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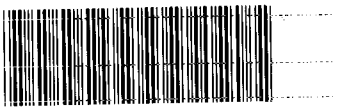

000111125

DATE: January 15, 1997

TO: J. Galeska, Kaiser-Hill Fire Protection Engineering, Building 130, X6304

FROM: D. Hoyt, RMRS Engineering, Building 130, X6742

SUBJECT: DRAFT ACCEPTANCE TEST PROCEDURE FOR THE NEW SANITARY LANDFILL FIRE PROTECTION SYSTEM - DLH-002-97

PURPOSE

The purpose of this memo is to request your review of the attached draft acceptance procedure.

DISCUSSION

The complete acceptance test procedure for the New Sanitary Landfill is extremely lengthy. Therefore, I have only attached the fire protection system test procedure for your review.

As you are aware, Park Construction has already conducted some of this testing. If possible, we would like to avoid retesting systems that have already been tested successfully. Please advise me which components and/or systems Fire Protection Engineering considers to be complete (assuming we receive adequate testing documentation from Park).

RESPONSE REQUIREMENTS

Please review this information and provide me with comments by January 20, 1997. Feel free to call me with any questions or concerns.

DLH

Attachment:
As stated.

cc:
DLH files

1/19

DRAFT DRAFT DRAFT DRAFT

ACCEPTANCE TESTING PROCEDURE
NEW SANITARY LANDFILL

January 11, 1997

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1.0 PURPOSE AND SCOPE

The purpose of this Acceptance Test Procedure is to determine and document the acceptability of the New Sanitary Landfill construction.

This procedure consists of both Component Checkout (CC) and System Testing.

Component Checkout tests ensure that the supplied construction components are free of operational defects in material and workmanship, and are installed without damage, and that they perform as the Construction Package required. At the time of issuance of this procedure, the majority of CC testing has been completed at the New Sanitary Landfill. This procedure does not require retesting of these systems (unless necessary to document correction of deficiencies). Instead, the purpose of the CC portion of this procedure is to:

1) Act as a checklist to ensure all required CC testing has or will be completed.
2) Document completion of CC testing by attaching all documentation of previous CC testing to this procedure in Section 12, Attachments.

System tests are comprehensive, integrated tests performed to demonstrate conformance to specification and operability. Generally, this test procedure is set up so that successful completion of CC testing is a prerequisite to performance of System tests.

Verification signatures will be required to documentation completion of each applicable section of this test procedure.

It should be noted that any piece of equipment or system which has been tested without proper documentation, will require retesting.

2.0 GENERAL TEST METHOD

2.1 Refer to each specific test in Section 7 for a description of the general test method.

RMRS Construction Management shall obtain a "Temporary Facility Transfer" according to 4-15C-COEM-CMG-415 from Park Construction prior to performance of the SO testing.

2.2 Responsibilities

2.2.1 Each person performing a test procedure is responsible for:

Obtaining the necessary training to safely operate the equipment. Training shall include, but not be limited to safety, equipment operation and contingency actions.

Adhering to the requirements of the applicable testing procedure(s) being performed. In the event that the requirements cannot be met, management shall be contacted.

Reviewing references and the test procedures, prior to performing selected tests, to ensure no changes to the component system or structure being tested has occurred that would require test procedure revision.

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Identify deficiencies in the existing test procedures and the need for revisions or any additional testing procedures, to his/her management.

Identifying and documenting on the applicable Rocky Flats document (such as a non-conformance report) for evaluation and disposition, all deficiencies identified by performance of the tests and/or all results that do not meet the acceptance criteria in the test procedure.

2.2.2 Specific responsibilities are as follows:

RMRS Construction Management: Comply with the responsibilities outlined in COEM-415. Coordinate resources necessary to perform testing. Notify all other parties of testing schedules. Construction Management may sign for the RMRS representative to verify testing is complete.

RMRS Engineering: Prepare and revise this testing document as necessary. Engineering may sign for the RMRS representative to verify testing is complete.

