Hazen and Sawyer
5775 Peachtree Dunwoody Road, Suite D-520
Atlanta, Georgia 30342
Phone: (404) 459-6363

Project: 32457-011 - WJ Hooper WPP Generator - SDC
70 Oakdale Drive
Stockbridge, Georgia 30281

Distribution Summary

Distributed on 08/12/2021 by Griffin Ghesquiere ()

To:

Message: Engineer's review of the Contractor's submittals shall in no way relieve the Contractor of any of his responsibilities under the Contract. An acceptance of a submittal shall be interpreted to mean that the Engineer has no specific objections to the submitted material, subject to conformance with the Contract Drawings and Specifications. Engineer's review is confined to general arrangement and compliance with the Contract Drawings and Specifications only, and will not be for the purpose of checking dimensions, weights, clearances, fittings, tolerances, interferences, coordination of trades, etc.

Additional Attachments: 26 32 13-011.A Engine Generator & Medium Voltage Circuit Breaker Switchgear Field.pdf

NAME	RESPONSE	ATTACHMENTS	COMMENT
Eddie Bodnar **(Hazen and Sawyer - Atlanta)**	Furnish as Submitted		Include the field test data in the final O&M submittal for the Medium Voltage Switchgear.

Engine Generator & Medium Voltage Circuit Breaker Switchgear Field Test

SPEC SECTION:	26 32 13 - Engine Generators	**CREATED BY:**	
		DATE CREATED:	08/06/2021
ISSUE DATE:	08/06/2021	**REVISION:**	A
RESPONSIBLE CONTRACTOR:	Crowder Construction Company	**RECEIVED FROM:**	Jordan Tinnell
RECEIVED DATE:	08/06/2021	**SUBMIT BY:**	08/20/2021
FINAL DUE DATE:	09/03/2021	**LOCATION:**	
TYPE:		**COST CODE:**	
BALL IN COURT:			

DISTRIBUTION:
Jeff Winston **(Clayton County Water Authority)** , Jordan Tinnell **(Crowder Construction Company)** , Eddie McCallum **(Hazen and Sawyer - Atlanta)** , Griffin Ghesquiere **(Hazen and Sawyer - Atlanta)** , Tyler Chow **(Hazen and Sawyer - Atlanta)**

DESCRIPTION:

ATTACHMENTS:
26 32 13-011.A Engine Generator & Medium Voltage Circuit Breaker Switchgear Field.pdf

BY	DATE	COPIES TO

CROWDER CONSTRUCTION COMPANY
1080 Holcomb Bridge Road
Building 200, Suite 180
Roswell, GA 30076
Phone (770) 761-5578
Fax (770) 761-5971

LETTER OF TRANSMITTAL

To: Hazen & Sawyer	Date: 08/06/2021	Job No.: Hazen: 32457-011 Crowder: 40781

To: Hazen & Sawyer
5775 Peachtree Dunwoody Road
Suite 2-520
Atlanta, GA 300342

Attn: Tyler Chow, P.E.

Ph: 404-459-6363
Cell: 626-780-7164

Date: 08/06/2021	Job No.: Hazen: 32457-011 Crowder: 40781
Project: W.J. Hooper WPP Standby Power Generator	
Location: Stockbridge, GA	
Submittal No: 26 32 13-011.A	
Specification Section: 26 32 13 & 23 13 13	

WE ARE SENDING YOU ☑ Attached ☐ Under separate cover via _____ the following items:

☐ Shop drawings ☐ Prints ☐ Plans ☐ Samples ☐ Specifications

☐ Copy of Letter ☐ Change order ☑ Other

COPIES	NO.	DESCRIPTION
1		Engine Generator & Medium Voltage Circuit Breaker Switchgear Field Test Startup Reports/Certification – Electronic Copy

THESE ARE TRANSMITTED as checked below:

☑ For approval ☐ Resubmit _____ copies for approval ☐ For your use

☐ Submit _____ copies for distribution ☐ As requested ☐ Returned for corrections

☐ Return _____ corrected prints ☐ For Information Only ☐ Other:

☐ FOR BIDS DUE _____,

TRANSMITTED BY: *Jordan Tinnell*_____ DATE: 08/06/2021_____

W.J. Hooper WPP Standby Generator

70 Oakdale Drive, Stockbridge, GA 30281

Owner: Clayton County Water Authority
Engineer: Hazen & Sawyer
Submittal Prepared by: Crowder Construction Company

Contractor:	Subcontractor:	Supplier:
Crowder Construction Company	N/A	Cummins Inc.
1080 Holcomb Bridge Rd		5125 Highway 85
Bldg 200, Ste 180		Atlanta, GA 30349
Roswell, GA 30076		

Submittal No:	26 32 13-011-A
Submittal Name:	Engine Generator & Medium Voltage Circuit Breaker Switchgear Field Test Start Up Reports/Certification
Product Manufacturer:	Cummins Inc.
Ref. Specification No:	26 32 13 & 26 13 13
Ref. Specification Title:	Engine Generators & Medium Voltage Circuit Breaker Switchgear
Drawing Reference:	N/A
Submittal Date:	08/06/2021

Crowder Construction Submittal Review:

For approval………………... ☐
Approved……………….…… ☑
Approved as Noted…...…… ☐
Revise and Resubmit……... ☐
For Information Only……… ☐

Crowder Construction has reviewed, checked, and approved this submittal for compliance with Contract Documents.

Approval by Crowder Construction Company does not relieve suppliers or subcontractors of responsibility to comply with requirements of plans and specification and/or other contract document under and for which this information is submitted. Nor does our approval establish compliance with the design concept of the project.

By: Jordan Tinnell

Date: 08/06/2021

Crowder Comments:

Both the Engine Generator & Medium Voltage Circuit Breaker Switchgear Field Test Start Up Reports/Certification is incorporated within this title.
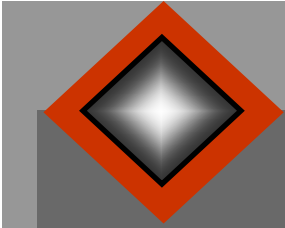
AC & DC POWER TECHNOLOGIES, LLC

5195 Southridge Parkway, Suite 120
College Park, GA 30349
Phone: 404-361-3788 Fax: 404-361-3791

SUBMITTAL DATA

PROJECT INFORMATION:

AC & DC Power Submittal #:	**26 32 13-011.A**	Date:	**8-6-2021**
CUSTOMER:	Crowder Construction	Revision:	**0**
CONTRACT MANAGER:	Jordan Tinnell		
STREET ADDRESS:	N/A		
PHONE/ CELL NUMBER:	470-512-4249		
PROJECT:	WJ Hooper		
ITEM:	32457-006 WJ Hooper Genset/Switchgear Field Test Reports	Subcontract:	**40781/10001**

COVER PAGE

Item	ATTACHMENTS	QTY	SPEC SECTION
1	**WJ Hooper Genset & Switchgear Field Test Reports**	**1**	**263213**

NOTES TO REVIEWER:
Field Test Reports Provided are for (1) System, with Genset & Switchgear Combined

Check   ENGINEERING COMMENTS

- ☐ **For Reference Only**
- ☐ **Revise as noted and resubmit**
- ☐ **Rejected**
- ☐ **Released for manufacture with exceptions as noted**
- ☐ **Released for manufacturing with no exceptions**

STARTUP/COMMISSIONING TEST REPORTS POWER GENERATION SYSTEM

PROJECT NAME: W. J. Hooper Water Plant - O-98979

CUSTOMER: AC & DC Power Technologies

REVISION: 0

SECTIONS
Project Work Plan- Power System Commissioning
Load Bank Report; S/N B210877143
Field Test Procedure Report; DMCDDBADBA0427/SWGDDBADBA0269

Sales and Service

Project Work Plan

Category	Task	Comment	Responsibility	Update Date	Scheduled Date	Status
Daily	Perform JSA - Determine hazards and appropriate tools/PPE/work procedures		ALL	8/4/2021		Completed
Daily	Verify other crafts working will not pose a safety or efficiency issue		ALL	8/4/2021		Completed
Daily	Coordinate with other crafts/contractors to advise of system energizing and running system		ALL	8/4/2021		Completed
Daily	Assure work area is clean, clear of all obstacles		ALL	8/4/2021		Completed
Project Preperation	Record model, serial, and other pertinent nameplate data -- gen and engine		Cummins	6/1/2021		Completed
Project Preperation	Record vendor, model, serial, and other pertinent nameplate data -- all accessory items		Cummins	6/1/2021		Completed
Project Preperation	Obtain all equipment drawings, manuals, software, settings, etc.		Cummins	6/1/2021		Completed
Project Preperation	Prepare field test forms from factory test document		Cummins	6/1/2021		Completed
General Installation	Concrete pad is adequate for the generator skid		Others	7/6/2021		Completed
General Installation	Vibration isolators are placed under the skid per drawings and anchored to pad		Others	7/6/2021		Completed
General Installation	Genset has adequate clearance between other gensets, walls, and equipment.		Others	7/6/2021		Completed
Exhaust System	Exhaust piping is routed away from combustible material and dangerous inadvertent contact		Others	7/6/2021		Completed
Exhaust System	Exhaust piping is supported by steel hangers. Engine flex/adapter is not supporting weight		Others	7/6/2021		Completed
Exhaust System	Exhaust flex is the proper length, and ran in a straight line. No bends are acceptable.		Others	7/6/2021		Completed
Exhaust System	Exhaust silencer is proper size		Others	7/6/2021		Completed
Exhaust System	Condensation trap/valve is properly installed in silencer or piping		Others	7/6/2021		Completed
Exhaust System	Thimble is present where piping penetrates a wall/partition		Others	7/6/2021		Completed
Exhaust System	Expansion joints where required are installed		Others	7/6/2021		Completed
Exhaust System	Silencer, and piping are insulated as required		Others	7/6/2021		Completed
Exhaust System	Rain caps, outlet elbows, etc are installed and positioned downwind of prevailing winds		Others	7/6/2021		Completed
Exhaust System	Piping is only connected to the individual engine. Piping cannot share multiple engines		Others	7/6/2021		Completed
Exhaust System	Pyrometer probes installed where required		Others	7/6/2021		Completed
Ventilation	Verify room/enclosure ventilation is correct for application		Others	7/6/2021		Completed
Ventilation	Verify radiator discharge plenum and flex correctly installed and complete		Others	7/6/2021		Completed
Ventilation	Verify radiator discharge air louvers are free to open		Others	7/6/2021		Completed
Ventilation	Verify ventilation power louvers and/or fans interlocked to open on run		Others	7/6/2021		Completed
Ventilation	Inlet/Outlet vent area is larger than radiator area		Others	7/6/2021		Completed
Ventilation	Room equipped with vent fan if remote cooling is installed		Others	7/6/2021		Completed
Ventilation	Room ventilation flows from back to front of generator		Others	7/6/2021		Completed
Diesel Fuel System	Tanks have been upfit and tested to meet local codes if required		Others	7/6/2021		Completed
Diesel Fuel System	Tanks are sized properly for application		Others	7/6/2021		Completed
Diesel Fuel System	Tanks are fitted with supply/return pumps and pump controller.		Others	7/6/2021		Completed
Diesel Fuel System	Tanks are vented to atmosphere		Others	7/6/2021		Completed
Diesel Fuel System	Tank is anchored to pad/mounting surface		Others	7/6/2021		Completed
Diesel Fuel System	Rigid fuel lines are of black iron pipe. Flex lines are steel braided or rubber fuel rated hose.		Others	7/6/2021		Completed
Diesel Fuel System	Separate supply/return lines to each generator.		Others	7/6/2021		Completed
Diesel Fuel System	No manual shutoff valves present in engine return line.		Others	7/6/2021		Completed

