12.2 Radiation Sources

The information in this section of the reference ABWR DCD, including all subsections and tables, is incorporated by reference with the following departures and supplements.

STD DEP 5.4-1 (Table 12.2-9)

STD DEP 10.4-4 (Table 12.2-28)

STD DEP 11.2-1(Tables 12.2-13a through 12.2-13h)

STD DEP 11.4-1 (Tables 12.2-5a through 12.2-5k)

STD DEP Admin

12.2.1.2.6.2 Radioactive Sources in Liquid Radwaste System

STD DEP 11.2-1

The Liquid Radwaste System is composed of ~~three~~ four *subsystems designed to collect, treat and cycle or discharge different categories of waste water (Subsection 11.2.2). The radioactive sources for the components in the systems are provided in Table 12.2-13. The isotopic inventories in the liquid radwaste components were calculated assuming a fission product release rate from the fuel equivalent to that required to produce 3.7 GBq/s of offgas following a 30-min holdup period.*

12.2.1.2.6.4 Radioactive Sources in the Solid Radwaste System

STD DEP 11.4-1

The Solid Radwaste System provides the capability for solidifying or packaging waste from the other radwaste systems (Subsection 11.4.2). The wastes ~~are not~~ can be *solidified separately by type or source. The final waste is placed in a* waste*~~steel~~ container ~~or drums~~. The radioactive sources for the components in the system ~~container and drums~~ are given in Table 12.2-15.*

12.2.1.2.10 Post-accident Radioactive Sources

STD DEP Admin

With respect to the Reactor Building, the overall plant design has divided the Reactor Building into three separate and independent divisions. ECCS components are contained in each division in separate isolated rooms such that the failure of one system in one division will not affect components in another division. Releases of radioactive material either in the form of water or steam (airborne) are contained in and isolated to a large extent in the compartment in which it might occur by the use of watertight doors and ~~area~~ process *radiation monitors which isolate the HVAC System from the compartment* on a high radiation signal*. Divisional separation under such conditions is complete. Sumps are designed to detect and alarm in the event of leaks in excess of 0.063 liter per second. ~~establishing a threshold for leak before break on the larger water-carrying piping systems.~~ All connections to the*

Primary Containment not terminating in the Reactor Building meet GDC 54, 55, 56, and 57. Therefore, in the event of an accident involving radioactive sources in the Primary Containment or Reactor Building, such sources would be contained and isolated for further treatment and decontamination.

Likewise, potential releases in the Radwaste Building will be contained by ~~isolating~~ filtering *the Radwaste Building atmosphere and sealing any water releases in the building, which is seismically qualified and steel-lined to prevent any potential water releases. Such potential releases are discussed in Section 15.7.*

12.2.2.1 Production of Airborne Sources (Site-Specific Supplemental Value Used)

The following site-specific supplement addresses COL License Information Item 12.5 for airborne releases.

(8) χ/Q values obtained from Table 2.3S.5-2.

STP has re-performed the gaseous release dose analysis using site-specific parameters to determine conformance with 10 CFR 20 and 10 CFR 50 Appendix I (see Subsection 12.2.3 for COL License Information), concluding that identified limits are not exceeded. As shown in Table 12.2-20 the expected per unit release is a small fraction of the site wide release limits of 10 CFR 20.

12.2.2.4 Average Annual Doses

The following site-specific supplement addresses COL License Information Item 12.5.

For compliance with 10 CFR 50 Appendix I, evaluations have been made to determine average annual doses to unrestricted areas subject to airborne and liquid releases. For airborne dose calculations, isotopic releases were taken from Table 12.2-20. ~~assuming a 0.8 km exclusion boundary.~~ Releases were assumed to be from the plant stack, since all major (Reactor Building, Turbine Building and Radwaste Building) ventilation systems pipe to the stack for normal releases. ~~Since a site meteorology is not definitively defined, a statistical approach was used to evaluate the releases over a series of meteorologies discussed in References 12.26 and 12.27. Doses were calculated using methodologies and conversion factors consistent with Regulatory Guides 1.109 and 1.111 as implemented in References 12.28 and 12.29.~~ Results of the airborne evaluations are given in Table 12.2-21. For the ingestion doses given in Table 12.2-21, ingestion values given in Table E-5 of Regulatory Guide 1.109 were used. ~~COL applicants need to update the airborne dose calculations to conform to the as-designed plant and site-specific meteorology (see Subsection 12.2.3 for COL license information).~~

12.2.2.5 Liquid Releases

The following site-specific supplement addresses COL License Information Item 12.5 for liquid releases.

The ABWR is designed not to release radioactive liquid effluents. However, under certain conditions of high water inventory, ~~*up to 3.7 GBq per year, excluding tritium*~~ radioactive liquids *may be released as described in Subsection 11.2.3. These releases are given in Table 12.2-22 and form the basis for estimating doses using methodologies consistent with Regulatory Guide 1.113 as implemented in Reference 12.2-10. The results of liquid releases, assuming dilution factors described in Subsection* ~~*11.2.3.2*~~ 12.2.2.5.1*, are shown in the dose evaluation in Table 12.2-23.* ~~*COL applicants need to update*~~ STP has re-performed *the liquid dose analysis* ~~*to conform to the as-designed plant and*~~ using *site-specific parameters* to determine conformance with 10 CFR 20 and 10 CFR 50 Appendix I *(see Subsection 12.2.3 for COL license information),* concluding that the identified limits are not exceeded.

12.2.2.5.1 Dilution Factors

The following site-specific supplement addresses COL License Information Item 12.5 for liquid releases.

Dilution factors used in evaluating the release of liquid effluents are site specific. Using the methodology set forth in NUREG-0016 for Liquid Releases, the quantity of radioactive isotopes has been computed and is identified in column 2 of Table 12.2-22. The GALE code methodology, as specified in NUREG-0016, was used to determine the radiological activity released. The code provides recommended values for the activity fraction for potential effluent streams. It is assumed that this quantity is released to the plant discharge piping, which has a flow of 272,550 m^3/h (circulating water flow). A maximum of 150 cubic meters per hour of liquid radwaste discharge will be mixed with normal circulating water flow of 272,550 m^3/h providing significant dilution prior to release. The annual release values are used to calculate the per unit annual average liquid release discharge concentration, shown in column 3 of Table 12.2-22. The concentrations noted in this table are less than the limits in 10 CFR 20.

The discharge piping empties into the STP Main Cooling Reservoir (MCR), a 7000-acre reservoir. The plant liquid releases are further diluted in the MCR and allow for radioactive decay to occur before ultimate release from the site to unrestricted areas. The reservoir lies totally within the confines of the site and the use of its water is restricted to plant operation.

Liquid effluent discharge into the MCR can be released to unrestricted areas in the Little Robbins Slough or the Colorado River, and ultimately Matagorda Bay, providing further dilution prior to reaching the potential Maximally Exposed Individual (MEI). Dilution flow rates in the Colorado River, Matagorda Bay and Little Robbins Slough used to evaluate the liquid pathway dose to the MEI, were obtained using information from the STP 2006 Offsite Dose Calculation Manual (ODCM) as inputs to the LADTAP II computer program.

The liquid pathway doses to the MEI, assuming a dilution factor of only 10, are presented in Table 12.2-23. Dose to the MEI comply with the requirements of 10 CFR 50 Appendix I.

12.2.3 COL License Information

12.2.3.1 Compliance with 10 CFR 20 and 10 CFR 50 Appendix I

The following supplement addresses COL License Information Item 12.5.

Using site-specific parameters, the average annual liquid releases and the average annual airborne releases to the environment have been computed and are shown in Tables 12.2-20 through 12.2-23. The average annual liquid and airborne releases are in compliance with 10 CFR 20 and 10 CFR 50 Appendix I.

