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WASTE ISOLATION PILOT PLANT

FIRE PROTECTION SYSTEM (FP00)

SYSTEM DESIGN DESCRIPTION (SDD)

SDD-FP00

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5	07/01	Section 1 Section 2 Appendix E All Sections – Format Changes	ECO No. 9761
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8	5/05	Section 3.1.6.1 Appendix D	ECO No. 11296
9	1/06	Section 2.1	ECO No. 11320
10	4/06	Section 3.1.6.1 Appendix D	ECO No. 11418
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12	09/10	Section 1.1.6	ECO 12130
13	12/10	Section 1.2.2 Section 2.3.2.1.2 Section 1.2.2 Appendix F	ECO 12377 Addendum 1 ECO 12444

1.0 SYSTEM DESCRIPTION

The following is a general narrative of the overall system. Detailed information concerning system configuration and specific components is provided in the component indices, drawings and equipment/system files maintained in the Engineering File Room.

The Fire Protection System (FP00) consists of four subsystems, which form a part of the WIPP Site's overall Fire Protection Program. The subsystems are:

- Fire Water Supply and Distribution System (FP01)
- Fire Suppression System (FP02)
- Fire Detection and Alarm System (FP03)
- Radio Fire Alarm Reporter (RFAR) System (FP04).

All major components are Underwriters Laboratory (UL) Listed and/or Factory Mutual (FM) Approved for fire protection service.

1.1 Fire Water Supply and Distribution system (FP01)

The Fire Water Supply and Distribution System draws water from the water storage tanks of the Water Distribution System, normally the south tank (25-D-001A), and provides fire water at the design pressure and quantity to the yard fire hydrants and the automatic wet pipe sprinkler systems (FP02). The boundaries for the system are the nozzles on the water storage tanks and the first above ground connections (flange, union, etc.) to all sprinkler systems.

1.1.1 Fire Water Supply System

The Fire Water Supply System consists of two fire pumps and a jockey pump, their controllers, and necessary piping and valves. The system is located within the Water Pumphouse. The system layout is shown on controlled drawing 45-S-012-W.

1.1.2 Fire Pumps

The system contains two 100% capacity fire pumps, one electric motor driven and one diesel engine driven. Each pump is rated for 1500 gpm at 125 psi net discharge pressure. Both pumps have a Patterson 8" x 6" Type MABS, centrifugal pump end. The electric fire pump uses a TEFC motor, rated at 200 HP at 1770 RPM. The diesel fire pump uses a Clark GM diesel engine, rated at 188 BHP at 1750 RPM. To aid the engine in starting, the engine cooling water is thermostatically controlled by an electrical heater to maintain the cooling water temperature at approximately 100° F.

The electric fire pump is provided with a "circulation" relief valve, set to relieve at a pressure below the pump's no-flow discharge pressure at minimum expected suction pressure. This ensures water flow through the pump for cooling purposes during no-flow operation. The relief valve has a set point of 140 PSIG, which is approximately 10 PSIG below the pump's no-flow discharge pressure.

The diesel fire pump is provided with a relief valve which protects the system from over pressure. The relief is set to relieve at the system's maximum working pressure of 175 PSIG.

The diesel fire pump receives its fuel from a 250 gallon storage tank located in the Water Pumphouse.

1.1.3 Jockey Pump

The jockey pump is a Webtrol Industry pump, Model M10B14, used for pressure maintenance of Subsystems FP01 & FP02. The pump is a centrifugal-type and has a capacity of approximately 10 gpm at a discharge pressure of 125 PSIG. The pump's motor uses 3-phase, 480 V, 60 Hz power and is rated for 1-1/2 HP at 3450 RPM.

1.1.4 Pump Controllers

The electric fire pump is controlled by a Firetrol Model FTA 1000 combined manual and automatic fire pump controller. The controller is free standing and is rated for 3 Phase, 60 cycle, 460 Volt, 200 HP operation. Located inside the controller is a pressure switch which provides the signals for the automatic operation of the pump. The controller also has start/stop push buttons and an emergency run lever which bypasses the controller's control circuitry.

The normal power supply for the electric fire pump is provided by Substation #4. When required, the pump can be supplied power from the Backup Power Supply System.

The diesel fire engine is controlled by a Firetrol FTA1100 combined manual and automatic engine controller. The controller is designed for dual battery, negative 12 volt operation, and has two built-in battery chargers. Located inside the controller is a pressure transducer which provides the signals for the automatic operation of the pump. The controller also has push buttons for manual start/stop operation.

The jockey pump is controlled by a Firetrol FTA500 combined manual and automatic pump controller. Located inside the controller is a pressure switch which provides the signals for the automatic operation of the pump. The controller also has a Hand-Off-Auto switch for manual control of the pump.

1.1.5 Valves and Piping

The system's piping configuration allows for the system to be supplied water from either Water Storage Tank. The piping configuration also allows either fire pump to be removed from service without impacting the operation of the other fire pump.

Additionally, the fire pumps can discharge through either pipe line exiting the Pumphouse via the discharge piping cross-connect. This cross-connect also allows either pump to use the “test header” and the recirc pipe back to the south storage tank.

To avoid an unprotected cross-connect with the Domestic Water/Utility System (WD01), which uses the north water storage tank as its supply source, the fire water suction piping to the north water storage tank contains a spool piece, which is normally not installed. The spool piece is installed when it is necessary to utilize the water in the north tank as source of fire water.

Six fire hose valves are manifolded to form the "test header." The valves are located at the Water Pumphouse's north wall and are available for annual flow testing of the fire pumps.

The system's piping layout originally provided for the return of water used during fire pump testing to the south Water Storage Tank. Located in the piping was an orifice plate and a local flow meter. Due to insufficient straight pipe lengths into the orifice plate, the installation was removed. The recirc line was eventually blanked due to excessive water leakage pass the line's control valve.

1.1.6 Fire Water Distribution System

The Fire Water Distribution System consists of buried distribution piping, post indicator valves (PIVs), and fire hydrants. The distribution piping is buried approximately 4-ft to 6-ft below grade. The system layout is shown on controlled drawing 24-C-048-W.

The main distribution piping is installed in three piping loops, with branch lines supplying fire hydrants and building sprinkler systems. The main piping is 10 inches in diameter, and branch lines are 6 inches in diameter, with some few exceptions where 4" piping is used. All of the piping is PVC per AWWA C900, Class 200.

A PIV is a buried gate valve with an attached, above ground operator post, which also provides valve position indication. A PIV is installed in every branch line to a building sprinkler system. PIVs are also installed in the main piping to provide sectional control. These PIVs are spaced to minimize the impact (fire hydrants and sprinkler systems removed from service) of a break in the main piping.

Two branch lines, separated by a sectional valve, supply the RH Bay sprinkler system of the Waste Handling Building. This arrangement ensures a supply of water to the sprinkler system should the section valve need to be closed to isolate a section of the loop piping.

