ATTACHMENT 1

TECHNICAL FACILITY DESCRIPTION

OF THE ON-SITE LOW LEVEL RADIOACTIVE WASTE HOLDING FACILITY

AT THE SUSQUEHANNA STEAM ELECTRIC STATION

SEPTEMBER, 1982

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LOW LEVEL RADIOACTIVE WASTE HOLDING FACILITY
TECHNICAL FACILITY DESCRIPTIONS

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I

FACILITY DESCRIPTION

The Low Level Radwaste Holding Facility (LLRWHF) is a structural steel frame building with uninsulated metal siding and roofing to provide weather protection. The metal siding and roofing is designed for a nominal wind load 20 psf and a snow load of 30 psf. The steel frame is designed for the wind and snow loads plus UBC Seismic Zone I loads, a 30 ton bridge crane, 4-10 ton monorails, and dead loads. See Figure 1 for an artist's rendering of the LLRWHF. The building encloses a system of reinforced concrete waste storage vaults. For initial facility operation, two concrete vaults are provided for storage of waste liners and trash and are located in the western half of the building. During this initial operation, the eastern half is an open, unoccupied area. An additional concrete vault will be constructed over the eastern half of the building at a later date to accommodate additional trash storage.

The foundations consists of a 1'-6" slab on grade with 4'-0" deep grade beams running around the perimeter of the building as well as underneath the vault walls. The slab is designed for a 250 psf floor load, as well as the steel framing column loads, except in the truck bay which is designed for an AASHO H20-S16 load.

The reinforced concrete vaults provided for initial operation consist of 17'-0" high concrete walls which are 2'-6" thick on the north, west, and south sides and 2'-0" thick on the east side. There is a 1'-6" thick wall which divides this area into two separate vaults. This entire area is covered by 1'-6" thick precast concrete panels with a total of 395 circular plugs which are individually removed while a waste liner is being placed in or retrieved from storage. These precast panels are supported by a structural steel framing system. Both the precast panels and framing system are designed for either a 100 psf uniform load or a 58 kip load from a waste liner and its shielding (shield bell) resting at individual locations, which ever is greater. The walls of this area are designed to withstand a total tornado pressure of 300 psf.

For initial operation, waste liners will be stored in the west vault and trash in the adjacent vault. An inspection area is provided in the west vault to allow appropriate waste liner inspections at any time. In the adjacent vault, where trash will be stored on an interim basis, a labyrinth is provided to allow access by a forklift truck into this interim vault to store and retrieve trash. In addition, a stairway will be placed up, over, and back down the interim vault wall in the south east corner for emergency egress while this vault is used for trash storage. At a later date, when the interim vault is converted for use as a waste liner storage vault, an inspection station will be added and the emergency exit closed.

When either the interim trash vault or the liner storage vault approaches half-full capacity, construction will begin on an additional concrete vault in the eastern portion of the building to provide a permanent trash storage area. It is anticipated at this time, due to storage capacities and predicted waste generation rates, that construction of this trash vault will begin in mid-1984. This entire area will be enclosed by 2'-6" thick concrete walls which will be 24'-0" high on the north, east, and south sides with the east liner storage vault wall being extended up to form the west side. This vault will be covered by a poured-in-place, 1'-0" thick, concrete slab supported on metal decking over a structured steel framing system. The walls will be designed to withstand a total tornado pressure of 300 psf. The roof will be designed for a live load of 20 psf.

A 1'-6" thick concrete wall is located along the north side of the truck bay. This wall is 11'-0" high in one section and 23'-0" high on another to provide shielding during waste liner storage or retrieval. The truck bay wall is designed for a nominal 20 psf wind load or UBC Seismic Zone load, whichever is greater.

A control room is located at the north east corner of the facility. It has 1'-6" thick concrete walls on the south and west sides and metal siding with insulated sheetrock walls on the north and east sides. The ceiling is insulated accoustical panels below the metal roofing.

A battery charging station and parking area for a forklift truck is located adjacent to the west wall of the control room. It has 1'-6" thick concrete walls with a roll-up door into the truck bay. The roof is insulated metal roofing.

II

TOTAL CURIE CONTENT

The total curies accumulated in the LLRWHF due to the storage of condensate demineralizer wastes, reactor water clean-up wastes, and miscellaneous trash has been estimated using the assumptions indicated below. The resulting total curies are shown in Tables 1, 2, and 3.

A. CD Waste

The curie content of the CD (condensate demineralizer) waste is calculated using the design-basis activity spectra given in the Susquehanna SES-FSAR. The CD waste is solidified requiring a 5-day processing time and is contained in steel liners of 6 ft. diameter and 6 ft. high. Each liner is normalized to the design surface dose rate of 3 R/hr. At the end of 4 years, the vault storage area will contain CD liners, occupying 120,870 ft.^{3} which is 90% of the total vault storage capacity.

Table 1 gives the activity in curies of one CD liner (170 ft.^{3}) at the time the liner enters the vault (t=0), and the total curie content of all CD liners when the vault is full at t=4 years. The decay of the isotopes has been considered during the 4-year accumulation of the CD liners.

B. RWCU Waste

The curie content of the RWCU (reactor water clean-up unit) waste is calculated using the design bases activity spectra given in the Susquehanna SES-FSAR. The RWCU waste is a composite of 20 batches from the holding tank decayed such that the oldest batch is 60-days old and the newest is 3-days old. The RWCU waste is solidified and contained in steel liners of 6 ft. diameter and 3 ft. high. Each liner is normalized to the design surface dose rate of 60 R/hr. At the end of 4-years, the vault storage area will contain RWCU liners, occupying 13,430 ft.^{3} which is 10% of the total vault storage capacity.

Table 2 gives the activity in curies of one RWCU liner (85 ft^3) at the time the liner enters the vault (t=0), and the total curie content of all RWCU liners when vault is fill at t=4 years. The decay of the isotopes has been considered during the 4-year accumulation of the RWCU liners.

C. Dry Trash

The curie content of dry trash is calculated using the same activity spectra as the RWCU waste. The dry trash is contained in 55-gallon drums, each has a design surface dose rate of 30 mR/hr. Pallets, are stacked four high in a row in the final trash storage area. At the end of 4 years, the storage area will contain 16,000 drums.

Table 3 gives the curie activity of one drum as it enters the storage area (t=0), and also the total curie content of all trash drums when the trash storage area is fill at t=4 years. The decay of the isotopes has been considered during the 4-year accumulation of the trash.

III

RADIATION ZONING

The facility is divided into several radiation zones dictated by the dose rate from the radioactive materials to be handled and stored in the facility. For the interim trash storage arrangement, the radiation zones are as shown in Figure 2, whereas for the final trash storage arrangement, the radiation zones will be as indicated in Figure 3. Roman numerals are used to designate the radiation zones—the upper numeral indicates the maximum for the static storage while the lower numeral accounts for zone designation during movement of materials through the facility. The key to the radiation zone numbers is as follows:

Radiation Zones	Max. Design Dose Rate (MREM/HR)	Description
I	≤0.5	No radiation sources. No radiological control required.
II	≤2.5	Low radiation sources. Radiological control required.
III	≤15	Low-to-moderate radiation sources. Radiological control required.
IV	<100	Moderate Radiation sources. Radiological control required.
V	≥100	High radiation sources. Radiological control required.

IV

DESCRIPTION AND LOCATION OF AREA RADIATION MONITORS

The area radiation monitors provide a continuous readout of area radiation levels at selected locations within the facility. The radiation monitor selected is a gamma measuring device that has a sensor, an indicator and power supply. Radiation sensors are strategically located on the walls of the trash storage areas, control room, and truck bay. At all times there will be two area radiation monitors in the truck bay (one near the inspection station and one near the catch basin). There will also be an area radiation monitor in the control room. During interim operation, when vault No. 1 is used to store trash, an area radiation monitor will be near the north entrance and another near the emergency stairs at the south end (see Figure 2). Thus five radiation monitors will be in use initially. When the future dry trash storage area is in use, four additional area radiation monitors will be installed (see Figure 3). One area radiation monitor will be near each of the four entrances. When all the trash is removed from vault No. 1, the two monitors may be removed.

Radiation level detected by the sensors are sent to indicators located in the main control panel. All indicators have a direct read-out meter, alarm reset, trip reset-pushbutton and high and low trip indicator lights to alert personnel of an abnormal radiation level. Nine radiation monitors may be necessary when both trash storage areas are in use, but channels for twelve monitors are provided.

CRANE LOADING AND UNLOADING SYSTEM

The LLRWHF 30-ton crane with the 10-ton girder mounted monorail hoist is provided with a closed circuit television system for use in operating the crane to handle shielded radwaste liners and vault shield covers plugs remotely. Both loads are imposed on the crane bridge simultaneously. The crane bridge is provided with three closed circuit television cameras which have pan, tilt and zoom lens controls along with bridge mounted lighting fixtures to optimize visibility of crane loads-liners, shield covers, shield bells—and the path of crane motion. In addition, the crane is provided with a control pendant to facilitate crane operation while the crane is over the truck bay.

Provision is made for crane retrieval from the radwaste storage vault area back to the truck bay by releasing the crane brakes manually should there be a loss of power. A cable may be attached to the crane bridge to "winch" the crane to the truck bay.

Provision has also been made to facilitate relocating the crane from vault No. 2 to vault No. 1. Four lifting eyes at the four corners of the bridge are provided to facilitate lifting the crane from the runway rails, over the truck bay, using hoist/trolleys provided on monorails over the truck bay. In this manner, the crane may be moved from vault No. 2 to vault No. 1 or vice-versa.

Crane Operation

The crane motion speed controls operate in accordance with the following requirements:

The main hoist operates through 5 speed steps and provides a maximum hook speed of 15 feet/minute (fpm). The hoist drive is equipped with a completely independent and separate microdrive system. The microdrive system drives the hoist at 6 inches/minute (maximum) to obviate impact loads and achieve the required load positioning accuracy of ±1/2 inch. An electrical interlock permits lowering the load over the radwaste storage vault using the microdrive system only.

The crane main hoist is interlocked with the shield bell grappling device. It may be energized for lifting or lowering the shield bell when the liner is attached to the shield bell, or when the liner is not attached to the shield bell and the liner grapple is withdrawn into the shield bell.

The drive for the trolley operates through 5 speed steps and provides maximum trolley seed of 50 feet per minute. The trolley is also equipped with a completely independent and separate microdrive system. The microdrive system drives the trolley at 6 inches/minute.

The main drive for the crane bridge operates through 5 speed steps and provides a maximum bridge speed 70 feet per minute. The drive is also equipped with a separate and independent microdrive system. The microdrive system drives the crane bridge at 6 inches/minute so as to provide no impact.

The motor-driven monorail hoist operates at a maximum speed at 15 fpm. The hoist is provided with a microdrive for a speed of 6 inches/minute. An electrical interlock permits lowering the load over the radwaste storage vault using the microdrive system only. The monorail hoist is provided with an alarm signal at the control panel for loads exceeding 7 tons.

