APPENDIX 3.3
FIRE HAZARDS ANALYSIS OF ON-SITE FACILITIES

TABLE OF CONTENTS

LIST OF TABLES

Section Name **Page**

1.0 SUMMARY

A graded Fire Hazards Analysis (FHA) of Waste Control Specialist's (WCS), Limited Liability Corporation (LLC) proposed Low Level Radioactive Waste (LLRW) disposal site in Andrews County, Texas has been completed. Completion of the recommendations as outlined in this document will provide a complex that meets the requirements of National Fire Protection Association, National Fire Codes, the International Building Code and the International Fire Code.

1.1 Purpose and Methodology

A FHA has been performed for the Compact Waste Facility (CWF), Federal Waste Facility (FWF), CWF Staging Building, FWF Waste Staging Building, CWF Vehicle Decontamination Building, FWF Vehicle Decontamination Building, Laboratory Building, Disposal Area Gate/Guardhouse Building, Administration Building, Texas Commission on Environmental Quality (TCEQ) Office Building, FWF Bulk Staging Building and storage tanks.

The purpose of this FHA is to comprehensively and qualitatively assess the risk from fire and related perils within the above facilities based on the proposed protection. This analysis is used to ascertain whether (1) International Building Code (IBC) requirements, (2) International Fire Code (IFC) requirements and (3) National Fire Codes [National Fire Protection Association (NFPA)] requirements are met. This FHA evaluates the proposed buildings construction and systems, occupancy and hazards associated with the operations, the fire protection features (e.g. automatic suppression system including water supply, fire alarms, fire departments response, life safety features, pre-planning activities as well as other fire prevention programs), possible fire exposures to the facilities from other structures and wildfires, the adequacy of these features to assure adequate fire protection is provided for the facilities, and offers recommendations for improvement where deficiencies are noted. This FHA satisfies the scope and content contained in NFPA 801. *Fire Protection for Facilities Handling Radioactive Materials* (Section 4.2) requiring a fire hazards analysis.

This FHA was developed through reviews of available specifications, drawings, and consultation with design personnel. It is a deterministic evaluation of the assumed fire hazards present based on the proposed operations in the LLRW Disposal Facility and employs a graded approach to the extent that assumed worst-case fire hazards are considered to bound all other potential fire hazards. Information provided in cited documents is assumed to be accurate. Probabilistic evaluations of the fire scenarios are outside the scope of this FHA – *this document assesses only the consequences of the postulated fire events*.

1.2 Facility Description

The Administration Building will be located approximately 450 feet west of the Disposal Area Gate/Guardhouse Building. This facility is comprised of office areas, conference room, lunch room, men's and women's locker rooms and a mechanical room. Per IBC, Chapter 3, *Use and Occupancy Classification*, 304.1 this facility is classified as a business group B. Also, in accordance with NFPA 101, *Life Safety Code* (Section 6.1.11.1) and NFPA 101 (Section 38.1.5), this facility is classified as business and an ordinary hazard of contents, respectively.

The Disposal Area Gate/Guardhouse Building will be located at the entrance to the LLRW disposal site. This facility is used to provide physical control for waste transport vehicle and other vehicle access. This facility will serve as the access control point for the two disposal sites. The facility will have a guard room and inspection room. Besides the external access to these areas a door will be provided between the guard room and inspection room. The main phone switchboard and two-way radio base station will be located in this facility, along with emergency communication and first aid equipment. This facility will serve as the command center in an emergency and may be used for shelter in an emergency, if required. Per IBC, Chapter 3, *Use and Occupancy Classification* (Section 304.1), this facility is classified as a business group B. Also, in accordance with NFPA 101 (Section 6.1.11.1), and NFPA 101 (Section 38.1.5) this facility is classified as business and an ordinary hazard of contents, respectively.

The TCEQ Office Building will be located in the proximity of the Administration Building. It will be located approximately 12 feet from the Administration Building with a covered breezeway connecting the two buildings. The building will be situated so that TCEQ personnel have a view of the entrance gate to the facility. This facility will have two offices for TCEQ personnel, conference room and file storage room. Per IBC, Chapter 3, *Use and Occupancy Classification* (Section 304.1) this facility is classified as a business group B. Also, in accordance with NFPA 101 (Section 6.1.11.1) and NFPA 101 (Section 38.1.5), this facility is classified as business and an ordinary hazard of contents, respectively.

The CWF and FWF Staging Buildings will be located at the CWF and FWF disposal facilities, respectively. These facilities provide a packaging and staging area for the transfer of certain types of waste packages. Also, within these facilities will be sampling room, which will allow the sampling of various waste packages that comply with the waste acceptance criteria, and office area. There are two occupancy classifications within these facilities. Per IBC, Chapter 3, *Use and Occupancy Classification* (Sections 302.3 and 302.3.1), this is a mixed occupancy with nonseparated uses. Also, in accordance with NFPA 101 (Sections 6.1.14.1.2 and 6.1.14.2.1), this facility is classified as a mixed occupancy. The sampling room and office area per IBC, Chapter 3, *Use and Occupancy Classification* (Section 304.1), are classified as a business group B. Per IBC, Chapter 3, *Use and Occupancy Classification* (Sections 306.1 and 306.2), the packaging and staging area of these facilities is classified as factory industrial group F-1 moderate hazard. The office is classified as business occupancy in accordance with NFPA 101 (Section 6.1.11.1). The sampling room and the packaging and staging area are classified as industrial occupancy in accordance with NFPA 101 (Section 6.1.12.1). In accordance with NFPA 101 (Sections 6.2.2.3 and 40.1.4.1.1), this facility is classified as general industrial and an ordinary hazard of contents, respectively.

The CWF and FWF Vehicle Decontamination Buildings will be located at the CWF and FWF disposal facilities, respectively. These facilities are oversized wash bays that provide for wet decontamination of vehicles, equipment and other items. Adjacent to each of these buildings will be two rooms, one utilized for storage and the other a change room. There are two occupancy classifications within these facilities. Per IBC, Chapter 3, *Use and Occupancy Classification* (Sections 302.3 and 302.3.1), this is a mixed occupancy with nonseparated uses. Also, in accordance with NFPA 101 (Sections 6.1.14.1.2 and 6.1.14.2.1), this facility is classified as a mixed occupancy. Per IBC, Chapter 3, *Use and Occupancy Classification* (Sections 306.1 and 306.2), the decontamination area of this facility is classified as factory industrial group F-1

moderate hazard. The industrial classification was used in lieu of business group B for a car wash as this facility will be used for decontamination of vehicles and equipment. The area utilized for storage is classified as an S-1 storage area in accordance with IBC, Chapter 3, *Use and Occupancy Classification* (Sections 311.1 and 311.2). Also, in accordance with NFPA 101 (Sections 6.1.12.1 and 6.2.2.3), and NFPA 101 (Section 40.1.4.1.1), the wash bay of these facilities is classified as general industrial and an ordinary hazard of contents, respectively. In accordance with NFPA 101 (Sections 6.1.13.1 and 6.2.2.3) and NFPA 101 (Section 42.1.5), the storage area is classified as storage and an ordinary hazard of contents, respectively.

The Laboratory Building will be located east of the Disposal Area Gate/Guardhouse Building and is used to perform various radiological and chemical tests. Also, in accordance with NFPA 101 (Sections 6.1.12.1 and 6.2.2.3) and NFPA 101 (Section 40.1.4.1.1), this facility is classified as general industrial and an ordinary hazard of contents, respectively.

The FWF Bulk Staging Building will be located east of the Laboratory Building and will be used for the unloading and staging (storage) of intermodal containers to a maximum height of 13 feet. The content of the intermodal containers is noncombustible consisting of radiologically contaminated soil, concrete and reinforcing bars. This area is classified as an S-2 storage area in accordance with IBC, Chapter 3, *Use and Occupancy Classification* (Sections 311.1 and 311.3). In accordance with NFPA 101 (Sections 6.1.13.1 and 6.2.2.2) and NFPA 101 (Section 42.1.5), the staging area is classified as storage and low hazard of contents, respectively.

1.3 Summary of Concerns

Thirteen recommendations are offered as the result of this FHA. Two recommendations are concerned with the human element aspect of property conservation and the other eleven address issues of physical protection.

The first human element recommendation addresses the development of a fire protection program. The fire protection program should include the following elements: documented facility fire inspections, flammable and combustible liquid controls, hot work permits, fire reports including an investigation and statement on corrective action to be taken, testing, inspection and maintenance of fire protection systems, impairment of fire protection systems, construction, demolition and renovation activities, emergency response team, and pre-fire planning as required by NFPA 801 (See Section 12.1, A1). **(Code Compliance Issue)**

The second human element recommendation addresses the development of fire protection procedures implementing the elements as delineated in the fire protection program. Developing these procedures complies with the requirements of NFPA 801 (See Section 12.1, A2). **(Code Compliance Issue)**

The physical protection of these facilities is good, as automatic sprinkler protection, an adequate water supply and private fire mains will be provided as required by NFPA 801, *Fire Protection for Facilities Handling Radioactive Materials* (See Section 12.2, B1, B2, B3, B4). **(Code Compliance Issue)**

The installation of the fire alarm system in the CWF and FWF Staging Buildings, FWF Bulk Staging building and the Laboratory Building to monitor fire suppression system activation and manual pull station activation complies with the requirements of NFPA 801 (Section 6.8). Also, all fire protection control valves will be provided with electronic valve supervisory switches

installed in accordance with NFPA 72, *National Fire Alarm Code* (Section 5.15.1). In addition, a pump or motor running alarm, loss of phase alarm, phase reversal alarm, suction reservoir water level, suction reservoir water temperature, and pump house temperature will be provided to comply with NFPA 20, *Installation of Stationary Pumps for Fire Protection* (Sections 10.4.7.2 and 5.23) and NFPA 72 (Section 5.15.3, 5.15.4 and 5.15.5). These alarms and supervisory signals will be installed in accordance with NFPA 72 (See Section 12.2, B5). **(Code Compliance Issue)**

Fire extinguishers are the first line of defense in a fire in its incipient stage. Fire extinguishers will be provided in the Administration Building, TCEQ Office Building, Disposal Area Gate/Guardhouse Building, CWF and FWF Staging Buildings, CWF and FWF Decontamination Buildings, FWF Bulk Staging Building and the Laboratory Building in accordance with the requirements of NFPA 10, *Portable Fire Extinguishers* (See Section 12.2, B6). **(Code Compliance Issue)**

A method to prevent the spread of fire from one structure to another is to provide adequate separation distance between facilities. The Disposal Area Gate/Guardhouse Building and the Laboratory Building should be separated a minimum of 50 feet in accordance with NFPA 80A, *Protection of Buildings from Exterior Fire Exposures*, Chapter 4, *Classification of Exposure and Recommended Separation Distances* (See Section 12.2, B7). **(Code Compliance Issue)**

Occupant egress in an emergency is aided by emergency lighting and adequate exit signs to direct the occupants to the means of egress and exit discharge. Therefore, emergency lighting providing 1 foot-candle illumination at the floor level will be provided in the Administration Building, TCEQ Office Building, CWF and FWF Decontamination Buildings, Disposal Area Gate/Guardhouse Building, CWF and FWF Staging Buildings, FWF Bulk Staging Building and Laboratory Building to comply with the requirements of the IBC, Chapter 10, *Means of Egress*, 1006.1 and 1006.2, NFPA 101 (Sections 40.2.8, 42.2.8, 7.8 and 7.9.2.1). In addition, exits signs will be provided in the Administration Building, CWF and FWF Decontamination Buildings, CWF and FWF Staging Buildings, FWF Bulk Staging Building and Laboratory Building to comply with the requirements IBC, 1011.1, NFPA 101 (Sections 40.2.10, 42.2.10, 7.1, 7.10.1.2 and 7.10.1.5.1). In addition, each exit door requiring an exit sign will be provided tactile signage in accordance with NFPA 101 (Section 7.10.1.3). Refer to Section 12.2, B8, B9. **(Code Compliance Issue)**

To prevent the spread of smoke throughout the Administration Building and the TCEQ Office Building during a fire duct smoke detectors will be installed in AC-1 and AC-2 down stream of the air filters and ahead of any branch connections interlocked to shut down their respective fans on detecting the presence of smoke. NFPA 90A, *Installation of Air-Conditioning and Ventilating Systems* (Section 6.4.2.1), requires duct smoke detector be installed when the air flow is greater than 2000 cubic feet per minute (cfm). The smoke detectors will be installed in accordance with the requirements of NFPA 90A (Section 6.44). (See Section 12.2, B10). **(Code Compliance Issue, To Be Done)**

The use of fiberglass reinforced panels that have a Class A rating on the interior of the CWF and FWF Staging Buildings, CWF and FWF Decontamination Buildings and the FWF Bulk Staging Building will reduce the spread of fire and the amount of smoke developed. Class A rated materials have a flame spread rating less than 25 and smoke developed rating less than 450. In

accordance with NFPA 801 (Section 5.8.1) the interior finishing materials should have a Class A rating. In addition, the fiberglass reinforced panel should be approved by FM Global (See Section 12.2, B11). **(Code Compliance Issue, To Be Done)**.

