INSPECTION TECHNICAL PROCEDURE

I-138

INSPECTION OF FIRE PROTECTION SYSTEM INSPECTION, TESTING, AND MAINTENANCE

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INSPECTION TECHNICAL PROCEDURE I-138, REV. 0
INSPECTION OF FIRE PROTECTION SYSTEM INSPECTION, TESTING AND MAINTENANCE

1.0 PURPOSE

This inspection procedure provides guidance for assessing the Contractor's program and implementation covering the fire protection system inspection, testing, and maintenance activities. This guidance is based on the requirements set forth in the Safety Requirements Document (SRD), Section 4.5.

This procedure assesses the adequacy and effectiveness of the following:

- The program and procedures governing the inspection, testing, and maintenance of fire protection systems
- Implementation activities for the inspection, testing, and maintenance program
- Training and qualification of personnel
- System of records.

2.0 OBJECTIVES

This inspection procedure verifies the Contractor has established and implemented effective programs and procedures for testing, inspection, and maintenance of fire protection systems and verifying operability of fire protection systems in structures important-to-safety at the River Protection Project Waste Treatment Plant (RPP-WTP). This includes addressing programs for the following: (1) establishing and implementing commitments regarding programs and plans related to the above, and (2) managing and providing oversight to ensure that the above commitments are implemented effectively.

This inspection procedure is designed for use as a component of a complete construction inspection program. This and other inspection procedures will be used on an ongoing basis, as needed, to provide assurance that construction activities are being conducted as required by authorization basis commitments and Contractor procedures. Although it is expected during the construction phase that a significant portion of this procedure will be accomplished at least once for each major contractor/subcontractor involved with the activities addressed by this procedure, it is not expected that the entire procedure will be completed during any one inspection and/or every time the inspection procedure is used.

3.0 INSPECTION REQUIREMENTS

3.1 Assessing the Adequacy of the Contractor's Inspection, Testing, and Maintenance Implementing Procedures

3.1.1 The inspector should verify the Contractor has established an acceptable inspection, testing, and maintenance program (SRD SC 4.5-15) in accordance with the requirements of National Fire Protection Association (NFPA) 801-95, NFPA 25-92, and the NFPA standard governing each system [NFPA 13-94 (Sprinkler Systems), NFPA 14-93 (Standpipe and Hose Systems), NFPA 20-93 (Centrifugal Fire Pumps), NFPA 22-93 (Water Tanks), NFPA 24-92 (Fire Service Mains), and NFPA 72-96 (Fire Alarms)]

3.1.2 The inspector should verify the procedures provide for inspections to ensure that work activities required to be verified and documented, by the programs and procedures of paragraph 3.1.1, above, are accomplished as required by those documents and applicable NFPA standards. (SRD SC 4-5.15, 18, and 19)

3.1.3 The inspector should verify the Contractor has established procedures for ensuring that craft and inspection personnel performing work implementing the programs and procedures of paragraph 3.1.1, above, are qualified to perform their assigned work as required by the applicable NFPA standard. (SRD SC 4-5.15)

3.2 Assessing the Implementation of the Contractor's Fire Protection System Inspection, Testing, and Maintenance Activities

The inspector should verify the work implementing the fire protection system inspection, testing, and maintenance requirements is being accomplished under controlled conditions in accordance with the applicable NFPA standard requirements, above, and as implemented by the Contractor’s approved procedures.

3.3 Assessing the Implementation of the Contractor's Personnel Training and Qualification Program

The inspector should verify the craft and inspection and testing personnel involved in the performance of activities implementing the requirements of the programs being inspected are trained and qualified, as required by the applicable NFPA standards, above, and as implemented by the Contractor’s approved procedures, to perform their job functions. (SRD SC 4.5-15)

3.4 Assessing the Contractor's Implementation of the Records System

The inspector should verify those records demonstrating the achievement of required fire protection activities are as specified by NFPA standards, above, and as implemented by the Contractor’s approved procedures; reviewed for accuracy and assurance that the recorded

information meets project requirements; approved; and sufficiently stored and maintained to support technical requirements and compliance.