RMRS Operations: Receive training from the Construction Subcontractor. Perform the System Operation Tests. Operations may sign for the RMRS representative to verify testing is complete. Operations will assign a responsible testing engineer to obtain all necessary permits, conduct safety reviews, witness testing, and coordinate all other SO test procedures.

RMRS Quality Assurance: Assist in dispositioning and/or resolving any NCR's written during testing. The Quality Assurance representative may sign for the RMRS representative to verify testing is complete.

Kaiser-Hill Fire Protection Engineering: Inspect the Fire Protection/Detection system for compliance with NFPA and the Construction Package. Witness all Fire Protection/Detection system testing to ensure compliance with the applicable NFPA requirements. Assist RMRS in the identification and correction of deficiencies noted during testing and inspections.

Construction Subcontractor: Perform all component checkout tests specified in this procedure. Provide required training for systems as specified in the Construction Package. Correct deficiencies identified during both CC and SO testing until the systems or equipment operate as intended, and are suitable for use. The Construction Subcontractor shall be responsible for supplying all equipment required to perform, and conduct all testing identified in this procedure.

3.0 TEST EQUIPMENT

Refer to each test section under Section 7.0 for a description of necessary test equipment.

4.0 PREREQUISITES

Refer to each test section under Section 7.0 for a description of necessary prerequisites.

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5.0 INITIAL CONDITIONS

Refer to each test section under Section 7.0 for a description of necessary initial conditions.

6.0 PRECAUTIONS AND LIMITATIONS

Refer to each test section under Section 7.0 for a description of necessary precautions and limitations.

7.5 FIRE PROTECTION AND DETECTION SYSTEM OPERATION TEST PROCEDURE

7.5.1 PURPOSE AND SCOPE

This procedure provides instructions for the system operation and component check out testing of the Fire Protection System to ensure adequate protection of Buildings 280 and 282 in case of a fire.

The Fire Protection System in Buildings 280 and 282 consist of the following:

- Dry pipe fire sprinkler system in Bldg 280.
- Wet pipe fire sprinkler system in Bldg 282.
- Underground fire water piping system.
- Diesel engine driven, centrifugal fire pump system.
- Pressure maintenance (jockey) pump.
- Fire water storage tank system.

This procedure addresses:

- Hydrostatic testing of fire sprinkler systems.
- Main drain test of fire sprinkler system.
- Operational testing of dry pipe system components.
- Hydrostatic testing of fire water piping system.
- Operational testing of fire hydrants and fire water loop control valves.
- Hydrostatic testing of fire pump system piping.
- Operational testing of fire pump, fire pump motor controls, fire pump diesel engine, emergency power supply, and pressure maintenance (jockey) pump.
- Water flow testing of fire pump.
- Leak testing of fire water storage tank.

7.5.2 GENERAL TEST METHOD

7.5.2.1 The dry pipe and wet pipe fire sprinkler systems shall be tested in accordance with the requirements of NFPA 13.

7.5.2.2 The underground fire water piping system shall be tested in accordance with the requirements of NFPA 24.

7.5.2.3 The fire pump system shall be tested in accordance with the requirements of NFPA 20.

7.5.2.4 The fire water storage tank system shall be tested in accordance with the requirements of NFPA 22.

7.5.2.5 The fire protection system testing shall be performed by the Subcontractor and manufacturer's representatives as required by NFPA Standards and shall be witnessed by the Rocky Flats Plant Fire Protection Engineer.

7.5.3 TEST EQUIPMENT

7.5.3.1 Hydrostatic testing equipment capable of 200 psi test pressure.

7.5.3.2 Pneumatic testing equipment capable of 200 psi test pressure or 50 psi in excess of the maximum system static pressure when the system static pressure is in excess of 150 psi.

7.5.3.3 Approved water discharge flow meter.

7.5.3.4 The Subcontractor shall provide calibrated test equipment to determine the net pump pressures, rate of flow through the pump and engine speed.

