11.4 Solid Waste Management

The solid waste management system (WSS) is designed to collect and accumulate spent ion exchange resins and deep bed filtration media, spent filter cartridges, dry active wastes, and mixed wastes generated as a result of normal plant operation, including anticipated operational occurrences. The system is located in the auxiliary and radwaste buildings. Processing and packaging of wastes are by mobile systems in the auxiliary building rail car bay and in the mobile systems facility part of the radwaste building. The packaged waste is stored in the auxiliary and radwaste buildings until it is shipped offsite to a licensed disposal facility.

The use of mobile systems for the processing functions permits the use of the latest technology and avoids the equipment obsolescence problems experienced with installed radwaste processing equipment. The most appropriate and efficient systems may be used as they become available.

This system does not handle large, radioactive waste materials such as core components or radioactive process wastes from the plant's secondary cycle. However, the volumes and activities of the secondary cycle wastes are provided in this section.

11.4.1 Design Basis

11.4.1.1 Safety Design Basis

The solid waste management system performs no function related to the safe shutdown of the plant. The system's failure does not adversely affect any safety-related system or component; therefore, the system has no nuclear safety design basis.

There are no safety related systems located near heavy lifts associated with the solid waste management system. Therefore, a heavy loads analysis is not required.

11.4.1.2 Power Generation Design Basis

The solid waste management system provides temporary onsite storage for wastes prior to processing and for the packaged wastes. The system has a 60-year design objective and is designed for maximum reliability, minimum maintenance, and minimum radiation exposure to operating and maintenance personnel. The system has sufficient temporary waste accumulation capacity based on maximum waste generation rates so that maintenance, repair, or replacement of the solid waste management system equipment does not impact power generation.

11.4.1.3 Functional Design Basis

The solid waste management system is designed to meet the following objectives:

- Provide for the transfer and retention of spent radioactive ion exchange resins and deep bed filtration media from the various ion exchangers and filters in the liquid waste processing, chemical and volume control, and spent fuel cooling systems

- Provide the means to mix, sample, and transfer spent resins and filtration media to high integrity containers or liners for dewatering or solidification as required

- Provide the means to change out, transport, sample, and accumulate filter cartridges from liquid systems in a manner that minimizes radiation exposure of personnel and spread of contamination

- Provide the means to accumulate spent filters from the plant heating, ventilation, and air-conditioning systems

- Provide the means to segregate solid wastes (trash) by radioactivity level and to temporarily store the wastes

- Provide the means to accumulate radioactive hazardous (mixed) wastes

- Provide the means to segregate clean wastes originating in the radiologically controlled area (RCA)

- Provide the means to store packaged wastes for at least 6 months in the event of delay or disruption of offsite shipping

- Provide the space and support services required for mobile processing systems that will reduce the volume of and package radioactive solid wastes for offsite shipment and disposal according to applicable regulations, including Department of Transportation regulation 49 CFR 173 (Reference 1) and NRC regulation 10 CFR 71 (Reference 2)

- Provide the means to return liquid radwaste to the liquid radwaste system (WLS) for subsequent processing and monitored discharge

The solid waste management system is designed according to NRC Regulatory Guide 1.143 to meet the requirements of General Design Criterion (GDC) 60 as discussed in Sections 1.9 and 3.1. The seismic design classifications of the radwaste building and system components are provided in Section 3.2.

Provisions are made in the auxiliary and radwaste buildings to use mobile radwaste processing systems for processing and packaging each waste stream including concentration and solidification of chemical wastes from the liquid waste management system, spent resin dewatering, spent filter cartridge encapsulation and dry active waste sorting and compaction.

The radioactivities of influents to the solid waste management system are based on estimated radionuclide concentrations and volumes. These estimates are based on operating plant experience, adjusted for the size and design differences of AP600. The influent source terms are consistent with Section 11.1.

The solid waste management system airborne process effluents are released through the monitored plant vent as described as part of the 10 CFR 50 (Reference 3), Appendix I, analysis presented in subsection 11.3.3.

The solid waste management system collects and stores radioactive wastes within shielding to maintain radiation exposure to plant operation and maintenance personnel as low as is reasonably achievable (ALARA) according to General Design Criteria 60 as discussed in Section 3.1 and Regulatory Guide 8.8. Personnel exposures will be maintained well below the limits of 10 CFR 20 (Reference 4). Design features incorporated to maintain exposures ALARA include remote and semi-remote operations, automatic resin transport line flushing, and shielding of components, piping and containers holding radioactive materials. Access to the solid waste storage areas is controlled, to minimize inadvertent personnel exposure, by suitable barriers such as heavy storage cask covers and locked or key-card-operated doors or gates (see Section 12.1).

The solid waste management system conforms with the design criteria of NRC Branch Technical Position ETSB 11-3. Suitable fire protection systems are provided as described in subsection 9.5.1.

Waste disposal containers are to be selected from available designs that meet the requirements of the DOT and NRC. The solid waste management system does not require source-specific waste containers. Waste containers must meet the regulatory requirements for radioactive waste transportation in 49 CFR 173 and for radioactive waste disposal in 10 CFR 61 (Reference 5) as well as specific disposal facility requirements.

11.4.2 System Description

11.4.2.1 General Description

The solid waste management system includes the spent resin system. The flows of wastes through the solid waste management system are shown on Figure 11.4-1. The radioactivity of influents to the system are dependent on reactor coolant activities and the decontamination factors of the processes in the chemical and volume control system, spent fuel cooling system, and the liquid waste processing system.

The parameters used to calculate the estimated activity of the influents to the solid waste management system are listed in Table 11.4-1. The estimated expected isotopic curie content of the primary spent resin and filter cartridge wastes to be processed on an annual basis is listed on Table 11.4-2. Table 11.4-3 provides the same information for the estimated maximum annual activities. The AP600 has sufficient radwaste storage capacity to accommodate the maxium generation rate.

The radioactivity of the dry active waste is expected to normally range from 0.1 curies per year to 8 curies per year with a maximum of about 16 curies per year. This waste includes spent HVAC filters, compressible trash, non-compressible components, mixed wastes and solidified chemical wastes. These activities are produced by relatively long lived radionuclides (such as Cr-51, Fe-55, Co-58, Co-60, Nb-95, Cs-134 and Cs-137), and therefore, radioactivity decay during processing and storage is minimal. These activities thus apply to the waste as generated and to the waste as shipped.

The estimated expected and maximum annual quantities of waste influents by source and form are listed in Table 11.4-1 with disposal volumes. The annual radwaste influent rates are derived by multiplying the average influent rate (e.g. volume per month, volume per refueling cycle) by one year of time. The annual disposal rate is determined by applying the radwaste packaging efficiency to the annual influent rate. The influent volumes are conservatively based on an 18-month refueling cycle. Annual quantities based on a 24-month refueling cycle are less than those for an 18-month cycle. The estimated expected isotopic curie content of the primary spent resin and filter cartridge wastes to be shipped offsite are presented in Table 11.4-4 based on 90 days of decay before shipment. The same information is presented in Table 11.4-5 for the estimated maximum activities based on 30 days of decay before shipment.

Section 11.1 provides the bases for determination of liquid source terms used to calculate several of the solid waste management system influent source terms. The influent data presented in Tables 11.4-2 and 11.4-3 are conservatively based on Section 11.1 design basis (Technical Specification) values.