Table 12.2- 5a Radiation Sources—Radiation Sources

Source Table	For	Drawing	~~Location~~	Approximate Geometry
12.2-6	RHR Heat Exchanger	12.3-1	~~(R1,RF) (R6,RA) (R6,RF)~~	Rt Cylndr (r=0.9m, l=7m)
12.2-8	RCIC Turbine	12.3-1	~~(R6,RC)~~	Rt Cylndr (r=0.5m, l=0.7m)
12.2-9	CUW Filter Demineralizer	12.3-3	~~(R2,RB)~~	2 Tanks, Rt Cylndr (r=0.6m, l=3.3m)
12.2-10	CUW Regen Heat Exchanger	12.3-2	~~(R1,RC)~~	Rt Cylndr (r=~~0.4m~~ **0.63m**, l=~~6.8m~~ **4.9m**)
12.2-11	CUW Non-Regen Heat Exchanger	12.3-1	~~(R1,RC)~~	Rt Cylndr (r=0.4m, l=5.5m)
12.2-13.1	LCW Collector Tank	12.3-37	~~ITEM 7~~	~~2~~ **4** Tanks, Rt Cylndr (r=~~4.~~**2.74**m, l=~~9.49.~~**58m**)
12.2-13.2	LCW Filter**/Demin Skid****	~~12.3-39~~	~~ITEM 12~~	~~Rt Cylndr (r=0.5m, l=2.5m)~~**Vendor Provided**
~~12.2-13.3~~	~~LCW Demineralizer~~	~~12.3-39~~	~~ITEM 11~~	~~Rt Cylndr (r=0.6m, l=2.8m)~~
12.2-13.4	LCW Sample Tank	12.3-38	~~ITEM 8~~	2 Tanks, Rt Cylndr (r=~~4.~~**2.74**m, l=~~9.49.~~**58m**)
12.2-13.5	HCW Collector Tank	12.3-37	~~ITEM 13~~	Rt Cylndr (~~r=2.2m, l=4.3m~~)
12.2-13.6	HCW **Filter/**Demin~~eralizer~~ **Skid****	12.3-39	~~ITEM 20~~	Rt Cylndr (r=0.6m, l=2.8m)
12.2-14	Offgas	12.3-50	~~(TF,T2)~~	Tank 1, Rt Cylndr (r=0.6m, l=7.6m) Tanks 2-9, Rt Cylndr (r=1.1m, l=7.6m)
12.2-29	Steam Jet Air Ejector	12.3-51	~~(TF,T2)~~	Rt Cylndr (r=0.15m, l=4.6m) Rt Cylndr (r=0.76m, l=6.1m) Rt Cylndr (r=0.2m, l=4.6m)
12.2-14	Offgas Recombiner	12.3-51	~~(TF,T2)~~	Rt Cylndr (r=1.4m, l=7m)
12.2-15.1	CUW Backwash Receiving Tank	12.3-1	~~(R2,RB)~~	Rt Cylndr (r=2.2m, l=5.7m)
12.2-15.2	CF Backwash Receiving Tank	12.3-49	~~(TD,T4)~~	Rt Cylndr (r=2.2m, l=5.7m)
12.2-15.3	Phase Separator	12.3-38	~~ITEM 30~~	2 Tanks, Rt Cylndr (r=~~2.4~~ **2.3**m, l=~~6.0~~**9.7**m)
12.2-15.4	Spent Resin Storage Tank	12.3-38	~~ITEM 31~~	Rt Cylndr (r=2.0m, l=~~5.7~~**6.6**m)**, 2 Tanks**
~~12.2-15.5~~	~~Concentrated Waste Tank~~	~~12.3-37~~	~~ITEM 35~~	~~Rt Cylndr (r=1.5m, l=4.4m)~~
~~12.2-15.6~~	~~Solids Dryer Feed Tank~~	~~12.3-41~~	~~ITEM 39~~	~~Rt Cylndr (r=1.6m, l=3.2m)~~
~~12.2-15.7~~	~~Solids Dryer (outlet)~~	~~12.3-39~~	~~ITEM 55~~	~~Rt Cylndr (r=0.2m, l=3.2m)~~

Source Table	For	Drawing	~~Location~~	Approximate Geometry
~~12.2-15.8~~	~~Solids Pelletizer~~	~~12.3-38~~	~~ITEM 58~~	~~Rt Cylndr (r=0.4m, l=2.5m)~~
~~12.2-15.9~~	~~Sol Mist Separator (steam)~~	~~12.3-39~~	~~ITEM 56~~	~~Rt Cylndr (r=0.1m, l=2.8m)~~
~~12.2-15.10~~	~~Sol Condenser~~	~~12.3-40~~	~~ITEM 57~~	~~Rt Cylndr (r=0.2m, l=1.4m)~~
~~12.2-15.11~~	~~Sol Drum~~	~~12.3-39~~	~~(2,D)~~	~~Rt Cylndr (r=0.3m, l=0.8m) Box (1.5mx1.5mx1m)~~
12.2-16	FPC Filter Demineralizer	12.3-3	~~(R2,RB)~~	Rt Cylndr (r=0.7m, l=3.4m)
12.2-17	Suppression Pool Cleanup System*	12.3-3	~~(R2,RA)~~	Rt Cylndr (r=0.7m, l=3.4m)
12.2-18	Control Rod Drive System†	12.3-2	~~(R4,RF)~~	Distributed Source
12.2-24	Traversing Incore Probe	12.3-2	~~(R4,RB)~~	Distributed Source
12.2-25	Reactor Internal Pumps‡	12.3-2	~~(RF,R1)~~	Distributed Source
12.2-25	RIP Heat Exchanger	1.2-3b	~~El 3000~~	Rt Cylndr (r=0.322m, l=2.9m)
12.2-26	Turbine Moisture Separator/Reheater	12.3-52	~~(T6,TE)~~	Rt Cylndr (r=1.8m, l=31.m)
12.2-27	Turbine Condenser	12.3-53	~~(TD,TG)~~	Distributed Source
12.2-28	Condenser Filter/ Demineralizer Filter Demineralizer	 12.3-51 12.3-51	 ~~(TC,T2)~~ ~~(TC,T3)~~	 3 Tanks, Rt Cylndr(r=1.4m, l=6.1m) 6 Tanks, Rt Cylndr(r=1.7m, l=5.1m)
12.2-30	SGTS Filter Train	12.3-7	~~(R2,RB)~~	Surface, (3.66m x 2.54m)§
Applicant	Spent Fuel Storage	12.3-6	~~(R4,RF)~~	See Drawings
12.2-31	**HSD Receiver Tank**			**Cylinder (r=1.98m, l=4.4m)**
12.2-32	**HSD Sample Tank**			**Cylinder (r=1.98m, l=4.4m)**
12.2-33	**RS Backwash Receiving Tank**			**Cylinder (r=1.98m, l=6.6m**
12.2-34	**Chem Drain Tank**			**Cylinder (r=0.91m, l=2.6m**
12.2-35	**HC Sample Tank**			**Rt Cylinder (r=2.74m, l=9.58m)**