4.0 INSPECTION GUIDANCE

4.1 Assessing the Adequacy of the Contractor's Inspection, Testing, and Maintenance Implementing Procedures

The Contractor is obligated to accomplish the inspection, testing, and maintenance requirements applicable to a particular system, identified in the attached tables, from the time the system is accepted and placed in service. This is applicable to systems placed in service during the WTP construction period. The inspector is expected to maintain awareness of fire protection systems that are in service during the construction period and verify, through selected inspections, that the Contractor has implemented the required inspection, testing, and maintenance requirements identified. (NOTE: In accordance with NFPA 24, Section 9-2.3.4, all hydrostatic testing of fire service mains must be witnessed by the authority having jurisdiction or the representative of the owner. In the case of the RPP-WTP, the OSR is to perform this witness function.)

4.1.1 The inspector should review the following areas as identified:

4.1.1.1 Review the Contractor's program for inspection, testing, and maintenance of fire protection systems, by performing a representative sample of the inspections specified in each of the following paragraphs, to verify that the program adequately addresses the attributes identified below. (NFPA 801-95, Section 2.5)

In particular, procedures for the following types of activities should be reviewed to ensure that they include the requirements of the NFPA 801-95, described below:

- Inspection and testing of fire protection systems, upon installation, in accordance with the applicable NFPA standard. (NFPA 801-95, Section 2-5.1)

- Periodic testing, inspection and maintenance of fire protection systems in accordance with NFPA 25-92. (NFPA 801-95, Section 2-5.2)

The following sections reference or describe the details regarding the requirements for initial and periodic inspection, testing, and maintenance applicable to each system type. A thorough performance of each section would require a large investment of resources. The inspector should sample the equipment specified by each Table and perform the required inspections until a substantial level of confidence has been developed that the Contractor has performed satisfactorily in those areas.

4.1.1.2 Review the program and procedures for inspection, testing, and maintenance of sprinkler systems and verify that the inspection, testing, and maintenance requirements of Table 1, attached, have been specified by procedures. Table 1 is a summary of the requirements of NFPA 25-92, Table 2-1. The Contractor's procedures for the inspection, testing and

maintenance must be based upon manufacturer's literature providing any needed or special requirements for the specific activity.

- Verify that procedures require that gauges on dry, pre-action, and deluge systems must be visually inspected weekly to verify they are in good condition and normal air and water pressures are being maintained. Verify that procedures require that gauges on wet pipe sprinkler systems must be inspected monthly to verify they are in good condition and that normal water supply pressure is maintained.

- Verify that pre-operational testing procedures verify, following construction completion and prior to placing the system in service, proper operation of all attributes of Table 1 and, in addition, require that fire service mains (from the water supply to the system riser) and lead in connections to system risers are completely flushed before connection is made to sprinkler piping. (NFPA 13-96, Section 10-2.1)

- Verify that pre-operational test procedures require the hydrostatic testing, following construction completion and prior to placing the system in service, of all piping and attached appurtenances, subjected to system working pressure, at 200 psi while maintaining that pressure for 2 hours or at 50 psi above the maximum pressure, if maximum pressure is above 150 psi. (NFPA 13-96, Section 10-2.2) These hydrostatic testing requirements must, also be implemented during periodic hydrostatic testing throughout the life of the system.

- Verify that pre-operational test procedures require that dry pipe and double interlock systems be air tested following construction completion and prior to placing the system in service, in addition to the standard hydrostatic test, with an air pressure leakage test at 40 psi for 24 hours with an acceptance criteria of less than or equal to 1.5 psi for 24 hours. (NFPA 13-96, Section 10-2.3)

- Verify that the pre-operational test procedures require, following construction completion and prior to placing the system in service, system operational tests of water flow detection devices and associated alarm circuits, dry pipe valve alone and with a quick opening device (if installed), and automatic operation of deluge or pre-action valves in accordance with manufacturers instructions. (NFPA 13-96, Section 10-2.4)

- Verify that in-service system test procedures require that the following NFPA 13-96 tests: each hydrant be fully opened and closed under system water pressure (Section 10-2.4.5.1); all control valves be fully closed and opened under system pressure (Section 10-2.4.5.2); each pressure reducing valve on completion of installation under flow and no-flow conditions (Section 10-2.5); and each back flow prevention assembly shall be forward flow tested for proper operation (Section 10-2.6).

4.1.1.3 Review the program and procedures for inspection, testing, and maintenance of standpipe and hose systems and verify that the inspection, testing, and maintenance requirements of

Table 2, attached, have been specified by procedures. Table 2 is a summary of the requirements of NFPA 25-92, Table 3-1. The Contractor's procedures for the inspection, testing and maintenance must be based upon manufacturer's literature providing any needed or special requirements for the specific activity.