Project Work Plan

Category	Task	Comment	Responsibility	Update Date	Scheduled Date	Status
Diesel Fuel System	Upstream triplex or other supplemental fuel filtration installed		Others	7/6/2021		Completed
Diesel Fuel System	Positive head reservoir installed where required		Others	7/6/2021		Completed
Diesel Fuel System	At-a-glance level indication, electric level indication, and float switches installed		Others	7/6/2021		Completed
Diesel Fuel System	Tank overflow, and/or rupture basin		Others	7/6/2021		Completed
Enclosure	Enclosure is bolted to sub-base tank		Others	7/6/2021		Completed
Enclosure	Enclosure grounding conductors are terminated		Others	7/6/2021		Completed
Enclosure	Enclosure wiring is routed and terminated to the proper location		Others	7/6/2021		Completed
Enclosure	Engine exhaust is conencted to muffler and hardware is tight.		Others	7/6/2021		Completed
Enclosure	Rain caps are installed and positioned downwind of prevailing winds		Others	7/6/2021		Completed
Alternator	Differential CT ratio is correct for switchgear requirements		Others	7/6/2021		Completed
Alternator	Phase cabling terminations match CB lug, disconnect, or direct connection requirements		Others	7/6/2021		Completed
Alternator	Genset CB has been adjusted and set per coordination study		Others	7/6/2021		Completed
Alternator	Alternator is grounded and bonded per drawings and specifications		Others	7/6/2021		Completed
NGR	NGR is secured to a flat level surface		Others	7/6/2021		Completed
NGR	NGR CT is installed and control wiring is terminated		Others	7/6/2021		Completed
NGR	NGR is terminated to the alternator and grounded		Others	7/6/2021		Completed
Heaters	Coolant heater is tapped for the proper voltage and supply voltage is correct		Others	7/6/2021		Completed
Heaters	Alternator heater is terminated and matches supply voltage		Others	7/14/2021		Completed
Gen Charger	Battery charger is installed in close proximity to the genset batteries		Others	7/12/2021		Completed
Gen Charger	Battery charger is supplied the proper voltage from an emergency source		Others	7/12/2021		Completed
Gen Charger	Battery charger DC is wired to the engine starter and wiring is proper size to handle the charger ampacity		Others	7/12/2021		Completed
Gen Controls	Control wiring is installed, labeled and terminated per drawings		Others	7/21/2021		Completed
Switchgear Installation	Concrete pad is adequate for the switchgear lineup		Others	7/14/2021		Completed
Switchgear Installation	Gear is leveled and anchored to pad		Others	7/14/2021		Completed
Switchgear Installation	Shipping splits have been bolted		Others	7/14/2021		Completed
Switchgear Installation	Shipping split control wiring connected		Others	7/14/2021		Completed
Switchgear Installation	Visually inspect all phase terminations, verify properly terminated and identified		Others	7/14/2021		Completed
Switchgear Installation	Switchgear is grounded		Others	7/14/2021		Completed
Switchgear Installation	Breakers and/or relays have been set per coordination study.		Others	7/14/2021		Completed
Switchgear Installation	Station battery chargers and batteries installed. Supply voltage is correct for equipment		Others	7/14/2021		Completed
Switchgear Installation	Station batteries flooded, DC wiring sized to meet ampacity requirements		Others	7/14/2021		Completed
Switchgear Pre Cx	All PT drawers are pulled and fuses are open		Others	7/14/2021		Completed
Switchgear Pre Cx	All control fuses and circuit breakers are open		Cummins	7/14/2021		Completed
Switchgear Pre Cx	All CTs are shorted		Cummins	7/14/2021		Completed

Project Work Plan

Category	Task	Comment	Responsibility	Update Date	Scheduled Date	Status
Switchgear Pre Cx	All loose parts/equipment are located and identified.		Cummins	7/14/2021		Completed
Gen Pre Cx	Inspect and adjust vibration isolators		Others	7/14/2021		Completed
Gen Pre Cx	Verify fuel available		Cummins	7/14/2021		Completed
Gen Pre Cx	Install fuel lines		Cummins	7/14/2021		Completed
Gen Pre Cx	Prefill triplex or supplemental fuel filtration system and prime fuel system		Cummins	7/14/2021		Completed
Gen Pre Cx	Check coolant level, coolant concentration, and DCA level		Cummins	7/14/2021		Completed
Gen Pre Cx	Check lube oil level		Cummins	7/14/2021		Completed
Gen Pre Cx	Install battery cables on starters		Cummins	7/14/2021		Completed
Gen Pre Cx	Install batteries in battery racks or trays -- DO NOT CONNECT BATTERIES		Cummins	7/14/2021		Completed
Gen Pre Cx	Check starting battery electrolyte levels, top off		Cummins	7/14/2021		Completed
Gen Pre Cx	Inspect control wiring to assure properly terminated and secured		Cummins	7/14/2021		Completed
Gen Pre Cx	Inspect all engine and control harnesses to assure secure and properly connected		Cummins	7/14/2021		Completed
Gen Pre Cx	Inspect accessory (battery charger, day tank, annunciator) wiring , verify complete and correct		Cummins	7/14/2021		Completed
Gen Pre Cx	Remove all packing, strapping, and shipping materials		Cummins	7/14/2021		Completed
Gen Cx	Connect starting batteries to engine		Others	7/14/2021		Completed
Gen Cx	Energize battery charger		Others	7/14/2021		Completed
Gen Cx	Energize coolant heaters		Others	7/14/2021		Completed
Gen Cx	Energize oil heaters		Others	7/14/2021		Completed
Gen Cx	Energize battery heaters		Others	7/14/2021		Completed
Gen Cx	Energize alternator heaters (must heat HV alternators 48 hours prior to running)		Others	7/14/2021		Completed
Gen Cx	Take initial gen control capture file, identify file with unit serial number and "initial"		Cummins	7/14/2021		Completed
Gen Cx	Set gen control to "idle" mode		Cummins	7/14/2021		Completed
Gen Cx	Start engine and allow to idle		Cummins	7/14/2021		Completed
Gen Cx	Check for unusual noise or vibration		Cummins	7/14/2021		Completed
Gen Cx	Change control mode to run at rated speed		Cummins	7/14/2021		Completed
Gen Cx	Check for coolant, fuel, and oil leaks		Cummins	7/14/2021		Completed
Gen Cx	Check for excessive exhaust smoke or unusual smoke color. Check for any leaks.		Cummins	7/14/2021		Completed
Gen Cx	Shut unit down, check oil and coolant level. Top off if required		Cummins	7/14/2021		Completed
Gen Cx	Test generator safeties and verify proper remote annunciation		Cummins	7/14/2021		Completed
Gen Cx	Calibrate gen control voltage, frequency, paralleling parameters, and customer IO		Cummins	7/14/2021		Completed
Gen Cx	Identify load bank connection point. If paralleled system, generator paralleling bus is preferred		Cummins	7/14/2021		Completed
Gen Cx	Perform load bank test per specification		Cummins	7/21/2021		Completed
Gen Cx	Perform transient load test per specification		Cummins	7/21/2021		Completed
Gen Cx	Perform InPower monitor data logging as required		Cummins	7/21/2021		Completed
Switchgear Cx	Install and connect DMC batteries 24 volt external batteries		Cummins	7/14/2021		Completed
Switchgear Cx	Connect and charge PLC backup / best battery system		Cummins	7/14/2021		Completed
Switchgear Cx	Verify switchgear de-energized, LOTO all gens and energy sources		Cummins	7/14/2021		Completed

Project Work Plan

Category	Task	Comment	Responsibility	Update Date	Scheduled Date	Status
Switchgear Cx	Rack out all parelleling, feeder, and main breakers		Cummins	7/14/2021		Completed
Switchgear Cx	Visually inspect breakers and cubicles for damage, loose parts, tools, debris		Cummins	7/14/2021		Completed
Switchgear Cx	Visutally inspect all control and power sections for damage, loose parts, tools, debris		Cummins	7/14/2021		Completed
Switchgear Cx	Visually inspect all control terminations, verify properly terminated and identified		Cummins	7/14/2021		Completed
Switchgear Cx	Turn DC control power on to gear sections.		Cummins	7/14/2021		Completed
Switchgear Cx	Verify IO comms, meter comms, breaker and bus status		Cummins	7/14/2021		Completed
Switchgear Cx	Verify gens are communicating with DMC		Cummins	7/14/2021		Completed
Switchgear Cx	Start each generator, verify feeding correct power section		Cummins	7/14/2021		Completed
Switchgear Cx	Start each generator, verify data properly displayed on switchgear HMI		Cummins	7/14/2021		Completed
Switchgear Cx	Start each generator one at a time, close associated paralleling breaker manually		Cummins	7/14/2021		Completed
Switchgear Cx	Calibrate gen bus voltage values on each generator		Cummins	7/14/2021		Completed
Switchgear Cx	Perform phasing checks across each genset paralleling breaker.		Others	7/21/2021		Completed
Switchgear Cx	Calibrate gen/utility voltage levels at each MCM		Cummins	8/3/2021		Completed
Switchgear Cx	Commission switchgear in accordance with specifications and field test forms		Cummins	8/3/2021		Completed
Closeout	Download final capture files from all equipment		Cummins	8/3/2021		Completed
Closeout	Download final protective relay settings		Cummins	8/3/2021		Completed
Closeout	Download final PLC program and state ram		Cummins	8/3/2021		Completed
Closeout	Download final HMI program		Cummins	8/3/2021		Completed
Closeout	Download final configuration/etc. from other configurable devices		Cummins	8/3/2021		Completed
Closeout	Verify all drawing, SOO, and hardware changes have been documented.		Cummins	8/3/2021		Completed
Closeout	Submit final software, settings, confiurations, and redlines to systems support for archive.		Cummins	8/3/2021		Completed
Closeout	Archive final software, settings, confiurations, and redlines to server		Cummins	8/3/2021		Completed
Closeout	Save final software, settings, confiurations, and redlines to flash drive and leave a copy at the site.		Cummins	8/3/2021		Completed
Closeout	Submit factory corrected drawings & documents to customer/owner		Cummins	8/3/2021		Completed
Closeout	Prepare owner training presentation		Cummins	8/3/2021		Completed
Closeout	On-site owner traning per project requirements		Cummins	8/3/2021		Completed

