

WP 12-FP5114

Revision 1

Annual Diesel Fire Pump Flow Test 45-G-602

Technical Procedure

EFFECTIVE DATE: 07/30/10

Robert Paslay
APPROVED FOR USE

CONTINUOUS USE

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CHANGE HISTORY SUMMARY

REVISION NUMBER	ISSUED DATE	DESCRIPTION OF CHANGES
1	07/30/10	Updated references. Updated equipment. Added warnings for job hazards. Added PLD Danger Tag information. Added Section 2.0 Pump Test, sequenced it for availability of pumps. Continuous Use Section. Clarified correct performance of flow testing throughout document.

INTRODUCTION

This procedure provides the work instructions to perform the annual flow test of the Diesel Fire Pump, 45-G-602.

This procedure provides instruction to perform the annual **Surveillance Requirement (SR) 4.1.1.7 of Limiting Conditions of Operation (LCO) 3.1.1 for the diesel fire pump.**

Automated Job Hazard Analysis (AJHA) PROD 324 has been identified for the job hazards present in performance of this procedure.

Performance of this procedure generates the following record(s), as applicable:

- Attachment 1, Verification and Validation Sheet

REFERENCES

BASELINE DOCUMENTS

- Hazardous Waste Facility Permit, Waste Isolation Pilot Plant, Permit #NM4890139088 TSDf, Issued by New Mexico Environment Department
- NFPA 20, *Standard for the Installation of Stationary Pumps for Fire Protections*
- NFPA 25, *Inspection, Testing and Maintenance of Water-Based Fire Protection System*
- NFPA 70E, *Standard for Electrical Safety in the Workplace*
- DOE/WIPP-07-3372, *Waste Isolation Pilot Plant Documented Safety Analysis*
- DOE/WIPP-07-3373, *Waste Isolation Pilot Plant Technical Safety Requirements*
- WP 10-2, Maintenance Operation Instruction Manual
- WP 10-WC3010, Maintenance PM/MWI Controlled Document Processing
- WP 10-WC3011, Maintenance Process
- WP 12-FP.01, Fire Protection Program
- WP 12-FP3001, Fire Protection Impairment
- WP 12-IS.01, Industrial Safety Program

- Various Manufacturer's Operation and Maintenance Manuals
- Drawing 45-S-012-W, Water Pump House 456 Fire Water Pumping System/Sprinkler System Piping and Instrument Diagram

REFERENCED DOCUMENTS

- WP 04-AD3001, Facility Mode Compliance
- WP 04-AD3030, Pre-Job and Post-Job Reviews
- WP 13-1, Washington TRU Solutions LLC Quality Assurance Program

EQUIPMENT

Approved personal protective equipment (PPE) including:

- Hearing Protection
- Leather gloves
- Leather footwear – ANSI Z41-EH or SD
- Safety Glasses
- Hard Hat
- Water diffuser

Measuring and Test Equipment (M&TE) needed:

- Process Calibrator, recommend FLUKE Model 702-743, Calibrated - 2 each
- Pressure Module, 0-500 PSI, recommend Fluke Model 700P07 – 2 each
- Ultrasonic Flow Meter, recommend Sierra Ultrasonic Flow Meter Model 210, calibrated
- Tachometer, Photo/Contact, recommend Shimpo Model DT-205B, calibrated
- Standard I&C tool kit
- Barrier Material
- Warning sign