7.5.3.5 Calibrated test container for testing underground piping system.

7.5.3.6 Test blanks with lugs for isolating systems for hydrostatic testing.

7.5.4 PREREQUISITES

7.5.4.1 Perform system flush of the fire protection system piping, including fire pump system, underground fire water distribution system, and automatic sprinkler system piping, per the minimum flow rates of 10 fps as specified in NFPA Standards or at the hydraulically calculated water demand rate of the system, which ever is greater.
Verify completion of the system flush prior to installation of the sprinkler system.
Kaiser Fire Protection Engineer _____ date _____
RMRS Rep. _____ date _____
Construction Subcontractor Rep. _____ date _____

7.5.4.2 Verify that the fire protection system installation is complete and ready for testing.
Kaiser Fire Protection Engineer _____ date _____
RMRS Rep. _____ date _____
Construction Subcontractor Rep. _____ date _____

7.5.4.3 Verify the system installation in accordance with approved drawings.
Kaiser Fire Protection Engineer _____ date _____
RMRS Rep. _____ date _____
Construction Subcontractor Rep. _____ date _____

7.5.4.4 The equipment manufacturer's representative and Subcontractors shall be present for the system testing.

7.5.4.5 The Rocky Flats Plant Fire Protection Engineer shall be present to witness the system operation testing.

7.5.5 INITIAL CONDITIONS

7.5.5.1 For hydrostatic testing of the system piping for the fire pump, underground fire water distribution system, and automatic sprinkler, isolate or verify that the piping systems are isolated from the water storage tank.
Kaiser Fire Protection Engineer _____ date _____
RMRS Rep. _____ date _____
Construction Subcontractor Rep. _____ date _____

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7.5.5.2 For the fire pump system testing, verify that the water level in the fire water storage tank is at normal system capacity or at adequate level for the performance of the fire pump testing.
Kaiser Fire Protection Engineer _____ date _____
RMRS Rep. _____ date _____
Construction Subcontractor Rep. _____ date _____

7.5.5.3 Hearing and eye protection must be worn in Building 282 when the fire pump system is operating.

7.5.5.4 Isolate the area near the fire pump test header outside Building 282 for high pressure water discharge during the fire pump system test.

7.5.5.5 Establish a method for securing fire hoses connected to the fire pump test header during the fire pump test.

7.5.5.6 Verify adequate fuel is available in diesel tank to perform test.

7.5.6 PROCEDURE

7.5.6.1 FIRE PUMP SYSTEM

NOTE: RMRS MUST HAVE THE O&M MANUALS FOR THE FIRE PUMP SYSTEM INCLUDING ALL CONTROLLER COMPONENTS, VALVES AND INSTRUMENTATION TO COMPLETE THIS PROCEDURE

1. Isolate the fire pump system piping from the fire sprinkler system in Building 282, the underground fire water piping system, and the fire water storage tank for performance of hydrostatic testing on the fire pump system piping.

2. Perform hydrostatic test on the fire pump system piping, including all piping and attached appurtenances, at 200 psi for 2 hours or at 50 psi in excess of the maximum pressure, when the maximum pressure to be maintained in the system is in excess of 150 psi. The test pressure shall be read from a gauge located at the low elevation point of the system or portion being tested. Pressure loss shall be determined by a drop in the gauge pressure or visual leakage.

3. Correct any leakage and retest as required.

4. Verify that the fire pump system piping maintained hydrostatic test pressure of 200 psi without loss for 2 hours, and attach documentation of this test.
Kaiser Fire Protection Engineer _____ date _____
RMRS Rep. _____ date _____
Construction Subcontractor Rep. _____ date _____

5. The Subcontractor shall provide a certificate of pressure test and certified pump test characteristic curve prior to the start of fire pump field acceptance test.

6. Restore fire pump system connection with the fire water storage tank for flow testing.

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7. Perform flow tests at the minimum, rated, and peak loads of the fire pump by controlling the quantity of water discharge through approved test devices. Refer to the certified test curves for pump flow rates versus head conditions.

8. The quantity of water discharge through the fire pump assembly shall be determined and stabilized. Immediately thereafter, the operating condition of the fire pump and diesel engine shall be measured. The fire pump shall perform at the minimum, rated, and peak loads without objectionable overheating of any component. Vibrations of the fire pump assembly shall not be of a magnitude to warrant potential damage to any fire pump component.

