February 24, 1993

Attached are the recent revisions to the Offsite Dose Calculation Manual's (ODCM) Chapter 10 and Appendix F for Braidwood Station. Please complete the following manual update:

REMOVE	INSERT
Braidwood Station Annex Entire Chapter 10. p. 10-i to 10-iii, 10-1 to 10-18	Braidwood Station Annex Entire Chapter 10 Revision 0.K, Jan. 1993 p. 10-i to 10-v, 10-1 to 10-19
Braidwood Station Annex Entire Appendix F p. F-i to F-iv, F-1 to F-22	Braidwood Station Annex Entire Appendix F Includes Rev. 0.K p. F-i to F-iv F-1 to F-22

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BRAIDWOOD ANNEX INDEX

CHAPTER 10

RADIOACTIVE EFFLUENT TREATMENT AND MONITORING

TABLE OF CONTENTS

CHAPTER 10

RADIOACTIVE EFFLUENT TREATMENT AND MONITORING

TABLE OF CONTENTS

CHAPTER 10

LIST OF TABLES

CHAPTER 10

LIST OF FIGURES

CHAPTER 10

RADIOACTIVE EFFLUENT TREATMENT AND MONITORING

10.1 AIRBORNE RELEASES

10.1.1 System Description

A simplified HVAC and gaseous effluent flow diagram is provided in Figure 10-1. The principal release points for potentially radioactive airborne effluents are the two auxiliary building vent stacks (designated Unit 1 Vent Stack and Unit 2 Vent Stack in Figure 10-1). In the classification scheme of Section 4.1.4, each is classified as a vent release point (see Table A-1 of Appendix A).

10.1.1.1 Waste Gas Holdup System

The waste gas holdup system is designed and installed to reduce radioactive gaseous effluents by collecting reactor coolant system off-gases from the reactor coolant system and providing for delay or holdup to reduce the total radioactivity by radiodecay prior to release to the environment. The system is described in Section 11.3.2 of the Byron/Braidwood UFSAR.

10.1.1.2 Ventilation Exhaust Treatment System

Ventilation exhaust treatment systems are designed and installed to reduce gaseous radioiodine or radioactive material in particulate form in gaseous effluents by passing ventilation or vent exhaust gases through HEPA filters (and charcoal adsorbers when required to mitigate potential iodine releases) prior to release to the environment. Such a system is not considered to have any effect on noble gas effluents. The ventilation exhaust treatment systems are shown in Figure 10-1.

Engineered safety features atmospheric cleanup systems are not considered to be ventilation exhaust treatment system components.

10.1.2 Radiation Monitors

10.1.2.1 Auxiliary Building Vent Effluent Monitors

Monitors 1RE-PR028 (Unit 1) and 2RE-PR028 (Unit 2) continuously monitor the final effluent from the auxiliary building vent stacks.

Both vent stack monitors feature automatic isokinetic sampling, grab sampling, and tritium sampling.

In normal operation all three noble gas channels (low, mid-range, high) are on line and active. On a high alarm the low and mid-range noble gas channels are closed and only the high range noble gas channel remains active. The iodine and particulate channels, however, continue to operate under all conditions.

No automatic isolation or control functions are performed by these monitors. Pertinent information on these monitors is provided in Byron/Braidwood UFSAR Table 11.5-1.

10.1.2.2 Containment Purge Effluent Monitors

Monitors 1RE-PR001 (Unit 1) and 2RE-PR001 (Unit 2) continuously monitor the effluent from the Unit 1 and Unit 2 containments, respectively. When airborne radioactivity in the containment purge effluent stream exceeds a specified level, station personnel will follow established procedures to terminate the release by manually activating the containment purge valves. Additionally, the auxiliary building vent effluent monitors provide an independent, redundant means of monitoring the containment purge effluent.

No automatic isolation or control functions are performed by these monitors.

Pertinent information on these monitors is provided in Byron/Braidwood UFSAR Table 11.5-1.

Area Radiation Monitors 1(2) RE-AR011 and 1(2) RE-AR012 monitor the containment atmosphere. On high alarm during a containment purge, these monitors will automatically terminate the purge.

10.1.2.3 Waste Gas Decay Tank Monitors

Monitors ORE-PR002A/B continuously monitor the noble gas activity released from the gas decay tanks.

On high alarm, the monitors automatically initiate closure of the valve OGW014 thus terminating the release.

Pertinent information on these monitors and associated control devices is provided in Byron/Braidwood UFSAR Table 11.5-1.

10.1.2.4 Gland Steam and Condenser Air Ejector Monitors

Monitors 1RE-PR027 and 2RE-PR027 continuously monitor the condenser air ejector gas from Units 1 and 2, respectively. On high alarm 1(2)RE-PR027 initiates startup of the offgas treatment system.

Pertinent information on these monitors is provided in Byron/Braidwood UFSAR Table 11.5-1.

10.1.2.5 Radwaste Building Ventilation Monitor

Monitor ORE-PR026 continuously monitors radioactivity in the radwaste building ventilation system. No control device is initiated by this channel.

Pertinent information on this monitor is provided in Byron/Braidwood UFSAR Table 11.5-1.

10.1.2.6 Component Cooling Water Monitor

Monitors ORE-PR009 (common), 1RE-PR009 (Unit 1), and 2RE-PR009 (Unit 2) continuously monitor the component cooling water heat exchanger outlets. On high alarm ORE-PR009 initiates closure of both component cooling water surge tank (CCWST) vents, 1RE-PR009 initiates closure of the Unit 1 CCWST vent, and 2RE-PR009 initiates closure of the Unit 2 CCWST vent.

Pertinent information on this monitor is provided in Byron/Braidwood UFSAR Table 11.5-1.

10.1.2.7 Miscellaneous Ventilation Monitors

Monitor ORE-PR003 continuously monitors radioactivity in the ventilation exhaust from the laboratory fume hoods. No control device is initiated by this channel.

Pertinent information on this monitor and associated devices is provided in Byron/Braidwood UFSAR Table 11.5-1.

10.1.3 Alarm and Trip Setpoints

10.1.3.1 Setpoint Calculations

10.1.3.1.1 Auxiliary Building Vent Effluent Monitors

The setpoints for the low range noble gas channel are conservatively established at 5% of the maximum permissible station release rate for the high alarm and 1/2% of the maximum release rate for the alert alarm.

The setpoints for the high range noble gas channel are conservatively established at 50% of the maximum permissible station release rate for the high alarm and 25% of the maximum release rate for the alert alarm.

10.1.3.1.2 Containment Purge Effluent Monitors

The setpoints are established at 1.25 times the analyzed containment noble gas activity during purge.

10.1.3.1.3 Waste Gas Decay Tank Effluent Monitors

The setpoints are established at 1.25 times the analyzed waste gas tank activity during release.

10.1.3.1.4 Component Cooling Water Monitors

The setpoint is based on the radionuclide mix in Table 10-1. The total calculated detector respons is divided by 2 to obtain the final setpoint. (See section 10.2.3.5 for the conversion factor).

10.1.3.2 Release Limits

Alarm and trip setpoints of gaseous effluent monitors are established to ensure that the release rate limits of 10 CFR 20 are not exceeded. The release limits are found by solving Equations 10-1 and 10-2 for the total allowed release rate of vent releases, Q_{tv}.

$$(1.11)Q_{tv} \sum (\overline{V}_i f_i) \leq 500 \text{ mrem/yr} \qquad (10\text{-}1)$$

$$Q_{tv} \sum \{(f_i)[\overline{L}_i (X/Q)_v \exp(-\lambda_i R/3600u_v)^{*} + 1.11V_i]\} < 3000 \text{ rem/yr} \qquad (10\text{-}2)$$

The summations are over noble gas radionuclides i.

f_i Fractional Radionuclide Composition

The release rate of noble gas radionuclide i divided by the total release rate of all noble gas radionuclides.

Q_{tv} Total Allowed Release Rate, Vent Release [μCi/sec]

The total allowed release rate of all noble gas radionuclides released as vent releases.

* $\exp(-\lambda_i R/3600U_v)$ is set equal to 1.0 for setpoint calculations.

The remaining parameters in Equation 10-1 have the same definitions as in Equation A-8 of Appendix A. The remaining parameters in Equation 10-2 have the same definition as in Equation A-9 of Appendix A.

Equation 10-1 is based on Equation A-8 of Appendix A and the 10 CFR 20 restriction on whole body dose rate (500 mrem/yr) due to noble gases released in gaseous effluents (see Section A.1.3.1 of Appendix A). Equation 10-2 is based on Equation A-9 of Appendix A and the 10 CFR 20 restriction on skin dose rate (3000 mrem/yr) due to noble gases released in gaseous effluents (see Section A.1.3.2 of Appendix A).

Since the solution to Equation 10-2 is more conservative than the solution to Equation 10-1, the value of Equation 10-2 (3.09×10^6 μCi/sec) is used as the limiting noble gas release rate. During evolutions involving releases from the containment or waste gas decay tanks, the release rate from each release path is procedurally limited to 1×10^6 μCi/sec (less than 1/3 the maximum permissible station release rate).

Calibration methods and surveillance frequency for the monitors will be conducted as specified in the RETS.

10.1.3.3 Release Mixture

In the determination of alarm and trip setpoints, the radioactivity mixture in exhaust air is assumed to have the radionuclide composition of Table 10-1.

10.1.3.4 Conversion Factors

The response curves used to determine the monitor count rates are based on the sensitivity to Xe-133 for conservatism.

10.1.3.5 HVAC Flow Rates

The plant vent stack flow rates are obtained from 1/2 PR28J. However, if the readout indicates "0" flow, the following minimum rated fan flow values are currently used:

Unit 1 - 6.15×10^6 cc/sec
Unit 2 - 4.55×10^6 cc/sec

10.1.4 Allocation of Effluents from Common Release Points

Radioactive gaseous effluents released from the auxiliary building, miscellaneous ventilation systems and the gas decay tanks are comprised of contributions from both units. Consequently, allocation is made evenly between units.

10.1.5 Dose Projections for Batch Releases

Dose projections are not made prior to release. Doses are calculated after purging the containment or venting the waste gas decay tanks. Per procedure, representative samples are obtained and analyzed, and the doses calculated on a monthly basis to verify compliance with 10CFR50.

10.2 LIQUID RELEASES

10.2.1 System Description

A simplified liquid effluent flow diagram is provided in Figure 10-3. A simplified liquid waste processing diagram is provided in Figure 10-2.

The liquid radwaste treatment system is designed and installed to reduce radioactive liquid effluents by collecting the liquids, providing for retention or holdup, and providing for treatment by demineralizer or a concentrator for the purpose of reducing the total radioactivity prior to release to the environment. The system is described in Section 11.2.2 of the Byron/Braidwood Updated Final Safety Analysis Report.

10.2.1.1 Release Tanks

There are two radwaste release tanks (OWX01T - 33,100 gallon capacity, and OWX26T - 33750 gallon capacity) which receive liquid waste before discharge to the Kankakee river.