All radwaste which is packaged and stored by AP600 will be shipped for disposal. The AP600 has no provisions for permanent storage of radwaste. Radwaste is stored ready for shipment. Shipped volumes of radwaste for disposal are estimated in Table 11.4-1 from the estimated expected or maximum influent volumes by making adjustments for volume reduction processing by mobile systems and the expected container filling efficiencies. For drum compaction, the overall volume reduction factor, including packaging efficiency, is 3.6. For box compaction, the overall volume reduction factor is 5.4. These adjustments result in a packaged internal waste volume for each waste source, and the number of containers required to hold this volume is based on the container's internal volume. The disposal volume is based on the number of containers and the external (disposal) volume of the containers.

The expected disposal volumes of wet and dry wastes are approximately 352 and 1278 cubic feet per year, respectively as shown in Table 11.4-1. The wet wastes shipping volumes include 315 cubic feet per year of spent ion exchange resins and deep bed filter activated carbon, 20 cubic feet of volume reduced liquid chemical wastes and 17 cubic feet of mixed liquid wastes. The spent resins and activated carbon are initially stored in the spent resin storage tanks located in the rail car bay of the auxiliary building. When a sufficient quantity has accumulated, the resin is sluiced into two 158 cubic feet high-integrity containers in anticipation of transport for offsite disposal. Liquid chemical wastes are reduced in volume and packaged into three 55-gallon drums per year (about 20 cubic feet) and are stored in the packaged waste storage room of the radwaste building. The mixed liquid wastes fill less than three drums per year (about 17 cubic feet per year) and are stored on containment pallets in the waste accumulation room of the radwaste building until shipped offsite for processing.

The two spent resin storage tanks (275 cubic feet usable, each) and one high integrity container in the spent resin waste container fill station at the west end of the rail car bay of the auxiliary building provide more than 2 years of spent resin storage at the expected rate of more than 6 months of storage at the maximum generation rate. The expected radwaste generation rate is based upon the following:

- All ion exchange resin beds are disposed and replaced every refueling cycle.
- The WGS activated carbon guard bed is replaced every refueling cycle.
- The WGS delay beds are replaced every ten years.
- All wet filters are replaced every refueling cycle.
- Rates of compatible and non-compatible radwaste, chemical waste and mixed wastes are estimated using historical operating plant data.

The maximum radwaste generation rate is based upon the following:

- The ion exchange resin beds are disposed based upon operation with 0.25% fuel defects.
- The WGS activated carbon guard bed is replaced twice every refueling cycle.
- The WGS delay beds are replaced every five years.
- All wet filters are replaced based upon operation with 0.25% fuel defects.
- The expected rates of compatible and non-compatible radwaste, chemical waste and mixed wastes are increased by about 50%.
- Primary to secondary system leakage contaminates the condensate polishing system and blowdown system resins and membranes which are replaced.

The dry solid radwaste includes 1246 cubic feet per year of compactible and non-compactible waste packed into about 13 boxes (90 cubic feet each) and ten drums per year. Drums are used for higher activity compactible and non-compactible wastes. Compactible waste includes HVAC exhaust filter, ground sheets, boot covers, hair nets, etc. Non-compactible waste includes about 60 cubic feet per year of dry activated carbon and other solids such as broken tools and wood. Solid mixed wastes will occupy 7.5 cubic feet per year (one drum). The low activity spent filter cartridges may be compacted to fill about 0.26 drums per year (2 ft^3/year) and are stored in the packaged waste storage room. Compaction is performed by mobile equipment or is performed offsite. High activity filter cartridges fill three drums per year

(22.5 cubic feet per year) and are stored in portable processing or storage casks in the rail car of the auxiliary building.

The total volume of radwaste to be stored in the radwaste building packaged waste storage room is 1293 cubic feet per year at the expected rate and 2309 cubic feet per year at the maximum rate. The compactible and non-compactible dry wastes, packaged in drums or steel boxes, are stored with the mixed liquid and mixed solid, volume reduced liquid chemical wastes, and the lower activity filter cartridges. The quantities of liquid radwaste stored in the packaged waste storage room of the radwaste building consists of 20 cubic feet of chemical waste and 17 cubic feet of mixed liquid waste. The useful storage volume in the packaged waste storage room is approximately 3900 cubic feet (10 feet deep, 30 feet long, and 13 feet high), which accommodates more than one full offsite waste shipment using a tractor-trailer truck. The packaged waste storage room provides storage for about 3 years at the expected rate of generation and more than 2 years at the maximum rate of generation. One four-drum containment pallet provides more than 8 months of storage capacity for the liquid mixed wastes and the volume reduced liquid chemical wastes at the expected rate of generation and more than 4 months at the maximum rate.

A conservative estimate of solid wet waste includes blowdown material based on continuous operation of the steam generator blowdown purification system, with leakage from the primary to secondary cycles. The volume of radioactively contaminated material from this source is estimated to be 540 cubic feet per year. Provisions for processing and disposal of radioactive steam generator blowdown resins and membranes are described in subsection 10.4.8. Note that, although included here for conservatism, this volume of contaminated resin will be removed from the plant within the contaminated electrodeionization unit and not stored as wet waste.

The condensate polishing system includes mixed bed ion exchanger vessels for purification of the condensate as described in subsection 10.4.6. Should the resins become radioactive, the resins are transferred from the condensate polishing vessel directly to a temporary processing unit or to the temporary processing unit via the spent resin tank. The processing unit, located outside of the turbine building, dewaters and processes the resins as required for offsite disposal. Radioactive condensate polishing resin will have very low activity. It will be disposed in containers as permitted by DOT regulations. After packaging, the resins may be stored in the radwaste building. Based on a typical condensate polishing system operation of 30 days per refueling cycle with leakage from the primary system to the secondary system, the volume of radioactively contaminated resin is estimated to be 206 cubic feet per year (one 309 cubic foot bed per refueling cycle). Normal disposal of nonradioactive condensate polishing system resins is described in subsection 10.4.6.

The parameters used to calculate the activities of the steam generator blowdown solid waste and condensate polishing resins are given in Table 11.4-1. Based on the above volumes, the disposal volume is estimated to be 939 cubic feet per year. The expected and maximum activities of the resins as generated are given in Tables 11.4-6 and 11.4-7, respectively. The expected and maximum activities of resins as shipped, based on 90 days decay prior to shipment, are given in Tables 11.4-8 and 11.4-9, respectively.

11.4.2.2 Component Description

The seismic design classification and safety classification for the solid waste management system components are listed in Section 3.2. The components listed are located in the Seismic Category I Nuclear Island. Table 11.4-10 lists the solid waste management system equipment design parameters. The following subsections provide a functional description of the major system components.

11.4.2.2.1 Spent Resin Tanks

The spent resin tanks provide holdup capacity for spent resin and filter bed media decay before processing. High- and low-activity resins may be mixed to limit the radioactivity concentration in the waste containers to 10 Ci/ft^3 in accordance with the USNRC Technical Position on Waste Form (Reference 6).

Resin mixing capability is provided by mixing eductors in each tank, and resin dewatering, air sparging and complete draining capabilities are also provided. The ultrasonic level sensors and dewatering screens are arranged for remote removal. The vent and overflow connections have screens to prevent the inadvertent discharge of spent resin.

