

1999 - 2001 EDG Failures

Failure ID	Recommended EDG Failure Mode	Start	Load	Run	Discovery Date	EDG Running	EDG Secured as Result of Failure	Failure Time Ided	Status on Discovery Secured/ Loaded/ Unloading	Failure Time	Failure Description	Impact	Corrective Action	Comment
	148	82	45	21										
343	S	1	0	0	9/12/2000	No - Discovered Condition	No	Yes	Secured	Discovered after a surveillance run	Auto start light was not illuminated. Blown fuse causing auto voltage circuitry to be inoperable	EDG declared inoperable	Light socket and fuse replaced	
621	L	0	1	0	1/17/2000	Yes	Unknown	No	Loading	After breaker closure	Would not respond to repeated attempts to raise load. Load was at 3.5 MW. Pot had dead spot on pot winding	Condition cleared with no further operator action. Pot later found to have dead spot on winding	Replaced pot	
809	R	0	0	1	7/1/1999	Yes	Yes	Yes	Full Load	After approximately full load for one hour	LO pressure degraded to approximately 33psi (from 75 psi) from a combination of failed bolting and cracked bracket (stub shaft bushing assembly). Discovered as part of the post maintenance testing. A non-mandatory May 1972 maintenance bulletin to retrofit with a new design bracket in order to increase strength had not been implemented. Upgrade likely to have been planned in conjunction with turbo charger upgrades at a later date. Failure does not appear to be directly related to the maintenance actions.	EDG was shut down	Unknown	
944	S	1	0	0	1/28/1999	No - Discovered Condition	No	Yes	Secured	Discovered during walkdown on 1/28/1999. Failure likely the result of maintenance performed on 1/9/1999.	LO AMOT (cast iron) valve flanges were torqued such that the valve body cracked approximately 20 days after the maintenance was performed. Crack resulted in loss of LO.	EDG declared inoperable	Valve replaced and procedure revised	
945	S	1	0	0	1/29/1999	Yes	No	Yes	Full Load	Less than 1 hour.	Tachometer driven gear coupling tang broke. The tang connects the tachometer shaft to the bevel driven gear. In addition, the bevel drive gear had broken teeth. The bevel drive gear is attached to the governor power take off shaft. The tachometer drive shaft was bent. Failure investigation concluded that the gear mesh engagement was inadequately spaced. This caused excessive forces to be experienced by the tachometer driven gear and shaft. It was also determined that mesh adjustment could be achieved by varying the thickness of the bearing retainer cover gasket, which corrected the problem.	During Manual Slow Speed Start - this failure had little impact on engine operation. Local Panel Tachometer readout was erratic and reading between 0 and 200 RPM, even though the engine was being loaded at 900 RPM. At less than 200 RPM indicated, the standby keep warm engine systems automatically operated. Note: Had the Tachometer malfunctioned during an Auto-Start, the engine would have failed to run.	An undamaged Tachometer Assembly was installed, and the bearing retainer cover gasket thickness was altered to achieve the desired driven gear engagement.	On an actual LOOP, this Tachometer malfunction would have resulted in a failure to start. A slow start bypasses this input.
1463	R	0	0	1	4/22/2000	Yes	Yes	Yes	105% of rated load	23 hours and 12 minutes	Failure of fuel supply line from engine header to the jerk pump (high pressure fuel injection pump) suction	EDG secured via emergency stop	Replace fuel supply hose, inlet elbow and fuel injection pump	
1566	L	0	1	0	1/19/1999	Yes	Yes	Yes	100% load	Less than 1 hour.	EDG tripped during loading due to high temperature trip at 198F.	EDG was shut down and declared inoperable.	Adjusted cooling water valve position	
1568	S	1	0	0	2/18/1999	Yes	Yes	Yes	Unloaded	Less than 1 hour.	EDG tripped on high crankcase pressure trip due to the crankcase pressure trip switch being out of calibration.	EDG tripped from unloaded condition.	Crankcase pressure trip switch was calibrated.	
1781	L	0	1	0	2/5/1999	Yes	Yes	No	Loaded	Less than 1 hour.	Engine #2 caused the load imbalance by producing 4.6 MW instead of 4.0 MW which Engine #1 was producing. The #2 Engine Fuel Rack Limiter Jack vibrated out of position and required readjustment.	EDG was unavailable	Readjusted and locked down Fuel Rack Jack	
1828	S	1	0	0	9/13/1999	Yes	Yes	Yes	Unloaded	Less than 1 hour.	Operator were unable to control generator output frequency due to Generator Load Sharing and Speed Control Module	EDG was unavailable	The speed control module was replaced, calibrated, and tested	
1987	L	0	1	0	5/10/2000	Yes	Yes	Yes	Loaded	Less than 1 hour.	Engine oil sump was overfilled due to a problem with the insertion of the dipstick. This caused foaming during a test run. The foam caused a low level trip of the EDG within 5 minutes of loaded operation.	EDG was unavailable	Oil level was adjusted	
2059	L	0	1	0	4/16/2001	Yes	Yes	Yes	Loaded	Less than 1 hour.	EDG Radiator Fans were not running with the engine loaded, due to numerous electrical malfunctions including starting relay.	Rendered EDG unavailable	Wiring re-attached to Relay and breaker overcurrent trip settings raised	

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2453	L	0	1	0	8/31/1999	Yes	Yes	Yes	Unloaded	Less than 1 hour.	The root cause of the diesel generator output breaker tripping was an improper over-current trip set point for the Amptector (solid state trip device) of the breaker. Post trip testing revealed the over-current trip set point for 23 EDG was 3200 amps vs 6000 as intended. This improper setting was caused by the difficulty of setting the Amptector low in its high amp, coarse setting span.	EDG was unavailable during a test demand	Circuit breaker Amptector was recalibrated	
2644	L	0	1	0	1/10/1999	Yes	Yes	Yes	Loading	Less than 1 hour.	EDG did not load as required due to failure of Fuel Oil Booster Pump losing its prime. The cause was determined to be improper pump and piping configuration, which caused air in-leakage through the pump seal.	EDG was unavailable for power production	Booster pump piping modifications are being evaluated for installation	
2654	S	1	0	0	6/20/1999	Yes	Yes	Yes	Unloaded	Less than 1 hour.	EDG had a cracked Cylinder Head which leaked noticeably during unloaded operation. Leak prevented engine from running in its normal parameters and was shutdown.	EDG was unavailable for power production	Cracked cylinder was replaced	
2673	S	1	0	0	10/6/1999	Yes	Yes	Yes	Unloaded	Less than 1 hour.	EDG did not load as required due to a shorted diode resulting in loss of generator excitation. The shorted diode in the jacket water pressure permissive is an input into breaker 72-302 field flashing/excitation breaker logic.	EDG was unavailable for power production	The diode was replaced	
2683	R	0	0	1	6/24/1999	Yes	Yes	Yes	Loaded	Greater than 1 hour	With the EDG loaded the Lube Oil Pump P-212B, Relief Valve cycled open and closed, below its 130# setpoint. The Lube Oil Pressure was approximately 85#.	EDG was unavailable for power production	Lube Oil Pump and Relief Valve was replaced	
2955	L	0	1	0	5/23/1999	Yes	Yes	Yes	Loaded	Less than 1 hour.	DG would not load to greater than 1500 kW instead of the desired 3000 kW. EGA Motor Operated Pot was determined to be malfunctioning.	DG was taken out of service for repair. DG would have been able to pick up Full Load in a LOOP, however may not been able to parallel to restore buses when off-site power returned. A LOOP concurrent with a LOCA may challenge the 1500kW limit.	DG Motor operated POT was repaired	
3047	R	0	0	1	3/3/2000	Yes	Yes	Yes	Loaded	Greater than 1 hour	DG 2 Tripped while supplying power to Bus E-2, due to a failure of the Excitation Transformer.	DG was unavailable	Excitation Transformer was replaced	
3099	R	0	0	1	10/17/2000	Yes	Yes	Yes	Loaded	Greater than 1 hour	A Fuel Oil Leak at the fuel oil isolation valve occurred while the DG was being shutdown.	DG became unavailable	1/4" Close nipple was replaced	
4226	S	1	0	0	1/13/2000	Yes	Yes	Yes	Unloaded	Less than 1 hour.	Loose lead terminal on Governor caused unexpected Frequency Swings when 1A DG was running unloaded.	DG was unavailable	Trouble shooting activities identified the loose governor terminal lead, which was tightened.	