2.0 CONSTRUCTION

The Administration Building is one story measuring approximately 64 feet by 125 feet on a reinforced concrete floor. The facility is approximately 8000 square feet. The eave height is proposed to be 10 feet with an overall building height of 13 feet. Exterior wall and roof construction will be metal panels on steel frame. Interior wall construction will be gypsum wallboard on metal studs.

The TCEQ Office Building is one story measuring approximately 22 feet by 30 feet on a reinforced concrete floor. The facility is approximately 660 square feet. The eave height is proposed at 10 feet with an overall height of 13 feet. Exterior wall and roof construction will be metal panels on steel frame. Interior wall construction will be gypsum wallboard on metal studs.

The Disposal Area Gate/Guardhouse Building is one story measuring approximately 10 feet by 30 feet on a reinforced concrete floor. The facility is approximately 300 square feet. The eave height is proposed to be approximately 8 feet with an overall building height of 11 feet. Exterior wall and roof construction will be metal panels on steel frame. Interior wall construction will be gypsum wallboard on metal studs.

When reviewing the requirements of Regulatory Guide 1.143, *Design Guidance for Radioactive Waste Management Systems, Structures, and Components Installed in Light-Water-Cooled Nuclear Power Plants*, the term "radioactive waste," as used in this Guide 1.143, means liquids, gases, or solids that contain radioactive materials that by design or operating practice will be processed prior to final disposition. WCS will not do any processing of waste in the CWF or FWF staging facilities. Thus, the requirements as outlined in Regulatory Guide 1.143 were not deemed applicable to the CWF and FWF Staging Buildings.

The FWF Staging Building is one story measuring approximately 60 feet by 152 feet on a reinforced concrete floor. The raised staging area measures approximately 42 feet by 82 feet and is 4 feet higher than the floor in the building. One roll up door will be provided in the east wall of the building and two roll up doors will be provided in the west wall of the building. An office area measuring approximately 10 feet by 12 feet will be located in the northeast corner of the raised staging area. Attached to the east end of the buildings is a Sampling Room that will be one story measuring approximately 22 feet by 25 feet on a reinforced concrete floor. Exterior wall construction will be exposed concrete block from floor to 4 feet above the floor with metal panels above on steel frame. A fiberglass reinforced panel liner will be provided inside of the metal panels. Roof construction will be metal panels on steel frame. The eave height is proposed to be approximately 20 feet with an overall building height of 22.5 feet. A 4-inch sloped containment curb will be provided at the perimeter of the building. Interior perimeter office and sampling room walls will be gypsum wallboard on metal studs with acoustical insulation. Ceiling in the office and sampling rooms will be 2 feet by 4 feet acoustical panels.

The CWF Staging Building is one story measuring approximately 60 feet by 127 feet on a reinforced concrete floor. The raised staging area measures approximately 42 feet by 57 feet and is 4 feet higher than the floor in the building. One roll up door will be provided in the east wall of

the building and two roll up doors will be provided in the west wall of the building. An office area measuring approximately 10 feet by 12 feet will be located in the northeast corner of the raised staging area. Attached to the east end of the building is a Sampling Room that will be one story measuring approximately 22 feet by 25 feet on a reinforced concrete floor. Exterior wall construction will be exposed concrete block from floor to 4 feet above the floor with metal panels above on steel frame. A fiberglass reinforced panel liner will be provided inside of the metal panels. Roof construction will be metal panels on steel frame. The eave height is proposed to be 20 feet with an overall building height of 22.5 feet. A 4-inch sloped containment curb will be provided at the perimeter of the building. Interior perimeter office and sampling room walls will be gypsum wallboard on metal studs with acoustical insulation. Ceiling in the office and sampling rooms will be 2 feet by 4 feet acoustical panels.

The FWF Vehicle Decontamination Building is one story measuring approximately 32 feet by 90 feet on a reinforced concrete floor. One roll up door will be provided in both the east wall and west wall of the building. In addition, three doors will be provided on the north side of the building. These doors will be provided one per 30 foot bay. The eave height will be approximately 25 feet with an overall building height of approximately 26.25 feet. The reinforced concrete floor will slope 2 percent to a centered trench drain that drains to a containment sump. Exterior wall and roof construction will be metal panels on steel frame. A fiberglass reinforced panel liner will be provided inside of the metal panels. On the south side of the FWF Decontamination Building, an approximately 12 feet by 60 feet area on a reinforced concrete floor will be added. The eave height of this area is approximately 12 feet with an overall height of approximately 13 feet. Exterior wall and roof construction will be insulated metal panels on steel frame.

The CWF Vehicle Decontamination Building is one story measuring approximately 32 feet by 90 feet on a reinforced concrete floor. One roll up door will be provided in both the north wall and south wall of the building. In addition, three doors will be provided on the east side of the building. These doors will be provided one per 30 foot bay. The eave height will be approximately 25 feet with an overall building height of approximately 26.25 feet. The reinforced concrete floor will slope 2 percent to a centered trench drain that drains to a containment sump. Exterior wall and roof construction will be metal panels on steel frame. A fiberglass reinforced panel liner will be provided inside of the metal panels. On the west side of the CWF Decontamination Building, an approximately 12 feet by 60 feet area on a reinforced concrete floor will be added. The eave height of this area is approximately 12 feet with an overall height of approximately 13 feet. Exterior wall and roof construction will be insulated metal panels on steel frame.

The Laboratory Building is one story measuring approximately 20 feet by 70 feet on a reinforced concrete floor. Exterior wall and roof construction will be metal panels on steel frame with fiberglass insulation. The building height will be approximately 12.5 feet. The wall separating the interior rooms will be gypsum wallboard on metal studs. The walls will extend floor to ceiling.

The FWF Bulk Staging Building is one story measuring approximately 60 feet by 450 feet on a reinforced concrete floor. Two roll up doors will be provided in the east wall of the building, two roll up doors will be provided in the south wall near the east and west ends and one roll up door will be provided in the north wall near the west end. Exterior wall construction will be exposed

concrete block from floor to 4 feet above the floor with metal panels above on steel frame. A fiberglass reinforced panel liner will be provided inside of the metal panels. Roof construction will be metal panels on steel frame. The eave height is proposed to be 20 feet with an overall building height of 22.5 feet. A 4-inch sloped containment curb will be provided at the perimeter of the building.

The CWF and FWF disposal units will be constructed exclusively in the red bed clay unit of the Dockum Group, below the calcified layers of the Ogallala, Antlers, Gatuna formation (Caliche Caprock) (OAG). The approximately 35-feet deep OAG overburden horizon will be removed as the disposal unit is developed, and will be replaced with a multi-layer cover system using the full excavated depth to the red bed clay. A substantial volume of reserve red bed clay will be incorporated into the cover over the waste disposal zone, allowing the cover system to reform and remold in areas of minor settlement so that surface water is precluded from infiltrating the waste matrix.

The CWF will be developed as a rectangular excavation over the life of the facility. Overall disposal site dimensions at surface grade are square, and measure 1,100 feet by 1,100 feet, including the 100-feet wide buffer zone around the perimeter of the disposal unit. Waste will be placed below the OAG/Red bed interface approximately 35 feet below surface grade, and the disposal unit floor will be 47 feet below this transition.

The FWF will be developed as two rectangular excavations over the life of the facility. Overall disposal site dimensions at surface grade are 1,676 feet wide by 2,297 feet long, including the 100-foot wide buffer zone around the perimeter of the disposal unit. Waste will be placed below the OAG/red bed interface approximately 35 feet below surface grade, and the disposal unit floor will be approximately 80 feet below this transition.

The total depth of placement ensures that all waste is placed greater than the 5 meter depth required by 30 Texas Administrative Code (TAC) 336.730(b) for containerized class A/B/C waste. Placing all waste to an average of 35 feet below final surface grade provides a significant barrier to inadvertent intrusion.

Five 500,000 gallon above ground storage tanks will be installed for FWF contact storm water and leachate. The tanks will be located just east of the FWF disposal unit, and will not be relocated over the facility life. Tank capacity is based on a 2.4 million gallon 25-year storm water event production volume. This volume is based on the assumption that two disposal units for the FWF non-canister disposal unit (FWF-NCDU) and FWF- canister disposal unit (FWF-CDU) are operational at the same time.

Each storage tank will be constructed of steel and be 60 feet in diameter and 24 feet in height. Each storage tank is set on a 1-foot thick, reinforced concrete slab-on-grade and a 2.5-foot thick ring wall for the foundation. Secondary containment is provided by an 8-inch thick reinforced concrete pad. At the perimeter of the rectangular concrete pad is an 8-foot high concrete wall to provide secondary containment capacity for at least one of the tanks (500,000 gallons).

For the CWF, two 500,000-gallon tanks will be installed inside that disposal unit. Secondary containment and structural calculations are identical to the FWF system. Tank capacity is based on a 650,000-gallon 25-year storm water event production volume, with a 35% reserve. This volume is based on the assumption that one disposal cell is operational at a time.

2.1 Building Construction

2.1.1 Building Construction (IBC)

Table 1. Building Construction Summary

Area	Construction Type	Fire Area Yes/No	Automatic Sprinklers (ft^2)	No Sprinklers (ft^2)
Administration Building	IIB	Yes	0	8000
Gate Building	IIB	Yes	0	300
TCEQ Office Building	IIB	Yes	0	660
CWF Staging Building	IIB	Yes	8,170	0
FWF Staging Building	IIB	Yes	9,670	0
CWF Decontamination Building	IIB	Yes	0	3,600
FWF Decontamination Building	IIB	Yes	0	3,600
Laboratory Building	IIB	Yes	1,400	0
FWF Bulk Staging Building	IIB	Yes	27,000	0

Construction Type IIB of the IBC is the same as Type II (000) of NFPA 220, *Types of Building Construction*.

2.2 Fire Areas

The Administration Building and TCEQ Office Building are only separated by 12 feet. . The Administration Building and TCEQ Office Building are considered to be one fire area. The Disposal Area Gate/Guardhouse Building and Laboratory Building are only separated by 20 feet. As the Laboratory Building is provided with automatic sprinkler protection and the Disposal Area Gate/Guardhouse Building is not provided with sprinkler protection, the Laboratory Building should be separated a minimum of 50 feet from the Disposal Area Gate/Guardhouse Building in accordance with NFPA 80A. With the 50 feet separation distance provided between the Disposal Area Gate/Guardhouse Building and the Laboratory Building, the only two buildings to be considered one fire area are the Administration Building and TCEQ Office Building. All other facilities are separate fire areas.

2.3 Exposures

The only exposure to any of the facilities is that provided by the Disposal Area Gate/Guardhouse Building to the Laboratory Building. The exposing wall from the Disposal Area Gate/Guardhouse Building is 10 feet and is parallel to the 20 foot wall section of the Laboratory Building and is approximately 20 feet away from the Laboratory Building. The eave height is 8 feet with an overall building height of 13 feet. The metal panel walls are not expected to withstand fire penetration of 20 minutes. Thus, the exposing wall from the Disposal Gate/Guardhouse Building is treated as having 100 percent opening. The fire severity within the Disposal Area Gate/Guardhouse Building is estimated as moderate.

Calculation of required separation distance: Calculate the width/height or height/width ratio to determine the configuration of the exposing face of the Disposal Area Gate/Guardhouse Building. The largest value of these two should be used.

$$\frac{Height}{Width} = \frac{8}{10} = 0.8 \qquad \text{or} \qquad \frac{Width}{Height} = \frac{10}{8} = 1.25$$

With a severity of moderate, 100 percent openings and interpolating between the table height/width values in NFPA 80A (Table 4.3.7.3), the resulting guide number is 2.26. The separation distance is calculated by multiplying the lesser dimension of the width or height by the guide number plus 5 feet. The estimated separation distance is (2.26 x 8) + 5. Thus, the required separation distance is approximately 24 feet per NFPA 80A. However, since the fire department response is estimated at 30 minutes application of NFPA 80A (Section 4.3.7.3) recommends increasing the distance derived from the guide numbers in Table 4.3.7.3 by a factor of 3 or less. Based on the anticipated combustible loading and the writer's professional judgment, this writer would use a factor of 2 resulting in a separation distance of approximately 48 feet. Thus, I would round the separation distance to 50 feet.

3.0 FACILITY OPERATIONS AND PROCESSES

3.1 Operations and Processes

Transport check-in, weighing, examination of the shipping paperwork, including the manifest, inspection of the waste package(s) for integrity, marking, labeling and conformance with the information on the manifest, and radiological verification surveys will be completed in the common fenced area between the Main LLRW Facilities Gate and the LLRW Disposal Area Gates in accordance with facility SOPs. These activities will verify compliance with applicable Department of Transportation (DOT), Environmental Protection Agency (EPA), Nuclear Regulatory Commission (NRC), and EPA shipping requirements for surface radiation. After completing the above WCS personnel will determine if to issue an approval for entry or off-site shipment, and does the shipment/package require sampling. If sampling is required, waste will be moved to the CWF or FWF for sampling prior to proceeding, otherwise it will be moved to the respective waste transfer facility for disposal. The designated demurrage area is also located within this fenced area.

Inside each of the respective LLRW disposal facilities, are separate areas for offloading and turnaround. Each loading and turnaround area will include a staging building for offloading and sampling of waste packages and a decontamination building for vehicle and equipment decontamination activities. Prior to vehicles leaving the facility, they will be surveyed in the decontamination facilities to assure there is no radiological contamination. If decontamination is required, the vehicle will be decontaminated with a clean water wash down. Once the vehicle is decontaminated it will be released to exit the facility.