11.4.2.2.2 Resin Mixing Pump

The resin mixing pump provides the motive force to fluidize and mix the resins in the spent resin tanks, to transfer water between spent resin tanks, to discharge excess water from the spent resin tanks to the liquid waste processing system, and to flush the resin transfer lines.

11.4.2.2.3 Resin Fines Filter

The resin fines filter minimizes the spread of high-activity resin fines and dislodged crud particles by filtering the water used for line flushing or discharged from the spent resin tanks to the liquid waste processing system.

11.4.2.2.4 Resin Transfer Pump

The resin transfer pump provides the motive force for recirculation of spent resins via either one of the spent resin tanks for mixing and sampling, for transferring spent resin between tanks, and for blending high- and low-activity resins to meet the specific activity limit for disposal. The resin transfer pump is also used to transfer spent resins to a waste container in the fill station or in its shipping cask located in the auxiliary building rail car bay.

11.4.2.2.5 Resin Sampling Device

The resin sampling device collects a representative sample of the spent resin either during spent resin recirculation or during spent resin waste container filling operations. A portable shielded cask is provided for sample jar transfer.

11.4.2.2.6 Filter Transfer Cask

The filter transfer cask permits remote changing of filter cartridges, dripless transport to the storage area in the auxiliary building, transfer of the filter cartridges into and out of the filter storage, and loading of the filter cartridges into disposal containers.

11.4.2.3 System Operation

11.4.2.3.1 Spent Resin Handling Operations

Demineralized water is used to transfer spent resins from the various ion exchangers to the spent resin tanks. A demineralized water transfer pump provides the pressurized water flow to transfer the spent resins as described in subsection 9.2.4. Before the transfer operation, it is verified that the selected spent resin tank is aligned as a receiver and has the capacity to accept the bed. It is also verified that the resin mixing pump is aligned to discharge excess transfer water through the resin fines filter to the liquid waste processing system.

During the transfer operation the tank level is monitored and the resin mixing pump is operated, if required, to limit tank water level. The operator stops the transfer when the CCTV camera viewing the sight flow glass indicates on a control panel monitor that the sluice water is clear and the transfer line is, therefore, flushed of resins.

After the bed transfer, the tank solids level can be checked by operating the resin mixing pump to lower the water level below the solids level. The solids level can be determined by the ultrasonic surface detector.

Between bed transfer operations the water level in the spent resin tanks is maintained above the solids level. Demineralized water is supplied for water level adjustment as well as a backup water source for flushing resin handling lines after resin recirculation and waste disposal container filling operations.

The solids bed can be agitated and mixed at any time by using compressed air or by operating the resin mixing pump in the resin mixing mode. In the resin mixing mode, water is drawn from the spent resin tank via resin retention screens. The water is returned via tank mixing eductors that generate a resin slurry recirculation within the tank equivalent to about four times the flow rate generated by the resin mixing pump. The solids bed is locally fluidized during this operation.

The resin mixing mode is established to fluidize and mix the solids bed in the spent resin tank before waste disposal container filling. The resin transfer pump is then started in the recirculation mode. A resin slurry is drawn from the spent resin tank and returned to the same tank. A representative resin sample may be obtained during recirculation or container filling modes by operating the sampling device.

The portable system's container fill valve is opened to initiate the filling operation. The resin dewatering pump of the portable dewatering system is started to dewater the resin as it accumulates in the container. The resin dewatering pump discharges the water to the recirculation line. The water flows back to the spent resin tank, thereby preserving the water inventory in the system and retaining any resin fines or dislodged crud within the system.

The resin mixing pump can be stopped at any time during the filling operation. When the solids level nears the top of the container, as detected by level sensors and observed by a television camera, the fill valve is closed and cycled to top off the container. Excessive water or solids level automatically closes the fill valve.

When the filling operation is complete, the line flushing sequence controller is manually initiated to automatically operate the pumps and valves to flush the resin transfer lines back to the spent resin tank. The container fill valve is opened for a short time period to flush the remaining resin to the waste container. The resin mixing pump supplies filtered flush water from the spent resin tank. The portable dewatering system's dewatering pump is operated periodically until no further dewatering flow is detected by the pump discharge pressure indicator and/or audible indications from the pump.

11.4.2.3.2 Spent Filter Processing Operations

A filter transfer cask is used to change the higher-activity filters of the chemical and volume control system and spent fuel cooling system. The filter vessel is drained, and the filter cover is opened remotely. The shield plug of the port over the filter is removed and the transfer cask, without its bottom shield cover, is lifted and positioned on the port directly over the cartridge in the filter vessel.

A grapple inside the transfer cask is remotely lowered and connected to the filter cartridge. The cartridge is lifted into the transfer cask, and the cask is transferred over plastic sheeting to the bottom shield cover. The dose rate of the cartridge is measured with a long probe, and the cask is lowered onto and connected to the bottom shield cover. The transfer cask is then moved to the auxiliary building rail car bay.

If recent applicable sample analysis results are available, the filter cartridge can be loaded directly into a disposal container as described in the following paragraph. If analysis is required, a sample of the filter media is obtained through a port in the transfer cask. The filter cartridge is placed in one of nine high-activity filter storage tubes until sample analysis results are available. The transfer cask bottom cover is disconnected, the transfer cask is lifted by the crane and transferred to a position over one of the temporary storage tubes, and the spent filter cartridge is lowered into the tube. After moving the transfer cask away, the crane is used to install a shield plug onto the storage tube. Any water draining from the filter during storage collects in the storage tube which may be drained to a floor drain for subsequent transfer to the liquid radwaste system.

When sample analysis is complete and packaging requirements are established, the transfer cask is used to retrieve the spent cartridges from storage and deposit them into a waste container via a port in the top of a portable processing and storage cask. Plastic coverings are removed and the container is capped, smear-surveyed, and decontaminated as required, using reach rod tools through a cask port. The dose rate survey is also made through a cask port. Transfer of the filled waste container to the shipping cask, including cask cover handling, is then performed using the rail car bay crane under remote control.

Filters with dose rates less than 15 R/hr on contact may be changed from outside of filter vessel shielding by using reach rod tools. The filter vessel is drained, and the cover is removed. Then the spent filter cartridge is grappled and lifted out and into a filter transfer cask.

At the radwaste building, low and moderate activity filter cartridges are deposited into disposal or storage drums. The drums are stored within portable shield casks in the shielded accumulation room, which is serviced by the mobile systems facility crane. Depending on dose rates and analysis results, stabilization may or may not be required. Cartridges not requiring stabilization are loaded into standard, 55 gallon shipping drums with absorbent and may be compacted using a mobile system. When stabilization is required, the cartridges may be loaded into either high integrity containers or standard drums. If standard drums are used, mobile equipment is used to encapsulate the contents of the drums.

The drum covers are manually installed, and the drums are smear surveyed, decontaminated by wiping, if required, weighed, stacked on pallets, and placed in the packaged waste storage room.

When a truck-load quantity of waste containers accumulates, shipment to a low-level waste disposal facility is initiated by loading pallets of drums and other low-level waste containers into a closed van using the scissor lift or onto a flat-bed trailer using the crane. If the activity level is too high for unshielded shipment, the drums are loaded onto a cask pallet and into a shielded shipping cask using the mobile systems facility crane.