Cummins Sales and Service

UNIT NAME:	Hooper WTP
UNIT S/N:	B210877143

FUEL LEVEL — START: ___ END: ___

FA JOB #:	132453	DATE:	7/20/2021	TEST PURPOSE:	Initial

UNIT HOURS — START: 10.60 END: 14.90

kW:	2500	VOLTAGE:	4160	PHASE:	3	Hz:	60

Date	Time	Hours	L1-L2 vac	L2-L3 vac	L1-L3 vac	L1 Amps	L2 Amps	L3 Amps	KW	PF	Hz	O/P	TEMP	VDC	Fuel (gal/hr)
7/20/2021	10:59:11.295	10.6	4163	4160	4158	0	0	0	0	1	60.014	105.5	122	26.242	4.95
7/20/2021	10:59:16.322	10.6	4163	4160	4158	0	0	0	0	1	60.007	105.5	122	26.553	5.05
7/20/2021	10:59:21.362	10.6	4164	4158	4156	0	0	0	0	1	59.971	105.5	120.2	26.83	11.35
7/20/2021	10:59:26.401	10.6	4164	4160	4158	0	0	0	0	1	59.994	103.8	122	26.968	18.65
7/20/2021	10:59:31.615	10.6	4164	4160	4159	0	0	0	0	1	59.975	103.8	122	27.314	18.3
7/20/2021	10:59:36.625	10.6	4164	4161	4159	0	0	0	0	1	59.939	102.1	122	27.211	18.5
7/20/2021	10:59:41.658	10.6	4170	4167	4165	0	0	0	0	1	59.997	101.5	122	27.349	4.25
7/20/2021	10:59:46.672	10.6	4168	4165	4162	0	0	0	0	1	60.001	100.3	122	27.384	16.45
7/20/2021	10:59:51.706	10.6	4167	4164	4162	0	0	0	0	1	60.036	100.9	122	27.349	2.7
7/20/2021	10:59:56.752	10.6	4169	4166	4164	0	0	0	0	1	60.01	100.3	122	27.349	17.95
7/20/2021	11:00:01.777	10.6	4170	4166	4165	0	0	0	0	1	60.102	100.3	123.8	27.418	8.4
7/20/2021	11:00:06.695	10.6	4168	4165	4163	0	0	0	0	1	60.045	100.3	123.8	27.522	5.1
7/20/2021	11:00:11.748	10.6	4168	4165	4163	0	0	0	0	1	60.071	99.2	123.8	27.453	13.4
7/20/2021	11:00:17.091	10.6	4169	4165	4163	0	0	0	0	1	60.036	98.6	123.8	27.522	17.7
7/20/2021	11:00:22.003	10.6	4168	4165	4163	0	0	0	0	1	60.07	98.6	125.6	27.418	3.45
7/20/2021	11:00:27.048	10.6	4168	4165	4163	0	0	0	0	1	60.007	98	125.6	27.522	13.15
7/20/2021	11:00:32.086	10.6	4167	4164	4162	0	0	0	0	1	60.068	95.7	125.6	27.557	18.4
7/20/2021	11:00:37.301	10.6	4170	4166	4164	0	0	0	0	1	60.013	94.5	127.4	27.557	16.85
7/20/2021	11:00:42.331	10.6	4170	4167	4165	0	0	0	0	1	60.067	94.5	127.4	27.522	6.9
7/20/2021	11:00:47.379	10.6	4168	4165	4163	0	0	0	0	1	60.068	93.9	127.4	27.557	6.5
7/20/2021	11:00:52.400	10.6	4169	4166	4164	0	0	0	0	1	60.033	93.4	129.2	27.591	9.4
7/20/2021	11:00:57.452	10.6	4168	4165	4162	0	0	0	0	1	59.977	93.4	129.2	27.66	3.4
7/20/2021	11:01:02.463	10.6	4167	4164	4164	0	0	0	0	1	60.001	93.4	129.2	27.66	3.1
7/20/2021	11:01:07.706	10.6	4170	4166	4164	0	0	0	0	1	60.03	92.2	129.2	27.591	2.9
7/20/2021	11:01:12.723	10.6	4169	4166	4164	0	0	0	0	1	60.039	91	131	27.591	12.8
7/20/2021	11:01:17.741	10.6	4168	4165	4163	0	0	0	0	1	60.073	91.6	131	27.591	13.95
7/20/2021	11:01:22.759	10.6	4167	4165	4163	0	0	0	0	1	60.004	91	131	27.626	11.4
7/20/2021	11:01:27.695	10.6	4168	4165	4163	0	0	0	0	1	60.07	91	132.8	27.591	6.35
7/20/2021	11:01:32.737	10.6	4164	4160	4159	0	0	0	0	1	60	89.3	132.8	27.626	10.4
7/20/2021	11:01:37.769	10.65	4162	4159	4157	0	0	0	0	1	59.934	90.5	132.8	27.626	5.4
7/20/2021	11:01:43.002	10.65	4163	4160	4158	0	0	0	0	1	60.042	89.3	134.6	27.73	11.55
7/20/2021	11:01:47.636	10.65	4163	4160	4158	0	0	0	0	1	59.975	89.3	134.6	27.66	10.35
7/20/2021	11:01:52.676	10.65	4164	4160	4158	0	0	0	0	1	60.03	88.7	134.6	27.73	5.2
7/20/2021	11:01:57.706	10.65	4167	4165	4162	0	0	0	0	1	60.079	87.5	134.6	27.695	0
7/20/2021	11:02:02.748	10.65	4169	4166	4164	0	0	0	0	1	60.047	87.5	136.4	27.73	4.9
7/20/2021	11:02:07.815	10.65	4167	4164	4162	0	0	0	0	1	60.073	88.1	136.4	27.626	3.55
7/20/2021	11:02:13.015	10.65	4167	4164	4162	0	0	0	0	1	60.044	87.5	136.4	27.73	3.1
7/20/2021	11:02:18.051	10.65	4169	4166	4164	0	0	0	0	1	60.039	87.5	138.2	27.66	18.4
7/20/2021	11:02:23.078	10.65	4169	4165	4163	0	0	0	0	1	60.108	87	138.2	27.764	7.3
7/20/2021	11:02:28.006	10.65	4168	4165	4163	0	0	0	0	1	60.104	86.4	138.2	27.66	5.4
7/20/2021	11:02:33.058	10.65	4169	4165	4162	0	0	0	0	1	60.108	86.4	138.2	27.764	11.05
7/20/2021	11:02:38.289	10.65	4168	4165	4163	0	0	0	0	1	59.971	85.2	140	27.764	18.85
7/20/2021	11:02:43.332	10.65	4168	4165	4163	0	0	0	0	1	60.044	84.6	140	27.695	16.95
7/20/2021	11:02:48.091	10.65	4168	4165	4163	0	0	0	0	1	60.067	84.6	140	27.695	2.9
7/20/2021	11:02:53.138	10.65	4168	4165	4162	0	0	0	0	1	60.104	84.6	141.8	27.764	4.2
7/20/2021	11:02:58.167	10.65	4169	4166	4164	0	0	0	0	1	60.039	83.5	141.8	27.695	17.45
7/20/2021	11:03:03.382	10.65	4169	4166	4164	0	0	0	0	1	60.03	83.5	141.8	27.73	15.7
7/20/2021	11:03:08.440	10.65	4168	4165	4163	0	0	0	0	1	60.108	83.5	143.6	27.66	4.45
7/20/2021	11:03:13.466	10.65	4169	4166	4164	0	0	0	0	1	60.039	83.5	143.6	27.695	6.35
7/20/2021	11:03:18.288	10.65	1746	1747	1746	0	0	0	0	1	48.673	70.1	143.6	27.799	0
7/20/2021	11:03:23.341	10.65	513	509	508	0	0	0	0	1	0	65.5	143.6	27.799	0
7/20/2021	11:03:28.399	10.65	281	262	268	0	0	0	0	1	0	55.6	143.6	27.868	0
7/20/2021	11:03:33.290	10.65	271	242	245	0	0	0	0	1	0	45.2	145.4	26.346	2.2

Date	Time	Hours	L1-L2 vac	L2-L3 vac	L1-L3 vac	L1 Amps	L2 Amps	L3 Amps	KW	PF	Hz	O/P	TEMP	VDC	Fuel (gal/hr)
7/20/2021	11:03:38.320	10.65	266	242	249	0	0	0	0	1	0	45.2	145.4	26.276	3.05
7/20/2021	11:03:43.666	10.65	266	242	249	0	0	0	0	1	0	44.6	145.4	26.173	2.85
7/20/2021	11:03:48.693	10.65	267	245	244	0	0	0	0	1	0	45.2	145.4	26.242	1.5
7/20/2021	11:03:53.724	10.65	271	240	245	0	0	0	0	1	0	45.8	145.4	26.207	1.75
7/20/2021	11:03:58.873	10.65	267	245	245	0	0	0	0	1	0	45.2	145.4	26.069	0.95
7/20/2021	11:04:03.680	10.65	267	245	244	0	0	0	0	1	0	45.2	145.4	26.103	2.2
7/20/2021	11:04:08.713	10.65	271	240	245	0	0	0	0	1	0	45.8	145.4	26.138	1.8
7/20/2021	11:04:13.751	10.65	266	242	249	0	0	0	0	1	0	45.8	145.4	26.173	2.45
7/20/2021	11:04:18.794	10.65	266	242	249	0	0	0	0	1	0	45.2	145.4	26.138	2.35
7/20/2021	11:04:23.000	10.65	271	240	245	0	0	0	0	1	0	45.2	145.4	26.138	2
7/20/2021	11:04:29.047	10.65	266	242	249	0	0	0	0	1	0	45.8	145.4	26.173	2
7/20/2021	11:04:34.063	10.65	266	242	249	0	0	0	0	1	0	45.8	145.4	26.103	1.65
7/20/2021	11:04:38.986	10.7	271	240	245	0	0	0	0	1	0	45.8	145.4	26.173	2.05
7/20/2021	11:04:44.017	10.7	266	242	249	0	0	0	0	1	0	45.8	145.4	26.173	2.35
7/20/2021	11:04:49.052	10.7	267	246	244	0	0	0	0	1	0	45.8	145.4	26.138	2.1
7/20/2021	11:04:54.083	10.7	267	245	244	0	0	0	0	1	0	45.8	145.4	26.173	1.7
7/20/2021	11:04:59.100	10.7	271	240	245	0	0	0	0	1	0	45.8	145.4	26.138	2
7/20/2021	11:05:04.152	10.7	265	242	249	0	0	0	0	1	0	45.8	145.4	26.138	1.9
7/20/2021	11:05:09.379	10.7	267	245	244	0	0	0	0	1	0	45.2	145.4	26.103	2.3
7/20/2021	11:05:14.420	10.7	271	240	245	0	0	0	0	1	0	45.2	145.4	26.103	2.35
7/20/2021	11:05:19.436	10.7	0	0	0	0	0	0	0	1	0	34.8	145.4	26.034	0
7/20/2021	11:05:24.497	10.7	0	0	0	0	0	0	0	1	0	31.3	145.4	25.93	0
7/20/2021	11:05:29.294	10.7	0	0	0	0	0	0	0	1	0	17.9	145.4	25.93	0
7/20/2021	11:05:34.354	10.7	0	0	0	0	0	0	0	1	0	4	145.4	25.896	0
7/20/2021	11:05:39.290	10.7	0	0	0	0	0	0	0	1	0			25.93	0
7/20/2021	11:05:44.321	10.7	0	0	0	0	0	0	0	1	0			25.93	0
7/20/2021	11:05:49.376	10.7	0	0	0	0	0	0	0	1	0			25.93	0
7/20/2021	11:05:54.405	10.7	0	0	0	0	0	0	0	1	0			26	0
7/20/2021	11:05:59.449	10.7	0	0	0	0	0	0	0	1	0			25.965	0
7/20/2021	11:06:04.499	10.7	0	0	0	0	0	0	0	1	0			25.896	0
7/20/2021	11:06:09.717	10.7	0	0	0	0	0	0	0	1	0	0	143.6	25.792	0
7/20/2021	11:06:14.740	10.7	0	0	0	0	0	0	0	1	0	0	143.6	25.688	0
7/20/2021	11:06:19.774	10.7	0	0	0	0	0	0	0	1	0	0	143.6	25.688	0
7/20/2021	11:06:26.537	10.7	0	0	0	0	0	0	0	1	0	0	143.6	25.654	0
7/20/2021	11:06:29.000	10.7	269	243	245	0	0	0	0	1	0	62.6	145.4	24.304	64.25
7/20/2021	11:06:35.021	10.7	4167	4164	4162	0	0	0	0	1	59.968	91	145.4	24.304	7.8
7/20/2021	11:06:40.080	10.7	4162	4159	4157	0	0	0	0	1	60.029	89.9	145.4	24.477	10.25
7/20/2021	11:06:45.296	10.7	4163	4160	4158	0	0	0	0	1	60.006	82.9	145.4	25.757	12.05
7/20/2021	11:06:50.311	10.7	4162	4158	4156	0	0	0	0	1	60.031	82.9	147.2	25.93	11.2
7/20/2021	11:06:55.328	10.7	4163	4160	4158	0	0	0	0	1	59.971	82.3	147.2	26.242	19.65
7/20/2021	11:07:00.365	10.7	4170	4170	4164	8	0	0	1	0.09	59.965	81.2	147.2	26.38	19.4
7/20/2021	11:07:05.414	10.7	4165	4163	4160	0	0	0	0	1	59.998	81.7	147.2	26.726	1.45
7/20/2021	11:07:10.449	10.7	4166	4164	4161	0	0	0	0	1	59.936	80.6	149	26.899	0
7/20/2021	11:07:15.494	10.7	4168	4166	4163	0	0	0	0	1	60.03	80.6	149	27.211	19.05
7/20/2021	11:07:20.687	10.7	4168	4165	4162	0	0	0	0	1	59.965	80	149	27.314	1.15
7/20/2021	11:07:25.698	10.7	4167	4164	4162	0	0	0	0	1	59.936	80.6	149	27.349	21.1
7/20/2021	11:07:30.724	10.7	4167	4164	4162	0	0	0	0	1	59.899	79.4	150.8	27.384	20.55
7/20/2021	11:07:35.756	10.7	4166	4164	4162	0	0	0	0	1	59.939	78.8	150.8	27.384	19.8
7/20/2021	11:07:40.796	10.7	4167	4164	4162	0	0	0	0	1	60.006	80.6	150.8	27.384	0
7/20/2021	11:07:45.984	10.7	4168	4165	4163	0	0	0	0	1	60.003	79.4	152.6	27.418	18.1
7/20/2021	11:07:51.023	10.7	4166	4163	4161	0	0	0	0	1	60.013	79.4	152.6	27.487	0
7/20/2021	11:07:56.057	10.7	4168	4164	4162	0	0	0	0	1	60.046	79.4	152.6	27.522	0
7/20/2021	11:08:01.078	10.7	4168	4165	4163	0	0	0	0	1	60.047	79.4	152.6	27.487	0
7/20/2021	11:08:05.987	10.7	4166	4163	4161	0	0	0	0	1	59.974	79.4	154.4	27.487	14.9
7/20/2021	11:08:11.033	10.7	4165	4162	4160	0	0	0	0	1	59.931	79.4	154.4	27.591	8.95
7/20/2021	11:08:16.064	10.7	4166	4163	4161	0	0	0	0	1	60	77.7	154.4	27.487	4.95
7/20/2021	11:08:21.389	10.7	4167	4164	4161	0	0	0	0	1	59.98	77.7	154.4	27.557	8.9
7/20/2021	11:08:26.408	10.7	4167	4165	4162	0	0	0	0	1	60.001	78.3	156.2	27.626	6.75
7/20/2021	11:08:31.147	10.75	4166	4163	4161	0	0	0	0	1	60.03	76.5	156.2	27.626	18.15
7/20/2021	11:08:36.386	10.75	4166	4163	4161	6	7	6	38	0.83	60.035	75.9	156.2	27.626	15.65
7/20/2021	11:08:41.423	10.75	4167	4164	4162	6	6	6	38	0.87	60.006	76.5	156.2	27.66	3.65