9. The diesel engine shall not show sign of overload or stress. The engine shall not be operating in overspeed. Verify there is no overspeed alarm on the pump controller panel.
Kaiser Fire Protection Engineer _____ date _____
RMRS Rep. _____ date _____
Construction Subcontractor Rep. _____ date _____

10. Perform loads start test of the fire pump system. Verify that the fire pump system shall be started and brought up to rated speed without interruption under the conditions of a discharge equal to peak load.
Kaiser Fire Protection Engineer _____ date _____
RMRS Rep. _____ date _____
Construction Subcontractor Rep. _____ date _____

11. Perform fire pump controller test in accordance with the manufacturer's recommended test procedure. As a minimum no less than 10 automatic and 10 manual operations shall be performed during the acceptance test. The diesel engine shall be operated for a period of at least 5 minutes at full speed during each operation.

- Attach the manufacturer's test procedure.
- Attach documentation of the fire pump control test.

Verify proper operation of the fire pump controller in accordance with the manufacturer's test.
Kaiser Fire Protection Engineer _____ date _____
RMRS Rep. _____ date _____
Construction Subcontractor Rep. _____ date _____

12. Perform testing of the automatic operation sequence of the fire pump controller to verify starting of the fire pump from all provided starting features.
Verify automatic operation of the jockey pump and fire pump from the pressure switches located in the Fire Pump Controller Panels. Attach documentation of the test and final pressure settings for the Jockey Pump and Fire Pump.
Kaiser Fire Protection Engineer _____ date _____
RMRS Rep. _____ date _____
Construction Subcontractor Rep. _____ date _____

13. Perform testing of the diesel engine controller on both sets of batteries. Verify proper operation of the diesel engine controller with both sets of batteries.
Kaiser Fire Protection Engineer _____ date _____

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RMRS Rep. _____ date _____
Construction Subcontractor Rep. _____ date _____

14. Verify fire pump system selection, size, and setting of all overcurrent protective devices to be in accordance with NFPA 20.
Kaiser Fire Protection Engineer _____ date _____
RMRS Rep. _____ date _____
Construction Subcontractor Rep. _____ date _____

15. The fire pump system shall be in operation for not less than 1 hour total time for the duration of the system testing.

16. The Subcontractor shall complete and attach the Factory Mutual Research Corp. Pump Acceptance Test Data sheet.

17. Verify the fire pump system meet the requirements of NFPA 20. Attach documentation of the fire pump test.
Kaiser Fire Protection Engineer _____ date _____
RMRS Rep. _____ date _____
Construction Subcontractor Rep. _____ date _____

7.5.6.2 UNDERGROUND FIRE WATER PIPING SYSTEM

1. Isolate the underground fire water piping system from the fire sprinkler systems in Buildings 280 and 282, and fire pump system for performance of hydrostatic testing on the underground fire water piping system.

2. The Subcontractor shall provide a Contractor's Material and Test Certificate for Underground Piping to the Contractor and Rocky Flats Plant Fire Protection Engineer.

3. Perform hydrostatic test on the underground fire water piping system, including all piping and attached appurtenances, at 200 psi for 2 hours, or at 50 psi in excess of the maximum static pressure when the maximum static pressures in excess of 150 psi. The amount of leakage in the piping system shall be measured at the specified test pressure by pumping from a calibrated container.

4. The amount of leakage at the joints shall not exceed two quarts per hour per 100 gaskets or joints. The amount of leakage may be increased by 1 fluid ounce per inch valve diameter per hour for each metal seated valve isolating the test section. If the dry barrel hydrants are tested with the main valve open, so the hydrants are under pressure, an additional 5 ounces per minute leakage is permitted for each hydrant.

5. Correct any leakage and retest as required.

6. Verify that the underground fire water piping system maintained hydrostatic test pressure of 200 psi without loss for 2 hours or 50 psi in excess of maximum static pressure when the static pressure is greater than 150 psi.
Kaiser Fire Protection Engineer _____ date _____
RMRS Rep. _____ date _____

Construction Subcontractor Rep. _____ date _____

7. Remove isolation of the undergound piping system from the fire pump system and restore system connection for subsequent testing.