4555	S	1	0	0	2/5/1999	Yes	Yes	Yes	Unloaded	Less than 1 hour.	DG trouble alarm came in while engine was running unloaded. This alarm can be caused by multiple conditions, many of which were locally in alarm. Additionally, the engine speed spiked for a short time. The cause for all the alarms were from a Power Supply Failure in a control panel.	Failed Power Supply caused 1B DG to be inoperable and unavailable.	Power Supply was replaced with a functioning one	
5062	S	1	0	0	4/12/2000	Yes	Yes	Yes	Unloaded	Less than 1 hour.	EDG speed oscillated while unloaded. The fuel rack was moving as demanded by the governor. The Governor Solenoid was found to be open-circuited during trouble shooting.	EDG was inoperable and unavailable	Governor was repaired	
5277	R	0	0	1	3/9/2000	Yes	Unknown	Yes	Loaded	Unknown - assumed to occur after loading as this is a 24 endurance test	EDG electrical output drifted downward while paralleled, due to a governor problem. Missing fasteners caused the Governor Motor to vibrate and change its demand signal downward during 24 hour endurance test.	EDG was inoperable and might not have completed its mission time	Fasteners were installed on the governor housing	

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5278	S	1	0	0	3/11/2000	No - Failed Start Attempt	Yes	Yes	Secured	After endurance run and full load reject	EDG failed the hot restart test after and endurance run with full load reject. Trouble shooting did not identify a cause.	Engine did not restart to power the ECCS system as required	Trouble shooting activities did not identify a cause. Engine was successfully retested.	
5322	S	1	0	0	6/2/1999	No - Discovered Condition	No	No	Secured	Discovered during non-demand observation	EDG Jacket Water Cooling system partially drained due to leaking Heat Exchanger Tubes.	Engine would not have run loaded for greater than an hour.	Heat Exchanger tubes repaired	
6444	L	0	1	0	10/21/1999	Yes	No	Yes	Unloaded	After completion of the surveillance run	Burning odor came from EDG 12 Control Panel after the completion of a surveillance run. Linear Reactor 1 and the Current Potential Transformer in the Generator Exciter controls, were found to be completely functional, except that there was evidence of a grounded overheated location.	Failure report states that the EDG was manually unlaoded and manually shutdown at the end of the surveillance test. Conservatively assumed that the Engine would have failed to Load.	Replaced with new components	
6481	L	0	1	0	5/6/2000	Yes	Yes	No	Loaded	Greater than 1 hour	Burning odor and smoke came from EDG 14 Control Panel during a surveillance run. EDG 14 was manually shutdown. Linear Reactor 1 in the Generator Exciter controls, were found to be completely functional, except that there was evidence of a grounded overheated location.	EDG was secured to burnging order	Replaced with new components	
6540	R	0	0	1	3/21/2001	Yes	Yes	No	Loaded	11 hours	EDG 14 Generator Outboard Bearing failed due to lack of lubrication 11 hours into its 24 hour endurance run.	EDG was unavailable after 11 hours of loaded run	Bearing was replaced and oil sightglass was calibrated.	
6696	L	0	1	0	7/16/1999	Yes	Yes	Yes	Loaded	Less than 1 hour.	EDG-2 Voltage Regulator failed which caused the trip of 2DF Emergency Bus. The Voltage Regulator failure caused the Bus offsite feeder to trip open, and erratic EDG voltage caused the operator to manually open the EDG output breaker on to that bus. EDG voltage ultimately went to zero, which instantaneously caused the Offsite Power Feeder Breaker to trip on overcurrent.	EDG energized 2DF Emergency Bus but operator force to trip the EDG due to voltage swings.	Voltage Regulator was repaired	
6803	L	0	1	0	11/16/1999	Yes	Yes	Yes	Loaded	Less than 1 hour of Loaded Operation	D/G Tripped on OverCurrent while loading for Operations Testing. Problems were identified in Fuel Rack Linkages	This is a Failure to Load because the Test was secured prior to one hour of loaded operation.	Fuel Rack Linkages were replaced	
6842	L	0	1	0	2/6/2001	Yes	Yes	Yes	Loading	Less than 1 hour	DG tripped on Lo-Lo Lube Oil Pressure due to instrument slow response. The instrument line had sludge buildup restricting flow. The actual lube oil pressure was always above the trip setpoint.	DG tripped during manual loading	Oil Pressure Instrument Line was flushed	
6846	R	0	0	1	11/10/2000	Yes	Yes	No	Loaded	Unknown - Assumed to occur last as event occurred during a test run.	Smoke came from 1B D/G Control Panel during a test run. The D/G was carrying the emergency bus without being paralleled. The Voltage Regulator 3 Phase Power Potential Transformer was faulted.	1B D/G was secured from its loaded run, however it is unknown if it was tripped in less than 1 hour.	Replaced Voltage Regulator	
6965	L	0	1	0	2/7/2000	Yes	Yes	Yes	Unloaded	Less than 1 hour	DG Output Breaker Closing Coil malfunctioned such that it would not close when testing DG.	DG was inoperable since the Breaker was last closed on 2/7/00 (22 Days). The Breaker Failure prevented the DG from Loading.	Repaired Closing Coil.	

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7061	L	0	1	0	10/2/1999	Yes	Yes	Yes	Loaded	Less than 1 hour	DG experienced high exhaust temperatures on number 4 Left Cylinder accompanied by noise. Hydraulic cylinder required replacing. Subsequent testing resulted in replacing Exhaust Valve Insert, which was fractured.	DG was shutdown after being loaded for 15 minutes.	Cylinder was rebuilt	
7695	S	1	0	0	8/30/1999	Yes	Yes	Yes	Unloaded	Less than 1 hour	The B Battery Ground that was detected coincidentally with the loaded test run of EGDG-1B was localized to an Amphenol Connector on the DG Governor. Amphenol connector started to smoke when energized.	DG Test was suspended apparently prior to loading generator.	Connections were repaired	
7718	S	1	0	0	7/5/2001	Yes	Yes	Yes	Unloaded	Less than 1 hour	EDG failure due to loss of Fuel Oil Header Prime.	EDG would did not start and would not have been available.	Cause of Fuel Prime loss was identified and corrected.	