The controls for operating the shield bell hoist motor are located on the shield bell control unit on the crane control panel and interlocked with the crane main hoist.

The crane positioning system is calibrated and its accuracy meets the requirements for locating concrete vault shield covers and liner vault covers.

Liner Storage

The 30-ton capacity crane main hoist is used to lift shielded radwaste liners from the flatbed truck parked in the East end of the Truck Bay of the LLRWHF. The radwaste liner is contained inside a shield bell, the entire assembly—shield bell and liner—are lifted by the crane main hoist and transported into the vault area for storage of the liners.

The 10-ton monorail hoist supports the shield plug grapple which is used to engage and lift the vault shield plug. The crane bridge, then, is moved to position the shield bell directly over the vault opening from which the shield cover has been removed. The liner is lowered from the shield bell into the vault and released via the shield bell hoist and liner grapple.

The shield bell hoist raises the empty liner grapple up into the shield bell and the crane main hoist lifts the shield bell from the vault roof recess. The crane bridge is moved to realign the vault shield cover over the opening where the liner was placed and the vault shield plug is lowered into place.

Liner Retrieval

The 30-ton capacity crane is used to remove the liners from the vault. The 10-ton monorail hoist supports the shield plug grapple which is used to lift the vault shield plug and support the plug. The crane bridge, then, is moved to position the shield bell directly over the vault opening from which the shield plug has been removed.

The liner grapple is then lowered via the shield bell hoist, into the vault and the grapple is attached to the liner to be removed from storage. The shield bell hoist raises the liner into the shield bell. The crane main hoist lifts the shield bell from the vault opening and the crane bridge is moved to position the vault plug directly over the vault opening. The vault plug is lowered into place and the grapple is rotated and removed from the eye bolts in the vault shield plug.

The shield bell, which contains the liner, is moved by the crane to the appropriate position required by the next operation, which will be either the inspection station or the truckbay for shipping.

VI

SHIELD BELL SYSTEM

The radwaste liners are put in containers called shield bells while being transported or moved into or out of the storage vault to minimize radiation exposure of operating personnel. Two shield bells are provided to accommodate two liner sizes. One is for transferring liners approximately 72" OD x 40" high containing the higher radiation level (RWCU) wastes. See figure 5. The second is for transferring liners approximately 76" OD x 79" high or approximately 72" OD x 72" high containing the lower radiation (CD) level wastes. See figure 4.

Each of the shield bells incorporate an electrically operated grapple for securing the liner within the shield bell for liner transport. The grapple system includes three electric motors which drive worm gears to engage a ring beam attached to the top of the liner. The bell grapple is operated by an electric motor driven hoist which raises or lowers the grapple into position to engage a waste liner. The shield bells are supported by the bridge crane and receive the necessary power and control signals via the crane bridge from a control panel located in the facility control room.

VII

CONTROL PANELS

There are three control panels located in the main control room that consolidate all functions for the operation of the facility. The panels include; 1) HVAC and Radiation Monitoring, 2) Crane Control and Shield Bell Control and, 3) Fire Protection Panels.

The HVAC and Radiation Monitoring includes the switches that control the roof exhaust fans, the fume exhaust fan and the smoke override. Radiation indicators and annunciation of high radiation reading and high liquid level in the sump for the trash and vault area are also included in the panel.

The crane control panel has all the controls necessary for remote operation of the crane and three TV monitors for viewing the operation. The position indicator lights of the crane are also on the panel. The shield bell control panel is a part of the crane control panel. The controls and switches for operating the shield bell are on this panel.

The fire protection panel includes all smoke and fire detection signals, fire alarm signals and the fire sprinkler system for the entire facility. Lighted zone annunication and alarm bells are provided in the panel to locate trouble areas. All signals received by the panels are retransmitted to the power plant fire control system.

VIII

FIRE PROTECTION SYSTEM OPERATING DESCRIPTION

1. Dry Pipe sprinkler Systems

The dry pipe sprinkler systems are hydraulically designed to discharge at a density of 0.25 GPM/FT² over the most remote 3000 FT². The design will comply with NFPA #13 and provide protection to combustible areas. Sprinkler heads in the storage area are equipped with fusuable links rated at 286°F when the links fuse upon high heat, the air in the piping system is released allowing it to fill with water and discharge at the design rate. A single AC powered air compressor located near the west valve house (room 114) will supply air to the dry pipe systems through the automatic filling system at each valve. Air pressure is maintained in the sprinkler system piping at approximately 50 PSI to maintain the water inlet valve in a closed position and prevent freezing of the protection system.

2. Infra Red Smoke Detection Systems

Initially, smoke detectors will be provided in the Interim Trash Storage vault. Later, when the Final Trash Storage area in the east side of the LLRWHF building is occupied, these smoke detectors will be relocated. As trash is moved, additional detectors will be added where required to assure an adequate detection system. The smoke detection system is comprised of units which project an infra-red beam the length of the vault. Each unit includes a transmitter and a receiver mounted below the vault roof. A smoke emitting fire causes attentuation of the beam at the receiver which generates a smoke alarm when 50% obscuration occurs. Total blockage of the beam is discriminated by the receiver, so that inadvertent blockage (during maintenance) does not result in a smoke alarm. A side benefit of the infra-red beam is that of fire detection when little or no smoke is present. Rising heat waves can cause the beam to shimmer and this pulsing or vibration is interpreted by the receiver as a fire condition. Thus, the infra-red system is in reality a dual mode smoke detection and fire detection system.

3. Photo Electric Smoke Detection System

The photo electric system is comprised of three (3) spot type ceiling mounted detectors of the conventional type operating on the light scattering, photodiode principle. They are located in the control room and will alarm at a smoke density of 1.5% light obscuration per foot.

4. Fire Alarm System

The fire alarm system is an extension of the existing plant wide Simplex Time Recorder Company multiplex system. The LLRWHF incorporates the use of the Simplex basic transponder as the control panel for the local facility. It provides both normal and emergency back up power to the system from its own internal powre supply.

All external fire alarm circuits from the transponder are electrically supervised against opens and short circuits. In addition, the power supplied for the operation of the infra-red smoke detection system and the spot type smoke detectors is also supervised. Any malfunction is alarmed locally and the signal retransmitted to the plant central control room over supervised multiplex circuits from the Central Processing Unit (CPU).

The fire alarm system incorporates the use of separate alarm zones as follows:

A. The water flow switch of each of the sprinkler systems is connected to a common zone so that the operation of any system provides a common alarm.

B. The alarm contacts of each infra-red beam receiver are connected to a common zone so that the operation of any system provides a common alarm.

C. The alarm contacts of each photo electric smoke detector are connected to a common zone so that the operation of any detector provides a common alarm.

D. Several supervisory features for external devices are provided and the operation of any of these units provides a common alarm. Those supervisory features provided are as follows:

   1. Low air pressure in a sprinkler system
   2. Low air temperature in a valve house
   3. Off normal position of any sprinkler system water supply valve.

   NOTE: Low air pressure or low temperature are also alarmed on a panel in the valve house and at an external horn (rated 100 DB) near the enclosure.

The control panel (transponder) is located in the control room and is provided with lighted zone annunication and alarm bell. In addition, a slow whoop horn (rated at 100 DB) is located in the storage area. All signals received by the panel's external circuits are retransmitted to the CPU, by multiplex.

IX

ELECTRICAL SYSTEMS

1. 480 Volt Distribution System

The 480 volt distribution system is a non Class IE, seismic category II design system rated for operation at 277/480 volt, 3 phase, 4 wire, 60 Hz with neutral solidly grounded. Source power for the LLRW holding facility is supplied by Pennsylvania Power and Light through a 300 KVA, 3 phase transformer. Underground service entrance conductors connect the transformer to the 480 volt motor control center located in the facility control room. Ground fault protection and overload protection is provided on the main incoming line breaker of the motor control center. All power for the facility is distributed at appropriate voltage levels from the control room. The motor control center is the main source of power for all facility loads. The exceptions are: battery packs, for emergency exit lighting; batteries used in the transponder for the fire alarm system; and batteries used for the annunciator system. Batteries are also provided to power the annunciators in the event of loss of power. There is no diesel backup or 125 volt DC station battery power for this facility. Metering, controls, and alarm relaying are provided in the facility control room. The motor control center has a spare section equipped with horizontal and vertical bus bars to allow for additional future loads.

2. Grounding System

The grounding system includes a grounding grid of 250 MCM cables to which every other column is connected. The grounding grid is connected to the site main grounding grid in four places. The structural steel for liner vaults is bolted together and connected directly to the building ground grid in ten places. Electrical and mechanical equipment, stairways, handrails and grating are connected to the building ground grid, either directly, or indirectly through the grounded structural steel. The 480 volt motor control center is connected to the building ground grid by two 250 KCMIL equipment grounds conductors to provide a low resistance fault current return path. The system neutral in the MCC, and the lighting transformer neutral are connected to the facility grounding grid by individual grounding conductors.

3. Lighting System

This system provides lighting for the various activities conducted at the facility. Illumination levels and other data are as follows:

Area	Footcandles	Type	Life	System Voltage
Control room	100	Fluorescent	9,000 hrs.	277V
Lockers	30	Fluorescent	9,000 hrs.	277V
Battery charging room	100	HP sodium	24,000 hrs.	277V
Truck bay	30	HP sodium	24,000 hrs.	277V
Top of liner vaults	30	HP sodium	24,000 hrs.	277V
Interim Trash Storage Vault	30	HP sodium	24,000 hrs.	277V
Future Trash storage vault (interim)	10	HP sodium	24,000 hrs.	277V
Future trash storage vault (Final)	30	HP sodium	24,000 hrs.	277V
Exterior truck bays	5	HP sodium	24,000 hrs.	277V
Inspection station	150	Incandescent	750 hrs.	120V
Four hour battery operated emergency lights	3	Halogen Incandescent	750 hrs.	277V
Valve Rooms	30	Incandescent	750 hrs.	120V

Control of the lighting system is maintained at the control room by means of molded case circuit breakers approved for switching purposes, installed in lighting panels located in the control room. It is anticipated that 11 lights inside the facility will be switched off during periods of inactivity to conserve energy. Lights on the outside of the building over each personnel exit door are controlled by photocell. Roll-up doors have switches at the doors and small rooms are also switched locally.

Long life lamps are installed in low level radiation areas to minimize time spent by maintenance personnel in replacing lamps. General illumination has been provided above the vaults to assist the supplementary high intensity incandescent lights installed on the crane for the closed circuit television operation. High levels of illumination have been provided in the inspection stations to enable still photographs to be taken of the liner using camera attachments.

Outside area lighting for security purposes is integrated into the total plant system and is not a part of this lighting system description.

Lighting is obtained from the facility main service via the motor control center and lighting panels. In the event of loss of power, battery operated emergency exit lights have been strategically located to facilitate egress from the facility. Fluorescent and HP sodium lights are served by a 3 phase 277/480 volt, 4 wire solidly grounded, 60 cycle, distribution system; incandescent lighting by a 3 phase 120/208 volt 4 wire solidly grounded 60 cycle distribution system. Convenience receptacles are located throughout the facility. These are the duplex, 3 wire grounding type, polarized, side wired by screw terminal, specification grade, industrial type rated 20 amps at 120 volt single phase. They are connected to the 3 phase 120/208 volt distribution system.

