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MIDDLE SOUTH UTILITIES SYSTEM

July 25, 1983

W3P83-2108
Q-3-A29.11

Director of Nuclear Reactor Regulation
Attention: Mr. G. W. Knighton, Chief
Licensing Branch Number 3
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

SUBJECT: Waterford SES 3
Docket Number 50-382
Waste Management System

Reference: Letter dated March 28, 1983 from G. W. Knighton to L. V. Maurin

Dear Sir:

The referenced letter requested additional information concerning changes made to the Waterford 3 Waste Management System. Per discussions with the NRC reviewer, Mr. Jack Hayes, we are hereby providing our response in the form of revisions to FSAR Chapter 11. However, the following information is not appropriate for inclusion to the FSAR and is therefore being included in this letter:

> LP&L has entered into negotiations with two vendors, Chem-Nuclear Systems, Inc. and Hittman Nuclear-Development Corporation, to provide a standby demineralizer system and a portable solidification system. LP&L's intent is to ensure that the portable solidification system is installed at Waterford 3 at the time of fuel load. Contract negotiations for the two systems are proceeding concurrently. However, it is LP&L's intent at this time to rely on the installed waste concentrators; although provisions for connecting a standby demineralizer are being made, it is not expected to be needed except under unusual circumstances.
>
> Following selection of the portable solidification system vendor, the NRC will be notified and the PCP submitted for review.

We hope that this information satisfactorily addresses your concerns. The enclosed FSAR revisions, as modified to address any future questions, will be included in FSAR Amendment 33 which is currently scheduled for August 1983.

Very truly yours,

F. J. Drummond
Project Support Manager-Nuclear

B001
1/1

FJD/RMF/ssd

cc: E. L. Blake, W. M. Stevenson, J. Wilson (NRC), J. Hayes (NRC), L. Constable

Insert A to Page 11.2-2

The installed treatment method for liquid waste is the waste concentrator. It is not anticipated that standby demineralizers will be kept on-site continously, but that they will be available from a vendor if circumstances require their use.

steam activity). Since the activity will be extremely low, it will be routinely discharged unprocessed after monitoring. However, if monitoring reveals significant levels of activity the sump water will be routed to the Waste Management System. 4

11.2.1.5 Waste Management System (WMS) and Boron Management System (BMS)

The BMS and the liquid subsystem of the WMS are designed with sufficient capacity, redundancy, and flexibility to meet concentration limits of 10CFR20 during periods of equipment downtime when operating at design basis fuel leakage of one percent. The BMS has redundancy in its tanks, pumps, filters, ion-exchangers, and concentrators. The WMS has redundancy in its tanks and pumps. If the waste concentrator is down for maintenance, one of the boric acid concentrators can be substituted so that the processed fluid will experience the same high overall DF prior to being discharged. As an additional measure of assurance that liquid wastes can be processed during all plant conditions, piping taps have been installed in the LWMS process stream to allow use of a standby portable demineralizer system should the need arise. 31 In the case of the WMS, if a filter cartridge must be changed or an ion-exchanger bed be replaced, sufficient tankage is provided to hold the waste so that these operations can be performed with no loss of efficiency. The same is true for the BMS with the added advantage of redundant equipment. INSERT A

The WMS and BMS are located in the seismic Category I Reactor Auxiliary Building.

Tanks outside of containment are provided with level indication and alarms for high level conditions. The level alarms will alert operators when tanks are nearly full and transfer flow from a filled tank to alternate tanks may proceed. For cubicles which contain tanks with significant radioactivity and thus require shielding, the floors in these cubicles will be pitched to floor drains located at low points to facilitate floor drainage.

Collection tanks and tanks which receive processed waste are generally provided in pairs. The pairing of tanks allows one tank to be in the fill mode while the other tank is in the sampling, recirculation, process, or standby mode. Since the schedule of influent waste (See Table 11.2-3 and 11.2-4) can be processed with approximately 10 percent operational time or less using the subsystems described in Subsection 11.2.2, an empty standby tank would normally be available for any filled tank. Thus, switching from one tank to another will normally prevent overflow of tanks.

The monitor tanks (i.e., boric acid condensate tanks, waste condensate tanks, and laundry tanks) can be sampled prior to discharge or prior to transferring to the outside water storage tanks (i.e., primary water storage tank or the discharge structure). If analysis indicates further processing is required 27 the water will be reprocessed prior to leaving the building. Therefore, the potential release of water by overflowing outside storage tanks would not result in uncontrolled release of radioactive materials. The outside storage tanks have level detection instrumentation which will annunciate under high level conditions.

11.2.2.2 Waste Management System

The design of the WMS is presented in Figure 11.2-2. Principal flow paths through the system (heavy lines) and the release point (circulating water discharge) are clearly indicated on the figure. The figure indicates all system interconnections.

Process data is presented in Table 11.2-10. Input streams into the WMS are identified in Figure 11.2-2 and expected sources, volumes, and activities of waste influent are listed in Table 11.2-4. Decontamination factors are presented in Table 11.2-7 for WMS process equipment.

11.2.2.2.1 Miscellaneous Waste

Miscellaneous non-detergent waste is collected in one of two waste tanks. As wastes are collected, they are processed on a batch basis through an oil separator filter to reduce suspended oil when required and a filter to reduce suspended solids. The wastes are then processed through a waste concentrator to remove dissolved solids and radioactivity. Concentrated bottoms from the waste concentrator are pumped to the Solid Waste Management System for solidification and disposal. A mixed bed (H-OH form) ion ex-
changer is provided in the condensate path from the concentrator to further reduce any volatile species which carry over in the distillate. The con-
densate is collected in one of two waste condensate tanks for sampling and analysis prior to release to the circulating water discharge. Discharge activity is monitored for radioactivity, as described in Section 11.5.

All potential bypass routes in the WMS are indicated in Figure 11.2-2. Because of the redundancy of equipment; it is not expected that equipment will need to be bypassed very frequently. If process equipment is bypassed for any reason, and sampling of the waste condensate tank shows that further processing is necessary, the contents of one tank can be recycled back through a filter, concentrator, or ion exchanger as desired, and collected in the second tank.

The WMS has sufficient capacity to accept liquid waste during startup, shutdown, and refueling.

11.2.2.2.2 Laundry Waste

Liquid detergent waste from the laundry, laundry sump, contaminated showers, and contaminated sinks are collected in two laundry tanks. The waste is normally sampled to assure low activity and then pumped through a filter directly to the circulating water discharge. Discharge activity is monitored as described in Section 11.5. Should the need arise, laundry and decontamination wastes can be processed using the waste concentrator, although this is not recommended practice.

11.2.2.3 Steam Generator Blowdown System

The Steam Generator Blowdown System (SGBS) is described in Section 10.4.8. The waste removed by the blowdown filters and the waste produced by regen-

11.4 SOLID WASTE MANAGEMENT SYSTEM

High activity radioactive wastes and low specific activity (LSA) solid radioactive wastes are processed, packaged and stored for subsequent shipment and offsite burial by the Solid Waste Management System (SWMS). Wastes include waste concentrator bottoms, spent ion exchange resin, used filter cartridges and miscellaneous refuse.

11.4.1 DESIGN BASES

The design bases of the SWMS are as follows:

a) Provide for receipt and interim storage of concentrates from waste concentrator package and spent resins. The SWMS provides for transferring concentrates from boric acid concentrator packages to SWMS.

b) Provide for holdup capacity for normally radioactive spent resin to allow decay of short-lived radionuclides.

c) Provide for receipt and water content adjustment (dewatering and/or dilution) of radioactive wastes such as spent resins.

d) Provide remote means for transferring used filter cartridges from their respective filters to the drumming area. Appropriate lifting grabs and remote handling tools will be used during filter transfer. 31

e) Provide means to compact LSA solid waste such as contaminated clothing, rags, paper, laboratory equipment and supply items.

f) Provide means for encapsulation and solidification of wastes in large volume disposable liners for subsequent shipment and offsite burial.

g) Prevent the release of significant quantities of radioactive materials. The overall exposure to the public and operating personnel will be kept within the requirements of 10CFR20 and 10CFR50.

h) Disposal and transportation of wastes from the SWMS, including the shipping containers, will satisfy the requirements of 10CFR20, 10CFR71, and 49CFR173.393 (1972).

INSERT 1

~~i) The SWMS components are not safety-related and are not designed to seismic Category I requirement.~~

11.4.2 SWMS DESCRIPTION

The SWMS is shown schematically on Figures 11.2-2 and 11.4-6. Layout drawings are in Section 1.2.

The SWMS will be operated to cast liquid and solid radioactive wastes into a solidified waste product which will be disposed of at a burial site. A comparison of the system requirements versus capabilities is provided in Table 11.4-2.

The SWMS will provide interim storage of radwaste and process it in a batch manner. The system will put filter cartridges into disposable cask liners. Waste evaporator concentrates will be mixed with a solidifying agent in disposable cask liners. The casks and liners will be transferred to a storage area before shipping.

Before starting solidification procedures, the radioactive level and chemical composition of the wastes will be determined.

INSERT 2

11.4.3 INPLANT SOLIDIFICATION SYSTEM DESCRIPTION

The evaporator bottoms are collected in the concentrate storage tank. A cement silo is provided for the storage of Portland cement and a sodium silicate tank is provided for storage of sodium silicate. Both are used as solidifying agents. Concentrates are pumped by a positive displacement pump at a controlled rate to the process pump mixer where the wastes are mixed with Portland cement. The process pump mixer assures a uniform mixture of waste and Portland cement. Sodium silicate is added downstream of the process pump mixer. Uniformity of mixing is assured by the fluidity of the constituents.

The dewatering tank, which is used for waste processing but not for waste storage, will be used to provide flexibility and control of the wastes to be solidified. Desired volumes from the concentrate storage tank can be metered into the dewatering tank or pumped directly to the mixer. After producing a desirable mixture of wastes in the dewatering tank, the operator can set the total amount and rate of feed by adjusting the flow ratio of the metering pump to the mixer and by adjusting the rotary feed valve downstream of the solidifying agent tank. 31

Both the dewatering tank and the concentrate storage tank are automatically controlled at 140F with adequate heating elements such that the concentrates (21,000 ppm boron by weight) do not deposit in the system. Temperature and level of the dewatering tank and concentrate storage tank concentrates are displayed on the control panel.

