# ATTACHMENT 2 - PERFORMANCE TESTING

**06/2019**

**PROJECT:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**LOCATION:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**NOTE: This attachment covers the common subsystems and equipment that will be encountered in most DoD POL fuel systems. The user will still have to make significant modifications as every fuel system is different.**

**NOTE: this attachment should only be used by a fuels engineer with significant experience in the systems their individual project will cover.**

**NOTE: The number of tests listed here sometimes exceed the normal efforts associated with Performance Testing. Depending on the system size quantity of tests should be revised. Typical efforts last a week with the following schedule:**

* **Mon walk thru of the system in the afternoon when government witnesses arrive**
* **Tue Computer, Safety, Truck Offloading and Tank tests completed**
* **Wed Pumphouse and Truck Loading tests**
* **Thu Finish tests and out briefing**
* **Fri travel**

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# ASSUMPTIONS

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**NOTE: Choose as appropriate.**

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* 1. Fueling system construction is substantially completed and fueling system is ready for operational testing: Equipment tests have been successfully completed.
		+ [Truck offloads]
		+ [Rail car offloads]
		+ [Marine offloads]
		+ [Pumphouse]
		+ [Tanks]
		+ [Rail car loading stations]
		+ [Marine Loading stations]
		+ [Truck fill stands]
		+ [Installation pipelines]
		+ [Intraterminal pipelines]
		+ [Service Station dispensers]
		+ Etc.
	2. Government Furnished Equipment to test and max out the system
		+ Different combinations to max out the system can be assembled; one possible configuration consists of:
			- [[\_\_\_\_] R11s at Truck Fill Stand (400 gpm each assumed)]
			- [[\_\_\_\_] [Barges][Ships] at Pier ([\_\_\_\_] gpm each assumed)]
			- [[\_\_\_\_] Railcars at Railcar Loading and Offloading positions ([\_\_\_\_] gpm each assumed)]
	3. [All truck fillstands shall be tested using an R11 or similar configuration]
	4. “Let System Stabilize” – means to wait until pressure and flow steadies to a relatively constant state. This is usually about 15 seconds after pump start.
	5. [Change lead pump between each test or as directed by Government Witness.]
	6. All tests are led by a designated person [, in this case, the System Supplier]. When to start, perform duties, and when the test is over is coordinated through the dedicated person to assure safety and good consistent results.
	7. Testing involving fuel movement shall be done only during daylight hours. [Control Panel computer tests involving no fuel movement may be conducted during non-daylight hours.]
	8. There shall be a meeting each morning prior to the daily Performance Testing efforts to review previous day’s tests, results, and plan for the day.
	9. All personnel and visitors involved in Performance Testing shall sign in each day.

# COMPUTER TESTS

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**NOTE: Delete “Computer Tests” if the project doesn’t provide, or modify an existing, Pump Control Panel.**

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Date: \_\_\_\_\_ Start Time: \_\_\_\_\_ End Time: \_\_\_\_\_

* 1. All Computer Tests shall be completed before proceeding to Safety Tests
	2. Perform Computer Tests; retest as per Equipment Tests: “Computer Tests”]

# SAFETY TESTS

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**NOTE: Check all emergency equipment before every project. Always check emergency stops and fire alarms. Always check emergency eyewash and showers if they are in the area and might be used in an emergency on this project.**

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Date: \_\_\_\_\_ Start Time: \_\_\_\_\_ End Time: \_\_\_\_\_

* 1. Test all emergency stops and the equipment they control; retest as per Equipment Tests: “Emergency Shutdown”. [Verify alarms are occurring where designated including remote from the site such as at a Fire Alarm Station or a Resource Control Center]
	2. Test emergency stops before proceeding to fuel movement involving tank trucks, railcars, pipelines or marine vessels.
	3. [Test Emergency Eye Wash and Shower; retest as per Equipment Tests: “Emergency Eye Wash and Shower”]
	4. [Ensure MCC and pump motor local switches are keyed properly].
	5. [Test the Fire Alarm System; retest as per Equipment Tests: “Fire Alarm”][Verify alarms are occurring where designated including remote from the site such as at a Fire Alarm Station or a Resource Control Center]