PRECAUTIONS AND LIMITATIONS

- The Technical Safety Requirements (TSRs) contains LCOs and Specific Administrative Controls (SACs) which provide specific preventative or mitigative limits and required actions for identified accident scenarios. Failure to comply with LCOs or SACs may constitute a violation and must be immediately reported to the Facility Shift Manager (FSM). The step affected by the LCO/SAC is followed by the LCO/SAC number in bold brackets (e.g., [**LCO 3.X.X**]).
- Job hazards exist for the performance of this procedure. They include: rotating hazard, noise hazard, and liquid hazard. Mitigation of the hazards is shown in Warning boxes and performance steps. No other hazards are recognized.
- Only Section 2.0 must be performed as written. Other sections may be performed in parallel or out-of-sequence as long as **NO** hold or witness points are bypassed, and equipment lockout steps are performed in sequence.
- Guards and covers provided on rotating equipment shall be securely in place unless the energy source has been locked out and verified for absence of energy.
- The South Water Tank level per the Hazardous Waste Facility Permit (HWFP) states a minimum of 144,000 gallons (80%) must be maintained. The possibility of 20,000 gallons of water use may occur during test process.
- Direct Facility Operations to ensure that Diesel Fuel Tank, 45-D-601, is full prior to the performance of Section 2.0.
- Any employee who has a concern for employee safety, the safety of the environment, or the quality of the activity has the responsibility and authority to suspend the performance of that activity.
- Work shall be stopped when instructions can not be performed, field conditions change, or additional job hazards are identified.
- All personnel affixing initials on Attachment 1 shall provide information listed in the Personnel Data Table of Attachment 1.

PREREQUISITE ACTIONS

- 1.0 Zone Maintenance Manager (ZMM)/ZS, conduct a pre-job safety meeting in accordance with WP 04-AD3030. This is considered an infrequently performed procedure.

SIGN-OFF ZMM/ZS

- 2.0 ZMM, notify the Fire Protection Engineer and the cognizant engineer prior to beginning the pump test so they can observe the testing and review the data as it is collected.
- 3.0 Personnel performing this work must review these work instructions prior to beginning action.
- 4.0 Record the work order number on the Attachment 1, if applicable.
- 5.0 Record equipment number on Attachment 1 and in data block.
- 6.0 Record M&TE data on Attachment 1 and verify all equipment is within current calibration cycle.

SIGN-OFF METROLOGY

- 7.0 Request an impairment tag as necessary.
- 8.0 Operations (OPS), verify South Water Storage Tank is full, or near full, prior to initiation of fire pump test.

SIGN-OFF OPS**PERFORMANCE****1.0 EQUIPMENT SETUP**

- 1.1 ZMM/ZS, prior to performance, discuss with all personnel involved in the performance of this work, the liquid pressure hazards, precautions, and mitigating actions to be taken in the event of an incident.

SIGN-OFF ZMM/ZS

WARNING

Potential rotational hazards exist. If guard is removed, to prevent injury to personnel or damage to equipment, a barrier must be in place and craft personal must ensure that there is no loose clothing that may come into contact with the rotational hazard.

- 1.2 Record pump/engine/controller data plate information on Attachment 1.
- 1.3 Craft, CLOSE isolation valve FW-456-V-068.
- 1.4 Craft, place Personal Locking Device (PLD) Danger Tag on isolation valve FW-456—V-068.

SIGN-OFF CRAFT**WARNING**

Potential liquid pressure hazards exist. When performing Step 1.5 and Step 1.10, to prevent injury to personnel or damage to equipment, care must be used when removing pressurized equipment.

- 1.5 Craft, remove pressure gauge, 456-PI-008-021, and install calibrated pressure module set to read pressure. (This gauge will be used to record the discharge pressure.)
- 1.6 Craft, remove PLD Danger Tag on isolation valve FW-456-V-068.
- 1.7 Craft, OPEN FW-456-V-068.
- 1.8 Craft, CLOSE FW-456-V-067.
- 1.9 Craft, place PLD Danger Tag on isolation valve FW-456-V-067.

SIGN-OFF CRAFT

- 1.10 Craft, remove pressure gauge 456-PI-008-020 and install calibrated pressure module set to read pressure. (This gauge will be used to record the suction pressure.)
- 1.11 Craft, remove PLD Danger Tag on isolation valve FW-456-V-067.
- 1.12 Craft, OPEN FW-456-V-067.