The Portland cement will be delivered to the site in a self-unloading bulk truck carrier. A pipe connection will be provided at the unloading station for conveying the cement to a dust-tight bulk storage hopper.

The entire system will be vented through a bag filter located on top of the storage hopper. The atmospheric exhaust from the bag filter will have an outlet dust load of less than 0.02 gram per cubic ft of air. For ease in handling, the cement in the storage hopper will be continuously fluidized by a flow aerator located in the bottom of the storage bin.

A separate control panel for the cement handling subsystem is provided. This panel contains the bag filter, aeration blower and cement-level indicators.

A single fill port is provided for packaging all wastes. Interlocks are provided to prevent system operation if no radwaste container is in place under the fill port or in the event of component malfunction. The fill port is equipped with a vented splash guard that seals the liner during filling. A mixer bypass is provided that permits direct discharge of wastes into the

Insert 1 - Pg. 11.4-1

i. The inplant SWMS is housed in the Reactor Auxiliary Building which meets the seismic criteria of Regulatory Guide 1.143.

j. Components of the inplant SWMS are classified "NNS" at Waterford 3. (RG 1.26-Quality Group "D"). Further discussion of the conformance of the SWMS with RG 1.143 can be found in the response to NRC question 321.8.

k. SWMS meets the QA requirements of RG 1.143.

Insert 2 - Pg. 11.4-2

The buildings, systems and facilities described in this section are designed and constructed such that handling waste containers and operating equipment of the SWMS can be done with the least possible personnel exposure in accordance with the ALARA criteria of RG 8.8 and 8.10. In addition, plant procedures specify particular practices for waste handling and monitoring for the various systems and storage areas that also adhere to the ALARA requirements of RG 8.8 and 8.10.

container, if desired. Since a completely mixed liquid stream of waste, cement and sodium silicate flows into the container, there is no danger from airborne contamination. Filling of the container is monitored by an ultrasonic level indicator that automatically stops the filling operation when the waste reaches a predetermined level in the liner.

At the completion of each fill cycle, there are provisions for thoroughly flushing with water all portions of the system that have contained the cement-waste mixture. The small contained volume of the mixer permits thorough cleaning with the production of a minimum of added waste.

The entire process, dewatering, mixing and filling will be monitored and controlled from a completely equipped control console by a single operator. Thus personnel radiation exposures are kept at a minimum within the requirements of 10CFR20 and 10CFR50. These controls minimize the chances of releasing radioactive materials.

Compressed air is required for the cement silo to fluidize the cement and the spent resin storage tank to mix the spent resin. The flow rate of compressed air for the cement silo storage tank is 100 cfm at three psig and for the spent resin tank 15 cfm at 15 psig. The cement silo is dust tight and the entire cement system will be vented through a bag filter located on top of the storage hopper.

At the capper unloading station shown on Figure 1.2-9 the liner is capped and decontaminated if necessary by remote flexible hoses. The waste from the decontaminated liners will be collected through the floor drain to the floor drain sump, and then pumped to the Liquid Waste Management System. 31

11.4.3.1 Equipment Description

Table 11.4-1 gives the list of system components, their capabilities, design pressure, design temperature, flow rates and materials of construction.

11.4.3.2 System Operation and Controls

Functional automatic controls are provided by which the operator activates controls sequentially. Interlocks will allow a control to be activated only when the next previous control has been satisfied. A manual mode of operation is provided so that interlocks are bypassed and individual components are operated from the control panel.

The concentrate storage tank and the dewatering tank are provided with level indicators and alarms for high-level conditions. The level alarms will alert operators when tanks are nearly full. In the event of operator error or equipment malfunctions (e.g., high-level alarm failure) that may result in overflow of tanks, the concentrate storage tank and the dewatering tank will overflow to the floor of their respective cubicles. Curbing is provided to prevent the spread of liquid from the cubicle. This provision to prevent entry of the concentrates into the floor drain system is necessary to prevent potential solidification within the drainage system.

11.4.4 SOLIDIFICATION PROGRAM ALTERNATIVES

Two systems have been considered for handling solid wastes from plant operations:

a) The installed plant solidification system.

b) Portable solidification systems supplied by contractors.

Evaluations of these alternatives covering current regulations on shipping and burial criteria, radiation exposures to operating and maintenance personnel and interim plant storage requirements have been performed.

11.4.4.1 Installed Plant Solidification System

Certain design and ALARA concerns have been identified on the Inplant Cement Solidification and handling portion of the SWMS. LP&L has made a decision not to address these concerns prior to initial plant startup. Therefore these systems will not be used at this time. The status and ultimate use of this system will be addressed on a backfit basis. Should evaluations at that time indicate the feasibility of routine usage of the installed system, these concerns shall be resolved prior to use of the system.

11.4.4.2 Portable Solidification System 31

Waterford will utilize a vendor supplied portable solidification system to provide for those plant solidification requirements not satisfied by installed plant equipment. This portable solidification system will be housed in a weatherproof structure with curbing and a sump system which discharges to the LWMS. An overhead bridge crane is provided for lifting requirements up to 10 tons. This structure will be located on the west side of the RAB adjacent to the existing in-plant solidification area (See Figure 11.4-1).

INSERT 3

11.4.5 PORTABLE SOLIDIFICATION FACILITY

The function of the Portable Solidification Facility (PSF) is to provide shelter for the contractor's portable solidification equipment and to supply the necessary service requirements and waste delivery for this system. In addition to service provided to this facility (air, water, electric power), a 10 ton overhead crane is provided to handle the portable solidification equipment.

The bridge crane has full travel over the interior area of the PSF.

The operation of waste solidification (and/or resin dewatering) will be performed in a shielded waste liner mounted on a trailer. This trailer shall be backed into the PSF and the work performed in this enclosed building. Waste is supplied to the liner by flexible hoses connected to waste transfer lines routed from inside the RAB out to the PSF. Support equipment for the portable system is mounted on skids. The PSF will supply space for the trailer, the skid mounted equipment, and materials required by the contractor for solidification. (See Figure 11.4-2)

Insert 3

Insert to Pg. 11.4-4

The portable solidification systems represent state-of-the-art technology in equipment design. These systems employ Portland Cement as the solidifying agent with additives specified by the respective vendor process control program.

Major components include: cement silo, fillhead assembly, pump and valve skid(s), control panel and liner shielding cask. When a cask is required, it will stay on a flat bed trailer during the solidification process. Connections between the in-plant system and portable system equipment are by flexible hoses with a metal shield. The waste concentrates storage and handling portion of the in-plant SWMS is utilized to supply waste feed to the portable solidification system. These parts of the inplant SWMS are situated with appropriate shielding, remote sampling, separation of components and accessibility to reduce leakage and facilitate maintenance and operation in accordance with RG 1.143 and BTP ETSB 11-3.

The operation of a portable system is relatively simple. A Process Control Program (PCP) is established prior to any actual operation. This PCP includes testing of the operability of the system as well as the compatability of waste and cement. Samples of waste are taken to determine the waste to cement ratio to insure solidification process.

Other items addressed in the PCP include provisions to monitor for agressive chemical waste and their neutralization to prevent degradation of the waste container and inventory records of waste types, contents etc. and other pertinent data related to the handling and storage of solid waste.

After sampling and analysis, an empty liner is put into the shielding cask. Radwaste will be solidified primarily in large volume liners ranging in size from 50 $ft.^3$ to 300 $ft.^3$. There may be special cases where smaller liners or 55 gallon drums will be used to solidify waste.

A predetermined amount of waste concentrate or spent resin is then pumped into the liner through the fillhead assembly. If dewatering is required, it is done at the same time as the liner is being filled. Cement is added to the liner after waste fill is completed. During the cement addition, the fillhead assembly drives a disposable mixing device inside the liner to mix the cement and waste. At the end of the mixing step a homogenous mixture is achieved inside the liner. The liner is then capped and set aside until the cement is cured. The liner can then be put into interim on-site storage facility or shipped off-site to a burial ground, as desired.

The basic equipment set up in the PSF will be used to process spent resins into liners and associated preparations for storage and shipment to a burial facility including the dewatering operation to meet the Free Standing Water (FSW) criteria of the intended burial facility.

If the burial site does not accept dewatered resins or the FSW criteria cannot be met, Waterford III will have the ability to solidify resins utilizing the Portable Solidification System.

The PSF is a pre-engineered, prefabricated sheet metal building with interior dimensions of [illegible] wide by 55' long with a 30' high eave. The building is located on the concrete truck platform on the west side of the RAB. The area selected for erection of the PSF is between the RAB main access doors and the solidification area doors at elevation +21 ft. (See Figure 11.4-1)

The existing concrete slab on the west side of the RAB is only 40' wide, so an additional 15' by [illegible] section of slab is added to support the building. A combined foundation and curbing is constructed on this slab to serve both as a point for attaching the building's siding and as curbing to contain any potential spills within the PSF.

The design of the PSF satisfies the applicable requirements of Regulatory Guide 1.143, NUREG-0800 BTP-ETSB 11-3 and the applicable ACI and AISC Codes and Standards. The BTP, which specifies minimum requirements for portable solid waste systems, calls for equipment to be located on concrete pads with curbs and drainage provisions for containing radioactive spills. To manage potential spills, a sump is provided in the PSF with provisions to interface with the plant radwaste systems to return any collected liquids.

11.4.6 STORAGE FACILITIES

The storage facilities for the solidified waste are shown on the general arrangement drawing Figure 1.2-9. The in-plant Liner Storage Area is a remote shielded storage area totaling 391 square feet for storage of radioactive waste solidified in disposable liners. In addition, an outdoor area has been prepared for storage of additional liners as discussed in Subsection 11.4.7. 31
Solid waste storage capacity is detailed in Table 11.4-3.

a) <u>Solidified Waste Per Design Basis For Waterford SES No. 3</u>

There is sufficient space for over two months of remote and shielded storage for wastes which are normally stored before shipment.

b) <u>Values Of Waste Given By The NRC</u> (See Question 321.22)

The 391 square feet Liner Storage Area in addition to the interim storage discussed in Subsection 11.4.7 have sufficient capacity for remote and shielded storage of the radioactive (spent resin and concentrates) waste per NRC given volumes.

c) <u>Dry Waste Storage</u>

Storage of dry uncompacted and compacted miscellaneous dry wastes is discussed in Subsection 11.4.8.