- Verify that the procedure for flow testing requires the use of the most remote hose connection of each zone of a standpipe system to verify the provision of design pressure at the required flow. (NFPA 14-96, Section 9-5.1)

- Verify that the procedure for hydrostatic testing prescribes testing at a minimum of 200 psi for 2 hours, or at 50 psi above the maximum pressure if maximum pressure is above 150 psi. The hydrostatic test must be conducted on any system that has been modified or repaired or where an inspection provides reason to believe that the system could fail to operate properly in an emergency. (NFPA 14-96, Section 9-4.1)

- Verify that test procedures require testing water flow alarm devices and supervisory devices on a quarterly basis. (NFPA 25-92, Table 3-1)

- Following construction completion and prior to placing the system in service, verify that pre-operational testing procedures verify proper operation of all attributes of Table 2 and, in addition, require that underground piping supplying the system and piping between the fire department connection and the check valve in the inlet pipe are flushed to remove any construction debris prior to the completion of the system and installation of the fire department connection. (NFPA 14-96, Section 9-2)

4.1.1.4 Review the program and procedures for inspection, testing and maintenance of fire service mains and verify that the inspection, testing and maintenance requirements of Table 3, attached, have been specified by procedures. Table 3 is a summary of the requirements of NFPA 25-92, Table 4-2.1. The Contractor's procedures for the inspection, testing, and maintenance must be based upon manufacturer's literature providing any needed or special requirements for the specific activity.

- Verify that pre-operational test procedures verify, following construction completion and prior to placing the system in service, proper operation of all attributes of Table 3 and, in addition, require flushing the service mains and lead-in connections to system risers before connection is made to system piping. The minimum flow rate shall be not less than the design water demand rate of the system or not less than 10 ft/sec, whichever is greater. (NFPA 24-95, Section 9-1)

- Verify that the pre-operational test procedures require, following construction completion and prior to placing the system in service, hydrostatic testing fire service mains at not less than 200 psi for 2 hours or at 50 psi above the maximum static pressure when that pressure is greater than 150 psi. These requirements for

hydrostatic testing are applicable to the periodic hydrostatic tests performed throughout the life of the system. (NFPA 24-95, Section 9-2.3)

4.1.1.5 Review the program and procedures for inspection, testing, and maintenance of fire pumps and verify that the inspection, testing, and maintenance requirements of Table 4, attached, have been specified by procedures. Table 4 is a summary of the requirements of NFPA 25-92, Table 5-1.1. The Contractor's procedures for the inspection, testing, and maintenance must be based upon manufacturer's literature providing any needed or special requirements for the specific activity.

- Verify that the Contractor has established a preventive maintenance program on all components of the pump assembly in accordance with manufacturer's recommendations and that records are maintained on all work performed on the pump, driver, controller, and auxiliary equipment. In the absence of manufacturer's recommendations for preventive maintenance, verify that the procedures implement the requirements of NFPA 25-92, Table 5-5.1. (NFPA 25-92, Section 5.5)

- Verify that pre-operational test procedures verify, following construction completion and prior to placing the system in service, proper rotation, alarm operation, indicator operation, electric pump controller operation, diesel driver operation, and other tests that ensure that the entire pump system meets design criteria. The pre-operational test procedure should verify proper operation of all attributes of Table 4. The inspector is encouraged to refer to NFPA 20-99 for a complete listing of attributes and acceptance criteria.

4.1.1.6 Review the program and procedures for inspection, testing, and maintenance of water storage tanks and verify that the inspection, testing, and maintenance requirements of Table 5, attached, have been specified by procedures. Table 5 is a summary of the requirements of NFPA 25-92, Table 6-1.1. The Contractor's procedures for the inspection, testing, and maintenance must be based upon manufacturer's literature providing any needed or special requirements for the specific activity.

- Verify that the pre-operational test procedure for the tanks ensures that, following construction completion and prior to placing the system in service, the tanks are clean prior to filling; tank interior surface conditions are as specified by design; all valves operate as the designer intended; all indicators and alarms operate in accordance with specifications; all tank openings are closed and secured; tank integrity is maintained after filling; and vacuum breakers and relief valves operate as designed. The pre-operational test procedure should verify proper operation of all attributes included in Table 5.