Date	Time	Hours	L1-L2 vac	L2-L3 vac	L1-L3 vac	L1 Amps	L2 Amps	L3 Amps	KW	PF	Hz	O/P	TEMP	VDC	Fuel (gal/hr)
7/20/2021	11:08:46.451	10.75	4166	4163	4161	6	6	6	36	0.82	59.974	77.1	158	27.591	8.75
7/20/2021	11:08:51.507	10.75	4168	4165	4163	6	6	6	38	0.86	60.009	75.9	158	27.626	14.75
7/20/2021	11:08:56.696	10.75	4166	4163	4161	6	6	6	38	0.86	59.974	76.5	158	27.626	16.6
7/20/2021	11:09:01.341	10.75	4166	4163	4161	6	7	6	38	0.84	60.008	75.9	158	27.695	16.6
7/20/2021	11:09:06.390	10.75	4165	4162	4160	6	6	6	38	0.83	60.07	75.9	159.8	27.695	10.6
7/20/2021	11:09:11.623	10.75	4166	4163	4161	6	6	6	38	0.85	60.099	75.4	159.8	27.695	11.3
7/20/2021	11:09:16.658	10.75	4166	4163	4160	6	6	6	38	0.87	60.099	74.8	159.8	27.73	16.8
7/20/2021	11:09:21.696	10.75	4165	4162	4160	6	6	6	38	0.85	60.037	75.4	161.6	27.66	16.25
7/20/2021	11:09:26.731	10.75	4166	4163	4161	6	7	6	38	0.86	60.04	75.4	161.6	27.695	17.7
7/20/2021	11:09:31.768	10.75	4167	4164	4162	6	6	6	37	0.84	60.032	75.9	161.6	27.73	17.15
7/20/2021	11:09:36.991	10.75	4164	4166	4165	69	70	70	502	1	60.006	74.8	161.6	27.66	42.15
7/20/2021	11:09:42.051	10.75	4163	4165	4163	67	68	69	491	1	59.995	73.6	163.4	27.73	41.15
7/20/2021	11:09:47.073	10.75	4163	4164	4163	67	67	68	486	1	60.04	74.2	163.4	27.695	37.05
7/20/2021	11:09:51.991	10.75	4162	4164	4162	66	67	67	482	1	60.003	73	165.2	27.73	42.65
7/20/2021	11:09:57.013	10.75	4163	4164	4163	66	67	67	481	1	59.98	74.8	165.2	27.695	37.15
7/20/2021	11:10:02.040	10.75	4163	4165	4163	66	67	67	479	1	60.003	73.6	167	27.764	36.85
7/20/2021	11:10:07.068	10.75	4162	4164	4162	66	66	67	478	1	60.006	73	167	27.764	37.15
7/20/2021	11:10:12.118	10.75	4163	4165	4163	65	66	67	477	1	59.97	73.6	168.8	27.764	35.55
7/20/2021	11:10:17.290	10.75	4146	4150	4149	105	105	106	757	1	59.763	71.9	168.8	27.66	69.7
7/20/2021	11:10:22.301	10.75	4161	4165	4165	104	104	105	753	1	60	72.5	170.6	27.73	55.15
7/20/2021	11:10:27.356	10.75	4161	4166	4165	103	103	104	747	1	60.035	73.6	170.6	27.73	53.9
7/20/2021	11:10:32.376	10.75	4162	4166	4165	102	103	103	743	1	60.04	73.6	172.4	27.73	55.05
7/20/2021	11:10:37.412	10.75	4162	4166	4165	102	103	103	741	1	60.034	72.5	172.4	27.73	55.8
7/20/2021	11:10:42.437	10.75	4162	4166	4165	102	102	103	738	1	60.003	71.9	172.4	27.73	56.85
7/20/2021	11:10:47.474	10.75	4162	4166	4165	102	102	103	738	1	60.037	73	172.4	27.73	58.85
7/20/2021	11:10:52.390	10.75	4162	4166	4165	101	102	103	738	1	60.006	73	174.2	27.66	54.5
7/20/2021	11:10:57.715	10.75	4162	4166	4165	101	102	103	737	1	60.006	71.3	174.2	27.695	57.25
7/20/2021	11:11:02.753	10.75	4162	4166	4165	101	102	103	738	1	60.066	71.9	174.2	27.73	62.55
7/20/2021	11:11:07.779	10.75	4162	4166	4165	101	102	103	737	1	60.003	73	174.2	27.66	64.2
7/20/2021	11:11:12.681	10.75	4161	4165	4164	101	102	103	736	1	60.037	72.5	174.2	27.73	53.85
7/20/2021	11:11:17.722	10.75	4162	4166	4165	101	102	103	736	1	59.967	72.5	174.2	27.73	56.9
7/20/2021	11:11:22.743	10.75	4161	4165	4164	101	102	103	736	1	60.04	71.9	174.2	27.764	52.75
7/20/2021	11:11:27.764	10.8	4162	4166	4165	101	102	103	736	1	60.034	72.5	174.2	27.66	51.65
7/20/2021	11:11:33.004	10.8	4161	4165	4164	101	102	103	736	1	60.003	73	174.2	27.66	51.7
7/20/2021	11:11:38.035	10.8	4161	4165	4164	101	102	103	736	1	60.003	70.1	174.2	27.695	53.25
7/20/2021	11:11:43.060	10.8	4162	4166	4165	101	102	103	736	1	60.035	71.9	174.2	27.695	51.85
7/20/2021	11:21:42.791	10.95	4161	4165	4165	101	102	102	735	1	60.006	70.1	177.8	27.66	58.05
7/20/2021	11:31:42.819	11.1	4162	4166	4165	101	102	102	734	1	60.04	69.6	177.8	27.66	53.2
7/20/2021	11:41:42.873	11.3	4162	4166	4165	101	102	102	735	1	60.001	68.4	177.8	27.557	99.25
7/20/2021	11:51:42.917	11.45	4158	4167	4167	174	176	177	1267	1	59.995	67.8	177.8	27.591	98.15
7/20/2021	12:01:42.968	11.6	4158	4167	4166	174	176	177	1268	1	59.998	68.4	179.6	27.591	98.85
7/20/2021	12:11:43.022	11.8	4157	4167	4166	174	176	176	1267	1	59.975	68.4	177.8	27.66	98.85
7/20/2021	12:21:43.453	11.95	4148	4170	4170	344	346	347	2493	1	59.975	65.5	185	27.591	169.65
7/20/2021	12:31:43.120	12.1	4148	4170	4170	344	346	347	2492	1	59.967	64.9	185	27.487	171.55
7/20/2021	12:41:43.144	12.3	4148	4171	4171	344	346	347	2492	1	59.934	64.9	185	27.591	170.55
7/20/2021	12:51:43.192	12.45	4148	4171	4171	344	346	347	2492	1	59.928	66.7	185	27.557	169.55
7/20/2021	13:10:24.617	12.75	4148	4171	4171	344	346	347	2494	1	59.936	62	185	27.626	174.8
7/20/2021	13:11:43.414	12.8	4149	4172	4172	344	346	347	2493	1	59.934	65.5	185	27.557	175
7/20/2021	13:23:23.549	12.95	4148	4171	4171	344	346	347	2493	1	59.931	63.8	185	27.591	175
7/20/2021	13:31:43.439	13.1	4148	4170	4170	344	346	347	2494	1	59.965	64.3	185	27.591	181.55
7/20/2021	13:45:05.367	13.35	4148	4170	4170	344	346	347	2494	1	59.898	64.3	186.8	27.591	181.55
7/20/2021	13:51:43.744	13.45	4148	4171	4171	344	346	347	2494	1	59.965	63.2	186.8	27.66	180.8
7/20/2021	14:01:43.514	13.6	4150	4172	4172	344	346	347	2495	1	60.003	62	186.8	27.626	167.95
7/20/2021	14:11:43.557	13.8	4149	4171	4171	344	346	347	2494	1	59.968	64.3	186.8	27.626	99.2
7/20/2021	14:21:43.613	13.95	4157	4166	4166	178	179	180	1294	1	59.964	67.8	176	27.591	99.2
7/20/2021	14:31:43.703	14.1	4157	4167	4166	178	179	180	1294	1	59.974	67.2	176	27.73	96.6
7/20/2021	14:41:43.722	14.3	4157	4166	4166	178	179	180	1294	1	60.009	67.8	176	27.73	99.5
7/20/2021	14:51:43.728	14.45	4155	4165	4165	178	179	180	1294	1	60.003	69	176	27.73	64.1
7/20/2021	15:01:43.766	14.6	4161	4165	4164	109	110	111	794	1	60.003	67.2	174.2	27.764	66.05
7/20/2021	15:11:43.827	14.8	4160	4165	4164	109	110	111	795	1	60.003	67.2	174.2	27.764	66.05
7/20/2021	15:12:58.049	14.8	4161	4165	4165	109	110	111	794	1	59.968	66.7	174.2	27.695	68.55

Date	Time	Hours	L1-L2 vac	L2-L3 vac	L1-L3 vac	L1 Amps	L2 Amps	L3 Amps	KW	PF	Hz	O/P	TEMP	VDC	Fuel (gal/hr)
7/20/2021	15:13:02.990	14.8	4162	4166	4165	109	110	111	794	1	60.003	68.4	174.2	27.73	16.4
7/20/2021	15:14:02.853	14.8	4166	4163	4161	0	5	0	9	0.71	60.065	68.4	172.4	27.73	6.1
7/20/2021	15:15:02.875	14.85	4165	4162	4161	0	5	0	10	0.8	59.965	69.6	170.6	27.764	6.65
7/20/2021	15:16:02.899	14.85	4167	4163	4161	0	0	0	0	1	60.039	68.4	170.6	27.764	8.65
7/20/2021	15:17:02.948	14.85	4162	4159	4157	0	0	0	0	1	59.998	69	170.6	27.73	9.45
7/20/2021	15:18:02.984	14.9	4162	4159	4157	0	0	0	0	1	59.999	69.6	170.6	27.764	9.75
7/20/2021	15:19:03.035	14.9	4167	4164	4162	0	0	0	0	1	60.043	69	170.6	27.764	9.75

UNLESS STATED OTHERWISE ON THIS DOCUMENT THE LOAD TEST WAS CONDUCTED AT UNITY POWER FACTOR, THUS KVA AND KW ARE EQUAL VALUES. WHEN TESTING FOR SPECIFICATION PURPOSES WE ARE UNABLE TO CONTROL AMBIENT CONDITIONS, ELEVATION AND FUEL QUALITY THUS THE DOCUMENTED RESULTS MAY DIFFER FROM EQUIPMENT DATA SHEETS AND TEST CELL REPORTS FROM MANUFACTURERS DATA. PLEASE SEE ALL ATTACHED DOCUMENTATION REGARDING THE SERVICES PERFORMED ON

WITNESS:

TITLE: Project Manager

COMMENTS: Test was successful.

