

Attachment 1
Final Grading And Drainage Plan

A reference diagram which depicts the grading for and the drainage from the Calvert Cliffs Nuclear Power Plant can be found in the following reference:

Final Grading And Drainage Plan
Calvert Cliffs Nuclear Power Plant Units 1 and 2,

BGE Document ID Number: 61517SH0001

BGE Document ID Number: 61514SH0002

The above referenced grading and drainage plan is intended for reference only.
This drawing may not reflect the changes and modifications since March 1975.

Attachment 2
 Outfall 001 - Sources of Liquid Radioactive Waste

Waste Stream	Radiation Monitor	Type of Release	Max. Discharge Flow Rate		Maximum Volume		Notes
			gal/min	liters/min	gal	liters	
Rx. Coolant Wst. Mon. Tk.	0-RE-2201	Batch	120	454	90000 ¹⁶	3.407E5 ¹⁶	
Rx. Coolant Wst. Rec. Tk.	0-RE-2201	Batch	120	454	90000 ¹⁶	3.407E5 ¹⁶	
Misc. Wst. Mon. Tk.	0-RE-2201	Batch	120	454	4000 ¹⁶	15140 ¹⁶	
Misc. Wst. Rec. Tk.	0-RE-2201	Batch	120	454	4000 ¹⁶	15140 ¹⁶	
Aux. Boiler Steam Drum	All releases are via Auxiliary Blowdown Tank						
Aux. Blowdown Tk.	Unmonitored	Continuous	200 ¹⁵	757	N/A	N/A	
Waste Neut. Tk. 11	Unmonitored	Batch	1000 ¹	3790 ¹	45988	1.74E5	
Waste Neut. Tk. 12	Unmonitored	Batch	1000 ¹	3790 ¹	47749	1.80E5	
Strm. Gen. Blowdown Tk.	1/2-RE-4014 ¹⁷	Batch ¹⁴	225 ²	852 ²	2350 ³	8895 ³	
Component Cooling Water ⁴	Unmonitored	Continuous	variable ⁵	variable ⁵	44090 ⁶	1.669E5	
Condenser Hotwells	Unmonitored	Batch ¹³	4500 ⁷	17000 ⁷	1.05E5	3.97E5	
Salt Water System	Unmonitored	Continuous	15500	58670	N/A	N/A	
Condensate Storage Tank ⁸	Unmonitored	Batch	variable ⁹	variable ⁹	3.5E5 ¹⁰	1.3E6 ¹⁰	
Demin. Water Storage Tank ¹¹	Unmonitored	Batch	variable ⁹	variable ⁹	3.5E5 ¹⁰	1.3E6 ¹⁰	
Precoat Sump ¹²	Unmonitored	Continuous	50	94.6	10305 ³	39004 ³	