Waste containers may be inspected outside of radiological controlled areas provided they remain on the transport vehicle, and prior to being transferred in the staging buildings. Waste will be transferred from the waste staging building using pallet movers, lift trucks, or manual transfer techniques.

When required, sampling activities will be conducted in the sampling rooms of the staging buildings in accordance with the Waste Acceptance Plan and the "Waste Sampling" procedure. Waste with high radiation fields (greater than 100 mrem/hr), pathogenic hazards, or other occupational risks will not be subject to invasive sampling due to as-low-as-reasonably-achievable (ALARA) and other potential health and safety concerns. Pathogenic waste must have been treated by the generator or waste processor to the maximum extent practicable prior to acceptance at the LLRW Disposal facilities.

Waste analysis will be conducted in the Laboratory Building. The analysis samples will be analyzed for appropriate radiochemical parameters (Refer to the Waste Acceptance Plan, Appendix 5.2-1 for details of the waste acceptance process that is summarized here). The WCS laboratory will be equipped with analytical instruments to analyze waste samples for these parameters. Additional analyses may be performed at an outside laboratory, as needed.

If the waste does not pass the waste verification process, it will be rejected. Waste with non-conformances may be accepted for disposal if the discrepancies are resolved satisfactorily with the generator. Waste packages with visible physical damage will not be accepted at the facility and must be returned to the generator or resolved at an off-site facility prior to acceptance at either the Federal or Compact facilities. However, waste packages with damage may be enclosed or placed in overpacks, as required in accordance with the operating procedure and other applicable procedures prior to acceptance for disposal.

Class A waste that is deemed acceptable for disposal as bulk waste will be placed in the FWF-non- canister disposal unit (FWF-NCDU) using conventional construction backfill methods. All FWF-canister disposal unit (FWF-CDU) waste will be offloaded directly into reinforced concrete canisters pre-placed in the final disposal array. Waste that is Class B, C, or canister A and does not pose an exposure hazard to workers will be placed in canisters using a diesel forklift or crane. Waste with high exposure rates will be transferred remotely by crane, with additional canisters or other shielding material arranged to provide operational shielding as required. After the waste is placed in the containers at the FWF-CDU, a temporary cover will be placed on the receiving canister until the unit is grouted to remove all interstitial voids. After the canister is grouted, a canister cover will be placed on the topmost layer only with an interim cover placed until construction closure activities.

Most waste delivered to the CWF will be placed in canisters; very little bulk waste is anticipated within the CWF. Waste designated for the CWF requiring remote handling will be disposed using the same remote procedure described for the FWF above. Waste items that are too big to go into canisters will be evaluated on a case-by-case basis. Waste items will be expected to meet the structural stability requirements by virtue of their waste character. If they are hollow forms, like tanks or vessels, they will have to be backfilled with sand, waste, or grout to ensure voids are filled. WCS will ensure that every effort is made to remove accessible void spaces in oversized items. After the waste is placed in the containers at the CWF disposal unit, a temporary cover will be placed on the receiving canister until the unit is grouted to remove all interstitial voids. After the canister is grouted, a canister cover will be placed on the topmost layer only with an interim cover placed until construction closure activities.

Waste receipts will be pre-approved to reduce the potential for backups at the receiving gate. Even with effective planning, temporary backlogs may be unavoidable for various reasons. WCS

operations will make decisions as required to avoid backups, and to mitigate backups from becoming a multiple shift problem.

There are operational steps available to address unplanned backlogs, including the initiating event, decision timeframe, and duration of effect. Decision and steps can be implemented individually or in combination with other steps. WCS will monitor waste receipt rates and implement appropriate actions to ensure that receipt backlogs are minimized. The decision timeframe is an indication of how quickly the action can be taken in response to an initiating event. The duration value is the maximum length of time that WCS proposes to rely on the action to resolve a backlog-initiating event. As an example, an equipment malfunction is likely to be addressed by a combination of temporary demurrage and the use of substitute on-site equipment while a commercially available substitute is arranged and delivered. Depending on the timeframe required to repair the problematic equipment, a rental unit may not be required.

In the event of a prolonged disposal placement delay, WCS will use a combination of these same techniques to manage waste receipts. While not proposed as a general practice, WCS will have the ability to mitigate longer duration delays as well. Roll-off containers can be staged within the FWF-controlled area if required. Procedures are in place that provide one possible configuration for roll-off staging, and provides a calculation basis to demonstrate that bulk receipts could be staged for at least three weeks, should conditions require such an action. WCS does not propose to use these extended staging options as an operational practice, but rather to respond to an unavoidable condition. A more practical response would be to delay shipments and reschedule receipts, but this action is not included in this analysis.

Similarly, packaged waste arriving by truck transport could be accommodated by a combination of truck demurrage and container staging inside the FWF and CWF controlled area. Waste receipt rates for the CWF are considerably lower than the FWF and at least two weeks of staging is available within the CWF staging building. For the FWF, a combination of demurrage and staging could provide approximately nine weeks of extended staging, but is not proposed as a routine operating approach. As with bulk receipts, the WCS proposed response would be to limit or reschedule new receipts until the reason for the delay was resolved.

3.2 Utilities and Support Systems

3.2.1 Heating Ventilation and Air Conditioning

Table 2. HVAC

Area	Electrical	Forced Air Gas	Refrigerated Air	Steam	Hot Water
Administration Building	X	- -	X	- -	- -
Gate Building	X	- -	X	- -	- -
TCEQ Office Building	X	- -	X	- -	- -
CWF Staging Building	X	- -	X	- -	- -
FWF Staging Building	X	- -	X	- -	- -
CWF Decontamination Building	X	- -	- -	- -	- -
FWF Decontamination Building	X	- -	- -	- -	- -
Laboratory Building	X	- -	X	- -	- -
FWF Bulk Staging Building	N/A	N/A	N/A	N/A	N/A

The CWF and FWF Staging Buildings will each be provided with pre-filters and HEPA final filters. The exhaust fan with the associated filters and exhaust louver will be provided in one wall and intake louvers will be provided on the opposite wall. The fan will be sized to provide 10,200 cfm in the CWF and 10,200 cfm in the FWF. The exhaust fan will be operated by a wall mounted hand/off/auto switch whenever the space temperature rises above 75 degrees Fahrenheit (F). Adjacent to the wall mounted thermostat is a carbon monoxide sensor that will also activate the exhaust system if the carbon monoxide concentration of the space exceeds 25 parts per million. The exhaust and intake openings will be equipped with normally closed automatic dampers which will open whenever the fans are activated.

The sampling room in the CWF and FWF Staging Buildings will be provided with a slot hood on the opposite wall from the door entering into the sampling room from the staging and garage area. These systems will be equipped with bubble-tight isolation dampers on the inlet and outlet and pre-filters and HEPA final filters. Make-up air for the Sampling Room in the CWF and FWF will be provided by a unit capable of providing 1,300 cfm. This unit will be exterior to the CWF and FWF and mounted on a pad near the office area in the buildings. The fan for the slotted hoods in the Sampling Rooms will be sized to provide 1,715 cfm.

Heat for the CWF and FWF Staging Buildings will be provided by four downflow electric unit heaters rated at 10 kW that are suspended from the roof. One downflow electric unit heater rated at 10 kW will provide the heat for the Sampling Rooms. These unit heaters will maintain the space at 70 degrees F while the exhaust system is operating during the coldest expected occupied time.

Heat for the office areas in the CWF and FWF will be provided by packed air-conditioning and heat units. Each unit is rated at 220 cfm.

In addition, a vehicle exhaust system will be provided that can be connected directly to the exhaust of the trucks.

The CWF and FWF Decontamination Buildings will each be provided with pre-filters and HEPA final filters. The exhaust fan with an associated filter exhaust louver will be provided in one wall and two intake louvers will be provided, one on each of the 32 foot walls. The fan will be sized to provide cubic 4,050 cfm in the CFW and 4,050 cfm in FWF. The exhaust fan will be operated by a wall mounted hand/off/auto switch whenever the space temperature rises above 75 degrees F. Adjacent to the wall mounted thermostat is a carbon monoxide sensor that will also activate the exhaust system if the carbon monoxide concentration of the space exceed 25 parts per million. The exhaust and intake openings will be equipped with normally closed automatic dampers which will open whenever the fans are activated.

Heat for the CWF and FWF Decontamination Buildings will be provided by two downflow electric unit heaters rated at 5 kW that are suspended from the roof. These unit heaters will be sized to maintain the space at 70 degrees F while the exhaust system is operating during the coldest expected occupied time.

The storage and change areas adjacent to the CWF and FWF Decontamination Buildings will be heated by combination units rated a 600 cfm.

The Laboratory Building will be provided with a packaged make-up air unit rated at 1,920 cfm. The fan coil unit is rated at 1,600 cfm an electrical heater of 15 kW. Rooms 2 and 3 are both equipped with a chemical hood system. The hoods are each provided with a fan rated at 960 cfm. The exhaust systems for the chemical hoods are equipped with a carbon pre-filter and HEPA final filter. In addition, Rooms 2 and 3 are provided with a 150 cfm exhaust fan. The associated air-cooled condensing unit will be located outside the building on a grade-mounted concrete pad.

Heating and cooling for the Disposal Area Gate/Guardhouse Building will be provided by two combination heating and cooling units. The units will be rated at 295 and 225 cfm. The 295-cfm unit will be located in the guard area and 225 cfm unit in the driver inspection area.

Heat and cooling for the Administration Building and the TCEQ Office Building will be provided by two units. AC-1 will be rated 3810 cfm and AC-2 will be rated at 6205 cfm.

No heating or cooling will be provided for the FWF Bulk Staging Building.

3.2.2 Electrical Systems

The normal power electric service will be derived from the existing primary electric power system serving the area. High voltage equipment, including but not limited to disconnect switches, taps, fuses, stress cone terminations, and insulation wraps will be provided. Primary electric cabling will be provided with copper conductors and a steel interlocked sheath under a rugged duty PVC jacket. The cable will be High-Pot performance tested and accepted prior to final connection to the primary power grid. A service transformer will be provided to step down the primary grid voltage to 208/120 volt. The secondary service entrance conductors will be run in a concrete encased duct bank at a depth of 30 inches below grade.

The service transformer for the CWF and FWF Staging and the Laboratory Buildings will be located outside on a concrete pad. The high-voltage electrical characteristics of the transformers will match the primary grid electrical distribution, and the electrical characteristics of the transformers secondary will be 208/120 volt, 3-phase, 4-wire. The pad will be 4 inches thick with reinforcing mesh installed at the midpoint of the pad. Openings in the pad will be provided that match the opening for the primary and secondary passages in the transformer. A 3/4-inch x 10’-0” copper-clad ground rod shall be installed through the pad opening and the transformer will be grounded. The ground conductor to ground rod connection will be an exothermic weld. Secondary conductors from the pad-mounted transformer will be installed in a duct bank (encased on concrete). The number and size of the secondary feeders will meet National Electrical Code (NEC) requirements. The secondary conductors will terminate in a service entrance rated panelboard. This panelboard will have a main circuit breaker. Circuit breakers, conduits, primary disconnect and conductors (number and size to comply with NEC and voltage drop requirements) will be provided to serve the Vehicle Decontamination Building from the Waste Storage Building distribution system.

Electrical power to Disposal Area Gate/Guardhouse Building, Administration Building and the TCEQ Building will be 208/120 volt, 3-phase, 4 wire.

3.3 Fire Hazards

The Administration Building, TCEQ Office Building and Disposal Area Gate/Guardhouse Building are primary office areas. These facilities are expected to contain the normal hazard

associated with an office operation. The primary hazard associated with the Laboratory Building is that provided by the reagent grade methanol used in the process. The use will consist of approximately 12 – 500 ml bottles per six months. With the exception of the bottle in use, the remaining bottles will be stored in a flammable liquids cabinet. Other combustible materials would be those normally associated with laboratory operations.

Primary hazards associated with the CWF and FWF Staging Buildings are waste stored in steel drums and fuel from the vehicles and their associated combustibles. The material in drums can range from personnel protective equipment (e.g. plastic material, paper products) and non-combustible items.

Primary hazards associated with The CWF and FWF Decontamination Buildings would be posed by items stored in the storage area and the fuel and their associated combustibles from a vehicle being decontaminated. The items in storage would most likely range from instrumentation, personnel protective equipment and supplies for business operations.

Primary hazards associated with the FWF Bulk Staging Building are noncombustible waste stored in steel intermodal containers to a maximum height of 13 feet and fuel from vehicles and their associated combustibles.

4.0 SAFETY CLASS STRUCTURES, SYSTEMS AND COMPONENTS

There are no safety class or safety significant systems in the facilities covered by this document.

5.0 SECURITY AND SAFEGUARDS CONSIDERATIONS RELATED TO FIRE PROTECTION

A minimum 7-foot high chain link fence will be provided around the entire complex. Three stands of twisted double strand barbed wire will be provided on top of the chain link fence. Gates to the complex will be provided at the Disposal Area Gate/Guardhouse Building. The above security safeguards will have no impact on fire department access in the event of a fire.

The sprinkler control valves for both of these facilities will be wall post indicator valves located outside the facilities and are readily accessible.