* Suppression pool clean up F/D uses second of Fuel Pool F/D

** LCW and HCW Filter/Demin Skid to be Vendor Provided

† Maintenance Facility

‡ Maintenance Facility, see Figure 1.2-3b Elevation 3000 for drywell location

§ Surface area of HEPA and charcoal filter

Table 12.2- 5b Radiation Sources—Source Geometry

Component	Assumed Shielding Source Geometry
RHR Heat Exchanger	Homogenous source over volume of heat exchanger
RCIC Turbine	Homogenous source over volume of turbine
CUW Filter Demineralizer	80% of source in first 15 cm, remainder dispersed over volume.
CUW Regen Heat Exchanger	Homogenous source over volume of exchanger
CUW Non-Regen Heat Exchanger	Homogenous source over volume of exchanger
LCW Collector Tank	80% non-solubles in slurry on tank bottom, rest evenly dispersed in volume
LCW Filter**/Demin Skid**	~~Homogenous source over volume of filter~~**Vendor Provided Equipment**
~~LCW Demineralizer~~	~~80% of source in first 15 cm, rest evenly dispersed over volume~~
LCW Sample Tank	Homogenous source over volume of tank
HCW Collector Tank	Homogenous source over volume of tank
HCW **Filter/**Demin~~eralizer~~ **Skid**	~~80% of source in first 15 cm, rest evenly dispersed over volume~~**Vendor Provided Equipment**
Offgas	90% of source in first tank in first (upper) 30 cm, rest evenly dispersed. Remaining tanks, homogenous source over tank volume.
Steam Jet Air Ejector**	Homogenous source over volume of ejector
Offgas Recombiner*	Homogenous source over subcomponent ~~(Figure 12.2-14)~~††
CUW Backwash Receiving Tank	80% non-solubles in slurry on tank bottom, rest evenly dispersed in volume
CF Backwash Receiving Tank	80% non-solubles in slurry on tank bottom, rest evenly dispersed in volume
Phase Separator	90% non-solubles in slurry on tank bottom, rest evenly dispersed in volume
Spent Resin Storage Tank	Homogenous source over volume of tank
~~Concentrated Waste Tank~~	~~90% non-solubles in slurry on tank bottom, rest evenly dispersed in volume~~
~~Sol Dryer Feed Tank~~	~~Source evenly dispersed over volume~~
~~Sol Dryer (outlet)~~	~~Source evenly dispersed over volume~~
~~Sol Peletizer~~	~~Source evenly dispersed over volume~~
~~Sol Mist Separator (steam)~~	~~Source evenly dispersed over volume~~
~~Sol Condenser~~	~~Source evenly dispersed over volume~~
~~Sol Drum~~	~~Source evenly dispersed over volume~~
FPC Filter Demineralizer	90% insolubles in first 15 cm, rest of source evenly dispersed over volume

** Radiation levels in SJAE and recombiner highly dependent upon power level. Actual measurements on SJAE condenser contact dose rate are $2x10^{-3}$ Gy/h at 100% power and less than $5x10^{-2}$m Gy/h at 20% power.

†† See Offgas Recombiner Description, Section 11.3, use inventory for preheater, recombiner, condenser and cooler for recombiner inventory for shielding applications.

Component	Assumed Shielding Source Geometry
Suppression Pool Cleanup System	90% insolubles in first 15 cm, rest of source evenly dispersed over volume
Transverse Incore Probe	Point or line geometry (Table 12.2-24)
Reactor Internal Pumps	Cylindrical source coupled to water bearing components
RIP Heat Exchanger	Homogenous source over volume of exchanger
Turbine Moisture Separator/Reheater	Homogenous source over volume of component
Turbine Condenser	Homogenous source over volume of condenser
Condenser Filter/Demineralizer	
Filter	Source evenly dispersed over volume of filter
Demineralizer	90% insolubles in first 15 cm, rest of source evenly dispersed over volume
SGTS Filter Train	90% particulates on HEPA filter, remaining on charcoal filter
Spent Fuel Storage	Applicant
HSD Receiver Tank	**Homogenous source over volume of tank**
HSD Sample Tank	**Homogenous source over volume of tank**
RS Backwash Receiving	**Homogenous source over volume of tank**
Chem Drain Tank	**Homogenous source over volume of tank**
HC Sample Tank	**Homogenous source over volume of tank**

Table 12.2- 5c Radiation Sources—Shielding Geometry in Meters

Component	Room Dimensions			Wall Thickness in Meters					
	Length	Width	Height	East	West	North	South	Floor	Ceiling
RHR Heat Exchanger	12.6	5.6	5.6	0.8	0.6	0.6	0.6	Ground	0.8
RCIC Turbine	14.6	7.8	5.6	0.8	2	0.6	0.6	Ground	0.8
CUW Filter Demineralizer	2.8	3	7.4	0.8	1	0.8	1	0.5	Hatch
CUW Regen Heat Exchanger	7.7	3.6	6	1.4	1.4	1	1.4*	0.8	0.5
CUW Non-Regen Heat Exchanger	7.4	4.4	5.6	1	1	1	1†	Ground	0.8
LCW Collector Tank **(4 Tanks)**	~~19~~16	~~1~~15	13	~~1.2~~0.6	~~0.8~~0.6	~~0.8~~0.9	~~1.2~~0.9	Ground	0.8
LCW Filter**/Demin Skid**	~~16.4~~	~~10.6~~	~~8~~	~~0.8~~	~~0.8~~	~~0.8~~	~~0.8~~	~~0.8~~	~~0.8~~
~~LCW Demineralizer†~~**HCW Filter/Demin Skid***** ~~19.6~~ ~~10.6~~ ~~8~~ ~~0.8~~ ~~0.8~~ ~~0.8~~ ~~0.8~~ ~~0.8~~ ~~0.8~~									
LCW Sample Tank **(2 Tanks)**	~~19~~7.4	~~10~~15	13	~~1.2~~0.6	~~0.8~~0.6	1.2	~~0.8~~0.6	Ground	0.8
HCW Collector Tank **(3 Tanks-L-Shape Room)**	~~9~~16	~~11.2~~15	~~5.4~~13	~~0.8~~0.9	~~0.8~~0.6	~~0.8~~0.9	~~1.2~~0.9	Ground	0.8
~~HCW Demineralizer‡~~	~~19.6~~	~~10.6~~	~~8~~	~~0.8~~	~~0.8~~	~~0.8~~	~~0.8~~	~~0.8~~	~~0.8~~
Offgas	9.1	11	16	1	1	1	1	2.5	1
Steam Jet Air Ejector and Recombiner Room	9.1	14.2	7	1	1	1	1	1	1
CUW Backwash Receiving Tank	6.6	7.4	5.6	1	0.8	0.8	1	Ground	0.8
CF Backwash Receiving Tank	5	5	25	1	1	1	1	2.5	Hatch
Phase Separator **(2 Tanks-2 Rooms)**	~~16~~5.4	~~8.4~~8.6	~~4.6~~13	~~0.8~~1.2	~~0.8~~1.2	~~0.8~~0.6	1.2	~~0.8~~Ground	0.8
Spent Resin Storage Tank	6.4	6.4	4.6	0.8	0.8	0.8	0.8	0.8	0.8

* Moveable Wall

~~† LCW and HCW Demineralizer share same room~~

~~Concentrated Waste Tank~~	~~4.6~~	~~5~~	~~5.4~~	~~0.8~~	~~0.8~~	~~1.2~~	~~0.8~~	~~Ground~~	~~0.8~~
~~Sol Dryer Feed Tank~~	~~9.4~~	~~7.2~~	~~6.2~~	~~0.8~~	~~0.8~~	~~0.8~~	~~0.8~~	~~0.8~~	~~0.8~~
~~So Dryer (outlet)‡~~									
~~9.2~~	~~5.2~~	~~8~~	~~0.8~~	~~0.8~~	~~0.8~~	~~0.8~~	~~0.8~~	~~0.8~~	~~0.8~~
~~Sol Peletizer~~	~~9.2~~	~~5.2~~	~~6.8~~	~~0.8~~	~~0.8~~	~~0.8~~	~~0.8~~	~~0.8~~	~~0.8~~
~~Sol Mist Separator (steam)[‡]~~	~~9.2~~	~~5.2~~	~~8~~	~~0.8~~	~~0.8~~	~~0.8~~	~~0.8~~	~~0.8~~	~~0.8~~
~~Sol Condenser~~	~~4.2~~	~~7.2~~	~~6.2~~	~~0.8~~	~~0.8~~	~~0.8~~	~~0.8~~	~~0.8~~	~~0.8~~
~~Sol Drum~~	~~3.2~~	~~3~~	~~8~~	~~0.8~~	~~0.8~~	~~0.8~~	~~0.8~~	~~0.8~~	~~0.8~~
FPC Filter Demineralizer	3.2	3.2	7.4	0.8	1	0.8	0.8	0.5	Hatch
Suppression Pool Cleanup Sys	3.2	3.2	7.4	0.5	0.8	0.8	0.8	0.5	Hatch
Control Rod Drive System§									
7.6	33.4	5.8	0.6	0.6	0.6	0.6	0.8	0.6	
Transverse Incore Probe	4	7.3	2.7	1	1	1	1	Mezz	0.6
Reactor Internal Pumps**	8.2	8.5	5.8	0.6	0.6	0.6	0.6	0.8	0.6
RIP Heat Exchanger	Primary Containment								
Turbine Moisture Sep/Reheater	12.4	47.6	8.5	1	1	1	1	1	1
Turbine Condenser	14.2	36	25	3.5	2.5	1	1	2.5	Turbine
Condenser Filter	5	21.1	8	2.5[†]	1	1	1	1	Hatch
Condenser Demineralizer	9.8	17.3	9	1	1	1	1.6	1	1
SGTS Filter Train	14.4	5	8.2	0.2	0.5	0.2	0.2	2	0.6
Spent Fuel Storage	9.4	14	4.1	2	2	2	2	2	7.4**

~~‡ Solid dryer and Mist Separator share same room~~

‡ Maintenance Facility

*** The LCW and HCW Filter Demineralizer Skip will be vendor provided. They will be located on the ground floor elevation, 10700, (See Fig. 1.2-23C) The vendor will provide the skids with shielding adequate to maintain the Room, 6381, as a Radiation Zone C.