Provision has been made for future expansion and the addition of extra lights anywhere in the facility to the extent of 25% of the existing lighting system. This provision is in the form of spare capacity in the distribution feeders and panels, installed spare circuit breakers in the lighting panels, and spare conduit access from the control room to the storage area.

4. Communication System

One telephone with a main plant extension is located in the LLRW control room. The control room and storage areas are furnished with an extension of the main plant intercommunication system with paging station and speakers. Public address handset stations for conversation and paging are located in the control room, off loading area, and the inspection station. One PA cone type speaker is located in the control room. PA horn speakers are arranged in the truck bay and storage areas (including interim trash storage vault) such that paging or alarm can be heard when the facility is at full capacity.

Provision is made to add a PA handset station in the future inspection station, and additional PA horn speakers in the trash storage vault.

5. Cable and Raceway System

Systems that are an extension of the main plant are: telephone, intercommunications, and alarm. The embedded conduits for these systems are stubbed 10 feet out of the north side of the Low Level Radwate control room. The conduits will join the telephone duct bank. Six spare conduits are provided for four systems: one for telephone, one for instrumentation, two for control and two for low voltage power.

Three underground conduits are run in a duct bank between the PP&L 300 KVA transformer, located outside of the LLRW battery charging room and the 480V motor control center in the facility control room. Two of these conduits are spare.

All underground raceway, except for the intercommunication and telephone systems, are 4" approved ABS plastic or PVC conduit. The intercommunication and telephone systems raceway is 4" rigid steel. Exposed and concealed raceway within the storage facility and control room is 1" minimum rigid galvanized steel, except for the indoor lighting system, which is 3/4" minimum electrical metallic tubing with short connecting lengths of flexible metal conduit. All cable and raceway, except for lighting and communication, is scheduled and shown on the cable and raceway schedules.

X

HVAC SYSTEM OPERATING DESCRIPTION

1. General Functions and Controls

The HVAC systems are designed to provide adequate air flow to remove heat and fumes, and maintain area design temperatures in the facility.

In the event of fire, the Storage Area Ventilating System, the Battery Charging Station Heating and Ventilating System, and the Truck Bay Vehicle Fume Exhaust System are shutdown completely upon the signal from fire detection system. An override switch is provided in the control room to override the fire detection signal and purge smoke after a fire has been suppressed. To prevent outside air infiltration, backdraft dampers are provided for the fans exhausting room air directly to outside of the building and arranged to close automatically when fans are not operated.

2. Storage Area Ventilating System

The system has three seperate subsystems and is designed to remove heat and fumes from the storage area and maintain the room design temperature of 100°F using outside air introduced through outside air intake louvers.

The subsystem equipment consists of five roof mounted exhaust fans for the area above vaults and trash storage ceiling, two ceiling mounted exhaust fans for the final trash area, and one ceiling mounted exhuast fan for the interim dry trash storage area.

The system sequence of operation and controls are as follows:

1. The selected exhaust fans are started manually by individual handswitches located in the control room.
2. With the handswitches in the automatic position, exhaust fans are started automatically by room temperature switches when the temperature exceeds the set point of 100°F.
3. The interim trash and final trash storage area ceiling fans are interlocked with the roof mounted exhaust fans, so that roof mounted exhaust fans are operated whenever ceiling fans are in operation unless the signals are overriden by the control room switches.

3. Control Room HVAC System

The control room HVAC system is designed to maintain room design temperatures during occupied periods as well as unoccupied periods and maintain positive room pressure to minimize air infiltration from the storage area.

The equipment consists of an air cooled cooling unit which consists of a low efficiency filter band, a supply fan and a direct expansion cooling coil, and a multistep electrical duct heater, with associated ductwork and controls.

The system sequence of operation and controls are as follows:

1. The supply fan on the cooling unit is started manually by a handswitch mounted on unit.

2. The supply fan may also be started automatically by room temperature switches when the handswitch is in the automatic position.

3. The set points of room temperature switches are 78°F and 90°F for summer, 70°F and 45°F for winter, during occupied and unoccupied period respectively. The supply fan is started with either the cooling coil or the electric duct heater, as required.

4. When the system is started and the cooling or the heating mode is determined by room temperature switches, the system capacity will be adjusted automatically in response to room loads modulating the expansion valve on the cooling coil for cooling mode operation or adjusting the operating step on the electric duct heater for heating mode operation.

5. The supply fan continuously recirculates conditioned air with a fixed quantity of outside air for space pressurization.

4. Battery Charging Station Heating and Ventilating System

The system is designed to remove hydrogen gas produced during battery charging operation and maintain summer and winter room design temperatures. The exhaust fan operates continuous whenever the battery charging operation is required and maintains room pressure slightly below atmospheric to prevent the spread of hydrogen gas.

The equipment consists of a roof mounted exhaust fan, an electric unit heater and associated controls.

The system sequence of operation and controls are as follows:

1. The exhaust fan and electric unit heater are started manually by individual handswitches located on the local control panels.

2. With the handswitch in the automatic position, the exhaust fan is started when room temperature exceeds the set point of 100°F.

3. With the handswitch in the automatic position, room temperature is maintained above 40°F automatically by room temperature switch which starts heater.

4. Both the exhaust fan and unit heater will be started during winter.

5. Sprinkler Valve House Heating Systems

The systems are designed to maintain a minimum room temperature of 40°F for freeze protection. The equipment consists of two 50% capacity electric base board heaters and associated controls for each system.

The system sequence of operation and controls are as follows:

1. Heaters are started manually by individual local handswitches located in the valve houses.

2. The heaters can be started automatically by room temperature switches mounted inside of the valve houses. The set points for room temperature switches is 45°F for the primary heater and 40°F for the secondary heater.

3. If the room temperature drops below 35°F, low temperature switches activate audible low temperature alarms installed near the valve houses and also annunciate to control room.

4. Normally, room temperature is maintained by the handswitch in the automatic position. The manual controls are required only for operating tests.

6. Truck Bay Vehicle Fume Exhaust Systm

The system is designed to remove vehicle fumes produced during loading and unloading operations. The equipment consists of a wall mounted exhaust fan, with associated ductwork and manual controls.

7. Inspection Station Ventilation

One wall mounted exhaust fan is provided for heat removal from high intensity lighting in the inspection station. The fan exhausts to the area above the vaults and is manually controlled by handswitches on the local panel.

XI

SUSQUEHANNA STEAM ELECTRIC STATION

LOW LEVEL RADWASTE HOLDING FACILITY

TECHNICAL CONCEPT

SUSQUEHANNA STEAM ELECTRIC STATION
LOW LEVEL RADWASTE HOLDING FACILITY
TECHNICAL CONCEPT

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1.0 FACILITY FUNCTION

The function of the Low Level Radwaste Holding Facility (LLRWHF) is to provide temporary on-site storage for low level radioactive waste produced at the Susquehanna Steam Electric Station (SSES) until it can be shipped off-site to permanent disposal facilities. This storage capability is required whenever shipment off-site is temporarily restricted by unavailability of disposal quota, unavailability of shipping casks, transportation problems or other such problems that have hampered LLRW disposal in recent years.

The original plant design provided very limited storage capacity based on the assumption that the waste would be continuously shipped off-site for disposal. Therefore, any interruption in shipment would have the potential to shut down the plant. This facility allows temporary shipping interruptions to occur without impacting plant operations.

This facility also aids in reducing the total man-rem exposure associated with the disposal process by providing the means to allow significant decay before off-site shipment and burial activities occur.

2.0 GENERAL DESCRIPTION

The LLRWHF shall be designed to hold all of the dry solid (trash) and solidified (cemented) low level radioactive wastes that are generated by both SSES units. It shall be designed to house all such wastes inside an uninsulated, sheet metal building, with the solidified waste stored in a shielded vault and the trash stored in an adjacent shielded vault.

The primary purpose of the metal building will be to provide weather protection for all stored wastes and to provide all-weather loading and off loading capability.

The primary purpose of the shielded vaults will be to provide radiation shielding such that on-site worker doses are as low as reasonable achievable and the total site boundary dose rate is a small fraction of the plant operating license allowables.

The LLRWHF shall be a Non-Seismic Category I facility per the definitions in Section 3.7a of the Susquehanna SSES FSAR. The Safety Classification shall be "other" as defined in Section 3.2.3.4 of the FSAR. Its Quality Group Classification shall be N/A.

3.0 GENERAL DESIGN REQUIREMENTS

3.1 Codes and Standards

The design of the Low Level Radwaste Holding Facility (LLRWHF) shall conform to the applicable portions of the codes, standards, and specifications listed below, except where specifically stated otherwise. In case of conflict between the various codes and standards, the more stringent requirements shall apply.

a. 10CFR20, Standards for Protection Against Radiation.

b. 10CFR30, Rules of General Applicability to Domestic Licensing of By Product Material.

c. Occupational Safety and Health Standards, Department of Labor, Volume 36, No. 105 of Federal Register.

d. Uniform Building Code (UBC) 1976 revision.

e. American Institute of Steel Construction (AISC). "Specification for the Design, Fabrication and Erection of Structural Steel for Buildings" — 1969 revision.

f. American Institute of Steel Construction (AISC). "Manual of Steel Construction" — 1970.

g. American Iron and Steel Institute (AISC). "Specification for the Design of Cold-Formed Steel Structural Members" — 1968.

h. American Concrete Institute (ACI). "Building Code Requirements for Reinforced Concrete" — (ACI 318-77) and Recommended Practice for Concrete Formwork — (ACI 347-68).

i. American Welding Society (AWS). "Structural Welding Code" — AWS D1.1-72.

j. Regulations of the Commonwealth of Pennsylvania as follows:

   1) Standard specifications of the Department of Transportation (PennDOT) for 1970 with respect to roads and bridges.

   2) Regulations of the Department of Environmental Resources—with respect to water supply, sewage, and erosion control.

3) Department of Labor and Industry regulations. Current issue (at the time of design) for:

Construction and Repairs.
Plant Railways.
Excavation.
Railings, Toeboards, Openshided Floors, Platforms, and Runways.
Ladders.
Protection from Fire and Panic.
Miscellaneous Hazards and Conditions of Employment.
Cranes, Booms, and Hoists.

