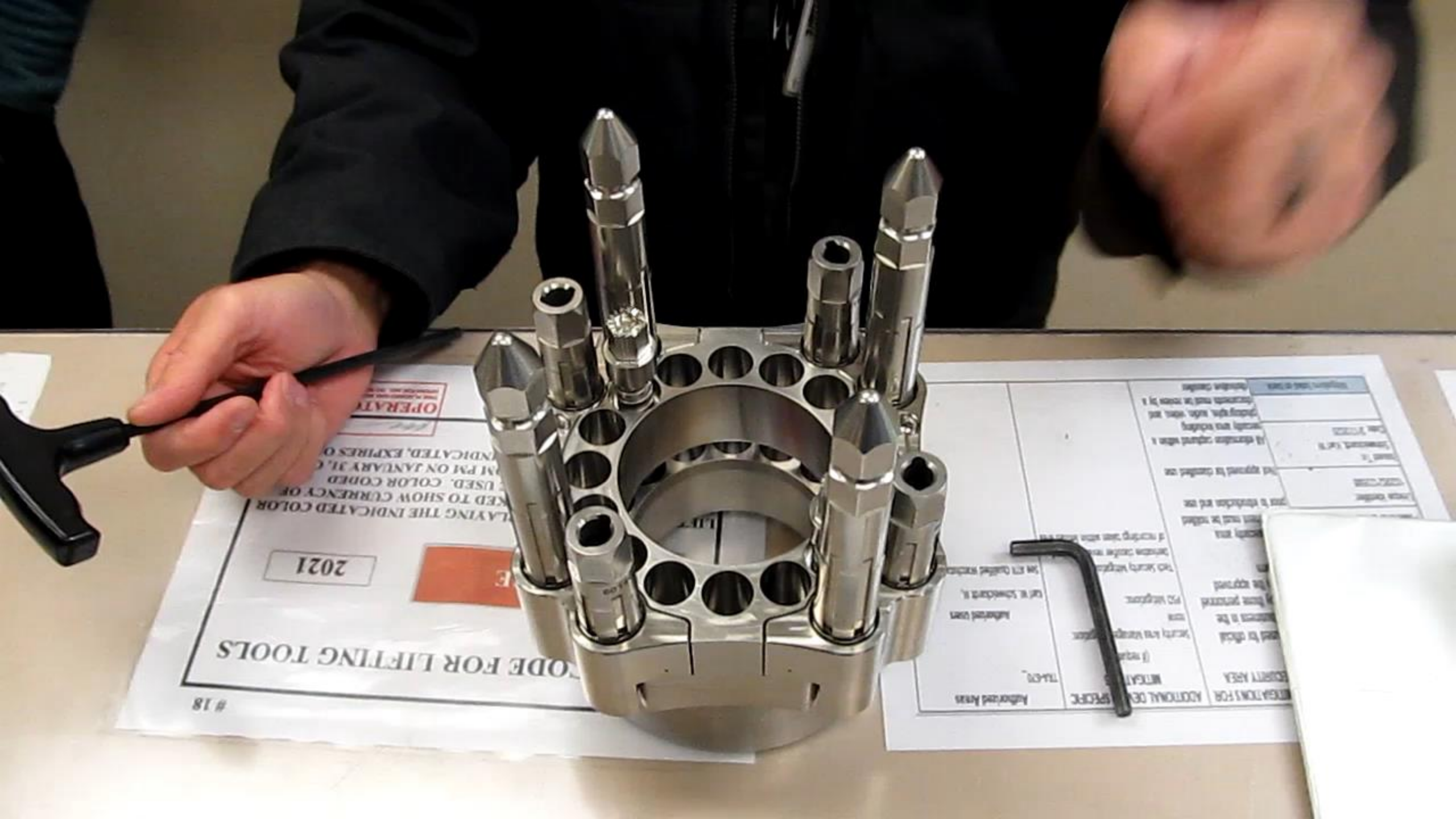


Center Flux Trap Baffle Collar Modification



Center Flux Trap Baffle Collar



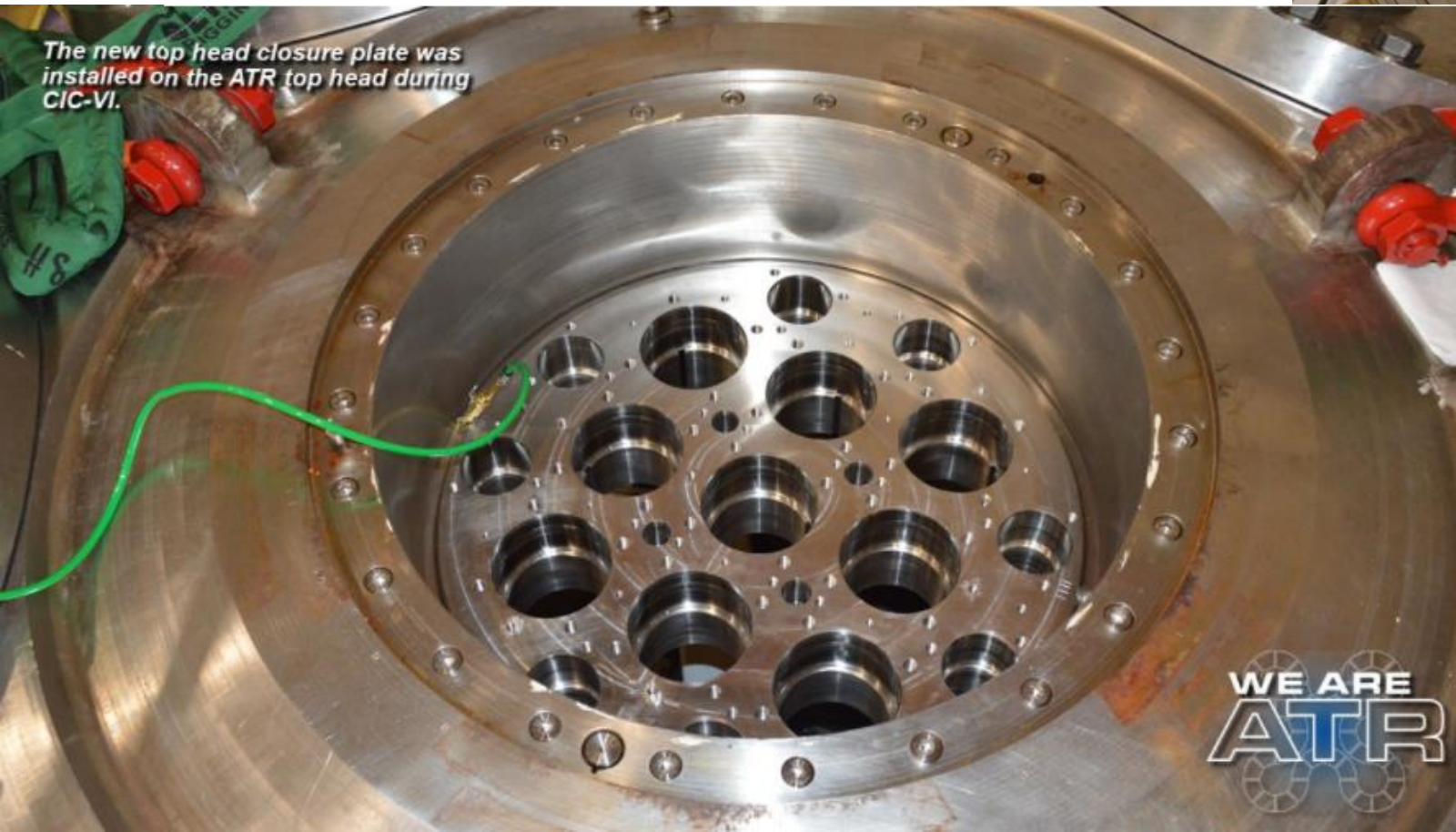




Top Head Closure Plate Modification



Top Head Closure Plate





Wide Range Neutron Level Channel B Replacement



All WRNL Recorders and Monitors are Digital





Digital Radiation Monitoring System Upgrade



ATR Reactor Building TRA-670: Replace active Berthold RAMs/CAMs

- Mirion/Canberra Equipment
 - Replace (49) Radiation Area Monitors (RAMs) with
 - (35) G64 and
 - (16) EcoGamma
 - Replace (23) CAMs with
 - (18) mobile iCAMs
 - (6) iCAM_PING skid
 - CAMs 23, 24 & 25 not being replaced
 - CAM 4 – mobile and fixed



Canberra G64 and EcoGamma RAMs