HSD Receiver Tank	7.7	7.2	6.2	0.6	0.6	0.6	0.9	Ground	0.6
HSD Sample Tank	7.7	7.2	6.2	0.6	0.6	0.6	0.9	0.6	0.8
RS Backwash Receiving	5.6	8.3	13	0.6	1.2	0.6	1.2	Ground	0.8
Chem Drain Collector Tank	4.4	3.7	3.1	0.6	0.6	0.6	0.6	0.6	0.6
HC Sample Tank (2 Tanks)	15	7.7	13	0.9	0.6	1.2	0.6	Ground	0.8
Spent Resin Storage Tank									
Tank A	5.2	6.4	10.1	0.9	0.9	0.9	0.9	Ground	0.6
Tank B	5.2	5.2	10.1	0.9	0.9	1.2	0.9	Ground	0.6

** 7.4m water depth above fuel elements

Table 12.2-9 CUW Filter Demineralizer

Source volume= 3.7 m^3

Total MBq 1.94E+08

Halogens		Soluble fission Products		Insoluble fission Products		Activation Products	
Isotope	MBq	Isotope	MBq	Isotope	MBq	Isotope	MBq
I-131	2.41E+07	Rb-89	2.82E+04	Y-91	3.66E+05	Na-24	5.01E+06
I-132	3.06E+06	Sr-89	9.40E+05	Y-92	7.37E+05	P-32	1.32E+06
I-133	2.20E+07	Sr-90	7.27E+04	Y-93	1.36E+06	Cr-51	4.99E+07
I-134	2.01E+06	Y-90	7.27E+04	Zr-95	7.41E+04	Mn-54	7.12E+05
I-135	9.52E+06	Sr-91	1.27E+06	Nb-95	7.41E+04	Mn-56	4.44E+06
		Sr-92	9.76E+05	Ru-103	1.73E+05	Co-58	1.87E+06
		Mo-99	4.05E+06	Rh-103m	1.73E+05	Co-60	4.10E+06
		Tc-99m	4.05E+06	Ru-106	3.11E+04	Fe-55	5.41E+06
		Te-129m	3.36E+05	Rh-106	3.11E+04	Fe-59	2.73E+05
		Te-131m	9.27E+04	La-140	2.51E+06	Ni-63	1.03E+07
		Te-132	2.37E+05	Ce-141	2.58E+05	Cu-64	1.22E+07
		Cs-134	1.54E+05	Ce-144	3.09E+04	Zn-65	2.00E+06
		Cs-136	6.44E+04	Pr-143	3.09E+04	Ag-110m	1.00E+04
		Cs-137	4.23E+05			W-187	2.28E+05
		Cs-138	2.07E+05				
		Ba-140	2.51E+06				
		Np-239	1.44E+07				
Total	6.06E+07	Total	2.98E+07	Total	5.85E+06	Total	9.77E+07

Table 12.2-13a Liquid Radwaste Component Inventories-LCW Collector Tank

Source volume = 140 m^3

Total MBq: 7.40E+05

Halogens		Soluble Fission Products		Insoluble Fission Products		Activation Products	
Isotope	MBq	Isotope	MBq	Isotope	MBq	Isotope	MBq
I-131	2.03E+04	Rb-89	9.42E+01	Y-91	2.97E+04	Na-24	1.29E+04
I-132	8.06E+03	Sr-89	2.11E+03	Y-92	2.32E+03	P-32	2.65E+03
I-133	5.54E+04	Sr-90	2.67E+02	Y-93	2.72E+04	Cr-51	1.04E+05
I-134	5.28E+03	Y-90	2.67E+02	Zr-95	6.03E+03	Mn-54	2.21E+03
I-135	2.50E+04	Sr-91	3.33E+03	Nb-95	6.03E+03	Mn-56	1.17E+04
		Sr-92	2.57E+03	Ru-103	1.38E+04	Co-58	4.43E+03
		Mo-99	8.86E+03	Rh-103m	1.38E+04	Co-60	1.47E+04
		Tc-99m	8.86E+03	Ru-106	2.69E+03	Fe-55	1.09E+04
		Te-129m	7.13E+02	Rh-106	2.69E+03	Fe-59	6.02E+02
		Te-131m	2.25E+02	La-140	1.89E+05	Ni-63	3.79E+04
		Te-132	5.09E+02	Ce-141	2.04E+04	Cu-64	3.17E+04
		Cs-134	4.00E+02	Ce-144	2.66E+03	Zn-65	6.00E+03
		Cs-136	1.35E+02	Pr-143	2.66E+03	Ag-110m	3.01E+01
		Cs-137	1.22E+03			W-187	5.66E+02
		Cs-138	5.46E+02				
		Ba-140	5.04E+03				
		Np-239	3.20E+04				
Total	1.14E+05	Total	6.72E+04	Total	3.19E+05	Total	2.40E+05

Table 12.2-13b ~~Liquid Radwaste Component Inventories-LCW Filter~~ Not Used

Table 12.2-13c ~~Liquid Radwaste Component Inventories-LCW Demineralizer~~
Not Used

Table 12.2-13d Liquid Radwaste Component Inventories-LCW Sample Tank

Source volume = 140 m^3

Total MBq: 4.12E+6

Halogens		Soluble Fission Products		Insoluble Fission Products		Activation Products	
Isotope	MBq	Isotope	MBq	Isotope	MBq	Isotope	MBq
I-131	1.82E+01	Rb-89	5.63E-03	Y-91	2.92E+01	Na-24	4.30E+00
I-132	4.35E-01	Sr-89	2.07E+00	Y-92	1.94E-01	P-32	2.49E+00
I-133	2.37E+01	Sr-90	2.67E-01	Y-93	6.43E+00	Cr-51	1.01E+02
I-134	1.09E-01	Y-90	2.67E-01	Zr-95	5.95E+00	Mn-54	2.20E+00
I-135	3.90E+00	Sr-91	7.37E-01	Nb-95	5.95E+00	Mn-56	7.12E-01
		Sr-92	1.64E-01	Ru-103	1.35E+01	Co-58	4.37E+00
		Mo-99	6.54E+00	Rh-103m	1.35E+01	Co-60	1.47E+01
		Tc-99m	6.54E+00	Ru-106	2.68E+00	Fe-55	9.91E+00
		Te-129m	6.95E-01	Rh-106	2.68E+00	Fe-59	5.90E-01
		Te-131m	1.20E-01	La-140	1.76E+02	Ni-63	3.79E+01
		Te-132	3.93E-01	Ce-141	1.99E+01	Cu-64	9.22E+00
		Cs-134	3.99E+00	Ce-144	2.65E+00	Zn-65	5.98E+00
		Cs-136	1.26E+00	Pr-143	2.65E+00	Ag-110m	3.00E-02
		Cs-137	1.22E+01			W-187	2.65E-01
		Cs-138	6.92E-02				
		Ba-140	4.71E+00				
		Np-239	2.25E+01				
Total	4.63E+01	Total	6.25E+01	Total	2.82E+02	Total	1.93E+02