11.4.7 INTERIM SOLID WASTE STORAGE

A permanent onsite low-level radioactive storage facility is being constructed. However this facility will not be available during the early phases of operation. To provide for temporary storage of solid wastes prior

to shipment during the interim period, a designated storage area will be provided on the east side of the plant adjacent to the RAB and within the security fence. A concrete pad with fencing and a locked gate will be constructed in an area accessible to trucks and mobile heavy lifting equipment. See Figure 11.4-7 for the location and dimension.

Solidified concentrates, spent filter cartridges and waste resins will be placed in disposable liners and stored in this area prior to shipment. Only ~~solid~~ waste ready for shipment will be stored in this interim solid waste storage area.

INSERT 4

Shielding will be provided through the use of "onsite storage containers". These are reinforced concrete containers with removable lids sized to handle the common cask liners and radiation levels currently in use. These containers are made weatherproof with a gasket seal between the container and lid. ~~Provisions are made to sample and remove any water found between the disposable liner and onsite storage container.~~

INSERT 5

This interim solid waste storage area will contain sufficient provisions to store and shield up to 1,200 cubic ft of additional solid waste beyond that provided within the plant. Should circumstances dictate, this area could be expanded and additional onsite storage containers procured in a short period of time to provide additional storage capacity.

11.4.8 INTERIM DRY COMPACTED WASTE FACILITY 31

In order to provide additional capacity for the projected peak volumes of dry compacted waste, Waterford-3 is installing a metal building for interim operations to house a dry radioactive waste compactor machine and additional storage area for the compacted dry waste metal boxes. The metal building is located inside the security fence between the existing water treatment building and chiller building. The location of the interim facility is shown on Figure 11.4-3.

A permanent onsite low level radioactive waste storage facility is being constructed which will include provisions for the waste compactor and storage of dry waste, however this facility will not be available during the early phases of operation. The interim dry compacted waste facility will support plant operations until that time. These facilities comply with the intent of NUREG-0787, Waterford-3 Safety Evaluation Report, Item 11.2.3.3.

11.4.8.1 Interim Dry Compacted Waste Facility Description

The interim metal building meets the applicable requirements of Regulatory Guide 1.143 NUREG-0800 SRP 11.4, BTP-ESTB 11-3, Appendix 11.4A, and the applicable ACI and AISC Codes and Standards. The metal building is a completely enclosed structure which includes a separate partitioned room housing the compactor machine. The compactor machine has a self-contained closed loop ventilation system thus minimizing the risk of airborne radioactive contamination. The compactor room is constructed with smooth, continuous internal surfaces to facilitate decontamination should it ever be required. The entire building is constructed on a reinforced concrete slab with curbing such that water is kept from entering the building.

Insert 4 Pg. -6

Plant procedures will contain provisions for periodic direct radiation and surface contamination monitoring to be performed on waste stored in this area to insure that the levels are below the limits of 10 CFR 20.202, 10 CFR 20.205 and 49 CFR 173.397.

Insert 5 Pg. 11.4-6

The OSC design incorporates a high strength liner for additional leakage protection and provisions for sampling and collecting any liquid found in the OSC cavity. Plant procedures require sampling and analysis of any residual water found in on-site storage containers (OSC) just prior to shipment and prior to dispositioning the water. The on-site storage containers have a tube extending to the bottom of the inner cavity of the OSC's which allows sampling and removing any water found with a portable pump.

All shipping containers of dewatered resin, as well as solidified waste exceeding radiation limits for unshielded shipments will be placed in OSC's designed for outside field storage.

The interim solid Radwaste Storage area slab will have sufficient area to hold the maximum expected number of containers without stacking containers. Additionally, spacing will be such that at least a two (2) foot clearance will be maintained between containers to allow for inspection. Plant procedures will contain requirements to not only survey for external radiation and contamination but also to periodically inspect waste containers to ensure that no container deterioration is occuring during temporary storage.

On site storage containers have tie down brackets. The interim Solid Radwaste Storage area slab will have tie down anchors placed at strategic locations to allow securing any waste container needing tie down. As a precaution, against approaching severe weather such as a hurricane, waste containers in use will either be tied down on the slab or moved to protected storage inside the RAB.

INSERT 6

The building is 55' by 40' and has sufficient storage capacity to house 76 6' x 4' x 4' metal boxes of compacted waste. The boxes are handled with a forklift. (See Figure 11.4-4).

Space has also been provided in the facility to temporarily store contaminated laundry. This area is 8' x 22' and walled separately from the waste compaction activities.

INSERT 7

11.4.8.2 Waste Compactor Description

The box compactor utilizes hydraulic pressure to compact low activity solid waste such as contaminated clothing, rags, paper, ~~laboratory waste~~ and miscellaneous low-level contaminated material generated by maintenance activities.

INSERT 8

The compressible waste is placed inside a 4' x 4' x 6' metal box and compressed by a vertically moving piston. The hydraulic press contains its own hood, ventilation fans and high efficiency filter. The displaced air is vented through high efficiency filters. After a predetermined waste volume is attained, the container is sealed and placed in storage. The hydraulic press and auxiliaries are skid mounted with start-stop switches mounted locally and independently of other solid waste system controls. 31

11.4.9 RADIOACTIVE FILTER HANDLING

Filter cartridges may be replaced using a bottom loading filter transfer cask when radiation levels dictate remote handling. After remotely removing bolts on the head of the filter, the filter cartridge is lifted into the filter transfer cask and the cask is closed.

The disposable filter and the filter transfer cask are placed on the filter transfer vehicle by means of monorails located above the filter cubicles. Remote viewing of these operations will be provided as necessary and water is supplied to facilitate decontamination of filter areas. The filter transfer cask and disposable filter cartridge are moved to the solidification area by the filter transfer vehicle. This arrangement minimizes radiation exposure to personnel and allows the movement of the cask with loaded filters from the filter housings to the solidification area.

At the solidification area, the bottom of the cask is removed, an overhead crane is used to lift the transfer cask containing the filter cartridge into position over a shipping liner and the filter is lowered into the liner. The liner, after being sealed, is positioned in a shipping cask or onsite storage container for shielding and storage prior to shipment.

The filter handling process will be completely tested in all modes of operation to verify proper operation by the startup testing group prior to plant operations.

low activity filters, activated charcoal and HEPA filters from plant ventilation systems,

Insert 6 Pg. 11.4-7

The use of curbing to separate the areas within the interim dry compacted waste building was evaluated during the design and determined to be unnecessary for the following reasons:

a.) The building was designed with special attention given to ensuring that hard driving rain would not penetrate to the interior of the structure.

b.) The building slab has special curbing and is raised above grade to prevent ground water from flowing into the dry storage area.

c.) The metal box containers containing dry compacted waste stored in this building have their own individual pallets which raise the bottom of the containers four (4) inches off the floor.

d.) The box containers have solid seams and are water tight up to the lid which is four (4) feet off the floor.

In summary, water intrusion should not occur due to the design features of the building.

Insert 7 - Pg. 11.4-7

Contaminated laundry is planned to be handled by one or both of the following methods:

a.) If laundry is processed onsite it will be temporarily stored in the Laundry storage area of the compactor building, when required, in cabinets or compaction boxes and handled in wheeled carts. All of these storage and handling methods keep the contaminated laundry several inches off the floor away from any possible contact with water if it should somehow occur on the floor.

b.) If an off site laundry service is to be utilized, the laundry will be accumulated in the steel boxes until full, then sealed for shipment. These steel laundry boxes are constructed with six (6) inch wheels and water tight seams up to the lid which would keep the contents dry.

Insert 8 Pg. 11.4-7

The compaction box containers are metal however some of the contents are combustible. The bulk dry waste material is collected in a large sealed transfer container as it is generated in the RAB. As the waste is removed from the transfer container it is inspected, surveyed for radiation and sorted prior to feeding into the box compactor. Plant procedures provide guidelines for monitoring the dry waste for materials that could cause chemical reactions or spontaneous combustion.

11.4.10 SPENT RESIN TRANSFER SYSTEM

The purpose of the Spent Resin Transfer System (SRTS) is to provide the following services:

a) Collect and store spent radioactive ion exchanger resin from the various process demineralizers.

b) Transfer resins to the solidification system.

The SRTS has the following modes of operation:

a) Spent resin tank fill

b) Spent resin tank dewatering

c) Spent resin tank water addition

d) Resin mixing and recirculation

e) Resin transfer to the solidification system

f) System flushing

11.4.10.1 System Description 31

The SRTS consists of the following components: One spent resin tank, one spent resin transfer pump, two spent resin strainers, and associated valves, piping and controls.

Spent ion exchanger resin from the waste condensate ion exchanger, boric acid condensate demineralizers, preconcentration ion exchangers, fuel pool demineralizers, purification ion exchangers and deborating ion exchangers are sluiced to the spent resin tank. After the sluicing operation is complete, excess water is removed from the tank using the tank dewatering connection and the resin transfer pump. The water is pumped to the waste collection tank via the local sump pump discharge line for processing by the Liquid Waste Management System. The water level in the spent resin tank is maintained such that it covers the top of the settled resin bed.

When a predetermined amount of resin has been collected in the spent resin tank, the resin is pumped to the solidification system by the spent resin transfer pump. This transfer is accomplished by using a bleed line to the solidification system off a recirculation line. A valve is provided in the recirculation line which will create back-pressure in the line when valving is open to the solidification system. Excess sluice water is pumped from the system back to the spent resin tank via the recirculation line.

When resin transfer is completed, the system is flushed to remove any residual resin from the piping system. Water in the spent resin tank is supplied either from dewatering operations or water added to the tank specifically for this operation. During flushing, the spent resin transfer pump takes suction from the dewatering connection on the spent resin tank. The majority of the

residual resin is flushed back to the spent resin tank with the remainder directed to the solidification system.

For schematic representation of the SRTS, see Figure 11.4-5.