# [**TIGHTNESS MONITORING SYSTEM TESTS**

Date: \_\_\_\_\_ Start Time: \_\_\_\_\_ End Time: \_\_\_\_\_

* 1. Re-test as per Equipment Tests: “Tightness Monitoring System”]

# [STORAGE TANK TESTS

Date: \_\_\_\_\_ Start Time: \_\_\_\_\_ End Time: \_\_\_\_\_

* 1. For each tank; re-test as per Equipment Tests: “Storage Tanks”
	2. Ensure certified strapping charts are provided to the Contracting Officer]

# [**PRODUCT RECOVERY TANK TESTS**

Date: \_\_\_\_\_ Start Time: \_\_\_\_\_ End Time: \_\_\_\_\_

* 1. Re-test as per Equipment Tests: “Product Recovery Tank”]

# FUELING PUMP – TEST OPERATION

**\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\***

**NOTE: Choose one or more of the following based on how the pumps are controlled.**

**NOTE: Even if the pumps and pump controls were not modified or in any way affected by this project, always test the pump and their control systems before using them in Start-Up.**

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Date: \_\_\_\_\_ Start Time: \_\_\_\_\_ End Time: \_\_\_\_\_

* 1. [Verify fueling pump operation for pumps not controlled by a Pump Control Panel, retest as per Equipment Tests: “Fuel Pumps”]
	2. [Verify fueling pump operation for pumps controlled by a Pump Control Panel using pressure and flow measuring sensors, retest as per Equipment Tests: “Fuel Pumps” and “Pump Operation Automatic Mode (Pressure and Flow Controls Pumps”]
	3. [Verify fueling pump operation for pumps controlled by a Pump Control Panel using Start/Stop pushbutton stations, retest as per Equipment Tests: “Fuel Pumps” and “Pump Operation - Automatic Mode (Pushbutton Stations Controls Pumps”]
	4. [Change lead pump on each subsequent test]]

# FUELING PUMP - TEST EMERGENCY SHUTDOWN

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**NOTE: Even if the pumps and pump controls were not modified or in any way affected by this project, always perform the following” tests before using them in Start-Up.**

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Date: \_\_\_\_\_ Start Time: \_\_\_\_\_ End Time: \_\_\_\_\_

* 1. While running each pump as part of this Performance test, shut off the pump using the emergency stops and the EPDS; re-test as per “Fueling Pumps - Test EPDS”
	2. Verify each pump stops, the relevant indicators light illuminates, and the is initiated
	3. Reset system

# FUELING PUMP - TEST PUMP FLOW FAILURE

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**NOTE: Even if the pumps and pump controls were not modified or in any way affected by this project, always perform the following tests before using them.**

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Date: \_\_\_\_\_ Start Time: \_\_\_\_\_ End Time: \_\_\_\_\_

* 1. While running each pump as part of this Performance test, close the pumps downstream isolation valve.
	2. Confirm the flow switch shuts off the pump; re-test as per “Fueling Pump - Test Pump Flow Failure”
	3. [In a Lead/Lag Pump Control System, verify that the Lag Pump starts.]
	4. Verify each pump shuts off on no-flow, that the relevant indicators light illuminates, and that the alarm is initiated.
	5. Reset system.

# FLUSHING

Date: \_\_\_\_\_ Start Time: \_\_\_\_\_ End Time: \_\_\_\_\_

Lead Pump: \_\_\_

* 1. Manually start pumps
	2. Verify pressures, flowrates, velocities, and tank levels. Re-test as per Equipment Tests: [“Flushing with Water”][Flushing with Fuel].
	3. Manually stop pumps

# [INSTALLATION PIPELINE

Date: \_\_\_\_\_ Start Time: \_\_\_\_\_ End Time: \_\_\_\_\_

Lead Pump: \_\_\_

* 1. Verify each line
	2. Pumps, pump controls, tanks, tank controls and tightness testing have been individually tested elsewhere.
	3. Set up the piping and valving for normal flow of fuel through the pipeline.
	4. System in “automatic”
	5. Start the system
	6. Let system stabilize
	7. Verify “typical” system operation
	8. Verify meter performance and verification of proper calibration
	9. Verify filtration system performance
	10. Verify system inlet and outlet pressures, piping flowrates, time, etc. Re-test as per Equipment Test: “Installation Pipeline”.]