Table 12.2-13e Liquid Radwaste Component Inventories-HCW Collector Tank

Source volume = 140 m^3

Total MBq: 1.80E+04

Halogens		Soluble Fission Products		Insoluble Fission Products		Activation Products	
Isotope	MBq	Isotope	MBq	Isotope	MBq	Isotope	MBq
I-131	4.45E+02	Rb-89	2.57E+02	Y-91	5.51E-01	Na-24	4.94E+01
I-132	9.76E+00	Sr-89	5.68E+00	Y-92	4.05E+02	P-32	6.51E+00
I-133	2.57E+02	Sr-90	4.27E+01	Y-93	6.59E+02	Cr-51	6.51E+00
I-134	5.68E+00	Y-90	1.32E-01	Zr-95	7.35E+01	Mn-54	4.04E+01
I-135	4.27E+01	Sr-91	1.87E+02	Nb-95	2.53E+00	Mn-56	2.19E+02
		Sr-92	1.55E+01	Ru-103	7.87E+00	Co-58	9.38E+03
		Mo-99	1.55E+01	Rh-103m	1.50E+01	Co-60	1.50E+02
		Tc-99m	6.96E+00	Ru-106	1.50E+01	Fe-55	1.41E+01
		Te-129m	3.13E+00	Rh-106	3.38E+01	Fe-59	3.79E+02
		Te-131m	2.30E+02	La-140	3.38E+01	Ni-63	8.72E+02
		Te-132	2.30E+02	Ce-141	6.56E+00	Cu-64	7.90E+02
		Cs-134	6.46E+01	Ce-144	6.56E+00	Zn-65	5.40E+01
		Cs-136	1.75E+00	Pr-143	4.05E+02	Ag-110m	2.19E+03
		Cs-137	1.64E+01			W-187	8.47E+01
		Cs-138	5.84E+01				
		Ba-140	1.88E+01				
		Np-239	1.62E+02				
Total	7.60E+02	Total	1.32E+03	Total	1.66E+03	Total	1.42E+04

Table 12.2-13f ~~Liquid Radwaste Component Inventories-HWC Demineralizer~~
Not Used

Table 12.2-13g Liquid Radwaste Component Inventories-HCW Sample Tank

Source volume = 140 m^3

Total MBq: 1.81E+00

Halogens		Soluble Fission Products		Insoluble Fission Products		Activation Products	
Isotope	MBq	Isotope	MBq	Isotope	MBq	Isotope	MBq
I-131	2.90E-02	Rb-89	9.29E-07	Y-91	6.90E-03	Na-24	3.38E-04
I-132	1.25E-03	Sr-89	1.75E-02	Y-92	4.99E-06	P-32	1.71E-02
I-133	2.99E-01	Sr-90	1.55E-03	Y-93	4.48E-05	Cr-51	8.22E-01
I-134	2.78E-04	Y-90	1.55E-03	Zr-95	1.42E-03	Mn-54	1.48E-02
I-135	1.57E-02	Sr-91	3.68E-05	Nb-95	1.42E-03	Mn-56	2.03E-05
		Sr-92	4.74E-06	Ru-103	3.09E-03	Co-58	3.60E-02
		Mo-99	7.92E-03	Rh-103m	3.09E-03	Co-60	8.70E-02
		Tc-99m	7.92E-03	Ru-106	6.50E-04	Fe-55	5.47E-02
		Te-129m	5.79E-03	Rh-106	6.50E-04	Fe-59	4.98E-03
		Te-131m	2.92E-05	La-140	3.07E-02	Ni-63	2.19E-01
		Te-132	6.41E-04	Ce-141	4.41E-03	Cu-64	6.05E-04
		Cs-134	5.77E-03	Ce-144	6.42E-04	Zn-65	4.14E-02
		Cs-136	1.43E-03	Pr-143	6.42E-04	Ag-110m	2.07E-04
		Cs-137	1.62E-02			W-187	4.20E-05
		Cs-138	1.65E-07				
		Ba-140	3.07E-02				
		Np-239	1.97E-02				
Total	3.45E-01	Total	1.17E-01	Total	5.36E-02	Total	1.30E+00

Table 12.2-13h Liquid Radwaste Component Inventories-HSD Receiver Tank

Source volume= 30.00 m^3

Total MBq 1.59E+03

Halogens		Soluble fission Products		Insoluble fission Products		Activation Products	
Isotope	MBq	Isotope	MBq	Isotope	MBq	Isotope	MBq
I-131	2.05E+02	Rb-89	3.32E-01	Y-91	2.29E+00	Na-24	4.71E+01
I-132	2.13E+01	Sr-89	5.92E+00	Y-92	5.32E+00	P-32	9.75E+00
I-133	2.25E+02	Sr-90	4.28E-01	Y-93	1.17E+01	Cr-51	3.33E+02
I-134	1.34E+01	Y-90	4.28E-01	Zr-95	4.61E-01	Mn-54	4.23E+00
I-135	7.46E+01	Sr-91	1.07E+01	Nb-95	4.61E-01	Mn-56	3.12E+01
		Sr-92	6.87E+00	Ru-103	1.12E+00	Co-58	1.16E+01
		Mo-99	4.55E+01	Rh-103m	1.12E+00	Co-60	2.41E+01
		Tc-99m	4.55E+01	Ru-106	1.85E-01	Fe-55	4.40E+01
		Te-129m	2.20E+00	Rh-106	1.85E-01	Fe-59	1.74E+00
		Te-131m	1.03E+00	La-140	1.90E+01	Ni-63	6.04E+01
		Te-132	2.59E+00	Ce-141	1.69E+00	Cu-64	1.10E+02
		Cs-134	1.64E+00	Ce-144	1.84E-01	Zn-65	1.19E+01
		Cs-136	8.76E-01	Pr-143	1.84E-01	Ag-110m	5.96E-02
		Cs-137	4.48E+00			W-187	2.41E+00
		Cs-138	1.37E+00				
		Ba-140	1.90E+01				
		Np-239	1.64E+02				
Total	5.39E+02	Total	3.13E+02	Total	4.39E+01	Total	6.91E+02

Table 12.2-15a Solid Radwaste Component Inventories CUW Backwash Receiving Tank

Source volume= 50 m^3

Total MBq 1.94E+08

Halogens		Soluble fission Products		Insoluble fission Products		Activation Products	
Isotope	MBq	Isotope	MBq	Isotope	MBq	Isotope	MBq
I-131	2.41E+07	Rb-89	2.82E+04	Y-91	3.66E+05	Na-24	5.01E+06
I-132	3.06E+06	Sr-89	9.40E+05	Y-92	7.37E+05	P-32	1.32E+06
I-133	2.20E+07	Sr-90	7.27E+04	Y-93	1.36E+06	Cr-51	4.99E+07
I-134	2.01E+06	Y-90	7.27E+04	Zr-95	7.41E+04	Mn-54	7.12E+05
I-135	9.52E+06	Sr-91	1.27E+06	Nb-95	7.41E+04	Mn-56	4.44E+06
		Sr-92	9.76E+05	Ru-103	1.73E+05	Co-58	1.87E+06
		Mo-99	4.05E+06	Rh-103m	1.73E+05	Co-60	4.10E+06
		Tc-99m	4.05E+06	Ru-106	3.11E+04	Fe-55	5.41E+06
		Te-129m	3.36E+05	Rh-106	3.11E+04	Fe-59	2.73E+05
		Te-131m	9.27E+04	La-140	2.51E+06	Ni-63	1.03E+07
		Te-132	2.37E+05	Ce-141	2.58E+05	Cu-64	1.22E+07
		Cs-134	1.54E+05	Ce-144	3.09E+04	Zn-65	2.00E+06
		Cs-136	6.44E+04	Pr-143	3.09E+04	Ag-110m	1.00E+04
		Cs-137	4.23E+05			W-187	2.28E+05
		Cs-138	2.07E+05				
		Ba-140	2.51E+06				
		Np-239	1.44E+07				
	6.06E+07	Total	2.98E+07	Total	5.85E+06	Total	9.77E+07