SUBMITTED BY: Chris Jolly

TECHNICIAN: Delvin Plath

Project Name:
WJ Hooper Production Plant
Sales Order #:
111348
Product Model #:
DMCDDBADBA0427
SWGDDBADBA0269

Revision: Field

Test Technician: Mitch Howell

Commissioning Engineer: Dino Drain

Date Test Completed: 8/3/21

	Static Test Hw Setup
	The following procedures should be performed by the tester to verify the DMC and switchgear functionality.
	Breaker Charge, Close and Open procedure (execute for all breakers in system)
	Charge breaker via the charging handle
	Press the close button
	Breaker closes
	Press the open button
	Breaker opens
	Test Complete___✓
	Other Tests:
	Station Battery installed and fuses installed
	Verify primary current injection to applicable breaker is performed. Use the load bank to ensure all meters are reading the correct AMP and KW values.
	Test Complete___✓

Generator Parallelig Breakers	
(Breaker Indication Switch)	
Verify breaker position switch open LED color (Green)	
Verify breaker position switch closed LED color (Red)	
Verify lockout relay opens the breaker	
Verify the breaker is open and lockout trip LED color (Red)	
Test Complete___✓	
Auto / Manual Switches	
(LED Indication Test)	
Verify Amber LED is on when the switch is in Auto	
Verify Green LED is on when the switch is in Manual	
Test Complete___✓	
Feeder Breakers (Load Breakers)	
(Breaker Control Switch and Lockout Relay)	
Place the Auto/Manual switch in Manual	
Verify breaker control switch closes the breaker	
Verify breaker control switch closed LED color (Red)	
Verify breaker control switch opens the breaker	
Verify breaker control switch open LED color (Green)	
Place the Auto/Manual switch in Auto	
Verify breaker control switch does not close the breaker in Auto	
Verify lockout relay opens the breaker	
Verify the breaker is open and lockout trip LED color (Red)	
Test Complete___✓	
Main Breakers (Utility Main/Gen Main)	
(Breaker Control Switch and Lockout Relay)	
Place the Auto/Manual switch in Manual	
Verify breaker control switch closes the breaker	
Verify breaker control switch closed LED color (Red)	
Verify breaker control switch opens the breaker	
Verify breaker control switch open LED color (Green)	
Place the Auto/Manual switch in Auto	
Verify breaker control switch does not close the breaker in Auto	
Verify lockout relay opens the breaker	
Verify the breaker is open and lockout trip LED color (Red)	
Test Complete___✓	

Manual Breaker Interlock Test		
Place the System Auto Manual Switch(es) in **Manual** Mode		
Verify breaker cannot be closed in the below conditions	52-UM	52-GM
Condition:		
52-GM Closed	Block Closure	
52-UM Open		
Condition:		
52-GM Open		Block Closure
52-UM Closed		
Test Complete___ ✓		

PLC Software/Firmware Versions	
PLC CPU Firmware	**3.1**
PLC Copro Firmware	**NA**
NOE Firmware	**2.16**
CRP Firmware	**NA**
PLC Program File Name (*.sta)	**WJHOOPER_HSBY**
PLC Program File Build #	**14**
PLC Unity Version	**11.1**

PLC Racks	
Record the firmware version and verify firmware update is completed for all CRA drops.	
Firmware on Each CRA card	**2.40**

UNI Module	
Record the firmware version and verify firmware update is completed for all UNI modules.	
Firmware on Each Phoenix Uni	**E2.40**

Protonode Module	
Record the firmware and verify firmware update is completed for all Protonode modules.	
Firmware on Protonode	**Build 242**

MCM Software	
Record the firmware and verify firmware update is completed for all MCM's.	
Firmware on Each MCM	**2.19**
Capture File Name on each MCM	**MCM_SteelHead_Defaults**
Capture File Version on each MCM	

HMI Software	
Indusoft Project File Name (*.zip)	**WJ_HOOPER_HMI**

Indusoft Project Template Name	**TEMLATE_SINGLE_TP**
Indusoft Version	**80**
Advantech HMI Image Version	**Indusoft Webstudio V7.1**

Information Screen	Data
Project Name	**WJ Hooper Production Plant**
Model Number	**DMCDDBADBA0427, SWGDDBADBA0269**
Order Number	**111348**
Distributor Name	**Cummins South**
Phone Number	**763 574 5000**

Generator Settings						
Generator Number	Generator Name	Generator CB Name	kW Rating	PCC Type	Node Address	Connect to Bus
1	Gen 1	52-G1	2500	3	2	1
2*	TG	52-TG/LB	2500	3	1	1
*Note: TG is required to be enabled (KW set to 2500 only during Temp Gen operation)						

Generator Gauge Settings		
Gauge	Min Value	Max Value
Average Voltage (L-L)	0	5600
Average Current	0	600
Real Power	0	3000
Frequency	*Same as Meter Min	*Same as Meter Max
Oil Pressure	0	125
Coolant Temperature	0	302
Engine Speed	0	2000
Battery Voltage	0	30

WJ Hooper Production Plant
Setup - Screen 2

	Meter 0	Meter 1
Enabled	Checked	Checked
Meter Name	52-GM Meter	52-UM Meter
Nominal Voltage L-L	4200	4200
Connection (Delta or Wye)	Delta	Delta
PT Primary	4200	4200
PT Secondary	120	120
CT Primary	1200	2000
CT Secondary	5	5
Unload kW	50	50
System Frequency	60	60

Meter Gauge Settings			
Gauge	Min Value	Min Value	Max Value
Average Voltage L-L	1000	1000	5000
Average Current	0	0	1000
Real Power	0	0	3000
Frequency	45	45	65

Generator Main 1 Settings	
GM Name	52-GM

Utility and Utility Main 1 Settings	
Utility Name	Utility source
Utility Fail Delay Range (1-10 Sec)	3s
UM Name	52-UM

Time Setup
System Date and Time set to current time
PLC Date and Time report the same data (within +-5 seconds)

System Settings	
Max Ramp Time Range (10-180 Sec)	20s
Authorized Return to Utility Required	ckecked

Load Add/Shed Settings	
Genbus Add Delay Range (0-60 Sec)	3
Utility Bus Add Delay Range (0-60 Sec)	2
Load Shed Delay Range (0.1-10 Sec)	2
Quick Shed Enable	unChecked
Custom Load Shed Level Assignment	Off

Load Add/Shed Settings			
Load Number	**Load Type**	**Oneline Name**	**Load Control Name**
1	CB Status w Ctrl EODO	52-F1	52-F1
Note: Enable 7 other loads as CB W Ctrl EO/DO for testing purposes			

Load Add/Shed Settings	
Required Online Capacity, Loadbus 1	2500

Min. Capacity To Connect	
Loadbus 1 Capacity	2500
Loadbus 1 Time Out Range (30-600 Sec)	30s

Control Mode Switch	
Off	Disabled
Load Bank	Enabled
Non-Paralleling Temp Gen	Disabled

Load Bank 1 Settings	
LB Name	52-TG/LB

Load Level Assignment			
Load Number	Load Name	Load Add Level Assignment	Load Shed Level Assignment
1	52-F1	1	0
Note: Add Load Add/Shed settings for 7 other loads for testing purposes			

Loadbus 1 Time Delay Settings - On Sys Control Page 1	Default Values
Program Transition Delay (Range 1-60 Sec)	18s
Transfer Delay (Range 0-12 Sec)	12s
Retransfer Delay (Range 1-120 Min)	5 min

Generator Report Screen Settings	
Enable	On
Sample Rate	1
Minimum Load %kW	25%

Run Report Screen Settings	
Enable	On

System Alarms
Remote Generator E-Stop Active
System in Manual
Low Fuel Main Tank
MCM 1 Hardware Failure
Station Power UPS Alarm
Station Power From Batteries (1 minute before appearing)
PLC Communication Failure
Utility Failure
Test Complete___✓

Generator Breaker Alarms
Fail to Open
Fail to Close
Lockout Trip
Protective Relay Failure
Unexpected CB Rack In or Rack Out
Test Complete___✓

Generator Controller Alarms **Alarms marked with a "*" are excluded from static test since the testing was performed as part of the HMI image**
Shutdown with Breaker Fail to Open
Fail to Come Online
Communication Failure
Common Alarm
Not in Auto
Common Alarm
Fail to Start
Low Coolant Temp
PreHigh Engine Temp
High Engine Temp
PreLow Oil Pressure
Low Oil Pressure
Overspeed
High AC Voltage
Low AC Voltage
Overload
Overcurrent
Fail to Sync
Emergency Stop
Short Circuit *

Test Complete___✓

Active Shed Level Alarms
Shed Level 1 Active
Shed Level 2 Active
Shed Level 3 Active
Shed Level 4 Active
Shed Level 5 Active
Shed Level 6 Active
Shed Level 7 Active
Test Complete___✓

Feeder Breaker Alarms (Load Breaker)
Fail to Open
Fail to Close
Lockout Trip
Protective Relay Failure
In Manual
Test Complete___✓

Main Breakers Alarms (Utility Main/Gen Main)
Fail to Open
Fail to Close
Aux Failure
Lockout Trip
Protective Relay Failure
Unexpected CB Open
Unexpected CB Close
Unexpected Change to Zone Manual
Unexpected CB Rack In or Rack Out
In Manual
Test Complete___✓

Island Comm Failure Alarms **(Remove Link 1 from rack/island to test Link Failure alarm)** **Remove both Links from rack/island to test Comm Failure alarm**
NID'n' Link Failure
NID'n' Comm Failure
Test Complete___✓

Normal Standby Conditions for Sequence Testing
Utility Source is available and utility main breaker 52-UM is closed
Generator main breaker 52-GM is open
Generator set breakers are open and the generator sets are not running
All generator sets are in Auto at each generator set PCC
Feeder breakers are connected and in the closed position
System mode is Off on the System Control Screen
Operator is selected under Control Selection on the System Control Screen
All Auto/Manual switches are in Auto mode
No Alarms Active, All alarms acknowledged