Attachment 2
Outfall 001 - Sources of Liquid Radioactive Waste

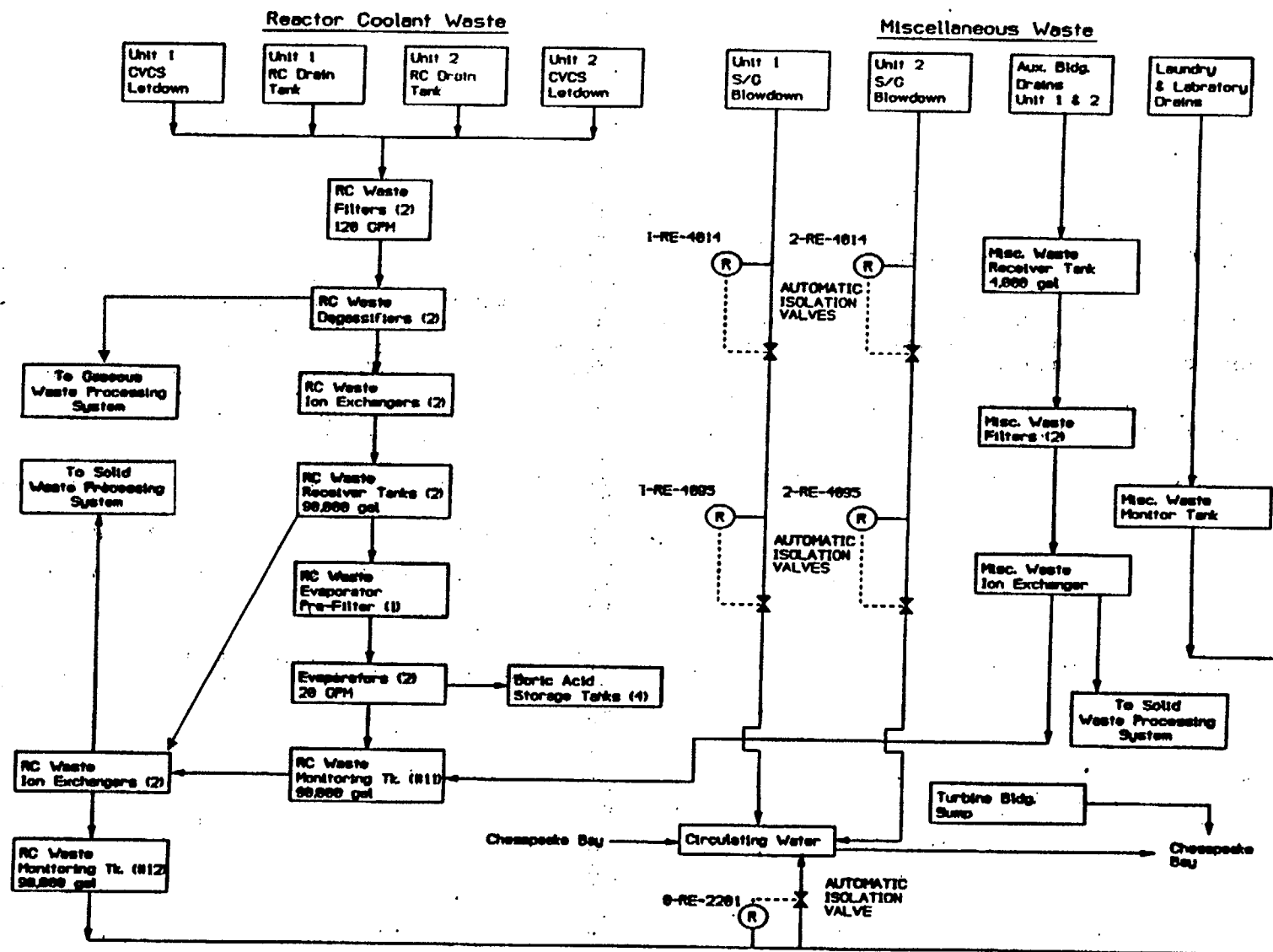
1. This flow rate is only an approximation. The motive force is gravity
2. This is the maximum flow rate. The actual flow rate will be considerably less.
3. This is the maximum volume of the tank, however, since this is a **CONTINUOUS RELEASE**, the volume discharged would be calculated from the discharge flow rate and duration of the release.
4. There is no direct path by which radioactive liquid from the CCW System could enter outfall 001. Liquid from the CCW System may leak into either the Salt Water System (which drains to outfall 001) or the Liquid Waste Processing System (via Aux. Bldg. Drains).
5. Radioactive liquid is not normally released from the CCW system. Flow rate to outfall 001 may occur via Salt Water System. For this pathway, the flow rate will vary (e.g., depending on size of leak). See Safety Analysis No. 2, FCR 82-1053, Supplement 1.
6. System volume is 5894 cubic feet. Conversion constant is 0.13368 cubic feet per gallon.
7. The flow rate shown here is the flow rate for one condensate pump. Verify the number on condensate pumps in service, and modify this flow rate accordingly.
8. Radioactive liquid is not normally released from the CST. The CST would drain to outfall 001 only if catastrophic tank failure occurred. Small leaks would be collected by storm drains which would be released to outfall 002.
9. Flow rate should be calculated on a case-by-case basis.
10. Volume obtained from "Plant Data Book", BGE CCNPP Units 1 and 2, Bechtel Power Corporation, Volume 1, Job 6750.
11. Radioactive liquid is not normally released from the demineralized water storage tank (DWST). The DWST would drain to outfall 001 only if catastrophic tank failure occurred. Small leaks would be collected by the storm drains which would be released to outfall 002.
12. If the precoat sump contents were contaminated, releases would probably be directed to outfall 001, however depending on the valve line-ups, the sump may be discharged to outfall 002.
13. May be a **CONTINUOUS RELEASE** if contaminated sealing steam is operated during the release.
14. Although steam generator releases are normally **BATCH RELEASES**, discharges may at times be continuous. Verify type of release to be conducted prior to discharge.
15. This is the maximum rated discharge for two pumps in operation.
16. The volume specified is the design basis volume from Table 11-1 of the UFSAR.
17. The steam generator blowdown effluent radiation monitor, 1/2-RE-4095, may be equivalent to the 1/2-RE-4014 (see part 5, Liquid Effluent Radiation Monitor Alarm and Trip Setpoints, para. 2)

Attachment 3
Outfalls 002, 003, 004 - Potential Sources of Liquid Radioactive Waste

Waste Volume Stream	Radiation Monitor	Type of Release	Max. Discharge Flow Rate		Maximum Volume		Outfall
			gal / min	liters / min	gal	liters	
Turbine Bldg. Sump No. 11	Unmonitored	Continuous	470	889	1950	7381	002
Turbine Bldg. Sump No. 12	Unmonitored	Continuous	470	889	2415	9141	002
Turbine Bldg. Sump No. 21	Unmonitored	Continuous	470	889	2490	9425	002
Turbine Bldg. Sump No. 22	Unmonitored	Continuous	470	889	2182	8259	002
Precoat Sump	Unmonitored	Continuous	50	94.6	10305	39004	002
Diesel Oil Interceptor Sump	Unmonitored	Continuous	100	378.5	5790	21920	004
Yard Oil Interceptor	Unmonitored	Continuous	variable ³	variable ³	N/A	N/A	002
Refueling Water Tank	Unmonitored	Batch/Cont. ⁷	variable ³	variable ³	4.2E5	1.6E6	any ⁹
Condensate Storage Tank	Unmonitored	Batch/Cont. ⁷	variable ³	variable ³	3.5E5 ⁶	1.3E6 ⁶	002 ^{2,4}
Service Water System	1/2-RE-1595	Continuous	variable ³	variable ³	31418	1.189E5	002
Demin. Water Storage Tank	Unmonitored	Batch/Cont. ⁷	variable ³	variable ³	3.5E5 ⁶	1.3E6 ⁶	002 ²
Plant Heating System	Unmonitored	Continuous	variable ³	variable ³	N/A	N/A	002 ⁸