Fire hydrants are provided throughout the yard at approximately 300 foot intervals. Each hydrant is provided with an isolation valve in its branch line. The valves are the gate type, and are accessed via a roadside valve box, using a "T" handle wrench.

The fire hydrants are the "Traffic Model" type, which, when struck, break at the break off section flange, which is located above grade. The portion of the hydrant above this flange will break away without water loss or damage to the remainder of the hydrant.

The fire hydrants are the dry barrel type per AWWA C502, which ensures the hydrants do not freeze during cold weather.

1.2 Fire Suppression System (FP02)

The Fire Suppression System consists of four different types of suppression: automatic wet-pipe sprinkler systems (selected surface structures); dry chemical extinguishing system (underground fuel station); wet chemical extinguishing system (Building 458 kitchen); and portable fire extinguishers throughout the surface and underground.

Halon is no longer used as an extinguishing agent. All Halon extinguishing systems have been removed from service and all Halon storage tanks have been removed. In the CMR/CR of Building 451, the Halon system distribution piping has been abandoned in place.

1.2.1 Sprinkler Systems

The wet pipe sprinkler system is the principal above ground fire suppression system. It actuation is totally mechanical, by fusible sprinklers, and requires no electrical signal or power.

All wet pipe sprinkler systems have been designed and installed in accordance with the NFPA 13, except for those systems installed in small office trailers, which were designed and installed in accordance with NFPA 13D. The buildings and facilities protected with a sprinkler system are listed in Appendix F.

A wet pipe sprinkler system consists of a fix piping network with installed fusible sprinklers. The system also has a main drain, a pressure gage, a water flow detection device, and an Inspectors Test Connection. Additional sprinkler system features may include an isolation valve, and alarm check valve, a water motor gong, and a fire department connection.

Sprinkler systems are maintained full of water and pressurized by the Fire Water Distribution System (FP01). When a fire occurs, the heat produced will fuse one or more sprinklers in the area, causing water to flow through these sprinklers. This water flow will activate the sprinkler system water flow device, which will send a signal to the local fire panel, causing an annunciator to alarm and an alarm signal to be sent to the CMR. The sprinkler system will continue to flow until it is shut off manually.

A majority of sprinkler systems with an alarm check valve have a relief valve installed downstream of the check to maintain system pressure at or below 175 psig, which is the designed working pressure of the systems. The relief valves protect the piping from high pressures due to pressure surges and thermal expansion of the trapped water.

In the Waste Handling Building, a firewater supply extension has been installed between the CH Bay sprinkler system riser and the OP&RR sprinkler riser. The extension was installed to allow the CH Bay sprinkler system to be supplied firewater by the firewater supply to the OP&RR sprinkler system while the yard piping to the CH Bay sprinkler system was replaced. The extension is normally in use, providing a redundant water supply to both sprinkler systems.

1.2.2 U/G Dry Chemical Extinguishing System

A dry chemical extinguishing system is installed at the U/G fuel station. The system was designed and installed in accordance with NFPA 17. A schematic arrangement of the system is shown on controlled drawing 53-S-002-W.

The system consists of two skid-mounted units, one for the fueling area and the other for the alcove housing the fuel containers. Each unit is designed for 100% design capacity of their designated area and consists of the following: a storage tank of dry chemical agent, a high pressure nitrogen storage cylinder, a releasing device, and corresponding piping. Each unit uses their own bank of spray nozzles.

Each storage tank contains 500 lbs of dry chemical extinguishing agent, for a total of 1,000 lbs, sufficient to fully flood the volume of the fuel station with a suspension of the dry chemical powder at a density to enable rapid extinguishment.

The system is automatically actuated by thermal detectors (FP03) or can be manually activated locally (FP03).

Upon receiving an activation signal, the releasing devices use a mechanical puncture pin and stored pressure nitrogen cartridge to release pressure to pneumatically open the quick-opening valves. With both valves open, nitrogen under 1750 psig pressure, or greater, in the nitrogen storage cylinders is simultaneously released to the dry chemical storage tanks. This creates a homogeneous mixture of the nitrogen gas and dry chemical agent, as the nitrogen surges through the dry chemical in the storage tank.

As a result, it also causes the agent storage tank to pressurize rapidly. The units are designed to expel this mixture of dry chemical and nitrogen expellant at a high velocity when the agent storage tank is pressurized and burst disc ruptures. The arrangement of the spray nozzles is designed to achieve an even distribution of the extinguishing agent within the space of the protected fuel station.

1.2.3 Kitchen Wet Chemical System

The kitchen of the Guard and Security Building is provided with a wet chemical suppression system. The schematic arrangement of the system is shown on controlled drawing 45-S-006-W. The system provides fire protection for the appliance area ventilating hoods and ducts, and for the kitchen appliances. The system is designed and installed in accordance with NFPA 17A and NFPA 96.

The system is designed for both automatic and manual operation. Automatic operation of the system is controlled by means of fusible links. Separation of the fusible link in the event of a fire causes the wire rope line to relax, which actuates the agent releasing device. Manual operation is via a pull station (FP03) which also causes the wire rope to relax, resulting in the release of the suppression agent. Automatic or manual actuation of the system will activate the local fire panel and provide notification via the local fire panel (FP03).

Actuation of the system also automatically trips a circuit breaker to shut off the electrical power supply to the appliances.

1.2.4 Portable Fire Extinguishers

Portable fire extinguishers are provided throughout the WIPP site, both on the surface and in the U/G, for the purpose of manual fire fighting. The location, size, and specific type of portable fire extinguishers is in accordance with NFPA 10.

1.3 Fire Detection and Alarm System (FP03)

The Fire Alarm and Detection System is a proprietary signaling system comprised of a number of Protected Premises fire alarm systems which signal a centralized, continuously manned location (CMR) or, where deemed acceptable, provide only a local alarm.

The Protected Premises (local) fire alarm systems initiate an audible alarm and visual indication at the protected premises as the result of the manual operation of manual pull stations or the automatic operation of detection devices such as smoke detectors, thermal detectors, flow devices, or pressure switches. Except for certain locations where only a local alarm is necessary, the system sends a signal to the CMR for follow up action. The location of the fire alarm and detection systems are listed on controlled drawing 73-S-001-W.

In addition to the local fire alarm systems, a number of stand alone spot smoke detectors with audible alarms are employed throughout the site, mainly in temporary trailers.

The fire alarm and detection systems installed in the underground area are comprised of fire panels, thermal detectors and manual pull stations. The operation of the systems are the same as the surface with one added feature: When detectors or manual pull stations are activated, an evacuation alarm is also activated along with notification to the CMR.

The configuration of the systems is provided on fire alarm system drawings, which delineates the inputs and outputs of each fire panel with initiating and alarming devices.