- G64 Area Gamma Monitor - solid state detector
 - Detector head can be at the unit or remote up to 100 meters away
 - 10 μ REM/hr to 10 REM/hr
 - 55 kev to 7 Mev
 - 30 min. Back up battery
 - Stand alone or in a system

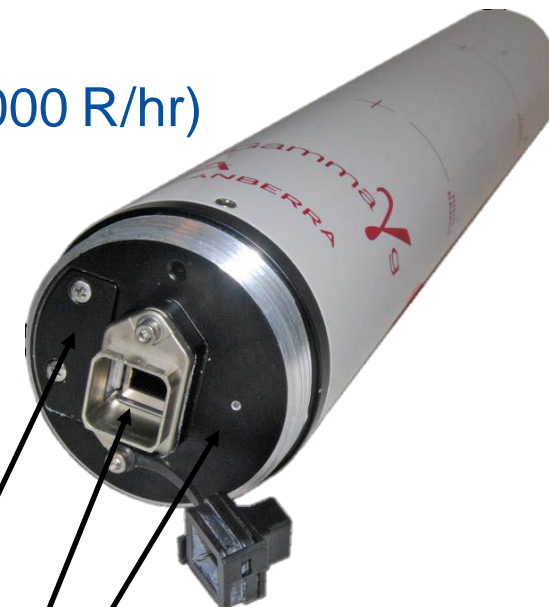
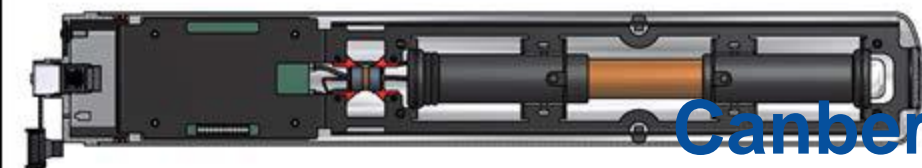


Canberra G64 and EcoGamma RAMs

- EcoGamma - dual halogen quenched GM detectors
 - 1 μ R/hr to 1000 R/hr (1 uR/hr to 500 mR/hr & 5 mR/hr to 1,000 R/hr)
 - 30 keV to 5 MeV
 - LED Status Indicator
 - Solid Green = Operational
 - Blinking Green 50% = Initializing
 - Blinking Green 10% = Internal Fault
 - Solid Red = High Dose Rate Alarm
 - Blinking Red = Alert Dose Rate Alarm
 - No LED = No power
 - Direct ethernet connection
 - No local alarm or readout