10.2.2 Radiation Monitors

10.2.2.1 Liquid Radwaste Effluent Monitors

Monitor ORE-PR001 is used to monitor all releases from the release tanks. On high alarm, the monitor automatically initiates closure of valves OWX-353 and OWX-896 to terminate the release.

Pertinent information on the monitor and associated control devices is provided in Byron/Braidwood UFSAR Table 11.5-2.

10.2.2.2 Station Blowdown Monitor

Monitor ORE-PR010 continuously monitors the circulating water blowdown. No control device is initiated by this channel.

Pertinent information on this monitor is provided in Byron/Braidwood UFSAR Table 11.5-2.

10.2.2.3 Reactor Containment Fan Cooler (RCFC) and Essential Service Water (ESSW) Outlet Line Monitors

Monitors 1RE-PR02, 2RE-PR002, 1RE-PR003, and 2RE-PR003 continuously monitor the RCFC and ESSW outlet lines.

No control device is initiated by these channels.

Pertinent information on these monitors is provided in Byron/Braidwood UFSAR Table 11.5-2.

10.2.3 Alarm and Trip Setpoints

10.2.3.1 Setpoint Calculations

Alarm and trip setpoints of liquid effluent monitors at the principal release points are established to ensure that the limits of 10 CFR 20 are not exceeded in the unrestricted area.

10.2.3.1.1 Liquid Radwaste Effluent Monitor

During release the setpoint is established at 1.5 times the analyzed tank activity plus the background reading.

10.2.3.1.2 Station Blowdown Monitor

The monitor setpoint is found by solving equation 10-3.

$$P \leq C^{CW} + (1.25 \times C^{T}) \times \left(F'_{max} / \left(F^{CW} + F'_{max}\right)\right) \qquad (10\text{-}3)$$

P	Release Setpoint	[μCi/mℓ]
1.25	Factor to account for minor fluctuations in count rate.	
C^{CW}	Concentration of activity in the circulating water blowdown at the time of discharge. ("Background reading")	[μCi/mℓ]
C^{T}	Analyzed activity in the release tank	[μCi/mℓ]
F^{CW}	Circulating Water Blowdown Rate	[gpm]

F'_{max} Maximum Release Tank Discharge Flow Rate [gpm]
The flow rate from the radwaste discharge tank.

10.2.3.2 Discharge Flow Rates

10.2.3.2.1 Release Tank Discharge Flow Rate

Prior to each batch release, a grab sample is obtained.

The results of the analysis of the waste sample determine the discharge rate of each batch as follows:

$$F'_{max} = 0.5(F^{d}_{act}/\sum (C^{T}_{i}/MPC_{i})) \quad (10\text{-}4)$$

The summation is over radionuclides i.

0.5 Factor for conservatism

F'_{max} Maximum Permitted Discharge Flow Rate [gpm]

The maximum permitted flow rate from the radwaste discharge tank based on radiological limits (not chemistry limits which may be more restrictive)

F^{d}_{act} Circulating Water Blowdown Rate [gpm]

C^{T}_{i} Concentration of Radionuclide i in the Release Tank [μCi/mℓ]

The concentration of radioactivity in the radwaste discharge tank based on measurements of a sample drawn from the tank.

MPC_i Maximum Permissible Concentration of Radionuclide i [μCi/mℓ]

10.2.3.3 Release Limits

Release limits are determined from 10 CFR 20. Discharge rates and setpoints are adjusted to ensure that 50% of applicable maximum permissible concentrations (MPC) are not exceeded. (See Section 10.2.3.2)

10.2.3.4 Release Mixture

For monitors ORE-PR001 and ORE-PR010 the release mixture used for the setpoint determination is the radionuclide mix identified in the grab sample isotopic analysis or the mix in Table 10-2.

For monitors 1RE-PR001, 1RE-PR002, 2RE-PR001, and 2RE-PR002, the release mixture is the radionuclides which are listed in Table 10-2. Each nuclide in the mix is at a concentration which is 10% of the MPC value given in 10 CFR 20 Appendix B, Table II, Column 2.

10.2.3.5 Conversion Factors

The readouts for the liquid effluent monitors are in $\mu Ci/m\ell$. The cpm to $\mu Ci/m\ell$ conversion is based on the detector sensitivity to Cs-137.

10.2.3.6 Liquid Dilution Flow Rates

Dilution flow rates are obtained from circulating water blowdown transmitter loop OFT-CW032.

10.2.4 Allocation of Effluents from Common Release Points

Radioactive liquid effluents released from either release tank (OWX01T or OWX26T) are comprised of contributions from both units. Under normal operating conditions, it is difficult to apportion the radioactivity between the units. Consequently, allocation is made evenly between units.

10.2.5 Projected Concentrations for Releases

After determining F'_{max} from Equation 10-4, 10 CFR 20 compliance is verified using Equations 10-5 and 10-6.

$$C_i^a = C_i^T[F'_{max}/(F'_{max} + F^d_{act})] \qquad (10\text{-}5)$$

$$\sum (C_i^a/MPC_i) \leq 0.5 \qquad (10\text{-}6)$$

The summation is over radionuclides i.

C_i^a Concentration of Radionuclide i in the Unrestricted Area [$\mu Ci/m\ell$]

The calculated concentration of radionuclide i in the unrestricted area as determined by Equation 10-5.

C_i^T	Concentration of Radionuclide i in the Release Tank The concentration of radioactivity in the radwaste discharge tank based on measurements of a sample drawn from the tank.	[μCi/mℓ]
MPC_i	Maximum Permissible Concentration of radionuclide i	[μCi/mℓ]
F'_{max}	Maximum Release Tank Discharge Flow Rate	[gpm]
F^d_{act}	Circulating Water Blowdown Rate	[gpm]
0.5	Factor for conservatism	

10.3 SOLIDIFICATION OF WASTE/PROCESS CONTROL PROGRAM

The process control program (PCP) contains the sampling, analysis, and formulation determination by which solidification of radioactive wastes from liquid systems is ensured.

Figure 10-4 is a simplified diagram of solid radwaste processing.

Table 10-1

Assumed Composition of the Braidwood Station
Noble Gas Effluent

Isotope	Percent of Total Annual Release
Ar-41	00.89
Kr-85m	00.18
Kr-85	24.9
Kr-87	00.04
Kr-88	00.28
Xe-131m	01.4
Xe-133m	00.57
Xe-133	71.1
Xe-135	00.53
Xe-138	00.04

Table 10-2

Assumed Composition of the Braidwood Station Liquid Effluent

Isotope	Concentration (μCi/ml)	Isotope	Concentration (μCi/ml)
Ru-103	8.00E - 06	Mn-54	1.00E - 05
Ag-110m	3.00E - 06	Fe-59	5.00E - 06
Te-127	2.00E - 05	Co-58	9.00E - 06
Te-129m	2.00E - 06	Co-60	3.00E - 06
Te-131m	4.00E - 06	Rb-86	2.00E - 06
Te-132	2.00E - 06	Zr-95	6.00E - 06
I-130	3.00E - 07	Nb-95	1.00E - 05
I-131	3.00E - 08	Mo-99	4.00E - 06
I-132	8.00E - 07		
I-133	1.00E - 07		
I-135	4.00E - 07		
Cs-134	9.00E - 07		
Cs-136	9.00E - 06		
Cs-137	2.00E - 06		
Ce-144	1.00E - 06		
Np-239	1.00E - 05		