In general, a major fire detection and alarm system will employ some of the following devices:

- Fire (control) Panel
- Sprinkler System Pressure Switch
- Smoke Detector
- Thermal Detector
- Manual Pull Station
- Sprinkler System Flow Switch
- Audible Alarm
- Visual Alarm
- Component Trouble Alarm Circuits
- Information Outputs to CMR
- Information Inputs from Components

The U/G Fuel Station has a fire detection and alarm system dedicated only to this location. The system is also used to control the fuel station's automatic dry chemical fire suppression system (FP02).

When any one of the fire input signals is received, visual and audible alarms are activated and the chemical discharge is initiated. Fault and alarm signals are sent to the CMR.

1.3.1 Fire Panels

Each fire panel at the site is a procured, engineered packaged unit designed to receive signals from automatic and manual fire alarm devices and in most cases supply power to detection devices. It provides power to the notification appliances, local annunciators, and visual alarms at the panel and at various remote locations.

Each fire panel monitors the devices and wiring connections in its system for integrity so that an open or ground fault condition is automatically indicated.

1.3.2 Smoke Detectors and Projected Beam

Smoke detectors fall into three general categories: photoelectric, ionization, and projected beam. The photoelectric smoke detector employs a light source and a photocell. They are both arranged in a manner that no direct light and practically no outside reflected light can reach the photocell. Smoke particles entering the detector are illuminated by the light source and the scattered light from the smoke particles activates the photocell. Electronic amplifiers provide a smoke detector output signal, which closes a set of contacts.

The ionization smoke detector has two electrodes connected to a DC voltage; the space between these electrodes is ionized by alpha particles emitted by the radioactive source Americium. The ions, positively and negatively charged gas molecules, travel towards the respective electrodes with a velocity determined by the size of the molecule and the

field electrical strength. If aerosols (floating particles generated by a fire) enter the sensing chamber, the ions to which they adhere will become heavier; therefore, the travel velocity and thus also the ionization electrical current will be reduced. Electronic amplifiers sense the current reduction and provide the smoke detector output, which close a set of contacts.

Projected beam detectors consist of a transmitter that projects an infrared beam across the protected area to a receiver containing a photosensitive cell, which monitors the signal level of the light beam. The detector works on the principle of light obscuration. Beam detectors are sensitive to the cumulative obscuration presented by a smoke field.

1.3.3 Manual Pull Stations

The fire alarm manual pull stations are simple electrical contact making devices. Some just require a pull motion (single action) and some require a push and then pull action (double action). A special tool is used for resetting of most of the fire alarm pull stations.

1.3.4 Signaling Devices

Signaling devices consist of bells and flashing strobe lights or a combination of the two.

1.4 Radio Fire Alarm Reporter (RFAR) System (FP04)

The RFAR System is a proprietary signaling system comprised of Fire Alarm Transmitters (FTR) that relay alarm and trouble signals, via an FM signal, to centrally located dual Fire Alarm Receiver (FAR) Consoles. At the core of FAR consoles is a computer operating on software specifically designed to process the radio alarm signals. The FAR consoles are located in the CMR.

FTRs are connected to the fire panel of the building it protects. Components associated with an FTR are: a transmitter, antenna, and batteries.

The location of FTRs is listed on drawing 73-S-002-W.

Each FAR console is comprised of a computer terminal and ancillary devices. Components associated with each FAR console are as follows:

- Display/monitor
- Decoder (IBM-PC)
- Printer
- FM Receiver
- Antenna
- Parallel/Serial Converter

In the event of a power failure, the system incorporates central UPS system backup power for the FAR consoles and 24-hour battery backup power for the FTRs.

In the event a transmitter, receiver, or fire panel fails, a trouble signal will emanate in the CMR so that proper maintenance can be performed with a minimum loss of down time.

2.0 DESIGN REQUIREMENTS

The following design requirements must be maintained during any Fire Protection System modification and reestablished following any maintenance performed on the system.

2.1 General Design Requirements

The functional classifications are defined in the Documented Safety Analysis (DSA) and the General Plant Design Description (GPDD).

2.1.1 The Fire Protection System is required to be designed in conformance with the design criteria set forth in DOE ORDER 420.1, Facility Safety; DOE-STD-1066-99, Fire Protection Design Criteria, and 30 CFR, Part 57, Mine Safety and Health Administration, Health and Safety Standards for Metal and Nonmetallic Underground Mines.

2.1.2 Water (automatic sprinkler systems) shall be the principal above ground fire suppressant. Provisions for special hazards shall be designed as needed. Provisions for U/G fire protection shall preclude the use of water. Halon shall not be considered for use as a fire suppressant due to its environmental impacts. Interior building fire hose stations are not required to be provided.

2.1.3 The Fire Protection System shall be designed to provide optimum performance in the control and extinguishment of the maximum credible fire. The system shall be conservatively sized to allow for future modifications and system expansion.

2.1.4 The Fire Protection System shall be designed such that, where possible, failure of any one component will not disable the entire Fire Protection System.

2.1.5 Components, equipment and materials used in the Fire protection system shall be listed or approved by Underwriters Laboratories, Inc. (UL) and/or Factory Mutual Research Corporation (FM).

2.1.6 The Fire Protection System shall have a design operating life of 25 years. Equipment and components which may fail or require replacement during this period shall be designed for ease of maintenance.

2.1.7 The Fire Protection System shall be designed and installed such that satisfactory protection is provided between the temperature extremes of -17 F and 111 F, appropriate to the installed environment. Heaters or trace heat is used to protect components from freezing.

2.1.8 Fire panels and instrumentation and control equipment shall operate satisfactorily under relative humidity from 10% to 95%.

2.1.9 Fire Protection System equipment located in the U/G shall be designed for operation in a dusty salt environment.

2.1.10 Fire suppression systems utilizing a gas discharge shall be designed such that storage containers are located near the protected hazard area to avoid long runs of discharge piping.

2.1.11 The design and layout of the fire protection system shall provide appropriate indication and measurement, provide for appropriate testability, and ensure the accessibility to all components to facilitate periodic inspections and testing of the system, as required, to ensure the system remains capable of functioning properly when required.

2.1.12 Information related to the status of the Fire Protection System shall be displayed locally and shall be transmitted to the CMR.

2.1.13 Instrumentation and control equipment shall be designed to operate at 120V AC, 60 Hz, single-phase. Control power shall be supplied from a 120V AC instrument bus and backed up by a backup power supply.

2.2 Subsystem FP01 Design Requirements - Fire Water Supply And Distribution System

2.2.1 Fire Water Supply System

2.2.1.1 The system shall be designed and installed in accordance with NFPA 20.

2.2.1.2 The system shall be capable of pumping water from the Water Storage Tanks (WD02) to the Fire Water Distribution System at a rate of 1500 GPM for two hours.