4) Pennsylvania State Police Department, Bureau of Fire Protection—regulations for storage, handling, and use of flammable and combustible materials.

k. Safety and Health Regulations for Construction. Department of Labor, Volume 36, No. 75 of Federal Register.

l. American Concrete Institute (ACI, Concrete Masonry Structures Design and Construction!low, ACI 531.70.

m. American Society for Testing Materials (ASTM), Structural Steel, ASTM A 36-74.

n. American Society for Testing Materials (ASTM), High Strength Bolts for Structural Steel Joints Including Suitable Nuts and Plain Hardened Washers, ASTM A 325-74.

o. Metal Building Manufacturers Association (MBMA), Recommended Design Practices Manual, dated 1974.

p. 49 CFR 170, Transportation.

q. PP&L Procedure SP-12—Quality Requirements for Fire Protection and Bechtel Systems.

r. NFPA Standards (includes National Electric Code).

s. ANSI C33.98—Electrical Metallic Tubing Safety Standard.

t. ANSI C80.1—Rigid Steel Conduit, Zinc Coated.

u. ANSI C80.4—Fittings for Rigid Metal Conduit and Electrical Metallic Tubing.

v. ASTM A525-73 Steel, Zinc Coated (Galvanized) by the Hot Dip Process.

w. NEMA TC-2 Electrical Plastic Tubing (EPT) and Conduit EPC-40 and EPC-80.

x. NEMA TC-7 Plastic Utilities Duct for Underground Installation.

y. UL-1 Flexible Metal Conduit.

z. UL-6 Rigid Metal Electrical Conduit.

aa. UL-514 Electrical Outlet Boxes and Fittings.

ab. UL-797 Electrical Metallic Tubing.

ac. 40CFR-190, Environmental Radiation Protection Standards for Nuclear Power Operations.

ad. PP&L Dwg. D-184172, Rev. 0; LLRW Holding Facility, Test Bore Holes, Location and Description.

ae. Factory Mutual Standards.

3.2 References

The following references have been considered in the design of the LLRW Holding Facility. None of these are specific requirements for the facility. These are provided for guidance in design as appropriate. Some references are listed simply to provide background information for the engineer.

a. Reg. Guide 1.69, Concrete Radiation Shields for Nuclear Power Plants.

b. Reg. Guide 7.1, Administration Guide for Packaging and Transporting Radioactive Material.

c. 10CFR71 — Packaging of Radioactive Material for Transport.

d. ANSI/ANS 55.1-1979, Solid Radioactive Waste Processing Systems for Light Water Reactor Plants.

e. 10CFR50 Appendix R — Fire Protection Program for Nuclear Power Facilities Operating Prior to January 1, 1979.

f. NRC BTP (Generic Letter 81-28) - Radiological Safety Guidance For On-Site Contingency Storage Capacity.

g. Reg. Guide 8.8, Information Relevant to Insuring that Occupational Radiation Exposure at Nuclear Power Plant Stations will be as low as is Reasonably Achievable.

h. Reg. Guide 8.10, Operating Philosophy for Maintaining Occupational Radiation Exposure as Low as is Reasonably Achievable.

i. Branch Technical Position 9.5.1 Appendix A — Guidelines for Fire Protection for Nuclear Power Plants.

3.3 ALARA Requirements

This facility shall be designed such that occupational and population doses are in accordance with that specified in Section 3.7. In addition, the design shall incorporate the guidance set forth in Regulatory Guides 8.8 and 8.10 with regard to maintaining exposures as low as reasonably achievable (ALARA).

3.4 Material Being Stored

The LLRWHF shall be designed to store low level solidified radioactive wastes, and the low level dry trash radioactive wastes. It will not be used for storage of gaseous wastes or wastes containing free liquids.

3.5 Containers

The radwaste containers which will be stored in LLRWHF are designed to preclude or reduce the occurrence of uncontrolled release of radioactive materials due to hauling, transportation, or storage.

All material which is stored in this facility will be packaged for eventual off-site shipment and permanent off-site disposal. All containers will be decontaminated for shipping to the standards of 49CFR 173.397 before being brought into the LLRWHF.

At the present time, and for the foreseeable future, there is a wide profusion in sizes and shapes of disposal containers in use in the nuclear industry. Each has its own advantages and applications. It is expected that during the life of the facility it will be required to accommodate several of these different types. The most likely containers which will be stored in the facility are listed below.

Manufacturer	Designation	Usage	Volume	Dimensions
Hittman	HN-100	Solid. Waste	163 ft^3	72-3/8" x 72-3/4" High
Hittman	HN-600	Solid. Waste	83 ft^3	72-3/8" x 40" High
Chem. Nuclear	14-195	Solid. Waste	200 ft^3	76" x 79" High
	55 gal. drum	Trash	7.5 ft^3	1.95 ft x 2.9' High
Container Prod. Corp.	B-25	Trash	96 ft^3	50" High x 46" Deep x 72" High

3.6 Storage Requirements

The LLRWHF shall be designed to store the quantity of solidified and dry low level radioactive wastes generated by the Susquehanna SES for the equivalent of 8 reactor years based on normal operation. This storage shall be segregated with cemented wastes stored in the shielded vault area and compacted trash stored in the shielded trash vault. The shielding required for the trash vault will not be installed initially. The Owner plans to use the eastern most solidified storage vault bay for interim trash storage. Therefore, provisions shall be made in this east-most vault for interim access by a shielded fork lift. Ultimately, this access area shall be converted into a liner inspection station.

3.7 Health and Safety Requirements

The facility shall be designed such that occupational and population radiation exposure is maintained in accordance with the principles of ALARA. Minimization of radiation exposure shall be achieved through the use of concrete shielding, shielded loading equipment and to the extent practical, controlled access to the facility and self-shielding properties of the stored material. Consistent with current balance of plant radiological zoning and control (Susquehanna SES FSAR Section 12.3), the radiation exposure at any accessible surface of the facility shall be less than or equal to a static dose rate of 0.5 mrem/hr. During waste transfer and handling, the hourly and weekly dose limits specified for continuous occupancy in unrestricted areas will not be exceeded (10 CFR 20.105). In addition, the instantaneous radiation exposure during waste transfer and handling will be maintained ALARA. Radiation dose rates in the facility control room shall be maintained less than or equal to 0.5 mrem/hr during the movement of the maximum postulated activity container. The annual radiation dose at the Susquehanna SES restricted area fence will be limited to 0.5 rem.

The dose to any member of the general public from this facility shall be a small fraction of the 10CFR limits as stated in the U.S. NRC Branch Technical Position (81-38), which is less than the limit given in 40 CFR 190.

Provisions shall be made in the facility design to minimize the detrimental effects of machinery exhaust fumes and excessive temperature. Such provisions shall include a building ventilation system which tends to draw exhaust fumes away from persons working on the operating floor of the facility, prevents temperatures from becoming excessive in the area, and circulate building air through the trash storage areas.

3.8 Design Life

This facility shall be designed to temporarily store the wastes generated by SSES for the equivalent of 8 reactor years. The duration of material storage for an individual container shall be up to four years. The design life of the facility shall be 40 years. The integrated life time radiation exposure for equipment specifications shall be 10^{4} rads. Equipment in areas of high radiation exposure shall be approximately designed for this exposure. No special equipment qualification will be required.

3.9 Architecture

The LLRWHF shall consist of storage vaults within the confines of an uninsulated steel-framed, metal sided structure. The purposes of the steel building are to provide weather protection; all-weather loading capability; and an exterior architectural treatment which will economically meet the service life of the structure and also be aesthetically compatible with other similar site structures. The building shall also be capable of supporting loading, radiation monitoring, lighting, and HVAC systems.

The storage vaults shall be of a rectangular cross-section. The walls of the vaults shall be of reinforced concrete construction. The solidified waste vault shall be covered with removable, reinforced concrete shield plugs to permit the loading and unloading of the waste containers. The sizing of these removable plugs shall be compatible with the container sizes given. The trash vault shall have a continuous concrete roof supported by steel columns from the floor. The thickness of the vault roofs and walls shall be designed to limit the off-site worker dose to levels specified in Section 3.3. The vaults shall be designed to minimize the streaming and the off-site and worker dose rate when the roof plugs are removed for loading and unloading.

The floor of the facility shall be designed to support all of the following:

a. Load from stacked waste containers
b. Load from vault walls and shielding panels
c. Load from handling equipment if carried by floor
d. Load from steel superstructure
e. Load from truck carrying waste and shielding

A curb shall be placed around the perimeter of the facility to contain any liquid such as rainwater or fire sprinkler water which may be introduced into the building. The curb shall be of such height as to contain the volume of fire protection water released if all the sprinklers are actuated for a period of one half hour. Ramps shall be provided to facilitate vehicular traffic over the curb.

The floor, curbing, sumps, and shield walls of the facility shall be coated with paint to a height equivalent to the height of the curbing to aid in decontamination.

The metal building shall provide a truck unloading area which will afford convenient inside unloading to the solidified waste vault areas. Access to the truck bay shall be provided by a rolling door.

A loading dock shall also be provided which will allow essentially level access from the trash vault to an enclosed van or trailer for each off loading such as a vehicle with a drive-on forklift. Access to the loading dock shall be through a roll-up door.

Personnel access doors are needed to satisfy operational requirements and fire safety standards. The actual number and location of the access doors shall be determined by the designer in accordance with all of the governing reference regulations. The personnel access doors shall be the hollow metal type.

Louvers shall be provided in the exterior metal siding of the building to permit air intake into the facility for the HVAC system. The size, number, and location of the louvers shall be determined by the design features of the HVAC system. The louvers shall be located and/or protected in such a manner as to not become blocked with snow, ice, mud, or any other substance which may restrict the flow of air into the facility.

3.10 Security

No special security provisions are required for this facility except that all access doors shall be capable of being locked.

4.0 SYSTEM DESIGN REQUIREMENTS

4.1 Building And Storage Vaults

The solidified storage vault shall store the higher level wastes, such as the solidified evaporator bottoms and demineralizer resins, while the trash vault shall provide storage space for the lower level wastes srch as trash.

The designer shall design the metal building to include the following:

a. Primary and secondary structural framing members, base plates, anchor bolts, connection bolts, and other items which are applicable.

b. Metal roof deck and exterior metal siding.

c. Closures.

d. Flashing.

e. Fasteners.

f. Sealants.

g. Gutters and Downspouts.

h. Louvers.

i. Coatings (structural steel).

j. Hatches and roof openings.

k. Crane rails and supports.

l. Crank transfer monorails and hoists.

4.2 Floor Drains System

The facility will be designed such that under normal conditions free liquids inside the building will be minimized. All waste will be either solidified waste or compacted dry waste.

Potential abnormal sources of free liquids are fire protection water, minute amounts if a cement container were to be breached in loading or unloading, rainwater or melting snow from roof leakage, cooling system leakage from equipment inside the faiclity, snow brought in on vehicles or liquids used for decontamination of containers before shipment, should that ever become necessary. All such liquids must be considered contaminated until verified otherwise.

The floor drains system shall be designed to collect liquids that are spilled on the floor of the facility. The system shall route all drains to one collection sump located at the building periphery. The sump shall be equipped with liquid detection devices which will provide annunication in the main plant and facility control rooms whenever liquid enters the sump.

Provisions shall be made such that sampling of the sump may be performed from either inside or outside the building. Provisions shall also be made such that the sump may be pumped to portable tanks from either inside or outside the building. There shall be no permanent pumping equipment installed or piping connections to the main plant.

The sump shall be provided with metal containers which will catch the initial quantities of water entering from the drains system. The container shall allow for removal from the sump by hand to provide a means for convenient disposal of small quantities of water which enter the sump.