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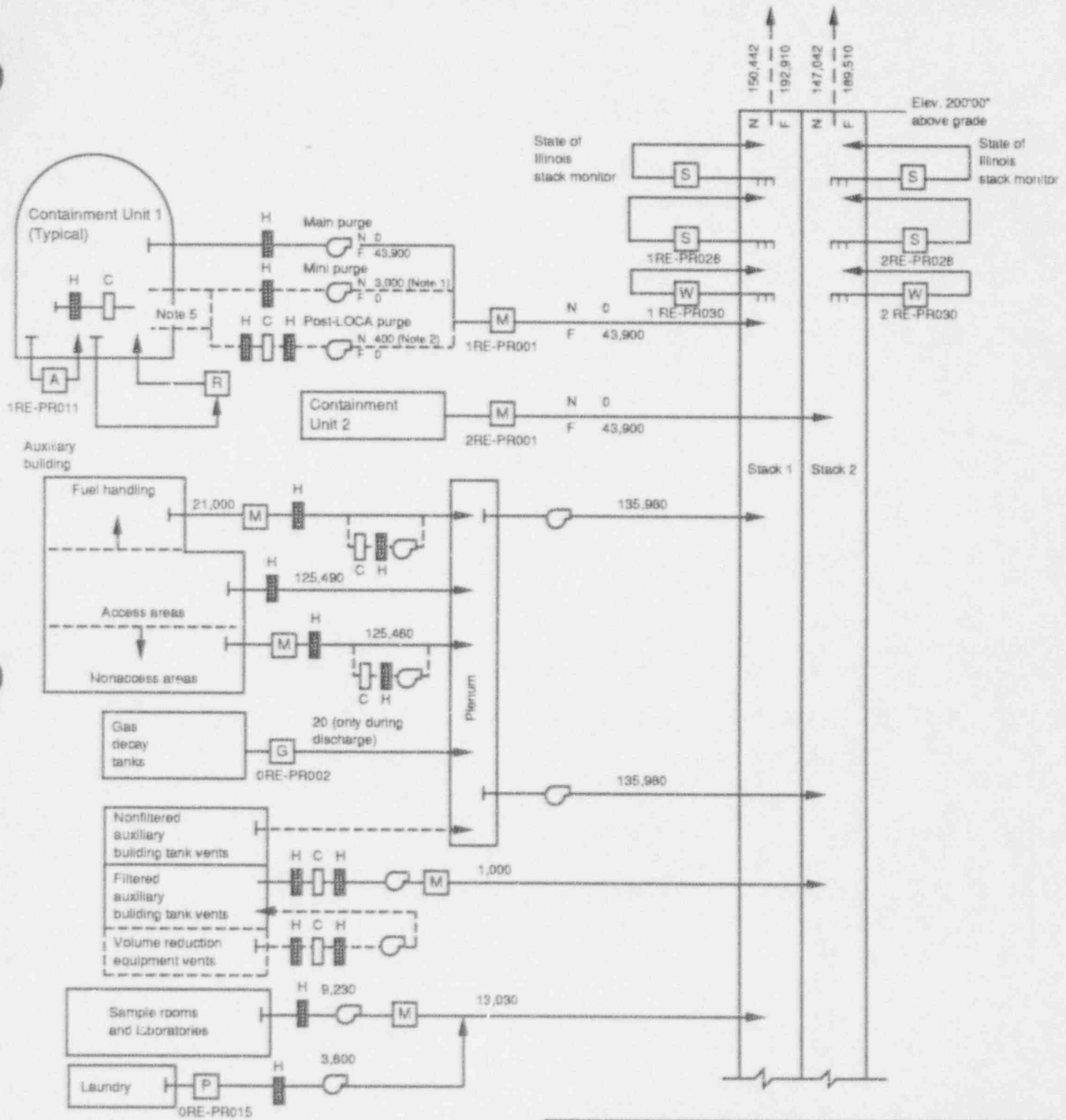
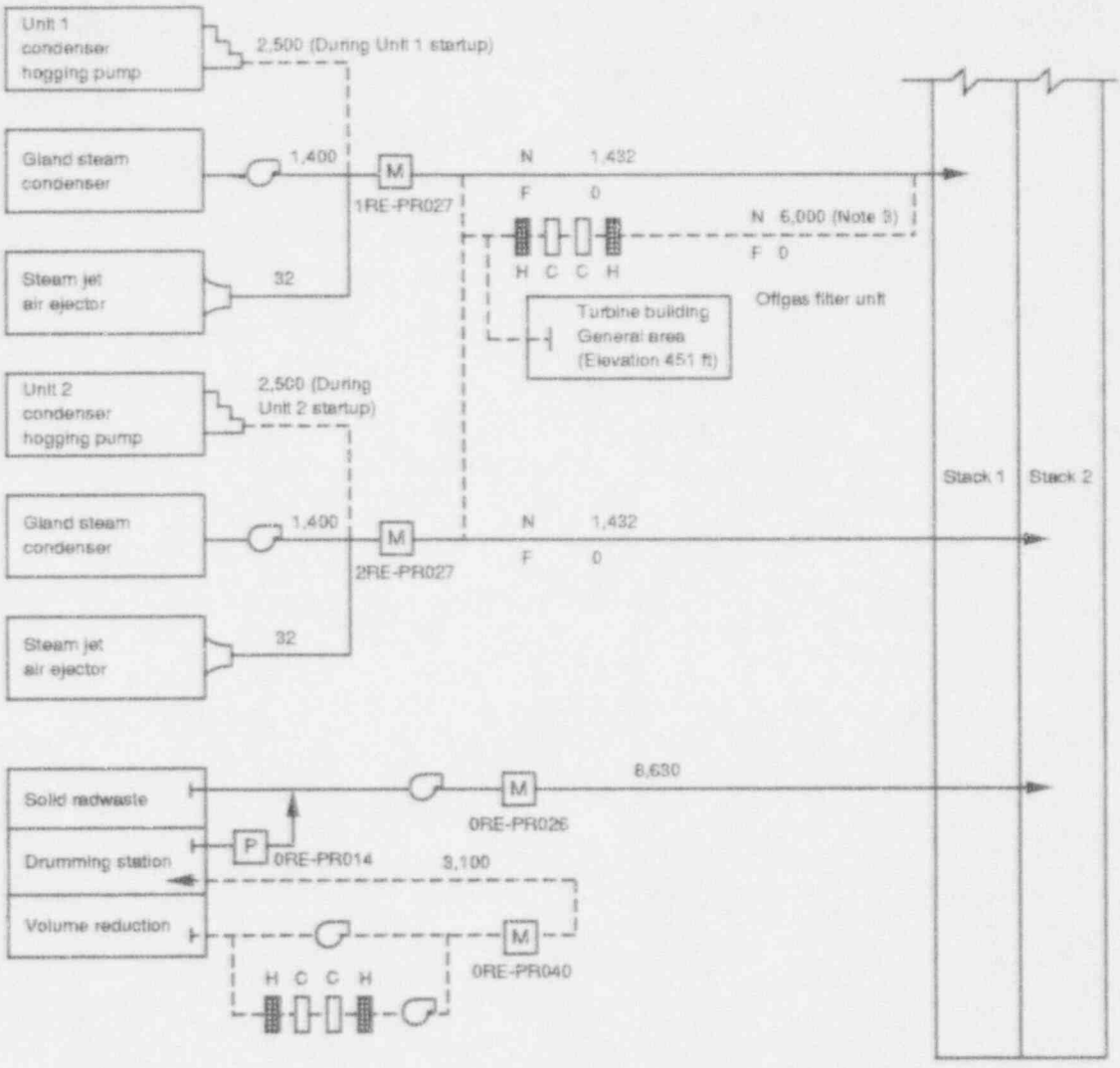


OFFSITE DOSE CALCULATION MANUAL
BRAIDWOOD STATION

FIGURE 10-1

SIMPLIFIED HVAC AND GASEOUS EFFLUENT FLOW DIAGRAM (SHEET 1 OF 2)

M2464.001a 1-93



Legend

———	Normal or frequent flow path
- - - -	Occasional flow path
A	Containment atmosphere radiation monitor
C	Charcoal filter
F	Refueling
G	Noble gas radiation monitor (offline)
H	HEPA filter
M	Three-channel radiation monitor for particulate, iodine, and noble gas (offline)
N	Normal operation
P	particulate monitor (offline)
R	Hydrogen recombiner
S	Normal range stack radiation monitor (particulate, iodine, and noble gas)
W	Wide-range stack noble radiation monitor

Notes

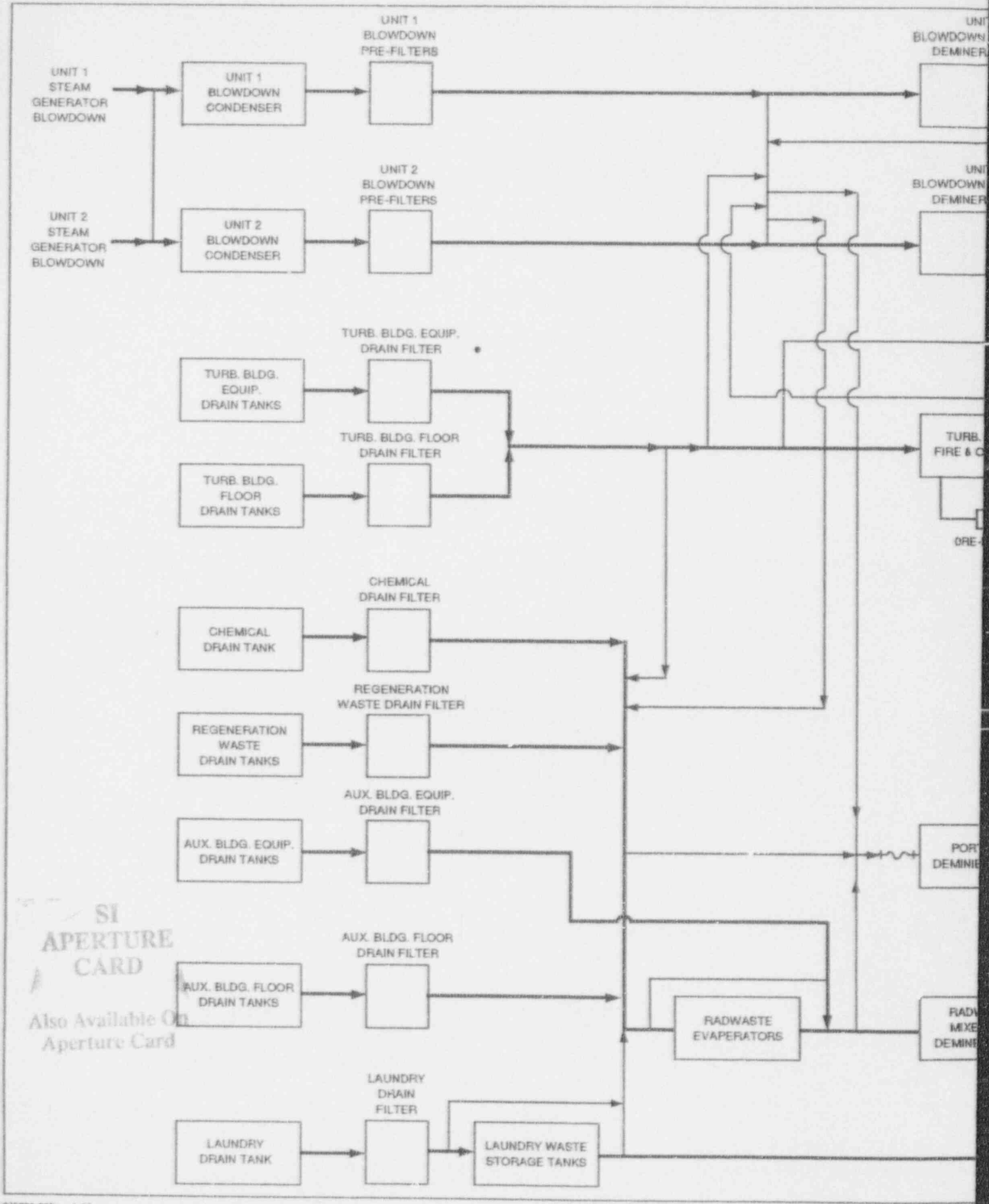
1. Used intermittently to vent containment during normal operation.
2. Used only during postaccident operation.
3. Filter unit operates only when high radiation is detected in offgas system effluent.
4. All flow rates are design flow rates in cubic feet per minute.
5. Integrated Leak Rate Test (ILRT) pressure relief point (an alternate release point that is seldom used).