Table 12.2-15b Solid Radwaste Component Inventories CF Backwash Receiving Tank

Source volume = 35 m^3

Total MBq: 2.59E+03

Halogens		Soluble Fission Products		Insoluble Fission Products		Activation Products	
Isotope	MBq	Isotope	MBq	Isotope	MBq	Isotope	MBq
I-131	0.00E+00	Rb-89	0.00E+00	Y-91	2.06E+02	Na-24	0.00E+00
I-132	0.00E+00	Sr-89	0.00E+00	Y-92	2.63E+02	P-32	0.00E+00
I-133	0.00E+00	Sr-90	0.00E+00	Y-93	4.88E+02	Cr-51	0.00E+00
I-134	0.00E+00	Y-90	0.00E+00	Zr-95	4.21E+01	Mn-54	0.00E+00
I-135	0.00E+00	Sr-91	0.00E+00	Nb-95	4.21E+01	Mn-56	0.00E+00
		Sr-92	0.00E+00	Ru-103	9.45E+01	Co-58	0.00E+00
		Mo-99	0.00E+00	Rh-103m	9.45E+01	Co-60	0.00E+00
		Tc-99m	0.00E+00	Ru-106	1.87E+01	Fe-55	0.00E+00
		Te-129m	0.00E+00	Rh-106	1.87E+01	Fe-59	0.00E+00
		Te-131m	0.00E+00	La-140	1.14E+03	Ni-63	0.00E+00
		Te-132	0.00E+00	Ce-141	1.37E+02	Cu-64	0.00E+00
		Cs-134	0.00E+00	Ce-144	1.85E+01	Zn-65	0.00E+00
		Cs-136	0.00E+00	Pr-143	1.85E+01	Ag-110m	0.00E+00
		Cs-137	0.00E+00			W-187	0.00E+00
		Cs-138	0.00E+00				
		Ba-140	0.00E+00				
		Np-239	0.00E+00				
Total	0.00E+00	Total	0.00E+00	Total	2.59E+03	Total	0.00E+00

Table 12.2-15c Solid Radwaste Component Inventories Phase Separator

Source volume= 100 m^3

Total MBq 5.10E+08

Halogens		Soluble fission Products		Insoluble fission Products		Activation Products	
Isotope	MBq	Isotope	MBq	Isotope	MBq	Isotope	MBq
I-131	2.41E+07	Rb-89	8.06E+04	Y-91	1.05E+06	Na-24	1.43E+07
I-132	8.75E+06	Sr-89	2.69E+06	Y-92	2.11E+06	P-32	3.76E+06
I-133	6.28E+07	Sr-90	2.08E+05	Y-93	3.90E+06	Cr-51	1.43E+08
I-134	5.74E+06	Y-90	2.08E+05	Zr-95	2.12E+05	Mn-54	2.03E+06
I-135	2.72E+07	Sr-91	3.63E+06	Nb-95	2.12E+05	Mn-56	1.27E+07
		Sr-92	2.79E+06	Ru-103	4.96E+05	Co-58	5.34E+06
		Mo-99	1.16E+07	Rh-103m	4.96E+05	Co-60	1.17E+07
		Tc-99m	1.16E+07	Ru-106	8.89E+04	Fe-55	1.54E+07
		Te-129m	9.61E+05	Rh-106	8.89E+04	Fe-59	7.81E+05
		Te-131m	2.65E+05	La-140	7.17E+06	Ni-63	2.94E+07
		Te-132	6.78E+05	Ce-141	7.37E+05	Cu-64	3.48E+07
		Cs-134	4.39E+05	Ce-144	8.84E+04	Zn-65	5.71E+06
		Cs-136	1.84E+05	Pr-143	8.84E+04	Ag-110m	2.86E+04
		Cs-137	1.21E+06			W-187	6.50E+05
		Cs-138	5.93E+05				
		Ba-140	7.17E+06				
		Np-239	4.10E+07				
Total	1.29E+08	Total	8.53E+07	Total	1.67E+07	Total	2.79E+08

Table 12.2-15d Solid Radwaste Component Inventories Spent Resin Storage Tank

Source volume= 100 m^3

Total MBq 1.94E+08

Halogens		Soluble fission Products		Insoluble fission Products		Activation Products	
Isotope	MBq	Isotope	MBq	Isotope	MBq	Isotope	MBq
I-131	1.48E+06	Rb-89	1.58E+02	Y-91	7.01E+01	Na-24	3.37E+04
I-132	1.53E+05	Sr-89	2.47E+04	Y-92	3.34E+01	P-32	1.43E+04
I-133	1.11E+06	Sr-90	4.45E+03	Y-93	6.21E+01	Cr-51	8.46E+05
I-134	9.88E+04	Y-90	4.45E+03	Zr-95	1.51E+01	Mn-54	3.66E+04
I-135	4.79E+05	Sr-91	8.53E+03	Nb-95	1.51E+01	Mn-56	2.97E+04
		Sr-92	6.52E+03	Ru-103	2.57E+01	Co-58	5.91E+04
		Mo-99	2.75E+04	Rh-103m	2.57E+01	Co-60	2.45E+05
		Tc-99m	2.75E+04	Ru-106	1.12E+01	Fe-55	4.74E+04
		Te-129m	6.52E+03	Rh-106	1.12E+01	Fe-59	6.59E+03
		Te-131m	6.24E+02	La-140	1.73E+02	Ni-63	6.31E+05
		Te-132	1.62E+03	Ce-141	3.32E+01	Cu-64	8.19E+04
		Cs-134	7.28E+03	Ce-144	1.06E+01	Zn-65	9.87E+04
		Cs-136	6.02E+02	Pr-143	1.06E+01	Ag-110m	4.95E+02
		Cs-137	2.35E+04			W-187	1.53E+03
		Cs-138	6.76E+02				
		Ba-140	2.55E+04				
		Np-239	9.69E+04				
	3.32E+06	Total	2.67E+05	Total	4.97E+02	Total	2.13E+06

Table 12.2-15e ~~Solid Radwaste Component Inventories Concentrated Waste Tank~~
Not Used

Table 12.2- 15f ~~Solid Radwaste Component Inventories Solids Dryer Feed Tank~~
Not Used

Table 12.2- 15g ~~Solid Radwaste Component Inventories Solids Dryer (Outlet)~~ Not Used

Table 12.2- 15h ~~Solid Radwaste Component Inventories Solids Dryer Pelletizer~~ Not Used

Table 12.2- 15i ~~Solid Radwaste Component Inventories Solids Mist Separator (Steam)~~ Not Used

Table 12.2- 15j ~~Solid Radwaste Component Inventories Solids Condenser~~ Not Used

Table 12.2- 15k ~~Solid Radwaste Component Inventories Solids Drum~~ Not Used

Table 12.2- 15l Solid Radwaste Component Inventories LRS Backwash Receiving Tank

Source volume = 50 m^3

Total MBq: 1.94E+8

Halogens		Soluble Fission Products		Insoluble Fission Products		Activation Products	
Isotope	**MBq**	**Isotope**	**MBq**	**Isotope**	**MBq**	**Isotope**	**MBq**
I-131	2.41E+07	Rb-89	2.82E+04	Y-91	3.66E+05	Na-24	5.01E+06
I-132	3.06E+06	Sr-89	9.40E+05	Y-92	7.37E+05	P-32	1.32E+06
I-133	2.20E+07	Sr-90	7.27E+04	Y-93	1.36E+06	Cr-51	4.99E+07
I-134	2.01E+06	Y-90	7.27E+04	Zr-95	7.41E+04	Mn-54	7.12E+05
I-135	9.52E+06	Sr-91	1.27E+06	Nb-95	7.41E+04	Mn-56	4.44E+06
		Sr-92	9.76E+05	Ru-103	1.73E+05	Co-58	1.87E+06
		Mo-99	4.05E+06	Rh-103m	1.73E+05	Co-60	4.10E+06
		Tc-99m	4.05E+06	Ru-106	3.11E+04	Fe-55	5.41E+06
		Te-129m	3.36E+05	Rh-106	3.11E+04	Fe-59	2.73E+05
		Te-131m	9.27E+04	La-140	2.51E+06	Ni-63	1.03E+07
		Te-132	2.37E+05	Ce-141	2.58E+05	Cu-64	1.22E+07
		Cs-134	1.54E+05	Ce-144	3.09E+04	Zn-65	2.00E+06
		Cs-136	6.44E+04	Pr-143	3.09E+04	Ag-110m	1.00E+04
		Cs-137	4.23E+05			W-187	2.28E+05
		Cs-138	2.07E+05				
		Ba-140	2.51E+06				
		Np-239	1.44E+07				
	6.06E+07	Total	2.98E+07	Total	5.85E+06	Total	9.77E+07