The areas inside the vaults shall also be provided with drains to route free liquids to the sump.

4.3 Loading System

The crane loading system for this facility shall be capable of unloading, transporting within the facility, placement, retrieval, and reloading of cemented waste. It shall also have the capacity to lift, transport, and replace all moveable shield bells (see Section 4.14) and individual vault shield panels and plugs.

Features shall be incorporated to minimize operator radiation exposure in accordance with ALARA principles.

The system shall be designed with features which facilitate its transfer from one solidified storage vault bay to the other as the vaults are filled.

The loading system, by the use of its hook, shall also be capable of retrieving dropped and damaged waste containers for repackaging or other disposition.

Loading for the compacted trash shall be by a batter-powered forklift. Shielding for the forklift operator shall be provided on the vehicle as required to meet ALARA requirements. A battery recharging station for the forklift shall be provided in the facility at a location outside the storage areas.

4.4 Lighting

Lighting levels for areas of the building in which activities are performed other than radwaste handling shall be consistent with published IES (Illuminating Engineers Society) recommended values.

Emergency lighting shall be provided as required to meet applicable safety codes.

Lighting levels for areas in which radwaste will be handled are to be as follows:

	Area	Approx. Ft. Candle
a.	Truck Bay	30
b.	Inside Crane Loaded Vaults ..	Lighting provided by crane lights of intensity required by CCTV manuf.
c.	Interim Trash Storage Area (Inside Vault)	30
d.	Area Above Shielded Vaults ..	30
e.	Trash Storage Area Working Level w/o Concrete ceiling ..	10
f.	Trash Storage Area Working Level w/Concrete Ceiling	30
g.	Area Above Trash Storage Area Ceiling	5

Fixtures for areas c, e, and f to be interchangeable if feasible to allow salvage of fixtures during building transition.

The lighting shall be designed to provide long element life and ease of replacement to minimize potential radiation exposure during maintenance.

The lighting system shall be provided in accordance with the latest issue of the National Electric Code (NEC) and applicable Bechtel Drawings E-40 thru E-60.

4.5 Heating, Ventilation & Air Conditioning Systems

The facility shall be provided with an active ventilation system for two basic functions: 1) removing noxious or irritating exhaust fumes whenever internal combustion engine powered machinery is operating inside the facility, and 2) preventing excessive heat build-up from the roof in the summer.

The system shall be designed such that it moves air generally in an upward direction, away from the equipment operators.

Air inlets shall be provided such that when the facility is closed, air entering the facility, when the building ventilation fans are operating, flows as described above. The inlets shall be located and/or protected such that snow accumulation cannot significantly restrict the flow or air nor be drawn into the facility.

The ventilation system for the storage areas and truck bay shall not provide any heating or air conditioning for the facility. It will also not provide any humidity control.

The system shall be provided with thermostatic controls to automatically maintain the facility temperature below the maximum allowed for safe working occupancy. It shall also be provided with an automatic shutdown feature which is activated when smoke is detected by the fire detection system. The controls shall provide for manual starting and stopping of the system which shall override the automatic functions described above. The system controls shall be located in the facility control room.

The system shall exhaust through a damper which shall open when the fans are in operation and close when the fans are shut down.

The facility control room shall be provided with heating and air conditioning which normally will be required when the facility is being loaded or unloaded.

The battery charging station will require special ventilation for hydrogen gas build-up.

4.6 AC Power Systems

The three phase, 480 volt power supply to the building will be provided by owner supplied 300 kVA pad mounted transformer and an associated disconnect cabinet located approximately 20 feet from the LLRWHF control/equipment room and battery charging station.

The power will be distributed at appropriate voltage levels from the facility motor control center equipped with relay ground fault protection. The motor control center shall be equipped with kW Hr metering facilities supplied and installed per manufacturer's standard practice.

This will be the only source of electrical power for all facility loads except for the following: Fire protection equipment and annuciator system will have individual battery backup to normal building AC supply.

In addition to permanent loads including a battery charging station, power is required for convenience 120 VAC outlets, and power/welding 480 VAC receptacles. All electrical equipment including cable contained within the sotrage area shall be capable of performing its function under normal environmental conditions which shall exist in the facility for the design life of the building. The AC power system is to be in accordance with the latest issue of the National Electric Code (NEC) and applicable Bechtel Drawing E-40 thru #-60.

4.7 Communications System

The communications system will allow two way conversation and paging between the main plant and the facility. It shall be designed to be compatible with the connected to the existing main plant communications system.

Public Address System stations for paging/communication shall be provided as follows:

Off-loading Area - Two stations, one located near entrance to future Trash Storage Vault/Truck Bay overhead door. The other station near Inspection station/entrance to Interim Trash Vault.

Control Room - One station near crane control panel.

Sufficient speakers shall be provided inside the storage area and inside Interim & Future Trash vaults to insure that paging an alarm can be heard when the facility is at full capacity.

One telephone with a plant extension shall also be provided in the LLRWHF Control Room.

Maintenance communications shall be via above facilities and customer's supplied portable radio equipment.

The system is to be installed in accordance with the latest issue of the National Electric Code and applicable portions of Bechtel drawings E-40 thru E-60.

4.8 Radiation Monitoring System

The radiation monitoring system shall be designed to monitor the general area radiation levels at various locations in the trash vault area, the off-loading area, and the facility control room. Readout and common High Radiation shall be in the facility control room.

Each indicator in the LLRWHF control room has alarm functions. All radiation alarms are grouped to generate a "Facility Radiation High' alarm in the facility control room and a LLRWHF "trouble" alarm in the main plant control room.

4.9 Fire Detection/Protection System

The fire protection design shall be based on a combustible loading of 1200 lbs/ft^2. The facility shall be provided with a fire detection system to provide an early warning alarm in sprinklered areas. Location and placement of detectors shall consider access to each detector for annual testing and servicing.

The interim vault, truck bay, control room, and ultimate trash storage vault shall be provided with a dry pipe sprinkler system designed to deliver .25 gpm per square foot over the hydraulically most remote 3000 square foot area. The system shall utilize sprinkler heads rated at 286°F.

Water will be supplied from the existing fire protection system by a 10" mortar lined ductile iron fire protection line. The water supply is capable of supplying a minimum of 1500 gpm at 100 psi. Fire hydrants shall be provided and equally spaced at approximately 300 foot intervals around the building perimeter. Hydrants and hose houses shall be identical to existing plant equipment.

All fire protection equipment shall be Underwriters Laboratories listed and approved by Factory Mutual. All fire protection and fire detection drawings are subject to PP&L and insurance approvals.

In the event of fire or trouble with the fire protection system in the LLRWHF, the fire detection system will annunciate an alarm in the main plant control room and automatically shut down the ventilation system. Should the fire continue to propagate, the fire protection system will be automatically actuated in the area of fire.

Any water or other fire fighting materials introduced into the facility should be considered contaminated until proven otherwise. If contaminated, they should be disposed of accordingly.

4.10 Annunciator System

The following occurrences in the facility will activate an annunciator in the main plant control room and at the facility:

a. Detection of fire and trouble with the fire protection system.

b. Detection of liquid presence in any of the facility sumps.

c. Loss of electrical power to the facility critical loads (eg. radiation monitors, annunciators, liquid detectors and charging station fan).

d. Facility incomming feeder undervoltage.

e. Detection of facility high radiation and Fire Protection System smoke singal override.

The main plant control room will have an annunciator window for the fire detection system and one common annunciator window which will be activated for any of the other above listed alarms. Annunicators provided at the LLRWHF control room shall have separate windows for each alarm.

4.11 Grounding Systems

The grounding system shall establish a buildng ground grid to connect electrical and mechanical equipment and structures, raceways, duct banks, and other required grounds to the existing exterior station grounding system.

The building ground grid shall include a minimum of a 250 kcmil cable loop connected to every other steel column as a minimum with additional connections as required to establish a uniform potential in and about the structure.

The building ground grid shall be connected to the existing exterior station ground system by a minimum of two connections located on diagonally opposite sides of the building and attached to different section of the exterior station grounding system.

All underground or embedded grounding connections shall be made by the exothermic process.

The grounding system shall be in accordance with the latest issue of the National Electric Code (NEC) and applicable portions of Bechtel Drawings E-40 thru E-60.

4.12 Raceway, Cable, Wire

Raceway, cable, and wire including specification, installation, termination, and labeling shall be in accordance with the latest issue of the National Electric Code and applicable portions of Bechtel Drawings E-40 thru E-60.

All raceway within the facility storage area, excluding lighting, shall be rigid steel conduit not less than one inch in diameter. EMT conduit is acceptable for lighting raceway.

Power and control wire shall have EPR compound insulation with flame retardant jacket per ICEA S-68-516 (1980).

4.13 Shielding

Radiation shielding shall be provided for the solidified waste storage area, trash storage area, inspection stations, truck bay and facility control room. A portable shield bell which can be attached to the facility loading crane and shields the solidified waste containers during transport and loading shall also be provided. For the trash waste, a fork lift with provisions for shielding if required shall be provided.

Radiation shielding design shall take into consideration both the steady state dose contribution from the in-place waste and the variable dose contribution which results from the handling and movement of wastes within the facility. Radiation shielding for this facility shall be designed to meet the dose criteria specified under Health and Safety Requirements, Section 3.7.

Wastes stored in the trash vault shall be segregated with containers having contact dose rates of less than or equal to 30 mrads/hr. stored on the top layer of the storage area and containers with contact dose rates of greater than 30 mrads/hr. stored underneath to the maximum extent practicable. Similarly, waste stored within the shielded vaults will be arranged with containers with contact dose rates less than or equal 3 rads/hr. stored next to the vault walls and on the top layer and containers greater than 3 rads/hr. stored inside this perimeter to the maximum extent practicable. These measures will take maximum advantage of the self-shielding properties of the waste material. PP&L will be responsible for these administrative controls during operation of the facility.

A design contact dose rate for the greater than 3 rads/hr. solidified waste container shall be determined based on radwaste shielding sources given in Section 12.2 of the SSES FSAR.

4.14 Liner Inspection Station

The facility shall be equipped with a liner inspection station where inspections required by 49CFR170 can be performed on the solidified waste containers immediately prior to shipment and as required for routine monitoring. The inspections will include the following:

1) Visual inspection of the container for deterioration, leakage, or other conditions which might preclude shipment, disposal, or might require repackaging.

2) A contact radiation dose reading on the container surface.

3) A radiation dose reading at three feet from the outer surface.

4) An outer surface contamination smear.

5) Weighing of a liner.

The inspection station shall provide shielding for the person performing the inspections and remote operating capability for these functions to minimize the radiation expsoure per ALARA principles. The inspection station shall be compatible with the loading system of the facility and shall be provided in one solidified storage vault bay with the provisions for installing another in the interim trash storage bay in the future.

The inspection station shall be equipped with the appropriate lighting to allow these inspections. Provisions shall be made in the facility for electrical power for the station at the locations it will occupy.