Hot Standby PLC Failure
(Test with load)
Start from Normal Standby Conditions, in Auto-Open Transition mode
Ensure the PLC clock and HMI clock are setup and in sync (Setup page 3)
Both PLCs are Running with R1A/S2 saying RUN PRIM/run stb and R1B/S2 saying RUN STBY / run pri
Select "Test With Load" on the System Control screen
Generator starts and closes to the Genbus
Transfer Delay starts and expires for Loadbus 1
52-UM opens
Loads shed on Loadbus 1
Program Transition Delay starts and expires for Loadbus 1
52-GM closes
Load add starts on Loadbus 1
Remove power to the Primary PLC, R1A/S2 by tripping the breaker
System is still in Test with load
No loads are shed and gensets remain online (the sequence is not affected by the PLC failure)
HMI reports alarms for Standby PLC Offline
Acknowledge and reset alarms
R1B/S2 reports RUN PRIM/unknown
Return power back to R1A/S2 by resetting the breakers
When power is returned, wait, then R1A/S2 reports RUN STBY / run pri and R1B/S2 reports RUN PRIM/run stb
Remove power to the Primary PLC, R1B/S2
System is still in Test with load
No loads are shed and gensets remain online (the sequence is not affected by the PLC failure)
HMI reports alarms for Standby PLC Offline
Acknowledge and reset alarms
R1A/S2 reports RUN PRIM/unknow
Return power back to R1B/S2 by resetting the breaker
When power is returned, wait, then R1B/S2 reports RUN STBY / run pri and R1A/S2 reports RUN PRIM/run stb
Select 'Off' under System Mode on the System Control screen
Retransfer Delay starts for Loadbus 1
While retransfer timer is timing on Loadbus 1 initiate the bypass
52-GM opens
Loads shed on Loadbus 1
Program Transition Delay starts and expires for Loadbus 1
52-UM closes
Load add starts on Loadbus 1
System in Normal Standby Conditions
Test Complete___✓
Hot Standby CRP Failure
(Test with Load)
Start from Normal Standby Conditions, in Auto-Open Transition mode

Select "Test With Load" on the System Control screen
Allow the system to power Loadbus 1 by generator source
Remove the ethernet links on R1A/S2 Port 1
System is still in Test with load
No loads are shed and gensets remain online (the sequence is not affected by the PLC failure)
HMI reports alarms for Standby Card 3 Failure
Acknowledge and reset alarms
R1B/S2 reports RUN PRIM
R1A/S2 reports RUN STBY
Return ethernet links back to R1A/S2 Port 1
R1A/S2 reports RUN STBY
R1B/S2 reports RUN PRIM
Remove the ethernet links on R1B/S2 Port 1
System is still in Test with load
No loads are shed and gensets remain online (the sequence is not affected by the PLC failure)
HMI reports alarms for Standby Card 3 Failure
Acknowledge and reset alarms
R1A/S2 reports RUN PRIM
R1B/S2 reports RUN STBY
Return ethernet links back to R1B/S2 Port 1
R1B/S2 reports RUN STBY
R1A/S2 reports RUN PRIM
Retransfer sequence is initiated
Allow the system to power Loadbus 1 by utility source
Test Complete___✓

	Manual Generator Operation From the Touchscreen - Generator 1
	Start from Normal Standby Conditions, in Manual Transition mode
	System in Manual alarm is active
	From the Oneline, press the Generator 1
	Verify the name in the pulldown matches the generator to test
	Open the Fly out window to access the generator control buttons
	Start the generator by pressing the Generator Start Pushbutton
	When the generator is ready to load verify the Generator Stop and CB close buttons are available to press
	Close the 52-G1 by pressing the CB Close Button
	Generator circuit breaker closes
	Go to the oneline and verify desired generator to test is the one connected and running on the oneline
	Return to the gen summary screen for Generator 1
	Open the Fly out window to access the generator control buttons
	Verify that the Generator CB Open pushbutton is available to press
	Open the generator circuit breaker by pressing the CB Open Pushbutton
	Generator ciruit breaker opens
	Generator stop and CB close buttons are available to press
	Stop the generator by pressing the Generator Stop Pushbutton
	Generator stops
	Test Complete___✓

System on-line Control available

Manual Feeder Breaker Operation From the Touchscreen - 52-F1
Start from Normal Standby Conditions, in Manual Transition mode
All Electrically Operated load breakers are open
Select "Test Without Load" on the System Control screen
Generator starts and closes to the Genbus
Go to the oneline screen
Touch the load named 52-F1
Manual screen pops up
Check the Manual Enable Box and confirm
Manual indicator for load appears in graphic
CB Open button is enabled to press
Press the CB Open Button and confirm
Close the manual pop up
Confirm 52-F1 Opens
Touch the load named 52-F1 to bring the manual screen back
CB Close button is enabled to press
Press the CB Close Button and confirm
Close the manual pop up
Confirm 52-F1 is Closed
Touch the load named 52-F1 to bring the manual screen back
Uncheck the Manual Enable box and confirm
Manual indicator graphic goes away
Close the Manual screen
Feeder does not open during operation

Temp Gen PG is a Non-Paralleing Genset - Standby Configuration
Place System into Manual at the System Control Screen
Navigate to the Setup Screen 1 and enter the Generartor settings for Non-Paralleling Gen
Set Generator 1 to 0 KW in Generator settings
Place System into Auto-Open Transition at the System Control Screen
Place the Control Mode in Non-Paralleling Temporary Generator Mode on the Setup Screen 6
PLC closes the 52-TG/LB Breaker
Verify that Temp Gen appears on the Oneline screen
Verify that Gen 1 disappears on the Oneline screen
System in Normal Standby Conditions
Feeder Breaker is connected and in the closed position
Permanent genset breaker is open and racked out.
Permanent Generator PCC is in Off Mode
Auto - Open Transition is Selected under Transition Type on the System Control Screen
Operator is selected under Control Selection on the System Control Screen
System mode is Off on the System Control Screen
No Alarms Active, All alarms acknowledged
Test Complete___✓

Loss and Return of Utility Source (Normal Standby)	
	Start from Normal Standby Conditions, in Auto-Open Transition mode
	Fail utility source
	Utility Fail Delay starts timing and expires
	Temporary Generator starts and closes to the Genbus
	Transfer Delay starts and expires for Loadbus 1
	52-UM opens
	Loads shed on Loadbus 1
	Program Transition Delay starts and expires for Loadbus 1
	52-GM closes
	Load add starts on Loadbus 1
	Loads are powered by the generator source
	Return utility source
	While retransfer timer is timing on Loadbus 1 initiate the bypass
	52-GM opens
	Loads shed on Loadbus 1
	Program Transition Delay starts and expires for Loadbus 1
	52-UM closes
	Load add starts on Loadbus 1
	52-TB opens
	Generator run in cooldown and shutdown
	System in Normal Standby Conditions
	Test Complete___✓

	Generator Test with Load Bank
	Place System into Manual at the System Control Screen
	Set the TG KW to 0 and Generator 1 KW to 2500. Verify Generator 1 settings
	Place System into Auto - Open Transition at the System Control Screen
	Navigate to the Setup screen 6 and check the Load Bank Control Mode Radio
	Navigate to the Load Bank Control screen and check the Enable LB Control Mode
	Select the Genset to be tested with the load bank
	Start Test with Load Bank:
	Start the Genset through the genset start pushbutton on the touchscreen
	When the Genset is Ready to Load, verify that the Breaker Close pushbutton is activated on the touchscreen
	Close the genset paralleling breaker using the gen breaker close pushbutton on the touchscreen
	Close the load bank breaker 52-TG/LB using the load bank breaker close pushbutton on the touchscreen
	Stop Test with Load Bank:
	Open the load bank breaker 52-TG/LB using the load bank breaker open pushbutton on the touchscreen
	Open the genset paralleling breaker using the gen breaker open pushbutton on the touchscreen
	Stop the Genset using the genset stop pushbutton on the touchscreen
	On the Load Bank Control screen and Uncheck LB control Mode Checkbox
	Test Complete___✓
	Loss of Utility during Load Bank Test
	Place the Generator into Load Bank Test as described above
	Fail utility source
	System exits Load Bank Test
	Load Bank breaker 52-TG/LB opens
	Generator continues to run
	System operates as in loss of utility source
	Return utility source and ensure System is back to Normal Standby Conditions
	System already on-line

Note: This sequence is set for the 52-UM to open on Utility Source Failure

Loss and Return of Utility Source
(Normal Standby)
Start from Normal Standby Conditions, in Auto-Open Transition mode
Fail utility source
Utility Fail Delay starts timing and expires
Generator starts and closes to the Genbus
Transfer Delay starts and expires for Loadbus 1
52-UM opens
Program Transition Delay starts and expires for Loadbus 1
52-GM closes
Loads are powered by the generator source
Return utility source
While retransfer timer is timing on Loadbus 1 initiate the bypass
52-GM opens
Program Transition Delay starts and expires for Loadbus 1
52-UM closes
52-G1 opens
Generator run in cooldown and shutdown
System in Normal Standby Conditions
Test Complete___✓
Loss and Return of Utility Source
(Authorized Return to Utility Enabled on Setup Screen)
Start from Normal Standby Conditions, in Auto-Open Transition mode
Check the Authorized Return to Utility checkbox on Setup screen
Fail utility source
Utility Fail Delay starts timing and expires
Generator starts and closes to the Genbus
Transfer Delay starts and expires for Loadbus 1
52-UM opens
Program Transition Delay starts and expires for Loadbus 1
52-GM closes
Loads are powered by the generator source
Return utility source
Initiate graphic for transfer pair appears
Open the dialog and press the start button for transfer pair
Retransfer timer for transfer pair starts
Press the Return Stop button

Retransfer timer for transfer pair stops
Press the start button for transfer pair
Retransfer timer for transfer pair Restarts
While retransfer timer is timing on Loadbus 1, initiate the bypass
52-GM opens
Program Transition Delay starts and expires for Loadbus 1
52-UM closes
52-G1 opens
Generator run in cooldown and shutdown
Uncheck the Authorized Return to Utility checkbox on Setup screen
System in Normal Standby Conditions
Test Complete___✓

Loss of Utility Source
(Utility Source Returns before Utility Fail Delay Expires)
Start from Normal Standby Conditions, in Auto-Open Transition mode
Set the utility fail Time Delay to 5 seconds in the DMC (Setup page 3)
Fail utility source
Utility Fail Delay starts
Return utility source in Less than the Utility source Time Delay
No Change to the system
System is still fed by the utility source
Restore the Utility Fail Delay back to orignal value
System in Normal Standby Conditions
Test Complete___✓

Loss of Utility Source
(Utility Source Returns before Transfer Time Delay Expires)
Start from Normal Standby Conditions, in Auto-Open Transition mode
Fail utility source
Utility Fail Delay starts and Expires
Generator starts and closes to the Genbus
Transfer Delay starts for Loadbus 1
Utility source returns before Transfer Delay expires
52-UM remains closed
52-G1 opens
Generator run in cooldown and shutdown
System in Normal Standby Conditions
Test Complete___✓

Loss of Utility Source
(Utility Source returns after Transfer Delay expires)
Start from Normal Standby Conditions, in Auto-Open Transition mode
Prepare to Fail then return the utility while both 52-GM and 52-UM are open, transferring to gens

Fail utility source
Utility Fail Delay starts timing and expires
Generator starts and closes to the Genbus
Transfer Delay starts and expires for Loadbus 1
52-UM opens
Loads shed on Loadbus 1
Program Transition Delay starts for Loadbus 1
Return utility source
Program Transition Delay expires for Loadbus 1
52-GM closes
Loads are powered by the generator source
Retransfer Delay starts and expires for Loadbus 1
52-GM opens
Loads shed on Loadbus 1
Program Transition Delay starts and expires for Loadbus 1
52-UM closes
52-G1 opens
Generator run in cooldown and shutdown
System in Normal Standby Conditions
Test Complete___✓