7876	S	1	0	0	5/22/2001	Yes	Yes	Yes	Unloaded	Less than 1 hour	EDG developed a serious radiator leak requiring immediate shutdown.	EDG was shutdown and deemed unavailable.	Radiator repaired	
7877	L	0	1	0	6/11/2001	Yes	Yes	Yes	Loaded	Less than 1 hour	EDG developed a serious radiator leak requiring immediate shutdown.	EDG was unavailable less than 1 hour into the loaded run	Radiator repaired	Report states that the Engine was Unloaded and Stopped
7884	S	1	0	0	7/2/2001	No - Discovered Condition	No	Yes	Secured	Pior to start	Air Start System Air Flasks Check Valve was leaking such that starting air pressure could not be maintained above the required limit.	EDG would not have been able to start if demanded.	Check valve was repaired	
8010	S	1	0	0	7/20/2000	Yes	Yes	Yes	Unloaded	Less than 1 hour	A failed Rectifier Diode prevented the EDG Voltage and Frequency to stabilize while attempting to parallel the Generator on the Safety Bus.	EDG 2B would not have been able to provide reliable power to the Emergency Bus	Diode was replaced	
8136	R	0	0	1	2/26/2000	Yes	Yes	Yes	Loaded	Greater than 1 hour	The ITD Time delay relay associated with the EDG governor failed causing a reverse power lockout and subsequent idling of the EDG.	EDG would not have remained loaded.	ITD Coil was failure tested and replaced	Assumed that the EDG was loaded for greater than minutes prior to opening.
8153	S	1	0	0	8/16/2000	Yes	Yes	Yes	Unloaded	Upon Starting	EDG Speed Control failed to control RPM from a Normal Start demand. Further, the EDG failed to Stop from the Control Room Push Button. The electronic section of the Governor had failed and defaulted to the mechanical section of the Governor.	EDG failed to start within normal parameters.	Capacitors and other electronic components were replaced.	
8214	S	1	0	0	10/24/1999	No - Discovered Condition	No	Yes	Secured	Discovered during non-demand observation	EDG Trouble Alarm annunciated for "EDG Not Ready for Emergency Start" and other similar conditions. Fuse Holders were found to be loose and non-conductive. This affected the DC Fuel Oil Pump.	Engine may not have started reliably	Fuse Clip holders replaced	
8399	R	0	0	1	1/29/2000	Yes	Yes	Yes	Loaded	Greater than 1 hour	EDG was manually tripped during Maintenance run due to #4L Link Pin Bushing damage which caused physical damage and vibrations. Engine ran for greater than 1 hour.	Engine would not have run loaded for for continued operation.	Link Pins and bearing supports repaired	This condition was unrelated to the planned maintenance on the EDG.
8416	R	0	0	1	3/23/2001	Yes	Yes	Yes	Loaded	Greater than 1 hour	An Oil Leak on the Turbocharger Lube Oil Piping required that EDG 2B be shutdown prior to the completion of the 24 hour run.	Engine was secured after being loaded for greater than 1 hour.	Leak was repaired	
8453	S	1	0	0	1/17/1999	No - Discovered Condition	No	Yes	Secured	Coincident with Alarm	"L.O. Temp Hi/Lo, Jacket Temp Hi/Lo Crankcase Press Hi/Lo" Alarm annunciated because the Lube Oil and Jacket Coolant Pumps were not running as required. Although the Breaker Door Handle/Switch indicated that the Breaker for these Loads were not tripped, the breaker was found to be tripped.	Engine may not have started reliably	Breaker door was repaired	

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8535	S	1	0	0	8/21/1999	No - Discovered Condition	No	Yes	Secured	Coincident with Alarm	"L.O. Temp Hi/Lo, Jacket Temp Hi/Lo Crankcase Press Hi/Lo" Alarm annunciated because the Standby Lube Oil Pump and Heater were not running as required. Pump and Heater was restarted locally and alarm cleared.	Engine may not have started reliably	Pump and Heater was restarted locally	
9098	S	1	0	0	5/5/2001	No - Discovered Condition	No	No	Secured	Coincident with Alarm	"LOW LUBE OIL TEMPERATURE" Alarm annunciated because the LO Standby Pump was found not running as required. The pump tripped on high motor current because it was mechanically bound	Engine may not have started reliably	Standby LO Pump was rebuilt	
9220	S	1	0	0	7/14/1999	Yes	Yes	Yes	Unloaded	Before breaker closure	Tachometer failed to indicate Div 1 D/G speed change when starting engine.	This condition would have prevented the DG from starting and loading.	Power Supplies for the Tachometer was replaced.	
9276	L	0	1	0	2/8/2001	Yes	Yes	Yes	Loaded	Less than 1 hour	The DIV II DG Tripped during a loaded run due to a fault. The Air Inlet valve inadvertently closed causing the engine to trip.	DG Tripped less than one hour after synchronising to the bus	Air Inlet Valve and Actuator repaired	
9684	S	1	0	0	3/4/1999	Yes	No	Yes	Unloaded	At the conclusion of the test run	STBY DG 21 Lube Oil Circ Pump did not Auto Start Following Surveillance Testing.	Condition could have affected the next start, however the condition was identified	Replaced starting relay	
11004	S	1	0	0	2/12/1999	No - Discovered Condition	No	Yes	Secured	Discovered during inspection	A loose diode on Div III Generator Exciter was found during inspection.	Generator may have been unavailable to provide power to the bus	Diode was re-torqued to proper specifications	
11010	S	1	0	0	1/26/1999	No - Discovered Condition	No	Yes	Secured	Discovered during maintenance	Three Relays were found outside their time delay range specifications. The Relays were Field Flash, Cranking Timer, and Jog Delay.	Engine may not have started reliably	Time delays for the relays were calibrated	
11022	S	1	0	0	3/7/1999	No - Failed Start Attempt	Yes	Yes	Secured	Prior to start	DG failed to start when 2 out of 3 Air Start Motors failed to engage when demanded. Problem with Air Start Solenoids prevented Air Start Motors from Engaging as required.	DG tripped after the 10 second time delay logic determined that engine was not running	Air Start Solenoids for the Air Start Motors were replaced	
11796	S	1	0	0	9/18/1999	Yes	Yes	Yes	Unloaded	Less than 1 hour	Bad Fuse connections caused EDG 103 Voltage Regulator to excite the Generator to only 3100 Volts instead of the 4100 Volts required.	EDG 103 was unavailable to provide power to its associated bus as required.	Fuses and Fuse Holders were replaced	
12187	L	0	1	0	3/15/2000	Yes	Yes	Yes	Loaded	Less than 1 hour	Div 1 DG was started for test when Voltage went to over 5kV instead of 4kV. A mispositioned Potential Transformer Fuse Carriage was discovered that caused the anomaly. The DG was tripped which resulted in a Dead Bus on SW101. Breaker was closed in on the bus.	DG was unavailable	Repaired PT assembly	
12652	R	0	0	1	11/25/1999	Yes	Yes	Yes	Loaded	Greater than 1 hour	DG tripped on High Crankcase Pressure during test run. Coolant leaking into the Crankcase through failed Lube Oil Cooler Welds vaporized causing high pressure.	Engine tripped from Loaded condition in greater than 1 hour. Engine was not readily available for restart	Lube Oil Cooler weld leaks repaired and coolant evacuated from crankcase	
12700	S	1	0	0	11/18/1999	Yes	Yes	No	Unloaded	Less than 1 hour	DG Surveillance Test aborted due to increase in Crankcase Pressure. The Crankcase Breather had a flow restriction and the Oil Level in the Sump was higher than normal. Both conditions contributed to high pressure.	DG was unavailable until corrective actions taken. DG was not loaded at the time.	Crankcase Breather Tube cleaned and oil level adjusted	

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12704	S	1	0	0	3/13/2000	Yes	Yes	Yes	Unloaded	Less than 1 hour	DG Failed to respond to Raise/Lower voltage demand from Volt Reg Norm/Stby Sel Switch. This caused to Voltage Regulator to fail as-is.	The Normal Voltage Controller was unavailable and it is unknown how this would affect Isochronous Operation	Control Switch Replaced	Assumed that the DG would not have been able to power bus
12705	L	0	1	0	5/26/2000	Yes	Yes	Yes	Loaded	Less than 1 hour	EDG Tripped after reaching rated speed and voltage due to a failed Circuit Board that falsely input a fuel rack differential trip.	DG Tripped less than 1 hour of loaded run. EDG was unavailable to provide emergency power	Circuit Board was replaced	
12707	S	1	0	0	10/29/2000	No - Discovered Condition	No	Yes	Secured	During Standby	EDG Conditioner Display failed while Engine in Standby. Discovered condition through normal plant rounds	DG was inoperable and would not function to provide power	Conditioner repaired	
12918	R	0	0	1	11/15/2000	No - Discovered Condition	No	Yes	Secured	Coincident with the engine barring	DG Engine Driven Jacket Water Pump Seal leak discovered during manual engine barring. Leak was minor, however engine was declared inoperable	DG would have been able to start, load, and run for several hours	Seal was replaced	Since engine would have run loaded for greater than 1 hour, run failure mode has been assumed.
