

# WP 12-FP5113

Revision 1

## Annual Electric Fire Pump Test 45-G-601

Technical Procedure

EFFECTIVE DATE: 04/28/10

Robert Paslay  
APPROVED FOR USE

**CONTINUOUS USE**

**TABLE OF CONTENTS**

**INTRODUCTION**..... 3

**REFERENCES**..... 3

**EQUIPMENT**..... 4

**PRECAUTIONS AND LIMITATIONS**..... 5

**PREREQUISITE ACTIONS** ..... 6

**PERFORMANCE** ..... 6

1.0 EQUIPMENT SETUP ..... 6

2.0 PUMP TEST ..... 8

3.0 EQUIPMENT REMOVAL..... 11

4.0 RESTORATION TO OPERATIONAL STATUS ..... 12

Attachment 1 – Verification and Validation Sheet ..... 13

## INTRODUCTION

This procedure provides the work instructions to perform the annual flow test of the Electric Fire Pump, 45-G-601.

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

Performance of this procedure generates the following record(s), as applicable. Any records generated are handled in accordance with departmental Records Inventory and Disposition Schedules.

- Attachment 1, Verification and Validation Sheet

## REFERENCES

### BASELINE DOCUMENTS

- Hazardous Waste Facility Permit, Waste Isolation Pilot Plan, 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:

- Shirt or switching coat and pants, or coveralls
- Headface shield
- Hearing Protection
- Leather gloves
- Leather footwear
- 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 Flowmeter Model 210, calibrated
- Tachometer, Photo/Contact, recommend Shimpo Model DT-205B, calibrated
- Multimeter, recommend Fluke Model 87, calibrated
- Ammeter, recommend Fluke Model 33, calibrated

Other:

- 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: electrical hazard, rotating 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.**
- 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.
- 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 Zone Maintenance Manager, 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 Operations (OPS), verify south water storage tank is full, or near full, prior to initiation of fire pump test. **[LCO 3.1.1]**

**SIGN-OFF OPS**

- 8.0 Request an impairment tag, as necessary.

**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. To prevent injury to personnel or damage to equipment:

If guard is removed, 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/motor/controller data plate information in Attachment 1.

**SIGN-OFF CRAFT**

- 1.3 Place barrier, as needed, around electric fire pump packing gland area for rotational hazard.
- 1.4 Craft, CLOSE isolation valve FW-456-V-066.
- 1.5 Craft, place Personal Locking Device (PLD) Danger Tag on isolation valve FW-456-V-066.

**SIGN-OFF CRAFT****WARNING**

Potential liquid pressure hazards exist. To prevent injury to personnel or damage to equipment:

- When performing Step 1.6 and Step 1.11, care must be used when removing pressurized equipment.

- 1.6 Craft, remove pressure gauge, 456-PI-008-017, and install calibrated pressure module set to read pressure. (This gauge will be used to record the discharge pressure.)
- 1.7 Craft, remove PLD Danger Tag on isolation valve FW-456-V-066.
- 1.8 Craft, OPEN isolation valve FW-V-456-066.
- 1.9 Craft, CLOSE isolation valve FW-456-V-065.
- 1.10 Craft, place PLD Danger Tag on isolation valve FW-456-V-065.

**SIGN-OFF CRAFT**

- 1.11 Craft, remove pressure gauge 456-PI-008-016 and install calibrated pressure module set to read pressure. (This gauge will be used to record the suction pressure.)
- 1.12 Craft, remove PLD Danger Tag on isolation valve FW-456-V-065.
- 1.13 Craft, OPEN isolation valve FW-V-456-065.

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**NOTE**

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

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- 1.14 Craft, install ultrasonic flow test 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 operating.

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**NOTE**

Access to interior of electric fire pump control cabinet is required during performance of pump test. The cabinet door interlock must be defeated to allow the pump to run while the readings are being taken. The interlock is defeated at the control panel breaker switch.

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## 2.0 PUMP TEST

- 2.1 ZMM or Craft, prior to performance of this work, discuss:
  - PPE to be used (insulation will be by PPE) as shown in Warning above Step 2.10.
  - Electrical hazards and precautions and mitigating actions to be taken.

### **SIGN-OFF ZMM or Craft**

- 2.2 OPS or designee, disable diesel fire pump, 45-G-602, by placing the selector switch on Diesel Fire Pump Control Panel, 45-CP-008-02, in the **OFF** position. **[LCO 3.1.1]**
- 2.3 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.
- 2.4 OPS or designee, CLOSE isolation valve FW-456-V-020. **[LCO 3.1.1]**

- 2.5 Craft, place barrier around the Electric Fire Pump Control Panel, 45P-CP-008-02, for electrical hazard.
- 2.6 Craft, lower barrier to allow OPS entrance to perform Step 2.7.
- 2.7 Ops, start electric fire pump, 45-G-601, at Electric Fire Pump Control Panel, 456-CP-008-01, by pressing the START button.
- 2.8 Craft, raise barrier and verify that all personal inside barrier area has required PPE donned.