Note: This sequence is set for the 52-UM to open on Utility Source Failure

Test without Load	
	Start from Normal Standby Conditions, in Auto-Open Transition mode
	Select "Test Without Load" on the System Control screen
	Generator starts and closes to the Genbus
Test without Load - Off	
	Select 'Off' under System Mode on the System Control screen
	52-G1 opens
	Generator run in cooldown and shutdown
	System in Normal Standby Conditions
	Test Complete___✓
Test With Load	
(Control selection is Operator on System Control screen)	
	Start from Normal Standby Conditions, in Auto-Open Transition mode
	Select "Test With Load" on the System Control screen
	Generator starts and closes to the Genbus
	Transfer Delay starts and expires for Loadbus 1
	52-UM opens
	Loads shed on Loadbus 1
	Program Transition Delay starts and expires for Loadbus 1
	52-GM closes
	Load add starts on Loadbus 1
	Loads are powered by the generator source
Test with Load - Off	
	Select 'Off' under System Mode on the System Control Screen
	Retransfer Delay for Loadbus 1
	While retransfer timer is timing on Loadbus 1, initiate the bypass
	52-GM opens
	Loads shed on Loadbus 1
	Program Transition Delay starts and expires for Loadbus 1
	52-UM closes
	Load add starts on Loadbus 1
	52-G1 opens
	Generator run in cooldown and shutdown
	System in Normal Standby Conditions
	Test Complete___✓
Test with Load	
(Authorized Return to Utility Enabled on Setup Screen)	
	Start from Normal Standby Conditions, in Auto-Open Transition mode
	Check the Authorized Return to Utility checkbox on Setup screen
	Select "Test With Load" on the System Control screen
	Allow the system to power Loadbus 1 by generator source
	Select 'Off' under System Mode on the System Control Screen

Authorized Return to Utility is ignored (removal from test is the authorize)
Retransfer Delay starts for Loadbus 1
While retransfer timer is timing on Loadbus 1, initiate the bypass
52-GM opens
Loads shed on Loadbus 1
Program Transition Delay starts and expires for Loadbus 1
52-UM closes
Load add starts on Loadbus 1
52-G1 opens
Generator run in cooldown and shutdown
Uncheck the Authorized Return to Utility checkbox on Setup screen
System in Normal Standby Conditions
Test Complete___✓

Test With Load
(Control selection is Hardwired Inputs on System Control Screen)
Start from Normal Standby Conditions, in Auto-Open Transition mode
Select "Hardwired Inputs" under Control Selection on the System Control Screen
System Mode radio buttons are disabled at the local control screen
Send hardwired Test with Load signal
Generator starts and closes to the Genbus
Transfer Delay starts and expires for Loadbus 1
52-UM opens
Loads shed on Loadbus 1
Program Transition Delay starts and expires for Loadbus 1
52-GM closes
Load add starts on Loadbus 1
Loads are powered by the generator source
Remove hardwired Test with Load signal
Retransfer Delay starts for Loadbus 1
While retransfer timer is timing on Loadbus 1, initiate the bypass
52-GM opens
Loads shed on Loadbus 1
Program Transition Delay starts and expires for Loadbus 1
52-UM closes
Load add starts on Loadbus 1
52-G1 opens
Generator run in cooldown and shutdown
System in Normal Standby Conditions
Test Complete___✓

Test With Load
(Control selection is Hardwired Inputs on System Control Screen, Disable Hardwired Inputs Control selection when System in Test)
Start from Normal Standby Conditions, in Auto-Open Transition mode
Select "Hardwired Inputs" under Control Selection on the System Control Screen

	System Mode radio buttons are disabled at the local control screen
	Send hardwired Test with Load signal
	Generator starts and closes to the Genbus
	Transfer Delay starts and expires for Loadbus 1
	52-UM opens
	Loads shed on Loadbus 1
	Program Transition Delay starts and expires for Loadbus 1
	52-GM closes
	Load add starts on Loadbus 1
	Loads are powered by the generator source
	Select "Operator" under Control Selection on the System Control Screen
	Mode Control is restored at the local control screen
	Remove hardwired Test with Load signal
	Loadbus 1 remains in the Test with Load mode, confirming local screen now has control of removal of test
	Select 'Off' under System Mode on the System Control Screen
	Retransfer sequence is initiated
	Allow the system to power Loadbus 1 by utility source
	System in Normal Standby Conditions
	Test Complete___✓
Test with Load **(Control selection is Operator on System control screen)**	Start from Normal Standby Conditions, in Auto-Open Transition mode
	Ensure Control selection on System Control screen page 1 is set to Operator
	Assert the Hardwired System Test input (default is Customer Input 2)
	Generator does not start, system does not enter test showing control is given to operator and not hardwired inputs
	Remove the Hardwired System Test Input (default is Customer Input 2)
	System in Normal Standby Conditions
	Test Complete___✓

52-UM Breaker Fail to Open during Loss of Utility Source
(Utility Source Returns before Fail to Open condition corrected)

Start from Normal Standby Conditions, in Auto-Open Transition mode
Setup system to fail 52-UM from opening
Fail utility source
Utility Fail Delay starts timing and expires
Generator starts and closes to the Genbus
Transfer Delay starts and expires for Loadbus 1
52-UM Fails to Open
52-G1 opens
Generator run in cooldown and shutdown
Return utility source
Acknowledge and reset fail to open alarm on the HMI
System in Normal Standby Conditions

Test Complete___✓

52-UM Breaker Fail to Open during Loss of Utility Source
(Utility Source Returns after Fail to Open condition corrected)

Start from Normal Standby Conditions, in Auto-Open Transition mode
Setup system to fail 52-UM from opening
Fail utility source
Utility Fail Delay starts and Expires
Generator starts and closes to the Genbus
Transfer Delay starts and expires for Loadbus 1
52-UM Fails to Open and an alarm is registered on the HMI
52-G1 opens
Generators run in cooldown and shutdown
Place system into Manual on the HMI
Fix 52-UM to allow opening
Place System into Auto-Open Transition on the HMI
Acknowledge fail to open Alarm on the HMI
System transfers to power Loadbus 1 from generator source
Loads are powered by the generator source
Return utility source
System transfers to power Loadbus 1 from utility source
System in Normal Standby Conditions

Test Complete___✓

52-UM Breaker Fail to Close
(Return of Utility Source)

Start from Normal Standby Conditions, in Auto-Open Transition mode
Setup system to fail 52-UM closure
Fail utility source
System transfers to power Loadbus 1 from generator source
Return utility source

	ReTransfer Delay starts and expires for Loadbus 1
	52-GM opens
	Program transition time delay for Loadbus 1 starts and expires
	52-UM Fails to Close and alarm is registered on the HMI
	52-GM closes
	Generators supply power to Loadbus 1
	Place system into Manual on the HMI
	Fix 52-UM Fail to close condition
	Place System into Auto-Open Transition on the HMI
	Acknowledge and reset alarm on the HMI
	System transfers to power Loadbus 1 from utility source
	System in Normal Standby Conditions
	Test Complete___✓
	52-GM Breaker Fail to Close during Loss of Utility Source **(Utility Source Returns after Fail to Close condition corrected)**
	Start from Normal Standby Conditions, in Auto-Open Transition mode
	Setup system to fail 52-GM Closure
	Fail utility source
	Utility Fail Delay starts and Expires
	Generator starts and closes to the Genbus
	Transfer Delay starts and expires for Loadbus 1
	52-UM opens
	Program transition time delay for Loadbus 1 starts and expires
	52-GM Fails to Close and an alarm is registered on the HMI
	52-G1 opens
	Generators run in cooldown and shutdown
	Return utility source
	52-UM closes
	Fix 52-GM to allow closure
	Acknowledge and reset 52-GM fail to close alarm on the HMI
	System in Normal Standby Conditions
	Test Complete___✓
	52-GM Breaker Fail to Open **(Return of Utility Source)**
	Start from Normal Standby Conditions, in Auto-Open Transition mode
	Setup system to fail 52-GM Opening
	Fail utility source
	System transfers to power Loadbus 1 from generator source
	Return utility source
	Bypass Retransfer time delay for Loadbus 1
	52-GM Fails to Open and an alarm is registered on the HMI

Generator continues to run supplying power to load
Place system into Manual on the HMI
Fix system to allow 52-GM Opening
Place System into Auto-Open Transition on the HMI
Acknowledge and reset 52-GM fail to open alarm on the HMI
While retransfer timer is timing on Loadbus 1, initiate the bypass
52-GM opens
Program Transition Delay starts and expires for Loadbus 1
52-UM closes
52-G1 opens
Generator run in cooldown and shutdown
System in Normal Standby Conditions
Test Complete___✓

	52-G1 Fail to open
	(Loss of Utility Source followed by Generator Paralleing Breaker Fail to Open)
	Start from Normal Standby Conditions, in Auto-Open Transition mode
	Setup system to fail Generator 1 paralleling breaker Opening
	Fail utility source
	System transfers to power Loadbus 1 from generator source
	Return utility source
	Bypass Retransfer time delay for Loadbus 1
	52-GM opens
	Program transition time delay for Loadbus 1 starts and expires
	52-UM closes
	Generator with its breaker failed to open remains running, powering the Genbus
	Fail utility source
	Utility Fail Delay starts timing and expires
	Transfer Delay starts and expires for Loadbus 1
	52-UM opens
	Program Transition Delay starts and expires for Loadbus 1
	52-GM closes
	Loads are powered by the generator source
	Fix Gen breaker to allow opening
	Place system in Manual from HMI
	Shutdown Gen 1 via E-stop and place PCC in Manual
	Open 52-G1 breaker and reset PCC
	Place PCC in Auto
	Acknowledge and reset fail to open alarm
	Place system in Auto Open Transition at HMI
	Return utility source and follow retransfer procedure

| System in Normal Standby Conditions |
| Test Complete___✓ |

| **Generator Fail to Open then Shutdown** |
| **(Loss of Utility Source followed by Generator Fail to Open)** |
| Start from Normal Standby Conditions, in Auto-Open Transition mode |
| Setup system to fail Generator 1 paralleling breaker Opening |
| Fail utility source |
| System transfers to power Loadbus 1 from generator source |
| Return utility source |
| Bypass Retransfer time delay for Loadbus 1 |
| 52-GM opens |
| |
| Program transition time delay for Loadbus 1 starts and expires |
| 52-UM closes |
| Generator with its breaker failed to open remains running, powering the Genbus |
| Fail utility source |
| Utility Fail Delay starts timing and expires |
| Transfer Delay starts and expires for Loadbus 1 |
| 52-UM opens |
| |
| Program Transition Delay starts and expires for Loadbus 1 |
| 52-GM closes |
| |
| Loads are powered by the generator source |
| Generator running with its breaker failed to open shuts down (Press E-Stop from PCC) |
| 52-GM opens |
| |
| |
| Return utility source |
| 52-UM closes immediately |
| |
| Allow Gen breaker to be able to open and reset faults |
| System in Normal Standby Conditions |
| Test Complete___✓ |

| **Generator Fail to Open and Shutdown** |
| **(then Loss of Utility Source)** |
| Start from Normal Standby Conditions, in Auto-Open Transition mode |
| Setup system to fail Generator 1 opening |
| Fail utility source |
| System transfers to power Loadbus 1 from generator source |
| Return utility source |
| Bypass Retransfer time delay for Loadbus 1 |
| 52-GM opens |
| |

Program transition time delay for Loadbus 1 starts and expires
52-UM closes
Generator with its breaker failed to open remains running, powering the Genbus
The generator is shutdown ((Press E-Stop from PCC)) with it's breaker failed to open
Fail utility source
Utility Fail Delay starts timing and expires
No additional action
Return utility source
Place system into Manual on the HMI
Fix Generator 1 fault condition
Place System into Auto-Open Transition on the HMI
Acknowledge and reset fail to close alarm on the HMI
System in Normal Standby Conditions
Test Complete___✓

Complete Genbus failure
(Loss of Utility source)
Start from Normal Standby Conditions, in Auto-Open Transition mode
Disable Quick Shed, Setup Page 4 on the HMI
Fail utility source
System transfers to power Loadbus 1 from generator source
Place generator into shutdown
52-GM opens
Program Transition time delay for Loadbus 1 starts and expires
Loads are not powered
Return utility source
52-UM closes
Remove generator shutdown alarms
System in Normal Standby Conditions
Test Complete___✓