13786	S	1	0	0	2/27/1999	Yes	Yes	Yes	Secured	Prior to Loading	EDG voltage went to 2kV after starting, then hesitated prior to reaching 4kV as required. Time to reach 4kV exceeded required 10 seconds. The problem was in the Field Flash Circuitry.	EDG was unavailable for power production	Trouble shooting and repair was performed on the Voltage Regulator.	
13807	L	0	1	0	9/10/1999	No - Discovered Condition	No	Yes	Secured	Discovered during operator rounds	52HG10 4kV Brkr to MCC 1G, 125 VDC control switch and red light lamp socket, found broken during operator round.	Would prevent EDG Breaker from closing on Bus. Also, if a seismic event had shorted out the lamp socket, it could have caused a loss of power to MCC 1G.	Replaced Lamp Socket, Control Switch, and Fuse	
13904	R	0	0	1	10/12/1999	Yes	Yes	Yes	Loaded	Greater than 1 hour	DG Output Breaker opened on Overcurrent during Loaded Test Run. Breaker opened 22 hours into 24 hour test run due to voltage regulator transformer becoming Grounded.	DG 2-1 failed Loaded Run Test	Transformer Replaced	
14089	L	0	1	0	12/31/1998	Yes	Yes	Yes	Loaded	Less than 1 hour	EDG Tripped on Overcurrent during routine Testing, from a loaded run. The Voltage Regulator was malfunctioning.	EDG tripped in less than one hour and was not available.	Voltage Regulator was repaired	
14116	S	1	0	0	5/19/1999	No - Discovered Condition	No	Yes	Secured	Discovered during a lube oil fill activity	EDG had a Lube Oil Leak at the Heat Exchanger Gasket	EDG was unavailable to run until leak was repaired	Leak Repaired	
14156	S	1	0	0	4/18/2000	Yes	Yes	Yes	Unloaded	Unknown	EDG Test Run was cut short due to a large Oil Leak at Cylinder 7R. The Engine was emergency shutdown.	DG Function was lost until it was repaired	Leak Repaired	
14169	S	1	0	0	8/6/2000	No - Discovered Condition	No	Yes	Secured	Discovery activity not specified	EDG Pre-Lube Pump was found in the OFF position and Lube Oil and Jacket Water Temps were Low out of Specification. This was due to a blown fuse in the Feeder Breaker	EDG may have started however it is not certain	Fuse replaced	
14540	S	1	0	0	2/23/2001	Yes	Yes	Yes	Unloaded	Discovered during EDG testing - output could not be increased above 920 RPM.	EDG could not be raised to full speed. Mechanical Governor needed adjustment.	Engine did not reach full speed and was not able to be loaded	Mechanical Governor required adjustment	
14756	L	0	1	0	3/6/2000	Yes	Yes	Yes	Loaded	Stated as occurring during an "operability run"	DG Intercooler Temperatures rose out of specification due to TCV Disk Separated from Valve Stem.	Engine had to be shutdown	Repaired TCV	
15174	S	1	0	0	3/17/1999	No - Discovered Condition	No	Yes	Secured	Discovery activity not specified	Service Water Leak on elbow on Heat Exchanger Tube Side Vent Elbow. Pipe was found corroded.	DG was unavailable for operation	Minor through-wall leak. Repaired Leak	

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15227	S	1	0	0	11/1/2000	Yes	Yes	Yes	Running Unloaded	Less than 1 hour after engine start. The generator was not loaded	DG had to be shutdown due to High Crank Case Exhaust Pressure and Vibrations. In addition, smoke was reported in DG-1B building.	EDG was not loaded at the time of the trip	Engine had to be extensively rebuilt.	Engine was not available for start.
15228	L	0	1	0	12/1/2000	Yes	Yes	Yes	Loaded	Less than 1 hour after engine load	DG was recently rebuilt due to extensive damage. During its break-in runs engine had to be shutdown due to high d/p across lube oil strainer indicative of bearing failure. Bearing failure heating caused damage to multiple other components.	Engine was loaded for less than 1 hour when the damage occurred. Engine required complete rebuild.	Engine Rebuild.	Engine was not available for run.
15441	L	0	1	0	6/8/1999	Yes	Yes	Yes	Unloaded	Engine Running Unloaded	DG Output Breaker to 14 Bus Failed to Close. Breaker Trip Bar Misalignment prevented breaker operations. Breaker Frame had loose screws in C Phase Arc Chute	Breaker Failure prevented DG from loading bus. This is a Load Failure because the breaker was demanded to close but did not close.	Breaker Rebuild	
15633	S	1	0	0	1/10/2001	Yes	Yes	Yes	Unloaded	Less than 1 hour run. Failed to Start because no voltage was developed	EDG failed to Develop Voltage after coming to rated speed during testing. Two shorted Diodes in the Rectifier Bridge	Although the engine started, the generator was unavailable to provide electrical power.	Rectifier Diodes were replaced	Failed to develop voltage therefore this is a Start Failure. The breaker never closed in on the Bus
15634	S	1	0	0	12/21/2000	Yes	Yes	Yes	Loaded	Instability in frequency occurred in less than an hour of operation, which is a failure to start.	Unstable Governor output caused DG to hunt and swing during unloading from load. Additionally, the DG experienced oscillations in load and speed during loaded operation and during unloaded operation	EDG was not available for loaded operation greater than one hour nor was it stable during unloaded operation therefore this is a failure to start	Governor modified	There were several run attempts that caused the DG load to oscillate prior to one our of loaded run.
15635	S	1	0	0	12/21/2000	Yes	Yes	Yes	Unloading	Instability in frequency occurred in less than an hour of operation, which is a failure to start.	Unstable Governor output caused DG to hunt and swing during unloaded, loading, and unloading operations. The cause was determined to be multifold including soldered joint connections and HVAC air flow interaction.	EDG was not reliably available to start.	Governor and HVAC system modified.	
15636	S	1	0	0	12/21/2000	Yes	Yes	Yes	Starting prior to loading	Less than 1 hour of starting the EDG prior to loading	EDG tripped on overspeed due to failed exciter diodes. The failed diodes prevented voltage from developing after field flash was applied.	EDG was not available to start.	Diodes were replaced.	