Radioactive filters from ventilation exhaust filtration units are bagged and transported to the radwaste building, where they are temporarily stored. The filters are compacted along with other dry active wastes by a mobile system as described in the following subsection.

11.4.2.3.3 Dry Waste Processing Operations

Dry wastes are segregated by measuring the contact dose rate of the wastes to determine the appropriate processing method. The contact dose rates for initial waste segregation are as follows:

Low activity	<5 mR/hr
Moderate activity	5 mR/hr to 100 mR/hr
High activity	>100 mR/hr

These activity levels may be adjusted by the operator to minimize exposures while maximizing processing efficiency.

Wastes from surface contamination areas in the radiologically controlled area are placed in bags or containers and tagged at the point of origin with information on radiation levels, waste type, and destination. The bags or containers are transported to the radwaste building, where they are placed into low-, moderate-, or high-activity storage, segregated by portable shielding as appropriate.

The high-activity wastes (greater than 100mR/hr) are normally expected to be compacted in drums using a mobile compactor system in the same manner as lower-activity filter cartridges.

Moderate-activity wastes (5 mR/hr to 100 mR/hr) are expected to be sorted in a mobile system to remove reusable items such as protective clothing articles and tools, hazardous wastes, and larger noncompressible items. The remaining wastes are normally compacted by mobile equipment. The packaged wastes may be loaded directly onto a truck for shipment or may be stored in the packaged waste storage room until a truck load quantity accumulates.

Low-activity, dry active waste (less than 5 mR/hr) generally contains a large amount of nonradioactive material. It is expected that these wastes normally will be processed through a mobile radiation monitoring and sorting system to remove non-radioactive items for reuse or local disposal. A radiation survey allows identification and removal of potentially clean items for the clean waste verification. The remaining radioactive wastes are normally compacted or packaged for disposal as appropriate.

Materials that enter the radiologically controlled area are verified as nonradioactive before being released for reuse or disposal. Tools and equipment belonging to personnel and contractors are surveyed at the radiologically controlled area exit in the annex building. If these items cannot be released or decontaminated, they become plant inventory or dry active waste and are handled as described previously.

Other wastes generated in the radiologically controlled area but outside of surface contamination areas are collected in bags or containers and are delivered to the temporary storage location in the radwaste building. These wastes normally are processed through a mobile radiation monitoring system to verify that they are nonradioactive and suitable for disposal in a local waste landfill.

11.4.2.3.4 Mixed Waste Processing Operations

Mixed wastes from the radiologically controlled area are collected in suitable containers and brought to the radwaste building, where separate containment pallets and accumulation drums are provided for solid and liquid mixed wastes. Mixed wastes are normally sent to an offsite facility having mixed-waste processing and disposal capabilities.

11.4.2.4 Waste Processing and Disposal Alternatives

11.4.2.4.1 Portable and Mobile Radwaste Systems Capabilities

Portable or mobile processing and packaging systems can be located in the auxiliary building rail car bay or the radwaste building mobile systems facility. Chemical wastes are normally processed in the radwaste building by a mobile concentration and/or solidification system when a batch accumulates in the chemical waste tank. Mobile systems are also used to encapsulate high-activity filters, to sort, decontaminate and compact dry active wastes, and to verify nonradioactive wastes.

The spent resin system includes connections in the fill station and rail car bay to allow spent resins to be delivered to a disposal container in either location for dewatering using portable equipment.

Branch Technical Position ETSB 11-3 provides guidance for portable solid waste systems in Section IV. Compliance with the four guidance items is achieved as follows:

IV.I The spent resin tanks are the only tanks that contain a significant volume of wet wastes, and these tanks are permanently installed. Concentrates that may be produced by mobile evaporation systems will be produced and stored by the mobile systems only in small batches prior to being solidified by the mobile systems. As described in subsection 1.2.7, the radwaste building is designed to retain spillage from mobile or portable systems.

IV.2 Permanently installed piping for transport of radioactive wastes to mobile or portable systems is routed close to the mobile or portable systems thereby minimizing the use of flexible interfacing hose. The hydrostatic test requirements of Regulatory Guide 1.143 will be applied to the flexible interfacing hose.

IV.3 Portable or mobile systems will be located in either the rail car bay of the auxiliary building or in the mobile systems facility in the radwaste building. The spent resin waste container fill station or the shipping cask in the auxiliary building collects spillage of spent resin during waste container filling operations. The radwaste and auxiliary buildings contain and drain spillage to the liquid radwaste system via the radioactive waste drain system as described in subsection 1.2.7 and Section 11.2. Portable or mobile systems will, when required, have their own HEPA filtered exhaust ventilation system. HEPA filtered exhaust is required when airborne radioactivity would exceed 10 CFR 20 derived air concentration limits for radiation workers. The mobile systems facility has connections on the exhaust ventilation ducts for connecting exhaust duct from mobile or portable processing systems to the building's exhaust ventilation system.

IV.4 Although the seismic criteria of Regulatory Guide 1.143 are not applicable to structures housing mobile or portable solid radwaste systems, the portable equipment used for spent resin container filling and dewatering and high-activity filter cartridge packaging will be housed within the Seismic Category I auxiliary building. The radwaste building, which provides shelter for mobile or portable radwaste systems, is non-seismic in accordance with Branch Technical Position ETSB 11-3.

11.4.2.4.2 Central Radwaste Processing Facility

As an alternative to the mobile or portable processes for lower-activity wastes (generally wastes reading below 200 mR/hr), the wastes may be sent to a licensed central radwaste processing facility for processing and disposal. This option requires minimal onsite processing to remove hazardous materials from the waste streams. The wastes are loaded into a cargo container. The mobile systems facility includes a designated laydown area, and the mobile systems facility crane may be used to handle a cargo container.

11.4.2.5 Facilities

11.4.2.5.1 Auxiliary Building

Resin and filtration media transfer lines from the various ion exchangers are routed to the spent resin tanks on elevation 100′ - 0″ in the southwest corner of the auxiliary building. The spent resin system pumps, valves, and piping are located in shielded rooms near the spent resin tanks.

Liquid radwaste system transfer lines to and from the radwaste building are routed to the south wall of the auxiliary building where they penetrate and enter into a shielded pipe pit in the base mat of the radwaste building.

Accessways in the auxiliary building are used to move the filter transfer casks. This includes filter transfer cask handling from the containment, where the chemical and volume control filters are located, to the auxiliary building rail car bay, where the filter cartridges are stored and subsequently packaged using mobile equipment. These accessways are also used to move dry active waste from various collection locations to the radwaste building. An enclosed accessway is provided between the auxiliary building and the radwaste building on elevation 100′-0″ (grade level).

11.4.2.5.2 Radwaste Building

The radwaste building, described in Section 1.2, houses the mobile systems facility. It also includes the waste accumulation room and the packaged waste storage room. These rooms are serviced by the mobile systems facility crane.

In the mobile systems facility, three truck bays provide for mobile or portable processing systems and for waste disposal container shipping and receiving. A shielded pipe trench to each of the truck bays is used to route liquid radwaste supply and return lines from the connections in the shielded pipe pit at the auxiliary building wall. Separate areas are reserved for empty (new) waste disposal container storage, container laydown, and forklift charging.