USB Connector
Ethernet Connector
LED Indicator Light

Low Range Detector
High Range Detector

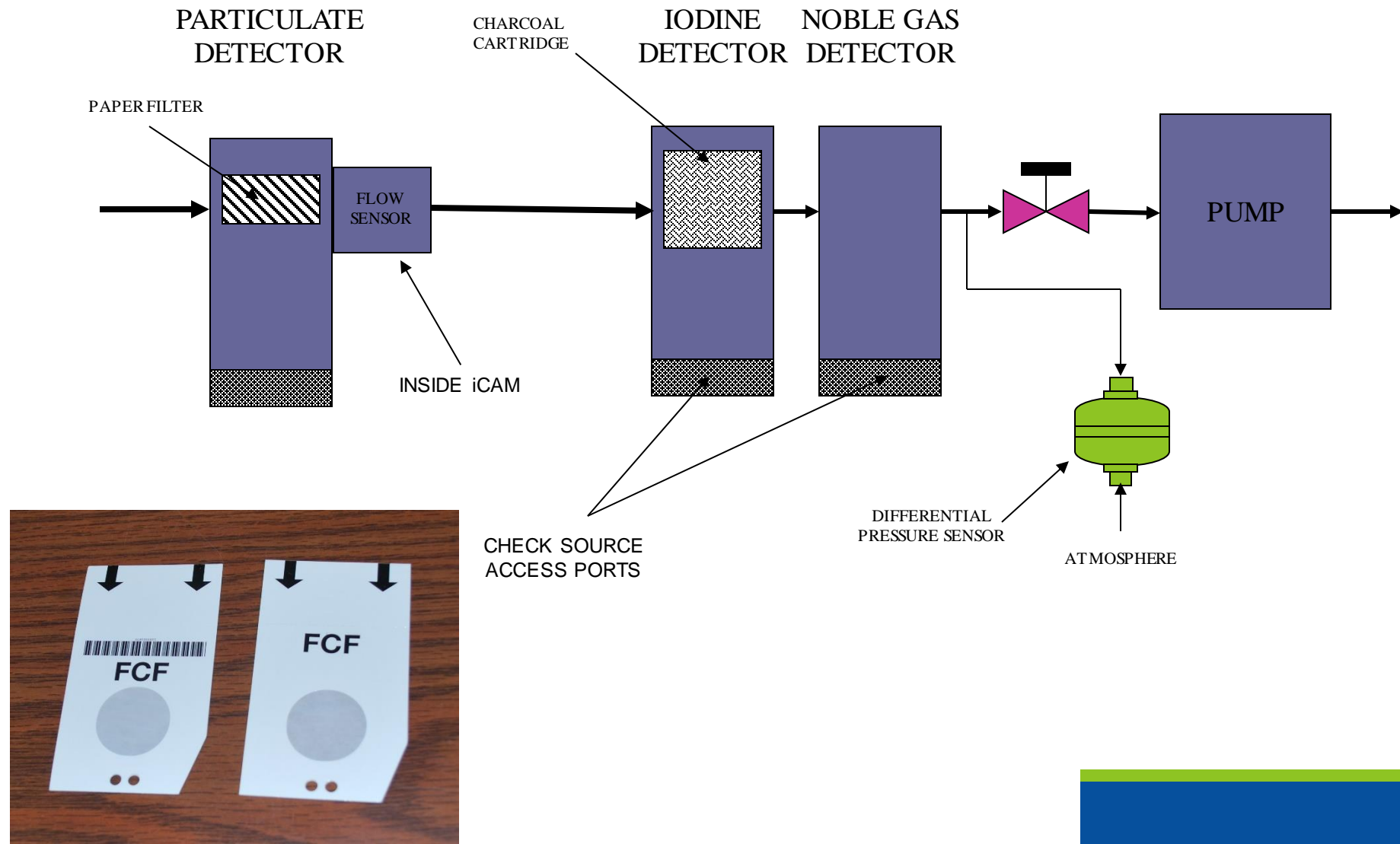


Canberra iCam

- Particulate - Silicon Semiconductor Detector for α/β with optional second detector for gamma compensation
- Iodine - NaI Detector
- Noble Gas - Plastic Scintillation Beta Detector
- Flow Path – Particulate, Iodine, Noble Gas, Pressure Transducer, Pump



iCAM PING Air Sampling Flow Path



Larger System

(15+ Mixed instruments)

