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INTRODUCTION

This supplement contains the responses to Item 1 of Enclosure 1 and Items 1 and 3 of Enclosure 2, as promised in the response to the above items in the Monticello Appendix I Analysis, filed June 4, 1976.

1.2 Doses from Gaseous Effluents

Gaseous source terms were calculated using the GALE code and are presented in Table 2.1-3 of the response to Item 1 of Enclosure 2. Inputs to the GALE code were based upon: (1) actual plant operating experience, (2) information supplied previously in the Monticello FSAR and ER, and (3) NUREG-0016.

Doses to the maximum individual from gaseous effluents were calculated by the NRC GASPAR code, using the models of Regulatory Guide 1.109. For the gamma air dose, the skin dose, and the total body dose due to noble gases the NUS computer code FIDOS was used in conjunction with GASPAR. Dose factors, annual air intake, intakes of food products, and parameters for calculating radionuclide concentrations in food products as given in Regulatory Guide 1.109 and in the GASPAR code were used.

Dose contributions from the following pathways were calculated and analyzed in the assessment of the maximum individual:

1. immersion in the plume

2. ground contamination

3. inhalation, and

4. consumption of vegetables, meat and milk.

For dose calculational purposes the source terms of Table 2.1-3 were divided into elevated releases (i.e., those released from the Monticello stack) and ground level releases (i.e., those released from the reactor building vents). The sources of release from the Monticello stack are the mechanical vacuum pump, the turbine gland seal, and the air ejectors. Releases from the reactor building, the turbine building, and the radwaste building all exit from the reactor building vents. For dose calculations the reactor building vent releases were considered to be ground level and the χ/Q and D/Q values, as presented in Tables 2.3-3 and 2.3-4 of the response to Item 3 of Enclosure 2, reflect this. This analysis is conservative. A more realistic assessment would have these releases treated as ground level releases during certain meteorological conditions and treated as elevated releases during others. Such a treatment, which is described in regulatory position 2.b of Regulatory Guide 1.111, would result in a reduction of the χ/Q and D/Q value presented in Tables 2.3-3 and 2.3-4 and ultimately the doses resulting from vent releases. Tables 2.3-1 and 2.3-2 of the response to Item 3 contain the χ/Q and D/Q values applicable to the Monticello stack.

TABLE 1.1-1

LADTAP INPUT DATA AND RESULTS
MAXIMUM INDIVIDUAL DOSE CALCULATIONS FOR THE MONTICELLO PLANT

Exposure Pathway	Dilution Factor	Transit Time (hr)	Usage Rates (Kg/yr or hrs/yr) Adult	Teen	Child	Infant
Fish Ingestion	1	24	21.0	16.0	6.9	0.0
Water Ingestion	1	12	730.0	510.0	510.0	510.0
Shoreline use	1	0	12.0	67.0	14.0	0.0
Swimming	1	0	6.0	6.0	6.0	0.0
Boating	1	0	52.0	52.0	29.0	0.0

Dose Results (mrem/yr)*

Exposure Pathway	Adults			Teenager		
	T. Body	Bone	Skin	T. Body	Bone	Skin
Fish Ingestion	1.31	4.67	- -	7.63(-1)	3.80	- -
Water Ingestion	2.62(-2)**	2.36(-2)	- -	1.43(-2)	2.15(-2)	- -
Shoreline use	1.14(-3)	1.14(-3)	1.33(-3)	6.36(-3)	6.36(-3)	7.44(-3)
Swimming	6.82(-5)	6.82(-5)	- -	6.82(-5)	6.82(-5)	- -
Boating	2.96(-4)	2.96(-4)	- -	2.96(-4)	2.96(-4)	- -
	1.34	4.69	1.33(-3)	7.84(-1)	3.83	7.44(-3)

*Doses to other individuals and organs are smaller than those presented.

**2.62(-2) = 2.62×10^{-2}

Enclosure 2

MONTICELLO

Item 1

Provide the information requested in Appendix D of Draft Regulatory Guide 1.BB or 1.CC, as appropriate.