5.0 CIVIL DESIGN CRITERIA

5.1 Classification of Structure

The LLRWHF shall be designated as a Non-Seismic Category I structure. A Non-Seismic Category I structure is one whose failure would not result in the release of significant amounts of radioactivity and is not required for reactor shutdown.

5.2 Design Loads

The following design loads shall apply to the LLRWHF. Situations not specifically covered by the following shall be evaluated on an individual basis, recorded, and approved by PP&L before implementation.

5.2.1 Dead Load (DL) — Includes weight of framing, roof, floors, walls, platforms, and all permanent equipment.

Permanent equipment such as:

a. HVAC equipment
b. Electrical panels and equipment
c. Control panel for overhead crane
d. Fire protection equipment
e. Overhead crane

A load allowance for piping, electrical trays, and ducts of 10 psf shall be taken as dead load in computing structural member stresses. This load allowance may include such items as:

a. HVAC ducts
b. Lighting
c. Sprinkler system
d. Fire detection system

5.2.2 Live Load (LV) — Includes all vertical loads except DL.

Following are minimum live loads to be used in design of the various areas:

a. Roof: The roof live load, including snow loads, shall be 30 psf on the projected horizontal area, or a concentrated load of 200 pounds acting on a 1 foot by 1 foot area at the center of the longest span, whichever is the more severe.

b. Ground Floor.

c. Truck Bay: AASHO H20-S16 Special Load Transporter.

d. Forklift Access Areas:

   1) Equipment Room: 250 psf
   2) Control Room: 250 psf

e. Surcharge outside and adjacent to structures: 250 psf, Railroad surcharge per A.R.E.A. specification.

f. Concentrated load on beams and girders (in addition to all other loads): 5 kips to be applied at points of maximum moment and shear. This load is not cumulative and is not carried to columns. It is not applied in office or access control areas and at equipment access and walkway platforms.

g. Concentrated load on slabs (to be considered with dead load only): 5 kips acting over an area of 3 sq. ft. to be applied at points of maximum moment and shear. This load is not cumulative and is not carried to columns. It is not applied in office or access control areas.

5.2.3 Crane Loads

The designer shall include within the scope of his work the design of the crane rails and supports. Crane and equipment vendor drawing shall be followed for wheel loads, equipment loads, weights of moving parts, and crane rail deflection requirements.

Impact allowance for traveling crane supports and their connections shall be 25%. Lateral force on crane runways shall be 20% of the sum of weight of the lifted load and the crane trolley applied at the top of rail, one-half on each side of the runway, and shall be considered as acting in either direction normal to the runway rail. The longitudinal force shall be taken as 10% of the maximum wheel loads of the crane applied at the top of the rail.

5.2.4 Ground Water Pressure

The ground water level shall be determined by the designer based on site specific information.

5.2.5 Floods

The LLRWHF need not be designed for the effects of a flood since the proposed site location as well above the flood stage for the probably maximum flood (PMF).

The facility shall be designed for a maximum rainfall intensity of 6 in/hr.

5.2.6 Wind Loads

The structure shall be designed for the basic wind loads tabulated below in accordance with ASCE paper No. 3269. Values are in pounds per square foot (psf) unless noted otherwise.

Wind Load on Structures:

a.	Height	0-50 ft.
b.	Basic Velocity	80 mph
c.	Dynamic Pressure with 1.1 Gust Factor q	20 psf
d.	Wall Pressure 0.8q	16 psf
e.	Wall Suction 0.5q	- 26 psf
f.	Total Design Pressure 1.3q	26 psf
g.	Roof Suction 0.6q	12 psf

5.2.7 Seismic Loads

The LLRWHF shall be designed in accordannce with the Uniform Building Code (UBC) for structures located in Seismic Zone 1 as defined therein.

5.2.8 Pressure Loads

The facility control room shall be designed to withstand the pressure generated by the HVAC system.

5.3 Materials and Design Methods

5.3.1 Materials

a. Concrete design strengths for the LLRW structure shall be based upon the following table:

1) Precast concrete panels 5000 psi
2) All other materials 4000 psi
3) Mass concrete fill and mud mat 2000 psi

b. Reinforcing Steel shall conform to ASTM-A615, Grade 60.

c. Structural Steel shall conform to ASTM-A-36, or other ASTM designations listed in Section 1.4.1.1 of AISI Specification for the design, fabrication, and erection of structural steel for buildings.

5.3.2 Design Methods

a. General

All steel structures shall be designed by the working stress method. All reinforced concrete structures shall be designed by the strength method. Any deviation from above is permitted only when approved by PP&L.

In determining the most critical loading condition to be used for design, the absence of a load or loads shall also be considered, when appropriate.

Formwork design shall be in accordance with ACE 347 and "Safety and Health Regulations for Construction," Department of Labor, Volume 36, No. 75. If any conflict occurs, the latter shall govern. Foundation design shall maintain minimum safety factors in accordance with the following criteria:

Load Combination:	D+H+W	D+F
a. Ovewrturning:	1.5	—
b. Sliding:	1.5	—
c. Flotation	—	1.1

b. Notations

U: Required strength to resist design loads, as defined in ACI 318.

D: Dead load of structure plus any other permanent loads contributing stress, such as hydrostatic loads.

L: Live loads expected to be present when the plant is operating, including movable equipment, and lateral earth pressures.

V: Seismic load on Non-Seismic Category I structures as specified in the Uniform Building Code for Seismic Zone 1.

W: Wind load.

Fs: Allowable stress for structural steel (as specified in AISC).

c. Design

Designated as a Non-Seismic Category I structure, the Low Level Radwaste Holding Facility shall be designed using the following load combinations:

1) Concrete Structures

a. U = 1.4 D + 1.7 L
b. U = .75 (1.4 D + 1.7 L + 1.7 (1.1) V)
c. U = .75 (1.4 D + 1.7 L - 1.7 W)
d. U = .9D + 1.3 (1.1) V (Note 1)
e. U = .9D + 1.3 W (Note 1)

2) Steel Structures

a. D + L ..... stress limit of Fs
b. D + L + V ..... stress limit of 1.33 Fs
c. D + L + W ..... stress limit of 1.33 Fs

Note 1: Where overturning forces cause net tension in the absence of live load.

5.4 Site Information and Site Work

5.4.1 Plant Datum and Orientation

a. Plant datum corresponds to U.S. Geological Survey Mean Sea Level (MSL) datum.

b. Plant north corresponds to true north.

5.4.2 Design Depth for Frost Protection

a. Bottoms of all foundations shall be located at a minimum depth of 4 ft. below grade.

b. All water pipine shall have a minimum cover of 4-1/2 ft.

5.4.3 Earthwork Slopes

Maximum embankment slope: 1-1/2 horiz.: 1 vert.

5.4.4 Rock Slopes

Recommended slopes: 1 horiz.: 4 vert.

XII

TABLE 1

TOTAL CURIE CONTENT OF CONDENSATE DEMINERALIZER WASTE LINERS

Isotope	Activity of 1 CD Liner at t=0[1]	Activity of CD Liners in at t=4yrs[2]	Total Estimated Activity of CD liners in vaults at t=4yrs[3]
BR—83	1.4548-16*	1.5574-16	6.70-15
BR—84	0.	0.	0.
I—131	5.1345+1	3.4160+2	2.65+3
I—133	1.1730-1	1.8697-1	5.47
I—134	0.	0.	0.
I—135	1.3310-5	1.5912-5	6.15-4
I—132	2.6166-1	8.5652-1	1.26+1
CR—51	2.5848-2	5.3046-1	1.69
MM—56	2.3931-16	2.5735-16	1.10-14
CO—58	3.3173-1	1.6942+1	3.19+1
CO—60	3.8747-2	2.1441+1	2.32+1
SR—89	2.3265-1	8.8424	1.93+1
SR—91	8.4584-5	1.0852-4	3.91-3
SR—92	1.3376-14	1.4437-14	6.16-13
NO—99	8.2243-2	2.4275-1	3.94
TC-99M	7.8688-2	2.3226-1	3.77
TE-132	2.5405-1	8.3161-1	1.23+1
CS-138	0.	0.	0.
BA-139	2.9372-27	3.0559-27	1.35-25
BA-140	4.8055-1	4.8000	2.641
BA-141	0.	0.	0.
BA-142	0.	0.	0.
CE-141	4.8062-2	1.1450	3.31
NP-239	6.0269-1	1.5956	2.87+1
CS-140	0.	0.	0.
LA-140	5.3645-1	5.4872	2.96+1
Y—92	8.3189-11	9.1782-11	3.84-9
CS-139	0.	0.	0.
SR—93	0.	0.	0.
Y—93	1.6991-5	2.2112-5	7.87-4
LA-141	6.3603-11	7.0805-11	2.93-9
RB—91	0.	0.	0.
RB—90	0.	0.	0.
RB—89	0.	0.	0.
RB—88	0.	0.	0.
LA-142	1.6142-25	1.6870-25	7.43-24

TABLE 1 (Cont.)

TOTAL CURIE CONTENT OF CONDENSATE DEMINERALIZER WASTE LINERS

Isotope	Activity of 1 CD Liner at t=0	Activity of CD liners in vaults at t=4 yrs	Total Estimuted Activity of CD liners in vaults at t=4yrs
Y—91M	5.4642-5	7.0102-5	2.53-3
Y—91	1.0770-1	4.5548	9.40
Y—89M	2.3265-5	8.8424-4	1.93-3
SR—90	3.8602-8	2.6138-5	2.79-5
Y—90	2.8945-8	2.6118-5	2.74-5
ZR—93	4.2717-11	3.0404-8	3.23-8
MB-93M	2.4819-14	2.7655-9	2.77-9
PU-239	5.3678-7	4.9447-4	5.19-4
U—235	4.4414-18	9.6695-13	9.67-13
TH-231	2.6882-18	9.6492-13	9.65-13
PA-231	2.3892-25	6.0580-17	6.06-17
TC—99	8.9600-9	8.6498-6	9.05-6
XE-135	1.0032-3	1.2741-3	9.64-2
CS-135	8.6230-10	6.1378-7	6.53-7
XE135M	4.1546-6	4.9667-6	1.92-4
XE133M	2.0171-2	5.3855-2	9.62-1
XE133	6.7336-1	3.2670	3.36+1
XE131M	9.6942-2	2.6418	7.00
KR-83M	6.3756-16	6.8252-16	2.94-14
FE-55	7.801-2	3.415+1	3.77+1
H-3	7.184-2	4.570+1	4.89+1
TOTAL	5.548+1	4.951+2	2.99+3

1. Based on a 6 ft. diameter liner, 6 ft. high with a design surface dose rate of 3R/hr

2. Based on a 4 year period of accumulation, taking credit for radioactive decay, assuming continuouswaste processing and emplacement into the LLRWHF.

3. To account for periods when waste generation rate exceeds the average generation rate, a non-decayed inventory equivalent to 3 months waste production is added to the calculated 4 year activity to obtain the total estimuted activity for CD wastes.