2.2.1.3 Two centrifugal fire pumps, one electric motor driven and one diesel engine driven, shall be provided. Each pump shall be capable of delivering the design flow rate of 1500 GPM at a net discharge pressure of 125 psi.

2.2.1.4 A jockey pump shall be provided for pressure maintenance, thus avoiding unnecessary fire pump starts. The jockey pump shall be a centrifugal-type with a capacity of approximately 10 GPM at a net discharge pressure of 125 psi.

2.2.1.5 The fire pumps and jockey pump shall be provided with automatic controllers, which shall be equipped for automatic and manual (start/stop) operation.

2.2.1.6 Motors for the electric pumps shall be designed to operate from 480V AC, 60 Hz, and 3-phase power. The power shall be supplied from a 480V Bus which is backed up by the site's backup power supply.

2.2.1.7 The diesel fire pump's engine shall be provided with electric starting features.

2.2.1.8 A diesel fuel storage tank shall be provided, sized and installed in accordance with NFPA 20.

2.2.1.9 The system's piping layout shall provide the following design features:

- Provide for one fire pump to be taken out of service without interrupting the availability of the other fire pump.
- Provide for the fire pumps to be supplied water from both Water Storage Tanks.
- Provide an "air gap" in the suction piping to the north Water Storage Tank, which stores Domestic Water, to avoid a cross-connection. A spool piece shall be available for installation in the "air gap" if the tank is needed to supply water to the fire pumps.

2.2.2 Fire Water Distribution System

2.2.2.1 The system shall be designed and installed in accordance with NFPA 24.

2.2.2.2 The distribution piping shall be arranged in a series of loops encircling the site buildings. Dead ends should be avoided.

2.2.2.3 The looped system, supplying fire hydrants and sprinkler systems, shall be capable of delivering the design basis fire water demand for 2 hours at a residual pressure of 55 psi at each building, when fed through the loop in one direction only.

2.2.2.4 The minimum size of the main distribution piping shall be 10 inches. The minimum size of the branch piping supplying fire hydrants and sprinkler systems shall be 6 inches.

2.2.2.5 Post indicator valves shall be provided for isolation and sectional control as follows:

- In the looped mains to provide sectional control to minimize the impact of a single water main break.
- On each side of branch lines to vital buildings.
- In the branch line to each sprinkler system.

- So that not all fire hydrants within 500 feet of a building are removed from service when any two valves are closed.

- So that no more than 3 sprinkler systems and 2 fire hydrants are removed from service when any two valves are closed.

- At the intersection of mains, one less valve than the total number of intersecting mains.

2.2.2.6 All valves in the system shall be the "gate" type.

2.2.2.7 Fire hydrants shall be of the "Traffic Model" type, which if sheared off, will break at predetermined points and will not allow water to flow. The hydrants shall be the dry-barrel type.

2.2.2.8 Each fire hydrant shall be provided with an isolation valve in its branch line from the main.

2.2.2.9 Fire hydrants shall be nominally 50 to 100 feet from building walls, and spaced at approximately 300 ft intervals around the buildings. Intervals over 300 feet are allowed if building doorways or other openings have larger space intervals.

2.3 Subsystem FP02 Design Requirements - Fire Suppression System

2.3.1 Wet Pipe Sprinkler Systems

2.3.1.1 Sprinkler systems shall be the wet pipe type, and shall be designed and installed in accordance with NFPA 13. Sprinklers shall have a temperature rating of 165 F, unless otherwise required or recommended by NFPA 13.

2.3.1.2 The hazard occupancy category for each facility shall be determined in accordance with NFPA 13. Appendix F presents the current hazard category for each existing sprinkler system on site.

2.3.1.3 No sprinkler systems shall be designed for light hazard occupancy.

2.3.1.4 The need for specific components, such as a water motor gong, a fire department connection, a relief valve, a riser control valve, shall be determined on a case-by-case basis, based on applicable codes.

2.3.2 Chemical Extinguishing Systems

2.3.2.1 U/G Fuel Station

2.3.2.1.1 The U/G Fuel Station shall be provided with an automatic dry chemical extinguishing system designed and installed in accordance with NFPA 17.

2.3.2.1.2 The system shall be an engineered type, utilizing an ABC dry chemical fire suppressant. The flow rate and area of coverage shall be consistent with the hazard to effect complete extinguishment.

2.3.2.1.3 The system shall be automatically actuated by thermal detectors or manually operated by the attendant operator during fueling of vehicles.

2.3.2.2 Guard and Security Building Kitchen

2.3.2.2.1 The kitchen of the Guard and Security Building shall be provided with an automatic wet chemical extinguishing system in accordance with NFPA 17A and NFPA 96.

2.3.2.2.2 The system shall be designed for both automatic and manual operation.

2.3.2.2.3 The system, when activated, shall secure electrical power to the protected appliances.

2.3.3 Portable Fire Extinguishers

Portable fire extinguishers shall be provided throughout the WIPP site, both on the surface and in the U/G. The specific type, size and placement of the fire extinguishers for different classes of fire hazards shall be determined in accordance with NFPA 10.

2.4 Subsystem FP03 Design Requirements - Fire Detection and Alarm System

2.4.1 Fire Detection and Alarm Systems shall be designed and installed in accordance with NFPA 72.

2.4.2 The need for specific detection components, such as sprinkler system flow, manual pull stations, detectors, and supervisory switches, shall be determined on a case-by-case basis.

2.4.3 As a minimum, manual pull stations shall be installed at each building exit door and throughout the facilities at readily accessible locations, such that the travel distance from any point in the building to a manual pull station shall not exceed 200 feet. These pull stations shall sound the local fire alarm signal.

2.4.4 Fires, which activate fire detection and/or suppression systems, shall be indicated by audible alarms.

2.4.5 The fire alarm systems shall provide for the receipt and transmission of alarms from manual pull stations, automatic fire extinguishing systems, fire control systems, or fire detection systems to the CMS (System CM00) or via the RFAR System (FP04). In addition, fire alarm systems shall provide for electrical supervision, through the CMS, of applicable systems, circuit condition, supply water or sprinkler system flow.

2.4.6 The design of the system shall be such that failure of the CMS will not jeopardize the integrity of any of the local fire alarm systems.

2.4.7 Electrical supervision, through the CMS, shall be provided for all hardwired fire protection systems. Supervisory monitoring shall include electric circuit failure, power failure, and low water supply.

2.4.8 Fire alarm and supervisory signals transmitted to the CMR shall also be recorded on a hard copy printout. The alarm signals shall also be displayed on a local annunciator panel at the building of origin.

2.4.9 Fire alarm (bells or other distinctive tone) shall be located so that they are clearly audible throughout all areas of the affected building, but shall not exceed permissible noise exposures listed in 29 CFR 1910.95, Table G-16. In areas of noisy equipment or soundproof construction, additional audible alarm devices shall be installed. Visual alarms may supplement audible alarms in noisy areas.