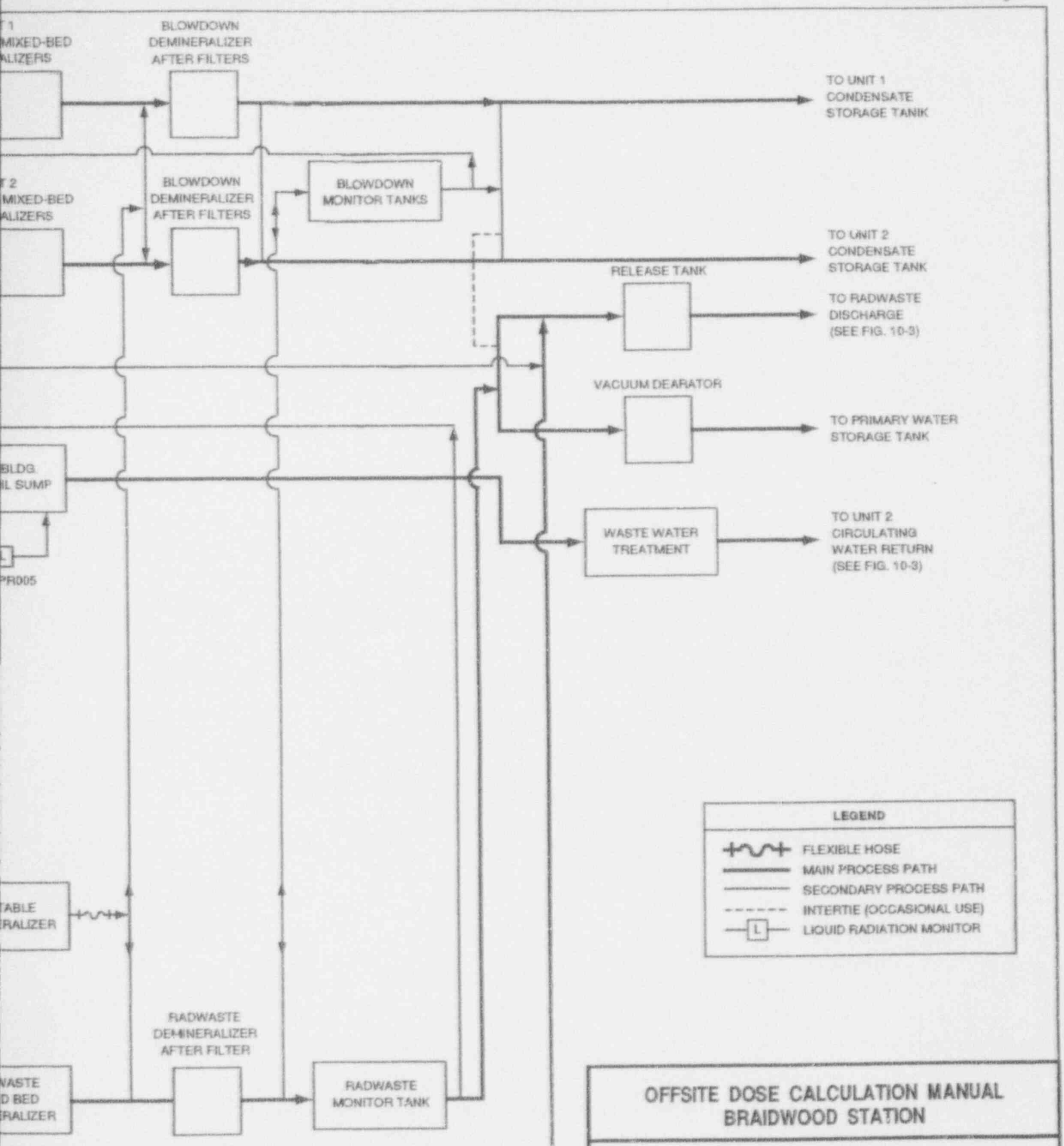
OFFSITE DOSE CALCULATION MANUAL
BRAIDWOOD STATION

FIGURE 10-1

SIMPLIFIED HVAC AND GASEOUS EFFLUENT FLOW DIAGRAM (SHEET 2 OF 2)

M2464.002a 1-93

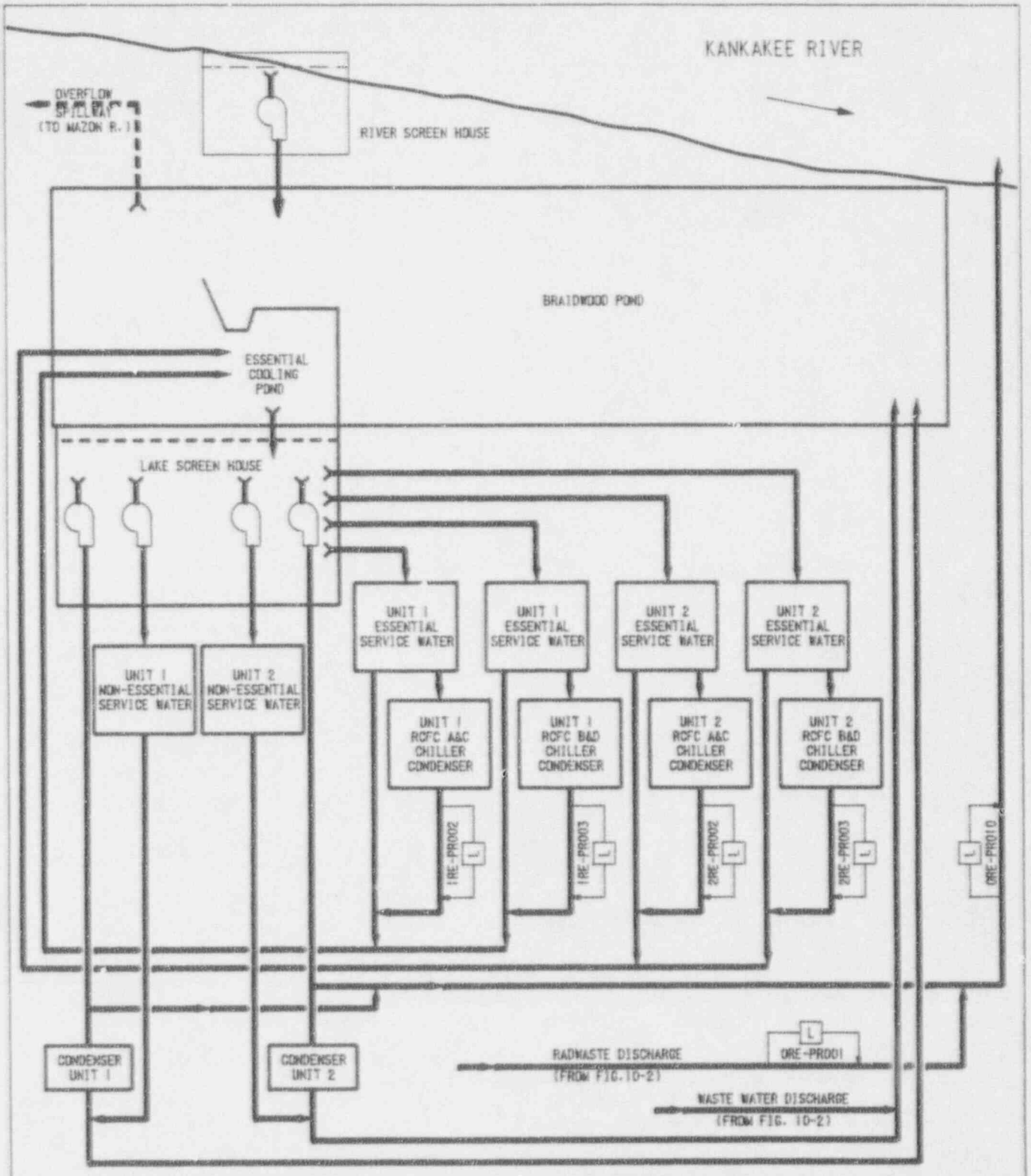




OFFSITE DOSE CALCULATION MANUAL
BRAIDWOOD STATION

FIGURE 10-2

SIMPLIFIED LIQUID RADWASTE
PROCESSING DIACRAM



LEGEND AND NOTES

L — LIQUID RADIATION MONITOR

RCFC=REACTOR CONTAINMENT FAN COOLER

IN EACH UNIT, ONLY THE A&C OR B&D CHILLER CONDENSERS ARE OPERATING AT ONE TIME.

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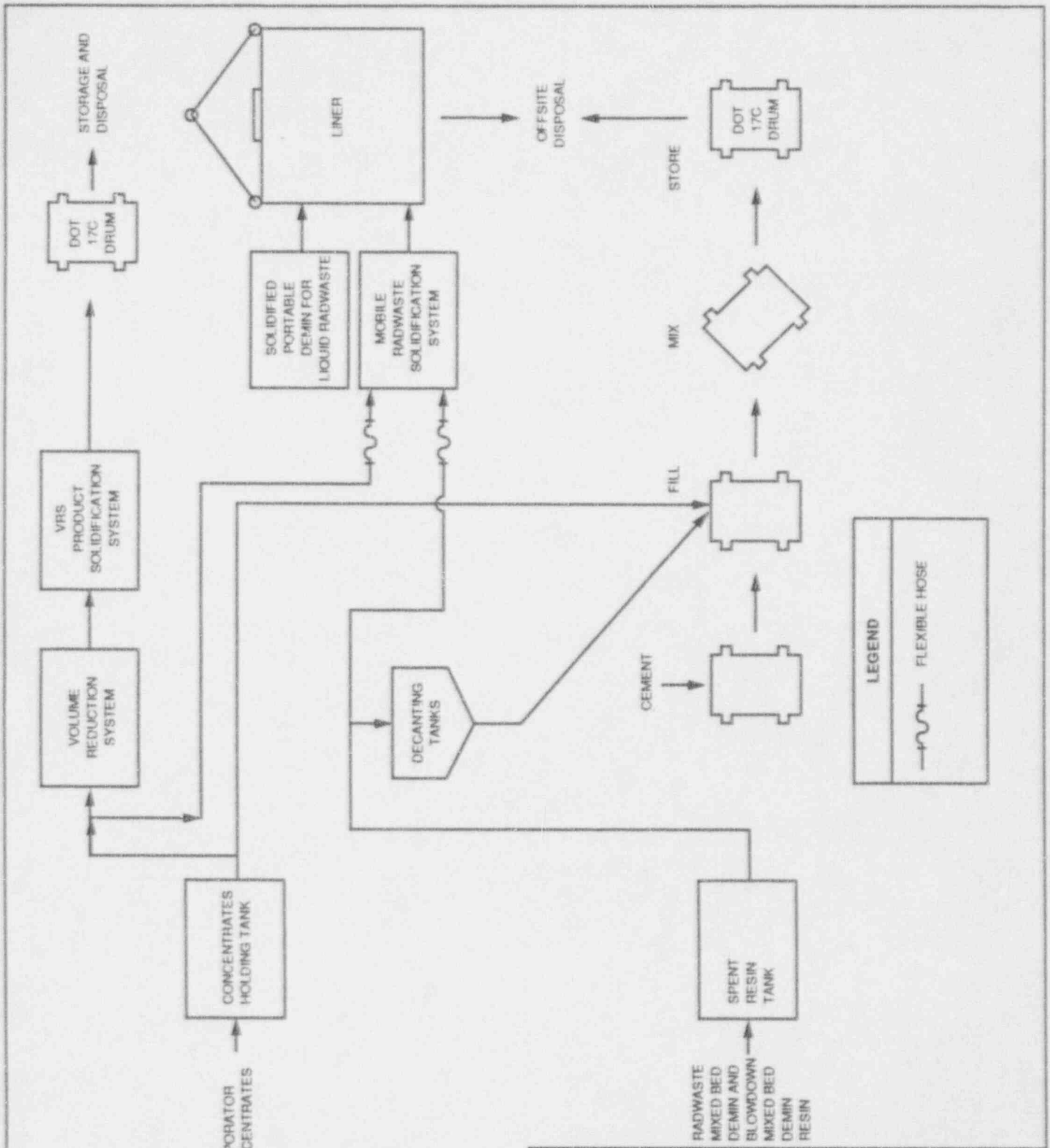
OFFSITE DOSE CALCULATION MANUAL
BRAIDWOOD STATION

FIGURE 10-3

SIMPLIFIED LIQUID EFFLUENT FLOW DIAGRAM



OFFSITE DOSE CALCULATION MANUAL
BRAIDWOOD STATION

FIGURE 10-4

SIMPLIFIED SOLID RADWASTE PROCESSING DIAGRAM

M5839.007 1-93

GENERIC BRAIDWOOD ANNEX INDEX

APPENDIX F

STATION-SPECIFIC DATA FOR BRAIDWOOD UNITS 1 AND 2

TABLE OF CONTENTS

APPENDIX F

LIST OF TABLES

APPENDIX F

LIST OF FIGURES

APPENDIX F

STATION-SPECIFIC DATA FOR BRAIDWOOD UNITS 1 AND 2

F.1 INTRODUCTION

This appendix contains data relevant to the Braidwood site. Included is a figure showing the unrestricted area boundary and values of parameters used in offsite dose assessment.