4. 1.4548-16 = 1.4548×10^{-16}

TABLE 2

TOTAL CURIE CONTENT OF RWCU WASTE LINERS

Isotope	Activity of 1 RWCU Liner at t=0[1]	Activity of RWCU liners in vaults at t=4 yrs[2]	Total Estimated Activity of RWCU Liners in Vault at t=4yrs[3]
F—18	1.4780-3*	1.4956-3	1.63-2
BR—83	9.7412-3	9.8939-3	1.07-1
BR—84	8.4351-4	8.4642-4	9.28-3
I—131	2.4264+1	5.4747+1	2.97+2
I—132	2.6317+1	3.9596+1	3.03+2
I—133	4.0513	4.5861	4.51+1
I—134	1.9989-2	2.0102-2	2.20-1
I—135	6.4122-1	6.6912-1	7.08
BA-141	1.6900-3	1.6933-3	1.86-2
BA-142	6.3451-4	6.3527-4	6.98-3
CE-141	7.0673-1	4.2919	1.14+1
CE-144	4.1509-1	1.8290+1	2.24+1
PR-143	1.3743-1	4.2890-1	1.80
NP-239	7.3680+1	1.0066+2	8.37+2
SR—89	2.6154+1	2.4125+2	5.03+2
SR—90	2.9687	4.4901+2	4.79+2
SR—91	7.1576-1	7.6077-1	7.92
SR—92	8.9685-2	9.1265-2	9.88-1
ZR—95	3.6767-1	4.1257	7.80
NB—95	4.8075-1	6.8607	1.17+1
MO—99	8.9641	1.2852+1	1.02+2
TC-99M	9.6326	1.3394+1	1.10+2
TC-101	8.4293-4	8.4421-4	9.27-3
TE129M	2.7823-1	1.7588	9.54
TE-132	2.5517+1	3.8409+1	2.94+2
CS-134	1.9985	1.7482+2	1.95+2
CS-136	3.7479-1	1.1761	4.92
CS-137	3.0949	4.6988+2	5.01+2
CS-138	6.0737-3	6.0949-3	6.68-2
BA-139	3.3893-2	3.4198-2	3.73-1
BA-140	2.8569+1	8.5138+1	3.71+2
NA—24	4.9507-2	5.4323-2	5.49-1
CR—51	3.0602	1.6337+1	4.69+1
MN—54	4.7585-1	2.2179+1	2.69+1
MN—56	3.6833-2	3.7450-2	4.06-1
CO—58	4.7182+1	5.7219+2	1.04+3
CO—60	6.3595	7.8697+2	8.51+2
FE—59	6.4171	5.2082+1	1.16+2
AG110M	7.0716-1	2.8316+1	3.54+1
W—187	1.8838-1	2.1766-1	2.10
LA-140	3.1108+1	9.6312+1	4.07+2
TE-129	1.7831-1	1.1272	2.91
Y—92	2.065-1	2.1282-1	2.28
Y—91	4.2103	4.2893+1	8.50+1
Y—91M	4.5894-1	4.8800-1	5.08

TABLE 2 (Cont.)

TOTAL CURIE CONTENT OF RWCU WASTE LINERS

Isotope	Activity of 1 RWCU Liner at t=0	Activity of RWCU liners in vaults at t=4 yrs	Total Estimated Activity of RWCU Liners in vaults at t=4 yrs
Y—90	2.8899	4.4901+2	4.78+2
PR-144	4.1511-1	1.8291+1	2.24+1
LA-142	5.9704-3	6.0310-3	6.57-2
LA-141	2.3492-2	2.4086-2	2.59-1
ND-255	1.0092-17	1.7058-14	1.72-14
I—129	1.1180-9	4.1115-7	4.22-7
RE-187	4.8710-13	7.9284-11	8.42-11
AG-110	9.1931-3	3.6811-1	4.60-1
TC—99	5.4492-6	9.2150-4	9.76-4
NB-95M	6.8497-3	8.6020-2	1.55-1
Y—89M	2.6154-3	2.4125-2	5.03-2
PU-239	3.2472-4	5.4651-2	5.79-2
U-235	2.4670-14	1.0997-10	1.10-10
TH-231	2.3373-14	1.0974-10	1.10-10
PA-231	9.6123-19	6.9681-15	6.98-15
XE-135	6.4127-1	7.0756-1	7.12
CS-135	2.3963-8	3.8689-6	4.11-6
XE135M	1.9238-1	2.0106-1	2.12
XE133M	9.7232-2	1.4436-1	1.12
XE-133	4.0495	7.9490	4.84+1
XE131M	1.3463-1	5.6546-1	1.91
KR-83M	9.7412-3	1.0012-2	1.07-1
FE-55	1.26+1	1.24+3	1.37+3
H3	5.83-2	1.10	1.68
TOTAL	3.61+2	5.06+3	8.67+3

1. Based on a 6 ft. diameter liner, 3 ft. high with a design surface dose rate of 30R/hr.

2. Based on a 4 year period of accumulation, taking credit for radioactive decay, assuming continuous waste processing and emplacement into the LLRWHF.

3. To account for periods when waste generation rate exceeds the average generation rate, a non-decayed inventory equivalent to 3 months waste production is added to the calculated 4 year activity, to obtain the total estimated activity for RWCU wastes.

4. 1.4780-3 = 1.4780×10^{-3}

TABLE 3

TOTAL CURIE CONTENT OF DRY TRASH

Isotope	Activity of 1 Trash Drum at t-0[1]	Activity of trash in trash storage area at t-4 yrs[2]	Total Estimated Activity of trash in trash storage area at t-4yrs[3]
F—18	3.08-8*	6.78-8	3.09-5
BR—83	2.03-7	5.25-7	2.04-4
BR—84	1.76-8	2.37-8	1.76-5
I—131	5.05-4	6.48-2	5.70-1
I—132	5.48-4	2.85-2	5.77-1
I—133	8.43-5	1.21-3	8.55-2
I—134	4.16-7	6.54-7	4.17-4
I-135	1.34-5	7.21-5	1.35-2
BA-141	3.52-8	4.21-8	3.52-5
BA-142	1.32-8	1.48-8	1.32-5
CE-141	1.47-5	7.57-3	2.23-2
CE-144	8.64-6	3.77-2	4.63-2
PR-143	2.86-6	6.17-4	3.48-3
NP-239	1.53-3	5.84-2	1.59
SR—89	5.44-4	4.54-1	9.98-1
SR—90	6.18-5	9.40-1	1.00
SR-91	1.49-5	1.10-4	1.5-2
SR-92	1.87-6	5.20-6	1.88-3
ZR-95	7.65-6	7.93-3	1.56-2
NB—95	1.00-5	1.35-2	2.35-2
MO—99	1.87-4	8.38-3	1.95-1
TC-99M	2.01-4	8.13-3	2.09-1
TC-101	1.75-8	2.02-8	1.75-5
TE129M	5.79-6	3.13-3	8.92-3
TE-132	5.31-4	2.77-2	5.59-1
CS-134	4.16-5	3.64-1	4.06-1
CS-136	7.80-6	1.70-3	9.50-3
CS-137	6.44-5	9.84-1	1.05
CS-138	1.26-7	1.71-7	1.26-4
BA-139	7.06-7	1.35-6	7.07-4
BA-140	5.95-4	1.21-1	7.16-1
NA—24	1.03-6	1.12-5	1.04-3
CR—51	6.37-5	2.81-2	9.18-2
MN—54	9.91-6	4.58-2	5.57-2
MN—56	7.67-7	2.07-6	7.69-4
CO—58	9.82-4	1.11	2.05
CO—60	1.32-4	1.65	1.78
FE—59	1.34-4	9.64-2	2.30-1
AG110M	1.47-5	5.82-2	7.29-2
W—187	3.92-6	6.56-5	3.99-3
LA-140	6.48-4	1.38-1	7.86-1
TE-129	3.71-6	2.00-3	5.71-3
Y—92	4.30-6	1.76-5	4.32-3
Y—91	8.77-5	8.16-2	1.69-1
Y—91M	9.55-6	7.08-5	9.62-3
Y—90	6.02-5	9.41-1	1.00

TABLE 3 (Cont.)

TOTAL CURIE CONTENT OF DRY TRASH

Isotope	Activity of 1 Trash Drum at t=0	Activity of trash in trash storage area at t=4 yrs	Total Estimated Activity of trash in trash storage area at t=4yrs
PR-144	8.64-6	3.77-2	4.63-2
LA-142	1.24-7	2.52-7	1.24-4
LA-141	4.89-7	1.74-6	4.91-4
ND-144	2.10-22	3.59-17	3.61-17
I—129	2.33-14	8.64-10	8.87-10
RE-187	1.01-17	1.66-13	1.76-13
AG-110	1.91-7	7.57-4	9.48-4
TC—99	1.13-10	1.93-6	2.04-6
NB-95M	1.43-7	1.67-4	3.10-4
Y—89M	5.44-8	4.54-5	9.98-5
PU-239	6.76-9	1.15-4	1.22-4
U—235	5.14-19	2.32-13	2.32-13
TH-231	4.87-19	2.31-13	2.31-13
PA-231	2.00-23	1.47-17	1.47-17
XE-135	1.34-5	1.53-4	1.36-2
CS-135	4.99-13	8.11-9	8.61-9
XE135M	4.00-6	2.23-5	4.02-3
XE133M	2.02-6	1.01-4	2.12-3
XE-133	8.43-5	8.30-3	9.26-2
XE131M	2.80-6	9.11-4	3.71-3
KR-83M	2.03-7	7.73-7	2.04-4
FE-55	2.62-4	2.571	2.83
H-3	1.53-7	2.18-3	2.43-3
TOTAL	7.52-3	9.90	1.74+1

1. Based on a 55 gal. drum with a design surface dose rate of 30 mR/hr.

2. Based on a 4 year period of accumulation, taking credit for radioactive decay, assuming continuous waste processing and emplacement into the LLRWHF.

3. To account for periods when waste generation rate exceeds the average generation rate, a non-decayed inventory equivalent to 3 months waste production is added to the calculated 4 year activity, to obtain the total estimated activity for dry trash.

4. $3.08\text{-}8 = 3.08\text{X}10^{-8}$

FIGURE 1

Artist's rendering of the low level radioactive waste holding facility.