2.4.10 Building fire alarm system components shall be accessible for testing and maintenance.

2.4.11 Thermal or smoke detectors shall be located principally at room ceilings or building roofs and arranged for ease of periodic testing. Spacing of the detectors shall be in accordance with NFPA 72 with proper evaluation for physical factors which could affect their operation.

2.4.12 Fire detection systems protecting high value areas such as the electronic data processing system area shall be designed to meet the special requirements of under floor protection.

2.4.13 Fire alarm system components, including signaling devices, manual stations, annunciators, control panels, and evacuation alarm signals shall be installed at strategic locations throughout the facility. All system intelligence shall be transmitted to the CMR.

2.4.14 The fire detection and alarm systems shall be provided with secondary power sources in conformance with NFPA 72.

2.4.15 Selected building fire alarm system shall be interlocked with the HVAC system, so that when detectors, manual fire alarm box, or sprinklers operate

in a protected area, the HVAC system will change to a predetermined "safest-mode" of operation. The response may include such functions as fan shutdown, damper control system activation, etc.

2.4.16 The U/G area shall have independent local fire alarm systems that transmit signals via local fire panels to the CMS. The fire detector systems and extinguishing systems shall be monitored and alarmed through these systems.

2.4.17 Smoke detectors shall be provided on approximately 250 square feet per detector spacing both below the raised floor and at the ceiling of the Computer Room and CMR in Building 451. Upon activation of any one detector in any zone, the building fire alarm system, shall be energized, a signal shall be sent to the CMR, and all fire doors releases activated.

2.5 Subsystem FP04 Design Requirements - Radio Fire Alarm Reporter (RFAR) System

2.5.1 The RFAR System shall be designed and installed in accordance with NFPA 72.

2.5.2 The RFAR System shall operate at a radio frequency of 136-174 MHZ. The RFAR System uses a narrow band frequency to eliminate false alarms due to stray radio signals.

2.5.3 Fire Alarm Transmitters (FTRs) shall be mounted on the outside of the buildings and trailers they serve.

2.5.4 Dual FAR consoles shall be installed in the CMR.

2.5.5 The RFAR System shall utilize the central UPS system as backup power for the dual Fire Alarm Receiver (FAR) consoles and 24-hour battery backup power for the Fire Alarm Transmitters (FTRs).

2.5.6 Each FTR shall include a manual push button which, when activated, sends its own coded FM signal to the dual FAR consoles.

2.6 Applicable Codes and Standards

Subject	Number	Title
General Design	DOE Order 420.1	Facility Safety
General Design	30 CFR Part 57	MSHA Health and Safety Standards for Metal and Non-Metallic Underground Mines. Subpart C
General Design	DOE-STD-1066-99	Fire Protection Design Criteria

Subject	Number	Title
General Design	DOE-STD-1088-95	Fire Protection for Relocatable Structures
General Design	DOE/EP-0108	Standard for Fire Protection of DOE Electronic Computer/Data Processing Systems
General Design	N/A	Uniform Building Code
General Design	N/A	Factory Mutual Loss Prevention Data Sheets
General Design	N/A	Factory Mutual System Approval Guide
General Design	29 CFR Part 1910	Occupational Safety and Health Standards. Subpart L
Quality Assurance	ANSI/ASME NQA-1 (1989)	Quality Assurance Program Requirements for Nuclear Power Plants
Quality Assurance	DOE/CAO-94-1012	Quality Assurance Program Document
Quality Assurance	10 CFR Part 830.120	Nuclear Safety Management Quality Assurance Requirements
Piping	ANSI B16.1	Cast-Iron Pipe Flanges and Flanged Fittings Class 25, 125, 250, and 800
Piping	AWWA C110	Ductile Iron and Gray Iron Fittings, 2 in. through 48 in., for Water and Other Liquids
Piping	AWWA C151	Ductile-Iron Pipe, Centrifugally Cast in Metal Molds or Sand Lined Molds
Piping	AWWA C600	Installation of Ductile-Iron Water Mains and Their Appurtenances
Piping	AWWA C900	Polyvinyl Chloride (PVC) Pressure Pipe, 4 in. through 12 in., for Water
Piping	NFPA 24	Standard for the Installation of Private Fire Service Mains and Their Appurtenances
Valves	UL-262	Gate Valves for Fire Protection Service
Valves	UL-789	Indicator Posts for Fire Protection Service
Fire Hydrants	AWWA C502	Dry-Barrel Fire Hydrant
Fire Hydrants	NFPA 1963	Standard for Screw Threads and Gaskets for Fire Hose Connections
Fire Extinguishers	NFPA 10	Standard for Portable Fire Extinguishers
Fire Pumps	NFPA 20	Standard for the Installation of Centrifugal Fire Pumps

Subject	Number	Title
Fire Pumps	NFPA 37	Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines
Sprinkler Systems	NFPA 13	Standard for the Installation of Sprinkler Systems
Fire Pumps, Piping, Sprinkler Systems, Hydrants	NFPA 25	Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems
Dry Chemical System	NFPA 17	Standard for Dry Chemical Extinguishing Systems
Wet Chemical System	NFPA 17A	Standard for Wet Chemical Extinguishing Systems
	NFPA 96	Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations
Fire Detection & Alarm Systems	NFPA 72	National Fire Alarm Code
	NFPA 75	Standard for the Protection of Electronic Computer/Data Processing Equipment
	NFPA 101	Code for Safety to Life from Fire in Buildings and Structures
	UL-864	Control Units for Fire Protective Signaling Systems
	NEMA ICS 6	Enclosures for Industrial Controls and Systems
	NEMA WC 8	Ethylene-Propylene-Rubber-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy

3.0 SYSTEM OPERATION AND PRECAUTIONS

3.1 System Operation – Fire Water Supply and Distribution System (FP01)

3.1.1 The Fire Water Supply and Distribution System consists of one electric fire pump, one diesel fire pump, and one jockey pump. During normal plant operation, the jockey pump automatically maintains system pressure against any leakage in the system, up to the pump's capacity

3.1.2 The two fire pumps do not operate during normal plant operation but are arranged for automatic starting upon the dropping of system pressure due to

a demand on the system, such as the operation of a sprinkler or a fire hydrant.

3.1.3 In the event of a drop in system pressure, the electric fire pump is arranged to start first, followed by the diesel fire pump if the water demand of the system is not met by the electric fire pump, or if the electric fire pump fails to start.

3.1.4 The system configuration of one electric motor driven and one diesel engine driven fire pumps, each of 100% design capacity, ensures operation of the water supply system even in the event of a loss of all offsite and onsite AC power supply sources.

3.1.5 **Jockey Pump**

3.1.5.1 The jockey pump starts when the system pressure falls to 130 psig and stops at 140 psig.

3.1.5.2 The pump's controller is located on the south wall of the Water Pumphouse. The front of the controller has only one device, an ON-OFF switch for the pump's circuit breaker. On the side of the controller is a red "pump running" light and a three position HAND-OFF-AUTO switch.