Response

Draft Regulatory Guide 1.CC has been replaced by Regulatory Guide 1.112, "Calculation of Releases of Radioactive Materials in Gaseous and Liquid Effluents From Light-Water-Cooled Power Reactors." Appendix A of this Regulatory Guide contains the latest version of Appendix D. The information requested in Appendix A is provided below:

APPENDIX A

	Units	Value	Source
1. GENERAL			
(a) Maximum core thermal power evaluated for safety considerations in SAR	MWt	1670.0	Pg.1.1-1, FSAR
(b) Quantity of tritium released in liquid effluents	Ci/yr	21.0	Calculations GALE Code
(c) Quantity of tritium released in gaseous effluents	Ci/yr	21.0	Calculations GALE Code
2. NUCLEAR STEAM SUPPLY SYSTEM			
(a) Total steam flow rate	10^6 lbs/hr	6.78	Fig.1-3-2B FSAR
(b) Mass of reactor coolant at full power	lbs	368,948	Plant Calculation
(c) Mass of steam in reactor vessel at full power	lbs	11,348	Plant Calculation

The equipment drains were to be processed back to the primary system while the floor drains were to be filtered, sampled, diluted with the circulating water discharge and released to the Mississippi River as were laundry wastes and chemical wastes. In order to keep the releases to a minimum, modifications were made to the radwaste system early in plant start-up to allow reclaiming of floor drains as well as equipment drains. The essential physical modification was to combine the treatment of all sources of waste water in one processing chain (refer to Fig 2.1-1). No distinction is now being made between floor drains and equipment drains. Both the waste collector tank and the floor drain collector tank are cross-connected such that mixing of their respective contents occur. The mixing is accomplished by continuously recirculating their contents with a common pump simultaneously drawing suction from both tanks and processing the waste water through a filter-demineralizer unit and returning the liquid back to the tanks. In this way, an inventory of high purity water is maintained in the collection tanks to serve as a diluent as fresh sump accumulation is discharged to the tanks. As the tanks are filled, the liquid is processed through a deep bed demineralizer and sent to one of two waste sample tanks. There the contents are analyzed and, if acceptable, the effluent is reclaimed via the condensate storage tanks. If further processing is needed, the water is recycled back to the collector tanks and the process cycle repeated.

The chemical and laundry waste processing chains have also been modified to conform with the overall objective of maximum recycle of waste water. Suspended solids are removed from laundry waste and chemical waste by recirculating the respective tanks through cartridge type filters. The laundry tanks are pumped to the chemical waste tank where the contents are either used for making concrete in the solid radwaste system (refer to Figure 2.1-2), or if the volume is too great, the contents of the chemical waste tank is processed a small amount at a time to the floor drain collector tank and reclaimed.

In order for the maximum recycle approach to be most effective at the Monticello Plant the quantity of waste water generated has been minimized. Deep bed demineralizer resins are not regenerated but are disposed of as a solid waste. The same procedures are used for the solka floc-powdered resin, waste filters, reactor cleanup filter-demineralizers, condensate filter-demineralizers and the fuel pool filter-demineralizer. In addition, floors are wet wiped rather than hosed down.

As previously mentioned in the above system the decant from the solid radwaste system (i.e., from the condensate phase separators and reactor cleanup phase separators) and equipment drains are collected in the waste collector tank and the floor drains are collected in the floor drain collector tank. A crosstie between the two tanks allows excess flow to pass from one to the other.

*** At the Monticello Plant the offgases from the air ejectors are routed to one of two recombiners which recombine the hydrogen and oxygen. The non-condensables are then routed to one of two compressors via a 42" line. Prior to entering the compressor the gases pass through a charcoal and particulate filter. The compressor pumps the gases into one of five storage tanks (1250 ft^3/tank) up to a pressure of 285 psig. While one tank is being filled another is released through a particulate filter and out the stack. Figure 2.1-5 depicts the Monticello offgas system.