11.4.10.2 <u>Component Description and Location</u>

The major components used within the SRTS are:

a) Spent Resin Tank - quantity: one

b) Spent Resin Transfer Pump - quantity: one

c) Piping and Valves

d) Strainers - quantity: two

e) Resin Sampling Valve - quantity: one

f) Sight Glass - quantity: one

General Description of Each Major Component:

a) Spent Resin Tank 31

The spent resin tank, fabricated of Type 304 stainless steel, is located in the southwest quadrant of the Reactor Auxiliary Building on EL. -35.00 ft msl. The tank is located in a shielded cubicle. The spent resin storage tank has a capacity of 3,200 gallons (427 cu ft).

b) Spent Resin Transfer Pump

An open impeller centrifugal type pump with double mechanical seal draws suction from the spent resin tank. The pump is located in a shielded area in the southwest quadrant of the Reactor Auxiliary Building just south of the spent resin tank room on EL. -35.00 ft msl.

The pump has a capacity of 230 gpm and is powered by a 20 hp electric motor.

c) Piping and Valves

The SRTS piping is fabricated of austenitic stainless steel, Type 304, and is designed in accordance with ANSI B31.1. All piping containing slurry is run utilizing five diameter bends, lateral type fittings on branch connections, butt welding and is run in shielded areas and chases to the maximum extent possible.

The process valves are plug type valves with ultra high molecular weight polyethylene seats. Valves with air operators are provided with limit switches and fail safe provisions where required.

d) Strainers

Two stainless steel "Y" type resin strainers sized at 80 mesh prevent resin fines from entering the waste system and the sump system during system drainage and dewatering operations, respectively. The strainer at the dewatering line can be backwashed.

e) Resin Sampling Valve

The valve is an Isolok liquid/slurry sampler which can extract a 10 cc sample slurry from the recirculation pipe by operating the manual cycle control switch.

f) Sight Glass

A sight glass is located at the inlet header of the spent resin tank to verify resin flow into the tank.

11.4.10.3 Design Basis

The SRTS is designed in accordance with the following:

a) Provide holdup capacity for normally radioactive spent resin to allow decay of short-lived isotopes.

b) Provide for receiving and adjusting water content in the spent resin tank. 31

c) Provide a means to transport resins to the solidification system using a recirculation loop concept.

d) Prevent the release of significant quantities of radioactive materials. The overall exposure to the public and operating personnel will be kept within the requirements of 10CFR20 and 10CFR50.

e) The SRTS is located entirely in the seismic Category I Reactor Auxiliary Building. The SRTS components are not safety-related and are not designed to seismic Category I requirements.

f) Provide a means for system flush after a resin transfer operation.

g) Provide a means for resin slurry sampling.

The spent resin tank is provided with level indication and alarms for high- and low-level conditions and is provided with a level device for monitoring the interface level of the settled resins. Level alarms alert operators when tanks are nearly full or empty. Appropriate control devices shut off the resin transfer pump on low-low level and prevent overfilling of the spent resin storage tank by closing the inlet valve on high-high tank level.

The SRTS sizing is based on the following:

- Recirculation loop piping is a minimum of three in. I.D. in order to minimize the potential for plugging.

- Resin slurry velocity is approximately 10 ft/sec. Higher than normal velocity helps insure that resin will remain in suspension during pumping.

- Resin slurry feed rate to the solidification system is 30 gpm.

The SRTS is located in the Reactor Auxiliary Building which is designed to seismic Category I. Therefore, uncontrolled release to the environs would not occur as a result of a seismic occurrence. The design and fabrication codes, seismic category, and classification meet the requirements of Regulatory Guide 1.26 (Rev 1), 1.29 (Rev 1), and 1.143 (Rev 1).

To reduce radioactive releases to the building atmosphere, the following design features have been incorporated into the system design:

a) Venting of the spent resin tank is to the vent gas collection header.

b) The spent resin tank overflow is provided with a loop seal to prevent the escape of radioactive gas.

c) Zero stem leakage valves are used on the process lines. 31

11.4.10.4 Instrumentation and Control

The control panel for monitoring and controlling the SRTS is located at the solid radwaste area of EL +21.00 ft msl. A mimic graphic panel with control switches, indicating lights, alarms and analog readout provides information to the operator. Operation of the SRTS is automatic with manual initiation at key controlling steps, i.e., start pump or open discharge valve. The operator can also override the automatic sequence, if necessary.

The SRTS utilizes a programmable controller (PC) to accomplish the functions required in the different modes of operation. The PC is located in the control panel located at EL. +21.00 ft in the RAB. A local instrument rack containing system transmitters is located at EL. -35.00 ft msl in the RAB just outside the spent resin tank/pump cubicles.

The SRTS has two level instruments, one for the spent resin level and the other for water level. These two instruments provide information to the operator to select the appropriate operating mode.

Spent resin level - A stainless steel float with a transmitter which sends a signal to the control panel is used to measure resin/water interface. The programmable controller compares this signal to the water level. An alarm will be actuated should the water/resin ratio exceed a predetermined limit or the water level drops below resin level. The instrument has a hand crank to lift the float, if desired, and a local level indicator dial. The stainless steel float is custom-made with a specific gravity of 1.2.

Water level - The water level is monitored by a differential pressure instrument. A transmitter sends a signal to the control panel, which will isolate the tank at high-high tank level or trip the pump at low-low tank level.

Pump discharge pressure - Pump discharge pressure is monitored by a pressure transmitter for pump protection. The pump is tripped automatically at high discharge pressure (dead headed) and low discharge pressure (cavitation).

Pump seal water pressure - The double mechanical seal is protected by a pressure transmitter. Low pressure signals lack of water in mechanical seal and will trip the pump automatically.

ΔP across dewatering strainer - High pressure signals that the strainer is clogged and will actuate an alarm.

Programmable controller - A programmable controller having 2K expandable to 8K RAM memory, automatic sequencing, monitoring and alarm. Communication between local instruments and control panel is via a remote I/O system. A CRT with its keyboard may be used to reprogram the automatic sequence and set points.

11.4.11 RADIOACTIVE MATERIAL PACKAGING

Packaging containers will consist of disposable steel liners or high integrity containers (HIC). When dose levels dictate shielding, these are contained in lead-shielded shipping casks. The lead shielded shipping casks meet the requirements of specification 55 of 49CFR178.250 (1972). 31

Solid wastes contained in disposable steel liners meet all the requirements of a specification 7A, Type A package of 49CFR178.350. Most of the waste shipments are expected to be either "Low Specific Activity" or Type A. Should Type B containers be required, a special Type B overpack will be rented from a licensed radioactive waste disposal company. In addition, all packaged radwaste prepared for shipment will meet the criteria of 10CFR71.

Large or highly radioactive components and equipment contaminated during reactor operation and not amenable to compaction either by qualified plant personnel or by outside contractors specializing in radioactive materials handling, are packaged in shipping containers of an appropriate size and design.

INSERT 9

~~Interlocks are provided to assure proper hookup of monorail or crane to liners to prevent dropping a container. In the unlikely event of container rupture, no liquid spillage would occur since the material is handled in the solid form.~~

~~11.4.12 RADIOACTIVE MATERIAL SHIPPING~~

~~All wastes will be shipped in accordance with 49CFR requirements. The containers and vehicles will be monitored and decontaminated if required for offsite shipment. The shipment of prepackaged solid radioactive waste from the plant site to burial locations will be contracted to firms licensed to transport radioactive materials in accordance with applicable DOT regulations.~~

Insert 9 to Pg. 11.2-12

11.4.11.1 WASTE CONTAINER FAILURE

In the unlikely event of waste container failure after final packaging during storage or prior to shipment, plant procedures will be developed to provide instruction on handling, repackaging and/or reprocessing of the waste.

Typical handling of a failure would be as follows. The liner or drum would be temporarily sealed and if necessary moved to an area affording maximum protection against spillage, spread of contamination and minimizing personnel radiation exposure. If the waste material is dewatered resin, the contents can be transferred to a new container, if required. Several options are available to resolve the container problem including repairing the waste container, placing the damaged waste container and contents into a larger liner or repackaging the waste in a different container. Loose concrete solids can be recast by the addition of fresh cement mixtures.

In case of a unique failure not anticipated in plant procedures, the failed container would be handled on a case by case basis; Waterford Engineering and Technical personnel would evaluate the situation and determine the best course of action based on the specific conditions. In no case would the method of resolution fail to meet shipping and burial criteria.

11.4.12 RADIOACTIVE MATERIAL SHIPPING

All wastes will be shipped in accordance with 49 CFR requirements. Specific burial site criteria will also be met for packaged waste shipment including the Free Standing Water(FSW) limits for the intended burial site. The containers and vehicles will be monitored and decontaminated if required prior to off site shipment. The shipment of pre-packaged solid radioactive waste from the plant site to burial locations will be contracted to firms licensed to transport radioactive materials in accordance with applicable DOT regulations.

TABLE 11.4-1

SOLID WASTE MANAGEMENT SYSTEM COMPONENT SUMMARY DATA

Tanks	Quantity	Code	Design Capacity	Design Pressure psig	Design Temp. F	Normal Operating Pressure psig	Normal Operating Temp. F	Material
Spent Resin Tank	1	ASME Section VIII Div. 1 (1973)	3200 gal	ATMOS ~~50~~	200	ATMOS ~~15~~	100	SA 240 Type 304
Dewatering Tank	1	ASME Section VIII Div. 1 (1973)	100 ft^3	Atm	150	Atm	140	ASTM A-240
Concentrate Storage Tank	1	ASME Section VIII Div. 1 (1973)	3000 gal	Atm	150	Atm	140	ASTM A-240
Cement Silo	1	None	500 ft^3	Atm	140	Atm	0-120	ASTM A-36
Sodium Silicate Tank	1	None	200 ft^3	Atm	140	Atm	0-120	ASTM A-36

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Pumps	Quantity	Standards	Type	Design Pressure psig	Design Temp. F	Design Flow gpm	Material	Seal Type	Motor HP	Motor Voltage/ Phase/Hz
Concentrate Storage Tank Metering Pump	1	Manufacturer's Standard	Progressing Cavity	100	180	7.5	SS 316	Mech.	2	460/3/60
Dewatering Tank Metering Pump	1	Manufacturer's Standard	Progressing Cavity	100	180	7.5	SS 316	Mech.	2	460/3/60
Process Mixing Pump	1	Manufacturer's Standard	Progressing Cavity	100	180	10	SS 316	Mech.	2	460/3/60
Sodium Silicate Pump	1	Manufacturer's Standard	Progressing Cavity	100	180	0.75	CI-Body Buna N-Stator	Mech.	1	460/3/60

TABLE 11.4-2

SOLID WASTE MANAGEMENT PROCESS DATA

31

Type of Waste	System Requirements: Output of Solidified Waste Ft^3/Yr	Solidification System Capabilities: Process Flow Rate gpm	Systems Output Ft^3/Yr	Fraction of Process Capacity Used	Remarks
Values Given by NRC (Question 321.22)					
Spent Resins	~~300~~ 588				* 2/3 of System Design Flow Rate (using 7.5 gpm pump)
Solidified conc.	13,000				
Total	~~13,300~~ 13,588	5*	49,439	~~26.9%~~ 27%	
Dry Waste	10,000	**	23,520	~~42.5%~~ 42%	** Based on filling one 96 ft^3 dry waste box per day and 245 work days per year.