3.1.5.3 When the switch is placed in the HAND position, the pump runs continuously.

3.1.5.4 When the switch is place in the AUTO position, the pump will cycle on and off between its start and stop pressure set points. An adjustable time delay in the control circuitry establishes a minimum run time for the pump to prevent the pump from cycling on and off in too short of a time period.

3.1.5.5 If the switch is placed in the OFF position, the pump will stop.

3.1.6 **Electrical Fire Pump**

3.1.6.1 The electric fire pump is arranged to start automatically when the system pressure falls to 120 psig. The pump will stop automatically when the system pressure reaches 140 psig and a preset time delay of 6.5 minutes has elapsed.

3.1.6.2 The pump's controller is located adjacent to the pump. The controller has an ON-OFF lever for the circuit breaker, a red light to indicate power available to the controller, and START and STOP push buttons.

3.1.6.3 At the bottom of the controller is an emergency run ON-OFF-ON turn push handle. This emergency run mechanism mechanically closes the motor contactor, by-passing all control circuits. To stop the pump in an emergency, the circuit breaker level at top of panel must be placed in the OFF position. The emergency push handle is then placed in the OFF position.

3.1.6.4 The normal starting of the electrical fire pump requires the circuit breaker to be ON, and either the START push button to be depressed or a Low pressure signal to be received. It should be noted that if Low pressure condition exists, the pump will start immediately upon closure of the circuit breaker.

3.1.6.5 The electrical fire pump can be stopped by placing the circuit breaker lever in OFF, by depressing the STOP push button, or by a High Pressure signal. The pressure signal trip is only activated after the pump has been running for preset time. This minimum run time permissive is to protect the pump motor from excessive start/stop cycles.

3.1.7 Diesel Fire Pump

3.1.7.1 The diesel fire pump is arranged to start automatically when system pressure falls to 110 PSIG. The normal shutdown mode for the pump is manual, by depressing the STOP button on the front of the pump's controller.

3.1.7.2 When the diesel fire pump's controller is programmed for automatic shutdown, the length of time the pump operates following an automatic start is controlled by either of two timers, the Minimum Run timer or the Off Delay timer. The pump will stop when system pressure reaches 140 PSIG and the programmed time delay of 0 - 60 minutes has elapsed.

3.1.7.3 The diesel fire pump can be started manually by placing the controller's Main Switch in MANUAL and depressing either of the two battery cranking push buttons. Following a manual start, the pump is stopped by turning the Main Switch to OFF.

3.1.7.4 If the diesel fire pump's controller is not functioning, the pump can be started and shutdown using manual controls at the diesel engine.

3.1.7.5 When the diesel fire pump's controller is programmed for automatic shutdown, and the automatic starting cause (low pressure) has cleared, either of the below-listed conditions will cause the operating pump to stop:

- Low lube oil pressure
- High diesel engine cooling water temperature

3.1.7.6 The pump's controller houses a computer and a 3 ½" floppy disk drive. The computer is programmed per vendor instructions utilizing a key pad on the front of the controller's locked door. The programmable parameters include:

- Present Date
- Present Time
- Start Pressure Set point
- Stop Pressure Set point
- Shutdown Mode

- Time Delays
- Day & Time of Automatic Weekly Test (Start & Stop Logic)
- Status of Internal Alarms and Parameters

3.1.7.7 Computer and system information is displayed on the front of the controller, and stored on a 3 ½" floppy disk for record.

3.2 WHB Fire Suppression System – Portions of FP01 and FP02

WHB Fire Suppression System consists of portions of the Fire Water Supply and Distribution System (FP01) and Fire Suppression System (FP02).

3.2.1 The WHB Fire Suppression System is operated using WP 04-FP1201, Site Fire Water Supply System Operations, and WP 04-AD3005, Administrative Control of System Lineups. WP 04-FP1201 is used for operation of the Fire Water Supply fire pumps and WP 04-AD3005 is used to establish the proper valve lineup configuration of the Fire Water Distribution System, which maintains the WHB Fire Suppression System in an OPERABLE condition. An OPERABLE fire suppression system consists of the following elements: **[TSR LCO 3.1.1]**

- Distribution system aligned to supply water from tank 25-D-001A to the sprinkler heads.

- Unobstructed flow path from tank 25-D-001A to sprinkler.

- Water supply static pressure at 411-PI-003-001, 411-PI-003-003, AND 411-PI-003-005 ≥ 105 pounds per square inch gauge (psig).

- Either fire pump 45-G-601 OR 45-G-602 is OPERABLE with a capability to pump 1,500 gallons per minute (gpm) at ≥ 105 psig.

- ≥ 105,000 gallons of fire water available (refer to SDD WD00).

3.2.2 Surveillance Requirements – WHB Fire Suppression System

3.2.2.1 Monthly, the water supply static pressure is verified to be ≥ 105 psig for each of the following risers using WP 12-FP0055, Monthly Surveillance for Fire Suppression System: **[TSR SR 4.1.1.1]**

Riser	Gauge Number
CH BAY	411-PI-003-001
OP&RR	411-PI-003-003
RH BAY	411-PI-003-005

3.2.2.2 Monthly, the isolation valve is verified to be locked open for each of the following risers using WP 12-FP0055: **[TSR SR 4.1.1.2]**

Riser	Isolation Valves
CH BAY	FW-411-V-001
OP&RR	FW-411-V-010
RH BAY	FW-411-V-052

3.2.2.3 Monthly, the following system isolation valves are verified locked open using WP 12-FP0055: **[TSR SR 4.1.1.3]**

Isolation Valves
FW-456-V-001
FW-456-V-003
FW-456-V-019
FW-456-V-020

3.2.2.4 Annually, valve FW-456-V-021 is verified locked closed using WP 12-FP0025, Sprinkler System Inspection and Testing. **[TSR SR 4.1.1.4]**

3.2.2.5 Quarterly, the inspectors test valve (ITV) is opened and water-flow verified through the associated riser for each of the following risers using WP 12-FP0056, Quarterly Surveillance of Fire Suppression System. **[TSR SR 4.1.1.5]**

Riser	Inspector's Test Valve
CH BAY	FW-411-V-023 and FW-412-V-002**
OP&RR	FW-411-V-062
RH BAY	FW-411-V-042 and FW-411-V-044

** Inspectors Test Valve, FW-412-V-002, is part of the TMF sprinkler system. Its inclusion in this surveillance is in error and its operation is not required to demonstrate operability of the CH Bay sprinkler system.