F.2 REFERENCES

1. Sargent & Lundy, Nuclear Safeguards and Licensing Division Braidwood Calculation No. BR-ER-02, Revs. 0 and 2.

Table F-1
Aquatic Environment Dose Parameters

Parameter[a]	Value
$1/M^w$, $1/M^f$	0.25, 1.0
F^w, cfs	5.63E3
F^f, cfs	5.63E3
t^f, hr[b]	24
t^w, hr[c]	3

Limits on Radioactivity in Unprotected Outdoor Tanks[d]

Primary Water Storage Tank $\leq$ 2000 Ci[e]

Outside Temporary Tank $\leq$ 10 Ci[e]

(per Technical Specification 3.11.1.4)

---

[a] The parameters are defined in Section A.2.1 of Appendix A.

[b] t^f (hr) = 24 hr (all stations) for the fish ingestion pathway

[c] t^w (hr) = 3 hr (distance to Wilmington is 4 river miles; flow rate of 1.4 mph assumed)

[d] See Section A.2.4 of Appendix A.

[e] Tritium and dissolved or entrained noble gases are excluded from this limit.

Table F-2
Station Characteristics

STATION: Braidwood

LOCATION: Braceville, Illinois

CHARACTERISTICS OF ELEVATED RELEASE POINT: Not Applicable (NA)

1) Release Height = _____m 2) Diameter = _____m

3) Exit Speed = _____ms^{-1} 4) Heat Content = _____KCal s^{-1}

CHARACTERISTICS OF VENT STACK RELEASE POINT

1) Release Height = 60.66 m[a] 2) Effective Diameter = 2.80 m

3) Exit Speed = 11.00 ms^{-1}[a]

CHARACTERISTICS OF GROUND LEVEL RELEASE

1) Release Height = 0 m

2) Building Factor (D) = 60.6 m[a]

METEOROLOGICAL DATA

A 320 ft Tower is Located 573m NE of vent stack release point

Tower Data Used in Calculations

Release Point	Wind Speed and Direction	Differential Temperature
Elevated	(NA)	(NA)
Vent	203	199-30 ft
Ground	34	199-30 ft

[a]Used in calculating the meteorological and dose factors in Tables F-5, F-6, F-7. See Sections B.3 through B.6 of Appendix B.

Table F-3

Critical Ranges

Direction	Site Boundary[a] (m)	Nearest Resident[b] (m)	Nearest Dairy Farm Within 5 Miles[c] (m)
N	610	800	None
NNE	914	1100	None
NE	792	1900	None
ENE	701	1800	None
E	1036	1100	3540
ESE	2713	3500	None
SE	3414	4500	None
SSE	3444	5100	None
S	4633	6300	None
SSW	975	1400	None
SW	625	1100	None
WSW	533	600	None
W	518	500	None
WNW	503	600	None
NW	495	500	7723
NNW	510	600	None

[a]Environmental Report, Table 2.1-1. Used in calculating the meteorological and dose factors in Tables F-5 and F-7. See Sections B.3 through B.6 of Appendix B.

[b]1988 annual survey, Teledyne Isotopes Midwest Laboratories.

[c]Milch animal census, Teledyne Isotopes Midwest Laboratories, 1985. Used in calculating the D/Q values in Table F-6.

Table F-4

Average Wind Speeds

Downwind Direction	Average Wind Speed (m/sec)[a] Elevated	Mixed Mode	Ground Level
N	7.6	6.0	4.7
NNE	7.5	5.8	4.4
NE	6.1	5.3	3.9
ENE	6.2	5.2	3.7
E	6.6	5.4	4.0
ESE	6.8	5.6	4.3
SE	6.2	5.3	3.9
SSE	5.8	5.2	4.1
S	5.5	4.9	3.6
SSW	5.5	5.0	3.7
SW	5.3	4.8	3.3
WSW	4.7	4.2	2.4
W	5.4	4.4	2.2
WNW	6.0	4.6	2.4
NW	6.0	4.8	3.1
NNW	6.8	5.4	3.9

[a] Based on Byron site meteorological data, January 1978 through December 1987. Calculated in Reference 1 of Section F.2, using formulas in Section B.1.3 of Appendix B.

[b] The elevated and ground level values are provided for reference purposes only. Routine dose calculations are performed using the mixed mode values.

Table F-5

X/Q and D/Q Maxima at or Beyond the Unrestricted Area Boundary

Downwind Direction	Mixed Mode(Vent) Release				Ground Level Release			
	Radius (meters)	X/Q (sec/m**3)	Radius (meters)	D/Q (1/m**2)	Radius (meters)	X/Q (sec/m**3)	D/Q (1/m**2)	
N	610.	1.159E-06	610.	1.643E-08	610.	4.638E-06	3.355E-08	
NNE	914.	5.056E-07	914.	7.023E-09	914.	1.776E-06	1.382E-08	
NE	792.	2.977E-07	792.	4.274E-09	792.	1.730E-06	1.092E-08	
ENE	701.	4.273E-07	701.	4.903E-09	701.	2.170E-06	1.310E-08	
E	1036.	3.095E-07	1036.	3.780E-09	1036.	1.500E-06	8.551E-09	
ESE	2713.	1.063E-07	2713.	1.164E-09	2713.	3.977E-07	1.949E-09	
SE	3414.	7.561E-08	3414.	7.225E-10	3414.	2.746E-07	1.088E-09	
SSE	3444.	6.021E-08	3444.	6.345E-10	3444.	2.157E-07	1.015E-09	
S	4633.	4.060E-08	4633.	2.644E-10	4633.	1.743E-07	4.520E-10	
SSW	975.	1.918E-07	975.	2.843E-09	975.	1.329E-06	6.781E-09	
SW	625.	5.232E-07	625.	5.479E-09	625.	3.544E-06	1.520E-08	
WSW	533.	8.335E-07	533.	4.777E-09	533.	5.841E-06	1.973E-08	
W	518.	8.886E-07	518.	5.064E-09	518.	5.892E-06	1.830E-08	
WNW	503.	1.076E-06	503.	6.100E-09	503.	6.464E-06	1.913E-08	
NW	495.	1.080E-06	495.	8.650E-09	495.	5.492E-06	2.537E-08	
NNW	510.	1.096E-06	510.	1.185E-08	510.	5.408E-06	3.023E-08	

Braidwood Site Meteorological Data 1/78 - 12/87

Note: Based on Reference 1 of Section F.2 and the formulas in Sections B.3 and B.4 of Appendix B.

[a]The elevated (stack) and ground level release data are provided for reference purposes only. Routine dose calculations are performed using mixed mode (vent) release data.

[b]Approximate distance from midpoint between gaseous effluent release points to location of highest X/Q or D/Q at or beyond the unrestricted area boundary.

Table F-6

D/Q at the Nearest Milk Cow and Meat Animal Locations Within 5 Miles

Downwind Direction	Nearest Milk Cow Radius (meters)	Milk Cow D/Q(1/m**2) Mixed Release	Milk Cow D/Q(1/m**2) Ground Release	Nearest Meat Animal Radius (meters)	Meat Animal D/Q(1/m**2) Mixed Release	Meat Animal D/Q(1/m**2) Ground Release
N	8045.	2.668E-10	4.042E-10	3702.	1.000E-09	1.609E-09
NNE	8045.	2.137E-10	3.188E-10	5472.	4.146E-10	6.361E-10
NE	8045.	1.321E-10	1.995E-10	5311.	2.654E-10	4.196E-10
ENE	8045.	1.293E-10	1.967E-10	4667.	3.199E-10	5.204E-10
E	3540.	6.188E-10	1.043E-09	4506.	4.213E-10	6.820E-10
ESE	8045.	1.943E-10	2.845E-10	3702.	7.114E-10	1.133E-09
SE	8045.	1.762E-10	2.371E-10	7403.	2.032E-10	2.754E-10
SSE	8045.	1.576E-10	2.247E-10	5472.	3.013E-10	4.482E-10
S	8045.	1.063E-10	1.687E-10	8045.	1.063E-10	1.687E-10
SSW	8045.	1.160E-10	1.740E-10	8045.	1.160E-10	1.740E-10
SW	8045.	1.404E-10	1.902E-10	4828.	3.252E-10	4.740E-10
WSW	8045.	1.132E-10	1.924E-10	5955.	1.867E-10	3.301E-10
W	8045.	9.608E-11	1.707E-10	6276.	1.460E-10	2.665E-10
WNW	8045.	9.197E-11	1.706E-10	8045.	9.197E-11	1.706E-10
NW	7723.	1.333E-10	2.375E-10	2736.	7.257E-10	1.489E-09
NNW	8045.	1.623E-10	2.753E-10	8045.	1.623E-10	2.753E-10

Braidwood Site Meteorologi- 1 7/87

Note: Based on Reference 1 of Section F.2 and the rormulas in Section B.4 of Appendix B.

[a]Approximate distance from center of plant as determined by annual census.

[b]The elevated and ground level release data are provided for reference purposes only. Routine dose calculations are performed using mixed mode release data.

[c]Approximate distance from center of plant per ER Table QER470.1-1 (Amendment 2, July 1983).

Table F-7

Site Boundary Finite Plume Gamma Dose Factors for Kr-83m

Downwind Direction	Unrestricted Area Bound (meters)	Mixed Mode(Vent) Release Radius (meters)	V (mrad/yr)/(uCi/sec)	VBAR	Ground Level Release Radius (meters)	G (mrad/yr)/(uCi/sec)	GBAR
N	610.	610.	1.455E-04	3.536E-05	610.	5.333E-04	1.296E-04
NNE	914.	914.	6.375E-05	1.549E-05	914.	2.125E-04	5.164E-05
NE	792.	792.	3.828E-05	9.301E-06	792.	2.007E-04	4.877E-05
ENE	701.	701.	5.294E-05	1.287E-05	701.	2.575E-04	6.256E-05
E	1036.	1036.	3.703E-05	8.998E-06	1036.	1.718E-04	4.174E-05
ESE	2713.	2713.	1.129E-05	2.744E-06	2713.	3.792E-05	9.215E-06
SE	3414.	3414.	7.089E-06	1.723E-06	3414.	2.141E-05	5.202E-06
SSE	3444.	3444.	6.047E-06	1.469E-06	3444.	1.798E-05	4.370E-06
S	4633.	4633.	3.224E-06	7.834E-07	4633.	9.268E-06	2.252E-06
SSW	975.	975.	2.363E-05	5.742E-06	975.	1.444E-04	3.508E-05
SW	625.	625.	6.030E-05	1.465E-05	625.	3.762E-04	9.141E-05
WSW	533.	533.	9.000E-05	2.187E-05	533.	6.336E-04	1.540E-04
W	518.	518.	9.909E-05	2.408E-05	518.	6.292E-04	1.529E-04
WNW	503.	503.	1.205E-04	2.927E-05	503.	6.653E-04	1.617E-04
NW	495.	495.	1.242E-04	3.018E-05	495.	6.066E-04	1.474E-04
NNW	510.	510.	1.322E-04	3.213E-05	510.	6.144E-04	1.493E-04

Braidwood Site Meteorological Data 1/78 - 12/87

Note: Based on Reference 1 of Section F.2 and the formulas in Sections B.5 and B.6 of Appendix B.