1. The maximum discharge flow rate is dependent on the influent flow rate (e.g., turbine building sump discharges).
2. The contents of these tanks are not normally discharged to the environment, however in the event of a small leak or catastrophic tank failure, the tank contents could be released to the designated outfall(s).
3. Maximum discharge flow rate shall be determined on a case-by-case basis.
4. It is also possible for the CST to be discharged via the condenser hotwells.
5. Flow rate should be calculated on a case-by-case basis.
6. Volume obtained from "Plant Data Book", BGE CCNPP Units 1 and 2, Bechtel Power Corporation, Volume 1, Job 6750.
7. Releases via this pathway would be considered a **BATCH RELEASE** if a catastrophic tank failure occurred. In the event of a small leak, the release may be considered a **CONTINUOUS RELEASE**. The release mode should be determination on a case-by-case basis.
8. The plant heating system is a closed system and is not normally released to the environment. In the event of a leak, the effluent may be released to the environment via the turbine building sumps (outfall 002). In some cases, depending on the location of the leak, the effluent would be collected in the auxiliary building sump and subsequently released through the liquid radioactive waste processing system. The effluent pathway should be determined on a case-by-case basis.
9. The contents of these tanks are not normally discharged to the environment, however in the event of a small leak or catastrophic tank failure, the tank contents could be released to outfall 002, 003, or 004..

Attachment 4
Block Diagram of Liquid Radioactive Waste Systems



Attachment 5

DOMINANT and LESS DOMINANT RADIONUCLIDES in Typical Radwaste Discharges

The term f_i -- a fraction which represents the relative activity contribution of nuclide i to the average total effluent activity -- is used in several equations in the ODCM (e.g., equations 2G, 5G, 3L, and 4L). This attachment provides guidance for calculating the values of f_i .

1. Select the calendar quarters which contain at least one "typical" liquid (or gas) release (see definition of TYPICAL RADWASTE RELEASE).
2. For each of the calendar quarters selected above, obtain a listing of the nuclides, nuclide activities, and release (end) dates.
 - a. This data may be obtained from the Radioactive Effluent Release Report(s) for the time periods of interest, or
 - b. This data may be obtained from a computer-based effluent management system (if available).
 - c. The values of nuclide activities and release end times may be close approximations of the true values.
3. Sum the quarterly activities (curies) for each individual radionuclide.

$$A_{iT} = \sum A_{iQ} \quad \text{Eq. 1R}$$

4. Sum the quarterly activities for all radionuclides, i .

$$A_T = \sum A_{iT} \quad \text{Eq. 2R}$$

5. Calculate the fraction of the total activity attributable to each radionuclide (i.e., the relative activity of nuclide i).

$$f_i = A_{iT} / A_T \quad \text{Eq. 3R}$$

6. Characterize each radionuclide as either "dominant" or "less dominant" as shown below:
 - * The radionuclide is defined as a **DOMINANT RADIONUCLIDE** if the following inequality is true.

$$f_i \geq 0.010 \quad \text{Eq. 4R}$$

- * The radionuclide is defined as a **LESS DOMINANT RADIONUCLIDE** if the following inequality is true.

$$f_i < 0.010 \quad \text{Eq. 5R}$$

Attachment 6
Liquid Effluent Dose Factors
(mrem/hr per uCi/ml)