6.0 OCCUPANT LIFE SAFETY CONSIDERATIONS

6.1 Life Safety Features Hazard of Contents

Table 3. Life Safety Features Hazard of Contents

Area	Low	Ordinary	High	Radioactive	Reduced Hazard	Special Hazards
Administration Building	N/A	X	N/A	N/A	N/A	N/A
Gate Building	N/A	X	N/A	N/A	N/A	N/A
TCEQ Office Building	N/A	X	N/A	N/A	N/A	N/A
CWF Staging Building	N/A	X	N/A	X	N/A	N/A

Table 3. Life Safety Features Hazard of Contents

Area	Low	Ordinary	High	Radioactive	Reduced Hazard	Special Hazards
FWF Staging Building	N/A	X	N/A	X	N/A	N/A
CWF Decontamination Building	N/A	X	N/A	N/A	N/A	N/A
FWF Decontamination Building	N/A	X	N/A	N/A	N/A	N/A
Laboratory Building	N/A	X	N/A	X	N/A	N/A
FWF Bulk Staging Building	X	N/A	N/A	X	N/A	N/A

6.2 Occupancy Class

Table 4. Occupancy Class

Area	Assembly	Business	Industrial	Storage	Special Structure	Mixed Occupancy
Administration Building	N/A	X	N/A	N/A	N/A	N/A
Gate Building	N/A	X	N/A	N/A	N/A	N/A
TCEQ Office Building	N/A	X	N/A	N/A	N/A	N/A
CWF Staging Building	N/A	N/A	X	N/A	N/A	X
FWF Staging Building	N/A	N/A	X	N/A	N/A	X
CWF Decontamination Building	N/A	N/A	X	X	N/A	X
FWF Decontamination Building	N/A	N/A	X	X	N/A	X
Laboratory Building	N/A	N/A	X	N/A	N/A	N/A
FWF Bulk Staging Building	N/A	N/A	N/A	X	N/A	N/A

6.3 Occupant Loading

Table 5. Occupant Loading

Area	Occupant Load	NFPA 101 Criteria	Actual Load	Comments
Administration Building	80	Table 7.3.1.2	Unknown	- -
Gate Building	3	Table 7.3.1.2	Unknown	- -
TCEQ Office Building	6	Table 7.3.1.2	Unknown	- -
CWF Staging Building	81	Table 7.3.1.2	Unknown	- -
FWF Staging Building	96	Table 7.3.1.2	Unknown	- -
CWF Decontamination Building	36	Table 7.3.1.2	Unknown	N/A in the 720 ft^2 storage area
FWF Decontamination Building	36	Table 7.3.1.2	Unknown	N/A in the 720 ft^2 storage area

Table 5. Occupant Loading

Area	Occupant Load	NFPA 101 Criteria	Actual Load	Comments
Laboratory Building	14	Table 7.3.1.2	Unknown	- -
FWF Bulk Staging Building	N/A	Table 7.3.1.2	Unknown	N/A in the FWF Bulk Staging Building

6.4 Means of Egress Features

Table 6. Means of Egress Features

Area	Number of Exits	Travel Distance to Exit (ft.)	Common Path of Travel (ft.)	Dead End Corridor (ft.)	Exit Signs Illuminated (Yes/No)	Emergency Lighting
Administration Building	3	113	50	0	Signs Required	Required
Gate Building	4	15	8	0	Signs Required	Required
TCEQ Office Building	1	33	33	0	Signs Required	Required
CWF Staging Building	2	145	57	0	Signs Required	Required
FWF Staging Building	2	195	82	0	Signs Required	Required
CWF Decontamination Building	2	79	0	0	Signs Required	Required
FWF Decontamination Building	2	79	0	0	Signs Required	Required
Laboratory Building	3	35	15	0	Signs Required	Required
FWF Bulk Staging Building	4	170	40	0	Signs Required	Required

Automatic sprinkler protection is not proposed in the CWF and FWF Decontamination Buildings, Disposal Area Gate/Guardhouse Building, Administration Building and the TCEQ Building. In accordance with NFPA 101 (Table 40.2.5), the maximum allowable dead-end corridor is 50 feet and common path of travel is 50 feet in an industrial occupancy. In accordance with NFPA 101 (Table 40.2.6), the maximum allowable travel distance to exits is 200 feet in a general industrial occupancy and 300 feet in a special purpose industrial occupancy.

NFPA 101 (Section 40.2.4.1.2) allows a single means of egress from any story or section in low and ordinary hazard industrial occupancies, provided the exit can be reached within the distance permitted as a common path of travel.

NFPA 101 (Section 38.2.5.2.2) permits a maximum allowable dead-end corridor of 20 feet and NFPA 101 (Section 38.2.5.3.2) permits a maximum common path of travel of 100 feet in a business occupancy with an occupant load not exceeding 30 persons; otherwise the maximum common path of travel is 75 feet in accordance with NFPA 101 (Section 38.2.5.3.3). In accordance with NFPA 101 (Section 38.2.6.2) the maximum allowable travel distance to exits is 200 feet in business occupancy.

Automatic sprinkler protection is proposed in the CWF and FWF Staging Buildings and the Laboratory Building. In accordance with NFPA 101 (Table 40.2.5), the maximum allowable dead-end corridor is 50 feet and common path of travel is 100 feet in an industrial occupancy. In accordance with NFPA 101 (Table 40.2.6), the maximum allowable travel distance to exits is 250 feet in a general industrial occupancy and 400 feet in a special purpose industrial occupancy.

NFPA 101 (Section 40.2.4.1.2) allows a single means of egress from any story or section in low and ordinary hazard industrial occupancies, provided the exit can be reached within the distance permitted as a common path of travel.

NFPA 101 (Section 38.2.5.2.1) permits a maximum allowable dead-end corridor of 50 feet and NFPA 101 (Section 38.2.5.3.1) permits a maximum common path of travel of 100 feet in business occupancy. In accordance with NFPA 101 (Section 38.2.6.1), the maximum allowable travel distance to exits is 300 feet in business occupancy.

Automatic sprinkler protection is proposed for the FWF Bulk Staging Building. In accordance with NFPA 101 (Section 42.2.4.1), a single means of egress is permitted from any story in low hazard storage occupancies. In low hazard storage occupancies, the allowable travel distance to exits, dead-end corridor travel distance and common path of travel distance are not limited in accordance with NFPA 101 (Section 48.2.5).

The Disposal Area Gate/Guardhouse Building will be provided with four exits. Two exits will be provided in the south wall of the facility, one from the guard area of the building and one from the driver inspection area of the building. Two exits will be provided in the north wall of the facility, one from the guard area of the building and one from the driver inspection area of the building. The common path of travel distance of 8 feet and the total travel distance of 15 feet to the exit discharge are both within the allowable distance of the NFPA 101 business occupancy.

The Administration Building will be provided with three exits. One exit will be provided at the northeast corner, one exit at the northwest corner and one exit as the southwest corner. The common path of travel distance of 50 feet and the total travel distance of 113 feet to the exit discharge are both within the allowable distance of the NFPA 101 business occupancy without sprinkler protection.

The TCEQ Building with be provided with one exit. The exit will be provided in the middle of the east wall. The common path of travel distance of 33 feet and the total travel distance of 33 feet to the exit discharge are both within the allowable distance of the NFPA 101 business occupancy without sprinkler protection.

The CWF and FWF Staging Buildings will each be provided with two exits from the staging and garage area. One exit will be provided at the northwest corner of each of the buildings and the other will be provided in the east wall just south of the office area. In addition, stairs will be provided from the floor to the raised staging area. The stairs will be located on the west side of the raised staging area just south of the ramp up to the staging area. The stairs from the west side of the raised staging area and the exterior stairs from the east exit shall be in accordance with NFPA 101 (Section 7.2.2). The stairs were unable to be evaluated against the requirements of NFPA 101 (Section 7.2.2) as no stair details were provided. One exit will be provided in the north wall of the sampling room which leads directly to the outside. The common path of travel distance of 82 feet in the FWF Staging Building, 57 feet in the CWF Staging Building and the

total travel distance of 195 feet and 145 feet, respectively, to the exit discharge are within the allowable distances of NFPA 101 industrial occupancy.

The CWF Decontamination Buildings will each be provided with two exits from the buildings. One exit will be provided on the north wall of the building and the other will be provided in the south wall. There is no common path of travel. Two exits will be provided from the storage room. One exit will be provided in the north wall of the storage room and one in the southwest corner of the storage room. The total travel distance of 79 feet to the exit discharge is within the allowable distance of NFPA 101 industrial occupancy.

The FWF Decontamination Buildings will each be provided with two exits from the buildings. One exit will be provided on the east wall of the building and the other will be provided in the west wall. There is no common path of travel. Two exits will be provided from the storage room. One exit will be provided in the west wall of the storage room and one in the southeast corner of the storage room. The total travel distance of 79 feet to the exit discharge is within the allowable distance of NFPA 101 industrial occupancy.

The Laboratory Building will be provided with three exits. Two exits will be provided in the north wall of the building and one exit will be provided in the south wall. The common path of travel distance of 15 feet and the total travel distance of 35 feet to the exit discharge are both within the allowable distance of the NFPA 101 for an industrial occupancy.

The FWF Bulk Staging Building will be provided with four exits. One exit will be provided in the west wall of the building, one in the east wall of the building, one in the north wall approximately midway in the building and one in the south wall approximately midway in the building. There are no dead-end corridors. A common path of travel may be created when the intermodal containers are introduced into the building. This common path of travel would exist between the rows of intermodal containers. Current plans are to store the intermodal storage containers two deep. Based on the length of the intermodal containers of approximately 20 feet, the common path of travel distance would be approximately 40 feet. The common path travel distance of 40 and the 170 feet travel distance to the exit discharge are within the allowable travel distance of NFPA 101 for low hazard storage occupancies.

The IBC, Chapter 10, *Means of Egress*, 1006.1 requires the means of egress and the exit discharge be illuminated at all times the building is occupied. IBC, 1006.2 requires that the illumination level not be less than 1 foot-candle at the floor level. This requirement would be applicable to the Administration Building, TCEQ Office Building, CWF and FWF Decontamination Buildings and Disposal Area Gate/Guardhouse Building.

The IBC, 1011.1 requires that exits and exit access doors be marked by an approved exit sign readily visible from any direction of egress travel. Access to exits shall be marked by readily visible exit signs in cases where the exit or path of egress travel is not immediately visible to the occupants. This requirement would be applicable to the Administration Building and CWF and FWF Decontamination Buildings. The exceptions state that exit signs are not required in areas which require only one exit or where the doors are obviously and clearly identifiable as exits. The one exit would be applicable to the TCEQ Office Building and the obvious and clearly identifiable exits would be applicable to the Disposal Area Gate/Guardhouse Building.

The NFPA 101 (Sections 40.2.8 and 42.2.8) requires that the means of egress be illuminated in accordance with NFPA 101 (Section 7.8) or with natural lighting that provides the required level

of illumination in structures only occupied during the daylight hours. NFPA (Section 7.9.2.1) requires that the illumination level not be less than an average of 1 foot-candle, measured along the path of egress, at the floor level. This requirement would be applicable to the CWF and FWF Staging Buildings, FWF Bulk Staging Building and the Laboratory Building.

The NFPA 101 (Sections 40.2.10 and 42.2.10) requires that the means of egress have signs as required by NFPA 101 (Section 7.10). NFPA 101 (Section 7.10.1.2) requires that exits, other than main exterior doors that obviously and clearly are identifiable as exits, shall be marked by an approved sign that is readily visible from any direction of exit access. Each exit door requiring an exit sign shall be provided tactile signage in accordance with NFPA 101 (Section 7.10.1.3). Also, in accordance with NFPA 101 (Section 7.10.1.5.1) access to exits shall be marked by approved readily visible signs in all cases where the exit or way to reach the exit is not readily apparent to the occupants. This requirement would be applicable to the CWF and FWF Staging Buildings, FWF Bulk Staging Building and the Laboratory Building.

7.0 FIRE PROTECTION FEATURES

7.1 Fire Protection Features Automatic Fire Sprinkler Systems

The fire hazard classification of the contents in the FWF and CWF Staging Building is predominately combustible radioactive materials in plastic bags, if the amount of exposed combustible radioactive material in plastic is minimized, in a steel drum. Combustible material in a plastic bag in a steel drum is considered a Class II Commodity. NFPA 13, *Installation of Sprinkler Systems* (Table 13.2.1) requires curve OH1 of NFPA 13 Figure 13.2.1 for sprinkler design and 250 gallons per minute for hose streams. The requirements of the above will protect a Class II Commodity to a maximum height of 10 feet. The sprinkler system will be designed to provide a density of 0.14 gpm per square foot over the hydraulically most remote 2000 square feet utilizing a wet pipe system. Sprinklers will be ½-inch orifice and rated at 165 degrees F. The sprinkler demand and hose stream demand will be available for 90 minutes.

The hazard classification of the contents in the CWF and FWF Staging Buildings, where vehicles and equipment are parked, is Ordinary Hazard Group I in accordance with NFPA 13 (Section 5.3.1). The 250-gpm hose stream demand and sprinkler demand required in Table 11.2.3.1.2 is required to be available for 90 minutes. The sprinkler system will be designed in accordance with the requirements of Figure 11.2.3.1.1. The sprinkler system will be designed to provide a density of 0.14 gpm per square foot over the hydraulically most remote 2000 square feet utilizing a wet pipe system. Sprinklers will be ½ inch orifice and 165 degrees F.