* Available shielded storage area = 391 ft^2 for 9-195 ft^3 liners plus 6-195 ft^3 liners stored in the interim solid waste storage area.

** Number of 96 ft^3 boxes/yr.

*** NRC value of blowdown system resin volume supplemented by resin volumes listed on Table 11.4-4

TABLE 11.4-3

SOLID WASTE MANAGEMENT STORAGE CAPACITY

Type of Waste	Ft^3/Year	Number of 195 Ft^3 Liners/Yr	Number of Liner* Spaces Allocated For Storage	Number of Months Storage
NRC VOLUMES (see Table 11.4-2)				
Spent Resin	~~300~~ 588	~~2~~ 3	1	~~[illegible]~~ 4
Concentrates	13,300	68	14	2.5
Dry Waste	10,000	105**	76	8.7

31

* Available shielded storage area = 391 ft^2 for 9-195 ft^3 liners plus 6-195 ft^3 liners stored in the interim solid waste storage area.

** Number of 96 ft^3 boxes/yr.

TABLE 11.4-4

QUANTITIES OF INPUT DURING NORMAL OPERATIONS INCLUDING ANTICIPATED OPERATIONAL OCCURRENCES TO SOLID WASTE MANAGEMENT SYSTEM

Type of Waste	Form	Quantity (cu. ft./yr)
Spent Resins		
CVCS	Dewatered	108
Boron Management System	Dewatered	72
Fuel Pool System	Dewatered	72
Waste Management System	Dewatered	36
Blowdown System	Dewatered	300
Concentrator Bottoms		
Boron Recycle System and Liquid Waste Management System	21,000 ppm boron	7030
Filters		
Spent Filter Cartridges	12 Cartridges	24.2
Oil Separator Filter Cartridges	10 Cartridges	10
Compressible Solids	Plastic, Rags, Paper, etc.	40,000

TABLE 11.4-5

QUANTITIES OF OUTPUT DURING NORMAL OPERATIONS INCLUDING ANTICIPATED OPERATIONAL OCCURRENCES FROM SOLID WASTE MANAGEMENT SYSTEM

Type of Waste	Form	Quantity (cu. ft./yr)
Spent Resins	Dewatered	588 (2)
Concentrator Bottoms	Solidified	13,000 (1) (2)
Filters	Dry, Dewatered	34.2
Compressible Solids	Compressed in boxes (Compaction Factor=4)	10,000 (2)

(1) Based on a solidified mixture of Concentrate and Cement in the ratio of 1.85:1

(2) Based on semi annual operating reports from nuclear plants through 1979 (NRC Question 321.22)

TABLE 11.4-6

ANNUAL ACTIVITIES (CURIES/YEAR) OF WASTE CONCENTRATOR BOTTOMS TO THE SOLID WASTE MANAGEMENT SYSTEM DURING NORMAL OPERATIONS INCLUDING ANTICIPATED OPERATIONAL OCCURRENCES

Nuclide	Activity	Nuclide	Activity
		I-133	2.5 (+1)
Br-84	3.5 (-3)*	I-134	1.1 (-1)
Rb-88	1.5 (-1)	Cs-134	4.9 (0)
Sr-89	7.1 (-2)	I-135	3.8 (0)
Sr-90	2.1 (-3)	Cs-136	2.3 (0)
Y-90	2.3 (-3)	Cs-137	3.5 (0)
Y-91	4.1 (0)	Ba-140	4.1 (-2)
Y-91m	8.3 (-4)	La-140	1.6 (-2)
Sr-91	1.9 (-2)	Pr-143	9.4 (-3)
Mo-99	6.0 (+1)	Ce-144	6.8 (-3)
Ru-103	9.1 (-3)	Zr-95	1.2 (-2)
Ru-106	2.1 (-3)	Mn-54	6.6 (-2)
Te-129	4.8 (-3)	Cr-51	3.9 (-2)
I-131	4.9 (+1)	Co-58	3.4 (-1)
I-132	6.2 (-1)	Co-60	4.3 (-2)
Te-132	3.8 (0)	Fe-59	2.1 (-2)

*() Denotes power of 10

TABLE 11.4-7

ANNUAL ACTIVITIES (CURIES/YEAR) OF SPENT RESIN INPUT TO THE SPENT RESIN TANK DURING NORMAL OPERATIONS INCLUDING ANTICIPATED OPERATIONAL OCCURRENCES **

Nuclide	Activity	Nuclide	Activity
Br-84	1.9 (-2)*	I-133	1.5 (+2)
Rb-88	4.6 (-1)	I-134	5.6 (-1)
Sr-89	8.7 (0)	Cs-134	1.4 (+3)
Sr-90	1.0 (0)	I-135	2.0 (+1)
Y-90	2.1 (-2)	Cs-136	5.0 (+1)
Y-91	5.7 (-2)	Cs-137	1.1 (+3)
Y-91m	4.0 (-3)	Ba-140	1.4 (0)
Sr-91	9.4 (-2)	La-140	1.1 (-1)
Mo-99	5.7 (+2)	Pr-143	3.3 (-1)
Ru-103	8.9 (-1)	Ce-144	2.4 (0)
Ru-106	7.8 (-1)	Zr-95	1.9 (0)
Te-129	2.5 (-2)	Mn-54	2.4 (0)
I-131	1.1 (+3)	Cr-51	2.8 (0)
I-132	3.3 (+0)	Co-58	5.6 (+1)
Te-132	4.3 (+1)	Co-60	2.0 (+1)
		Fe-59	2.3 (0)

* () Denotes power of 10

** includes purification, deborating, preconcentrator, boric acid condensate, fuel pool purification, waste condensate and steam generator blowdown ion exchangers.

TABLE 11.4-8

ANNUAL ACTIVITIES (CURIES/YEAR) OF SPENT FILTER CARTRIDGES INPUT TO THE SOLID WASTE MANAGEMENT SYSTEM DURING NORMAL OPERATIONS INCLUDING ANTICIPATED OPERATIONAL OCCURRENCES

Nuclide	Activity	Nuclide	Activity
H-3	**	I-133	**
Br-84	**	I-134	**
Rb-88	**	Cs-134	**
Sr-89	**	I-135	**
Sr-90	**	Cs-136	**
Y-90	**	Cs-137	**
Y-91	**	Ba-140	**
Y-91m	**	La-140	**
Sr-91	**	Pr-143	**
Mo-99	**	Ce-144	**
Ru-103	**	Zr-95	4.0 (0)*
Ru-106	**	Mn-54	2.9 (+1)
Te-129	**	Cr-51	8.8 (+1)
I-131	**	Co-58	1.2 (+3)
Te-132	**	Co-60	2.0 (+2)
		Fe-59	6.0 (+1)

* ( ) Denotes power of 10

** Negligible compared with other nuclides activities listed in this table.

*** Includes purification filter, pre-concentrator filter, fuel pool purification filter, waste filter, laundry filter, and oil separator filter.

TABLE 11.4-9

BASIS FOR ACTIVITIES PROVIDED IN TABLES 11.4-6 THROUGH 11.4-8

a) General

1) Activities are based on Reactor Coolant System activities provided in Table 11.1-3.

2) Filters and ion exchangers are assumed to be on the process line 292 days (plant capacity factor of .8) unless otherwise noted.

3) The waste concentrator has a bottoms to distillate decontamination factor (DF) of 10^4 and a concentration factor (CF) of 20.

4) Each ion exchanger resin bed contains 36 cu. ft. of resin.

5) Ion exchanger DF's used for buildup on resins and as upstream decontamination factors.

Nuclide	Purification I-X	Pool Purification, Waste Condensate and Lithium I-X	Deborating and Boric Acid Condensate I-X	Pre-Concentrator I-X
Cs, Rb	2	10	1	100
I	10	10	10	10
Other Anions	10	10	10	10
Other Cations	10	10	1	10
Crud	10	10	10	10
Noble gases, tritium	1	1	1	1

6) Filter DF's are 10 for crud and unity for all other nuclides.

7) Letdown is assumed to be 40 gpm.

8) Waste to the Boron Management System includes the following:

TABLE 11.4-9 (Cont'd)

Source	Volume	Fraction of RCS activity
from CVCS	734,000 gpy	1.0
Reactor Drain Tank	200 gpd	1.0
Equipment Drain Tank	50 gpd	0.1

b) Waste Concentrator Bottoms

1) The waste which ultimately reaches the waste concentrator bottoms is based on an average of 1375 gpd with an activity of 0.08 times that of the Reactor Coolant System (RCS).

2) Credit for decay is taken for the time required to fill one 4000 gallon waste tank.

3) An upstream decontamination factor (DF) of 10 is used for the waste filter for crud. No DF is taken for any other nuclides.

4) No credit is taken for any decay once the bottoms leave the concentrator.

c) Spent Resin

1) The purification ion exchanger (CVCS) dominates the amount of activity that enters the spent resin tank. Credit is taken for the upstream DF of the purification filter.

2) Lithium removal ion exchanger (CVCS)

(a) The lithium removal ion exchanger is assumed to be on line 20 percent of the time. (40 gpm) (.2) = 8 gpm average.