An area is reserved near the door to the auxiliary building for protective clothing dropoff and frisking.

The waste accumulation room (pre-processing) is divided as needed, using partitions and portable shielding to adjust the storage areas for different waste categories as needed to complement the radioactivity levels and volumes of generated wastes. The accumulation room has lockable doors to minimize unauthorized entry and inadvertent exposure.

The packaged waste storage room may be separated into high- and low-activity areas, using portable shielding to minimize exposure while providing operational flexibility. A lockable door is provided to minimize unauthorized entry and radiation exposure.

The heating and ventilating system for the radwaste building is described in subsection 9.4.8.

11.4.3 System Safety Evaluation

The solid waste management system has no safety-related function and therefore requires no nuclear safety evaluation.

11.4.4 Tests and Inspections

Preoperational tests are conducted as described in subsection 14.2.8. Tests are performed to demonstrate the capability to transfer ion exchange resins and deep bed filtration media from the ion exchangers and filters to the spent resin tanks or directly to a waste disposal container. Preoperational tests of the solid waste management system components are performed to prepare the system for operation.

After plant operations begin, the operability and functional performance of the solid waste management system is periodically evaluated according to Regulatory Guide 1.143 by monitoring for abnormal or deteriorating performance during routine operations. Instruments and setpoints are also calibrated on a scheduled basis. The preventive maintenance program includes periodic inspection and maintenance of active components.

11.4.5 Quality Assurance

The quality assurance program for design, installation, procurement, and fabrication issues of the solid waste management system is in accordance with the overall quality assurance program described in Chapter 17.

11.4.6 Combined License Information for Solid Waste Management System Process Control Program

The Combined License applicant will develop a process control program in compliance with 10 CFR Sections 61.55 and 61.56 for wet solid wastes and 10 CFR Part 71 and DOT regulations for both wet and dry solid wastes. Process control programs will also be provided by vendors providing mobile or portable processing or storage systems. It will be the plant operators responsibility to assure that the vendors have appropriate process control programs for the scope of work being contracted at any particular time. The process control program will identify the operating procedures for storing or processing wet solid wastes. The mobile systems process control program will include a discussion of conformance to Regulatory Guide 1.143 (Reference 7), Generic Letter GL-80-009 (Reference 8), and Generic Letter GL-81-039 (Reference 9) and, information of equipment containing wet solid wastes in the nonseismic Radwaste Building.

11.4.7 References

1. "Shippers-General Requirements for Shipments and Packagings," 49 CFR 173.

2. "Packaging and Transportation of Radioactive Material," 10 CFR 71.

3. "Domestic Licensing of Production and Utilization Facilities," 10 CFR 50.

4. "Standards for Protection Against Radiation," 10 CFR 20.

5. "Licensing Requirements for Land Disposal of Radioactive Waste," 10 CFR 61.

6. "USNRC Technical Position on Waste Form," Rev. 1, January 1991.

7. Regulatory Guide 1.143, "Design Guidance for Radioactive Waste Management Systems, Structures, and Components Installed in Light-Water-Cooled Nuclear Power Plants."

8. USNRC Generic Letter GL-80-009, "Low Level Radioactive Waste Disposal," dated January 29, 1980.

9. USNRC Generic Letter GL-81-039, "NRC Volume Reduction Policy (Generic Letter No. 81-39)," dated November 30, 1981.

Table 11.4-1

ESTIMATED SOLID RADWASTE VOLUMES

Source	Expected Generation (ft^3/yr)	Expected Shipped Solid (ft^3/yr)	Maximum Generation (ft^3/yr)	Maximum Shipped Solid (ft^3/yr)
WET WASTES				
Primary Resins (includes spent resins and wet activated carbon)	250[(2)]	315	1060[(4)]	1334
Chemical	350	20	700	40
Mixed Liquid	15	17	30	34
Condensate Polishing Resin [(1)]	0	0	206[(5)]	259
Steam Generator Blowdown [(1)(6)] Material (Resin and Membrane)	0	0	540[(5)]	680
Wet Waste Subtotals	**615**	**352**	**2536**	**2347**
DRY WASTES				
Compactible Dry Waste	4101	873	6265	1336
Non-Compactible Solid Waste	234	373	567	910
Mixed Solid	5	7.5	10	15
Primary Filters (includes high activity and low activity cartridges)	3.6[(3)]	24.5	6.5[(3)]	48
Dry Waste Subtotals	**4344**	**1278**	**6849**	**2309**
TOTAL WET & DRY WASTES	**4959**	**1630**	**9385**	**4656**

Notes:

1. Radioactive secondary resins and membranes result from primary to secondary systems leakage (e.g., SG tube leak)
2. Estimated activity basis is ANSI 18.1 source terms in reactor coolant
3. Estimated activity basis is breakdown and transfer of 10% of resin from upstream ion exchangers
4. Reactor coolant source terms corresponding to 0.25% fuel defects
5. Estimated activity basis from Table 11.1-5, 11.1-7 and 11.1-8 and a typical 30 day process run time, once per refueling cycle
6. Estimated volume and activity used for conservatism. Resin and membrane will be removed with the electrodeionization units and not stored as wet waste. See subsection 10.4.8.

Table 11.4-2 (Sheet 1 of 2)

EXPECTED ANNUAL CURIE CONTENT OF PRIMARY INFLUENTS

Isotope	Primary Resin Total Ci/yr	Primary Filter Total Ci/yr
Br-83	-	-
Br-84	1.51E-01	1.51E-02
Br-85	-	-
I-129	-	-
I-130	-	-
I-131	8.31E+01	8.31E+00
I-132	7.65E+00	7.65E-01
I-133	3.30E+01	3.30E+00
I-134	5.29E+00	5.29E-01
I-135	2.36E+01	2.36E+00
Rb-86	-	-
Rb-88	7.69E-01	7.69E-02
Rb-89	-	-
Cs-134	1.68E+02	1.68E+01
Cs-136	1.79E+00	1.79E-01
Cs-137	2.66E+02	2.66E+01
Cs-138	-	-
Ba-137m	2.47E+02	2.47E+01
Cr-51	1.79E+01	1.79E+00
Mn-54	5.85E+01	5.85E+00
Mn-56	-	-
Fe-55	5.66E+01	5.66E+00
Fe-59	2.83E+00	2.83E-01
Co-58	8.39E+01	8.39E+00
Co-60	1.27E+02	1.27E+01
Zn-65	1.70E+01	1.70E+00
Sr-89	1.52E+00	1.52E-01
Sr-90	6.33E-01	6.33E-02
Sr-91	1.14E-01	1.14E-02
Sr-92	-	-
Ba-140	3.62E+01	3.62E+00
Y-90	-	-
Y-91m	-	-
Y-91	3.70E-06	3.70E-07

Table 11.4-2 (Sheet 2 of 2)

EXPECTED ANNUAL CURIE CONTENT OF PRIMARY INFLUENTS

Isotope	Primary Resin Total Ci/yr	Primary Filter Total Ci/yr
Y-92	-	-
Y-93	-	-
La-140	-	-
Zr-95	1.39E-04	1.39E-05
Nb-95	-	-
Mo-99	-	-
Tc-99m	-	-
Ru-103	2.69E-03	2.69E-04
Ru-106	3.21E-02	3.21E-03
Rh-103m	-	-
Rh-106	-	-
Te-132	-	-
Te-125m	-	-
Te-127m	-	-
Te-127	-	-
Te-129m	6.82E-05	6.82E-06
Te-129	-	-
Te-131m	-	-
Total:	1.24E+03	1.24E+02

Note:
Values shown as "-" Ci/yr are those calculated to be lower than 1.0E-10 Ci/yr, and thus considered to have insignificant contributions to total.