Table 12.2-20 Airborne Concentrations

Nuclides	Annual Average Airborne per Unit		Site Wide
	Release MBq/yr	Concentration MBq/cm^3	10CFR20 Limits MBq/cm^3
Kr-83m	3.10E+01	1.28E-17	1.85E-06
Kr-85m	7.80E+05	3.22E-13	3.70E-09
Kr-85	2.10E+07	8.66E-12	2.59E-08
Kr-87	9.30E+05	3.83E-13	7.40E-10
Kr-88	1.40E+06	5.77E-13	3.33E-10
Kr-89	8.90E+06	3.67E-12	
Kr-90	1.20E+01	4.95E-18	
Xe-131m	1.90E+06	7.83E-13	7.40E-08
Xe-133m	3.20E+03	1.32E-15	2.22E-08
Xe-133	8.90E+07	3.67E-11	1.85E-08
Xe-135m	1.50E+07	6.18E-12	1.48E-09
Xe-135	1.70E+07	7.01E-12	2.59E-09
Xe-137	1.90E+07	7.83E-12	
Xe-138	1.60E+07	6.60E-12	7.40E-10
Xe-139	1.50E+01	6.18E-18	
I-131	9.60E+03	3.96E-15	7.40E-12
I-132	8.10E+04	3.34E-14	7.40E-10
I-133	6.30E+04	2.60E-14	3.70E-11
I-134	1.40E+05	5.77E-14	2.22E-09
I-135	8.90E+04	3.67E-14	2.22E-10
H-3	2.70E+06	1.11E-12	3.70E-09
C-14	3.40E+05	1.40E-13	1.11E-10
Na-24	1.50E+02	6.18E-17	2.59E-10
P-32	3.40E+01	1.40E-17	3.70E-11
Ar-41	2.50E+05	1.03E-13	3.70E-10
Cr-51	1.30E+03	5.36E-16	1.11E-09
Mn-54	2.00E+02	8.24E-17	3.70E-11
Mn-56	1.30E+02	5.36E-17	7.40E-10
Fe-55	2.40E+02	9.89E-17	1.11E-10
Fe-59	3.00E+01	1.24E-17	1.85E-11
Co-58	8.90E+01	3.67E-17	3.70E-11
Co-60	4.80E+02	1.98E-16	1.85E-12
Ni-63	2.40E-01	9.89E-20	3.70E-11
Cu-64	3.70E+02	1.53E-16	1.11E-09
Zn-65	4.10E+02	1.69E-16	1.48E+09
Rb-89	1.60E+00	6.60E-19	7.40E-09
Sr-89	2.10E+02	8.66E-17	3.70E-11

Table 12.2-20 Airborne Concentrations

Nuclides	Annual Average Airborne per Unit Release MBq/yr	Annual Average Airborne per Unit Concentration MBq/cm^3	Site Wide 10CFR20 Limits MBq/cm^3
Sr-90	2.60E+00	1.07E-18	2.22E-13
Y-90	1.70E+00	7.01E-19	3.33E-11
Sr-91	3.70E+01	1.53E-17	1.85E-10
Sr-92	2.90E+01	1.20E-17	3.33E-10
Y-91	8.90E+00	3.67E-18	7.40E-12
Y-92	2.30E+01	9.48E-18	3.70E-10
Y-93	4.10E+01	1.69E-17	1.11E-10
Zr-95	5.90E+01	2.43E-17	1.48E-11
Nb-95	3.10E+02	1.28E-16	7.40E-11
Mo-99	2.20E+03	9.07E-16	1.48E-10
Tc-99m	1.10E+01	4.53E-18	3.33E-11
Ru-103	1.30E+02	5.36E-17	3.33E-11
Rh-103m	4.10E+00	1.69E-18	7.40E-08
Ru-106	7.00E-01	2.89E-19	3.70E-12
Rh-106	7.00E-01	2.89E-19	1.48E-09
Ag-110m	7.40E-02	3.05E-20	3.70E-12
Sb-124	6.70E+00	2.76E-18	1.11E-11
Te-129m	8.10E+00	3.34E-18	3.33E-09
Te-131m	2.80E+00	1.15E-18	3.70E-11
Te-132	7.00E-01	2.89E-19	3.70E-11
Cs-134	2.30E+02	9.48E-17	7.40E-12
Cs-136	2.20E+01	9.07E-18	3.33E-11
Cs-137	3.50E+02	1.44E-16	7.40E-12
Cs-138	6.30E+00	2.60E-18	2.96E-11
Ba-140	1.00E+03	4.12E-16	7.40E-11
La-140	6.70E+01	2.76E-17	7.40E-11
Ce-141	3.40E+02	1.40E-16	3.70E-11
Ce-144	7.00E-01	2.89E-19	1.48E-12
Pr-144	7.00E-01	2.89E-19	7.40E-09
W-187	7.00E+00	2.89E-18	3.70E-10
Np-239	4.40E+02	1.81E-16	1.11E-10

Table 12.2-21 Gaseous Pathway Doses for Maximally Exposed Individual [1] One Unit (millirem per year)

PATHWAY	T.BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID [4]	LUNG	SKIN
PLUME	1.67E-01	1.67E-01	1.67E-01	1.67E-01	1.67E-01	8.65E-02	1.71E-01	4.62E-01
GROUND	2.36E-02	2.36E-02	2.36E-02	2.36E-02	2.36E-02	2.83E-02	2.36E-02	2.77E-02
VEGETABLE								
ADULT [2]	4.09E-02	4.04E-02	1.76E-01	4.41E-02	4.02E-02	8.30E-01	3.43E-02	3.35E-02
TEEN [2]	6.15E-02	6.10E-02	2.84E-01	7.00E-02	6.40E-02	1.06E+00	5.55E-02	5.40E-02
CHILD	1.38E-01	1.35E-01	6.80E-01	1.56E-01	1.45E-01	1.99E+00	1.31E-01	1.29E-01
MEAT								
ADULT	1.33E-02	1.80E-02	6.15E-02	1.38E-02	1.32E-02	3.99E-02	1.25E-02	1.23E-02
TEEN	1.09E-02	1.36E-02	5.20E-02	1.15E-02	1.10E-02	2.97E-02	1.05E-02	1.04E-02
CHILD	2.00E-02	2.11E-02	9.80E-02	2.09E-02	2.02E-02	4.67E-02	1.96E-02	1.94E-02
COW MILK [2]								
ADULT	2.08E-02	1.65E-02	7.40E-02	2.49E-02	2.18E-02	9.75E-01	1.44E-02	1.37E-02
TEEN	3.36E-02	2.85E-02	1.35E-01	4.45E-02	3.91E-02	1.55E+00	2.64E-02	2.50E-02
CHILD	7.20E-02	6.35E-02	3.32E-01	9.35E-02	8.40E-02	3.10E+00	6.30E-02	6.10E-02
INFANT [2]	1.43E-01	1.36E-01	6.45E-01	1.93E-01	1.65E-01	7.50E+00	1.31E-01	1.27E-01
GOAT MILK [3]								
ADULT	3.11E-02	1.60E-02	8.25E-02	3.84E-02	2.70E-02	1.28E+00	1.63E-02	1.41E-02
TEEN	4.33E-02	2.80E-02	1.52E-01	6.80E-02	4.81E-02	2.03E+00	3.00E-02	2.55E-02
CHILD	7.90E-02	6.35E-02	3.71E-01	1.33E-01	9.90E-02	4.05E+00	6.85E-02	6.15E-02
INFANT	1.50E-01	1.31E-01	7.10E-01	2.70E-01	1.90E-01	9.80E+00	1.41E-01	1.28E-01
INHAL								
ADULT	1.62E-03	2.14E-03	8.15E-04	2.41E-03	3.06E-03	7.45E-02	3.67E-03	1.03E-03
TEEN	1.75E-03	2.33E-03	1.13E-03	2.92E-03	3.80E-03	9.75E-02	5.05E-03	1.04E-03
CHILD	1.67E-03	1.77E-03	1.51E-03	2.71E-03	3.46E-03	1.21E-01	4.25E-03	9.20E-04
INFANT	1.04E-03	9.55E-04	1.13E-03	2.10E-03	2.17E-03	1.10E-01	3.06E-03	5.30E-04
SUM OF VIABLE PATHWAYS (CHILD)	3.51E-01	3.48E-01	9.70E-01	3.70E-01	3.59E-01	2.27E+00	3.49E-01	6.40E-01