4.1.1.7 Review the program and procedures for the inspection, testing, and maintenance of fire protection system valves, valve components, and trim and verify that the valve inspection, testing, and maintenance requirements of Tables 1 through 5, attached, have been specified by procedures. The requirements for valves, valve components, and trim, in Tables 1 through 5, are a summary of the requirements of NFPA 25-92, Table 9-1.

The Contractor's procedures for the inspection, testing, and maintenance must be based upon manufacturer's literature providing any needed or special requirements for the specific activity.

- Verify that the pre-operational test procedures for valves, valve components, and trim verify, following construction completion and prior to placing the system in service, the proper operation of the specific equipment in accordance with manufacturer's requirements and the designer's intent.

4.1.1.8 Review the program and procedures for the inspection, testing, and maintenance of the fire protection alarm system and verify that the inspection, testing, and maintenance requirements of Table 6, attached, have been specified by procedures. Table 6 is a summary of the requirements of NFPA 72-99, Tables 7-3.1, and 7-3.2.

- Verify that the pre-operational test procedures for fire protection alarm systems verify, following construction completion and prior to placing the system in service, the proper operation of the specific equipment in accordance with manufacturer's requirements and the designer's intent.

4.1.2 Review the Contractor's procedures providing for fire protection system testing, inspection, and maintenance to verify that procedures provide for inspections to ensure that work activities required to be verified and documented, by the programs and procedures of paragraph 4.1.1, above, are accomplished as required by those documents and applicable NFPA standards.

4.1.3 No additional guidance is necessary.

4.2 Assessing the Implementation of the Contractor's Fire Protection System Inspection, Testing, and Maintenance Activities

The inspector should conduct the inspections required by this section to verify that the attributes identified in Sections 4.1.1.1 through 4.1.1.8, above, have been implemented by the Contractor in the conduct of that activity. Before performing work observation inspections in the field, the inspector should review the Contractor's procedures for accomplishing the particular inspection, testing, and maintenance activities planned for observation and the NFPA standards, as specified above, applicable to the activity to be observed. During the field observations, the inspector should carry a copy of the procedure(s) and the industry standard(s) pertinent to the planned observations.

During the field observations, the inspector should interview a sample of the craft and QC personnel performing the observed activities. The interviews should focus on determining whether job and procedure knowledge is satisfactory. The names and job functions of those interviewed should be obtained for later use in verifying proper implementation of personnel qualification requirements as specified in Sections 4.3 and 4.4, below.

4.2.1 Perform the following inspections in the field to verify the areas identified.

Tables 1 through 6 identify inspection, test, and maintenance requirements for fire protection system components, excerpted from NFPA-25. The inspector should sample requirements from the tables for observation in the field and vary the sample each time field observations in this area are planned. The goal is that over time all table attributes would be observed. It is unrealistic to expect an inspector to observe all of the table attributes during a single inspection

Visual inspections of equipment usually accomplish one or more of the attributes detailed in the following paragraph. During tours of the facility, the inspector should be mindful of and conduct most of the visual inspection examples identified in the next paragraph.

- Visual Inspection

  Visual inspections generally examine and verify, as applicable, that: valve hand wheels are not missing; valves are in the required position and sealed, locked, or supervised, as required; the equipment is accessible; appropriate wrenches are provided; appropriate identification is provided; the equipment is free of external leaks and physical damage; gauges indicate within the normal range for the parameter being monitored; the equipment is free of damaging corrosion; hoses and nozzles are free of damage and properly stowed; portable fire extinguishers are charged and the tag documents the completion of required fire department inspections; fire doors are not propped open and are in good physical condition; equipment hangers and supports are not damaged or loose; piping systems are in good condition, and free of leaks, mechanical damage, corrosion and misalignment; alarm devices are free of physical damage; equipment power lights indicate properly and are not damaged; oil level sight glasses are not damaged and indicate in the normal range; and area drains are free of obstructions which could prevent proper operation and the areas are free of material which could migrate over the drain under flooding conditions and block the drain.

4.2.1.1 No additional guidance is necessary.

4.2.1.2 Determine when the Contractor will perform sprinkler system inspection, testing, and maintenance activities, selected from Table 1, attached, and make arrangements to observe and inspect the performance of a sample. Verify that the activities are performed and inspected as required by procedures.

- Visually inspect at least one sprinkler system installation using the attributes of Section 4.2.1, above

- Observe the performance of a sample of the pre-operational testing identified in Section 4.1.1.2, above, and verify that the testing conforms to procedure requirements.