15973	S	1	0	0	1/12/1999	No - Discovered Condition	No - Taken out of standby	Yes	Secured	EDG was considered failed at time of discovery of red liquid on the floor near the breaker	EDG Feeder Breaker Current Transformer (CT) epoxy insulation liquified due to a known process.	EDG was taken out of service until CT was replaced	Replaced CT with a liquification resistant epoxy	EDG was assumed to be inoperable until CT repair was completed
16038	S	1	0	0	2/19/2001	Yes	Yes - Immediately on failure	Yes	Unknown	Less that one hour into run	Div I EDG Turbocharger Cooling Water Crack leaking and worsening as 24 hour run commenced.	Assumed that EDG was not loaded when failure necessitated engine shutdown	Leak Repaired	
16039	S	1	0	0	2/21/2001	Yes	Yes - Immediately on failure	Yes	Running Unloaded	Failure assumed to occur prior to loading EDG	Div 1 EDG Fuel Injector Plug developed a Fuel Leak. The leak was caused by an Injector Plug that became loosened.	EDG was immediately shutdown and taken out of service.	Leak Repaired	
16048	S	1	0	0	5/17/2001	No - Discovered Condition	No - Taken out of standby and Secured to prevent starting	Yes	Standby	Unknown - Assumed that the Valve manipulation at 0300, contributed to the leak.	Div 2 EDG Jacket Water Level was intentionally lowered. Later, the Low Jacket Water Tank Level Alarm annunciated. A crack was found in the Drain Valve Yoke Nut which caused the valve to leak through.	EDG was declared inoperable and removed from Standby. This failure would have prevented EDG from Starting.	Leak Repaired	
16141	S	1	0	0	1/10/1999	No - Discovered Condition	No - The EDG status was unknown	Yes	Standby	Failure occurred while EDG was in Standby.	EDG Control Power was inadvertently tagged out.	EDG was unavailable to start and run manually or automatically.	AC control power was restored	
16168	S	1	0	0	10/27/1999	No - Failed Start Attempt	Yes - Immediately on failure	Yes	Standby	Prior to EDG Start Demand	Air Start Motor failed to start EDG, which automatically shutdown during a start attempt, on Start Failure Lockout.	Although the Opposite Side Air Start Motor subsequently started the EDG, this engine was declared out of service. EDG was unavailable for starting	Air Start Motor was replaced	
16235	S	1	0	0	4/12/2001	No - Failed Start Attempt	Yes - Immediately on failure	Yes	During Start	Prior to EDG Start Demand	Rust scale blocking Air Start Pressure Control Valves in the Air Start System caused a failed start attempt on the EDG.	EDG was unavailable to start and run manually or automatically.	Strainers were installed in the system and procedures to clean them were adopted	
16689	S	1	0	0	8/18/2000	Yes	Yes	Yes	Starting prior to loading	Prior to start	EDG Tripped on Voltage Spike. Ground Relay Tripped due to a poor connection of the Potential Transformer primary side through a loose knife switch.	EDG was not available to start.	Replaced and tightened PT Stabs and Knife Switch connections	EDG did not achieve rated speed and voltage prior to engine trip
16691	S	1	0	0	10/13/2000	Yes	Yes	Yes	Starting prior to loading	Coincident to the EDG Trip when attempting to start	DG tripped due to a voltage spike when the K1 Relay contacts failed. DG A Normal Voltage Regulator swapped to Standby Voltage Regulator while engine was being started.	EDG was not available to start. EDG was being tested subsequent to maintenance to replace the SCRs	Replaced K1 Contactors	

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Failure ID	Recommended EDG Failure Mode	Start	Load	Run	Discovery Date	EDG Running	EDG Secured as Result of Failure	Failure Time Ided	Status on Discovery Secured/ Loaded/ Unloading	Failure Time	Failure Description	Impact	Corrective Action	Comment
16815	S	1	0	0	9/25/1999	No - Discovered Condition	No	Yes	Standby	Upon discovery of the lifted Air Dryer RV.	EDG declared inoperable based on Air Starting System Pressure <165psi. The Right Bank Air Dryer Relief Valve was relieving continuously bringing the air pressure to 150 psig. The Left Bank Compressor was inoperable for a motor replacement.	EDG was not available to start.	The Right Bank Air Dryer was manually by-passed and isolated. This restored starting air pressure but did not cause the EDG from being declared Operable.	This Starting Air System failure rendered the EDG unable to start.
16817	S	1	0	0	11/7/1999	Yes	Yes - Immediately on failure	Yes	Starting prior to loading	Immediate - prior to achieving 900 RPM during fast speed start.	EDG Control Power Ground occurred on the +48 VDC Bus preventing it to achieve 900 RPM during fast speed start. EDG was shutdown immediately thereafter. Troubleshooting found that the Field Flash Relay and Field Flash Cutout Relay needed replacement.	EDG failed to start within normal parameters.	The Field Flash and Cutout Relays were replaced.	
16821	S	1	0	0	3/10/2000	Yes	No - The EDG was continued to operate to carry the Bus Load, at a diminished capacity	Yes	Unloaded	Unknown - Condition existed prior to engine run	EDG Governor failed to bring speed up to rated Frequency during testing and prior to loading. After loading with the low frequency, the normal Bus Feeder Breaker Tripped. The breaker tripped prior to 1 hour of loaded operation.	The licensee decided to continue the test with the low frequency condition. After they loaded the engine the normal bus feeder breaker tripped due to EDG load swings. This condition is a Failure to Start because the rated Frequency was not satisfactorily achieved.	Governor was repaired.	INL evaluated this as a Run Failure. This is a Start Failure because although the licensee Loaded the EDG with the faulted Governor, causing a subsequent transient, the EDG did not meet start criteria.
17391	S	1	0	0	3/1/1999	Yes	Yes	Yes	Unloaded	During loaded run	DG failed to maintain Frequency during the 18 Month Surveillance due to a bad Governor Resistor.	DG failed to load	All DG Governors at Watts Bar have been replaced to those that do not require this component.	One sentence description. The frequency swings implies that the EDG is not paralled
17428	S	1	0	0	9/8/1999	No - Maintenance Induced	No	Yes	Standby	Occurred coincident with maintenance activity on intake damper that resulted in EDG lockout	EDG Annunciators for "Crankcase Pressure HI" and DG Auto Start Locked Out" came in, in response to work being performed on the Room Ventilation Dampers. When an HVAC Damper failed shut, it caused a vacuum in the room, which actuated the Crankcase Pressure Switch Trip	The EDG was in Standby at the time of the lockout. The lockout prevented the EDG from starting if a demand signal came in. Therefore, the EDG would not have been able to start, load, and run if demanded.	HVAC equipment was repaired	Although this issue is related to room ventilation, the engine would not be able to perform its mission to to the vacuum in room.
17508	L	0	1	0	5/16/2001	Yes	Yes	Yes	Assumed that the EDG was running unloaded at the time, because breaker was taken to trip	Assuming EDG 1A-A was in operation at the time that the Breaker was taken to the Trip Position - Failure occurred coincident with breaker operation. Breaker was in degraded condition for an Unknown ammount of time when the Charging Spring Motor was installed incorrectly	EDG Spring Charging Motor was installed incorrectly which caused the breaker to remain Closed when its Hand Switch was taken to Trip Position, during a test. A new style Spring Charging Motor should have had a spacer installed, about which no vendor instructions were provided.	EDG would not have been available to load if a demand signal was present. This condition is considered a Start Failure because the Breaker would malfunction.	Installed Breaker Spring Charging Motors correctly	This is a Load Failure because it is not assured that the Breaker would close in on the Bus
17671	S	1	0	0	8/29/2000	Yes	No	Yes	Unloading from Loaded Run	Greater than 1 hour of loaded operation, however the failure did not prevent the Loaded Run.	EDG tripped on Volts/Hertz at the time the Generator was being Unloaded and the Breaker opened. This caused a Breaker Lockout. The 5B Relay was found to be defective. This relay malfunction would have prevented future EDG Starts	The EDG would have not been available to Start	5B Relay was replaced	This event would prevent DG subsequent starts. This relay failure would not have prevented the EDG from continuing to run.