iR7040

ADM606



Network



iCAM

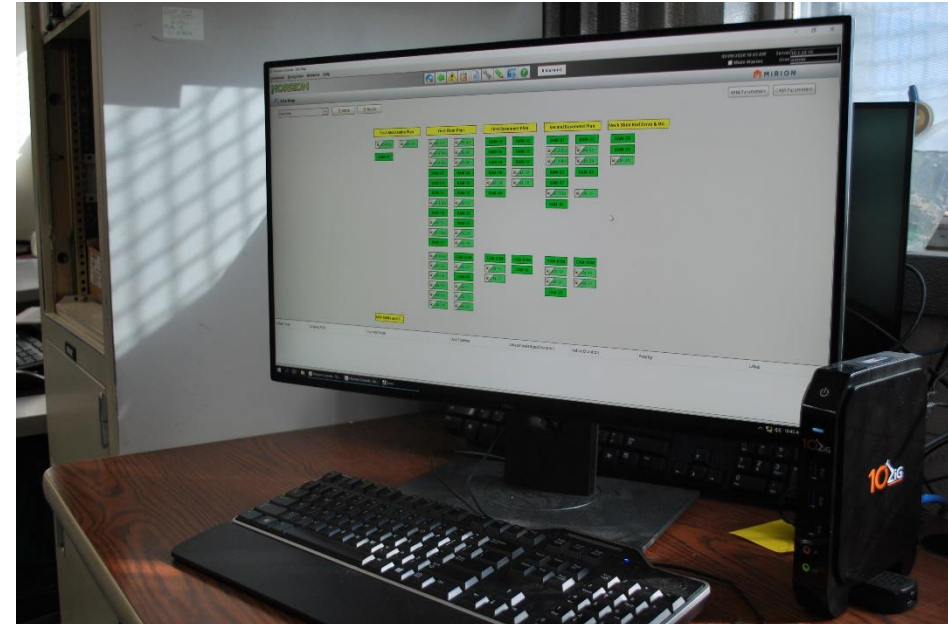
EcoGamma



Secondary
Horizon Consoles

Console(Remote Monitoring Terminals)

m
ces
e devices



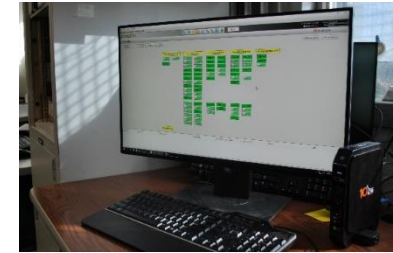
Horizon Console/Servers/Backup

- The **Horizon OPC (Open Productivity & Connectivity) Server** manages the **communication with the radiological instruments** and converts the data stream into the OPC intercommunication standard protocol.
- The **Horizon SCADA (Supervisory Control And Data Acquisition) Server** receives the data from the OPC Server and continuously maintains in its memory an instantaneous status of the instrumentation system (measured values and alarm status). **Operator interface**
- Sequel Server - Database Storage



Network Components

- Control System Interface (CSI)
 - Servers in RDAS
 - Two Cabinets in RDAS with three systems/servers in each rack and a back up in the Simulator
- Computer/Network system with Horizon Software
 - Each terminal is considered a **Remote Monitoring Terminal**
 - RCO(2 ea.), RCR, ECC, and Simulator
 - Many layers of redundancy in the system
- 7 CSI cabinets in the plant
 - 2 in RDAS, 1 in laydown and 2 each in first and second basements
 - Servers are in the 2 CSI cabinets in RDAS



Power Supplies

- **Diesel/Commercial**
 - Power for iCAMs 1-6, 12, 15-17, 19, 20, and 22
 - G64 RAMS 1, 3-6, 9-12, 14-23, 28, 29, 34, 38-40 and 44
- **Instrument UPS**
 - Power for iCAMs 7-11, 13, 14, 18, 21, and 25
 - RCUs in RCO
 - Battery bank in Switchgear (670-E-428 fed from 670-E-117)
 - G64 RAMs 2, 7, 8, 13, 24-27, 35
- **Dual Power Source Equipment (fed from both power sources)**
 - CSI Racks
 - Evacuation System “A” (EcoGamma RAMs 5, 6, 23 and 34)
 - Evacuation System “B” (EcoGamma RAMs 2, 13, 24 and 35)