With the microcurie threshold limits of 10 CFR 30 exceeded in the Laboratory, per NFPA 801 (Section 7.1.5), fire protection for laboratories involving radioactive materials shall be in accordance with NFPA 45, *Standard on Fire Protection for Laboratories using Chemicals.*

NFPA 45 (Section 6.2.1.1) requires automatic sprinkler protection be provided in all new laboratories. The sprinkler design criterion is based on the laboratory classification as A, B, C or D according to the quantity of flammable and combustible liquids in the laboratory unit.

This writer understands that approximately 12 500 ml bottles of Methanol will be used per six months. Assuming delivery of the 12 bottles at the beginning of each six months, there would be 6 liters present at the highest inventory. NFPA 45 (Table 10.1.1) would classify the fire hazard of

this 1,400 square foot laboratory as a Class D (minimal fire hazard). The allowable flammable liquid in this classification is 4 L per 100 square feet of laboratory unit, not in a safety can or storage cabinet, and 56 L in the entire laboratory. The allowable flammable liquid including that in safety cans and storage cabinets is 7.5 L per 100 square feet of laboratory unit and 105 L in the entire laboratory.

Based on the above laboratory hazard classification, the sprinklers will be designed for an Ordinary Hazard Group I per NFPA 45 [Section 6.2.1.1 (2)] NFPA 13 (Table 11.2.3.1.2) requires 250 gpm hose stream demand and the sprinkler demand to be available for 90 minutes. The sprinkler system will be designed in accordance with NFPA 13 (Figure 11.2.3.1.1). The sprinkler system will be designed to provide a density of 0.14 gpm per square foot over the entire 1400 square feet of the laboratory utilizing a wet pipe system. Sprinklers will be 1/2-inch orifice and rated at 165 degrees F.

Automatic sprinkler protection will not be provided in the Administration Building, TCEQ Office Building, Disposal Area Gate/Guardhouse Building, and the CWF and FWF Decontamination Buildings. These building are not under the requirements of NFPA 801, as there are no radioactive materials in these facilities or the radioactive materials are below the thresholds of 10 CFR 30. Thus, the requirements for sprinkler protection are based on the IBC. IBC 903.2.3, 903.2.8 does not require sprinkler protection in industrial F-1 occupancies or storage S-1 occupancies as long as the facilities are 1 story and less than 12, 000 square feet or in business occupancies regardless of the square feet. The industrial (F-1) and storage (S-1) facilities are less than 12,000 square feet.

With the microcurie threshold limits of 10 CFR 30 exceeded in the FWF Bulk Staging Building, per NFPA 801 (Section 6.1.2), automatic sprinkler protection shall be provided unless the fire hazards analysis dictates otherwise. The actual storage area of the intermodal containers is noncombustible; however the unloading and loading operations would require automatic sprinkler protection. The intermodal container storage is proposed to be located between the unloading and loading operations that are located at the ends of the building. Also, it is estimated that the storage area would occupy approximately 50 percent of building and the unloading and loading operations the other 50 percent of the building. Based on the building layout it is this writer's professional judgment that automatic sprinkler protection should be provided throughout the entire building.

The intermodal containers will contain radiological contaminated soil, concrete, and rebar in steel containers. NFPA 13 commodity classification, at worst, is a Class I commodity. Solid pile storage of a Class I commodity to 13 feet per NFPA 13 (Sections 14.2.4 and 14.2.4.5) requires a density of 0.15 gpm/ft^2 over the hydraulically most remote 2600 square feet utilizing a dry-pipe system and 165 degree Fahrenheit sprinklers. The required hose stream demand is 500 gpm with duration of 90 minutes in accordance with NFPA 13 (Table 14.1.1).

Unloading and loading intermodal areas are similar to a parking garage and thus the sprinkler requirements for a parking garage were used. NFPA 13, (Section 5.3.1, A5.3.1) classifies automobile parking garages as an Ordinary Hazard Group I. Using NFPA 13 (Figure 11.2.3.1.1), the required density is 0.14 gpm/ft^2 over 2600 square feet when a dry-pipe system is used. NFPA 13 (Table 11.2.3.1.2) requires 250 gpm hose stream demand and the sprinkler demand to be available for 90 minutes. Sprinklers should be rated at 165 degrees Fahrenheit.

The greatest sprinkler demand for the FWF Bulk Staging Building is that required for the storage of intermodal containers to 13 feet. Thus, the sprinkler system for the FWF Bulk Staging Building will be designed to provide a density of 0.15 gpm per square foot over the hydraulically most remote 2600 square feet utilizing a dry-pipe system. The required hose stream demand is 500 gpm with duration of 90 minutes in accordance with NFPA 13 (Table 14.1.1). Sprinklers will be rated at 165 degrees F.

7.2 Fire Protection Water Supplies

The water supply will be provided by a fire pump taking suction from an above ground storage tank. The pump will be electrically driven and rated at 1000 gpm at 100 psi. The tank will be 500,000 gallons. The fire pump and tank will be located at the southeast corner of the FWF and will discharge into a 6 inch polyvinyl chloride (PVC) underground pipe. The 6 inch underground pipe will run along the west side of the CWF and the north side of the CWF, supplying the sprinklers in the CWF and the fire hydrant at the CWF Staging Building, and the fire hydrant at the CWF Decontamination Building. A 6 inch PVC underground pipe will run along the south side of the FWF to within approximately 50 feet of the Administration Building. One fire hydrant will be provided to serve the FWF Staging Building and FWF Decontamination Building, one fire hydrant will be provided approximately 50 feet from the FWF Bulk Staging Building east end, one fire hydrant will be provided approximately 50 feet from the Laboratory Building and one fire hydrant approximately 50 feet from the Administration Building.

Table 7. Proposed Underground Fire Mains Point A to Point F (6 inch)

Pipe Type	Hydraulic Reference Points	Nominal Diameter (inches)	Internal Diameter (inches)	Length (feet)	Flow (gals/min)	Friction Factor	Pressure Drop (psi/ linear ft.)	Fittings	Fittings Equivalent Length	Total Pressure Drop (psi)
PVC PW Eagle Class 150 DR 18	A to B	6	6.08	150	300	150	0.007817			.4
PVC PW Eagle Class 150 DR 18	B to C	6	6.08	700	300	150	0.007817	1EL	14	1.8
PVC PW Eagle Class 150 DR 18	C to D	6	6.08	1080	300	150	0.007817			2.7
PVC PW Eagle Class 150 DR18	D to E	6	6.08	360	300	150	0.007817			.9
PVC PW Eagle Class 150 DR18	E to F	6	6.08	600	300	150	0.007817	1EL	14	1.5

Table 8. Proposed Underground Fire Mains Point A to Point F (6 inch)

Pipe Type	Hydraulic Reference Points	Nominal Diameter (inches)	Internal Diameter (inches)	Length (feet)	Flow (gals/min)	Friction Factor	Pressure Drop (psi/ linear ft.)	Fittings	Fittings Equivalent Length	Total Pressure Drop (psi)
PVC PW Eagle Class 150 DR 18	A to B	6	6.08	150	558	150	0.00248			1.2
PVC PW Eagle Class 150 DR 18	B to C	6	6.08	700	558	150	0.00248	1EL	14	5.6
PVC PW Eagle Class 150 DR 18	C to D	6	6.08	1080	558	150	0.00248			8.4
PVC PW Eagle Class 150 DR18	D to E	6	6.08	360	558	150	0.00248			2.8
PVC PW Eagle Class 150 DR18	E to F	6	6.08	600	558	150	0.007817	1EL	14	4.8

Table 9. Proposed Underground Fire Mains Point A to Point F (6 inch)

Pipe Type	Hydraulic Reference Points	Nominal Diameter (inches)	Internal Diameter (inches)	Length (feet)	Flow (gals/min)	Friction Factor	Pressure Drop (psi/ linear ft.)	Fittings	Fittings Equivalent Length	Total Pressure Drop (psi)
PVC PW Eagle Class 150 DR 18	A to B	6	6.08	150	930	150	0.013509			3.0
PVC PW Eagle Class 150 DR 18	B to C	6	6.08	700	930	150	0.013509	1EL	14	14.4
PVC PW Eagle Class 150 DR 18	C to D	6	6.08	1080	930	150	0.013509			21.7
PVC PW Eagle Class 150 DR18	D to E	6	6.08	360	930	150	0.013509			7.2
PVC PW Eagle Class 150 DR18	E to F	6	6.08	600	930	150	0.007817	1EL	14	12.3

Table 10. Proposed Underground Fire Mains Point A to Point F (8 inch)

Pipe Type	Hydraulic Reference Points	Nominal Diameter (inches)	Internal Diameter (inches)	Length (feet)	Flow (gals/min)	Friction Factor	Pressure Drop (psi/linear ft.)	Fittings	Fittings Equivalent Length)	Total Pressure Drop (psi)
PVC PW Eagle Class 150 DR 18	A to B	8	7.97	150	300	150	0.000664			.1
PVC PW Eagle Class 150 DR 18	B to C	8	7.97	700	300	150	0.000664	1EL	20	.5
PVC PW Eagle Class 150 DR 18	C to D	8	7.97	1080	300	150	0.000664			.7
PVC PW Eagle Class 150 DR18	D to E	8	7.97	360	300	150	0.000664			.2
PVC PW Eagle Class 150 DR18	E to F	8	6.08	600	300	150	0.007817	1EL	20	.4

Table 11. Proposed Underground Fire Mains Point A to Point F (8 inch)

Pipe Type	Hydraulic Reference Points	Nominal Diameter (inches)	Internal Diameter (inches)	Length (feet)	Flow (gals/min)	Friction Factor	Pressure Drop (psi/linear ft.)	Fittings	Fittings Equivalent Length	Total Pressure Drop (psi)
PVC PW Eagle Class 150 DR 18	A to B	8	7.97	150	558	150	0.002092			.3
PVC PW Eagle Class 150 DR 18	B to C	8	7.97	700	558	150	0.002092	1EL	20	1.5
PVC PW Eagle Class 150 DR 18	C to D	8	7.97	1080	558	150	0.002092			2.3
PVC PW Eagle Class 150 DR18	D to E	8	7.97	360	558	150	0.002092			.8
PVC PW Eagle Class 150 DR18	E to F	8	6.08	600	558	150	0.007817	1EL	20	1.3

Table 12. Proposed Underground Fire Mains Point A to Point F (8 inch)

Pipe Type	Hydraulic Reference Points	Nominal Diameter (inches)	Internal Diameter (inches)	Length (feet)	Flow (gals/min)	Friction Factor	Pressure Drop (psi/linear ft.)	Fittings	Fittings Equivalent Length	Total Pressure Drop (psi)
PVC PW Eagle Class 150 DR 18	A to B	8	7.97	150	930	150	0.003615			.8
PVC PW Eagle Class 150 DR 18	B to C	8	7.97	700	930	150	0.003615	1EL	20	3.9
PVC PW Eagle Class 150 DR 18	C to D	8	7.97	1080	930	150	0.003615			5.8
PVC PW Eagle Class 150 DR18	D to E	8	7.97	360	930	150	0.003615			1.9
PVC PW Eagle Class 150 DR18	E to F	8	6.08	600	930	150	0.007817	1EL	20	3.3

Table 13. Proposed Underground Fire Mains Point A to Point G (6 inch)

Pipe Type	Hydraulic Reference Points	Nominal Diameter (inches)	Internal Diameter (inches)	Length (feet)	Flow (gals/min)	Friction Factor	Pressure Drop (psi/linear ft.)	Fittings	Fittings Equivalent Length	Total Pressure Drop (psi)
PVC PW Eagle Class 150 DR 18	A to B	6	6.08	150	300	150	0.00248			.4
PVC PW Eagle Class 150 DR 18	B to G	6	6.08	1620	300	150	0.00248	1T and 2EL	73	4.2

Table 14. Proposed Underground Fire Mains Point A to Point G (6 inch)

Pipe Type	Hydraulic Reference Points	Nominal Diameter (inches)	Internal Diameter (inches)	Length (feet)	Flow (gals/min)	Friction Factor	Pressure Drop (psi/linear ft.)	Fittings	Fittings Equivalent Length	Total Pressure Drop (psi)
PVC PW Eagle Class 150 DR 18	A to B	6	6.08	150	558	150	0.007817			1.2
PVC PW Eagle Class 150 DR 18	B to G	6	6.08	1620	558	150	0.007817	1T and 2EL	73	13.2

Table 15. Proposed Underground Fire Mains Point A to Point G (6 inch)

Pipe Type	Hydraulic Reference Points	Nominal Diameter (inches)	Internal Diameter (inches)	Length (feet)	Flow (gals/min)	Friction Factor	Pressure Drop (psi/linear ft.)	Fittings	Fittings Equivalent Length	Total Pressure Drop (psi)
PVC PW Eagle Class 150 DR 18	A to B	6	6.08	150	930	150	0.013509			3.0
PVC PW Eagle Class 150 DR 18	B to G	6	6.08	1620	930	150	0.013509	1T and 2EL	73	34.7