- 1.13 OPS or designee, disable diesel fire pump, 45-G-602, at Fire Pump Control Panel, 45P-CP-008-02, by placing the selector switch in the OFF position. **[LCO 3.1.1]**

NOTE

Ultrasonic flow test transducers may be installed prior to performance of this procedure.

- 1.14 Craft, install ultrasonic flow transducers on discharge cross-connect piping.
- 1.15 Craft, program flow meter for ten-inch, schedule 40 carbon steel pipe.
- 1.16 Craft, verify a 0-gallon per minute (GPM) flow on ultrasonic flow meter, when no fire water pumps are running.

2.0 PUMP TEST

WARNING

Noise hazards exist. Hearing protection is required when the diesel fire pump is running.

- 2.1 OPS or designee, ensure that slight water leakage is occurring at fire pump packing glands by inspecting the individual packing gland drains following the start of the pump and periodically thereafter.
- 2.2 OPS or designee, ensure that Diesel Fuel Tank, 45-D-601, is full prior to starting the diesel fire pump. **[LCO 3.1.1]**
- 2.3 OPS or designee, manual start diesel fire pump, 45-G-602, per applicable procedure at Diesel Fire Pump Control Panel, 45P-CP-008-002.
- 2.4 OPS or designee, disable electric fire pump, 45-G-601, at Fire Pump Control Panel, 456-CP-008-01, by placing the breaker in the **OFF** position. **[LCO 3.1.1]**
- 2.5 OPS or designee, disable the jockey pump, 45-G-603, by placing hand switch, 456-HS-008-14, located at Pump Control Panel, 456-CP-008-03, in the **OFF** position.
- 2.6 OPS or designee, **CLOSE** isolation valve FW-456-V-019. **[LCO 3.1.1]**
- 2.7 Craft, record the actual RPM as read from the calibrated photo tachometer. The diesel fire pump operates between (approximately) 1700 and 1800 RPM.

- 2.8 Craft, at CHURN (zero flow, pump running) record per Data Block 1:
- Flow GPM
 - Discharge pressure PSI
 - Suction pressure PSI
 - Pump Speed RPM
- 2.9 OPS or designee, OPEN fire hydrants, as required, to achieve 100% flow, ≥ 1500 GPM, as ready by ultrasonic flow meter. **[LCO 3.1.1]**
- 2.10 Craft, record the actual RPM as read from the calibrated photo tachometer. (The diesel fire pump operates between (approximately) 1700 to 1800 RPMs.)
- 2.11 Craft, at 1500 GPM, record per Data Block 1, on Attachment 1:
- Flow GPM
 - Discharge pressure PSI
 - Suction Pressure PSI
 - Pump Speed RPM
- 2.12 OPS or designee, verify the diesel fire pump is capable of ≥ 1500 GPM flow at ≥ 105 psig. **[LOC 3.1.1] [SR 4.1.1.7]**

SIGN-OFF OPS

- 2.13 OPS or designee, OPEN fire hydrants to achieve 150% flow, ≥ 2250 GPM, as read by ultrasonic flow meter.
- 2.14 Craft, at 2250 GPM, record the following in Data Block 1 on Attachment 1.
- Flow GPM
 - Discharge pressure PSI
 - Suction Pressure PSI
 - Pump Speed RPM
- 2.15 OPS or designee, CLOSE fire hydrants.
- 2.16 OPS or designee, enable the Electric Fire Pump, 45-G-601, at Fire Pump Control Panel, 456-CP-008-01, by placing the breaker in the **ON** position.

SIGN-OFF OPS

- 2.17 OPS or designee, enable Jockey Pump, 45-G-603, by placing hand switch, 456-HS-008-14, located at Pump Control Panel, 456-CP-008-03, in the **AUTO** position.

SIGN-OFF OPS

- 2.18 OPS or designee, secure the Diesel Fire Pump by placing the selector switch in the Diesel Fire Pump Control Panel, 456-CP-008-02, in the **OFF** position.