Table 11.4-3 (Sheet 1 of 2)

MAXIMUM ANNUAL CURIE CONTENT OF PRIMARY INFLUENTS

Isotope	Primary Resin Total Ci/yr	Primary Filter Total Ci/yr
Br-83	3.00E+00	3.00E-01
Br-84	9.17E-02	9.17E-03
Br-85	1.02E-03	1.02E-04
I-129	1.23E-03	1.23E-04
I-130	2.75E+00	2.75E-01
I-131	1.43E+03	1.43E+02
I-132	9.58E+01	9.58E+00
I-133	6.67E+02	6.67E+01
I-134	1.99E+00	1.99E-01
I-135	1.39E+02	1.39E+01
Rb-86	7.14E+00	7.14E-01
Rb-88	6.74E+00	6.74E-01
Rb-89	3.53E-01	3.53E-02
Cs-134	3.40E+03	3.40E+02
Cs-136	6.31E+02	6.31E+01
Cs-137	4.25E+03	4.25E+02
Cs-138	3.81E+00	3.81E-01
Ba-137m	4.01E+03	4.01E+02
Cr-51	2.20E+01	2.20E+00
Mn-54	6.49E+01	6.49E+00
Mn-56	4.07E+01	4.07E+00
Fe-55	6.27E+01	6.27E+00
Fe-59	3.24E+00	3.24E-01
Co-58	9.34E+01	9.34E+00
Co-60	1.81E+02	1.81E+01
Zn-65	-	-
Sr-89	1.09E+01	1.09E+00
Sr-90	4.37E+00	4.37E-01
Sr-91	5.52E-01	5.52E-02
Sr-92	4.51E-02	4.51E-03
Ba-140	3.08E+00	3.08E-01
Y-90	4.30E+00	4.30E-01
Y-91m	1.16E-01	1.16E-02
Y-91	1.96E-01	1.96E-02

Table 11.4-3 (Sheet 2 of 2)

MAXIMUM ANNUAL CURIE CONTENT OF PRIMARY INFLUENTS

Isotope	Primary Resin Total Ci/yr	Primary Filter Total Ci/yr
Y-92	1.50E-02	1.50E-03
Y-93	6.19E-05	6.19E-06
La-140	2.70E+00	2.70E-01
Zr-95	-	-
Nb-95	-	-
Mo-99	-	-
Tc-99m	-	-
Ru-103	-	-
Ru-106	-	-
Rh-103m	-	-
Rh-106	-	-
Te-132	-	-
Te-125m	-	-
Te-127m	-	-
Te-127	-	-
Te-129m	-	-
Te-129	-	-
Te-131m	-	-
Total:	1.51E+04	1.51E+03

Note:
Values shown as "-" Ci/yr are those calculated to be lower than 1.0E-10 Ci/yr, and thus considered to have insignificant contributions to total.

Table 11.4-4 (Sheet 1 of 2)

EXPECTED ANNUAL CURIE CONTENT OF SHIPPED PRIMARY WASTES

Isotope	Primary Resin Total Ci/yr	Primary Filter Total Ci/yr
Br-83	-	-
Br-84	-	-
Br-85	-	-
I-129	-	-
I-130	-	-
I-131	3.56E-02	3.56E-03
I-132	-	-
I-133	-	-
I-134	-	-
I-135	-	-
Rb-86	-	-
Rb-88	-	-
Rb-89	-	-
Cs-134	1.54E+02	1.54E+01
Cs-136	1.48E-02	1.48E-03
Cs-137	2.63E+02	2.63E+01
Cs-138	-	-
Ba-137m	2.50E+02	2.50E+01
Cr-51	1.89E+00	1.89E-01
Mn-54	4.79E+01	4.79E+00
Mn-56	-	-
Fe-55	5.31E+01	5.31E+00
Fe-59	6.98E-01	6.98E-02
Co-58	3.48E+01	3.48E+00
Co-60	1.23E+02	1.23E+01
Zn-65	1.32E+01	1.32E+00
Sr-89	4.59E-01	4.59E-02
Sr-90	6.30E-01	6.30E-02
Sr-91	-	-
Sr-92	-	-
Ba-140	2.75E-01	2.75E-02
Y-90	-	-
Y-91m	-	-
Y-91	2.67E-04	2.67E-05

Table 11.4-4 (Sheet 2 of 2)

EXPECTED ANNUAL CURIE CONTENT OF SHIPPED PRIMARY WASTES

Isotope	Primary Resin Total Ci/yr	Primary Filter Total Ci/yr
Y-92	-	-
Y-93	-	-
La-140	3.17E-01	3.17E-02
Zr-95	-	-
Nb-95	-	-
Mo-99	-	-
Tc-99m	-	-
Ru-103	-	-
Ru-106	-	-
Rh-103m	-	-
Rh-106	-	-
Te-132	-	-
Te-125m	-	-
Te-127m	-	-
Te-127	-	-
Te-129m	-	-
Te-129	-	-
Te-131m	-	-
Total:	9.43E+02	9.43E+01

Note:
Values shown as "-" Ci/yr are those calculated to be lower than 1.0E-10 Ci/yr, and thus considered to have insignificant contributions to total.

Table 11.4-5 (Sheet 1 of 2)

MAXIMUM ANNUAL CURIE CONTENT OF SHIPPED PRIMARY WASTES

Isotope	Primary Resin Total Ci/yr	Primary Filter Total Ci/yr
Br-83	-	-
Br-84	-	-
Br-85	-	-
I-129	1.23E-03	1.23E-04
I-130	-	-
I-131	1.08E+02	1.08E+01
I-132	-	-
I-133	-	-
I-134	-	-
I-135	-	-
Rb-86	2.35E+00	2.35E-01
Rb-88	-	-
Rb-89	-	-
Cs-134	3.30E+03	3.30E+02
Cs-136	1.27E+02	1.27E+01
Cs-137	4.21E+03	4.21E+02
Cs-138	-	-
Ba-137m	3.98E+03	3.98E+02
Cr-51	1.04E+01	1.04E+00
Mn-54	6.08E+01	6.08E+00
Mn-56	-	-
Fe-55	6.14E+01	6.14E+00
Fe-59	2.03E+00	2.03E-01
Co-58	6.96E+01	6.96E+00
Co-60	1.79E+02	1.79E+01
Zn-65	-	-
Sr-89	7.29E+00	7.29E-01
Sr-90	4.37E+00	4.37E-01
Sr-91	-	-
Sr-92	-	-
Ba-140	6.06E-01	6.06E-02
Y-90	4.34E+00	4.34E-01
Y-91m	-	-
Y-91	1.40E-01	1.40E-02

Table 11.4-5 (Sheet 2 of 2)

MAXIMUM ANNUAL CURIE CONTENT OF SHIPPED PRIMARY WASTES

Isotope	Primary Resin Total Ci/yr	Primary Filter Total Ci/yr
Y-92	-	-
Y-93	-	-
La-140	6.11E-01	6.11E-02
Zr-95	-	-
Nb-95	-	-
Mo-99	-	-
Tc-99m	-	-
Ru-103	-	-
Ru-106	-	-
Rh-103m	-	-
Rh-106	-	-
Te-132	-	-
Te-125m	-	-
Te-127m	-	-
Te-127	-	-
Te-129m	-	-
Te-129	-	-
Te-131m	-	-
Total:	1.21E+04	1.21E+03

Note:
Values shown as "-" Ci/yr are those calculated to be lower than 1.0E-10 Ci/yr, and thus considered to have insignificant contributions to total.