[a]The elevated (stack) and ground level release data are provided for reference purposes only. Routine dose calculations are performed using mixed mode (vent) release data.

[b]Approximate distance from midpoint between gaseous effluent release points.

Table F-7 (Cont'd)

Site Boundary Finite Plume Gamma Dose Factors for Kr-85m

Downwind Direction	Unrestricted Area Bound (meters)	Mixed Mode(Vent) Release Radius (meters)	V (mrad/yr)/(uCi/sec)	VBAR	Ground Level Release Radius (meters)	G (mrad/yr)/(uCi/sec)	GBAR
N	610.	610.	9.989E-04	8.285E-04	610.	2.731E-03	2.242E-03
NNE	914.	914.	4.979E-04	4.143E-04	914.	1.222E-03	1.008E-03
NE	792.	792.	3.618E-04	3.023E-04	792.	1.173E-03	9.673E-04
ENE	701.	701.	4.452E-04	3.710E-04	701.	1.363E-03	1.121E-03
E	1036.	1036.	3.452E-04	2.882E-04	1036.	1.023E-03	8.441E-04
ESE	2713.	2713.	1.220E-04	1.021E-04	2713.	3.051E-04	2.533E-04
SE	3414.	3414.	8.179E-05	6.847E-05	3414.	1.970E-04	1.638E-04
SSE	3444.	3444.	6.958E-05	5.828E-05	3444.	1.634E-04	1.359E-04
S	4633.	4633.	4.000E-05	3.349E-05	4633.	1.051E-04	8.742E-05
SSW	975.	975.	2.413E-04	2.018E-04	975.	9.063E-04	7.480E-04
SW	625.	625.	5.268E-04	4.392E-04	625.	2.019E-03	1.659E-03
WSW	533.	533.	7.031E-04	5.846E-04	533.	3.226E-03	2.646E-03
W	518.	518.	6.908E-04	5.729E-04	518.	3.081E-03	2.524E-03
WNW	503.	503.	7.511E-04	6.210E-04	503.	3.126E-03	2.557E-03
NW	495.	495.	8.396E-04	6.959E-04	495.	2.915E-03	2.388E-03
NNW	510.	510.	9.023E-04	7.481E-04	510.	3.091E-03	2.536E-03

Braidwood Site Meteorological Data 1/78 - 12/87

Table F-7 (Cont'd)

Site Boundary Finite Plume Gamma Dose Factors for Kr-85

Downwind Direction	Unrestricted Area Bound (meters)	Mixed Mode(Vent) Release Radius (meters)	V (mrad/yr)/(uCi/sec)	VBAR	Ground Level Release Radius (meters)	G (mrad/yr)/(uCi/sec)	GBAR
N	610.	610.	1.125E-05	9.499E-06	610.	2.986E-05	2.521E-05
NNE	914.	914.	5.661E-06	4.778E-06	914.	1.344E-05	1.135E-05
NE	792.	792.	4.192E-06	3.538E-06	792.	1.311E-05	1.107E-05
ENE	701.	701.	5.150E-06	4.346E-06	701.	1.486E-05	1.255E-05
E	1036.	1036.	4.044E-06	3.413E-06	1036.	1.145E-05	9.660E-06
ESE	2713.	2713.	1.468E-06	1.239E-06	2713.	3.702E-06	3.124E-06
SE	3414.	3414.	1.025E-06	8.651E-07	3414.	2.620E-06	2.212E-06
SSE	3444.	3444.	8.593E-07	7.253E-07	3444.	2.101E-06	1.774E-06
S	4633.	4633.	5.432E-07	4.585E-07	4633.	1.699E-06	1.434E-06
SSW	975.	975.	2.853E-06	2.408E-06	975.	1.042E-05	8.796E-06
SW	625.	625.	6.177E-06	5.213E-06	625.	2.259E-05	1.907E-05
WSW	533.	533.	8.227E-06	6.944E-06	533.	3.577E-05	3.019E-05
W	518.	518.	7.924E-06	6.688E-06	518.	3.388E-05	2.859E-05
WNW	503.	503.	8.499E-06	7.174E-06	503.	3.430E-05	2.895E-05
NW	495.	495.	9.567E-06	8.074E-06	495.	3.174E-05	2.679E-05
NNW	510.	510.	1.025E-05	8.649E-06	510.	3.393E-05	2.864E-05

Braidwood Site Meteorological Data 1/78 - 12/87

Table F-7 (Cont'd)

Site Boundary Finite Plume Gamma Dose Factors for Kr-87

Downwind Direction	Unrestricted Area Bound (meters)	Mixed Mode(Vent) Release Radius (meters)	V (mrad/yr)/(uCi/sec)	VBAR	Ground Level Release Radius (meters)	G (mrad/yr)/(uCi/sec)	GBAR
N	610.	610.	3.313E-03	2.861E-03	610.	8.088E-03	6.980E-03
NNE	914.	914.	1.650E-03	1.425E-03	914.	3.649E-03	3.150E-03
NE	792.	792.	1.249E-03	1.079E-03	792.	3.373E-03	2.911E-03
ENE	701.	701.	1.516E-03	1.310E-03	701.	4.077E-03	3.518E-03
E	1036.	1036.	1.150E-03	9.936E-04	1036.	2.954E-03	2.550E-03
ESE	2713.	2713.	3.948E-04	3.411E-04	2713.	8.084E-04	6.979E-04
SE	3414.	3414.	2.559E-04	2.211E-04	3414.	4.691E-04	4.050E-04
SSE	3444.	3444.	2.231E-04	1.928E-04	3444.	4.098E-04	3.538E-04
S	4633.	4633.	1.162E-04	1.004E-04	4633.	2.055E-04	1.775E-04
SSW	975.	975.	8.253E-04	7.130E-04	975.	2.477E-03	2.138E-03
SW	625.	625.	1.782E-03	1.539E-03	625.	5.714E-03	4.931E-03
WSW	533.	533.	2.340E-03	2.022E-03	533.	9.198E-03	7.938E-03
W	518.	518.	2.276E-03	1.966E-03	518.	8.931E-03	7.707E-03
WNW	503.	503.	2.431E-03	2.099E-03	503.	9.052E-03	7.812E-03
NW	495.	495.	2.792E-03	2.411E-03	495.	8.646E-03	7.462E-03
NNW	510.	510.	2.982E-03	2.575E-03	510.	9.023E-03	7.787E-03

Braidwood Site Meteorological Data 1/78 - 12/87

Table F-7 (Cont'd)

Site Boundary Finite Plume Gamma Dose Factors for Kr-88

Downwind Direction	Unrestricted Area Bound (meters)	Mixed Mode(Vent) Release Radius (meters)	V (mrad/yr)/(uCi/sec)	VBAR	Ground Level Release Radius (meters)	G (mrad/yr)/(uCi/sec)	GBAR
N	610.	610.	7.997E-03	6.956E-03	610.	1.968E-02	1.708E-02
NNE	914.	914.	4.019E-03	3.498E-03	914.	8.899E-03	7.727E-03
NE	792.	792.	3.059E-03	2.665E-03	792.	8.441E-03	7.329E-03
ENE	701.	701.	3.725E-03	3.244E-03	701.	9.870E-03	8.566E-03
E	1036.	1036.	2.878E-03	2.507E-03	1036.	7.394E-03	6.421E-03
ESE	2713.	2713.	1.022E-03	8.910E-04	2713.	2.215E-03	1.926E-03
SE	3414.	3414.	6.859E-04	5.979E-04	3414.	1.396E-03	1.214E-03
SSE	3444.	3444.	5.929E-04	5.169E-04	3444.	1.185E-03	1.031E-03
S	4633.	4633.	3.301E-04	2.878E-04	4633.	6.987E-04	6.081E-04
SSW	975.	975.	2.066E-03	1.800E-03	975.	6.466E-03	5.616E-03
SW	625.	625.	4.447E-03	3.873E-03	625.	1.443E-02	1.253E-02
WSW	533.	533.	5.857E-03	5.099E-03	533.	2.300E-02	1.995E-02
W	518.	518.	5.607E-03	4.878E-03	518.	2.205E-02	1.912E-02
WNW	503.	503.	5.947E-03	5.170E-03	503.	2.232E-02	1.935E-02
NW	495.	495.	6.814E-03	5.927E-03	495.	2.097E-02	1.818E-02
NNW	510.	510.	7.265E-03	6.319E-03	510.	2.215E-02	1.922E-02

Braidwood Site Meteorological Data 1/78 - 12/87

Table F-7 (Cont'd)

Site Boundary Finite Plume Gamma Dose Factors for Kr-89

Downwind Direction	Unrestricted Area Bound (meters)	Mixed Mode(Vent) Release Radius (meters)	V (mrad/yr)/(uCi/sec)	VBAR	Ground Level Release Radius (meters)	G (mrad/yr)/(uCi/sec)	GBAR
N	610.	610.	4.323E-03	3.740E-03	610.	7.655E-03	6.619E-03
NNE	914.	914.	1.692E-03	1.464E-03	914.	2.645E-03	2.287E-03
NE	792.	792.	1.305E-03	1.130E-03	792.	2.219E-03	1.919E-03
ENE	701.	701.	1.577E-03	1.365E-03	701.	3.016E-03	2.608E-03
E	1036.	1036.	9.092E-04	7.869E-04	1036.	1.387E-03	1.200E-03
ESE	2713.	2713.	1.140E-04	9.868E-05	2713.	9.720E-05	8.410E-05
SE	3414.	3414.	4.392E-05	3.802E-05	3414.	2.983E-05	2.581E-05
SSE	3444.	3444.	3.822E-05	3.308E-05	3444.	3.079E-05	2.664E-05
S	4633.	4633.	9.027E-06	7.814E-06	4633.	6.198E-06	5.363E-06
SSW	975.	975.	6.764E-04	5.855E-04	975.	1.066E-03	9.223E-04
SW	625.	625.	1.785E-03	1.545E-03	625.	3.262E-03	2.821E-03
WSW	533.	533.	2.159E-03	1.868E-03	533.	5.063E-03	4.378E-03
W	518.	518.	2.170E-03	1.879E-03	518.	4.949E-03	4.280E-03
WNW	503.	503.	2.410E-03	2.085E-03	503.	5.589E-03	4.833E-03
NW	495.	495.	3.227E-03	2.792E-03	495.	7.228E-03	6.250E-03
NNW	510.	510.	3.714E-03	3.214E-03	510.	7.735E-03	6.688E-03

Braidwood Site Meteorological Data 1/78 - 12/87

Table F-7 (Cont'd)