(b) Credit is taken for upstream DF by the purification filter and purification ion exchanger.

3) Deboration ion exchanger (CVCS)

(a) The deborating ion exchanger is assumed to be on line at the end of the core cycle when the boron concentration reaches 30 ppm.

(b) Credit is taken for upstream DF by the purification filter and purification ion exchanger.

TABLE 11.4-9 (Cont'd)

4) Pre-Concentrator ion exchanger (BMS)

(a) Waste processed through this ion exchanger (see a.8)

(b) Credit is taken for upstream DF by the purification filter and purification ion exchanger.

5) Fuel pool purification ion exchanger (FPS)

(a) The fuel pool water is processed through the ion exchanger at 150 gpm.

(b) The volume of the spent fuel pool is 312,000 gallons.

(c) The volume of the refueling cavity pool is 470,000 gallons.

6) Boric acid condensate ion exchanger (BMS) and waste condensate ion exchangers

(a) These ion exchangers are located downstream of the distillate of the concentrators. Their contribution to total resin activity is negligible compared to the previously listed ion exchangers.

7) Blowdown ion exchangers

(a) Based on primary-to-secondary leakage of 100 pounds per day and one regenerative batch being radioactive. 260 cu ft./yr. of radioactive resin is being collected from steam generator blowdown ion exchangers.

d). Spent Filter Cartridges

1) Purification filter (CVCS)

(a) The activity that builds up on the purification filters predominates over the other filters.

(b) The purification filter is assumed to be changed four times per yr.

2) Fuel pool purification filter (FPS)

See c.5.

3) Waste filter (WMS)

(a) Waste quantities and activities processed through this filter are the same as in b.1.

TABLE 11.4-9 (Cont'd)

(b) Credit for decay is taken for the time required to fill one 4000 gallon waste tank.

4) Laundry filter (WMS)

(a) The activity built up on this filter is negligible when compared to other filters in system.

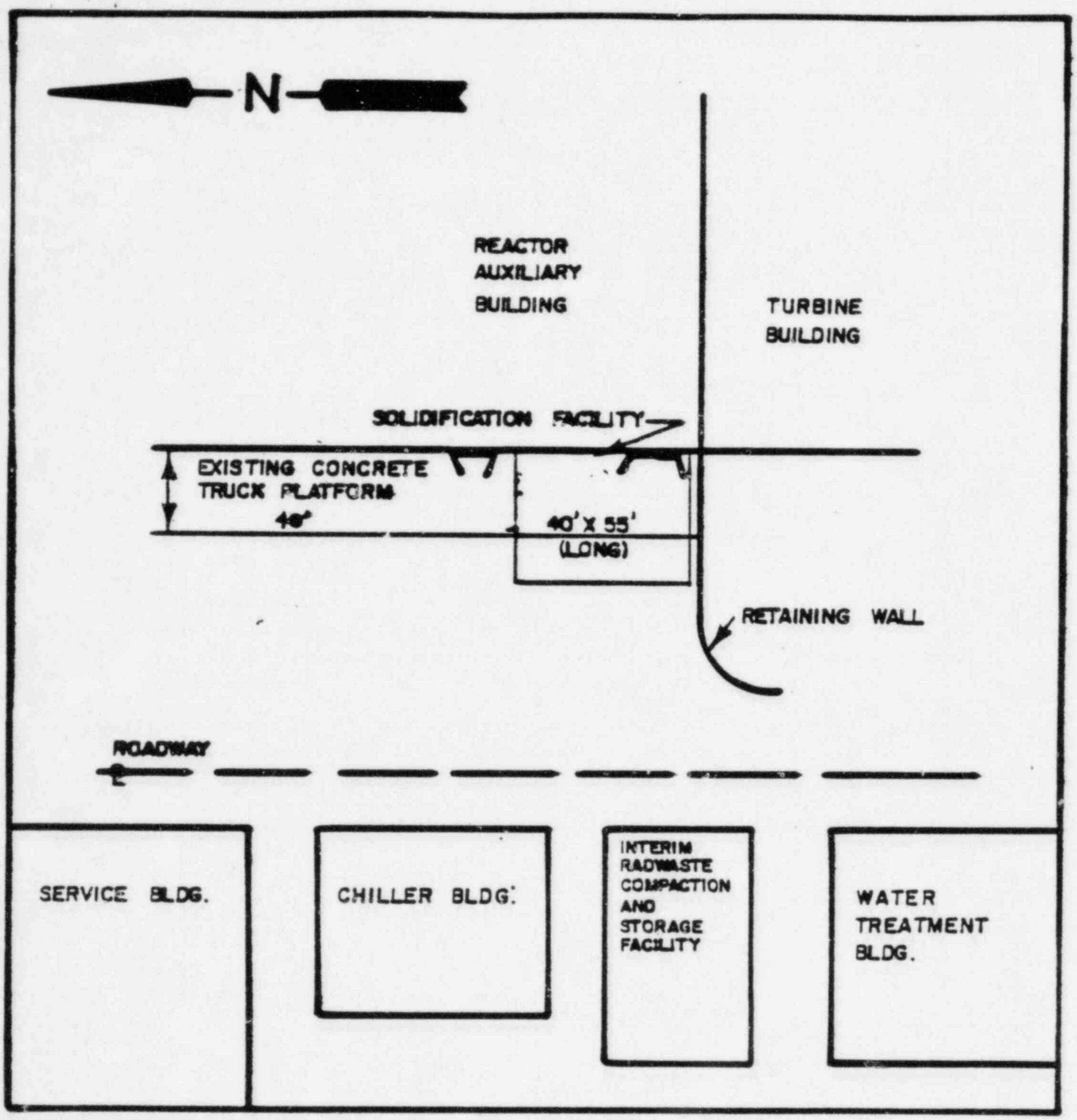
5) Pre-Concentrator filter (BMS)

(a) Waste processed through this filter (see a.8)

(b) Credit is taken for upstream DF by the purification filter.

6) Oil separator filter (WMS)

See d.3.

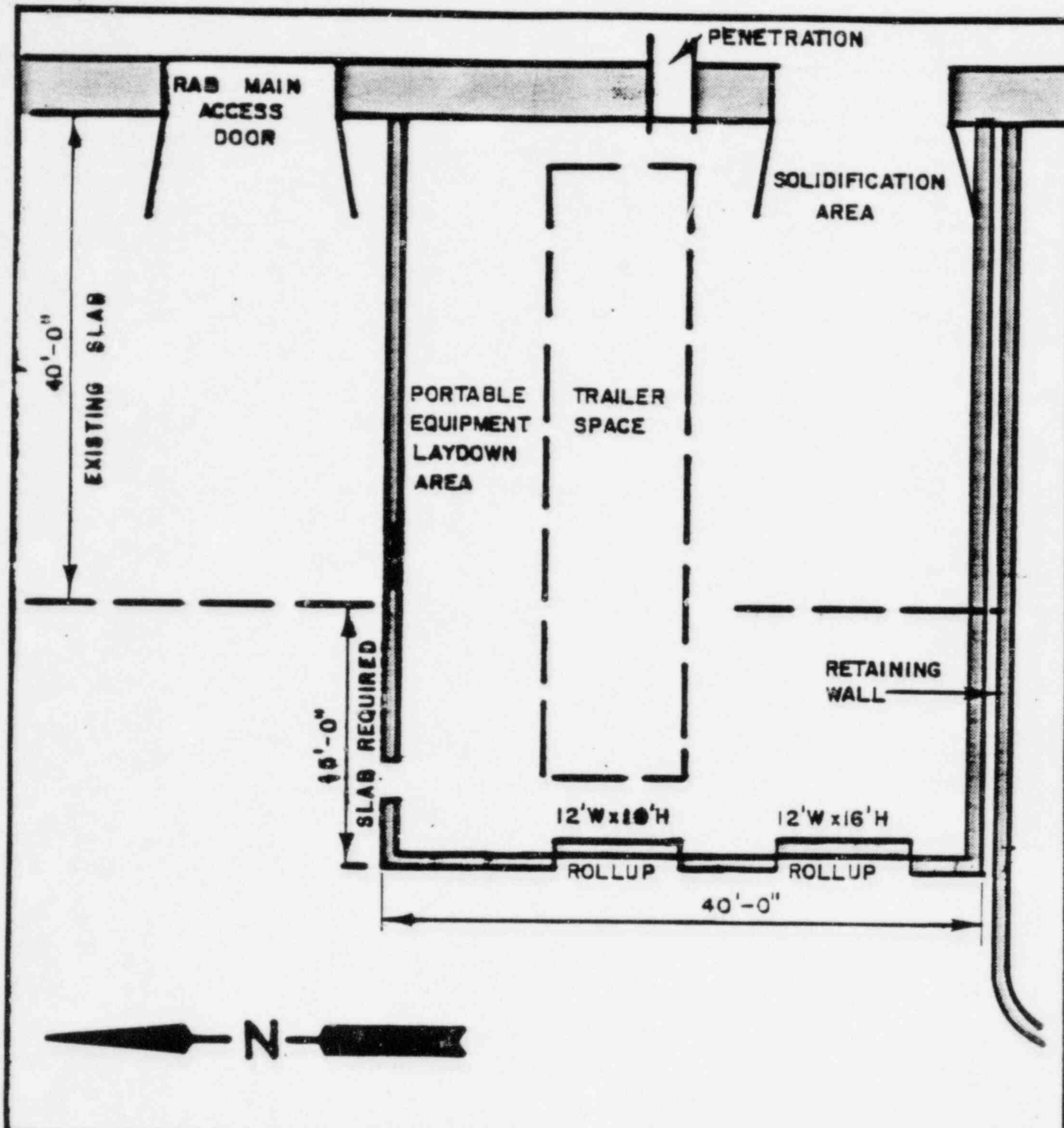


PORTABLE SOLIDIFICATION SYSTEM

SITE PLAN- LOCATION

(NOT TO SCALE)

