15.7 Radioactive Release from Subsystems and Components

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

STD DEP T1 2.15-1

STD DEP 11.3-1 (Figure 15.7-2)

15.7.1.1 Basis and Assumptions

STD DEP 11.3-1

*The ABWR offgas system is detailed in Subsection 11.3. The system is designed to be both detonation and seismic resistant and meets all criteria of Regulatory Guide 1.143. As such the failure of a single active component leading to a direct release of radioactive gases to the environment is highly unlikely. Therefore, inadvertent operator action with bypass of the delay charcoal beds is analyzed for compliance to ESTB 11-5. A top level diagram of the ABWR offgas system can be found in Figure 11.3-1 (see also Figure 15.7- 2) which shows that the ABWR charcoal beds consists of ~~nine~~*five *charcoal tanks.The first or guard tank contains 4,721 kg of charcoal followed by ~~a flow split into four lines, each line of which leads through 2 massive tanks~~*four tanks *each containing ~~12~~27,200 kg of charcoal. Bypass valves exists to direct flow around the (1) guard tank, (2) four series of follow-on tanks or (3) all tanks. To bypass either pathway (1) or (2) above requires the operator to enter a computer command with a required permissive. To bypass all tanks (pathway (3)) requires the operator to key in the command with two separate permissives. Since pathway (3) would require both inadvertent operation upon the operator (keying in the wrong command) plus getting two specific permissives for three incorrect decisions, it is not assumed that pathway (3) is likely to occur. Redundant upon human decision making and downstream of the charcoal beds and the post charcoal bed particle filter shown in Figure 11.3-1 are a series of two redundant radiation monitoring instruments and an air operated isolation valve which will alarm the control room and automatically shut off all flow from the offgas system for radioactivity levels in excess of environmental limits which are defined by 10CFR20 as not greater than $2x10^{-2}$m Sv/h at the site boundary. Therefore, bypass of the charcoal beds during periods with significant radioactive flow through the offgas system will be limited and/or automatically terminated by actuation of the downstream sensors.*

To evaluate the potential radiological consequences of an inadvertent bypass of the charcoal beds, it was assumed that operator error or computer error has led to the bypass of the ~~eight~~ four *follow-on beds in addition to the failure of the automated air operated downstream isolation valve. It is also assumed that during this period, the plant is running at and continues to run at the maximum permissible offgas rate of 14.8 GBq/s (based upon the assumption of 0.0037 GBq/s/MWt as stipulated in Standard Review Plan 11.3) evaluated to a decay time of 30 minutes from the vessel exit nozzle. Even with the failure of the downstream isolation valve, it is not*

anticipated or assumed that the isolation instrumentation would fail but would instead alarm the control room with a high radiation alarm causing the operator to manually isolate the offgas system (i.e., close suction valves) within 30 minutes of the alarm. Therefore, this analysis differs from the branch technical position on the following points:

(1) Flow is through a single 4,721 kg charcoal tank with an evaluated hold up time given by NUREG-0016, equation 1.5.1.6 using K_d's for Kr and Xe from NUREG-0016.

(2) An isolation valve prevents flow through the ~~*There is no motive force to remove any significant inventory from the eight*~~ *follow-on charcoal tanks while in bypass and therefore no activity from these tanks is included in the final release calculations.*

15.7.3.1 Identification of Cause and Frequency Classification

STD DEP T1 2.15-1

The ABWR Radwaste Building is ~~*a Seismic Category I structure*~~ *designed* ~~*to withstand all credible seismic events*~~ in accordance with the requirements of Regulatory Guide 1.143. *In addition, all compartments containing liquid radwastes are steel-lined up to a height capable of containing the release of all the liquid radwastes into the compartment. Because of these design capabilities, it is considered remote that any major accident involving the release of liquid radwastes into these volumes would result in the release of these liquids to the environment via the liquid pathway. Releases as a result of major cracks would instead result in the release of the liquid radwastes to the compartment and then to the building sump system for containment in other tanks or emergency tanks. A complete description of the Liquid Radwaste System is found Section 11.2, except for the tank inventories, which are found in Section 12.2.*

15.7.6 COL License Information

15.7.6.1 Radiological Consequences of Non-Line Break Accidents

The following site-specific supplements address COL License Information Item 15.9.