Site Boundary Finite Plume Gamma Dose Factors for Kr-90

Downwind Direction	Unrestricted Area Bound (meters)	Mixed Mode(Vent) Release Radius (meters)	V (mrad/yr)/(uCi/sec)	VBAR	Ground Level Release Radius (meters)	G (mrad/yr)/(uCi/sec)	GBAR
N	610.	610.	8.576E-04	7.368E-04	610.	9.142E-04	7.846E-04
NNE	914.	914.	1.453E-04	1.249E-04	914.	1.212E-04	1.040E-04
NE	792.	792.	1.302E-04	1.119E-04	792.	1.132E-04	9.720E-05
ENE	701.	701.	1.874E-04	1.611E-04	701.	1.634E-04	1.403E-04
E	1036.	1036.	5.480E-05	4.712E-05	1036.	3.996E-05	3.432E-05
ESE	2713.	2713.	2.691E-07	2.314E-07	2713.	1.795E-07	1.543E-07
SE	3414.	3414.	1.662E-08	1.429E-08	3414.	6.748E-09	5.802E-09
SSE	3444.	3444.	2.647E-08	2.275E-08	3444.	2.033E-08	1.747E-08
S	4633.	4633.	5.354E-10	4.602E-10	4633.	3.704E-10	3.183E-10
SSW	975.	975.	4.411E-05	3.792E-05	975.	3.803E-05	3.265E-05
SW	625.	625.	2.343E-04	2.015E-04	625.	2.074E-04	1.780E-04
WSW	533.	533.	2.628E-04	2.261E-04	533.	2.229E-04	1.914E-04
W	518.	518.	2.822E-04	2.428E-04	518.	1.673E-04	1.436E-04
WNW	503.	503.	3.444E-04	2.962E-04	503.	2.412E-04	2.070E-04
NW	495.	495.	5.611E-04	4.824E-04	495.	5.535E-04	4.750E-04
NNW	510.	510.	8.014E-04	6.886E-04	510	9.221E-04	7.913E-04

Braidwood Site Meteorological Data 1/78 - 12/87

Table F-7 (Cont'd)

Site Boundary Finite Plume Gamma Dose Factors for Xe-131m

Downwind Direction	Unrestricted Area Bound (meters)	Mixed Mode(Vent) Release Radius (meters)	V (mrad/yr)/(uCi/sec)	VBAR	Ground Level Release Radius (meters)	G (mrad/yr)/(uCi/sec)	GBAR
N	610.	610.	1.355E-04	4.542E-05	610.	4.922E-04	1.537E-04
NNE	914.	914.	6.125E-05	2.116E-05	914.	1.988E-04	6.368E-05
NE	792.	792.	3.806E-05	1.383E-05	792.	1.946E-04	6.228E-05
ENE	701.	701.	5.153E-05	1.816E-05	701.	2.358E-04	7.430E-05
E	1036.	1036.	3.805E-05	1.368E-05	1036.	1.677E-04	5.382E-05
ESE	2713.	2713.	1.232E-05	4.592E-06	2713.	4.412E-05	1.491E-05
SE	3414.	3414.	8.612E-06	3.203E-06	3414.	3.046E-05	1.036E-05
SSE	3444.	3444.	6.862E-06	2.594E-06	3444.	2.387E-05	8.166E-06
S	4633.	4633.	4.603E-06	1.704E-06	4633.	1.914E-05	6.553E-06
SSW	975.	975.	2.441E-05	9.030E-06	975.	1.504E-04	4.846E-05
SW	625.	625.	6.166E-05	2.172E-05	625.	3.680E-04	1.152E-04
WSW	533.	533.	9.058E-05	3.099E-05	533.	6.049E-04	1.874E-04
W	518.	518.	9.576E-05	3.200E-05	518.	5.874E-04	1.814E-04
WNW	503.	503.	1.132E-04	3.695E-05	503.	6.171E-04	1.891E-04
NW	495.	495.	1.167E-04	3.890E-05	495.	5.515E-04	1.702E-04
NNW	510.	510.	1.244E-04	4.156E-05	510.	5.698E-04	1.772E-04

Braidwood Site Meteorological Data 1/78 - 12/87

Table F-7 (Cont'd)

Site Boundary Finite Plume Gamma Dose Factors for Xe-133m

Downwind Direction	Unrestricted Area Bound (meters)	Mixed Mode(Vent) Release			Ground Level Release		
		Radius (meters)	V (mrad/yr)/(uCi/sec)	VBAR	Radius (meters)	G (mrad/yr)/(uCi/sec)	GBAR
N	610.	610.	2.561E-04	1.454E-04	610.	8.256E-04	4.275E-04
NNE	914.	914.	1.216E-04	7.133E-05	914.	3.481E-04	1.868E-04
NE	792.	792.	8.185E-05	5.041E-05	792.	3.399E-04	1.822E-04
ENE	701.	701.	1.055E-04	6.314E-05	701.	4.017E-04	2.106E-04
E	1036.	1036.	8.032E-05	4.898E-05	1036.	2.943E-04	1.584E-04
ESE	2713.	2713.	2.749E-05	1.730E-05	2713.	8.394E-05	4.811E-05
SE	3414.	3414.	1.908E-05	1.199E-05	3414.	5.806E-05	3.350E-05
SSE	3444.	3444.	1.562E-05	9.938E-06	3444.	4.609E-05	2.677E-05
S	4633.	4633.	1.005E-05	6.292E-06	4633.	3.632E-05	2.113E-05
SSW	975.	975.	5.390E-05	3.370E-05	975.	2.651E-04	1.433E-04
SW	625.	625.	1.260E-04	7.540E-05	625.	6.188E-04	3.215E-04
WSW	533.	533.	1.767E-04	1.026E-04	533.	1.004E-03	5.152E-04
W	518.	518.	1.799E-04	1.018E-04	518.	9.658E-04	4.916E-04
WNW	503.	503.	2.046E-04	1.124E-04	503.	1.001E-03	5.031E-04
NW	495.	495.	2.185E-04	1.232E-04	495.	9.067E-04	4.612E-04
NNW	510.	510.	2.337E-04	1.322E-04	510.	9.487E-04	4.882E-04

Braidwood Site Meteorological Data 1/78 - 12/87

Table F-7 (Cont'd)

Site Boundary Finite Plume Gamma Dose Factors for Xe-133

Downwind Direction	Unrestricted Area Bound (meters	Mixed Mode(Vent) Release		Ground Level Release		
		Radius (meters)	V (mrad/yr)/(uCi/sec)	VBAR	Radius (meters)	G (mrad/yr)/(uCi/sec)	GBAR
N	610.	610.	2.824E-04	1.857E-04	610.	9.100E-04	5.631E-04
NNE	914.	914.	1.355E-04	9.132E-05	914.	3.891E-04	2.477E-04
NE	792.	792.	9.079E-05	6.314E-05	792.	3.804E-04	2.421E-04
ENE	701.	701.	1.161E-04	7.904E-05	701.	4.450E-04	2.782E-04
E	1036.	1036.	8.914E-05	6.157E-05	1036.	3.295E-04	2.102E-04
ESE	2713.	2713.	3.072E-05	2.172E-05	2713.	9.583E-05	6.399E-05
SE	3414.	3414.	2.135E-05	1.506E-05	3414.	6.660E-05	4.465E-05
SSE	3444.	3444.	1.740E-05	1.238E-05	3444.	5.275E-05	3.552E-05
S	4633.	4633.	1.130E-05	7.955E-06	4633.	4.215E-05	2.840E-05
SSW	975.	975.	5.975E-05	4.197E-05	975.	2.978E-04	1.907E-04
SW	625.	625.	1.386E-04	9.423E-05	625.	6.830E-04	4.235E-04
WSW	533.	533.	1.924E-04	1.278E-04	533.	1.103E-03	6.774E-04
W	518.	518.	1.965E-04	1.285E-04	518.	1.056E-03	6.441E-04
WNW	503.	503.	2.231E-04	1.429E-04	503.	1.088E-03	6.567E-04
NW	495.	495.	2.383E-04	1.553E-04	495.	9.911E-04	6.041E-04
NNW	510.	510.	2.563E-04	1.677E-04	510.	1.044E-03	6.426E-04

Braidwood Site Meteorological Data 1/78 - 12/87

Table F-7 (Cont'd)

Site Boundary Finite Plume Gamma Dose Factors for Xé-135m

Downwind Direction	Unrestricted Area Bound (meters)	Mixed Mode(Vent) Release Radius (meters)	V (mrad/yr)/(uCi/sec)	VBAR	Ground Level Release Radius (meters)	G (mrad/yr)/(uCi/sec)	GBAR
N	610.	610.	1.924E-03	1.609E-03	610.	4.403E-03	3.668E-03
NNE	914.	914.	9.071E-04	7.594E-04	914.	1.913E-03	1.596E-03
NE	792.	792.	6.745E-04	5.656E-04	792.	1.628E-03	1.358E-03
ENE	701.	701.	8.149E-04	6.826E-04	701.	2.191E-03	1.826E-03
E	1036.	1036.	5.710E-04	4.787E-04	1036.	1.368E-03	1.142E-03
ESE	2713.	2713.	1.557E-04	1.306E-04	2713.	2.479E-04	2.074E-04
SE	3414.	3414.	8.843E-05	7.422E-05	3414.	1.163E-04	9.741E-05
SSE	3444.	3444.	7.741E-05	6.496E-05	3444.	1.062E-04	8.896E-05
S	4633.	4633.	3.277E-05	2.750E-05	4633.	4.020E-05	3.368E-05
SSW	975.	975.	4.100E-04	3.439E-04	975.	1.011E-03	8.443E-04
SW	625.	625.	9.034E-04	7.574E-04	625.	2.580E-03	2.151E-03
WSW	533.	533.	1.154E-03	9.673E-04	533.	4.266E-03	3.553E-03
W	518.	518.	1.187E-03	9.932E-04	518.	4.362E-03	3.631E-03
WNW	503.	503.	1.304E-03	1.090E-03	503.	4.495E-03	3.740E-03
NW	495.	495.	1.546E-03	1.293E-03	495.	4.695E-03	3.908E-03
NNW	510.	510.	1.673E-03	1.399E-03	510.	4.688E-03	3.903E-03

Braidwood Site Meteorological Data 1/78 - 12/87

Table F-7 (Cont'd)

Site Boundary Finite Plume Gamma Dose Factors for Xe-135

Downwind Direction	Unrestricted Area Bound (meters)	Mixed Mode(Vent) Release Radius (meters)	V (mrad/yr)/(uCi/sec)	VBAR	Ground Level Release Radius (meters)	G (mrad/yr)/(uCi/sec)	GBAR
N	610.	610.	1.353E-03	1.145E-03	610.	3.674E-03	3.104E-03
NNE	914.	914.	6.781E-04	5.745E-04	914.	1.652E-03	1.397E-03
NE	792.	792.	4.952E-04	4.200E-04	792.	1.599E-03	1.353E-03
ENE	701.	701.	6.084E-04	5.157E-04	701.	1.833E-03	1.549E-03
E	1036.	1036.	4.753E-04	4.030E-04	1036.	1.395E-03	1.180E-03
ESE	2713.	2713.	1.700E-04	1.442E-04	2713.	4.326E-04	3.664E-04
SE	3414.	3414.	1.160E-04	9.837E-05	3414.	2.914E-04	2.468E-04
SSE	3444.	3444.	9.782E-05	8.300E-05	3444.	2.377E-04	2.014E-04
S	4633.	4633.	5.868E-05	4.978E-05	4633.	1.698E-04	1.439E-04
SSW	975.	975.	3.328E-04	2.823E-04	975.	1.253E-03	1.060E-03
SW	625.	625.	7.237E-04	6.134E-04	625.	2.748E-03	2.322E-03
WSW	533.	533.	9.542E-04	8.168E-04	533.	4.369E-03	3.690E-03
W	518.	518.	9.408E-04	7.966E-04	518.	4.151E-03	3.506E-03
WNW	503.	503.	1.018E-03	8.613E-04	503.	4.203E-03	3.548E-03
NW	495.	495.	1.139E-03	9.646E-04	495.	3.908E-03	3.301E-03
NNW	510.	510.	1.225E-03	1.037E-03	510.	4.166E-03	3.519E-03