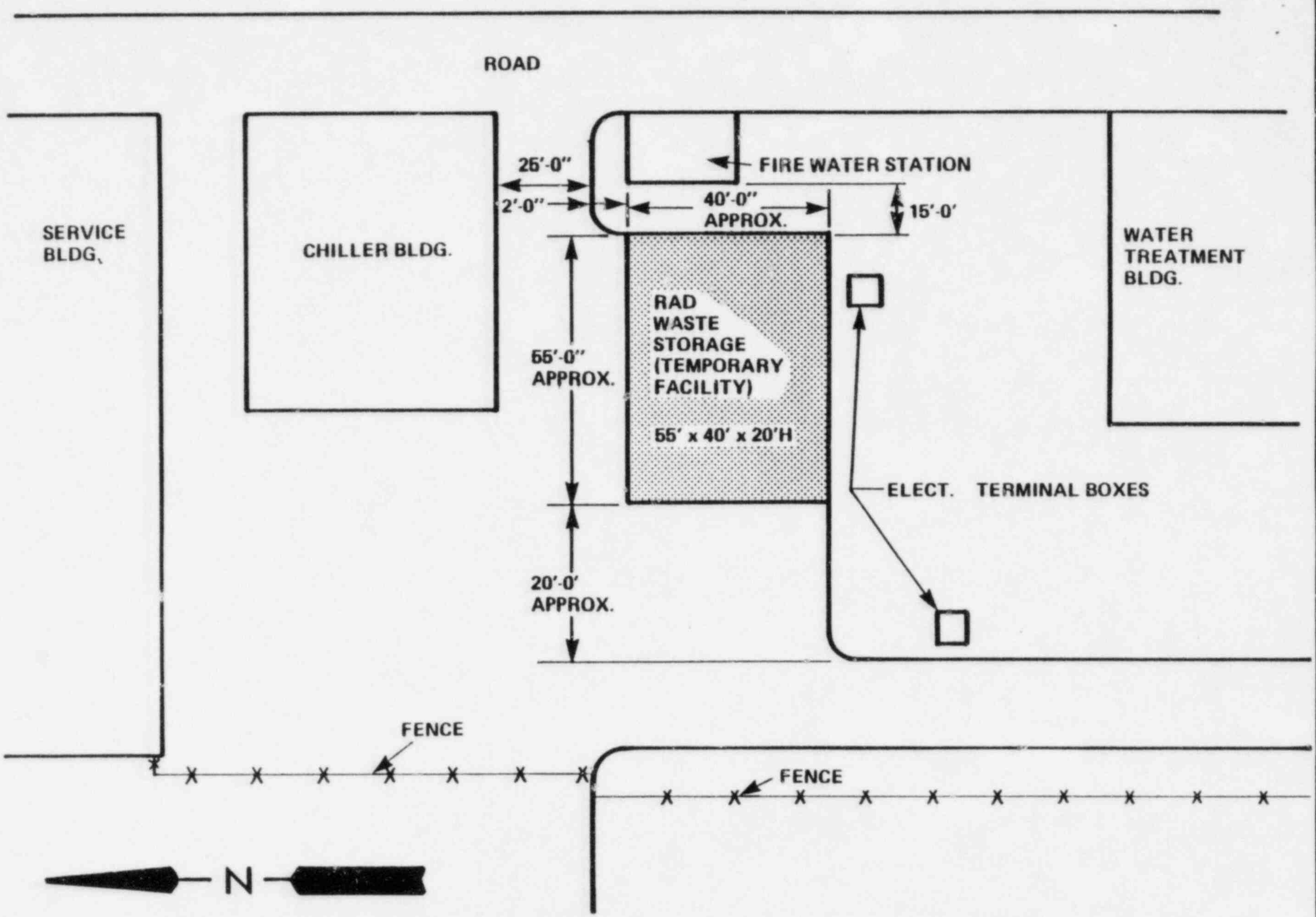
FIGURE 11.4-1



PORTABLE SOLIDIFICATION SYSTEM PLAN VIEW EL. +21 WEST SIDE RAB

(NOT TO SCALE)