The mechanical vacuum pump, used during startup, exhausts air and radioactive gases from the main steam condenser. Offgases from this system are discharged to the gland seal holdup line before being released to the main stack.

Table 2.1-3 contains the gaseous source terms for the Monticello Plant. ***

	Units	Value	Source
(c) Expected inleakage per condenser shell	cfm	2.1	Plant Experience
(d) Number of condenser shells		2	Pg.11.3, FSAR
(e) Iodine source term from the condenser	Ci/yr	5.0	GALE NUREG-0016
(f) Charcoal delay system		NA	
(i) Mass of charcoal	tons		
(ii) Operating and dew point temperatures, respectively	^oF		
(iii) Dynamic adsorption coefficients for Xe and Kr, respectively			
(g) Cyrogenic distillation system		NA	
(i) Description of system			
(ii) Fraction of gases partitioned during distillation			

TABLE 2.1-1

MONTICELLO LIQUID RADWASTE SYSTEM

		Low Purity Wastes			Chemical Wastes	Laundry Wastes
1.	Sources	Floor Drains	Equipment Drains	Decant From Solid Radwaste System	Laboratory Drain Sump	Laundry Drain Tank
2.	Flow Rate (gpd)	1,288	9,962	8,750	33	450
3.	Activity (FPCA)	0.231	0.196	1.46(-4)	0.02	- -
4.	Collection Tank Vol. (gal)		20,000		4,000	1,000
5.	Collection Rate (gpd)		20,000		33	450
6.	Collection Time (days)		0.4		48.5	1.78
7.	Processing Rate (gpm)		110		50	25
8.	Processing Time (days)		0.055		0.02	0.02
9.	Discharge Tank Vol. (gal)		10,000		10,000	1,000
10.	Discharge Rate (gpm)		50		50	25
11.	Discharge Time (days)		0.055		0.055	0.02
12.	Fraction of Processed Stream Released		1.0		1.0	1.0
			Waste Demineralizer		Floor Drain Filter	Laundry Drain Filter
13.	DF's I		100		1	1
14.	Cs, Rb		2		1	1
15.	Others		100		1	1
16.	Regenerant Time (days)		Resins are not regenerated but are disposed of as solid waste		N/A	N/A
17.	Regenerant Vol. (gal)					
18.	Regenerant Activity (I					
19.	Fraction of Regenerants Discharged					
20.	Treatment of Regenerants					
21.	Source Terms		See Table 2.1-2		See Table 2.1-2	See Table 2.1-2

TABLE 2.1-2 LIQUID SOURCE TERMS FROM THE MONTICELLO PLANT (Continued)

MONTICELLO PLANT LIQUID EFFLUENTS (CONTINUED)