### **WARNING**

Potential electrical shock or arc hazards exist. To prevent injury to personnel or damage to equipment:

- Appropriate PPE for 151 to 600 Volts and an incident energy of 3.128 cal/sq cm ( $>5$  cal/sq cm  $< \approx 8$  cal/sq cm) SHALL be worn.
- A 6-foot minimum flash protection boundary SHALL be maintained.
- The two-person rule SHALL be observed for all energized work.

- 2.9 Craft, defeat interlock at the Electrical Fire Pump Control Panel, 456-CP-008-01, breaker switch and open the control panel door.

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### **NOTE**

The A, B, and C phase in the Electric Fire Pump Control Cabinet are identified by electric tape. Phase A is brown (Br), phase B is orange (Or), and phase C is yellow (YI).

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- 2.10 Craft, at CHURN record per Data Block 1, on Attachment 1:
  - Flow reading
  - RPM
  - Suction pressure
  - Discharge pressure
  - Motor amperage
  - Voltage
- 2.11 OPS or designee, open fire hydrants, as required, to achieve 100% flow,  $\geq$  1500 GPM, as read on ultrasonic flow meter. **[LCO 3.1.1]**

2.12 Craft, at 1500 GPM flow, record per Data Block 1 on Attachment 1:

- Flow reading
- RPM
- Suction pressure
- Discharge pressure
- Motor amperage
- Voltage

2.13 OPS or designee, verify the electric fire pump is capable of  $\geq 1500$  GPM flow at  $\geq 105$  psig. **[LCO 3.1.1] [SR 4.1.1.7]**

### **SIGN-OFF OPS**

2.14 OPS or designee, OPEN fire hydrants, as required, to achieve 150% flow,  $\geq 2250$  GPM, as read on the ultrasonic flow meter.

2.15 Craft, at 2250 GPM, record in Data Block 1 on Attachment 1:

- Flow reading
- RPM
- Suction pressure
- Discharge pressure
- Motor amperage
- Voltage

2.16 OPS or designee, CLOSE fire hydrants.

2.17 Craft, remove M&TE.

2.18 Craft, CLOSE Electric Fire Pump Control Panel, 456-CP-008-01, door and enable panel door interlock at the panel breaker switch.

2.18.1 Craft, remove barrier.

2.19 OPS or designee, manually STOP electric fire pump at Fire Pump Control Panel, 456-CP-008-01, by pressing the STOP Button.

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

### **SIGN-OFF OPS**

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

### **SIGN-OFF OPS**

2.22 OPS or designee, **OPEN** isolation valve FW-456-V-020.

### **SIGN-OFF OPS**

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

### **SIGN-OFF OPS**

## 3.0 EQUIPMENT REMOVAL

3.1 Craft, **CLOSE** isolation valves FW-456-V-065.

3.2 Craft, place PLD Danger Tag on isolation valve FW-456-V-065.

### **SIGN-OFF CRAFT**

### **WARNING**

Potential liquid pressure hazards exist. To prevent injury to personnel or damage to equipment:

- When performing Step 3.3 and Step 3.8, care must be used when removing pressurized equipment.

3.3 Craft, remove pressure module and reinstall 456-PI-008-016.

3.4 Craft, remove PLD Danger Tag on isolation valve FW-456-V-065.

3.5 Craft, **OPEN** isolation valve FW-456-V-065.

3.6 Craft, **CLOSE** isolation valve FW-456-V-066.

3.7 Craft, place PLD Danger Tag on isolation valve FW-456-V-066.

### **SIGN-OFF CRAFT**

3.8 Craft, remove pressure module and reinstall 456-PI-008-017.

3.9 Craft, remove PLD Danger Tag on isolation valve FW-456-V-066.

3.10 Craft, **OPEN** isolation valve FW-456-V-066.

- 3.11 Craft, verify with ZMM/ZS if ultrasonic flow transducers need to be left in place for diesel 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 1.1 through 2.23 have been signed off, restoration requirements have been satisfied and surveillance has been completed, initial on Attachment 1.