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	GIttract
H-3	0.000E+00	2.820E-01	2.820E-01	2.820E-01	2.820E-01	2.820E-01	2.820E-01
BE-7	2.700E+01	1.100E+01	6.500E+01	1.300E+00	1.600E+01	3.100E+00	2.700E+02
C-14	1.450E+04	2.900E+03	2.900E+03	2.900E+03	2.900E+03	2.900E+03	2.900E+03
NA-24	4.570E-01	4.570E-01	4.570E-01	4.570E-01	4.570E-01	4.570E-01	4.570E-01
P-32	4.690E+06	2.910E+05	1.810E+05	0.000E+00	0.000E+00	0.000E+00	5.270E+05
CR-51	0.000E+00	0.000E+00	5.580E+00	3.340E+00	1.230E+00	7.400E+00	1.400E+03
MN-54	0.000E+00	7.060E+03	1.350E+03	0.000E+00	2.100E+03	0.000E+00	2.160E+04
MN-56	0.000E+00	1.780E+02	3.150E+01	0.000E+00	2.260E+02	0.000E+00	5.670E+03
FE-55	5.110E+04	3.530E+04	8.230E+03	0.000E+00	0.000E+00	1.970E+04	2.030E+04
FE-59	8.060E+04	1.900E+05	7.270E+04	0.000E+00	0.000E+00	5.300E+04	6.320E+05
CO-57	0.000E+00	1.420E+02	2.360E+02	0.000E+00	0.000E+00	0.000E+00	3.590E+03
CO-58	0.000E+00	6.030E+02	1.350E+03	0.000E+00	0.000E+00	0.000E+00	1.220E+04
CO-60	0.000E+00	1.730E+03	3.820E+03	0.000E+00	0.000E+00	0.000E+00	3.250E+04
NI-63	4.960E+04	3.440E+03	1.670E+03	0.000E+00	0.000E+00	0.000E+00	7.180E+02
NI-65	2.020E+02	2.620E+01	1.200E+01	0.000E+00	0.000E+00	0.000E+00	6.650E+02
CU-64	0.000E+00	2.140E+02	1.010E+02	0.000E+00	5.400E+02	0.000E+00	1.830E+04
ZN-65	1.610E+05	5.130E+05	2.320E+05	0.000E+00	3.430E+05	0.000E+00	3.230E+05
ZN-69	3.430E+02	6.560E+02	4.560E+01	0.000E+00	4.260E+02	0.000E+00	9.850E+01
BR-82	0.000E+00	0.000E+00	4.070E+00	0.000E+00	0.000E+00	0.000E+00	4.670E+00
BR-83	0.000E+00	0.000E+00	7.250E-02	0.000E+00	0.000E+00	0.000E+00	1.040E-01
BR-84	0.000E+00	0.000E+00	9.390E-02	0.000E+00	0.000E+00	0.000E+00	7.370E-07
BR-85	0.000E+00	0.000E+00	3.860E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB-86	0.000E+00	6.240E+02	2.910E+02	0.000E+00	0.000E+00	0.000E+00	1.230E+02
RB-88	0.000E+00	1.790E+00	9.490E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB-89	0.000E+00	1.190E+00	8.340E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SR-89	4.990E+03	0.000E+00	1.430E+02	0.000E+00	0.000E+00	0.000E+00	8.000E+02
SR-90	1.230E+05	0.000E+00	3.010E+04	0.000E+00	0.000E+00	0.000E+00	3.550E+03
SR-91	9.180E+01	0.000E+00	3.710E+00	0.000E+00	0.000E+00	0.000E+00	4.370E+02
SR-92	3.480E+01	0.000E+00	1.510E+00	0.000E+00	0.000E+00	0.000E+00	6.900E+02
Y-90	6.060E+00	0.000E+00	1.630E-01	0.000E+00	0.000E+00	0.000E+00	6.420E+04
Y-91M	5.730E-02	0.000E+00	2.220E-03	0.000E+00	0.000E+00	0.000E+00	1.680E-01
Y-91	8.880E+01	0.000E+00	2.370E+00	0.000E+00	0.000E+00	0.000E+00	4.890E+04
Y-92	5.320E-01	0.000E+00	1.560E-02	0.000E+00	0.000E+00	0.000E+00	9.320E+03
Y-93	1.690E+00	0.000E+00	4.660E-02	0.000E+00	0.000E+00	0.000E+00	5.350E+04
ZR-95	1.590E+01	5.110E+00	3.460E+00	0.000E+00	8.020E+00	0.000E+00	1.620E+04
ZR-97	8.810E-01	1.780E-01	8.130E-02	0.000E+00	2.680E-01	0.000E+00	5.510E+04
NB-95	4.470E+02	2.490E+02	1.340E+02	0.000E+00	2.460E+02	0.000E+00	1.510E+06
NB-97	3.750E+00	9.490E-01	3.460E-01	0.000E+00	1.110E+00	0.000E+00	3.500E+03

Attachment 6
Liquid Effluent Dose Factors
(mrem/hr per uCi/ml)