FIGURE 11.4-2

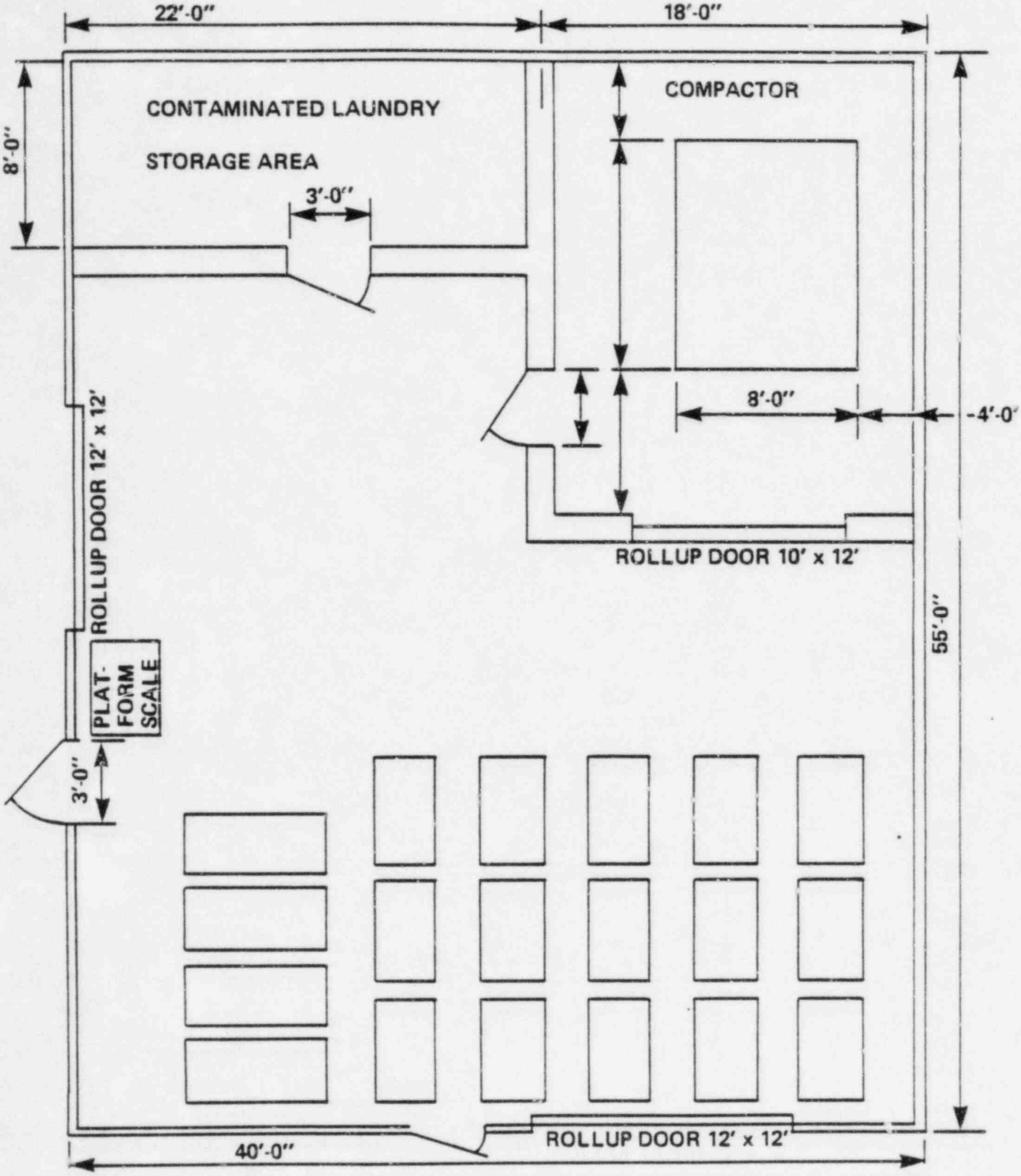


LOUISIANA POWER & LIGHT CO.
Waterford Steam Electric Station

LOCATION LAYOUT INTERIM RADWASTE COMPACTION AND STORAGE FACILITY

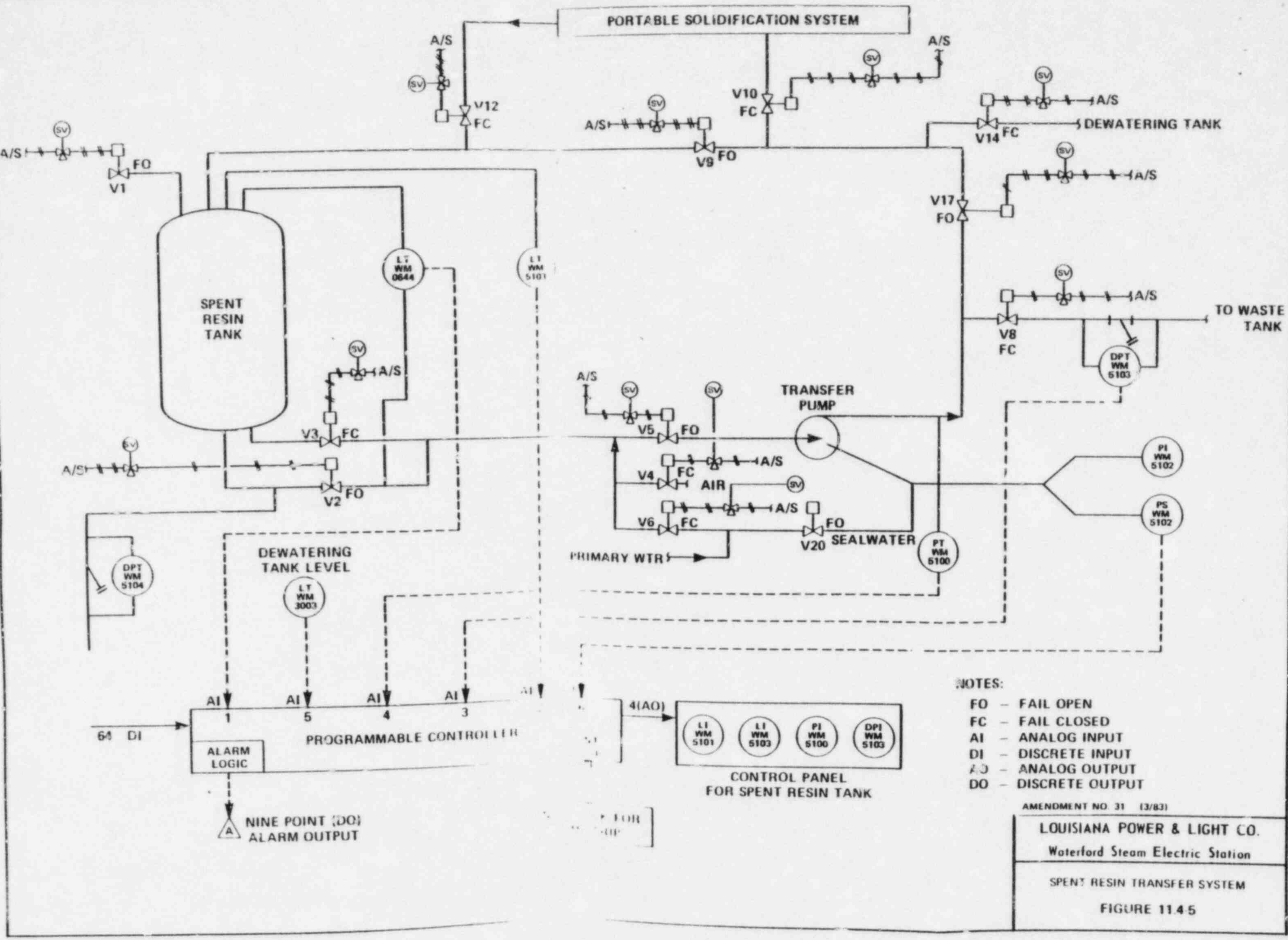
Figure 11.4-3

AMENDMENT NO. 31 (3/83)



AMENDMENT NO. 31 (3/83)

LOUISIANA POWER & LIGHT CO. Waterford Steam Electric Station	INTERIM RADWASTE COMPACTION AND STORAGE FACILITY PLAN VIEW	Figure 11.4-4

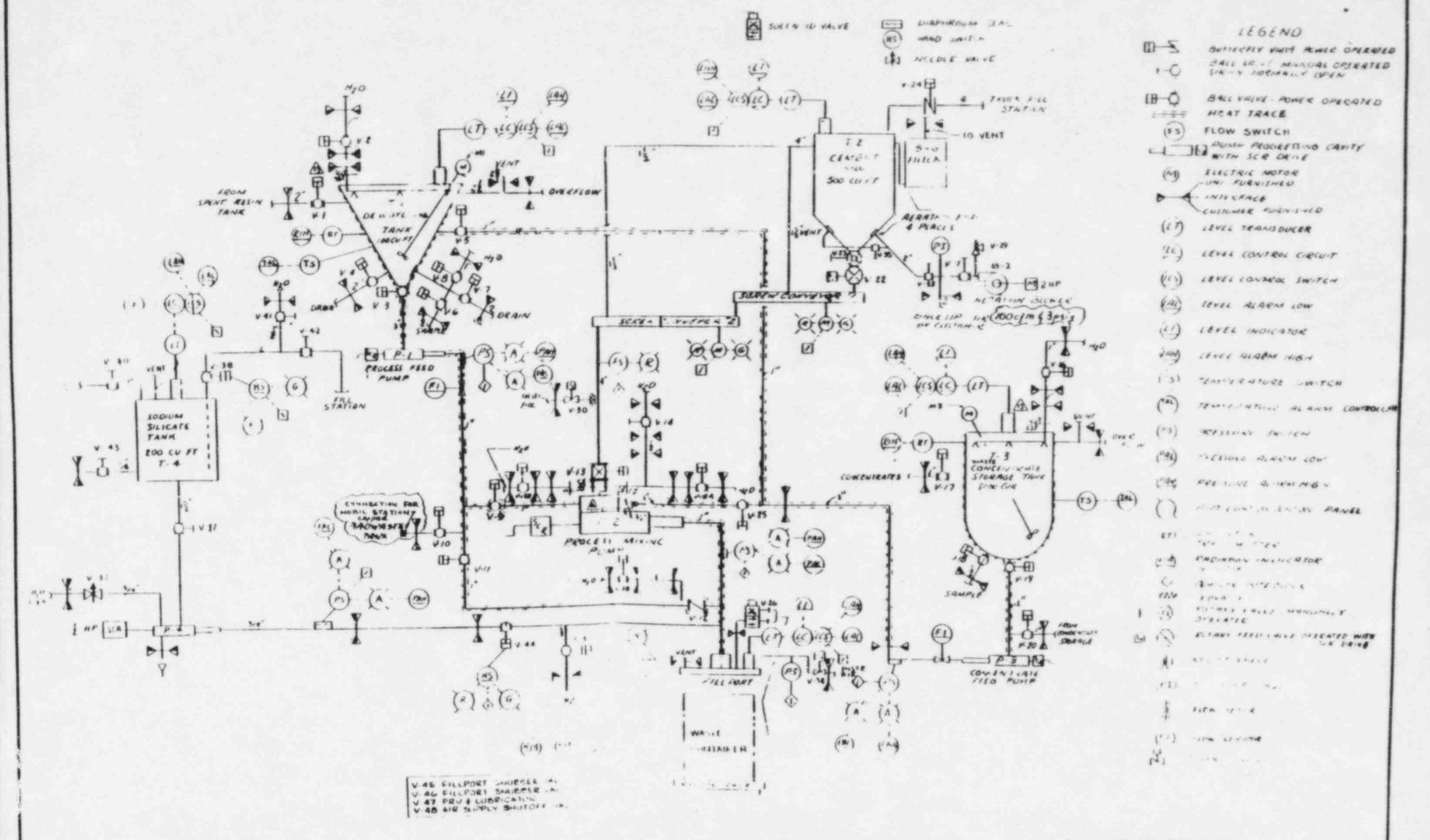


AMENDMENT NO. 31 (3/83)

LOUISIANA POWER & LIGHT CO.
Waterford Steam Electric Station

SPENT RESIN TRANSFER SYSTEM

FIGURE 11.4-5



AMENDMENT NO. 31 (3/83)

LOUISIANA POWER & LIGHT CO.
Waterford Steam Electric Station

FLOW DIAGRAM
SOLID WASTE MANAGEMENT SYSTEM

FIGURE 11.4-6

REF DWG EMDRAC DWG 1564-2788 (REV. 10)

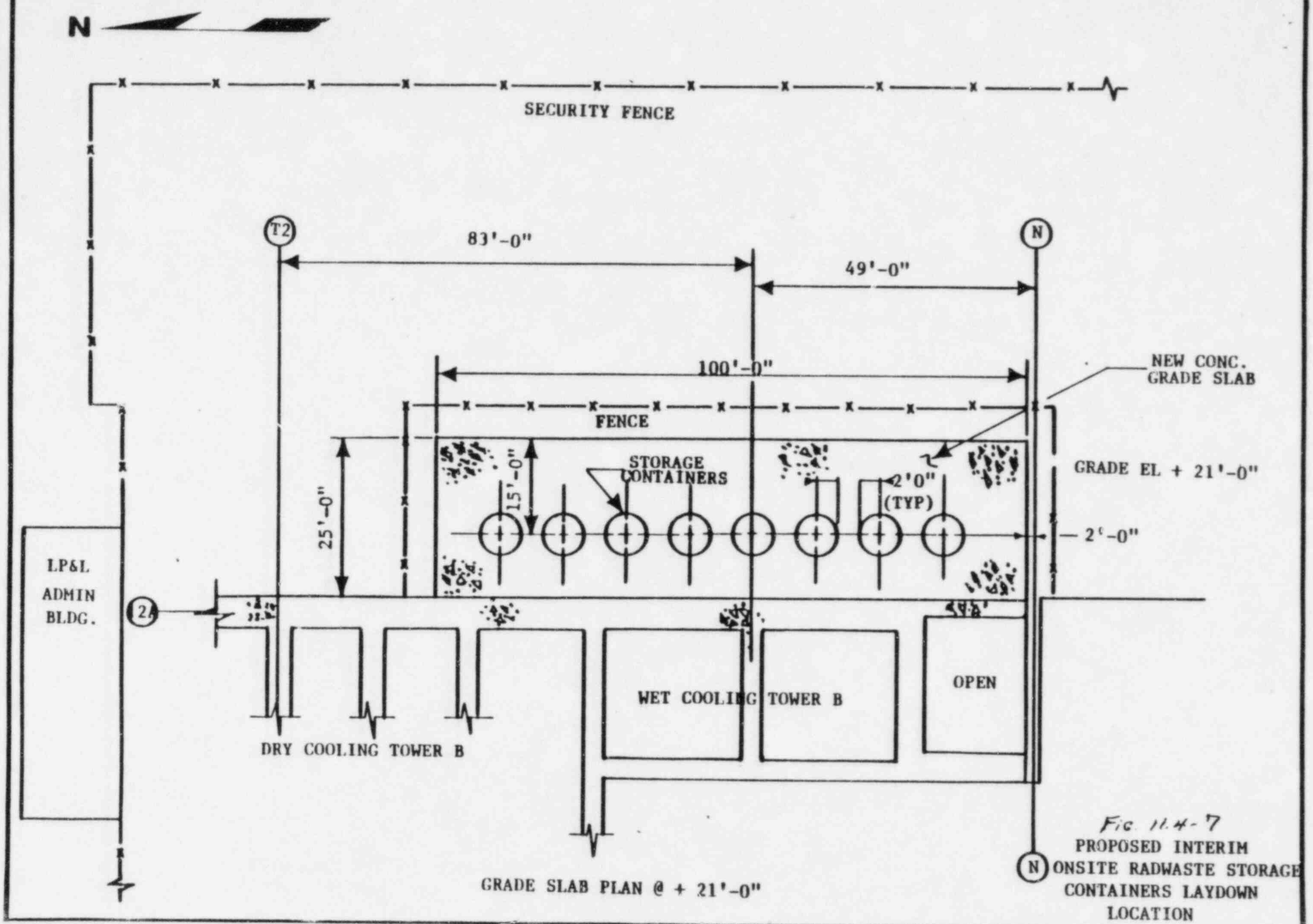


Fig. 11.4-7
PROPOSED INTERIM
ONSITE RADWASTE STORAGE
CONTAINERS LAYDOWN
LOCATION