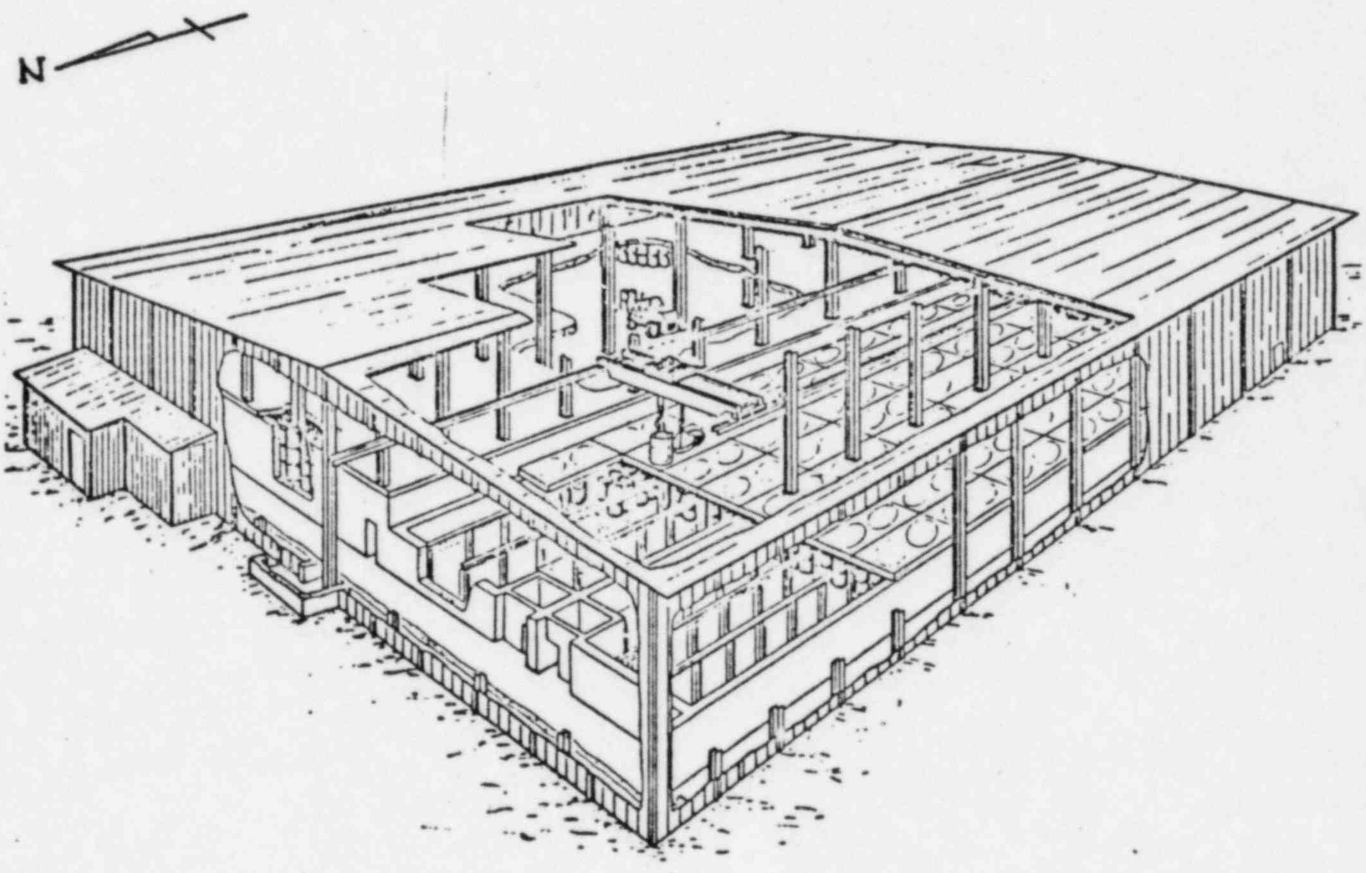

FIGURE 2
RADIATION ZONING FOR INTERIM TRASH STORAGE

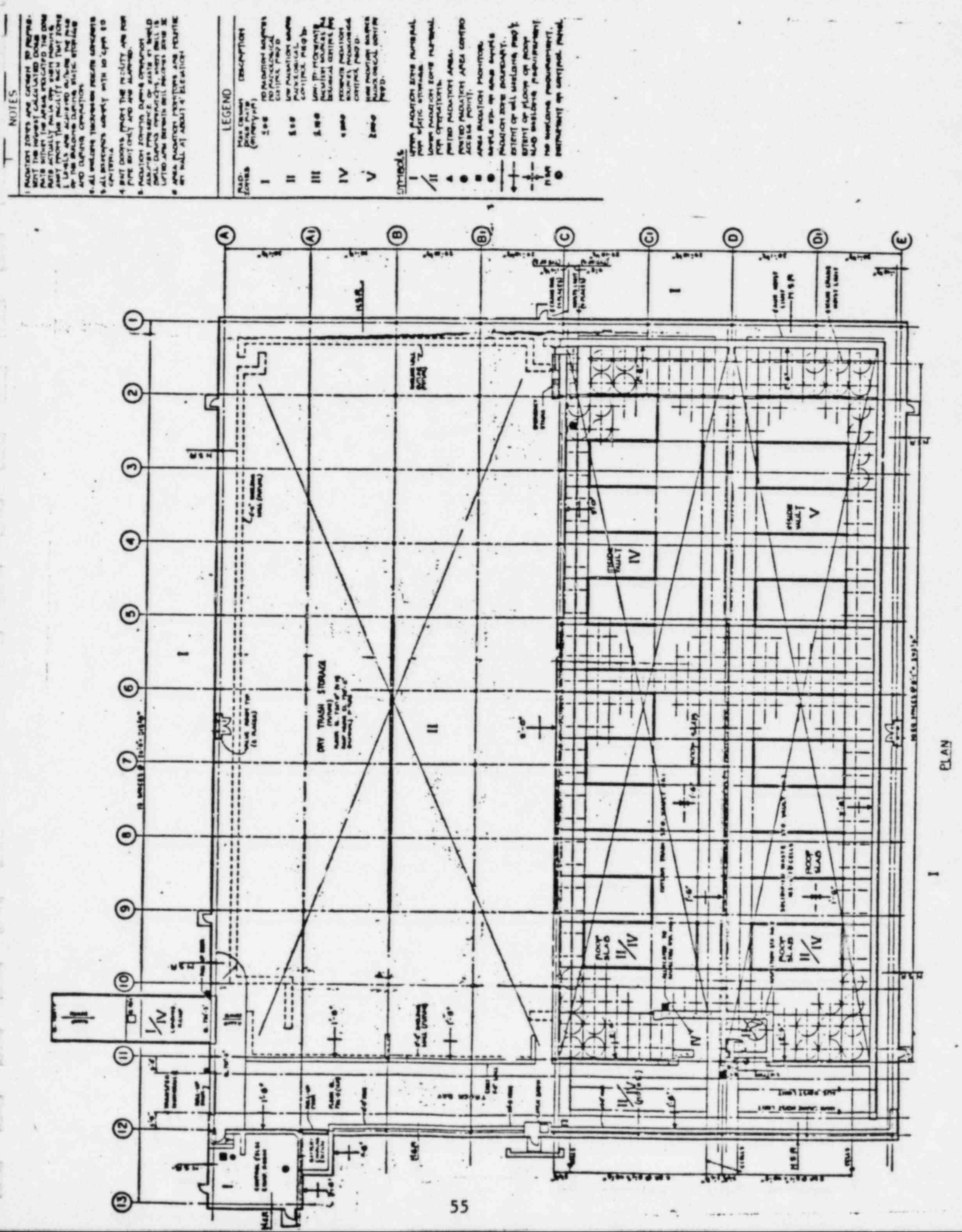

FIGURE 3

RADIATION ZONING FOR FINAL TRASH STORAGE

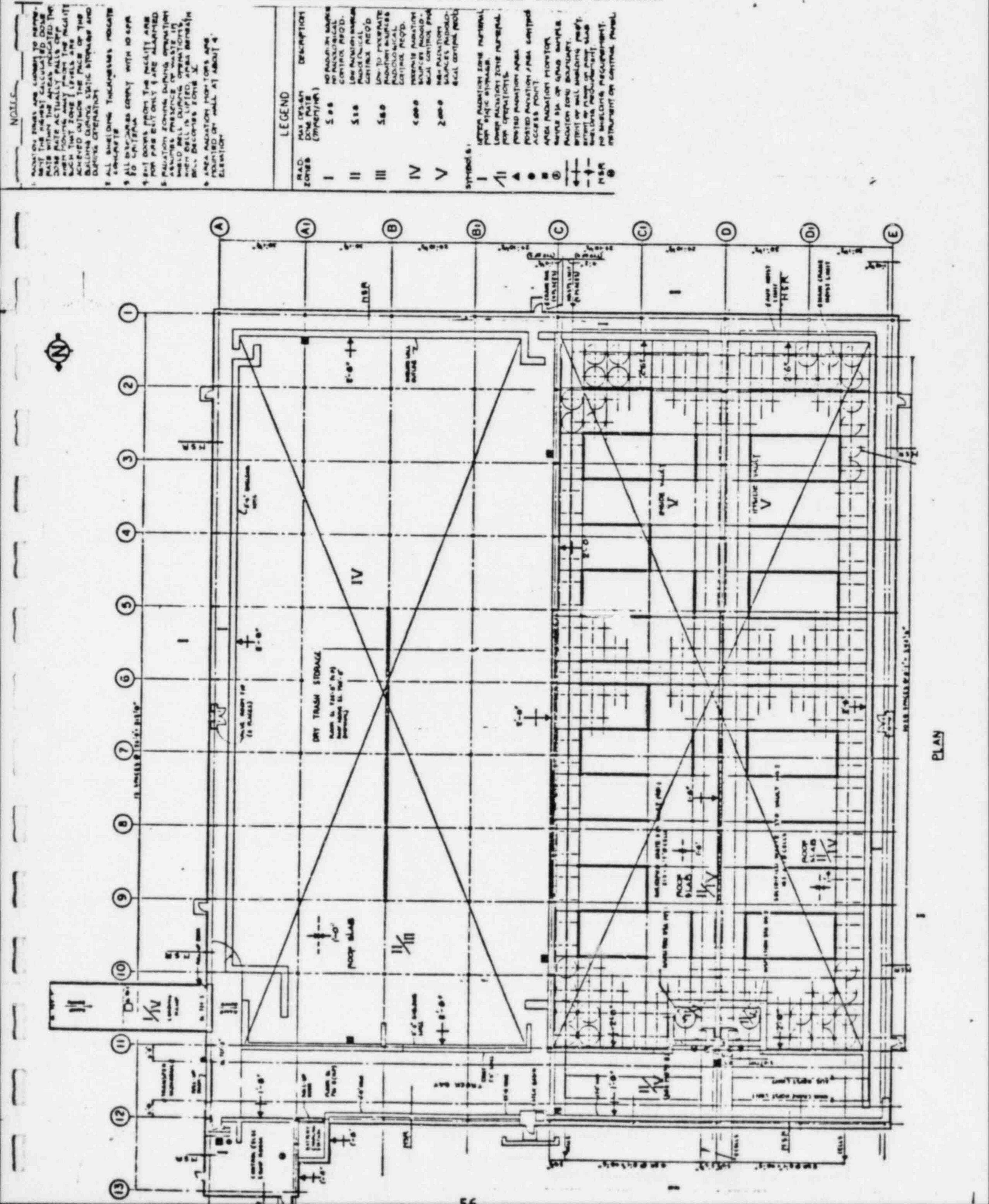

FIGURE 4

CD SHIELD BELL

This figure is considered proprietary and has been submitted under separate cover. See letter dated 9/23/82, Kenyon to Rouse (PLA-1308).

FIGURE 5

RWCU SHIELD BELL

This figure is considered proprietary and has been submitted under separate cover. See letter dated 9/23/82, Kenyon to Rouse (PLA-1308).