4.2.1.3 Determine when the Contractor will perform standpipe and hose system inspection, testing, and maintenance activities, selected from Table 2, attached, and make

arrangements to observe and inspect the performance of these tests. Verify that the activities are performed and inspected as required by procedures.

- Observe the pre-operational and hydrostatic testing identified in Section 4.1.1.3, above, and verify that the testing activities are performed and inspected as required by procedures.

4.2.1.4 Determine when the Contractor will perform fire service main system inspection, testing, and maintenance activities, selected from Table 3, attached, and make arrangements to observe and inspect the performance of a sample. Verify that the activities are performed and inspected as required by procedures.

- Observe a sample of the pre-operational testing identified in Section 4.1.1.4, above, on fire service mains and verify that the testing activities are performed and inspected as required by procedures.

4.2.1.5 Determine when the Contractor will perform fire pump inspection, testing, and maintenance activities, selected from Table 4, attached, and make arrangements to observe and inspect the performance of a sample. Verify that the activities are performed and inspected as required by procedures.

- Observe a sample of the pre-operational testing identified in Section 4.1.1.5, above, on fire service mains and verify that the testing activities are performed and inspected as required by procedures.

4.2.1.6 Determine when the Contractor will perform water storage tank inspection, testing and maintenance activities, selected from Table 5, attached, and make arrangements to observe and inspect the performance of a sample. Verify that the activities are performed and inspected as required by procedures.

- Observe a sample of pre-operational testing on water storage tanks identified in Section 4.1.1.6, above, and verify that the testing activities are performed and inspected as required by procedures.

4.2.1.7 Determine when the Contractor will perform fire protection system valve inspection, testing, and maintenance activities, selected from Tables 1 through 5, attached, and make arrangements to observe and inspect the performance of a sample. Verify that the activities are performed and inspected as required by procedures.

4.2.1.8 Determine when the Contractor will perform fire alarm system inspection, testing, and maintenance activities, selected from Table 6, attached, and make arrangements to observe and inspect the performance of a sample. Verify that the activities are performed and inspected as required by procedures.

4.3 Assessing the Implementation of the Contractor's Personnel Training and Qualification Program

The inspector should review the Contractor's procedures that specify the requirements for education, experience, training, and certification of craft and inspection personnel performing and verifying the activities inspected in Section 4.2, above. If not accomplished during performance of activities in Section 4.2, the inspector should interview and collect the names of at least the following personnel:

- Two crafts-persons performing fire protection system inspection, testing, and maintenance activities

- Two personnel involved in the inspection and verification activities of fire protection system inspection, testing, and maintenance.

During the interviews, the inspector should verify that the respective personnel are sufficiently knowledgeable of applicable procedural requirements.

The inspector also should examine the training and qualification records of the craft and QC personnel interviewed. The inspector should determine whether the records demonstrate conformance to the Contractor's requirements for personnel training, qualification, and certification.

4.4 Assessing the Contractor's Implementation of the Records System

The inspector should sample and examine the completed records that were generated during the fire protection activities observed in Section 4.2. This inspection should focus on verifying that the records conform to applicable procedures and to applicable procedure and NFPA standard requirements.

The records for fire protection system construction and testing activities, and for the training and qualification of personnel, should be examined to verify approval by proper authority; storage and maintenance in accordance with procedural requirements; and the acceptable performance of the documented activity.

5.0 REFERENCES

DOE-STD-1066-99, *DOE Standard Fire Protection Design Criteria*, July 1999 (Superceding the 1997 Edition).

DOE G-440.1, *Implementation Guide for use with DOE Orders 420.1 and 440.1 Fire Safety Program*, September 30, 1995.

NFPA 13, *Standard for the Installation of Sprinkler Systems*, 1996 Edition.

NFPA 14, *Standard for the Installation of Standpipe and Hose Systems*, 1996 Edition.

NFPA 20, *Standard for the Installation of Centrifugal Fire Pumps,* 1996 Edition.

NFPA 22, *Standard for Water Tanks for Private Fire Protection*, 1996 Edition.

NFPA 24, *Standard for the Installation of Private Fire Service Mains and their Appurtenances*, 1995 Edition.

NFPA 25, *Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems*, 1998 Edition.

NFPA 72, *National Fire Alarm Code*, 1996 Edition.

NFPA 801, *Facilities Handling Radioactive Materials*, 1995 Edition.