[1] Maximally exposed individual for total body and all organs except thyroid is child resident, 2.19 miles WSW of STP3/4.

[2] Adult, teen and infant doses are presented as additional information.

[3] Cow milk and goat milk pathway doses are hypothetical for this location and are presented as additional information only; no milk animals are located within 5 miles of the plant.

[4] Maximally exposed individual for thyroid. Child resident 3.04 miles NNW.

Ground level releases assumed.

Source: GASPAR II calculated pathway doses for locations indicated in footnotes [1] and [4]

Table 12.2-22 Average Annual Liquid Releases

Nuclide	Annual Release MBq/yr	Concentration MBq/ml
I-131	3.35E+02	1.75E-13
I-132	7.15E+01	3.75E-14
I-133	1.38E+03	7.23E-13
I-134	4.22E+00	2.21E-15
I-135	4.03E+02	2.11E-13
H-3	2.96E+05	1.55E-10
C-14	0.00E+00	0.00E+00
Na-24	1.87E+02	9.78E-14
P-32	2.10E+01	1.10E-14
Cr-51	6.30E+02	3.30E-13
Mn-54	1.47E+02	7.68E-14
Mn-56	7.55E+01	3.95E-14
Co-56	0.00E+00	0.00E+00
Co-57	0.00E+00	0.00E+00
Co-58	3.10E+02	1.62E-13
Co-60	5.69E+02	2.98E-13
Fe-55	3.50E+02	1.83E-13
Fe-59	8.24E+01	4.31E-14
Ni-63	6.29E+01	3.30E-14
Cu-64	4.67E+02	2.45E-13
Zn-65	1.63E+01	8.53E-15
Rb-89	0.00E+00	0.00E+00
Sr-89	1.16E+01	6.08E-15
Sr-90	9.92E-01	5.19E-16
Y-90	0.00E+00	0.00E+00
Sr-91	4.64E+01	2.43E-14
Y-91	8.70E+00	4.55E-15
Sr-92	1.64E+01	8.58E-15
Y-92	6.27E+01	3.28E-14
Y-93	5.05E+01	2.64E-14
Zr-95	4.10E+01	2.14E-14
Nb-95	1.16E+01	6.08E-15
Mo-99	9.66E+01	5.06E-14
Tc-99m	2.10E+02	1.10E-13
Ru-103	1.21E+01	6.34E-15
Rh-103m	0.00E+00	0.00E+00
Ru-106	3.29E+02	1.72E-13
Rh-106	0.00E+00	0.00E+00

Nuclide	Annual Release MBq/yr	Concentration MBq/ml
Te-129m	3.12E+00	1.63E-15
Te-131m	3.10E+00	1.63E-15
Te-132	5.00E-01	2.62E-16
Cs-134	4.18E+02	2.19E-13
Cs-136	2.78E+01	1.46E-14
Cs-137	6.57E+02	3.44E-13
Cs-138	2.96E-02	1.55E-17
Ba-140	6.23E+01	3.26E-14
La-140	0.00E+00	0.00E+00
Ce-141	1.10E+01	5.74E-15
Ce-144	1.44E+02	7.56E-14
Pr-143	3.00E+00	1.57E-15
Nd-147	7.40E-02	3.87E-17
W-187	8.24E+00	4.32E-15
Np-239	3.51E+02	1.84E-13

Table 12.2-23 Liquid Pathway Dose Analysis[1] (millirem per year) (One Unit)

Skin	Bone	Liver	Total Body	Thyroid	Kidney	Lung	GI-LLI [2]
2.12 E-4	1.15 E-3	2.92E-4	2.63E-4	2.03 E-4	2.13E-4	2.05 E-4	4.34 E-4

[1] Liquid pathway MEI is a teenager ingesting fresh water sport fish and receiving shoreline exposure from the Little Robbins Slough.

[2] GI-LLI = Gastrointestinal-lining of lower intestine.

Table 12.2-28 Activity in the Condenser Demineralizer

Isotopes	Demin MBq	Filter MBq	Isotopes	Demin MBq	Filter MBq
I-131	1.48E+06	0.00E+00	Sr-92	6.52E+03	0.00E+00
I-132	1.53E+05	0.00E+00	Y-91	7.01E+01	7.75E+03
I-133	1.11E+06	0.00E+00	Y-92	3.34E+01	9.87E+03
I-134	9.88E+04	0.00E+00	Y-93	6.21E+01	1.83E+04
I-135	4.79E+05	0.00E+00	Zr-95	1.51E+01	1.58E+03
Total	3.32E+06	0.00E+00	Nb-95	1.51E+01	1.58E+03
			Mo-99	2.75E+04	0.00E+00
Rb-89	1.58E+02	0.00E+00	Tc-99m	2.75E+04	0.00E+00
Cs-134	7.28E+03	0.00E+00	Ru-103	2.57E+01	3.55E+03
Cs-136	6.02E+02	0.00E+00	Rh-103m	2.57E+01	3.55E+03
Cs-137	2.35E+04	0.00E+00	Ru-106	1.12E+01	7.03E+02
Cs-138	6.76E+02	0.00E+00	Rh-106	1.12E+01	7.03E+02
Total	3.22E+04	0.00E+00	Ag-110m	4.95E+02	0.00E+00
			Te-129m	6.52E+03	0.00E+00
			Te-131m	6.24E+02	0.00E+00
Na-24	3.37E+04	0.00E+00	Te-132	1.62E+03	0.00E+00
P-32	1.43E+04	0.00E+00	Ba-140	2.55E+04	0.00E+00
Cr-51	8.46E+05	0.00E+00	La-140	1.73E+02	4.30E+04
Mn-54	3.66E+04	0.00E+00	Ce-141	3.32E+01	5.16E+03
Mn-56	2.97E+04	0.00E+00	Ce-144	1.06E+01	6.96E+02
Fe-55	4.74E+04	0.00E+00	Pr-143	1.06E+01	6.96E+02
Fe-59	6.59E+03	0.00E+00	W-187	1.53E+03	0.00E+00
Co-58	5.91E+04	0.00E+00	Np-239	9.69E+04	0.00E+00
Co-60	2.45E+05	0.00E+00	Total	2.37E+06	9.72E+04
Ni-63	6.31E+05	0.00E+00			
Cu-64	8.19E+04	0.00E+00			
Zn-65	9.87E+04	0.00E+00			
Sr-89	2.47E+04	0.00E+00			
Sr-90	4.45E+03	0.00E+00			
Y-90	4.45E+03	0.00E+00			
Sr-91	8.53E+03	0.00E+00			
			Total	5.72E+06	9.72E+04