Table 16. Proposed Underground Fire Mains Point A to Point G (8 inch)

Pipe Type	Hydraulic Reference Points	Nominal Diameter (inches)	Internal Diameter (inches)	Length (feet)	Flow (gals/min)	Friction Factor	Pressure Drop (psi/linear ft.)	Fittings	Fittings Equivalent Length	Total Pressure Drop (psi)
PVC PW Eagle Class 150 DR 18	A to B	8	7.97	150	300	150	0.000664			.1
PVC PW Eagle Class 150 DR 18	B to G	8	7.97	1620	300	150	0.000664	1T and 2EL	93	1.1

Table 17. Proposed Underground Fire Mains Point A to Point G (8 inch)

Pipe Type	Hydraulic Reference Points	Nominal Diameter (inches)	Internal Diameter (inches)	Length (feet)	Flow (gals/min)	Friction Factor	Pressure Drop (psi/linear ft.)	Fittings	Fittings Equivalent Length	Total Pressure Drop (psi)
PVC PW Eagle Class 150 DR 18	A to B	8	7.97	150	558	150	0.002092			.3
PVC PW Eagle Class 150 DR 18	B to G	8	7.97	1620	558	150	0.002092	1T and 2EL	93	3.6

Table 18. Proposed Underground Fire Mains Point A to Point G (8 inch)

Pipe Type	Hydraulic Reference Points	Nominal Diameter (inches)	Internal Diameter (inches)	Length (feet)	Flow (gals/ min)	Friction Factor	Pressure Drop (psi/ linear ft.)	Fittings	Fittings Equivalent Length	Total Pressure Drop (psi)
PVC PW Eagle Class 150 DR 18	A to B	8	7.97	150	930	150	0.003615			.8
PVC PW Eagle Class 150 DR 18	B to G	8	7.97	1620	930	150	0.003615	1T and 2EL	93	9.2

The available water at point G (CWF Staging Building) is approximately 560 gpm at 102 psi using 6 inch PVC pipe and 560 gpm at 113 psi using 8 inch PVC pipe with a 1000 gpm at 100 psi fire pump. With the minimum sprinkler discharge pressure of 7 psi per NFPA 13 (Section 14.4.4.8.1), a maximum sprinkler coverage of 100 square feet per sprinkler and an elevation pressure loss of approximately 10 psi (0.433 x 22.5), due to the 22.5 feet in elevation, leaves an available water supply of approximately 560 gpm at 85 psi utilizing 6 inch PVC underground pipe and 560 gpm at 96 psi utilizing 8 inch PVC underground pipe to design the sprinkler system.

The available water at point C (FWF Staging Building) is approximately 560 gpm at 110 psi using 6 inch PVC pipe and 560 gpm at 115 psi using 8 inch PVC pipe with a 1000 gpm at 100 psi fire pump. With the minimum sprinkler discharge pressure of 7 psi per NFPA 13 (Section 14.4.4.8.1), a maximum sprinkler coverage of 100 square feet per sprinkler and an elevation pressure loss of approximately 10 psi (0.433 x 22.5), due to the 22.5 feet in elevation, leaves an available water supply of approximately 560 gpm at 93 psi utilizing 6 inch PVC underground pipe and 560 gpm at 98 psi utilizing 8 inch PVC underground pipe to design the sprinkler system.

The available water at point D (FWF Bulk Staging Building) is approximately 960 gpm at 70 psi using 6 inch PVC pipe and 960 gpm at 99 psi using 8 inch PVC pipe with a 1000 gpm at 100 psi fire pump. With the minimum sprinkler discharge pressure of 7 psi per NFPA 13 (Section 14.4.4.8.1), a maximum sprinkler coverage of 100 square feet per sprinkler and an elevation pressure loss of approximately 10 psi (0.433 x 22.5), due to the 22.5 feet in elevation, leaves an available water supply of approximately 960 gpm at 53 psi utilizing 6 inch PVC underground pipe and 960 gpm at 82 psi utilizing 8 inch PVC underground pipe to design the sprinkler system.

The available water at point E (Laboratory Building) is approximately 470 gpm at 101 psi using 6 inch PVC pipe and 470 gpm at 113 psi using 8 inch PVC pipe with a 1000 gpm at 100 psi fire pump. With the minimum sprinkler discharge pressure of 7 psi per NFPA 13 (Section 14.4.4.8.1) and a maximum sprinkler coverage of 100 square feet per sprinkler with an elevation pressure loss of approximately 6 psi (0.433 x 14.0), due to the 14 feet in elevation, leaves an available water supply of approximately 470 gpm at 88 psi utilizing 6 inch PVC underground pipe and 470 gpm at 100 psi utilizing 8 inch PVC underground pipe to design the sprinkler system.

The available water at point F (Administration Building is approximately 500 gpm at 96 psi using 6 inch PVC underground pipe and 500 gpm at 112 psi using 8 inch PVC underground pipe with a 1000 gpm at 100 psi fire pump.

The use of 6 inch PVC underground pipe in conjunction with the 1000 gpm at 100 psi fire pump provides sufficient water flow and pressure to design the sprinkler systems and provide adequate flow and pressure for hose streams at the Administration Building.

7.3 Special Hazard Protection Systems

No special hazard protection systems will be installed at the facilities covered by this document.

7.4 Fire Alarm Initiating Devices

Table 19. Fire Alarm Initiating Devices

Area	Ionization Smoke	Photoelectric Smoke	Thermal	Combo	Flame UV/IR	Waterflow	Manual Pull Station
CWF Staging Building	N/A	N/A	N/A	N/A	N/A	1 Zone	2
FWF Staging Building	N/A	N/A	N/A	N/A	N/A	1 Zone	2
Laboratory Building	N/A	N/A	N/A	N/A	N/A	1 Zone	3
FWF Bulk Staging Building	N/A	N/A	N/A	N/A	N/A	1 Zone	4

NFPA 801 (Section 6.8) requires that a fire alarm system be provided that monitors fire suppression systems activation and manual pull station activation that is connected to a constantly attended location. The fire alarm system is required in the buildings in which NFPA 801 is applicable. This includes the CWF and FWF Staging Buildings, FWF Bulk Staging Building and the Laboratory Building. The water flow initiating devices and manual pull stations will be installed in accordance with NFPA 72, (Sections 5.11 and 5.13). In addition, all fire protection control valves will be provided with electronic valve supervisory switches installed in accordance with NFPA 72, (Section 5.15.1). The entire fire alarm system will be installed in accordance with NFPA 72.

NFPA 20 (Section 10.4.7.2) requires a pump or motor running alarm, loss of phase alarm, phase reversal alarm. NFPA 20 (Section 5.23) and NFPA 72 (Sections 5.15.3, 5.15.4 and 5.15.5) requires monitoring of suction reservoir water level, suction reservoir water temperature, and pump house temperature. The installation of these alarms and supervisory signals will be done in accordance with NFPA 72.

IBC, Chapter 9, *Fire Protection Systems*, 907.2.2 does not require a fire alarm system in a Group B, business occupancy with less than 500 persons or less than or equal to 100 persons above are below the lowest level of exit discharge. NFPA 101 (Section 38.3.4.1) does not require a fire alarm system in business occupancy where the building is less than two stories above the level of exit discharge, less than 50 persons are above or below the level of exit discharge, or the occupancy is less than 300 persons. This is applicable to the Administration Building, TCEQ Office Building and Disposal Area Gate/Guardhouse Building.

IBC, Chapter 9, *Fire Protection Systems*, 907.2.4 does not require a fire alarm system in a Group F, industrial occupancy that is less than 2 stories in height and is occupied by less than 500 persons. NFPA 101 (Section 40.3.4.1) does not require a fire alarm system in an industrial occupancy where the building is occupied by less than 100 persons and less than 25 persons are above or below the level of exit discharge.

IBC, Chapter 9, *Fire Protection Systems*, 907.2.14 does not require a fire alarm system is storage areas unless it is high-piled storage. High-piled storage is greater than 12 feet in height. NFPA 101 (Section 42.3.4.1.2) does not require a fire alarm system in a storage occupancy with ordinary of high hazard contents that does not exceed 100, 000 square feet of floor area.

The above two items are applicable to the CWF and FWF Decontamination Buildings.

7.5 Fire Alarm Signaling Devices

Table 20. Fire Alarm Signaling Devices

Area	Audible	Visible	Audible/Visible	Fire Alarm Control Panel	Comments
CWF Staging Building	- -	- -	Yes	- -	- -
FWF Staging Building	- -	- -	Yes	- -	- -
Laboratory Building	- -	- -	Yes	- -	- -
FWF Bulk Staging Building	- -	- -	Yes	- -	- -

Alarm audible and visual notification devices will be provided in the CWF and FWF Staging Buildings, FWF Bulk Staging Building and the Laboratory Building in accordance with NFPA 72 (Chapter 7, *Notification Appliances for Fire Alarm Systems*).

7.6 Smoke Control Features

Table 21. Smoke Control Features

Area	HVAC Fan Shutdown	Auto and/or Manual	Shutdown Means	Comment(s)
Administration Building	Yes	Auto	Smoke Detector	To be installed

The heating and cooling units AC-1 and AC-2 are rated at 3810 cfm and 6205 cfm, respectively. NFPA 90A (Section 6.4.2.1) requires smoke detectors be located downstream of the air filters and ahead of any branch connections in air supply systems having a capacity great than 2000 cfm. When these smoke detectors detect the presence of smoke, they shall be interlocked to shut down their respective fans. As the AC-1 and AC-2 both exceed 2000 cfm, duct smoke detectors will be provided.

7.7 Portable Fire Extinguishers

Portable fire extinguishers will be provided in all of the buildings in accordance with NFPA 10. Based on the requirements of NFPA 10, fire extinguishers will be provided as follows:

Table 22. Minimum Number of Portable Fire Extinguishers

Area	Minimum Number of Fire Extinguishers (Based on 2-A extinguisher rating)	Comments
Administration Building	3	- -
Gate Building	1	- -
TCEQ Office Building	1	- -

Table 22. Minimum Number of Portable Fire Extinguishers

Area	Minimum Number of Fire Extinguishers (Based on 2-A extinguisher rating)	Comments
CWF Staging Building	4	Includes one in Sampling Room
FWF Staging Building	5	Includes one in Sampling Room
CWF Decontamination Building	2	Includes one in Storage Room
FWF Decontamination Building	2	Includes one in Storage Room
Laboratory Building	1	- -
FWF Bulk Staging Building	8	Depending on storage arrangement additional fire extinguishers may be required

7.8 Fire Hydrants

Table 23. Fire Hydrants

Hydrant Location	Type	Distance	Comment(s)
CWF Staging Building	Dry-Barrel	50 feet	- -
CWF Decontamination Building	Dry-Barrel	50 feet	
FWF Decontamination and Staging Buildings	Dry-Barrel	100 feet	One hydrant provided for both of the buildings.
Laboratory Building	Dry-Barrel	50 feet	
Administration Building	Dry-Barrel	50 feet	
FWF Bulk Staging Building	Dry-Barrel	50 feet	

The fire hydrant to be located at the Laboratory Building and the one to be located at east end of the FWF Bulk Staging Building will provide adequate fire hydrant coverage for the FWF Bulk Building.

The suggested fire flow in the IFC, Appendix B, *Fire-Flow Requirements for Buildings* not provided with automatic sprinkler protection was not considered in the fire hydrant design as the public fire department response was indicated to be 30 plus minutes. The economics of providing the fire flow required for the non-sprinklered facilities is not justifiable when the resource would not be used prior to being destroyed by fire.

8.0 FIRE LOSS POTENTIALS

8.1 Property Fire Loss Scenarios

8.1.1 CWF and FWF Waste Staging Buildings

Equipment used to deliver and handle the waste all are powered by combustion engine vehicles. It is expected that there would be both gasoline and diesel fuel in the vehicles in the area. The scenario is a spill of fuel either from the vehicle delivering the waste or equipment that may be

handling the waste and ignition occurs. By providing a sprinkler system designed for the hazard of contents in these two facilities it is anticipated that control of the fire will be accomplished by the sprinkler system. It is not anticipated that the radioactive materials that may be stored inside the steel drums would be involved in the fire, prior to control. Any release of radioactive material would be resultant of contamination of the floor or building.

8.1.2 CWF and FWF Disposal Units

Equipment used to deliver and handle the waste all are powered by combustion engine vehicles. It is expected that there would be both gasoline and diesel fuel in the vehicles in the area. The scenario is a spill of fuel either from the vehicle delivering the waste or equipment that may be handling the waste and ignition occurs. It is postulated that the greatest potential risk is fire occurring in the equipment handling the cask when it is suspended above the cell for placement. A fuel spill from the crane is ignited with the cask suspended in the air. The fuel spill continues to burn involving the hydraulics of the crane ultimately causing the cask to be dropped into the burning fuel spill. Thus the contents of the cask would become involved in the fire and release radioactive contamination into the air.

8.2 Business Interruption and Recovery Potential

The loss of the Laboratory Building would have the greatest impact on the throughput of LLRW. Without the Laboratory Building, WCS would be operating at the turnaround time dictates by other laboratories prior to placing the LLRW in the disposal units.