Safety Requirements Document, BNFL-5193-SRD-01, Volumes I and II, Rev. 2 and 3, respectively, BNI, 1998 and 2000, respectively.

6.0 LIST OF TERMS

NFPA	National Fire Protection Association
RPP-WTP	River Protection Project Waste Treatment Plant
SC	Safety Criteria
SRD	Safety Requirements Document

Attachments:
Table 1 - 6

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Table 1. Sprinkler System Inspection, Testing, and Maintenance

Item	Activity	Frequency	NFPA-25 Reference
Gauges (dry, pre-action deluge systems)	Inspection	Weekly	2-2.4.2
Control valves	Inspection	Weekly	9-3.3.1
Alarm devices	Inspection	Quarterly	2-2.6
Gauges (wet pipe systems)	Inspection	Monthly	2-2.4.1
Hydraulic nameplate	Inspection	Quarterly	2-2.7
Buildings	Inspection	Annually (prior to freezing weather)	2-2.5
Hangers/seismic bracing	Inspection	Annually	2-2.3
Pipe and fittings	Inspection	Annually	2-2.2
Sprinklers	Inspection	Annually	2-2.1.1
Spare sprinklers	Inspection	Annually	2-2.1.3
Fire department connections	Inspection	Quarterly	9-7.1
Valves (all types)	Inspection	Various	Table 9-1
Alarm devices	Test	Quarterly	2-3.3
Main drain	Test	Annually	9-2.6, 9-3.4
Anti-freeze solution	Test	Annually	2-3.4
Gauges	Calibrate	5 years	2-3.2
Sprinklers (extra high temp)	Test	5 years	2-3.1.1
Valves (all types)	Maintenance	Annually (clean, lubricate, operate)	9-3.5, 9-4.3.3.2, 9-4.4.3.2
Obstruction investigation	Maintenance	5 years	Chapter 10

Table 2. Standpipe and Hose System Inspection, Testing, and Maintenance

Item	Activity	Frequency	NFPA-25 Reference
Control valves	Inspection		9-3.3.1
Sealed		Weekly	
Locked		Monthly	
Tamper switches		Monthly	
Pressure regulating devices	Inspection	Quarterly	9-5.1.1, 9-5.2.1, 9-5.3.1
Piping	Inspection	Quarterly	3-2.1
Hose connections	Inspection	Quarterly	9-5.3.1
Hose Cabinet	Inspection	Annually	NFPA-1962
Hose	Inspection	Annually	NFPA-1962
Hose storage device	Inspection	Annually	NFPA-1962
Water flow Alarm device	Test	Quarterly	9-2.7
Hose nozzle	Test	Annually	NFPA-1962
Hose storage device	Test	Annually	NFPA-1962
Hose	Test	5 years/3 years	NFPA-1962
Pressure control valve	Test	5 years	9-5.1.2
Pressure reducing valves	Test	5 years	9-5.2.2
Hydrostatic test	Test	5 years	3-3.2
Flow test	Test	5 years	3-3.1
Main drain test	Test	Annually	9-2.6, 9-3.4
Hose connections	Maintenance	Annually	NFPA-1962
Valves (all types)	Maintenance	Annually	9-4.3.3.2, 9-4.4.3.2

Table 3. Private Fire Service Main Inspection, Testing, and Maintenance

Item	Activity	Frequency	NFPA-25 Reference
Hose houses	Inspection	Quarterly	4-2.2.7
Hydrants (dry barrel and wall)	Inspection	Annually and after each operation	4-2.2.4
Monitor nozzles	Inspection	Semi-annually	4-2.2.6
Hydrants (wet barrel)	Inspection	Annually and after each operation	4-2.2.5
Mainline strainers	Inspection	Annually and after each significant flow	4-2.2.3
Piping (exposed)	Inspection	Annually	4-2.2.1
Piping (underground)	Inspection	Significant leaks may be revealed during five year flow testing	4-2.2.2
Monitor nozzles	Test	Annually (lubricate)	4-3.3
Hydrants	Test	Annually (flow)	4-3.2
Piping (underground and exposed)	Test	5 years (Flow test)	4-3.1
Mainline strainers	Maintenance	Annually and after each operation	4-4.2
Hose houses	Maintenance	Annually	4-4.5
Hydrants	Maintenance	Annually	4-4.3
Monitor Nozzles	Maintenance	Annually	4-4.4