Table 11.4-6 (Sheet 1 of 2)

EXPECTED ANNUAL CURIE CONTENT OF SECONDARY WASTE AS GENERATED

Isotope	Secondary Resin Total Ci/yr
NA-24	1.73E-02
CR-51	3.81E-02
MN-54	2.62E-02
FE-55	2.01E-02
FE-59	3.94E-03
CO-58	6.75E-02
CO-60	9.10E-03
ZN-65	8.27E-03
BR-84	2.59E-05
RB-88	1.01E-04
SR-89	1.96E-03
SR-90	2.03E-04
SR-91	2.01E-04
Y-90	1.80E-04
Y-91	2.19E-04
Y-91M	1.98E-04
Y-93	9.10E-04
ZR-95	5.66E-03
NB-95	4.52E-03
NB-95M	4.74E-03
MO-99	1.36E-02
TC-99M	1.35E-02
RU-103	1.00E-01
RU-106	1.48E+00
RH-103M	9.68E-02
RH-106	1.44E+00
AG-110	2.12E-02
AG-110M	2.12E-02
TE-129	2.52E-03
TE-129M	2.41E-03
TE-131	1.28E-03
TE-131M	1.32E-03
TE-132	4.21E-04

Table 11.4-6 (Sheet 2 of 2)

EXPECTED ANNUAL CURIE CONTENT OF SECONDARY WASTE AS GENERATED

Isotope	Secondary Resin Total Ci/yr
I-131	1.45E-01
I-132	8.39E-03
I-133	4.88E-02
I-134	1.30E-03
I-135	2.56E-02
XE-131M	-
XE-133	-
XE-135	-
CS-134	2.17E-01
CS-135	4.70E-10
CS-136	1.30E-02
CS-137	2.88E-01
BA-136M	1.39E-02
BA-137M	2.88E-01
BA-140	1.09E-01
LA-140	1.35E-01
CE-141	1.88E-03
CE-143	2.58E-03
CE-144	6.37E-02
PR-143	2.04E-03
PR-144	6.37E-02
Total:	4.83

Table 11.4-7 (Sheet 1 of 2)

MAXIMUM ANNUAL CURIE CONTENT OF SECONDARY WASTE AS GENERATED

Isotope	Secondary Resin Total Ci/yr
NA-24	4.62E-04
CR-51	5.17E-01
MN-54	3.55E-01
MN-56	2.75E-01
FE-55	2.78E-01
FE-59	5.88E-02
CO-58	9.25E-01
CO-60	1.23E-01
BR-83	2.27E-02
BR-84	1.03E-03
BR-85	1.30E-06
KR-83M	-
KR-85	-
KR-85M	-
RB-88	3.57E-02
RB-89	1.24E-03
SR-89	3.59E-01
SR-90	2.50E-02
SR-91	1.42E-02
SR-92	4.89E-04
Y-90	2.22E-02
Y-91	1.75E-02
Y-91M	1.29E-02
Y-92	1.09E-03
Y-93	4.77E-03
ZR-95	3.15E-02
NB-95	3.36E-02
NB-95M	5.52E-02
MO-99	5.80E+00
TC-99M	6.30E+00
RU-103	2.51E-02
RU-103M	3.87E-02
RH-103M	2.54E-02
RH-106	4.32E-02

Table 11.4-7 (Sheet 2 of 2)

MAXIMUM ANNUAL CURIE CONTENT OF SECONDARY WASTE AS GENERATED

Isotope	**Secondary Resin Total Ci/yr**
AG-110	1.34E-02
AG-110M	1.01E-01
TE-129	5.34E-01
TE-129M	4.24E-01
TE-131	1.01E+00
TE-131M	8.65E-02
TE-132	2.65E+00
TE-134	1.03E-03
I-130	4.91E-02
I-131	5.74E+01
I-132	4.26E+00
I-133	1.23E+01
I-134	3.32E-02
I-135	1.88E+00
XE-131M	-
XE-133	-
XE-135	-
CS-134	2.27E+02
CS-135	6.16E-08
CS-136	2.75E+02
CS-137	2.10E+02
CS-138	2.62E-02
BA-136M	6.35E+02
BA-137M	2.17E+02
BA-140	1.13E-01
LA-140	8.28E-01
CE-141	2.72E-02
CE-143	1.89E-03
CE-144	2.67E-02
PR-143	1.83E-02
PR-144	2.67E-02
Total:	1660

Table 11.4-8 (Sheet 1 of 2)

EXPECTED ANNUAL CURIE CONTENT OF SHIPPED SECONDARY WASTES

Isotope	Secondary Resin Total Ci/yr
NA-24	-
CR-51	4.04E-03
MN-54	2.13E-02
FE-55	1.88E-02
FE-59	1.01E-03
CO-58	2.82E-02
CO-60	8.81E-03
ZN-65	6.41E-03
BR-84	-
RB-88	-
SR-89	6.00E-04
SR-90	2.02E-04
SR-91	-
Y-90	2.02E-04
Y-91	5.80E-09
Y-91M	-
Y-93	-
ZR-95	2.18E-03
NB-95	3.54E-03
NB-95M	2.32E-03
MO-99	2.43E-12
TC-99M	2.56E-12
RU-103	2.07E-02
RU-106	1.25E+00
RH-103M	2.00E-02
RH-106	1.21E+00
AG-110	1.66E-02
AG-110M	1.66E-02
TE-129	3.79E-04
TE-129M	3.87E-04
TE-131	2.77E-25
TE-131M	2.83E-25

Table 11.4-8 (Sheet 2 of 2)

EXPECTED ANNUAL CURIE CONTENT OF SHIPPED SECONDARY WASTES

Isotope	Secondary Resin Total Ci/yr
TE-132	1.81E-11
I-131	6.24E-05
I-132	1.84E-11
I-133	4.62E-34
I-134	-
I-135	-
XE-131M	-
XE-133	-
XE-135	-
CS-134	2.00E-01
CS-135	4.86E-10
CS-136	1.38E-04
CS-137	2.86E-01
BA-136M	1.47E-04
BA-137M	2.86E-01
BA-140	8.33E-04
LA-140	9.58E-04
CE-141	2.76E-04
CE-143	5.15E-23
CE-144	5.12E-02
PR-143	2.38E-05
PR-144	5.12E-02
Total:	3.50

Table 11.4-9 (Sheet 1 of 2)