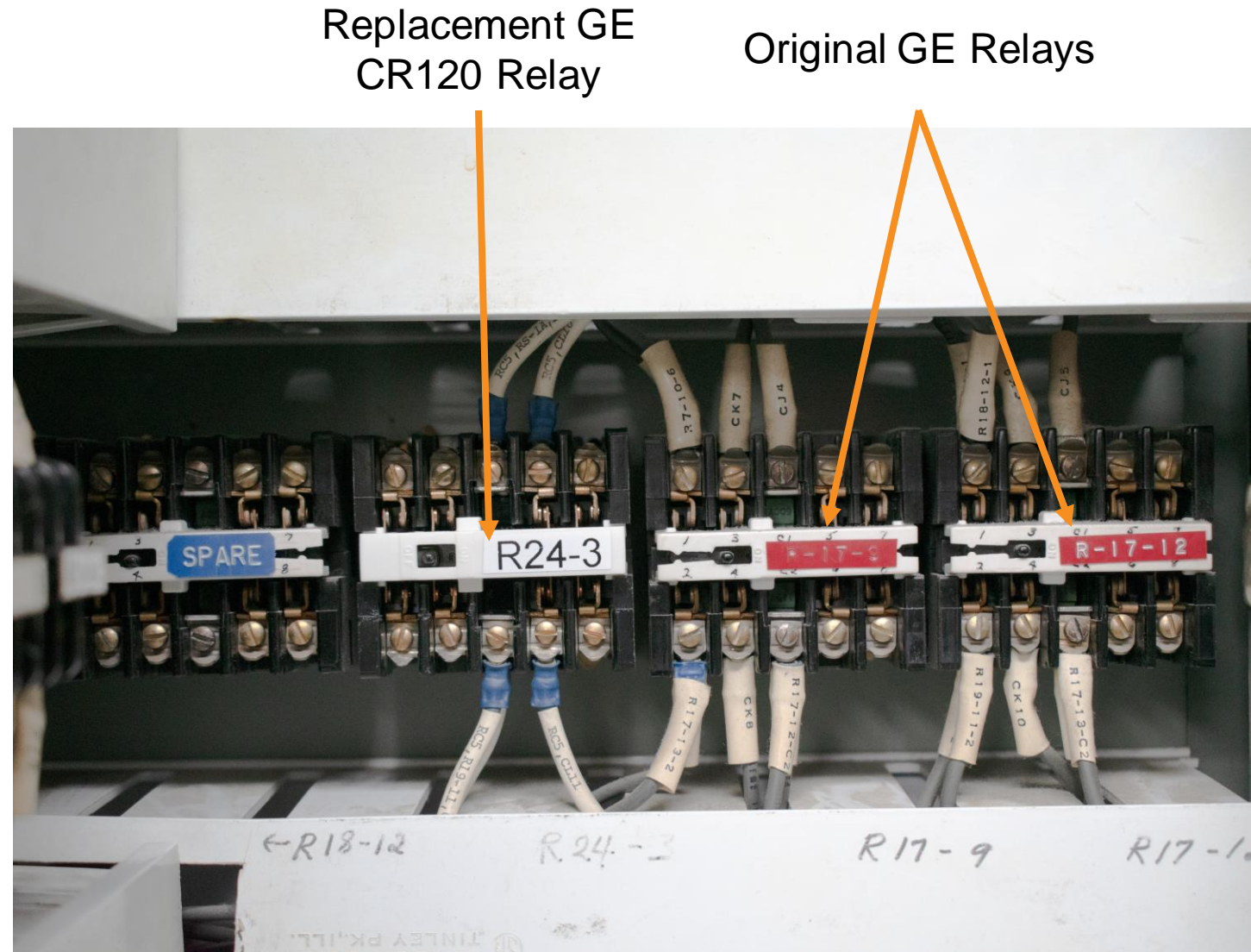


Permissive Relays Upgrade



Background

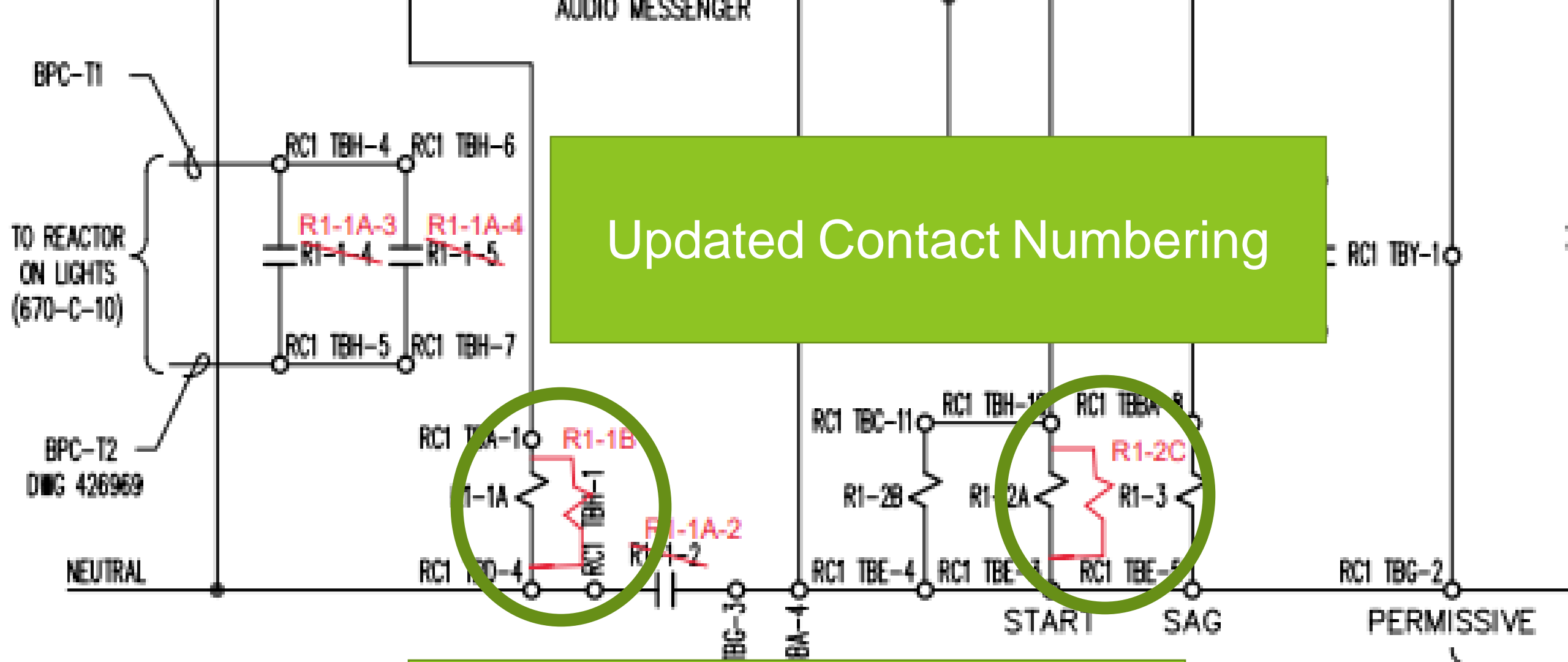
- Original GE relays installed in 1965 were failing catastrophically
- New GE CR120 relays installed—these were failing rapidly for withdrawal circuits on the 1/5 second timer