Generator Fails to Start
(Loss of Utility Source)
Start from Normal Standby Conditions, in Auto-Open Transition mode
Ensure capacity to connect is set to the total number of Generators in the system, Setup page 5
Setup Generator 1 to have a fail to start
Fail utility source
Generator 1 Fails to start and does not close to the Genbus
52-GM does not closes
Loadbus 1 remains unpowered
Generator 1 fail to come Online alarm is registered on the HMI
Remove Generator 1 fail to start
Acknowledge and reset fail to close alarm on the HMI
Allow Loadbus 1 to be powered by Generator source

Return utility source
System transfers to power Loadbus 1 from utility source
System in Normal Standby Conditions
Test Complete___✓

52-UM Breaker Lockout Trip during Normal Standby Conditions
(Loss of Utility Source following Lockout Trip)
Start from Normal Standby Conditions, in Auto-Open Transition mode
Lockout 52-UM
52-UM Lockout alarm is registered
No further action taken on system
Fail utility source
No further action taken on system
Return utility source
Reset Lockout Relay on 52-UM
Acknowledge and reset alarms for Lockout Trip on the HMI
Program Transition Delay starts and expires for Loadbus 1
52-UM closes
System transfers to power Loadbus 1 from utility source
System in Normal Standby Conditions
Test Complete___✓

52-GM Breaker Lockout
(Lockout Trip following Loss of Utility Source)
Start from Normal Standby Conditions, in Auto-Open Transition mode
Fail utility source
System transfers to power Loadbus 1 from generator source
Lockout 52-GM
52-G1 opens
Generator run in cooldown and shutdown
Return utility source
52-UM remains open since 52-GM in lockout
Reset Lockout relay on 52-GM
Acknowledge and reset lockout alarm on the HMI
Program Transition Delay starts and expires for Loadbus 1
52-UM closes
System in Normal Standby Conditions
Test Complete___✓

52-UM Breaker Protective Relay Failure
(Loss of Utility Source)

Start from Normal Standby Conditions, in Auto-Open Transition mode
52-UM protective relay fail
Generator starts and closes to the Genbus
Transfer Delay starts and expires for Loadbus 1
52-UM opens
Program Transition Delay starts and expires for Loadbus 1
52-GM closes
Generators run supplying power to load
Place the system into manual on the HMI
Fix the 52-UM protective relay Fail
Acknowledge and Reset the alarms on the HMI
Place System into Auto-Open Transition on the HMI
Retransfer timer timing for Loadbus 1
Bypass retransfer timer
System transfers to power Loadbus 1 from utility source
System in Normal Standby Conditions
Test Complete___ ✓
52-UM Breaker Protective Relay Failure   **(Return of Utility Source)**
Start from Normal Standby Conditions, in Auto-Open Transition mode
Fail utility source
System transfers to power Loadbus 1 from generator source
Return utility source
Set protective relay fault for 52-UM
Retransfer time delay stops for Loadbus 1
Generator continue to provide power to load
Place the system into Manual on the HMI
Remove 52-UM protective relay failure
Place System into Auto-Open Transition on the HMI
Acknowledge and Reset the alarms on the HMI
ReTransfer Delay starts for Loadbus 1
Bypass retransfer timer
System transfers to power Loadbus 1 from utility source
System in Normal Standby Conditions
Test Complete___ ✓
52-GM Breaker Protective Relay Failure   **(Protective Relay Fail after 52-GM closes)**
Start from Normal Standby Conditions, in Auto-Open Transition mode
Fail utility source
System transfers to power Loadbus 1 from generator source
With 52-GM closed, give it a protective relay failure
Generator continue running supplying power to load

Return utility source
Retransfer time delay times for Loadbus 1
Bypass retransfer timer
52-GM opens
Program transition timer starts and expires for Loadbus 1
52-UM closes
52-G1 opens
Generator run in cooldown and shutdown
System in Normal Standby Conditions
Test Complete___✓

52-GM Breaker Protective Relay Failure
52-GM Breaker Protective Relay Failure
(Protective Relay Fail before 52-GM closes)
Start from Normal Standby Conditions, in Auto-Open Transition mode
Prepare for failing 52-GM protective relay prior to 52-GM closing
Fail utility source
Utility Fail Delay starts timing and expires
Generator starts and closes to the Genbus
Transfer Delay starts for Loadbus 1 starts
Set the 52-GM protective relay failure prior to transfer time delay completing
52-GM Protective Relay alarm is registered on the HMI
52-G1 opens
Generators run in cooldown and shutdown
Place system into Manual on the HMI
Repair 52-GM protective relay failure
Acknowledge and Reset the alarms on the HMI
Place System into Auto-Open Transition on the HMI
System transfers to power Loadbus 1 from generator source
Return utility source
Retransfer time delay times for Loadbus 1
Bypass retransfer timer
52-GM opens
Program transition timer starts and expires for Loadbus 1
52-UM closes
52-G1 opens
Generator run in cooldown and shutdown
System in Normal Standby Conditions
Test Complete___✓

Test with Load	
(Loss of Utility Source)	
Start from Normal Standby Conditions, in Auto-Open Transition mode	
Select "Test With Load" on the System Control screen	
Allow the system to power Loadbus 1 by generator source	
Fail utility source	
System remains in Test with Load	
Return utility source	
System remains in Test with Load	
Select 'Off' under System Mode on the System Control Screen	
System transfers to power Loadbus 1 from utility source	
System in Normal Standby Conditions	
Test Complete___✓	
Bus Overload during Test with Load	
(Authorized Return to Utility enabled on Setup Screen)	
Start from Normal Standby Conditions, in Auto-Open Transition mode	
Check the Authorized Return to Utility checkbox on Setup screen	
Select "Test With Load" on the System Control screen	
Allow the system to power Loadbus 1 by generator source	
Give the system a overload signal by asserting the load dump from a generator that is online	
System remains in Test with Load	
Remove the load dump signal	
Acknowledge and Reset alarms for overload on the HMI	
Select 'Off' under System Mode on the System Control Screen	
System transfers to power Loadbus 1 from utility source	
Uncheck the Authorized Return to Utility checkbox on Setup screen	
System in Normal Standby Conditions	
Test Complete___✓	
Loss of Utility Source	
(During Test without Load)	
Start from Normal Standby Conditions, in Auto-Open Transition mode	
Select "Test Without Load" on the System Control Screen	
Fail utility source	
System mode changed to "Off" automatically	
Transfer Delay starts and expires for Loadbus 1	
52-UM opens	
Program Transition Delay starts and expires for Loadbus 1	
52-GM closes	
Return utility source	
While retransfer timer is timing on Loadbus 1 initiate the bypass	

52-GM opens
Program Transition Delay starts and expires for Loadbus 1
52-UM closes
52-G1 opens
Generators run in cooldown and shutdown
System does not automatically return to test without load
System in Normal Standby Conditions
Test Complete___✓

52-UM Breaker Fail to Open
(Test with Load)
Start from Normal Standby Conditions, in Auto-Open Transition mode
Set 52-UM to fail to open
Select "Test With Load" on the System Control screen
Generators start and close to the Genbus
Transfer Delay starts and expires for Loadbus 1
52-UM Fails to Open and an alarm is registered on the HMI
System automatically removed from test
Generators stop
Acknowledge and reset alarm on the HMI
System in Normal Standby Conditions
Test Complete___✓

52-UM Breaker Fail to Close
(During Test with Load Off when Retransfer to Utility Source)
Start from Normal Standby Conditions, in Auto-Open Transition mode
Setup 52-UM to fail to close
Uncheck Open Transition Utility Transfer Load Shed, Setup Page 4
Select "Test With Load" on the System Control screen
Allow the system to power Loadbus 1 by generator source
Allow all loads to add
Select 'Off' under System Mode on the System Control Screen
Retransfer Time Delay starts
Bypass Retransfer Time Delay
52-GM opens
Load breakers do not open
Program Transition Delay starts and expires for Loadbus 1
52-UM Fails to Close and an alarm is registered on the HMI
Load breakers open (demonstrates LAS transition to gens from utility source)
52-GM closes
Load is powered by the generator source
Place system into Manual on the HMI
Fix 52-UM to allow closure

Place System into Auto-Open Transition on the HMI
Acknowledge fail to close alarm on the HMI
Return utility source
System transfers to power Loadbus 1 from utility source
System in Normal Standby Conditions
Test Complete___✓

Genbus Failure
(Test with Load)
Start from Normal Standby Conditions, in Auto-Open Transition mode
Select "Test With Load" on the System Control screen
Verify that Generators start and close to the Genbus
Transfer Delay starts and expires for Loadbus 1
52-UM opens
Program transition time delay for Loadbus 1 starts and expires
52-GM closes
Loads are powered by the generator source
Place all available generators into shutdown (e-stop)
System is removed from test automatically
52-GM opens
Program transition time delay for Loadbus 1 starts and expires
52-UM closes
Remove generator shutdown alarms
Acknowledge and reset alarms on the HMI
System in Normal Standby Conditions
Test Complete___✓

Scheduler Screen
(Test without Load)
Start from Normal Standby Conditions, in Auto-Open Transition mode
Go to the Scheduler screen
Set a scheduled event to run Once, on today's date, 5 minutes in the future for test without load
Make the test duration 3 minutes
Enable the Test without Load on the Scheduler screen
Go to the System Control screen and change the control selection to Scheduler
Test without load starts at the specified time
System Mode indicates Test without load on the System Control screen
Generators start and close to the Genbus
Test without load lasts the specified duration
System Mode changes to Off when duration expires
52-G1 opens
Generators run in cooldown and shutdown
System in Normal Standby Conditions
Test Complete___✓

PLC Software	
PLC Program File Name (*.sta)	**wjhooper_hsby_asbuilt**
PLC Program File Build #	**25**
PLC *.DTX File Name	**Data_Real**
PLC *.DAT File Name	**N/A**

HMI Software	
HMI Diagnostics Program Build #	N/A
Indusoft Project Template Name	**Template_Single_TP**
Indusoft Version	**7.1**
Advantech HMI Image Version	**N/A**
Indusoft Project File Name (*.zip)	**WJ_Hooper_HMI**

Software Files Archive
PLC software files archived
HMI software files archived
All HMI screens Saved as HTML
Screen Captures Completed and archived
Modbus Map is updated and archived
MCM Capture Files archived
Protective Relay Settings files archived for shipment

	Static Test Completion Setup
	Ensure the DMC is in auto and in a standby condition. No alarms are present on the alarm screen
	Ensure logged in as technician
	Test Complete___✓
	Event Log Screen
	Navigate to the Event Log screen
	Open the fly out
	Press the delete button to delete the event logs from static test
	Press the confirm button
	Event logs deleted
	Test Complete___✓
	Alarm History Screen
	Navigate to the Alarm History screen
	Open the fly out
	Press the delete button to delete the alarm logs from static test
	Press the confirm button
	Alarm logs deleted
	Test Complete___✓
	Scheduler Screen
	Navigate to the Scheduler screen
	Click on each Schedule Exception and ensure the enable checkbox is unchecked for all 6 exceptions
	Click on each System Schedule and ensure the enable checkbox is unchecked for all 12 System Schedules
	Press the confirm button
	Test Complete___✓
	Generator Report Screen
	Navigate to the Generator Report screen
	Ensure under Report Settings, Enable is unchecked
	Delete the Report Note Text
	Press the delete button to delete the Generator Reports from static test
	Press the confirm button
	Generator Reports deleted
	Test Complete___✓
	Run Report Screen
	Navigate to the Run Report screen
	Ensure under Report Settings, Enable is unchecked
	Delete the Report Note Text
	Press the delete button to delete the Run Reports from static test
	Press the confirm button

Run Reports deleted	
Test Complete___✓	
System Settings Restoration	
Restore the system settings screens for static shipment by ensuring system is in manual, zero generators are online	
Verify Information screen settings match to project settings	
Verify Setup screens values match to project settings	
Verify Load Demand screen setup values match to project settings	
Verify Load Control screens setup values match to project settings	
Test Complete___✓	
PLC/HMI Power down	
System Control Transition Type in Manual before PLC/HMI power down for shipment	
Test Complete___✓	