8. Perform operational test by fully open and fully close each hydrant under system water pressure and dry barrel hydrants, and check for proper drainage. This shall be done with the fire pump system operating.

9. Perform operational test by fully open and fully close all control valves under system water pressure to ensure proper operation.

10. Verify that the system leakage rate as measured at the specified system test pressure by pumping from a calibrated container is less than 2 quarts per hour per 100 gaskets or joints. The maximum allowable leakage may be increased by 1 fluid ounce per inch valve diameter per hour for each metal seated valve isolating the test section. If dry barrel hydrants are under pressure, an additional 5 ounces per minute leakage rate is permitted for each hydrant.
Kaiser Fire Protection Engineer _____ date _____
RMRS Rep. _____ date _____
Construction Subcontractor Rep. _____ date _____

11. Verify that all system hydrants are fully operable and drained properly.
Kaiser Fire Protection Engineer _____ date _____
RMRS Rep. _____ date _____
Construction Subcontractor Rep. _____ date _____

12. Attach the completed Contractor's Material and Test Certificate for Underground Piping.

13. Perform system flush of the underground fire water distribution system at the minimum flow rates of 10 fps prior to connection to the automatic sprinkler system.

14. Verify that the underground fire water system meets the requirements of NFPA 24.
Kaiser Fire Protection Engineer _____ date _____
RMRS Rep. _____ date _____
Construction Subcontractor Rep. _____ date _____

7.5.6.3 FIRE SPRINKLER SYSTEMS

1. Isolate the dry pipe fire sprinkler system in Building 280 from the underground fire water piping system for performance of hydrostatic testing on the sprinkler piping system.

2. Perform hydrostatic test on the fire sprinkler system, including all interior piping and attached appurtenances, at 200 psi for 2 hours. The test pressure shall be read from a gauge located at the low elevation point of the system or portion being tested. Pressure loss shall be determined by a drop in the gauge pressure or visual leakage.

3. Correct any leakage and retest as required.

4. Verify that the fire sprinkler systems (wet pipe and dry pipe) maintained hydrostatic test pressure of 200 psi without loss for 2 hours, and attach documentation of this test.
Kaiser Fire Protection Engineer _____ date _____
RMRS Rep. _____ date _____
Construction Subcontractor Rep. _____ date _____

5. Perform pneumatic test on the dry pipe sprinkler system in Building 280 at air pressure of 40 psi for 24 hours. Any leakage that results in a loss of pressure in excess of 1.5 psi for the 24 hours shall be corrected.

6. Correct any leakage and retest as required.

7. Verify that the dry pipe fire sprinkler system maintained pneumatic test pressure of 40 psi for 24 hours without any leakage resulting in pressure loss in excess of 1.5 psi for 24 hours, and attach documentation of this test.
Kaiser Fire Protection Engineer _____ date _____
RMRS Rep. _____ date _____
Construction Subcontractor Rep. _____ date _____

8. Restore the dry pipe sprinkler system in Building 280 to the underground water piping system for performance of water flow test.

9. Perform system water flow test through the inspector's test connection for the dry pipe sprinkler system in Building 280 and verify water flow detecting devices, including associated alarm circuits, produce an alarm within 5 minutes after water flow begins.

10. Verify that the fire sprinkler system water flow test resulted in a system alarm within 5 minutes of water flow. Attach documentation of this test.
Kaiser Fire Protection Engineer _____ date _____
RMRS Rep. _____ date _____
Construction Subcontractor Rep. _____ date _____

11. Perform a working test of the dry pipe valve alone, and with a quick-opening device, if installed, by opening the inspector's test connection. Measure the time to trip the valve and the time for water to be discharged from the inspector's test connection. The times shall be measured from the time the inspector's test connection is completely opened. Record the measured time on the Contractor's Material and Test Certificate for Aboveground Piping.