### **SIGN-OFF OPS**

## 5.0 VERIFICATION AND VALIDATION

- 5.1 Zone 4, complete the Surveillance Data Sheet, EA04AD3001-SR7, for LCO 3.1.1, Surveillance Requirement 4.1.1.7, as found in WP 04-AD3001.
- 5.2 Zone 4, 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 Zone 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

<b>PREREQUISITE ACTIONS</b>				
<b>Work Order No.:</b>			<b>Equipment No.:</b>	
<b>M&amp;TE DOCUMENTATION</b>				
<b>SECTION USED AT</b>	<b>INSTRUMENT DESCRIPTION</b>	<b>INSTRUMENT NUMBER</b>	<b>CALIBRATION DUE DATE</b>	<b>INITIALS</b>
	Ammeter, recommend Fluke Model 33, calibrated Actual equipment used			Metrology _____
	Multimeter, recommend Fluke Model 87, calibrated Actual equipment used			Metrology _____
	Tachometer, Photo/Contact, recommend Shimpo Model DT-205B, calibrated Actual equipment used			Metrology _____
	Ultrasonic Flow Meter, recommend Controlotron Model 1010WDP1, calibrated Actual equipment used			Metrology _____
	Pressure Module, 0-500 PSI, recommend Fluke Model 700P07 – 2 each Actual equipment used			Metrology _____
	Process Calibrator, recommend FLUKE Model 702-743, Calibrated - 2 each Actual equipment used			Metrology _____
<b>SECTION</b>	<b>ACTION</b>			<b>INITIALS</b>
1.0	ZMM/ZS, conduct a pre-job safety meeting.			ZMM/ZS _____
7.0 <b>[LCO 3.1.1]</b>	Verify South Water Storage Tank is full, or near full, prior to initiation of fire pump test.			OPS _____
<b>PERFORMANCE</b>				
1.1	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 _____

## Attachment 1 – Verification and Validation Sheet

1.2	Record the following information: Pump: Manufacturer: _____ S/N: _____ Size/Type: _____ GPM: _____ RPM: _____ PSIG: _____  Motor: Manufacturer: _____ ID #: _____ Rated Horsepower: _____ Rated Speed: _____ Volts: _____ Amps: _____ Service Factor (SF): _____  Controller: Manufacturer: _____ Catalog #: _____	Craft _____
1.5	Place PLD Danger Tag on isolation valve FW-456-V-066.	Craft _____
1.10	Place PLD Danger Tag on isolation valve FW-456-V-065.	Craft _____
2.1	ZMM, prior to performance of this work, discuss: <ul style="list-style-type: none"> <li>Rotating equipment and pinch point hazards and precautions and mitigating actions to be taken</li> <li>PPE to be used (insulation will be by PPE)</li> <li>Electrical hazards and precautions and mitigating actions to be taken.</li> </ul>	ZMM or Craft _____
2.13 [LCO 3.1.1] [SR 4.1.1.7]	Verify the electric fire pump is capable of $\geq 1500$ GPM flow at $\geq 105$ psig. Sat: _____ Unsat: _____	OPS _____
2.20	Enable diesel fire pump, 45-G-062, by placing the selector switch in the Diesel Fire Pump Control Panel, 45P-CP-008-02, in the <b>AUTO</b> position.	OPS _____
2.21	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 <b>AUTO</b> position.	OPS _____
2.22	Open isolation valve FW-456-V-020.	OPS _____
2.23 [LCO 3.1.1]	OPS, verify water capacity $\geq 105,000$ gallons in South Water Tank, 25-D-001A.	OPS _____
3.2	Place PLD Danger Tag on isolation valve FW-456-V-065.	Craft _____
3.7	Place PLD Danger Tag on isolation valve FW-456-V-066.	Craft _____
3.11	Verify if ultrasonic flow transducers need to be left in place for diesel Fire Pump Flow Test or be removed.	Craft _____
4.1	Once the above Steps 1.1 through 2.23 have been signed off, restoration requirements have been satisfied and surveillance has been completed.	OPS _____
<b>COMMENTS:</b>		

## Attachment 1 – Verification and Validation Sheet

PERSONNEL DATA			
PRINTED NAME	SIGNATURE	INITIALS	DATE

DATA BLOCK 1			
PUMP FLOW	CHURN (Step 2.10) ( < 1 GPM)	100% (Step 2.12 ) ( ≥ 1500 GPM)	150% (Step 2.15 ) ( ≥ 2250 GPM)
Flow GPM			
Discharge Pressure PSI			
Suction Pressure PSI			
AMPS AØ (Br)			
AMPS BØ (Or)			
AMPS CØ (Yl)			
VOLTS A B (Br to Or)			
VOLTS B C (Or to Yl)			
VOLTS A C ( Br to Yl)			
PUMP SPEED RMP	(Approx. 1700 – 1800 RPMs)	(Approx. 1700 – 1800 RPMs)	(Approx. 1700 – 1800 RPMs)

Br = Brown  
Or = Orange  
Yl = Yellow