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	GIttract
MO-99	0.000E+00	1.280E+02	2.430E+01	0.000E+00	2.890E+02	0.000E+00	2.960E+02
TC-99M	1.300E-02	3.660E-02	4.660E-01	0.000E+00	5.560E-01	1.790E-02	2.170E+01
TC-101	1.330E-02	1.920E-02	1.880E-01	0.000E+00	3.460E-01	9.810E-03	0.000E+00
RU-103	1.070E+02	0.000E+00	4.600E+01	0.000E+00	4.070E+02	0.000E+00	1.250E+04
RU-105	8.890E+00	0.000E+00	3.510E+00	0.000E+00	1.150E+02	0.000E+00	5.440E+03
RU-106	1.590E+03	0.000E+00	2.010E+02	0.000E+00	3.060E+03	0.000E+00	1.030E+05
RH-103M	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RH-106	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CD-109	2.100E+05	4.000E+06	1.600E+06	1.500E+05	2.200E+07	1.800E+05	2.500E+06
AG-110M	1.560E+03	1.450E+03	8.600E+02	0.000E+00	2.850E+03	0.000E+00	5.910E+05
SN-113	6.700E+03	1.200E+03	2.100E+04	6.200E+02	1.600E+03	7.300E+02	2.200E+05
SB-122	5.300E+01	5.520E+01	6.690E+02	8.780E+00	2.610E+01	1.140E+01	6.580E+03
SB-124	2.770E+02	5.230E+00	1.100E+02	6.710E-01	0.000E+00	2.150E+02	7.860E+03
SB-125	1.770E+02	1.980E+00	4.210E+01	1.800E-01	0.000E+00	1.360E+02	1.950E+03
TE-125M	2.170E+02	7.860E+01	2.910E+01	6.520E+01	8.820E+02	0.000E+00	8.660E+02
TE-127M	5.480E+02	1.960E+02	6.680E+01	1.400E+02	2.230E+03	0.000E+00	1.840E+03
TE-127	8.900E+00	3.200E+00	1.930E+00	6.600E+00	3.630E+01	0.000E+00	7.030E+02
TE-129M	9.310E+02	3.470E+02	1.470E+02	3.200E+02	3.890E+03	0.000E+00	4.690E+03
TE-129	2.540E+00	9.550E-01	6.190E-01	1.950E+00	1.070E+01	0.000E+00	1.920E+00
TE-131M	1.400E+02	6.850E+01	5.710E+01	1.080E+02	6.940E+02	0.000E+00	6.800E+03
TE-131	1.590E+00	6.660E-01	5.030E-01	1.310E+00	6.990E+00	0.000E+00	2.260E-01
TE-132	2.040E+02	1.320E+02	1.240E+02	1.460E+02	1.270E+03	0.000E+00	6.240E+03
I-130	3.960E+01	1.170E+02	4.610E+01	9.910E+03	1.820E+02	0.000E+00	1.010E+02
I-131	2.180E+02	3.120E+02	1.790E+02	1.020E+05	5.350E+02	0.000E+00	8.230E+01
I-132	1.060E+01	2.850E+01	9.960E+00	9.960E+02	4.540E+01	0.000E+00	5.350E+00
I-133	7.450E+01	1.300E+02	3.950E+01	1.900E+04	2.260E+02	0.000E+00	1.160E+02
I-134	5.560E+00	1.510E+01	5.400E+00	2.620E+02	2.400E+01	0.000E+00	1.320E-02
I-135	2.320E+01	6.080E+01	2.240E+01	4.010E+03	9.750E+01	0.000E+00	6.870E+01
CS-134	6.840E+03	1.630E+04	1.330E+04	0.000E+00	5.270E+03	1.750E+03	2.850E+02
CS-136	7.160E+02	2.830E+03	2.040E+03	0.000E+00	1.570E+03	2.160E+02	3.210E+02
CS-137	8.770E+03	1.200E+04	7.850E+03	0.000E+00	4.070E+03	1.350E+03	2.320E+02
CS-138	6.070E+00	1.200E+01	5.940E+00	0.000E+00	8.810E+00	8.700E-01	5.120E-05
BA-139	7.850E+00	5.590E-03	2.300E-01	0.000E+00	5.230E-03	3.170E-03	1.390E+01
BA-140	1.640E+03	2.060E+00	1.080E+02	0.000E+00	7.020E-01	1.180E+00	3.380E+03
BA-141	3.810E+00	2.880E-03	1.290E-01	0.000E+00	2.680E-03	1.630E-03	1.800E-09
BA-142	1.720E+00	1.770E-03	1.080E-01	0.000E+00	1.500E-03	1.000E-03	0.000E+00
LA-140	1.570E+00	7.940E-01	2.100E-01	0.000E+00	0.000E+00	0.000E+00	5.830E+04
CE-139	1.000E+02	4.800E+01	3.700E+02	6.200E-01	3.400E+01	4.800E+00	3.200E+03

Attachment 6
Liquid Effluent Dose Factors
(mrem/hr per uCi/ml)

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	GIttract
LA-142	8.060E-02	3.670E-02	9.130E-03	0.000E+00	0.000E+00	0.000E+00	2.680E+02
CE-141	3.430E+00	2.320E+00	2.630E-01	0.000E+00	1.080E+00	0.000E+00	8.860E+03
CE-143	6.040E-01	4.460E+02	4.940E-02	0.000E+00	1.970E-01	0.000E+00	1.670E+04
CE-144	1.790E+02	7.470E+01	9.590E+00	0.000E+00	4.430E+01	0.000E+00	6.040E+04
PR-143	5.790E+00	2.320E+00	2.870E-01	0.000E+00	1.340E+00	0.000E+00	2.540E+04
PR-144	1.900E-02	7.870E-03	9.640E-04	0.000E+00	4.440E-03	0.000E+00	2.730E-09
ND-147	3.960E+00	4.580E+00	2.740E-01	0.000E+00	2.680E+00	0.000E+00	2.200E+04
EU-154	3.870E+02	4.760E+01	3.390E+01	0.000E+00	2.280E+02	0.000E+00	3.450E+04
EU-155	5.420E+01	7.68E+00	4.960E+00	0.000E+00	3.550E+01	0.000E+00	6.050E+03
W-187	9.160E+00	7.660E+00	2.680E+00	0.000E+00	0.000E+00	0.000E+00	2.510E+03
NP-239	3.530E-02	3.470E-03	1.910E-03	0.000E+00	1.080E-02	0.000E+00	7.110E+02
HG-203	1.400E+05	0.000E+00	1.600E+05	0.000E+00	1.600E+06	1.000E+05	3.200E+05