# [INTERTERMINAL PIPELINE

Date: \_\_\_\_\_ Start Time: \_\_\_\_\_ End Time: \_\_\_\_\_

Lead Pump: \_\_\_

* 1. Verify each line
	2. Pumps, pump controls, tanks, tank controls and tightness testing have been individually tested elsewhere.
	3. Set up the piping and valving for normal flow of fuel through the pipeline.
	4. System in “automatic”
	5. Start the system
	6. Let system stabilize
	7. Verify “typical” system operation
	8. Verify filtration system performance
	9. Verify meter performance and verification of proper calibration
	10. Verify system inlet and outlet pressures, piping flowrates, time, etc. Re-test per Equipment Test: “Interterminal Pipeline”.]

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**NOTE: Select as appropriate. Most systems will have one of the following offloading systems. Larger facilities may have two, with the second one being the direct offloading type.**

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#  [TANK [TRUCK][CAR][TRUCK/CAR] OFFLOAD SYSTEM TESTS

Date: \_\_\_\_\_ Start Time: \_\_\_\_\_ End Time: \_\_\_\_\_

* 1. [Retest as per Equipment Tests: “Tank [Truck][Car][Truck/Car] Packaged Off-Loading System”]
	2. [Retest as per Equipment Tests: “Tank [Truck][Car][Truck/Car] Drop Tank Off-Loading System”]
	3. [Retest as per Equipment Tests: “Tank [Truck][Car][Truck/Car] Direct Off-Loading System”]
	4. Verify meter performance and verification of proper calibration].

# [TANK [TRUCK][CAR][TRUCK/CAR] DIRECT LOADING SYSTEM

Date: \_\_\_\_\_ Start Time: \_\_\_\_\_ End Time: \_\_\_\_\_

* 1. Retest as per Equipment Tests: “Tank [Truck][Car][Truck/Car] Direct Loading System”
	2. Verify pressures, flows ( gpm), time, etc. in Equipment Test: “Truck Fill Control Valves”
	3. Verify meter performance and verification of proper calibration].

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**NOTE: Do a performance test of each of the Tank Car and/or Tank Truck Fillstand systems (that are not the direct loading type) by testing one position at a time until all have been checked out. Then, if there is more than one loading position, add one more loading position and retest. Keep adding loading positions one by one and retesting the new configuration until all the positions are being fueled simultaneously (maximum flow).**

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# [TANK [TRUCK] [CAR][TRUCK/CAR] FILL STAND – ONE POSITION FILLING

Date: \_\_\_\_\_ Start Time: \_\_\_\_\_ End Time: \_\_\_\_\_

Lead Pump: \_\_\_

* 1. Verify each position in turn
	2. Place R-11 at loading position
	3. Connect loading hose to R-11
	4. Connect overfill protection and ground verification unit ground proving system to the R-11
	5. System in “automatic”
	6. Squeeze deadman
	7. Let system stabilize (one pump running)
	8. Slowly shut-off fuel flow (manual 3 count) using R-11 bottom loading manual shut-off valve
	9. Verify surge pressure
	10. Open R-11 bottom loading valve
	11. Let system stabilize
	12. Disconnect overfill protection and ground verification unit
	13. Verify truck fill control valve closure
	14. Reconnect overfill protection and ground verification unit
	15. Let system stabilize
	16. Release deadman
	17. Let system automatically shutdown
	18. Verify “typical” system operation
	19. Verify pressures, flows ( gpm), time, etc. in Equipment Test: “Truck Fill Control Valves”]
	20. Verify meter performance [and preset controls] [ and verification of proper calibration].
	21. [Verify Control valve and meter preset interconnections for flow control and automatic shutdown.]
	22. [Verify additive injector system performance.]]
	23. Verify each loading position, one by one, before going on to multiple fillstand testing.