8.3 Fire-Initiated Toxic, Biological and/or Radiological Incidents

The Laboratory Building, the CWF Staging Building, FWF Bulk Staging Building and FWF Staging Building will have radioactive materials that exceed the threshold requirements of 10 CFR 30.

8.4 Contaminated Liquid Run-Off Control

Discharge originating from emergency fire fighting activities is one of the few conditionally authorized non-storm water discharges (Federal Register/Volume 65, No. 210, Monday, October 30, 2000, Notices, Part 1.2.2.2, of the Multi-Sector General Permit).

The Environmental Protection Agency (EPA) has authorized this type of discharge and does not require pollution prevention measures to be identified and implemented for non-storm water flows from fire-fighting activities. The EPA believes that these flows will generally be unplanned emergency situations where it is necessary to take immediate action to protect the public.

However, NFPA 801 (Section 5.10.1), requires that drainage or containment be provided in facilities that handle radioactive materials that meet the thresholds of 10 CFR 30. The CWF and FWF Staging, FWF Bulk Staging and the Laboratory Buildings meet the thresholds of 10 CFR 30. NFPA 801 (Section 5.10.2) requires that the drainage be sized to accommodate all of the following:

- The spill of the largest single container of any flammable liquid used or stored in the area.
- The credible volume of discharge for the suppression system operating for a period of 30 minutes where automatic suppression is provided throughout.
- The volume based on a manual fire-fighting flow rate of 500 gpm for duration of 30 minutes where automatic suppression is not provided throughout.
- The content of piping and containers that are subject to failure in a fire where automatic suppression is not provided.
- Credible environmental factors, such as rain and snow, where the installation is outside.

With the provision of automatic sprinkler protection for the buildings, the containment would only have to be sized to accommodate the sprinkler discharge for 30 minutes, as this is the largest anticipated discharge.

The sprinkler system for the CWF and FWF Staging Buildings will be designed to provide a density of 0.14 gpm per square foot over the hydraulically most remote 2000 square feet utilizing a wet pipe sprinkler system. The estimated sprinkler system discharge is 280 gpm plus a 10 percent overage. Thus, the total sprinkler demand is estimated at 308 gpm. The containment for each of these buildings would have to be sized to accommodate 308 gpm for 30-minute duration. The total is estimated at 9,240 gallons.

The total available containment of the smaller of these two facilities is estimated at approximately 11,700 gallons. This is based on a 4 inch curb and approximately 5200 square feet of containment area. The containment that will be provided for these facilities is adequate.

The sprinkler system for the FWF Bulk Staging Building will be designed to provide a density of 0.15 gpm per square foot over the entire building, 2600 square feet, utilizing a dry-pipe sprinkler system. The estimated sprinkler system discharge is 390 gpm plus a 10 percent overage. Thus, the total sprinkler demand is estimated at 429 gpm. The containment for this building would have to be sized to accommodate 429 gpm for 30 minute duration. The total is estimated at 12,870 gallons.

The total available containment of the FWF Bulk Staging Building is estimated based on approximately 50 percent of the facility utilized as storage and the remainder 50 percent for loading and unloading operations. Thus, the total containment of the facility is estimated to be approximately 30,375 gallons. This is based on a 4 inch curb and approximately 13,500 square feet of containment area. The containment that will be provided for this facility is adequate.

The sprinkler system for the Laboratory Building will be designed to provide a density of 0.14 gpm per square foot over the entire building, 1400 square feet, utilizing a wet pipe sprinkler system. The estimated sprinkler system discharge is 196 gpm plus a 10 percent overage. Thus, the total sprinkler demand is estimated at 216 gpm. The containment for this building would have to be sized to accommodate 216 gpm for 30 minute duration. The total is estimated at 6,480 gallons.

The containment for this facility will be provided by a holding tank capable of holding the estimated sprinkler discharge for 30 minutes.

9.0 FACILITY FIRE PREVENTION PROGRAMS

Currently the procedures related to the fire protection activities associated with a property conservation program are minimal. There is no document which delineates the requirements of a fire protection program as required by NFPA 801 (Section 4.3). Procedures should be developed for the elements of the fire protection program as required by NFPA 801 (Sections 4.3, 4.4, 4.5, 4.6, 4.7, and 4.8). The procedures that were noted relating to fire protection are LL-HS-9.0, *Fire Extinguisher Inspection*, LL-HS-17.0, *Flammable and Combustible Liquids Safety*, and LL-HS-18.0, *Hot Work Permit*. The procedures are located in Appendix 5.5, along with LL-FP-100, "Fire Protection Program."

10.0 NATURAL PHENOMENON HAZARDS

10.1 Natural Phenomenon Hazards (NPH)

Table 24. Natural Phenomenon Hazards

Area	Wind	Wildland	Seismic	Flood	Lightning	Comments
Administration Buildings	X	- -	X	- -	X	- -
Gate Building	X	- -	X	- -	X	- -
CWF Staging Building	X	- -	X	- -	X	- -
FWF Staging Building	X	- -	X	- -	X	- -
CWF Decontamination Building	X	- -	X	- -	X	- -
FWF Decontamination Building	X	- -	X	- -	X	- -
Laboratory Building	X	- -	X	- -	X	- -
FWF Bulk Staging Building	X	- -	X	- -	X	- -

Based on recorded wind events for the Site and the Andrews County, Texas and Lea County, NM areas, and the historical ANSI/ANS 2.3 Standard, wind loading for structural analysis of the disposal system was conservatively established at 160 miles per hour (mph). Since 1880, two Fujita Scale Class 2 (F2) tornados have been recorded by the National Climatic Data Center within 50 miles of the proposed Site, and no wind events greater than this class have been recorded in the region. F2 tornado events include wind gusts ranging from 113 to 157 mph. A wind design load of 160 mph was selected as being reasonably conservative. Using IBC, Chapter 16, *Structural Design* conversions, a 160 mph wind speed corresponds to a wind pressure of 45 pounds per square foot (psf). The 160 mph wind load is not proposed to apply to support buildings outside the waste management unit but only to the canister design. IBC, Chapter 16, *Structural Design* wind load design requirements are based on a 92 mile per hour basic wind speed, wind importance factor of 1.0, wind exposure category of C and internal pressure coefficient of $\pm$ 0.18 for support structures located outside the waste management unit.

The Design Earthquake ground motions for both the operations and post closure period are characterized by a peak horizontal acceleration of 0.05 g (g is the rate of gravitational acceleration). The Design Earthquake was defined based on a site-specific probabilistic seismic hazard analysis assuming a return period of 2500 years (annual exceedance probability of 4E-

04). IBC Category 1 peak ground acceleration (PGA) of 0.1g was also evaluated. IBC, Chapter 16, *Structural Design* earthquake load requirements for new construction are proposed for support structures located outside the waste management unit.

A lightning protection system will be provided on the CWF and FWF Staging Buildings, CWF and FWF Decontamination Buildings, Disposal Area Gate/Guardhouse Building, Laboratory Building, FWF Bulk Staging Building, Administration Building and TCEQ Building. The system will include air terminals installed along the roof peaks, perimeter, and on roof mounted equipment on each building. Bare copper ground conducts will tie all air terminals together and down conductor shall tie the roof mounted ground equipment to the counterpoise ground loop. All down conductors shall pass from roof to below grade in conduit installed outside the building exterior wall assembly.

11.0 FIRE DEPARTMENT RESPONSE/EMERGENCY PLANNING

11.1 WCS Emergency Response Team (ERT)/Emergency Planning

The emergency coordinator (EC) is responsible for declaring an event (e.g., fire) as emergency or non-emergency. If the EC determines that the event is an emergency, the EC immediately classifies the emergency as an alert or site area emergency. An alert requires mobilization of the WCS emergency response organization, either in the standby mode that will activate some portions of the organization or full mobilization, but does not indicate an expectation of off-site consequences. However, an alert may require off-site response organizations to respond to onsite conditions such as a fire. A site area emergency is defined as an incident that has led or could lead to a significant release to the environment of radioactive or other hazardous material and that could require a response by an offsite organization to protect people offsite. A site area emergency reflects full mobilization of the WCS emergency response organization and may result in requests for off-site organizations to respond to the site.

All fires that are not immediately extinguished by initial responders are considered to be emergencies. Off-site assistance shall immediately be notified. If the EC determines that the fire may be contained, suppressed, and extinguished by site personnel using site available equipment (Attachment B), the off-site assistance shall be placed on standby, and the assembled ERT shall immediately engage in containment, suppression, and extinguishing activities as directed by the EC. However, if the EC determines that containment, suppression, and extinguishing of the fire with site resources is not feasible or is doubtful, the off-site assistance shall immediately be called out and shall be given primary authority for containment, suppression, and extinguishing of the fire upon arrival. As directed by the EC, the ERT shall take measures to mitigate, contain and suppress the fire until the off-site assistance arrives.

The EC and WCS ERT will provide consultation and assistance to the off-site fire response team pertaining to the conditions assessment, any ERT actions taken prior to off-site fire response team arrival, and potential impacts to proposed off-site fire response team actions from known or probable conditions.

Currently there is no procedure delineating the organizational structure of the ERT or the types of fire which the ERT is allowed to contain and suppress.

11.2 Fire Department Response/Emergency Planning

Table 25. Fire Department Response Times

Area	Preplan (Yes/No)	Response Time	Comments
Administration Building	No	30 minutes plus	- -
Gate Building	No	30 minutes plus	- -
TCEQ office Building	No	30 minutes plus	- -
CWF Staging Building	No	30 minutes plus	- -
FWF Staging Building	No	30 minutes plus	- -
CWF Decontamination Building	No	30 minutes plus	- -
FWF Decontamination Building	No	30 minutes plus	- -
Laboratory Building	No	30 minutes plus	- -
FWF Bulk Staging Building	No	30 minutes plus	- -

The Andrews County Volunteer Fire Department has a written agreement to assist the emergency response team in the control of major emergencies. The Andrews County Volunteer Fire Department is fully equipped to respond to structural fires, oil well fires and chemical tank explosions. The Andrews County Volunteer Fire Department is trained and equipped to handle large fires. They are known for their wellhead fire fighting ability, and have experience fighting fires that may produce toxic fumes.

The Eunice Fire Department may also respond and are also known for fighting large fires and have worked with the Andrews fire fighting team often in the field. Radiological response training will be provided to both the Andrews Fire Department and Eunice Fire Department.

11.3 Staffing

The Andrews County Volunteer Fire Department organization consists of 28 regular and nine reserve members.

11.4 Apparatus Deployment, Staffing and Stations

Initial manned apparatus response capabilities include the following (each Engine responds with a Company Officer, Driver Engineer, and firefighters):

The equipment consists of 19171 Ford F-600, Boom Truck Foam and Dry Chemical; 1982, Ford F-700 ,750 gpm pump, 750 gallon tank and two 4.5 inch 20 foot suction lines; 1992 International, 1000 gpm pump, 750 gallon tank and two 5 inch suction lines; 1975 Ford, 250 gpm pump, 1200 gallon tank and one 2.5 inch 20 foot suction line; 1990 International, 300 gpm pump, 1178 gallon tank and one 2.5 inch 20 foot suction line; 1988 International, 70 gpm pump and 1200 gallon tank; 1985 Ford rescue van; 1977 Ford, 750 gpm, one 4.5 inch 20 foot suction

line, and one 4.5 inch 15 foot suction line; and 1979 Chevrolet, 225 gpm, 250 gallon tank and one 2.5 inch 20 foot suction line.

11.5 Emergency Medical Service

The City of Andrews Police Department also serves as the ambulance service for the entire county. All policemen are trained and certified as emergency medical technicians (EMTs). The Police Department has verbally agreed to provide emergency medical assistance and evacuation for the facility. Response time for medical assistance to the site is estimated to be 30 minutes from Andrews.

Additional ambulance service is available through the Eunice Fire and Rescue Service of Eunice, New Mexico, which has agreed to provide emergency medical care to the facility. The Eunice Fire and Rescue Service is approximately 5 miles from the facility. They can respond within ten minutes. Each ambulance will have at least two certified and trained EMTs.

Medical care is available from Permian Regional Medical Center, which is located approximately 35 miles to the east. The hospital is fully equipped to handle most types of emergencies. All severely injured personnel may be airlifted by helicopter to Lubbock Methodist Hospital in Lubbock, Texas or the Parkland Memorial Hospital in Dallas, Texas for treatment. All helicopters are staged at Lubbock Methodist Hospital. A flight time of 35-45 minutes is expected from Lubbock to Andrews. Copies of the ERP and a list of waste materials likely to be handled at this facility have been forwarded to Permian Regional Medical Center. Hospital personnel have been asked to review the plan. They have responded as to their willingness and preparedness in providing the necessary emergency care.

11.6 Hazardous Materials (Haz-Mat) Capabilities

Haz-Mat response is governed by OSHA 29 CFR, 1910.120, NFPA 472, *Standard for Professional Competence of Responders to Hazardous Materials Incidents* and NFPA 1710, *Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations and Special Operations to the Public by Career Fire Departments*. NFPA 471, *Recommended Practice for Responding to Hazardous Materials Incidents,* provides recommended practices for responding to Haz-Mat incidents. The OSHA regulations give explicit instructions concerning hazardous waste operations and emergency response.