3.2.2.6 Weekly, an automatic start test of the electric fire pump and diesel fire pump is performed to verify each starts at the setpoint specified below, using WP 12-FP0026, Weekly Surveillance for Fire Water Supply and Distribution Systems: **[TSR SR 4.1.1.6]**

Fire Pump	Setpoint
45-G-601 (Electric)	≥ 110 psig
45-G-602 (Diesel)	≥ 100 psig

3.2.2.7 Annually, the electric fire pump and diesel fire pump are verified to be capable of supplying ≥ 1,500 gpm at ≥ 105 psig net discharge, using WP 12-FP5113, Electric Fire Pump Test and WP 12-FP5114, Diesel Fire Pump Flow Test. **[TSR SR 4.1.1.7]**

3.2.2.8 Weekly, the diesel supply tank is verified to contain ≥ 3/4 full tank of diesel, using WP 12-FP0026, Weekly Surveillance for Fire Water Supply and Distribution Systems. **[TSR SR 4.1.1.8]**

3.3 Precautions

3.3.1 Never operate the fire pumps unless they are primed (pump casing full of water) and vented.

3.3.2 The diesel fire pump's cooling water heater should be energized at all times when the diesel fire pump is in service.

3.3.3 Never tighten the fire pump's packing glands to be leakproof. Always adjust the packing glands to have a slight leakage. Verify packing gland supply valves are open prior to operating the pump.

3.3.4 Do not operate a fire pump in reverse. For a 3 phase motor, rotation may be reversed. Interchange any two of the three power leads, if necessary.

3.3.5 Do not operate a fire pump if sufficient lubricant is not present in a bearing housing or if lubricant is contaminated with dirt or moisture.

3.3.6 Care must be taken to open and close system valves at a slow rate of speed so as not to cause sudden pressure changes and damages to any system components.

3.3.7 A dry barrel fire hydrant should never be left partially open. This allows system water to flow from the hydrant's drain holes, which could result in soil erosion around the base of the hydrant.

3.3.8 When attempting to start the diesel fire pump using the "cranking pushbuttons" or the "manual contactors," do not crank the engine for more than 10 seconds on each attempt.

Appendix A – System Interfaces

System Providing Service	Service to be Provided for FP00
AU00	Provides structural support for the installation of fire protection system equipment as required.
CF00 & GC00	Provides structural support for the installation of the fire protection system equipment. Provides suitable environmental conditions for the operation of fire protection equipment.
CM00	Provides signal transmission capability for monitoring and alarm annunciation in the CMR, the status of fire protection system equipment, and the fire detection and alarm signals, as required.
ED00	Provides electrical power supply to the fire pumps, their associated control equipment, and fire detection and alarm systems. Provides backup power supply to the electric fire pump and the fire panels in the Waste Handling Building and Support Building.
HV00	Provides suitable environmental conditions (room temperature and relative humidity) for the fire protection equipment. Provides control of air supply where required and as required.
PP00	Provides sensors and associated equipment for the WIPP off-site building and facilities to transmit fire detection signals to the WIPP-Site SCR Personal Computer.
WD00	Provides two independent, 180,000 gallon, storage tanks, designed in accordance with NFPA 20 & 22. (One tank normally supplies FP00, while the other tank reserves a minimum of 90,000 gallons for FP00 use.) Provides a fire water refill capability of 180,000 gallons in 8 hours.
System Requiring Service	**Service to be Provided by FP00**
AU00	Provides closure signals to the fuel station's ventilation fire dampers and fire door. Provides fire suppression and fire alarm & detection capability.
CF00	Provides closure signals to the release mechanisms for the CMR's fire doors. Provides fire suppression and fire alarm & detection capability.
HV00	Provides signals to automatically cause various ventilation and exhaust systems to change to a predetermined "safest mode" of operation.

Appendix A – System Interfaces

System Providing Service	Service to be Provided for FP00
CA00, CM00, ED00, EM00, GC00, RM00, UH00, VU00, WD00, WH00	Provides fire suppression and fire detection & alarm capability.
PC00	Provides an input to the CMS based on a fire alarm in the underground. The CMS in turn subsequently provides an input to the PA console electronics which generate the Underground Evacuation Alarm.

Appendix B – Operating Limits

Parameters	Limits
Pumphouse Ambient Temperature	50-104˚ F
Pumphouse Ambient Humidity	10-95%
Maximum Fire Water Pressure	175 psig

Appendix C – Gauge & Instrument Requirements

Instrument	Name	Range	Accuracy	Set Point
PI-016	Electric Pump Suction Gauge	30" Hg Vac. to 200 psi	± 3%	N/A
PI-017	Electric Pump Discharge Gauge	0-300 psi	± 3%	N/A
PI-018	Diesel Pump Relief Gauge	0-300 psi	± 3%	N/A
PI-020	Diesel Pump Suction Gauge	30" Hg Vac. to 200 psi	± 3%	N/A
PI-021	Diesel Pump Discharge Gauge	0-300 psi	± 3%	N/A
PI-025	Fire Water System Pressure	0-300 psi	± 1%	N/A
PT-001	Fire Water System Pressure	0-200 psi	± 1%	N/A
PSHL-003	Jockey Pump Pressure Switch	10-300 psi	± 3 psi	130 psi
PSL-002	Electric Pump Pressure Switch	10-300 psi	± 3 psi	120 psi
PSV-007	Electric Pump Circulation Relief	N/A	N/A	140 psi
PSV-009	Diesel Pump Pressure Relief	N/A	± 5%	175 psi
PI-024	Diesel Engine Oil Pressure	0-80 psi	± 5 psi	N/A
TI-012	Diesel Engine Coolant Temperature	100-265°F	± 10%	N/A
PS-XXX	Sprinkler System Pressure Switches	2-20 psi	N/A	4-6 psi
FS-XXX	Sprinkler System Flow Switches	N/A	N/A	10 gpm
PI-XXX	Sprinkler System Pressure Gauges	0-300 psi	± 3%	N/A

Appendix D – Control Set Points

Parameter	Function	Set Point
Jockey Pump Low Pressure	Starts Jockey Pump	130 psi*
Jockey Pump High Pressure	Stops Jockey Pump	140 psi*
Jockey Pump Run Time	Establishes minimum pump run time.	10 seconds
Electric Pump Low Pressure	Starts Electric Pump	120 psi*
Electric Pump High Pressure	Stops Electric Pump	140 psi*
Electric Pump Run Time	Establishes minimum pump run time.	6.5 minutes
Diesel Pump Low Pressure	Starts Diesel Pump	110 psi*
Diesel Pump High Pressure	Stops Diesel Pump	140 psi*

* The basis for these SET POINTS is the guidelines presented in NFPA 20, Appendix A.

Appendix E – Inspection, Testing & Maintenance Schedule

Minimum Inspection, Testing, and Maintenance requirements and frequencies for System FP00 shall be in accordance with the following:

- FP01 -- NFPA 25
- FP02 -- NFPA 10 (Portable Fire Extinguishers)
  NFPA 17 (Dry Chemical Systems)
  NFPA 17A (Wet Chemical Systems)
  NFPA 25 (Sprinkler Systems)
- FP03 -- NFPA 72
- FP04 -- NFPA 72

Exemptions to the above requirements are allowed with the approval of the Authority Having Jurisdiction (AHJ).