Relay Replacement

- 175 GE CR120 relays are being removed
- 196 new relays are being installed
 - Why more?
 - All new relays are 4 pole relays. Some existing relays are 8 Pole, so it will require two new relays to replace them
- Two types of new relays being installed
 - Allen Bradley 700 HC relays (Whiteish Gray)
 - Orange tab allows the relay to be blocked
 - Mors Smitt D Relays (Plastic Cover)
 - Used for special cases
 - 10 Amp relays
 - Relays requiring a long physical life
 - Cannot be blocked

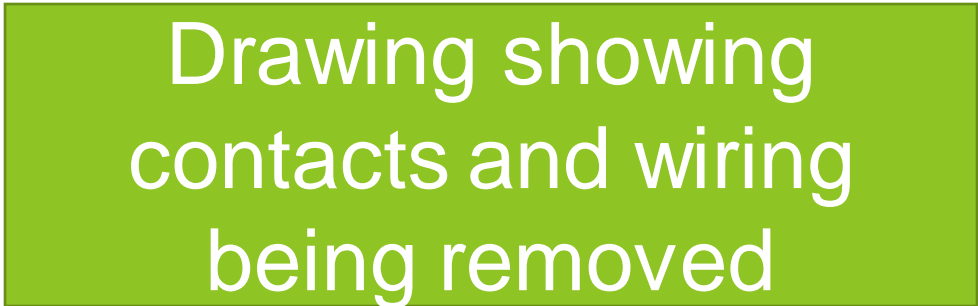




Updated Contact Numbering

Two 4-Pole Relays to Replace an 8-Pole Relay

NOTES:



Drawing showing contacts and wiring being removed



671 Chemical Supply Modification



New Contractor for Chemicals

- Water and Energy Systems Technology, Inc. (WEST) will be providing corrosion control and biocide chemicals for ATR's Secondary Coolant System (SCS).
 - 671-M-63 C-328 chemical storage tank will hold 1750 gallons of the corrosion control chemical (where the old CC tanks were).
 - 671-M-64 C-328 chemical storage tank will hold 1750 gallons of the corrosion control chemical (where the old CC tanks were).
 - 671-M-79 chemical storage tank will each hold 360 gallons of the biological control dispersant chemical (North/East side of the chemical storage area in TRA-671).
 - 671-M-181 Sodium Hypochlorite chemical storage tank will hold 700 gallons of biological control chemical (South wall of the pump area in TRA-671).



New Contractor for Chemicals

- C-328 corrosion control concentration will be maintained between 80-120 ppb.
- C-328 corrosion control chemical will be added to the secondary coolant system through one of two pumps:
 - 671-M-182
 - 671-M-183
- C-328 concentration in the secondary coolant system will be continuously monitored and adjusted by WEST's controller.
- Both 671-M-182 and 671-M-183 pumps can be placed in off, manual (hand) or auto from the selector switch on 671-E-191.



New Contractor for Chemicals

- Bellacide 335 biological control dispersant concentration will be maintained dependent on the secondary coolant makeup.
- Bellacide 335 biological control dispersant chemical will be added to the secondary coolant system through one of two pumps:
 - 671-M-184
 - 671-M-185
- Bellacide 335 will be automatically added to the secondary coolant system by WEST's controller.
- Both 671-M-184 and 671-M-185 pumps can be placed in off, manual (hand) or auto from the selector switch on 671-E-192.



Chemical Addition Panel

- 671-E-191/192
 - Switch to select pump (M-182-185)
 - Hand-Off-Auto Selector Switch
 - Light to indicate pump status (lit if pump is running)
- Four Pumps (M-182, 183, 184, 185)
- Valve Nest below to align proper flow paths for pump operation

New Contractor for Chemicals

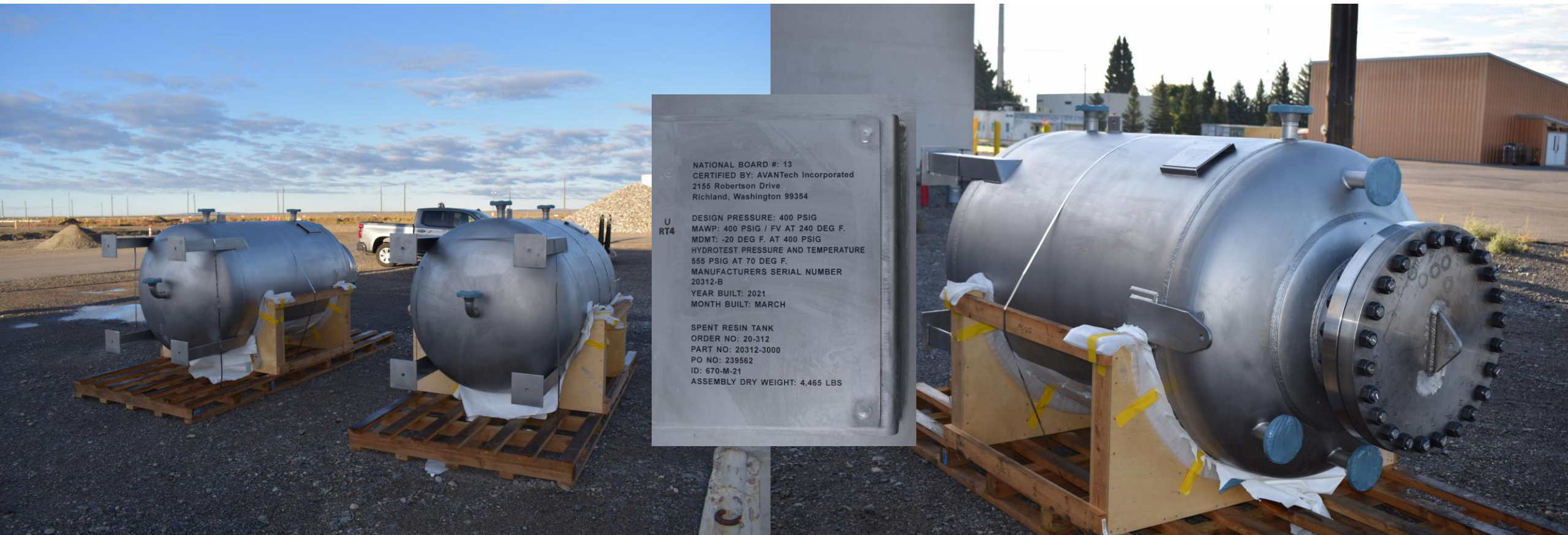
- Sodium Hypochlorite biological control chemical will be manually batch added to the secondary coolant system dependent on the concentration of free chlorine currently in the system.
- Sodium Hypochlorite biological control chemical will be added to the secondary coolant system through 671-M-181 batch pump.
- The Sodium Hypochlorite batch pump is pre-programmed to add the following volumes to the secondary coolant system:
 - 5-gallons (option # 1)
 - 10 gallons (option # 2)
 - 15 gallon (option # 3)