NUCLIDE	HALF-LIFE (DAYS)	CONCENTRATION IN PRIMARY COOLANT (MICRO CI/ML)	ANNUAL RELEASES TO DISCHARGE CANAL HIGH PURITY (CURIES)	LOW PURITY (CURIES)	CHEMICAL (CURIES)	TOTAL LWS (CURIES)	ADJUSTED TOTAL (CI/YR)	DETERGENT WASTES (CI/YR)	TOTAL (CI/YR)
TE131M	1.25E+00	7.90E-05	0.00000	.00215	.00000	.00215	.00225	0.00000	.00220
TE131	1.74E-02	0.	0.00000	.00039	.00000	.00039	.00041	0.00000	.00041
I131	8.05E+00	4.06E-03	0.00000	.12407	.00087	.12495	.13039	.00006	.13000
TE132	3.25E+00	8.08E-06	0.00000	.00024	.00000	.00024	.00025	0.00000	.00025
I132	9.58E-02	1.78E-02	0.00000	.2682	.00004	.12686	.13239	0.00000	.13000
I133	8.75E-01	1.50E-02	0.00000	.38683	.00035	.38718	.40406	0.00000	.40000
I134	3.67E-02	3.83E-02	0.00000	.06144	.00003	.06147	.06414	0.00000	.06400
CS134	7.49E+02	2.46E-05	0.00000	.03844	.00002	.03846	.04014	.01300	.05360
I135	2.79E-01	1.35E-02	0.00000	.23552	.00010	.23562	.24589	0.00000	.25000
CS136	1.30E+01	1.63E-05	0.00000	.02512	.00001	.02512	.02622	0.00000	.02600
CS137	1.10E+04	5.75E-05	0.00000	.08972	.00005	.08977	.09368	.02400	.12000
BA137M	1.77E-03	0.	0.00000	.08389	.00005	.08394	.08759	0.00000	.08800
CS138	2.24E-02	5.32E-03	0.00000	.14228	.00000	.14229	.14849	0.00000	.15000
BA139	5.76E-02	5.99E-03	0.00000	.02112	.00001	.02112	.02204	0.00000	.02200
BA140	1.28E+01	3.27E-04	0.00000	.01007	.00011	.01018	.01062	0.00000	.01100
LA140	1.68E+00	0.	0.00000	.00098	.00011	.00109	.00114	0.00000	.00110
BA141	1.25E-02	5.32E-03	0.00000	.00047	.00000	.00047	.00049	0.00000	.00049
LA141	1.63E+01	0.	0.00000	.00542	.00000	.00542	.00566	0.00000	.00570
CE141	3.24E+01	2.86E-05	0.00000	.00080	.00002	.00082	.00085	0.00000	.00085
BA142	7.64E-03	3.14E-03	0.00000	.00003	.00000	.00003	.00003	0.00000	.00003
LA142	6.39E-02	3.03E-03	0.00000	.01427	.00000	.01428	.01490	0.00000	.01500
CE143	1.38E+00	2.38E-05	0.00000	.00066	.00000	.00066	.00069	0.00000	.00069
PR143	1.37E+01	3.27E-05	0.00000	.00102	.00001	.00103	.00107	0.00000	.00110
CE144	2.84E+02	2.46E-06	0.00000	.00008	.00000	.00008	.00008	.00520	.00530
PR144	1.20E-02	0.	0.00000	.00008	.00000	.00008	.00008	0.00000	.00008
ND147	1.11E+01	2.45E-06	0.00000	.00008	.00000	.00008	.00008	0.00000	.00008
ALL OTHERS		1.53E-03	0.00000	.00000	.00000	.00000	.00000	0.0	.00000
TOTAL (EXCEPT TRITIUM)		3.22E-01	0.00000	3.43387	.00694	3.44081	3.59081	.06234	3.60000

TRITIUM RELEASE 21 CURIES PER YEAR

TABLE 2.1-3 GASEOUS SOURCE TERMS FROM THE MONTICELLO PLANT (Continued)

NUCLIDE	AIRBORNE PARTICULATE RELEASE RATE (CURIES PER YEAR) CONTAINMENT BLDG.	TURBINE BLDG.	AUXILIARY BLDG.	RADWASTE BLDG.	MECH VAC. PUMP	TOTAL
CR-51	3.0E-04	1.3E-02	3.0E-04	9.0E-05	0.	1.4E-02
MN-54	5.0E-03	6.0E-04	3.0E-03	3.0E-04	0.	6.9E-03
FE-59	4.0E-04	5.0E-04	4.0E-04	1.5E-04	0.	1.5E-03
CO-58	6.0E-04	6.0E-04	6.0E-04	4.5E-05	0.	1.8E-03
CO-60	1.0E-02	2.0E-03	1.0E-02	9.0E-04	0.	2.3E-02
ZR-95	2.0E-03	2.0E-04	2.0E-03	1.5E-05	0.	4.2E-03
SR-89	9.0E-05	6.0E-03	9.0E-05	4.5E-06	0.	6.2E-03
SR-90	5.0E-06	2.0E-05	5.0E-06	3.0E-06	0.	3.3E-05
ZR-95	4.0E-04	1.0E-04	4.0E-04	5.0E-07	0.	9.0E-04
SB-124	2.0E-04	3.0E-04	2.0E-04	5.0E-07	0.	7.0E-04
CS-134	4.0E-03	3.0E-04	4.0E-03	4.5E-05	3.0E-06	8.5E-03
CS-136	3.0E-04	5.0E-05	3.0E-04	4.5E-06	2.0E-06	6.6E-04
CS-137	5.5E-03	4.0E-04	5.5E-03	9.0E-05	1.0E-05	1.2E-02
BA-140	4.0E-04	1.1E-02	4.0E-04	1.0E-06	1.1E-05	1.2E-02
CE-141	1.0E-04	6.0E-04	1.0E-04	2.6E-05	0.	8.3E-04