17678	L	0	1	0	12/20/2000	Yes	Yes	Yes	Loaded	Less than 1 hour of Loaded Operation	EDG Tripped during manual loading. When the EDG was synchronized, it immediately accepted 4MW and tripped when the operator attempted to reduce load. The UPR in the Governor was determined to have high resistance in the contacts	This is a Load Failure because the EDG was loaded when it tripped.	The Governor was subsequently modified	
18067	S	1	0	0	4/4/2000	No - Failed Start Attempt	Yes	Yes	starting from standby	During Start from Standby	EDG failed to Start on LOOP to its associated bus. A piston was found hydraulically locked and filled with oil.	EDG Failed to start on valid demand signal	None specified	
18074	S	1	0	0	6/22/2000	No - Discovered Condition	No - Taken out of standby and Secured to prevent starting	Yes	Standby	Coincident with Breaker Trip	EDG Trouble Alarm annunciated because Brkr 1-EE-BKR-1J1-1-G2 had tripped and MCC 1J1-A became De-Energized. The cause of the De-Energized MCC was that a Load, 1-HV-F-22C Motor in the HVAC System, failed and drew large amount of current. A breaker problem caused the entire MCC that feeds power to the 1J EDG to become De-Energized.	This condition would have prevented the DG from starting and loading.	Replaced the HVAC Motor	Protective tripping failed to prevent the lost of MCC which resulted in failure of the EDG.

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Failure ID	Recommended EDG Failure Mode	Start	Load	Run	Discovery Date	EDG Running	EDG Secured as Result of Failure	Failure Time Ided	Status on Discovery Secured/ Loaded/ Unloading	Failure Time	Failure Description	Impact	Corrective Action	Comment
18730	R	0	0	1	4/15/2000	No - Discovered Condition	No	No	Standby	Coincident with the out of specification operation	A Failed resistor caused the EDG Battery Charger output to go to 147 VDC and 28 Amps, which is greater than specifications.	For this event it is assumed that the Battery Charger is necessary for the long term operation of the EDG. The event does not describe the function of the Battery therefore it is conservatively assumed that it is used for Control Power. The EDG would start as required with the battery charger failure, however, it would not continue to Run as the battery charger is unavailable.	Resistor in the Battery Charger was replaced	This event is assumed to be a Failure to Run
18750	S	1	0	0	8/22/2000	Yes	Yes	No	Standby	EDG at 820 RPM	EDG found running with Mechanical Overspeed Lever in the Actuated Position during Surveillance Test. Breaker was also found tripped open.	EDG would not have been able to start and carry load if required.	Overspeed Trip assembly was repaired	
19195	S	1	0	0	7/24/1999		No - Taken out of standby and Secured to prevent starting	Yes	Standby	Coincident with Alarm with EDG in Standby	EDG Air Start System Flexible Hose Split, causing Air Receivers to lose pressure. "Starting Air Pressure Low" Alarm annunciated.	EDG was unavailable to start.	Hoses were replaced	Air Receivers lost air pressure during this event.
19198	S	1	0	0	11/11/1999	Yes	Yes	Yes	Unloading	Unknown - The wiring condition was degraded over time	EDG Output Breaker failed to Open at conclusion of Surveillance Test. Breaker had to be opened Locally. Problems occurred in Switch Wiring.	This event is conservatively evaluated as a Start Failure because it is not apparent whether the Breaker Wiring Problem would have allowed Breaker to Close as required.	Switch Rewired	Unclear as to whether this breaker would close in future demands. Assumed to be a failure to start.
19314	S	1	0	0	3/16/1999	Yes	Yes	Yes	Starting from standby	Prior to start	EDG failed to Flash the Generator field during Surveillance Test Auto-Start. Control Power fuses were found to be blown.	EDG experienced a Start Failure because it could not provide power to its associated bus.	Fuses Replaced	
19386	R	0	0	1	2/11/2000	No - Discovered Condition	No - Taken out of standby and Secured to prevent starting	Yes	Standby	Unknown - The leaking Seal was degrading over time when it was determined that it passed the threshold for operability	EDG Jacket Water Pump Mechanical Seal was discovered to be degraded and leaking during Preventive Maintenance Activities. Subsequent analysis determined that the Engine would not be able meet its 7 day Run requirement.	Engine would have not met its 7 day Run Time, therefore this is a Run Failure	Seal was replaced	Licensee determined that the Leakage would have exceeded the makeup capacity of the Jacket Water Head Tank
19387	S	1	0	0	6/7/2000	No - Discovered Condition	No - DG was in Maintenance	Yes	Secured for Maintenance	Unknown - Bearing was degrading over period of time.	Diesel Lube Oil Keep Warm Pump tripped during standby operation. It was found to have a Failed Outboard Bearing during Troubleshooting Activities, due to improper grease. A Bearing Sleeve was found to block the grease path to the bearing internals.	This event is conservatively evaluated as a Start Failure because it is not apparent whether the loss of Lube Oil Prelube would have prevented the engine to start successfully.	Bearing was re-fit with a proper Rotor Sleeve that would allow grease passage to the bearing internals.	Fairbanks Morse engines typically use Lube Oil Pressure to avoid a start failure. The engine also requires initial oil pressure to protect the most remote bearings from damage during start.
19505	S	1	0	0	8/11/2000	No - Discovered Condition	No - DG was in Maintenance	Yes	Secured for Maintenance	Unknown - Bearing was degrading over period of time.	EDG had excessive Wrist Pin Bearing Wear as found by vendor recommended routine Lube Oil Analysis.	This event is conservatively evaluated as a Start Failure because bad wrist pin bearings could have affected engine starting.	Engine was rebuilt.	
19815	S	1	0	0	6/1/2001	No - Failed Start Attempt	Yes	Yes	starting from standby	Prior to EDG Start Demand	EDG failed to start during testing due to failed UV initiation Relay. Relay and its contacts were in a degraded condition.	This event is a Start Failure	Relays were replaced	
20019	L	0	1	0	3/15/2001	Yes	Yes	No	Unloading	Breaker closed satisfactorilly 30 days prior to this Test	DG was being shutdown from a Surveillance run. DG output breaker was taken to Open, however, "Bus 6 from D/G B breaker 1-603 Closed" alarm was annunciating. This alarm should have cleared when the breaker was open. It was found that Breaker linkage was disconnected such that the breaker was no longer operable.	This event was conservatively evaluated as a Start Failure because the disconnected linkage could have prevented closure of the breaker.	Breaker Linkage Cotter Pins needed to be replaced and bent correctly.	
20031	S	1	0	0	4/10/2001	Yes	Yes	Yes	Running Unloaded	Less than 1 hour from Starting	During Test, EDG failed to develop Voltage, however, its Output Breaker Closed as expected. This caused a LOOP on the associated bus, which caused the EDG to run without Cooling Water for 10 minutes prior to shutting down the EDG. The K1 Relay failed to Open to allow the Generator to build up voltage.	As the EDG failed to develop the propoer voltage, it is assumed to be a start failure.	The K1 Relay was repaired. The EDG was checked for damage.	