Attachment 7
General Information Related to Gaseous Releases via the Main Vents

Waste Stream	Radiation Monitor	Type of release	Nominal Discharge Flow Rate		Maximum Discharge Flow Rate		Note
			m ³ / sec	SCFM	m ³ /sec	SCFM	
Waste Gas System (WGDT)	0-RE-2191 ¹	Batch	N/A	N/A	2.36E-2	50	
Cntmt. Vent (via H2 Purge)	1/2-RE-5415 ²	Batch ³	2.36E-2	50	2.93E-1	620	
Unit 1 Cntmt. Purge (100%)	1-RE-5415 ⁴	Batch ⁵	N/A	N/A	22.4 ⁶	47,387 ⁶	
Unit 2 Cntmt. Purge (100%)	2-RE-5415 ⁷	Batch ⁵	N/A	N/A	19.7 ⁸	41,808 ⁸	
Unit 1 Main Vent Release	1-RE-5415 ⁴	Continuous	56.3 ⁹	119339 ⁹	62.0 ¹⁰	131273 ¹⁰	
Unit 2 Main Vent Release	2-RE-5415 ⁷	Continuous	47.1 ⁹	99749 ⁹	51.8 ¹⁰	109724 ¹⁰	

- ¹ Since the WGDT is released to the plant vent stack, 1/2-RE-5415 and 1/2-RE-5416 may also be used to monitor releases from a WGDT.
- ² The WRGM, 1/2-RE-5416, may also monitor these releases.
- ³ A containment vent is considered a "batch" release (even though inleakage of radioactive gases into the containment atmosphere may occur during the time the vent is in progress).
- ⁴ The WRGM, 1-RE-5416, may also monitor these releases.
- ⁵ A purge is considered a "batch" release (even though inleakage of radioactive gases into the containment atmosphere may occur during the time the purge is in progress, because the time required to discharge containment atmosphere is so short).
- ⁶ This is the purge flow rate as determined by approved test procedure (i.e., TE-006) in April 1998.
- ⁷ The WRGM, 2-RE-5416, may also monitor these releases.
- ⁸ This is the purge flow rate as determined by approved test procedure (i.e., TE-006) in April 1997.
- ⁹ This is the mean main vent stack flow rate as determined by approved test procedure (i.e., TE-001 from 8/90-3/96 for Unit 1 and ETP-87-16 for Unit 2).
- ¹⁰ This is the maximum vent stack flow rate which is equal to 110% of the Nominal Discharge Flow rate.

Attachment 8
General Information Related to Gaseous Releases via Pathways other than the Main Vents