12. The measured time to trip the dry pipe valve and time for water to discharge from the inspection's test connection is less than 1 minute.
Time to trip: _____
Kaiser Fire Protection Engineer _____ date _____
RMRS Rep. _____ date _____
Construction Subcontractor Rep. _____ date _____

13. With the main drain valve opened and the system pressure stabilized, record the static and residual pressure on the Contractor's Test Certificate and below.

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Static pressure: _____
Residual pressure: _____
Kaiser Fire Protection Engineer _____ date _____
RMRS Rep. _____ date _____
Construction Subcontractor Rep. _____ date _____

14. Close the main drain valve and place the system in normal operating configuration. Verify all blanks installed during testing are removed. Drain the dry pipe sprinkler system as required.

15. Verify the dry pipe sprinkler system air compressor is capable of recharging the pipe system within 30 minutes per NFPA 20.

16. Isolate the wet pipe fire sprinkler system in Building 282 from the fire pump piping system for performance of hydrostatic testing on the sprinkler piping system.

17. Perform hydrostatic test on the fire sprinkler system, including all interior piping and attached appurtenances, at 200 psi for 2 hours. The test pressure shall be read from a gauge located at the low elevation point of the system or portion being tested. Pressure loss shall be determined by a drop in the gauge pressure or visual leakage.

18. Correct any leakage and retest as required.

19. Verify that the fire sprinkler systems (wet pipe) maintained hydrostatic test pressure of 200 psi without loss for 2 hours and attach documentation of the test.
Kaiser Fire Protection Engineer _____ date _____
RMRS Rep. _____ date _____
Construction Subcontractor Rep. _____ date _____

20. Restore the wet pipe sprinkler system in Building 282 to the fire pump piping system for performance of water flow test.

21. Perform system water flow test through the inspector's test connection and verify water flow detecting devices, including associated alarm circuits, produce an alarm within 5 minutes after water flow begins. Measure the time for water to be discharged from the inspector's test connection. The times shall be measured from the time the inspector's test connection is completely opened.

22. With the main drain valve opened and the system pressure stabilized, record the static and residual pressure on the Contractor's Test Certificate.

23. Close the main drain valve and place the system in normal operating configuration.

24. The Subcontractor shall complete the Contractor's Material and Test Certificate for Aboveground Piping for both buildings 280 and 282.

25. Verify that the fire sprinkler systems meet the requirements of NFPA 13.
Kaiser Fire Protection Engineer _____ date _____
RMRS Rep. _____ date _____

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Construction Subcontractor Rep. _____ date _____

7.5.6.4 FIRE WATER STORAGE SYSTEM

1. Visual inspection of the tank shall be performed prior to the hydrostatic testing in item 2 below. A written inspection report of joint inspection shall be submitted to the Contractor under NFPA 22 paragraph 1-14.

2. The fire water storage tank system shall be tested by filling with water and repairing any leakage in accordance with AWWA D103 and NFPA 22. Verify that the fire water storage tank system has been tested and does not leak. Attach documentation of the test.
Kaiser Fire Protection Engineer _____ date _____
RMRS Rep. _____ date _____
Construction Subcontractor Rep. _____ date _____

3. Verify installation and operation of the following:
   - Heater
   - Recirculation Pump
   - Temperature elements
   How are we going to do this??

4. Verify installation and operation of the following:
   - Fire water tank level
   - Water temperature
   How are we going to do this??

7.5.6.7 FIRE DETECTION SYSTEM

1. Reference is made to the Emergency Generator System Operation Procedure (Section 7.3) for required tests related to the Fire Protection System. The generator provides emergency power to the diesel engine fire pump system and the fire alarm system.

2. Verify completion of the Emergency Power System Operation.
RMRS Rep. _____ date _____
Construction Subcontractor Rep. _____ date _____

3. The following table shall be used as a general guide and checklist for operational verification of the alarm initiating devices. All tests shall be performed in accordance with applicable NFPA Code Sections. See attached NFPA reference table for initial Visual Inspection and Testing requirements. Attach documentation that required tests have been completed and that proper alarms are activated as listed in the table.