Bypass Demineralizer M-20 and M-21 Upgrade







Warm Waste Lifting Station Upgrade



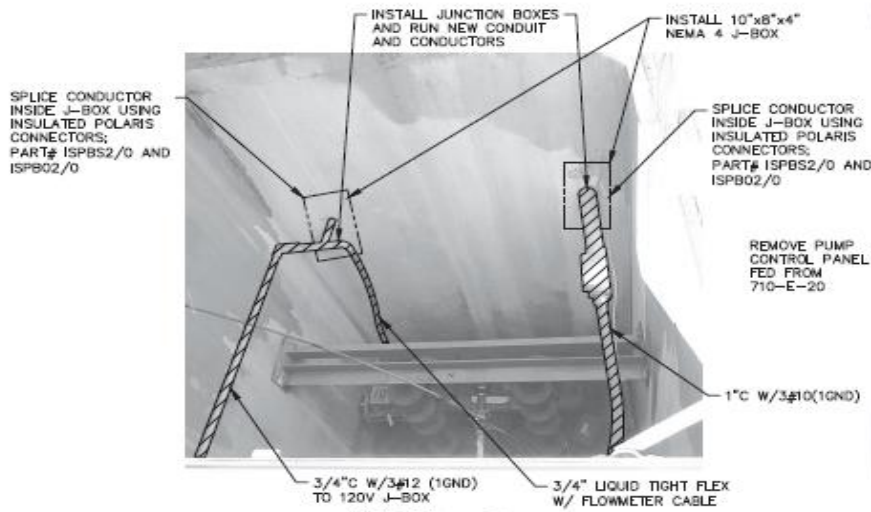


PHOTO (PH-1) D-1



PHOTO (PH-2) D-1

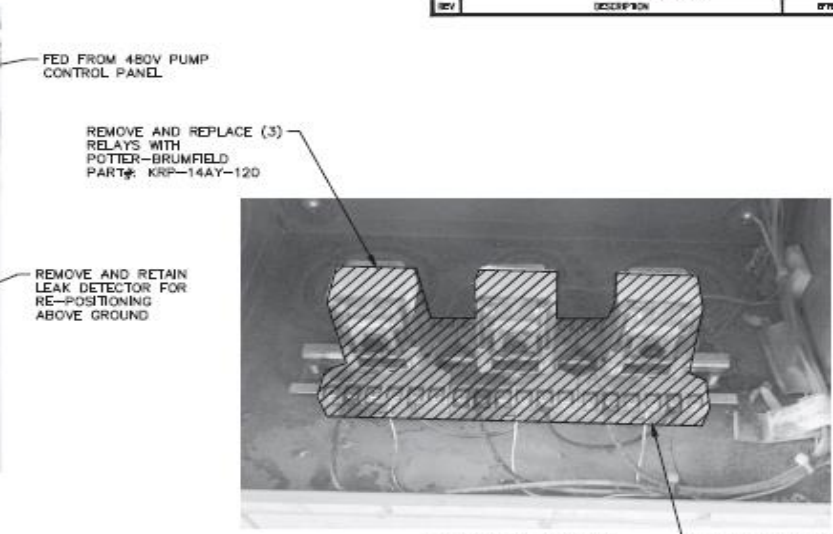


PHOTO (PH-3) D-1

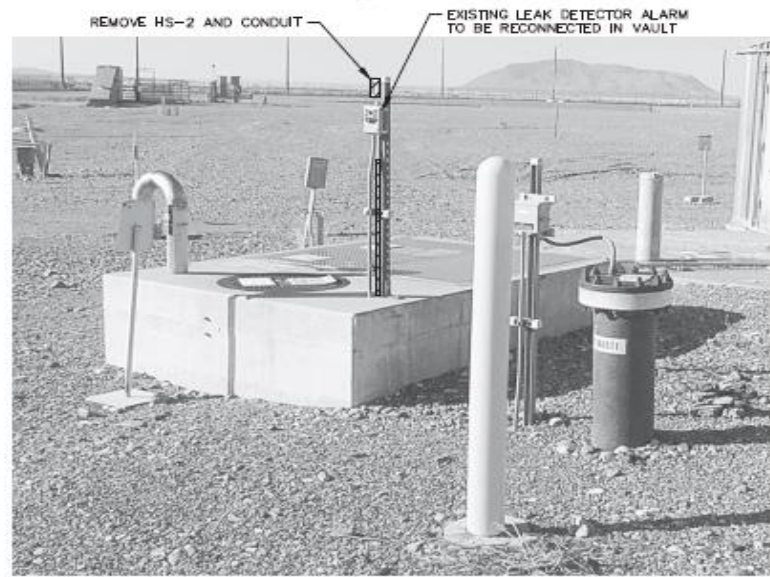


PHOTO (PH-3) D-1

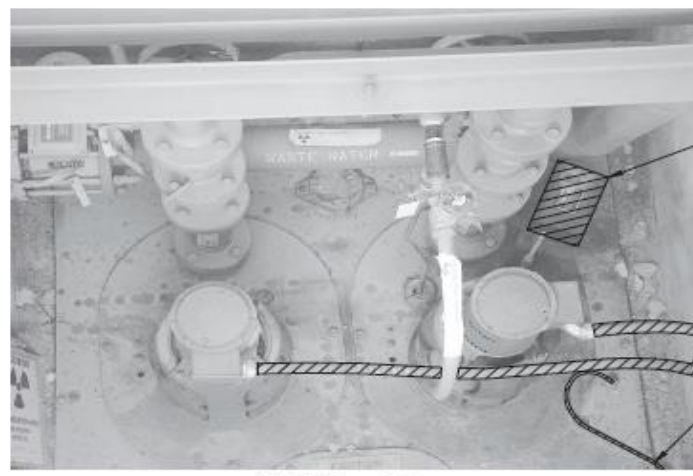


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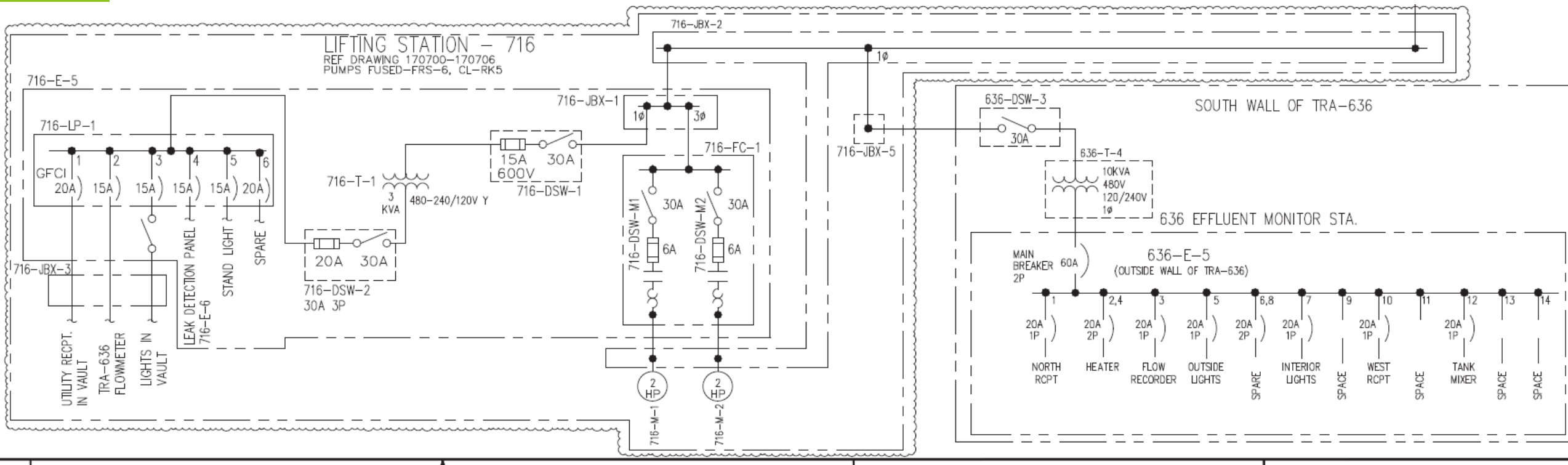
NOTE

1. FLOAT SWITCHES ARE INSIDE A CONTAMINATION AREA AND CONTAIN MERCURY. COORDINATE WITH WASTE GENERATOR SERVICES FOR DISPOSAL.

**RELEASED
FOR RECORD ONLY
DO NOT FABRICATE**

FOR DRAWING INDEX SEE DRAWING NO. 816691		DESIGNED BY: C. BROOKS		Idaho National Laboratory TRA-716-E-5 REPLACE WASTE WATER LIFTING STATION PUMP CONTROLLER	
NO SCALE		CHECKED BY: J.D. ZOLYNSKI		DEMOLITION PHOTOS DATE: 01MF3 TIME: 5:31 0400 10 081 SHEET: 0-2	
PROJECT NO: 32895		DRAWN BY: M. WATERMAN		816693 REV: 0-2	
SPL. CODE: NA		DATE: 01/10/01		531 0400 10 081 816693	
FOR REVIEW/APPROVAL SIGNATURES SEE BOX NO. 667650		PROJECT NO: 32895		531 0400 10 081 816693	
EFFECTIVE DATE: --/--		DATE: 01/10/01		531 0400 10 081 816693	
DESIGN PHASE: AFC		DATE: 01/10/01		531 0400 10 081 816693	





Lifting Station 716 Electrical One-Line