SIGN-OFF OPS

- 2.19 OPS or designee, **OPEN** isolation valve FW-456-019.

SIGN-OFF OPS

- 2.20 OPS or designee, enable Diesel Fire Pump, 45-G-602, by placing the selector switch in Diesel Fire Pump Control Panel, 45P-CP-008-02, in the **AUTO** position.

SIGN-OFF OPS

- 2.21 OPS or designee, ensure water capacity \geq 105,000 gallons in South Water Tank, 25-D-001A. The South Water Tank level per the HWFP states a minimum of 144,000 gallons (80%) must be maintained. **[LCO 3.1.1]**

SIGN-OFF OPS

- 2.22 OPS or designee, ensure the Diesel Fire Pump Fuel Tank, 45-D-601, is \geq 3/4 full. **[LCO 3.1.1]**

SIGN-OFF OPS

3.0 EQUIPMENT REMOVAL

- 3.1 Craft, **CLOSE** isolation valve FW-456-V-068.

- 3.2 Craft, place PLD Danger Tag on isolation valve FW-456-V-068.

SIGN-OFF CRAFT

WARNING

Potential liquid pressure hazards exist. To prevent injury to personnel or damage to equipment, care must be used when removing pressurized equipment when performing Steps 3.3 and 3.8.

- 3.3 Craft, remove pressure module and reinstall 456-PI-008-021.
- 3.4 Craft, remove PLD Danger Tag on isolation valve FW-456-V-068.
- 3.5 Craft **OPEN** isolation valve FW-456-V-068.
- 3.6 Craft, **CLOSE** isolation valve FW-456-V-067.
- 3.7 Craft, place PLD Danger Tag on isolation valve FW-456-V-067.

SIGN-OFF CRAFT

- 3.8 Craft, remove pressure module and reinstall 456-PI-008-020.
- 3.9 Craft, remove PLD Danger Tag on isolation valve FW-456-V-067.
- 3.10 Craft, **OPEN** isolation valve FW-456-V-067.
- 3.11 Craft, verify with ZMM/ZS if ultrasonic flow transducers need to be left in place for Electric Fire Pump Flow Test or be removed.

SIGN-OFF CRAFT**4.0 RESTORATION TO OPERATIONAL STATUS**

- 4.1 OPS or designee, once the above Steps 1.0 through 3.0 have been signed off, restoration requirements have been satisfied and surveillance has been completed, initial on Attachment 1.

SIGN-OFF OPS**5.0 TASK VERIFICATION**

- 5.1 Complete the Surveillance Data Sheet, EA04AD3001-SR7, for LCO 3.1.1 SR 4.1.1.7, as found in WP 04-AD3001.
- 5.2 Forward the completed Surveillance Data sheet and all associated documentation to the FSM for review and approval.
- 5.3 FSM, review the completed Data Sheet(s) for compliance with **LCO 3.1.1**.

- 5.4 Maintenance Engineer, complete the Data Sheet(s) and associated documentation for **LCO 3.1.1**, as found in WP 04-AD3001, and forward to cognizant engineer (CE) for evaluation.
- 5.5 CE, after review of completed Data Sheet(s) and associated documentation, forward to Fire Protection Engineer for evaluation.
- 5.6 Fire Protection Engineer, forward reviewed and completed Data Sheets to the FSM.