Braidwood Site Meteorological Data 1/78 - 12/87

Table F-7 (Cont'd)

Site Boundary Finite Plume Gamma Dose Factors for Xe-137

Downwind Direction	Unrestricted Area Bound (meters)	Mixed Mode(Vent) Release Radius (meters)	V (mrad/yr)/(uCi/sec)	VBAR	Ground Level Release Radius (meters)	G (mrad/yr)/(uCi/sec)	GBAR
N	610.	610.	6.360E-04	5.391E-04	610.	1.202E-03	1.019E-03
NNE	914.	914.	2.578E-04	2.185E-04	914.	4.345E-04	3.682E-04
NE	792.	792.	1.950E-04	1.653E-04	792.	3.640E-04	3.085E-04
ENE	701.	701.	2.355E-04	1.997E-04	701.	4.977E-04	4.217E-04
E	1036.	1036.	1.407E-04	1.193E-04	1036.	2.400E-04	2.034E-04
ESE	2713.	2713.	2.042E-05	1.732E-05	2713.	1.931E-05	1.637E-05
SE	3414.	3414.	8.468E-06	7.181E-06	3414.	6.393E-06	5.419E-06
SSE	3444.	3444.	7.384E-06	6.262E-06	3444.	6.474E-06	5.488E-06
S	4633.	4633.	1.951E-06	1.654E-06	4633.	1.457E-06	1.235E-06
SSW	975.	975.	1.038E-04	8.798E-05	975.	1.812E-04	1.535E-04
SW	625.	625.	2.625E-04	2.226E-04	625.	5.373E-04	4.553E-04
WSW	533.	533.	3.189E-04	2.704E-04	533.	8.494E-04	7.197E-04
W	518.	518.	3.247E-04	2.753E-04	518.	8.444E-04	7.154E-04
WNW	503.	503.	3.635E-04	3.081E-04	503.	9.371E-04	7.939E-04
NW	495.	495.	4.769E-04	4.043E-04	495.	1.167E-03	9.885E-04
NNW	510.	510.	5.441E-04	4.612E-04	510.	1.222E-03	1.035E-03

Braidwood Site Meteorological Data 1/78 - 12/87

Table F-7 (Cont'd)

Site Boundary Finite Plume Gamma Dose Factors for Xe-138

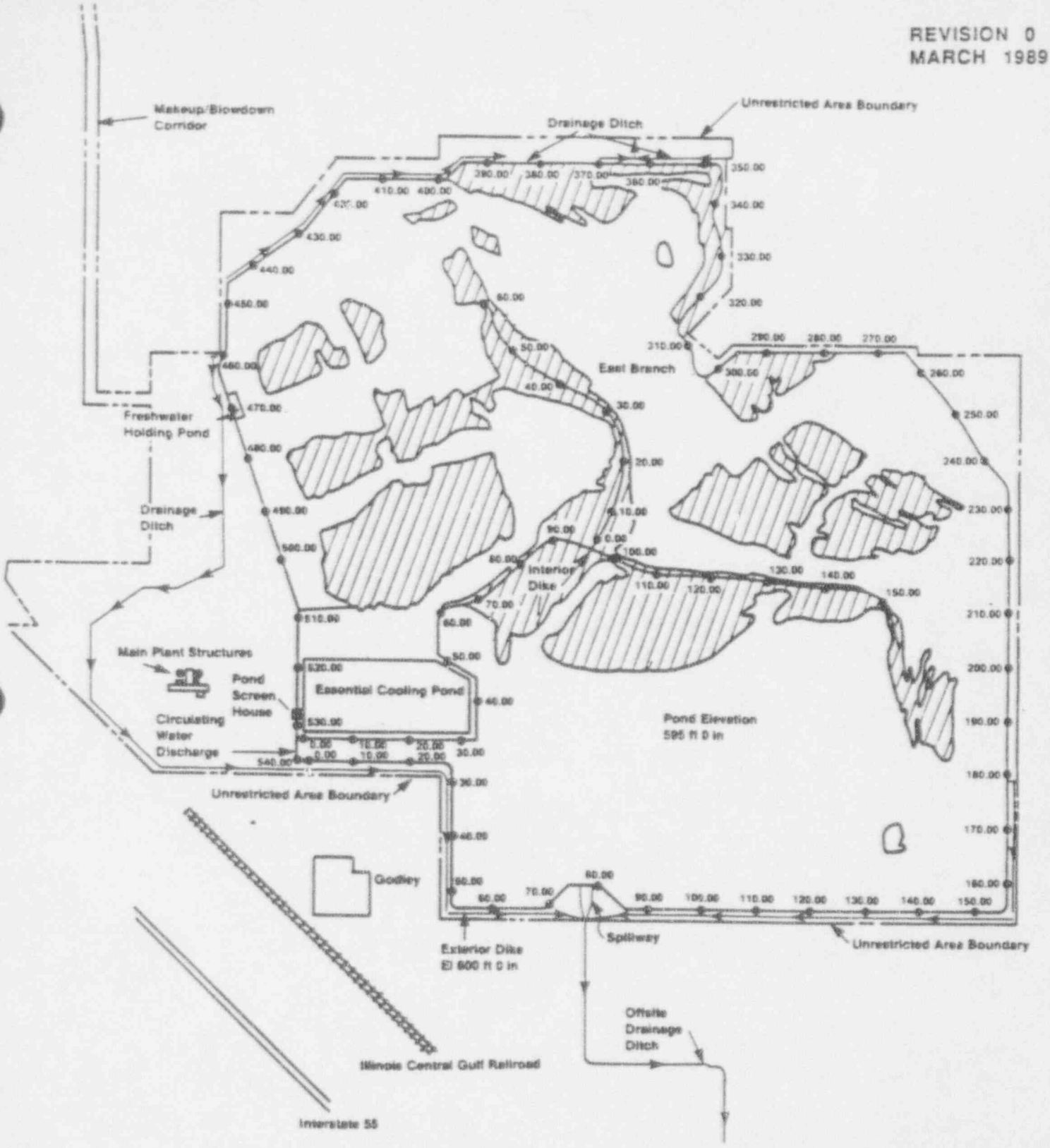
Downwind Direction	Unrestricted Area Bound (meters)	Mixed Mode(Vent) Release Radius (meters)	V (mrad/yr)/(uCi/sec)	VBAR	Ground Level Release Radius (meters)	G (mrad/yr)/(uCi/sec)	GBAR
N	610.	610.	4.201E-03	3.625E-03	610.	9.169E-03	7.900E-03
NNE	914.	914.	1.982E-03	1.711E-03	914.	3.986E-03	3.436E-03
NE	792.	792.	1.504E-03	1.298E-03	792.	3.379E-03	2.912E-03
ENE	701.	701.	1.805E-03	1.559E-03	701.	4.549E-03	3.921E-03
E	1036.	1036.	1.262E-03	1.089E-03	1036.	2.830E-03	2.440E-03
ESE	2713.	2713.	3.395E-04	2.932E-04	2713.	5.079E-04	4.382E-04
SE	3414.	3414.	1.926E-04	1.664E-04	3414.	2.381E-04	2.055E-04
SSE	3444.	3444.	1.685E-04	1.455E-04	3444.	2.185E-04	1.886E-04
S	4633.	4633.	7.045E-05	6.086E-05	4633.	8.174E-05	7.056E-05
SSW	975.	975.	9.144E-04	7.898E-04	975.	2.091E-03	1.803E-03
SW	625.	625.	2.021E-03	1.746E-03	625.	5.325E-03	4.589E-03
WSW	533.	533.	2.567E-03	2.217E-03	533.	8.769E-03	7.556E-03
W	518.	518.	2.609E-03	2.252E-03	518.	8.973E-03	7.731E-03
WNW	503.	503.	2.834E-03	2.445E-03	503.	9.247E-03	7.965E-03
NW	495.	495.	3.387E-03	2.923E-03	495.	9.733E-03	8.385E-03
NNW	510.	510.	3.657E-03	3.156E-03	510.	9.712E-03	8.367E-03

Braidwood Site Meteorological Data 1/78 - 12/87

Table F-7 (Cont'd)
Site Boundary Finite Plume Gamma Dose Factors for Ar-41

Downwind Direction	Unrestricted Area Bound (meters)	Mixed Mode(Vent) Release Radius (meters)	V (mrad/yr)/(uCi/sec)	VBAR	Ground Level Release Radius (meters)	G (mrad/yr)/(uCi/sec)	GBAR
N	610.	610.	5.141E-03	4.680E-03	610.	1.283E-02	1.093E-02
NNE	914.	914.	2.568E-03	2.188E-03	914.	5.780E-03	4.925E-03
NE	792.	792.	1.935E-03	1.649E-03	792.	5.421E-03	4.619E-03
ENE	701.	701.	2.357E-03	2.008E-03	701.	6.445E-03	5.491E-03
E	1036.	1036.	1.803E-03	1.536E-03	1036.	4.745E-03	4.043E-03
ESE	2713.	2713.	6.281E-04	5.351E-04	2713.	1.352E-03	1.152E-03
SE	3414.	3414.	4.128E-04	3.517E-04	3414.	8.140E-04	6.935E-04
SSE	3444.	3444.	3.580E-04	3.050E-04	3444.	7.007E-04	5.970E-04
S	4633.	4633.	1.924E-04	1.639E-04	4633.	3.770E-04	3.212E-04
SSW	975.	975.	1.289E-03	1.098E-03	975.	4.067E-03	3.465E-03
SW	625.	625.	2.785E-03	2.372E-03	625.	9.244E-03	7.876E-03
WSW	533.	533.	3.676E-03	3.132E-03	533.	1.482E-02	1.263E-02
W	518.	518.	3.562E-03	3.035E-03	518.	1.430E-02	1.218E-02
WNW	503.	503.	3.806E-03	3.243E-03	503.	1.449E-02	1.235E-02
NW	495.	495.	4.350E-03	3.706E-03	495.	1.371E-02	1.168E-02
NNW	510.	510.	4.647E-03	3.959E-03	510.	1.439E-02	1.226E-02

Braidwood Site Meteorological Data 1/78 - 12/87



OFFSITE DOSE CALCULATION MANUAL
BRAIDWOOD STATION

FIGURE F-1

UNRESTRICTED AREA BOUNDARY

6972-1
07-86—395