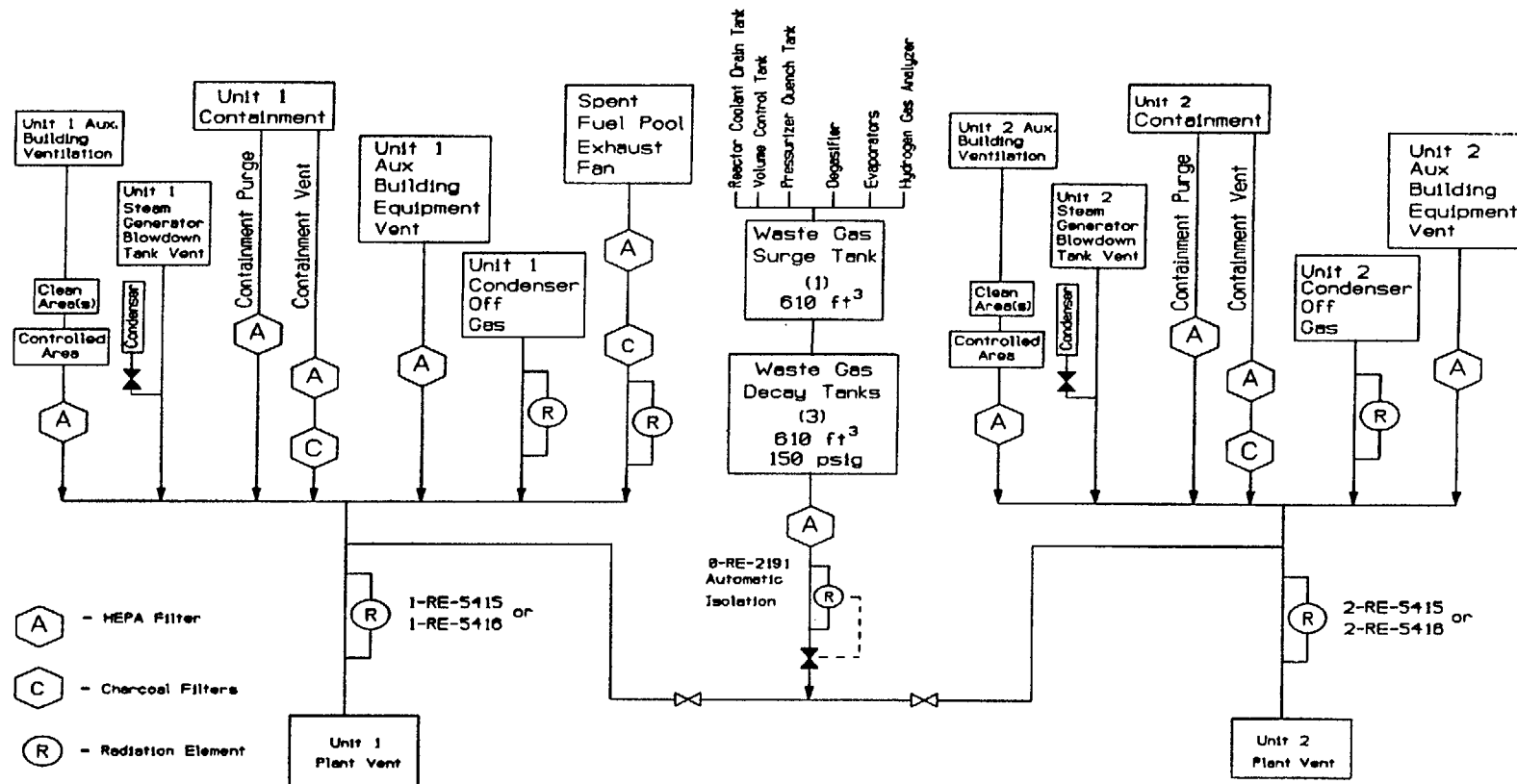
Waste Streams	Radiation Monitor	Type of Release	Nominal Discharge Flow Rate	Notes
Aux. Boiler Deaerator	Unmonitored	See Footnote ¹		See Footnote ²
Stm. Gen. Atm. Stm. Dumps	Unmonitored	See Footnote ¹		See Footnote ²
Plant Nitrogen System	Unmonitored	See Footnote ¹		See Footnote ²
Turbine Bldg. Vent. Exh.	Unmonitored	See Footnote ¹		See Footnote ²
Emergency Air Lock	Unmonitored	See Footnote ¹		See Footnote ²
Plant Compressed Air	Unmonitored	See Footnote ¹		See Footnote ²
Main Steam Line Penetrations	Unmonitored	See Footnote ¹		See Footnote ²
Steam Driven Auxiliary Feed Pumps	Unmonitored	See Footnote ¹		See Footnote ²
Containment Equipment Hatch	Unmonitored	See Footnote ¹		See Footnote ²
Battery Rooms Exhaust	Unmonitored	See Footnote ¹		See Footnote ²

¹ Since radioactive gaseous waste is not normally vented via this pathway, the determination of release type (i.e., continuous or batch) will be evaluated on a case-by-case basis.

² Since radioactive gaseous waste is not normally vented via this pathway, the determination of discharge flow rate will be evaluated on a case-by-case basis.

Attachment 9

Block Diagram of Gaseous Radioactive Waste Systems



Attachment 10
Noble Gas Dose Factors

Nuclide	GAMMA BODY DOSE K_i (mrem/yr)/(μCi/m3)	BETA SKIN DOSE L_i (mrem/yr)/(μCi/m3)	GAMMA AIR DOSE M_i (mrad/yr)/(μCi/m3)	BETA AIR DOSE N_j (mrad/yr)/(μCi/m3)
Ar-41	8.84E+03	2.69E+03	9.30E+03	3.28E+03
Kr-85	1.61E+01	1.34E+03	1.72E+01	1.95E+03
Kr-85m	1.17E+03	1.46E+03	1.23E+03	1.97E+03
Kr-87	5.92E+03	9.73E+03	6.17E+03	1.03E+04
Kr-88	1.47E+04	2.37E+03	1.52E+04	2.93E+03
Xe-131m	9.15E+01	4.76E+02	1.56E+02	1.11E+03
Xe-133	2.94E+02	3.06E+02	3.53E+02	1.05E+03
Xe-133m	2.51E+02	9.94E+02	3.27E+02	1.48E+03
Xe-135	1.81E+03	1.86E+03	1.92E+03	2.46E+03
Xe-135m	3.12E+03	7.11E+02	3.36E+03	7.39E+02
Xe-138	8.83E+03	4.13E+03	9.21E+03	4.75E+03

Attachment 11

Empirical Derivation Of Site-Specific Dose Factors

The total body dose, the skin dose, and the air doses--resulting from gamma and beta emitting radionuclides in discharges of gaseous radwaste--are normally calculated using nuclide specific dose factors. However, these same doses may be estimated using empirically derived, site specific, dose factors as shown below.

TOTAL-BODY, GAMMA-DOSE FACTOR

A site-specific, total-body, gamma-dose factor has been derived from historical data in accordance with the following equation.

$$K_{avg} = \sum (K_i) (f_i) \quad \text{Eq. 1F}$$

K_{avg} = the empirically derived, site-specific, total-body, gamma-dose factor due to all noble gases released during a specified time period

Values of K_{avg} have been calculated using gaseous radwaste discharge data collected over several years.