In addition to the above, preventive maintenance for equipment such as the fire pumps or smoke detectors shall be based on the manufactures' maintenance recommendations. As an equipment history is accumulated for these components, the scope and frequency of the preventive maintenance should be reviewed, and where appropriate, modified to ensure optimum performance and resource utilization.

The requirements and recommendations are delineated in the following tables:

Subsystem FP01		
Item	Frequency	Activity To Be Performed
Fire Pumps	Weekly	Visual inspection.
		Automatic start test.
	Quarterly	Inspection & maintenance per manufacturer. (Diesel engine)
	Annually	Rated flow test of each pump.
		Inspection & maintenance per manufacturer. (Diesel engine, electric motor & pump ends)
	3 Years	Calibrate suction & discharge pressure gages.
	5 Years	Internal inspection of each discharge check valve.
Electric Pump Circulation Relief Valve	Weekly	Visual inspection for adequate water flow.
	Annually	Verify proper operation.
Diesel Pump Relief Valve	Weekly	Visual inspection.
	Annually	Verify proper operation.
Controllers	Annually	Visual inspection & maintenance.

Appendix E – Inspection, Testing & Maintenance Schedule

Subsystem FP01		
Item	Frequency	Activity To Be Performed
Fire Pump Batteries	Monthly	Inspection & maintenance.
PT-001, PI-025, PI-024, TI-012	Annually	Calibrate.
Check Valves	5 Years	Internal inspection & maintenance.
Pressure Switches	Annually	Calibrate.
Control Valves In Pumphouse	Monthly	Visual inspection.
	Annually	Lubricate & cycle.
Control Valves In Yard (PIVs)	Monthly	Visual inspection.
	Annually	Lubricate & cycle.
Hydrants & Isolation Valves	Annually	Visual inspection, lubrication & functional test of hydrants.
		Cycle isolation valves.
Piping (Exposed/ Buried)	Annually	Visual inspection. (Exposed piping in Pumphouse)
	5 Years	Flow test.

Subsystem FP02		
Item	Frequency	Activity To Be Performed
Sprinkler Systems		
Control Valves	Monthly	Visual inspection.
	Annually	Lubricate (OS&Y type) & cycle.
Alarm Valves	Monthly	Visual inspection.
	5 Years	Internal inspection & maintenance. (Also includes strainers & orifices.)
Check Valve	5 Years	Internal inspection & maintenance.
Water Motor Gongs	Quarterly	Visual inspection & functional test.
Gauges	Monthly	Visual Inspection.
	3 Years	Calibrate.
Main Drain	Annually	Flow water to determine condition of water supply.
Fire Dept. Connection	Quarterly	Visual Inspection.

Appendix E – Inspection, Testing & Maintenance Schedule

Subsystem FP02		
Item	Frequency	Activity To Be Performed
Sprinkler Systems		
Sprinklers, Hangers & Piping	Annually	Visual Inspection.
Standpipe Hose Valve	Quarterly	Visual inspection.
	3 Years	Cycle valve.
Dry Chemical Systems		
Each System	Monthly	Visual inspection.
	Semi-Annually	Maintenance per NFPA 17.
Chemical Containers & Hoses	12 Years	Hydrostatic test.
Wet Chemical Systems		
Each System	Monthly	Visual inspection.
	Semi-Annually	Maintenance Per NFPA 17A.
Chemical Containers & Hoses	12 Years	Hydrostatic test.
Fire Extinguishers		
Each Extinguisher	Monthly	Visual inspection.
	Annually	Maintenance per NFPA 10.
	5 - 12 Years	Hydrostatic test.

Subsystem FP03		
Item	Frequency	Activity To Be Performed
All components listed below	Monthly	Visual inspection.
Smoke Detectors	Semi-Annually	Visual inspection & operational test.
	Annually	Maintenance per manufacturer recommendations.
Thermal Detectors	Semi-Annually	Visual inspection & operational test.

Appendix E – Inspection, Testing & Maintenance Schedule

Alarm Devices (Pressure & Flow Switches)	Quarterly	Visual inspection & operational test.
Manual Pull Stations	Annually	Operational test.
Supervisory Switches (On Control Valves)	Quarterly	Visual inspection.
	Semi-Annually	Operational test.
Audible & Visual Devices	Quarterly	Operational test.
Each Fire Panel	Quarterly or Semi-Annually*	Operational test.
	Semi-Annually	Visual inspection of batteries.
	Annually	Internal visual inspection & maintenance.
		24 hr. test of batteries.
	3 Years	Replace batteries.

Subsystem FP04		
Item	Frequency	Activity To Be Performed
Transmitter Panels	Monthly	External visual inspection.
	Quarterly or Semi-Annually*	Operational test.
	Semi-Annually	Visual inspection of batteries.
	Annually	Internal visual inspection & maintenance.
		24 hr. test of batteries.
	3 Years	Replace batteries.
Receiver Units	Semi-Annually	Visual inspection.
	Annually	Maintenance & testing.

* Frequency depends on the type of initiating device in System FP03.

Appendix F – Sprinkler System Location and Hazard Category

Building	Hazard Category	Comments
Salt Handling Hoist House, #384	OHG-2	
Waste Handling Building, #411	OHG-2	Note 1
TRUPACT Maintenance Facility, #412	OHG-2	Water supply from CH Bay sprinkler system.
Exhaust Filter Building, #413	OHG-1	
Support Building, #451	OHG-1	
Safety & Emergency Building, #452	OHG-1	
Warehouse/Shops Building, #453	OHG-3	
Maintenance Building, #455	OHG-3	
Water Pumphouse, #456	OHG-2	
Guard & Security Building, #458	OHG-1	
Core Storage Building & Annex, #459 & 459A	OHG-2	
Armory Building, #473	EHG-2	Water supply from Guard & Security Building sprinkler system.
Hazardous Material Area, #474A, B, C & E	EHG-1	
Warehouse Annex, #481	OHG-1	
Engineering Building, #486	OHG-2	
Training Building, #489	OHG-1	
Trailer 950	LHG	
Trailer 951	OHG-1	
Trailer 952	OHG-1	
Trailer 953	OHG-1	
Trailer 965	OHG-1	
All Remaining Trailers	N/A	Sprinkler systems designed to NFPA 13D.

Appendix F – Sprinkler System Location and Hazard Category

Note 1: The Mechanical Equipment Room and support areas of the remote handling facilities, are Ordinary Hazard Group 1, and the Cage Loading Room and Air Lock are Ordinary Hazard Group 3. The Hot Cell Complex is not sprinkled.