20127	L	0	1	0	10/29/2000	Yes	Yes	No	Loaded	Less than 1 hour after loading	EDG Voltage and VARS were unable to be controlled upon connecting the generator to its associated Bus. Failure attributed to malfunctioning Auto Voltage Regulator Circuit Board.	This is a Load Failure because the EDG was loaded when it was shutdown	Auto Voltage Circuit Board was replaced	

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Failure ID	Recommended EDG Failure Mode	Start	Load	Run	Discovery Date	EDG Running	EDG Secured as Result of Failure	Failure Time Ided	Status on Discovery Secured/ Loaded/ Unloading	Failure Time	Failure Description	Impact	Corrective Action	Comment
20225	L	0	1	0	8/7/2001	Yes	Yes	Yes	Unloaded	Less than 1 hour after starting	DG Breaker to Bus 17 failed to Close during Test due to excess play in Breaker Mechanism.	This is a Start Failure	Repaired Breaker	
20392	L	0	1	0	8/8/2001	Yes	Unknown	No	Loaded	Breaker Closed - Actual Time Unknown	EDG failed to respond to Voltage Regulator Manual Control during Loaded Operation. VAR loading dropped without adjustment and would not respond to Control Board signal adjustment.	This event is a Load Failure because the Voltage Regulator failed while paralleled.	Unknown	This event was assumed to have occurred prior to one hour of loaded operation
20393	L	0	1	0	8/13/2001	Yes	Unknown	No	Loaded	Breaker Closed - Actual Time Unknown	EDG failed to respond to Voltage Regulator Manual Control during Loaded Operation. VAR loading dropped without adjustment and would not respond to Control Board signal adjustment.	This event is a Load Failure because the Voltage Regulator failed while paralleled.	Unknown	This event was assumed to have occurred prior to one hour of loaded operation
20404	S	1	0	0	8/8/2001		Unknown	No	Unloading	After completion of the surveillance run	EDG experienced spurious annunciation for Oil Pressure, Low Water Pressure, and Overspeed after generator after successful completion of test. A faulted LWD Relay was most likely the cause.	A relay failed. It is assumed that the annunciation is tied with actuation of the trips, therefore EDG unavailable when the faulted relay occurred. The EDG would have been unavailable for Starting after this event.	Relays were replaced	This is assumed to be a failure during Unloading.
20440	S	1	0	0	5/9/2001	Yes	Yes	Yes	Unloaded	Less than 1 hour of starting the EDG prior to loading	EDG failed to develop Voltage due to malfunction in the K1 Relay.	This is a failure to Start because the generator was not able to energize the bus	K1 relay was replaced	
20441	S	1	0	0	8/1/2001	Yes	Yes	Yes	Unloaded	Less than 1 hour of starting the EDG prior to loading	EDG failed to stabilize its Frequency output while running unloaded during a test.	This is a Start Failure	Governor was repaired	
20522	L	0	1	0	10/8/2001	Yes	Yes	Yes	Loaded	Less than 1 hour of Loaded Operation	EDG was Loaded when a Trouble Alarm annunciated that was caused by lowering Jacket Water Head Tank Level. A Leak from the Jacket Water Pump Seal was found. The Engine ran for 42 minutes of its one hour run.	This is a Load Failure because the EDG would not have completed one hour of Loaded Operation.	Mechanical Seal was replaced	
20578	S	1	0	0	4/26/2000	No - Failed Start Attempt	Yes	Yes	Starting from standby	Immediately upon start attempt	EDG failed to start following repairs to the Fuel Oil Filter System. Fuel Oil Sediment stirred up in the Fuel Oil Tank prevented the successful start. The sediment was stirred up from Maintenance Activities.	EDG was unavailable to start and run manually or automatically.	Sediment was removed from components and cleaned. Evaluated as indirectly related to the maintenance activity and therefore considered a failure.	
21305	R	0	0	1	10/8/2001	Yes	Yes	Yes	Loaded	Greater than one hour of loaded operation	DG Monthly Test was terminated after 1.5 hours of loaded operation because of noise coming from a cylinder and high exhaust temperature. Engine was found to have failed exhaust valve seat inserts.	EDG did not run because it was unable to carry full load after 1 hour.	Engine was rebuilt.	
21317	S	1	0	0	10/21/2001	No - Discovered Condition	No	Yes	Starting from standby	Prior to start - during baring operation	DG Control Power to its logic circuitry was lost during testing. Engine may have not been running at the time, however, it was being prepared for an operations test. Failure occurred when an operator changed a lamp, which shorted inside the lamp receptacle. This in turn caused a control power Fuse to blow.	DG became unavailable and had to be secured. Further, this failure affected the ability for restart, until the control power was restored and components reset.	Short was cleared, fuses replaced, and components were reset.	It is assumed that DG4 was being prepared for an Operations Run when the Fuse Blew.
21322	L	0	1	0	12/13/2001	Yes	Yes	Yes	Starting from standby	Less than one hour after breaker closure	Although, DG connected to its bus in the required time during an Operations Test, it immediately lost voltage. This failure occurred during the ESF Bus during LOOP with ESF Test. The DG did not develop rated Voltage as desired during its starting cycle. A failed Exciter was identified.	DG was unavailable to Load and Run.	Exciter repaired	
21374	L	0	1	0	7/31/2001	Yes	Yes	Yes	Loaded	Less than one hour after breaker closure	During Operations Test of EDG A, the Voltage dipped 2 minutes and 30 seconds after Breaker Closure. A failure on the Voltage Regulator was identified.	The engine was secured for repair. EDG A would not have been able to Load.	Voltage Regulator was repaired	
21581	S	1	0	0	10/17/2001	No - Failed Start Attempt	Yes	No	Starting for Test	Prior to start	EDG failed to start on Test Signal simulating UV and SI. The EDG went through 3 cranking cycles without a successful start. This left the 1H Emergency Bus de-energized. The EDG's Governor Load Limit was found to be mispositioned. There were further complications with the EDG.	The EDG failed to Start.	The governor was adjusted and a jacket water leak was repaired.	

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Failure ID	Recommended EDG Failure Mode	Start	Load	Run	Discovery Date	EDG Running	EDG Secured as Result of Failure	Failure Time Ided	Status on Discovery Secured/ Loaded/ Unloading	Failure Time	Failure Description	Impact	Corrective Action	Comment
21616	L	0	1	0	9/16/2001	Yes	Yes	Yes	Unloaded	While attempting to close breaker	25H3 Breaker to 2H Emergency Bus from EDG failed to close while attempting to parallel. An internal Breaker Failure prevented Closure.	The breaker would not have been able to be closed as required to load the EDG. Therefore, this is a Load Failure.	The Breaker, Synch Switch, and Control Switch was replaced.	
21693	L	0	1	0	7/9/2001	Yes	Yes	Yes	Starting from standby	Less than one hour after breaker closure	EDG shut down from Testing due to Exhaust Leaks. A failed exhaust gasket blew out of the manifold and prevented Turbocharger Operation. This condition rendered the EDG inoperable.	EDG was not available to load	Repaired Exhaust Leaks	
21695	S	1	0	0	10/20/2001	Yes	Yes	No	Running Unloaded	Prior to Loading	EDG "Lube Oil Reservoir" Alarm annunciated shortly after it was started for a test. Oil was observed coming from the Vent on the Reservoir and water was visible in the Sightglass. Engine was shutdown. Water was leaking into the Lube Oil Reservoir from a Jacket Water Leak. This occurred prior to paralleling the EDG with the Bus.	EDG was not available for Starting because the EDG Output Breaker was not yet closed.	Repaired Leak	
21782	S	1	0	0	12/26/2001	No - Discovered Condition	No	Yes	Standby	Discovered during non-demand observation	EDG Output Breaker Closing Spring not Charged causing the EDG to be inoperable.	EDG was unavailable for subsequent load. Closing Springs should automatically Charge when breaker is racked up. EDG would Start but not Load.	Breaker Repaired	With Breaker Closing Spring not charged, EDG can NOT carry the bus.