Primary Haz-Mat response at WCS LLRW Facility will be provided by Emergency Response Team Members. The Haz-Mat Team (Emergency Response Team Members) is comprised of professional responders that hold certification at the Haz-Mat Technician and Haz-Mat Specialist Level as prescribe in the OSHA HAZWOPER Standard, 29 CFR 1920.120(q). The Haz-Mat Team provides both offensive mitigation and defensive spill control measures. At least three members of the Emergency Response Team will be present at the facility during operational hours.

11.7 Mutual Aid

Andrews County also has agreements with surrounding fire departments from neighboring counties for assistance during large-scale events. Refer to LL-EP-100, Consolidated Emergency Response Plan," in Appendix 5.5.

11.8 Pre-Fire Planning

Pre-fire plans are required by NFPA 801 (Section 4.8.1) for the CWF and the FWF Staging Buildings and the Laboratory Building. There is no similar requirement in the IFC for the owner of the property to develop pre-fire plans for the CWF and FWF Decontamination Buildings, Administration Building, TCEQ Office Building, or Disposal Area Gate/Guardhouse Building.

12.0 RECOMMENDATIONS

All deficiencies in the fire risk envelope of the facility will be listed and a recommended course of remedial action will be suggested. In some cases, it is foreseeable that recommendations will suggest further investigation of an apparently deficient condition where such investigation was not part of the scope of the proposal. The recommendations will be grouped as either (a) human element recommendations, or (b) physical protection recommendations.

12.1 Human Element Recommendations

A1. A Fire Protection Program should be developed outlining the elements of the fire protection program. The fire protection program should include the following elements: documented facility fire inspections, flammable and combustible liquid controls, hot work permits, fire reports including an investigation and statement on corrective action to be taken, testing, inspection and maintenance of fire protection systems, impairment of fire protection systems, construction, demolition and renovation activities, emergency response team, and pre-fire planning as required by NFPA 801. Refer to LL-FP-100, "Fire Protection Program" and the Health and Safety documents in Appendix 5.5.

A2. The fire protection procedures as delineated in the Fire Protection Program should be developed to comply with the requirements of NFPA 801. Refer to LL-FP-100, "Fire Protection Program" and the Health and Safety documents in Appendix 5.5.

12.2 Physical Protection Recommendations

B1. Automatic sprinkler protection in the CWF and FWF Staging Buildings and the Laboratory Building should be provided on a wet pipe system that is hydraulically designed to provide a density of 0.14 gpm over the hydraulically most remote 2000 square feet or maximum building size if less than 2000 square feet. The hydraulic calculations should include an allowance of 250 gpm for outside hose streams. The sprinklers should be 1/2 inch orifice and rated at 165 degrees F. Control for the systems should be provided by a wall post indicator valves (NFPA 13) **(Code Compliance Issue, To Be Completed During Construction)**.

B2 Automatic sprinkler protection in the FWF Bulk Staging Building should be provided on a dry-pipe system that is hydraulically designed to provide a density of 0.15 gpm over the hydraulically most remote 2600 square feet. The hydraulic calculations should include an allowance of 500 gpm for outside hose streams. The sprinklers should be 1/2 inch orifice and rated at 165 degrees F. Control for the systems should be provided by a wall post indicator valves (NFPA 13) **(Code Compliance Issue, To Be Completed During Construction)**.

B3. To provide an adequate water supply for the automatic sprinkler protection that will be installed in CWF and FWF Staging Buildings and the Laboratory Building a fire pump tanking suction from an above ground reservoir should be provided. The fire pump should be an Underwriters Laboratory listed or FM Global approved fire pump. The pump should be electrically driven rated at 1000 gallons per minute at 100 pounds per square inch (psi). Based on the estimated sprinkler and hose stream demand for a 90 minute duration approximately 100,000 gallons of water should be reserved for fire protection of 500,000 gallon capacity reservoir (NFPA 20 and NFPA 22) **(Code Compliance Issue, To Be Completed During Construction)**

B4. A six inch underground fire main should be provided from the fire pump to the six inch underground pipe that runs along the west side of the CWF and the north side of the CWF, supplying the sprinklers in the CWF and the fire hydrant at the CWF Staging Building, and the fire hydrant at the CWF Decontamination Building. A 6 inch PVC underground pipe will run along the south side of the FWF to within approximately 50 feet of the Administration Building. One fire hydrant will be provided to serve the FWF Staging Building and FWF Decontamination Building; one fire hydrant will be provided approximately 50 feet from the FWF Bulk Staging Building, one fire hydrant will be provided approximately 50 feet from the Laboratory Building and one fire hydrant approximately 50 feet from the Administration Building. Control valves should be installed on the six inch underground pipe running north on the west side of CFW complex and on the six inch underground pipe running west on the south side of the FWF near the point were the underground from the fire pumps ties in the 6 inch pipe. The installation will be done in accordance with NFPA 24, *Private Fire Service Mains*. **(Code Compliance Issue, To Be Completed During Construction)**

B5. A fire alarm system should be provided in the CWF and FWF Staging Buildings, FWF Bulk Staging Building and the Laboratory Building in accordance with NFPA 801 (Section 6.8). The fire alarm system should monitor fire suppression systems activation and manual pull station activation and is connected to a constantly attended location. The waterflow initiating devices and manual pull stations should be installed in accordance with NFPA 72 (Sections 11 and 5.13). In addition, all fire protection control valves should be provided with electronic valve supervisory switches installed in accordance with NFPA 72 (Section 5.15.1). The entire fire alarm system should be installed in accordance with NFPA 72.

In addition, NFPA 20 (Section 10.4.7) requires a pump or motor running alarm, loss of phase alarm and phase reversal alarm. NFPA 20 (Section 5.2) and NFPA 72, (Sections 5.15.3, 5.15.4 and 5.15.5) requires monitoring of suction reservoir water level, suction reservoir water temperature, and pump house temperature. These alarms and supervisory signals should be installed in accordance with NFPA 72. **(Code Compliance Issue, To Be Completed During Construction)**

B6. Fire extinguishers should be provided in the Administration Building, TCEQ Office Building, Disposal Area Gate/Guardhouse Building, CWF and FWF Staging Buildings, CWF and FWF Decontamination Buildings, FWF Bulk Staging Building and the Laboratory Building in accordance with the requirements of NFPA 10 **(Code Compliance Issue, To Be Completed During Construction)**

B7. The separation distance between the between the Disposal Area Gate/Guardhouse Building and the Laboratory Building should be a minimum of 50 feet in accordance with NFPA 80A, Chapter 4, *Classification of Exposure and Recommended Separation Distances* **(Code Compliance Issue, To Be Completed During Construction)**

B8. Emergency lighting should be installed that will provide 1 foot-candle illumination at the floor level in the Administration Building, TCEQ Office Building, CWF and FWF Decontamination Buildings, and Disposal Area Gate/Guardhouse Building in accordance with the requirements of the IBC, Chapter 10, *Means of Egress*, 1006.1 and IBC, 1006.2. Also, emergency lighting should be installed that will provided 1 foot-candle illumination at the floor level in the CWF and FWF Staging Buildings, FWF Bulk Staging Building and the Laboratory Building in accordance with the requirements of NFPA 101 (Sections 40.2.8, 42.2.8, 7.8 and 7.9.2.1). **(Code Compliance Issue, To Be Completed During Construction)**

B9. Access to exits and exit doors in the Administration Building and CWF and FWF Decontamination Buildings should be provided with approved exit signs readily visible from any direction of egress travel in accordance with the IBC, 1011.1. Also, exits signs should be installed in the CWF and FWF Staging Buildings, FWF Bulk Staging Building and the Laboratory Building in accordance with NFPA 101 (Sections 40.2.10, 42.2.10, 7.1, 7.10.1.2 and 7.10.1.5.1). In addition, each exit door requiring an exit sign shall be provided tactile signage in accordance with NFPA 101 (Section 7.10.1.3). **(Code Compliance Issue, To Be Completed During Construction)**

B10 Duct smoke detectors should be installed in AC-1 and AC-2 down stream of the air filters and ahead of any branch connections interlocked to shut down their respective fans on detecting the presence of smoke. The smoke detectors should be installed in accordance with the requirements of NFPA 90A (Section 6.44) **(Code Compliance Issue, To Be Completed During Construction)**

B11 The fiberglass reinforced panels that will be installed in the CWF and FWF Staging Buildings, CWF and FWF Decontamination Buildings and the FWF Bulk Staging Building should have a Class A rating (flame spread rating less than 25 and smoke developed rating less than 450) in accordance with NFPA 801, *Fire Protection for Facilities Handling Radioactive Material,* (Section 5.8.1). In addition, the fiberglass reinforced panel should be approved by FM Global **(Code Compliance Issue, To Be Completed During Construction)**

13.0 RELATED DRAWINGS IN APPENDIX 3.0-2

1. G.15 Site Plan
2. A0.02 Admin & TCEQ Buildings Floor Plan
3. A0.04 Admin & TCEQ Buildings Exterior Elevations
4. A0.08 Gate Building Floor Plan
5. A0.09 Gate Building Exterior Elevations
6. A0.12 Laboratory Building Floor Plan

7. A0.13 Laboratory Building Exterior Elevations
8. A1.08 CWF Vehicle Decontamination Building Floor Plan
9. A1.09 CWF Vehicle Decontamination Building Exterior Elevations
10. A2.08 FWF Vehicle Decontamination Building Floor Plan
11. A2.09 FWF Vehicle Decontamination Building Exterior Elevations
12. A1.02 CWF Waste Staging Building Floor Plan
13. A1.04 CWF Waste Staging Building Exterior Elevations
14. A2.02 FWF Waste Staging Building Floor Plan
15. A2.04 CWF Waste Staging Building Exterior Elevations
16. A2.13 FWF Bulk Staging Building Partial Floor Plan
17. A2.14 FWF Bulk Staging Building Partial Floor Plan
18. A2.19 FWF Bulk Staging Building Exterior Elevations
19. A2.20 FWF Bulk Staging Building Exterior Elevations

14.0 REFERENCES

International Building Code, 2003 Edition.

International Fire Code, 2003 Edition.

NFPA 10, *Portable Fire Extinguishers,* 2007 Edition, National Fire Protection Association, Quincy, MA.

NFPA 13, *Installation of Sprinkler Systems,* 2007 Edition, National Fire Protection Association, Quincy, MA.

NFPA 20, *Installation of Stationary Pumps,* 2007 Edition, National Fire Protection Association, Quincy, MA.

NFPA 22, *Water Tanks for Private Fire Protection,* 2003 Edition, National Fire Protection Association, Quincy, MA.

NFPA 24, *Private Fire Service Mains,* 2007 Edition, National Fire Protection Association, Quincy, MA.

NFPA 25, *Water-Based Fire Protection Systems,* 2002 Edition, National Fire Protection Association, Quincy MA.

NFPA 30, *Flammable and Combustible Liquids Code,* 2003 Edition, National Fire Protection Association, Quincy, MA.

NFPA 45, *Fire Protection for Laboratories using Chemicals,* 2004 Edition, National Fire Protection Association, Quincy, MA.

NFPA 72, *National Fire Alarm Code,* 2007 Edition, National Fire Protection Association, Quincy, MA.

NFPA 80A, *Recommended Practice for Protection of Building from Exterior Fire Exposure,* 2007 Edition, National Fire Protection Association, Quincy, MA.

NFPA 90A, *Install of Air-Conditioning and Ventilating Systems,* 2002 Edition, National Fire Protection Association, Quincy, MA.

NFPA 101, *Life Safety Code,* 2003 Edition, National Fire Protection Association, Quincy, MA.

NFPA 220, *Types of Building Construction,* 2006 Edition, National Fire Protection Association, Quincy, MA.

NFPA 471, *Recommended Practice for Responding to Hazardous Materials Incidents,* 2002 Edition, National Fire Protection Association, Quincy MA.

NFPA 472, *Standard for Professional Competence of Responders to Hazardous Materials Incidents,* 2002 Edition, National Fire Protection Association, Quincy, MA.

NFPA 600, *Industrial Fire Brigades,* 2005 Edition, National Fire Protection Association, Quincy, MA.

NFPA 780, *Installation of Lightning Protection Systems,* 2004 Edition, National Fire Protection Association, Quincy, MA.

NFPA 801, *Facilities Handling Radioactive Materials,* 2003 Edition, National Fire Protection Association, Quincy, MA.

NFPA 1081, *Standard for Industrial Fire Brigade Member Professional Qualifications,* 2007 Edition, National Fire Protection Association, Quincy, MA

NFPA 1710, *Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments,* 2004 Edition, National Fire Protection Association, Quincy, MA.

Federal Register/Volume 65, No. 210, Monday, October 30, 2000, Notices, Part 1.2.2.2 of the Multi-Sector General Permit CFR Volume 65.

29 CFR 1910, Section 120, *Hazardous Waste Operations and Emergency Response* Office of the Federal Register, National Archives and Records Administration, Washington DC.

NUREG 1200, *Standard Review Plan for the Review of a licenses application for a Low-Level Radioactive Waste Disposal Facility,* 1994 Edition, U.S Nuclear Regulatory Commission, Washington, DC.

Regulatory Guide 1.143, Design Guidance for Radioactive Waste Management Systems, Structures, and Components Installed in Light-Water-Cooled Nuclear Power Plants, 2001 Edition, U.S Nuclear Regulatory Commission, Washington, DC.