Radwaste System Failure Accident (Liquid Radwaste Tank Accident)

The STP 3 & 4 site-specific Exclusion Area Boundary (EAB) short-term release (accident) χ/Q is 1.96E-04 sec/m^3. Table 15.7-7 of the reference ABWR DCD provides radwaste system failure EAB doses as a function of χ/Q. The STP 3 & 4 thyroid and whole body doses associated with a radwaste system failure are a fraction of the 10 CFR 100 criteria and are provided below:

Meteorology (sec/m^3)	Distance (m)	Thyroid Dose (Sv)	Whole Body Dose (Sv)
1.96E-04	EAB	4.1E-02	3.4E-05

Fuel Handling Accident

Table 15.7-11 of the reference ABWR DCD provides fuel handling accident (FHA) EAB doses as a function of χ/Q. The STP 3 & 4 thyroid and whole body doses associated with a FHA are within the guidelines of 10 CFR 100 criteria and are provided below:

Meteorology (sec/m^3)	Distance (m)	Thyroid Dose (Sv)	Whole Body Dose (Sv)
1.96E-04	EAB	1.1E-01	1.8E-03

Fuel Cask Drop Accident

Table 15.7-14 of the reference ABWR DCD provides fuel cask drop accident EAB doses as a function of χ/Q. The STP 3 & 4 thyroid and whole body doses associated with a fuel cask drop accident are within the guidelines of 10 CFR 100 criteria and are provided below:

Meteorology (sec/m^3)	Distance (m)	Thyroid Dose (Sv)	Whole Body Dose (Sv)
1.96E-04	EAB	8.0E-03	1.4E-05

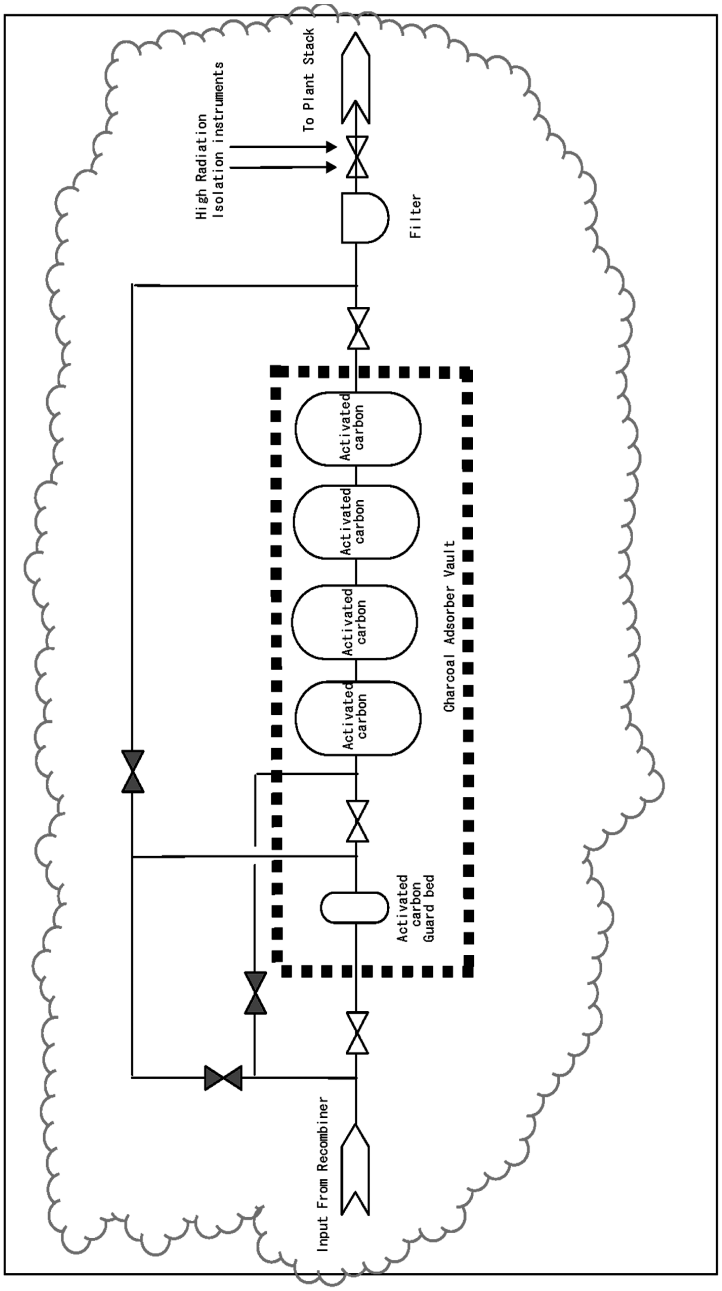

Figure 15.7-2 Offgas System (See Subsection 11.3)