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ALARM INITIATING DEVICES VERIFICATION TESTING

INSTRUMENT/SIGNAL	LOCATION	REVIEW/TEST
1) K-180, Flow Switch	B280, Room 109	A) Verify actuation and signal in alarm panel (FCID-A) B) Check signal failure indicates by jumper out or disconnecting wire at switch C) Check local input module signal indication.
2) K-181, Flow Switch	B282, Room 112	A) Verify Actuation and signal in alarm panel (FCID-A) B) Check signal failure indicates by jumper out or disconnecting wire at switch C) Check local input module signal indication.
3) FER-001, Fire Pump Running	B282, Room 112	A)Check signal indication on alarm panel(FCID-A) B) check signal failure by simulating engine shut down.
4) FHS-001 Common Alarm	B282, Room 112	Check signal indication at alarm panel FCID-A. This signal should be produced in both the off and manual modes of the Automatic switch located in the Fire Pump Controller Panel.
5) FSF-001 System Failure	B282, Room 112	This alarm test consists of several individual tests, each individual alarm condition shall activate System Failure FSF-001 in panel FCID-A 1) Verify Engine Low oil pressure signal is indicated on the Fire Pump Controller Panel. Create loss of signal by disconnecting wire at engine sensor. Simulate condition by jumping connection at engine sensor. 2) Verify High Engine Jacket Coolant Temperature signal is indicated on the Fire Pump Controller Panel. Create loss of signal by disconnecting wire at engine sensor. Simulate circuit connection by jumping connection at engine sensor. 3) Verify Failure of Engine to Start Automatically signal is indicated on the Fire Pump Controller Panel. 4) Verify Shutdown from Overspeed signal is indicated on the Fire Pump Controller Panel. 5) Diesel Engine Driven Fire Pump Batteries - General Tests:

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a) Visually inspect batteries for corrosion or leakage and inspect electrolyte level in lead acid batteries. Check and ensure tightness of connections.

b) Batteries shall be replaced in accordance with the recommendations of the pump/engine equipment manufacturer or when the recharged battery voltage or current falls below the manufacturer's recommendations.

c) 1) Verify Battery Charger Failure is indicated on the Fire Pump Controller Panel and System Failure is indicated in building 280 alarm panel FCID-A.

2) Perform battery charger test: With the batteries fully charged and connected to the charger, measure the voltage across the batteries with a voltmeter. The voltage per cell shall be as specified by the equipment manufacturer.

d) Perform battery discharge test: Disconnect the battery charger, load test the batteries following the manufacturers recommendations. The voltage level shall not fall below the levels specified.

e) Verify Battery Failure is indicated on the Fire Pump Controller Panel.
Simulate battery failure by disconnecting the negative lead terminal on battery (simulates a blown fuse). Verify system alarm is indicated in building 280 alarm panel FCID-A and battery failure light is properly indicating on the Fire Pump Controller Panel.

6) Fire Alarm Panel Batteries - General Tests:

a) Visually inspect batteries for corrosion or leakage and inspect electrolyte level in lead acid batteries. Check and ensure tightness of connections.

b) Batteries shall be replaced in accordance with the recommendations of the alarm panel manufacturer or when the recharged battery voltage or current falls below the manufacturer's recommendations.

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c) 1) Verify Battery Charger Failure is indicated on the Fire Alarm Panel.

2) Perform battery charger test: With the batteries fully charged and connected to the charger, place an amp meter in series with the battery under charge. The charging current shall be in accordance with the manufacturer's recommendations for the type of battery used.

d) Perform battery discharge test: Disconnect the battery charger, load test the batteries following the manufacturers recommendations. The voltage level shall not fall below the levels specified. An artificial load equal to the full fire alarm load connected to the battery shall be permitted to be utilized in conducting this test.

e) Verify Battery Failure is indicated on the Fire Alarm Panel.

Simulate battery failure by disconnecting the negative lead terminal on battery (simulates a blown fuse). Verify battery failure alarm is indicated in building 280 alarm panel FCID-A.

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7.5.7 RESTORATION OF EQUIPMENT

7.5.7.1 Place system control valves in normal system operating position per instructions from the RFP Fire Protection Engineer.

7.5.7.2 The RFP Fire Dept. shall lock system control valves in place.