# [TANK [TRUCK][CAR][TRUCK/CAR] FILL STAND – TWO POSITION FILLING

Date: \_\_\_\_\_ Start Time: \_\_\_\_\_ End Time: \_\_\_\_\_

Lead Pump: \_\_\_

* 1. Place an R-11 at both loading positions
	2. Connect loading hose to R-11 at both loading positions
	3. Connect overfill protection and ground verification unit ground proving system to both R-11s
	4. System in “automatic”
	5. Squeeze deadman at first position
	6. Let system stabilize (one pump running)
	7. Squeeze deadman at second position
	8. Let system stabilize (\_\_\_ pump(s) running)
	9. Slowly shut-off fuel flow at second position (manual 3 count) using R-11 bottom loading manual shut-off valve
	10. Verify surge pressure
	11. Open R-11 bottom loading valve
	12. Let system stabilize
	13. Release deadman at first position
	14. Let system stabilize
	15. Release deadman at second position
	16. Let system automatically shutdown
	17. Verify “typical” system operation
	18. Verify pressures, flows (~400 gpm), time, etc. in Equipment Test: “Truck Fill Control Valves”]

# [TANK [TRUCK][CAR][TRUCK/CAR] FILL STAND – [\_\_\_\_\_] POSITIONS FILLING

**\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\***

**NOTE: Below shows for three loading positions; modify as needed for four or more by adding more positions.**

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Date: \_\_\_\_\_ Start Time: \_\_\_\_\_ End Time: \_\_\_\_

Lead Pump: \_\_\_

* 1. Place an R-11 at each loading position
	2. Connect loading position hose to R-11 at each loading position
	3. Connect overfill protection and ground verification unit ground proving system to each R-11
	4. System in “automatic”
	5. Squeeze deadman at first position
	6. Let system stabilize (one pump running)
	7. Squeeze deadman at second position
	8. Let system stabilize (\_\_\_ pump(s) running)
	9. Squeeze deadman at third position
	10. Let system stabilize (\_\_\_ pumps running)
	11. Slowly shut-off fuel flow at third position (manual 3 count) using R-11 bottom loading manual shut-off valve
	12. Verify surge pressure
	13. Open R-11 bottom loading valve
	14. Let system stabilize
	15. Release deadman at first position
	16. Let system stabilize
	17. Release deadman at second position
	18. Let system stabilize
	19. Release deadman at third position
	20. Let system automatically shutdown
	21. Verify “typical” system operation
	22. Verify pressures, flows (~400 gpm), time, etc. in Equipment Test: “Truck Fill Control Valves”]

# [TANK [TRUCK][CAR][TRUCK/CAR] LOADING POSITION – ALL POSITIONS FILLING (MAX FLOW)

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**DESIGNER NOTE: Below shows for four loading positions; modify as needed for five or more.**

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Date: \_\_\_\_\_ Start Time: \_\_\_\_\_ End Time: \_\_\_\_\_

Lead Pump: \_\_\_

* 1. Place an R-11 at each loading position
	2. Connect loading position hose to R-11 at each loading position
	3. Connect overfill protection and ground verification unit ground proving system to each R-11
	4. System in “automatic”
	5. Squeeze deadman at first position
	6. Let system stabilize (one pump running)
	7. Squeeze deadman at second position
	8. Let system stabilize (\_\_\_ pump(s) running)
	9. Squeeze deadman at third position
	10. Let system stabilize (\_\_\_ pumps running)
	11. Squeeze deadman at fourth position
	12. Let system stabilize (\_\_\_ pumps running)
	13. Slowly shut-off fuel flow at Fourth position (manual 3 count) using R-11 bottom loading manual shut-off valve
	14. Verify surge pressure
	15. Open R-11 bottom loading valve
	16. Let system stabilize
	17. Release deadman at first position
	18. Let system stabilize
	19. Release deadman at second position
	20. Let system stabilize
	21. Release deadman at third position
	22. Let system stabilize
	23. Release deadman at fourth position
	24. Let system automatically shutdown
	25. Verify “typical” system operation
	26. Verify pressures, flows (~400 gpm), time, etc. in Equipment Test: “Truck Fill Control Valves”]