21912	L	0	1	0	10/16/2001	Yes	Yes	Yes	Loaded	Less than one hour of loaded operation	Speed Switch failed on EDG Start which caused its tripping on Reverse Power. The EDG was loaded for a short period of time prior to the trip.	Failure to Load.	Speed Switches were replaced	
22001	S	1	0	0	6/21/2001	No - Discovered Condition	No	Yes	Standby	Discovered during non-demand observation	EDG Speed Switch was found with loose screws while EDG was in Standby. When touched, the Overspeed Trip, locked out the Engine which became unavailable for Starting.	Engine was unable to Start	Speed Switch was repaired	
22561	L	0	1	0	10/17/2001	Yes	Yes	Yes	Loaded	Less than one hour of loaded operation	EDG experienced Water/Oil Mixture coming out of Crankcase Air Box Drain during a Test Run. The Test was halted. A failed Plug was found on Cylinder #19.	This is a Failure to Load because the Test was secured prior to one hour of loaded operation.	Plug on Cylinder 19 was replaced	
22573	S	1	0	0	11/17/2001	No - Failed Start Attempt	Yes - for repair	Yes	Starting from standby	Starting from Standby	EDG failed to start during Testing due to failed START Relay 1. STR 1 did not allow Air Start Solenoid to Energize.	This is a Start Failure	STR1 was replaced.	
22583	L	0	1	0	10/17/2001	Yes	Yes	Yes	Loaded	Less than one hour of loaded operation	EDG had to be shutdown during loaded testing due to noise coming from the Scavenging Air System. Test was aborted prior to one hour of loaded operation. Fuel Rack was also found to be hunting.	This is a Load Failure	Found several mechanical problems and repaired	
23557	L	0	1	0	12/11/2001	Yes	No	Yes	Loaded	Less than one hour of loaded operation	EDG loaded but needed to be shutdown due to a Governor Oil Leak	EDG failed to Load	Oil Leak was repaired	This is a Failure to Load
23699	L	0	1	0	11/28/2001	Yes	Yes - for repair	Yes	Loaded	Less than one hour of loaded operation	EDG tripped due to High Crankcase Pressure during Monthly Test. EDG was Loaded for Less than one hour.	This is a Failure to Load because the Test was secured prior to one hour of loaded operation.	Cause of the Crankcase pressure was repaired after extensive troubleshooting.	
24139	S	1	0	0	10/30/2001	Yes	Yes - Tripped	Yes	Running Unloaded	Running Unloaded	EDG Tripped on Low Jacket Cooling Water Pressure, during Testing. Cause was valve mispositioning error. The JW Cooling Headtank isolation Valve was closed and should have been open.	This is a Start Failure as the EDG was not yet Paralleled to the Bus. The licensee stated that no power was lost.	Conducted investigation to the cause of the Valve Mispositioning Event	
24659	L	0	1	0	12/26/2001			Yes	Loaded	Less than 1 hour of Loaded Operation	EDG Locked Out on Low Lube Oil Pressure even though adequate oil pressure existed. Tubing was inadequate to transmit the pressure to Pressure Switch.	EDG failed to Load	Installed Larger Tubing	
24702	S	1	0	0	12/11/2001	No - Discovered Condition	No	Yes	Standby	Discovered during non-demand observation	Malfunctioning Speed Switch caused Overspeed Trip Signal with EDG in Standby.	This is a Start Failure	Replaced Speed Switch	
26533	R	0	0	1	5/1/2001	Yes	Yes	No	Loaded	Greater than 1 hour of Loaded Operation	EDG Fuel Oil Day Tank Level was Low, during EDG Endurance Run. Fuel Oil Transfer Pump malfunctioned causing Low level in Day Tank. Pump had a Failed RV.	EDG would not have been able to Run over one hour of loaded operation with the Failed Transfer Pump	FOTP was repaired.	Day Tank Level was dropping 4" per hour. Day Tank had 25" in it when test started. EDG would not have been able to run for greater than 4 hours

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27306	L	0	1	0	4/15/2000	Yes	Yes	Yes	Loaded	Less than 1 hour of Loaded Operation	While Operating EDG For Surveillance Testing an acrid burning odor coming from the EDO control panel was detected. The Linear Reactor in the Exciter circuit was found grounded. Although this did not cause any operation problems, the degraded condition of the Reactor caused operations to shut down the engine.	This is a Load Failure because the engine was shutdown in less than one hour of loaded operation.	Repaired Linear Reactor	
27924	L	0	1	0	6/2/2000	Yes	Yes	Yes	Loaded	Less than 1 hour of Loaded Operation	EDG Tripped on Low Jacket Coolant Pressure in the first 20 minutes of loaded run. The test was an endurance run. A failed Jacket Water Coolant pump seal was identified	Engine was unavailable for Loading and Running	Replaced JW Cooling Pump	
28504	R	0	0	1	10/31/2000	Yes	Yes	Yes	Loaded	Greater than 1 hour of Loaded Operation	EDG surveillance run had to be terminated after several hours of operation due to high Lube Oil Strainer Differential Pressure. Unusual amounts of Lube Oil Debris were identified due to engine cylinder and piston wear in excess of what was expected.	Engine would not have been available for Running. This is assumed because of the Piston and Cylinder damage, not the Lube Oil Strainer DP.	Unknown	Assumed that Operators could swap Lube Oil Strainers during Engine Run. In this case, EDG could run longer.
29130	S	1	0	0	8/8/2001	Yes	Yes	Yes	Running Unloaded	Coincident with EDG Start	EDG started for no apparent reason. There was an problem in the Control Relay Panel.	Assuming that the failure affected the Start Logic, this event is conservatively evaluated as a Start Failure	Unknown	Assuming that this event is a Start Failure due to lack of detailed information and that it affected the Starting Logic.
34546	L	0	1	0	12/14/1999	No - Discovered Condition	No	Yes	Standby	Discovered during non-demand observation	Prior to Running, EDG was found with a broken Bearing Bullseye Oil Detector. Test was postponed until after maintenance.	This would have prevented the EDG from operating for an extended period. Therefore, this is conservatively identified as a Load Failure	Bullseye was repaired	
34586	S	1	0	0	11/13/2001	No - Failed Start Attempt	Yes	Yes	Starting from standby	Coincident with the Start Signal	EDG failed to start from Local Control. The Time Delay relays were found with tight tolerances incompatible with actual engine performance requirements.	Start Failure	Time delays for the relays were calibrated	
37226	S	1	0	0	11/14/2000	No - Discovered Condition	No	No	Secured for Maintenance	Discovered during maintenance that jacket water had leaked into the lube oil	EDG Jacket Water Leaked into Lube Oil. Leakage was from the Lube Oil Ht Exchanger Floating Packing Head Connection. Significant amount of water was found in Lube Oil. This condition was identified during routine Maintenance.	Significant Damage could have occurred if EDG was ran. This is a start failure.	Heat Exchanger was rebuilt.	It is assumed that the Maintenance Activities were unrelated to repairing the Heat Exchanger.
37310	R	0	0	1	5/9/2001	Yes	Yes	Yes	Loaded	Coincident with EDG Run	DG was prematurely shutdown due to increasing crankcase pressure prior to it reaching the trip set-point. Causes of the hi-crankcase pressure include a change in Fuel Oil type and Lube Oil Problems.	The DG would not have been able to Run. It is assumed that the DG ran loaded for greater than 1 hour.	Investigation inconclusive	