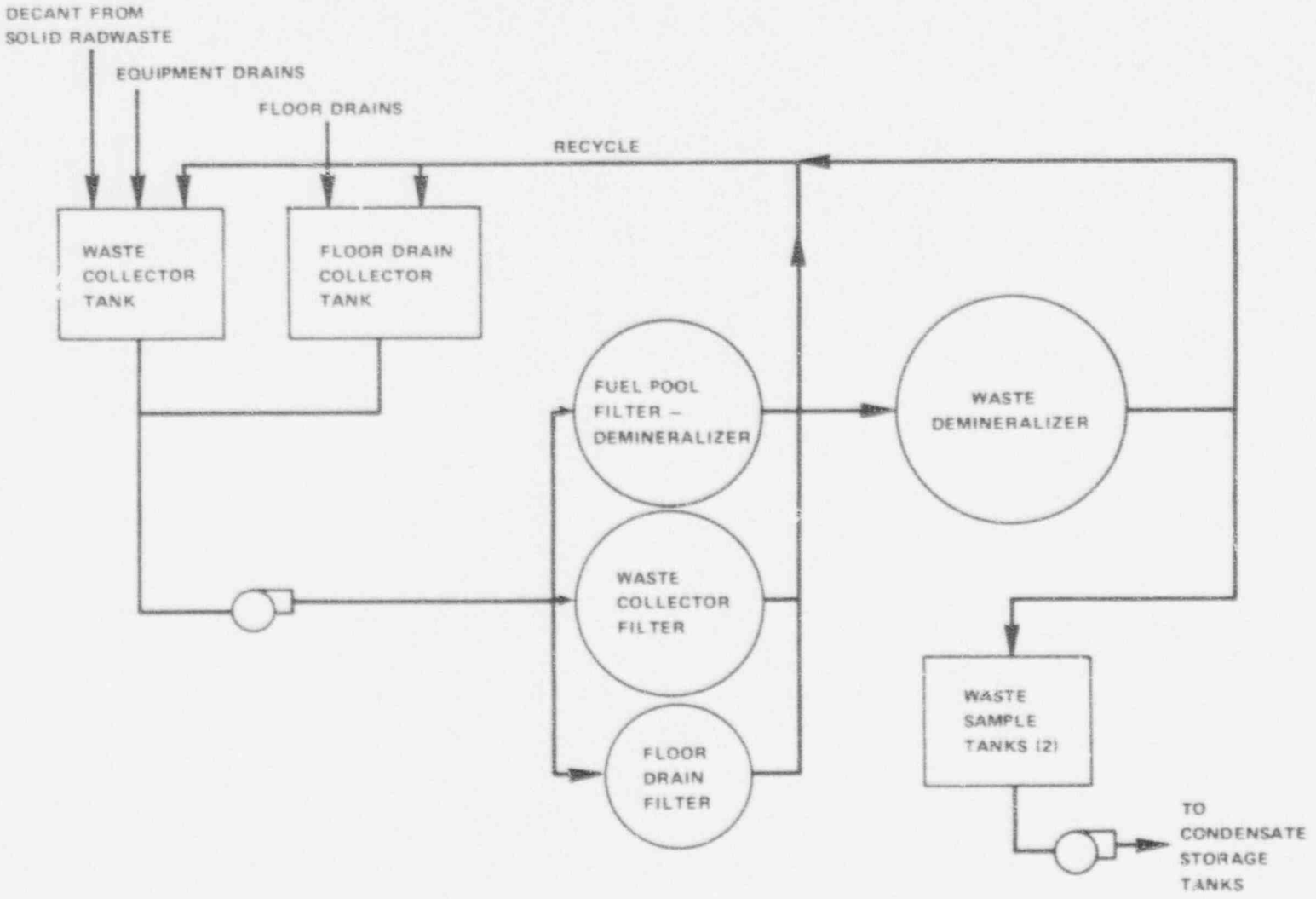

FIGURE 2.1–1

LIQUID RADWASTE BLOCK DIAGRAM

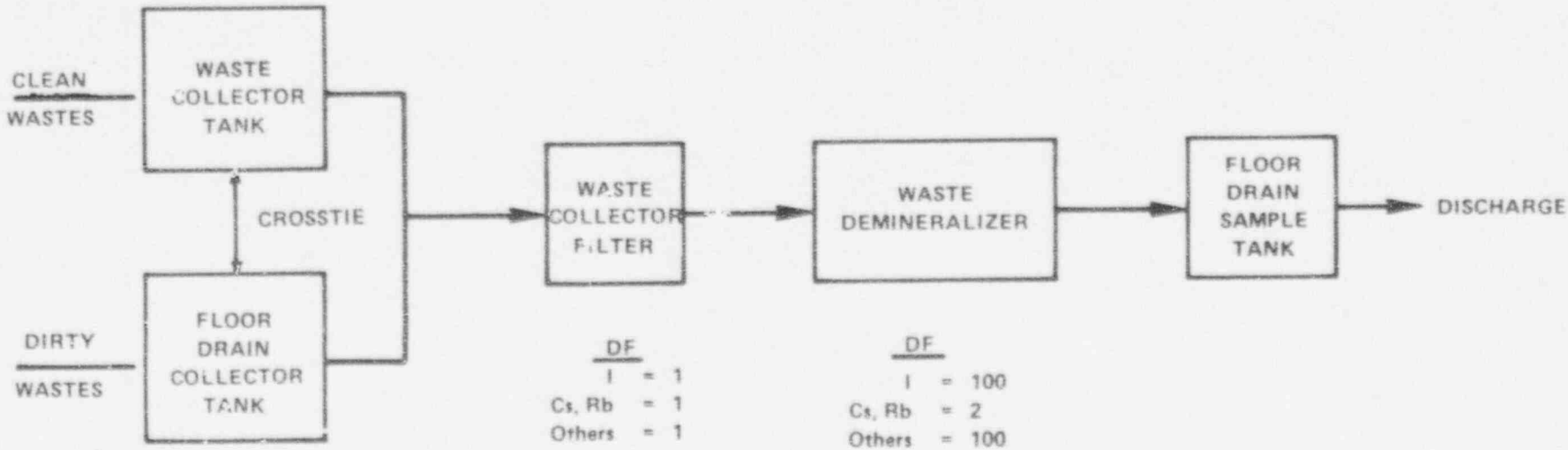

FIGURE 2.1–3

LOW PURITY WASTE SYSTEM

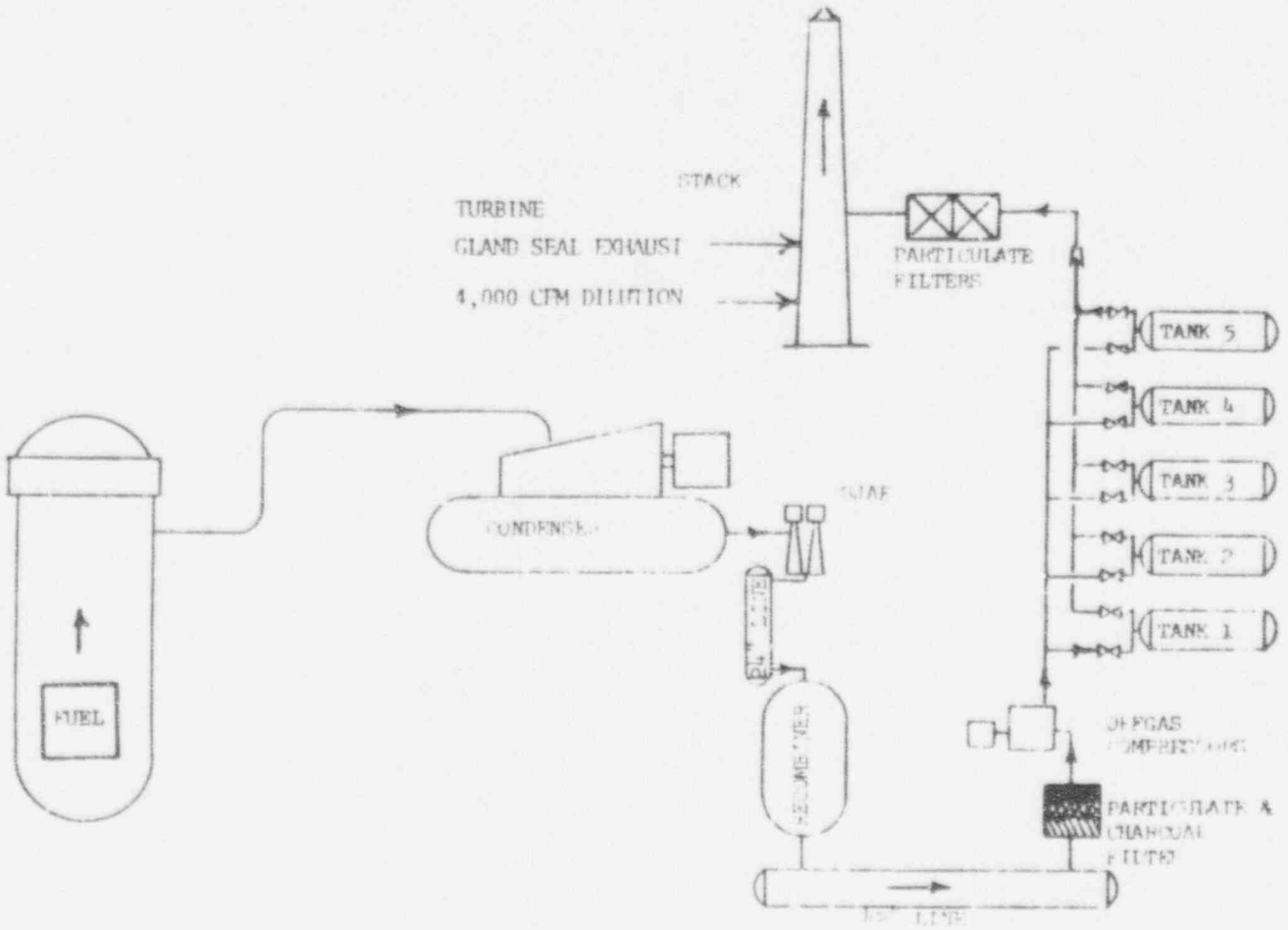

FIGURE 2.1-5

GASEOUS RADWASTE BLOCK DIAGRAM

ENCLOSURE 2

MONTICELLO

Item 3

Based on considerations in Draft Regulatory Guide 1.DD, provide estimates of relative concentration (χ/Q) and deposition (D/Q) at locations specified in response to Item 2 above for each release point specified in response to Item 1 above.

Response

Tables 2.3-1 and 2.3-3 contain χ/Q values at the location of the nearest dwelling, bovine, garden (area greater than 500 square feet), cows and goats which were provided in Table 2.2-4 of the June 4, 1976 submittal, for releases from the Monticello stack and the Monticello reactor building respectively. Tables 2.3-2 and 2.3-4 contain the relative deposition (D/Q) at the same locations for the respective release points. Table 2.3-5 contains the χ/Q and D/Q values at the site boundaries for releases from the Monticello stack and reactor building.