Table 4. Fire Pump Inspection, Testing, and Maintenance

Item	Activity	Frequency	NFPA-25 Reference
Pump house, heating/ventilating louvers	Inspection	Weekly	5-2.2.1
Fire pump system	Inspection	Weekly	5-2.2.1
Pump operation			
No-flow condition	Test	Weekly	5-3.2.1
Flow condition	Test	Annually	5-3.3.1
Hydraulic	Maintenance	Annually	5-5.1
Mechanical transmission	Maintenance	Annually	5-5.1
Electrical system	Maintenance	Various	Table 5-5.1
Controller, various components	Maintenance	Various	Table 5-5.1
Motor	Maintenance	Annually	Table 5-5.1
Diesel engine system, various components	Maintenance	Various	Table 5-5.1

Table 5. Water Storage Tank Inspection, Testing, and Maintenance

Item	Activity	Frequency	NFPA-25 Reference
Condition and level of water in tank	Inspection	Monthly Quarterly for tanks with supervised alarms connected to an attended location	6-2.1
Water temperature	Inspection	Daily when tank is subject to freezing; weekly for tanks with low temp alarms	6-2.9
Heating system	Inspection		6-2.8
Control valves	Inspection	Weekly; locked or supervised valves – monthly	9-3.3.1
Air pressure	Inspection	Monthly; quarterly for tanks with a supervised air pressure source	6-2.7
Tank exterior, vents, foundation, support structure, catwalks, and ladders	Inspection	Quarterly	6-2.2
Surrounding area	Inspection	Quarterly	6-2.3
Painted/coated surfaces	Inspection	Annually	6-2.6
Expansion joints	Inspection	Annually	6-2.10
Tank interior	Inspection	5 years; 3years for steel tanks w/o corrosion protection or pressure tanks	6-2.4
Check valves	Inspection	5 years	9-4.2.1
Temperature alarms	Test	Monthly	6-3.3
High water temperature limit switches on tanks with heating systems	Test	Monthly when heating system is in service	6-3.4
Water level alarms	Test	Semi-annually	6-3.5
Level indicators and pressure	Test	5 years	6-3.1

Item	Activity	Frequency	NFPA-25 Reference
gauges			6-3.6
Drain sediment	Maintenance	Semi-annually	6-4.3
Cathodic protection	Maintenance	Annually	6-4.5
Cycle drain valves	Maintenance	Annually	6-4.8
Vent screens	Maintenance	Annually	6-4.9
Control valves	Maintenance	Annually	9-5.1

Table 6. Alarm System Inspection, Testing, and Maintenance

Item	Activity	Frequency
Control equipment for monitored alarm, supervisory and trouble signals such as fuses, lamps, LEDs, and main power supply	Visually inspect	Annually
	Test	Annually
Control equipment for unmonitored alarm, supervisory and trouble signals such as fuses, lamps, LEDs, and main power supply	Visually inspect	Weekly
	Test	Quarterly
Batteries for fire alarm systems		
1. Lead-Acid	Visually inspect	Monthly
a. Charger	Test	Annually
b. 30 min discharge	Test	Monthly
c. Load voltage	Test	Monthly
d. Specific gravity	Test	Semiannually
2. Ni-Cad	Visually inspect	Semiannually
a. Charger	Test	Annually
b. 30 min discharge	Test	Annually
c. Load voltage	Test	Semiannually
Control unit trouble signals	Visually inspect	Weekly
	Test	Annually
Emergency voice/alarm communications equipment	Visually inspect	Semiannually
	Test	Annually
Remote annunciators	Visually inspect	Semiannually
	Test	Annually
Initiating devices		
1. Duct detectors	Visually inspect	Semiannually
	Test	Annually
2. Electromechanical releasing devices	Visually inspect	Semiannually
	Test	Annually
3. Fire extinguishing systems/suppression system switches	Visually inspect	Semiannually
	Test	Annually
4. Fire alarm boxes	Visually inspect	Semiannually
	Test	Annually
5. Heat and smoke detectors	Visually inspect	Semiannually
	Test	Annually
6. Radiant energy fire detectors	Visually inspect	Quarterly
	Test	Semiannually

Item	Activity	Frequency
7. Water flow devices	Visually inspect and test	Semiannually
8. Supervisory signal devices	Visually inspect and test	Quarterly
9. Supervising station alarm system transmitters	Visually inspect Test	Semiannually Annually
10. Supervising station alarm receivers	Visually inspect Test	Semiannually Monthly