MAXIMUM ANNUAL CURIE CONTENT OF SHIPPED SECONDARY WASTES

Isotope	Secondary Resin Total Ci/yr
NA-24	-
CR-51	5.47E-02
MN-54	2.89E-01
MN-56	-
FE-55	2.60E-01
FE-59	1.50E-02
CO-58	3.87E-01
CO-60	1.19E-01
BR-83	-
BR-84	-
BR-85	-
KR-83M	-
KR-85	-
KR-85M	-
RB-88	-
RB-89	-
SR-89	1.10E-01
SR-90	2.48E-02
SR-91	-
SR-92	-
Y-90	2.46E-02
Y-91	4.52E-07
Y-91M	-
Y-92	-
Y-93	-
ZR-95	1.21E-02
NB-95	2.11E-02
NB-95M	2.70E-02
MO-99	1.04E-09
TC-99M	1.14E-09
RU-103M	3.27E-02
RU-103	5.20E-03

Table 11.4-9 (Sheet 2 of 2)

MAXIMUM ANNUAL CURIE CONTENT OF SHIPPED SECONDARY WASTES

Isotope	Secondary Resin Total Ci/yr
RH-103M	5.25E-03
RH-106	3.65E-02
AG-110	1.05E-02
AG-110M	7.88E-02
TE-129	8.60E-02
TE-129M	6.83E-02
TE-131	2.18E-22
TE-131M	1.85E-23
TE-132	1.14E-08
TE-134	-
I-130	-
I-131	2.48E-02
I-132	1.49E-08
I-133	1.16E-31
I-134	-
I-135	-
XE-131M	-
XE-133	-
XE-135	-
CS-134	2.09E+02
CS-135	6.36E-08
CS-136	2.89E+00
CS-137	2.09E+02
CS-138	-
BA-136M	6.69E+00
BA-137M	2.15E+02
BA-140	8.70E-04
LA-140	7.17E-03
CE-141	3.98E-03
CE-143	3.77E-23
CE-144	2.14E-02
PR-143	1.88E-04
PR-144	2.14E-02
Total:	644

Table 11.4-10 (Sheet 1 of 2)

COMPONENT DATA - SOLID WASTE MANAGEMENT SYSTEM (NOMINAL)

Tanks

Spent resin tank

Number	2
Total volume (ft^3)	300
Type	Vertical, conical bottom, dished top
Design pressure (psig)	15
Design temperature (°F)	150
Material	Stainless steel

Pumps

Resin mixing pump

Number	1
Type	Pneumatic diaphragm
Design pressure (psig)	125
Design temperature (°F)	150
Design flow rate (gpm)	120
Design head (ft)	160
Air supply pressure (psig)	100
Air consumption (scfm)	130
Material	Stainless steel housing, Buna N diaphragms

Resin transfer pump

Number	1
Type	Progressing cavity
Design pressure (psig)	150
Design temperature (°F)	150
Design flow rate (gpm)	100
Material	Stainless steel housing, internals and rotor, Buna N stator liner

Table 11.4-10 (Sheet 2 of 2)

COMPONENT DATA - SOLID WASTE MANAGEMENT SYSTEM
(NOMINAL)

Filters

Resin fines filter

Number	1
Type	Filter cartridge for inside to outside flow
Design pressure (psig)	150
Design temperature (°F)	150
Design flowrate (gpm)	120
Filtration rating	10 microns
Material	Stainless steel housing and pleated polypropylene cartridge with stainless steel screen outer jacket

Sampler

Resin sampling device

Number	1
Type	Inline sampler, positive displacement sample collection and portable pig for sample jar
Material	Stainless steel and EPDM wetted parts

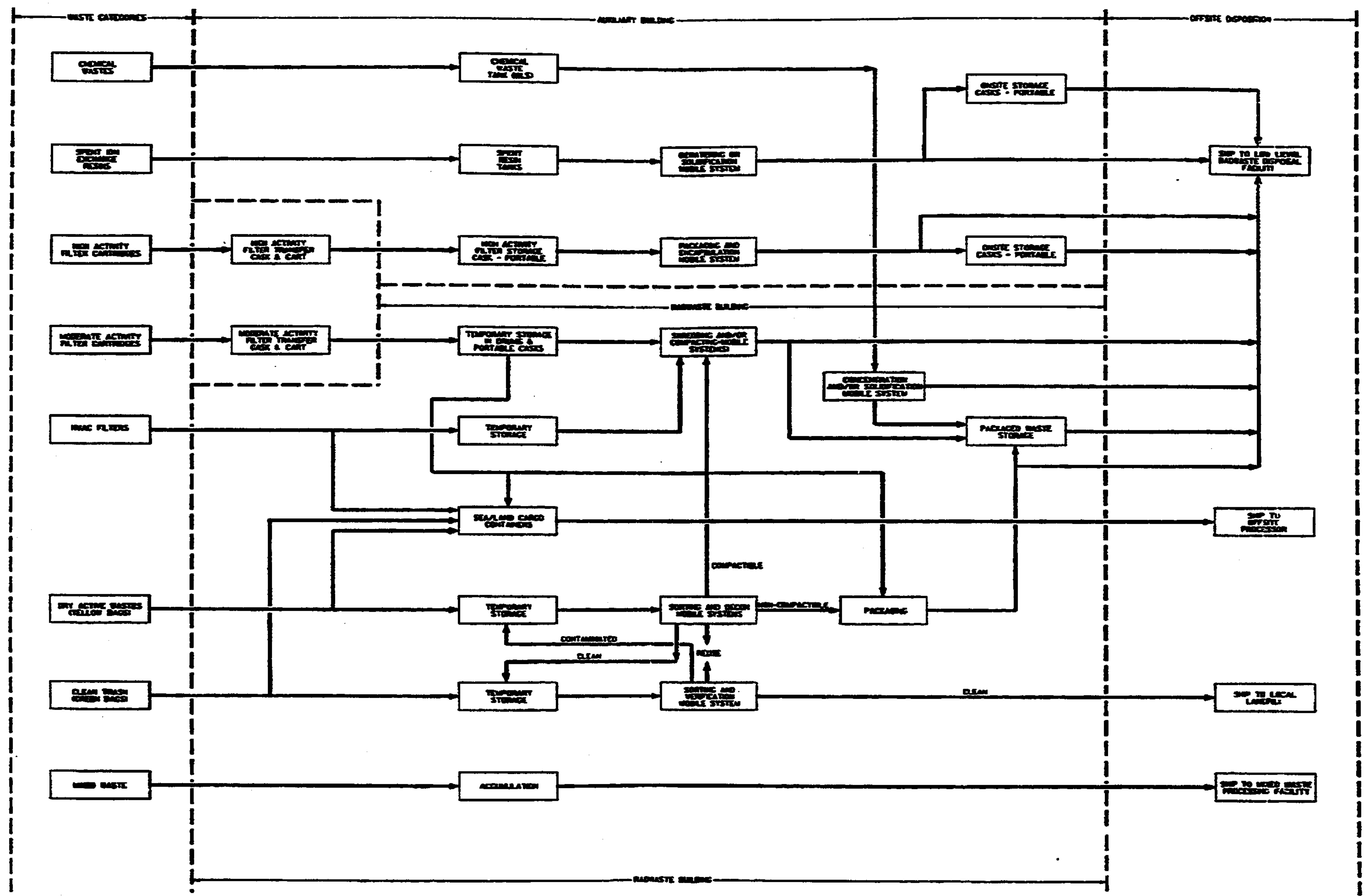

Figure 11.4-1

Waste Processing System Flow Diagram