Attachment 1 – Verification and Validation Sheet

Work Order No.:		Equipment No.:		
M&TE DOCUMENTATION				
SECTION USED AT	INSTRUMENT DESCRIPTION	INSTRUMENT NUMBER	CALIBRATION DUE DATE	INITIALS
	Process Calibrator, recommend FLUKE Model 702-743, Calibrated - 2 each Actual equipment used			Metrology _____
	Pressure Module, 0-500 PSI, recommend Fluke Model 700P07 – 2 each Actual equipment used			Metrology _____
	Ultrasonic Flow Meter, recommend Controlotron Model 1010WDP1, calibrated Actual equipment used			Metrology _____
	Tachometer, Photo/Contact, recommend Shimpo Model DT-205B, calibrated Actual equipment used			Metrology _____
	Standard I&C Tool Kit			Metrology _____
PREREQUISITE ACTIONS				
SECTION	ACTION			INITIALS
1.0	ZMM /ZS conduct a pre-job safety meeting.			ZMM/ZS _____
8.0	Verify South Water Storage Tank is full or near full prior to initiation of fire pump test.			OPS _____
PERFORMANCE				
1.1	ZMM/ZS, prior to performance, discuss with all personnel involved in the performance of this work, the liquid pressure hazards, precautions, and mitigating actions to be taken in the event of an incident.			ZMM/ZS _____
1.2	Record the following information: Pump: _____ Manufacturer: _____ S/N: _____ Size/Type: _____ GPM: _____ RPM: _____ PSIG: _____ Engine: _____ Manufacturer: _____ Model: _____ MFG S/N: _____ Rating: _____ BHP @: _____ RPM _____ Controller: _____ Manufacturer: _____ Catalog #: _____			
1.4	Place Personal Locking device (PLD) Danger Tag on isolation valve FW-456-V-068.			Craft _____

Attachment 1 – Verification and Validation Sheet

1.9	Place PLD Danger Tag on isolation valve FW-456-V-067	Craft _____
2.12 [LCO 3.1.1] [SR 4.1.1.7]	Verify the diesel fire pump is capable of ≥ 1500 GPM flow at ≥ 105 psig. Sat: _____ Unsat: _____ Date: _____ Time: _____	OPS _____
2.16	Enable Electric Fire Pump, 45-G-601, at Fire Pump control Panel, 456-CP-008-01, by placing the breaker in the ON position.	OPS _____
2.17	Enable Jockey Pump, 45-G-603, by placing hand switch, 456-HS-008-14, located at Pump Control Panel, 456-CP-008-03, in the AUTO position.	OPS _____
2.18	Secure the Diesel Fire Pump by placing the selector switch in the Diesel Fire Pump Control Panel, 456-CP-008-02, in the OFF position.	
2.19	Open isolation valve FW-456-019.	OPS _____
2.20	Enable Diesel Fire Pump 45-G-602 by placing the selector switch in Diesel Fire Pump Control Panel, 45P-CP-008-02, in the AUTO position.	OPS _____
2.21 [LCO 3.1.1]	Ensure water capacity $\geq 105,000$ gallons in South Water Tank, 25-D-001A. The South Water Tank level per the HWFP states a minimum of 144,000 gallons (80%) must be maintained.	OPS _____
2.22	Ensure the Diesel Fire Pump Fuel Tank, 45-D-601, is $\geq 3/4$ full.	
3.2	Place PLD Danger Tag on isolation valve FW-456-V-068.	Craft _____
3.7	Place PLD Danger Tag on isolation valve FW-456-V-067.	Craft _____
3.11	Verify with ZMM/ZS if ultrasonic flow transducers need to be left in place for Electric Fire Pump Flow Test or be removed.	Craft _____
4.1	Once the above Sections 1.0 through 3.0 have been signed off, restoration requirements have been satisfied.	OPS _____

COMMENTS:

PERSONNEL DATA

PRINTED NAME	SIGNATURE	INITIALS	DATE

Attachment 1 – Verification and Validation Sheet

DATA BLOCK 1			
PUMP FLOW	CHURN (Step 2.8) (< 1 GPM)	100% (Step 2.11) (≥ 1500 GPM)	150% (Step 2.14) (≥ 2250)
Flow GPM			
Discharge Pressure PSI			
Suction Pressure PSI			
Pump Speed RPM	(Approx. 1700 -1800 RPMs)	(Approx. 1700 – 1800 RPMs)	(Approx. 1700 – 1800 RPMs)