# [TANK [TRUCK][CAR][TRUCK/CAR] FILL STAND – TWO POSITIONS SIMULTANEOUS START

Date: \_\_\_\_\_ Start Time: \_\_\_\_\_ End Time: \_\_\_\_\_

Lead Pump: \_\_\_

* 1. Place an R-11 at both loading positions
	2. Connect loading position hose to R-11 at both loading positions
	3. Connect overfill protection and ground verification unit ground proving system to both R-11s
	4. System in “automatic”
	5. Squeeze both deadmen simultaneously
	6. Let system stabilize
	7. Release deadman at first loading position
	8. Let system stabilize
	9. Release deadman at second loading position
	10. Let system automatically shutdown
	11. Verify “typical” system operation
	12. Verify pressures, flows (~400 gpm), time, etc. in Equipment Test: “Truck Fill Control Valve”)]

# [TANK [TRUCK] [CAR][TRUCK/CAR] FILL STAND – TWO POSITIONS SIMULTANEOUS STOP

Date: \_\_\_\_\_ Start Time: \_\_\_\_\_ End Time: \_\_\_\_\_

Lead Pump: \_\_\_

* 1. Place an R-11 at each loading position
	2. Connect loading position hose to R-11 at each loading position
	3. System in “automatic”
	4. Squeeze both deadmen simultaneously
	5. Let system stabilize
	6. Release both deadmen simultaneously
	7. Let system stabilize
	8. Let system automatically shutdown
	9. Verify “typical” system operation
	10. Verify pressures, flows (~400 gpm), time, etc. in Equipment Test: “Truck Fill Control Valves”]

# [MARINE [LOADING][OFFLOADING] [LOADING AND OFFLOADING] POSITIONS

Date: \_\_\_\_\_ Start Time: \_\_\_\_\_ End Time: \_\_\_\_\_

* 1. Verify each position in turn
	2. Verify meter performance and verification of proper calibration
	3. Verify system as per Equipment Test: “Marine Offloading Systems – With Fuel (Phase 1)” and Marine Offloading Systems – With Fuel (Phase 2)]

#  [MILITARY SERVICE STATION

Date: \_\_\_\_\_ Start Time: \_\_\_\_\_ End Time: \_\_\_\_\_

* 1. Retest as per Equipment Tests: “Military Service Station”
	2. Repeat for each product]

# FILTER SEPARATOR WATER SLUG TESTS

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**NOTE: Even if the filter/separators were not modified or in any way affected by this project, always test the water slug features systems before using them in Start-Up. Delete “Filter Separator Water Slug Test” only if project is not aviation jet fuel or if filter/separators are not flowed through as part of this project.**

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Date: \_\_\_\_\_ Start Time: \_\_\_\_\_ End Time: \_\_\_\_\_

* 1. Flow routed through filter separators
	2. Manually start pump
	3. Manually trigger each filter/separator sump float to verify control valve closure
	4. Verify Equipment Tests: “Filter Separator Float Control Valve Manual Test”

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**NOTE: Delete “Jockey Pump…” tests if project does not provide a new, and/or modify an existing jockey pump.**

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#  [JOCKEY PUMP RE-PRESSURIZATION

Date: \_\_\_\_\_ Start Time: \_\_\_\_\_ End Time: \_\_\_\_\_

* 1. Start jockey pump by cracking a drain valve
	2. Verify pump stop when system pressurization has been returned]

# [JOCKEY PUMP WITH FUEL PUMP START

Date: \_\_\_\_\_ Start Time: \_\_\_\_\_ End Time: \_\_\_\_\_

* 1. Start jockey pump by opening a drain valve
	2. Verify jockey pump stop when lead pump is energized]

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**NOTE: Include “Emergency Generator” test only if an emergency generator is part of the project and is connected to facility power through an automatic transfer switch.**

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# EMERGENCY GENERATOR

Date: \_\_\_\_\_ Start Time: \_\_\_\_\_ End Time: \_\_\_\_\_

* 1. Transfer power to emergency generator
	2. Verify Kirk key (trapped key) operation
	3. Start a pump
	4. Let system stabilize (single pump running)
	5. Stop the pump
	6. Verify proper generator operation