ENCLOSURE 2

TABLE 2.3-2

D/Q VALUES AT LOCATION OF NEAREST DWELLING, BOVINE, GARDENS ≥500 sq. ft.
AND MILCH ANIMALS (COWS, GOATS) WITHIN 5 MILES OF THE MONTICELLO PLANT (ELEVATED RELEASE)

m^{-2} at the Location of the Nearest

Sector	Dwelling	Bovine*	Garden ≥ 500 sq. ft.	Cows	Goats
NNE	#8.75(-10)	4.67(-10)	3.03(-10)	5.07(-10)	- -
NE	6.89(-10)	3.58(-10)	1.28(-10)	1.32(-10)	- -
ENE	1.22(-9)	- -	1.22(-9)	- -	- -
E	2.23(-9)	2.59(-10)	2.23(-9)	7.98(-10)	- -
ESE	2.76(-9)	1.95(-9)	1.95(-9)	1.22(-9)	- -
SE	5.08(-9)	5.08(-9)	4.63(-9)	3.73(-10)	- -
SSE	4.14(-9)	4.14(-9)	1.29(-9)	2.48(-10)	- -
S	1.08(-9)	2.03(-10)	9.74(-10)	3.47(-10)	- -
SSW	2.91(-9)	2.91(-10)	2.91(-10)	- -	- -
SW	3.37(-9)	4.60(-10)	3.37(-9)	- -	- -
WSW	1.85(-9)	4.14(-10)	1.85(-9)	1.04(-9)	- -
W	1.04(-9)	9.96(-10)	9.96(-10)	4.27(-10)	- -
WNW	1.09(-9)	1.86(-10)	8.20(-10)	1.76(-10)	- -
NW	4.61(-10)	4.29(-10)	4.61(-10)	2.76(-10)	- -
NNW	7.10(-10)	- -	7.10(-10)	- -	- -
N	9.51(-10)	3.09(-10)	9.51(-10)	4.01(-10)	- -

*Bovine is defined as a cow which does not produce milk for human consumption but may be raised for meat consumption.

#8.75(-10) = 8.75×10^{-10}

ENCLOSURE 2

TABLE 2.3-4

D/Q VALUES AT LOCATION OF NEAREST DWELLING, BOVINE, GARDENS ≥500 sq. ft.
AND MILCH ANIMALS (COWS, GOATS) WITHIN 5 MILES OF THE MONTICELLO PLANT (REACTOR BUILDING VENT)

m^{-2} at the Location of the Nearest

Sector	Dwelling	Bovine*	Garden ≥500 sq. ft.	Cows	Goats
NNE	#2.93(-9)	1.35(-9)	8.17(-10)	1.48(-9)	- -
NE	2.02(-9)	9.15(-10)	2.90(-10)	3.02(-10)	- -
ENE	6.35(-9)	- -	6.35(-9)	- -	- -
E	7.78(-9)	5.14(-10)	7.78(-9)	1.87(-9)	- -
ESE	7.80(-9)	4.96(-9)	4.96(-9)	2.69(-9)	- -
SE	2.17(-8)	2.17(-8)	1.78(-8)	6.69(-10)	- -
SSE	3.14(-8)	3.14(-8)	4.16(-9)	5.79(-10)	- -
S	3.51(-9)	4.70(-10)	3.07(-9)	8.56(-10)	- -
SSW	4.84(-8)	8.45(-10)	8.45(-10)	- -	- -
SW	4.16(-8)	8.75(-10)	4.16(-8)	- -	- -
WSW	4.32(-8)	1.36(-9)	4.32(-8)	7.14(-9)	- -
W	5.98(-9)	5.11(-9)	5.11(-9)	1.59(-9)	- -
WNW	5.63(-9)	5.33(-10)	3.52(-9)	5.04(-10)	- -
NW	1.51(-9)	1.38(-9)	1.51(-9)	8.30(-10)	- -
NNW	2.56(-9)	- -	2.56(-9)	- -	- -
N	2.31(-9)	6.68(-10)	2.31(-9)	8.87(-10)	- -

*Bovine is defined as a cow which does not produce milk for human consumption but may be raised for meat consumption.

#2.93(-9) = 2.93×10^{-9}