The results of the calculations appear in the Table on page 5 of this attachment.

K_i = the total body dose factor due to gamma emissions for each identified noble gas radionuclide, i (mrem/yr per microcurie/cubic meter)

The total-body dose factors for gamma rays from noble gas radionuclides were obtained from Regulatory Guide 1.109, Appendix B, Table B-1.

The total-body dose factors for various noble gas radionuclides are tabulated in Attachment 10.

f_i = a fraction which represents the relative activity contribution of noble gas radionuclide i to the total noble gas activity for TYPICAL GASEOUS EFFLUENTS (unitless)

This value has been calculated for all gaseous radwaste discharges for the years 1986, 1987, and 1988 in accordance with equation 3R on Attachment 5.

Attachment 11

Empirical Derivation of Site-Specific Dose Factors

SKIN, BETA-DOSE FACTOR

A site-specific, skin, beta-dose factor has been derived from historical data in accordance with the following equation.

$L_{avg} = \sum (L_i) (f_i)$	Eq. 2F
------------------------------	---------------

L_{avg} = the empirically derived, site-specific, skin, beta-dose factor due to all noble gases released during a specified time period

Values of L_{avg} have been calculated using gaseous radwaste discharge data collected over several years.

The results of the calculations appear in the Table on page 5 of this attachment.

L_i = the skin dose factor due to beta emissions for each identified noble gas radionuclide, i (mrem/yr per microcurie/cubic meter)

The beta skin dose factors have been obtained from Regulatory Guide 1.109, Appendix B, Table B-1.

The beta skin dose factors for various noble gas radionuclides are tabulated in Attachment 10.

f_i = a fraction which represents the relative activity contribution of noble gas radionuclide i to the total noble gas activity for TYPICAL GASEOUS EFFLUENTS (unitless)

This value has been calculated for all gaseous radwaste discharges for the years 1986, 1987, and 1988 in accordance with equation 3R on Attachment 5.

Attachment 11

Empirical Derivation of Site-Specific Dose Factors

GAMMA-AIR-DOSE FACTOR

A site-specific, gamma-air-dose factor has been derived from historical data in accordance with the following equation.

$M_{avg} = \sum (M_i) (f_i)$	Eq. 3F
------------------------------	---------------

M_{avg} = the empirically derived, site-specific, gamma-air-dose factor due to all noble gases released during a specified time period

Values of M_{avg} have been calculated using gaseous radwaste discharge data collected over several years.

The results of the calculations appear in the Table on page 5 of this attachment.

M_i = the air dose factor due to gamma emissions for each identified noble gas radionuclide, i (mrad/yr per microcurie/cubic meter)

The gamma air dose factors have been obtained from Regulatory Guide 1.109, Appendix B, Table B-1.

The gamma air dose factors for various noble gas radionuclides are tabulated in Attachment 10.

f_i = a fraction which represents the relative activity contribution of noble gas radionuclide i to the total noble gas activity for TYPICAL GASEOUS EFFLUENTS (unitless)

This value has been calculated for all gaseous radwaste discharges for the years 1986, 1987, and 1988 in accordance with equation 3R on Attachment 5.

Attachment 11

Empirical Derivation of Site-Specific Dose Factors

BETA-AIR-DOSE FACTOR

A site-specific, beta-air-dose factor has been derived from historical data in accordance with the following equation.

$N_{avg} = \sum (N_i) (f_i)$	Eq. 4F
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N_{avg} = the empirically derived, site-specific, beta-air-dose factor due to all noble gases released during a specified time period

Values of N_{avg} have been calculated using gaseous radwaste discharge data collected over several years.

The results of the calculations appear in the Table on page 5 of this attachment.

N_i = the air dose factor due to beta emissions for each identified noble gas radionuclide, i (mrad/yr per microcurie/cubic meter)

The beta air dose factors have been obtained from Regulatory Guide 1.109, Appendix B, Table B-1.

The beta air dose factors for various noble gas radionuclides are tabulated in Attachment 10 (Attachment 1 of old ODCM).

f_i = a fraction which represents the relative activity contribution of noble gas radionuclide i to the total noble gas activity for TYPICAL GASEOUS EFFLUENTS (unitless)

This value has been calculated for all gaseous radwaste discharges for the years 1986, 1987, and 1988 in accordance with equation 3R on Attachment 5.

Attachment 11

Empirical Derivation of Site-Specific Dose Factors

SITE-SPECIFIC, AVERAGE DOSE FACTORS

Year	K_{avg}	L_{avg}	M_{avg}	N_{avg}
1986	330	790	390	1100
1987	340	810	400	1100
1988	390	960	450	1200
Average	350	850	410	1100
Maximum % difference	11%	13%	10%	9%

As can be seen from the above table, the percent difference between the yearly dose factors and the 3-year average dose factors range from 9% to 13%. This variability is minor considering other areas of uncertainty inherent in the environmental dose calculation models.

It should be noted that the empirically-derived, site-specific, average dose factors listed in the above table shall only rarely be used. In those rare instances where empirically-derived, site-specific, average dose factors are used, the results shall be carefully evaluated by qualified members of the facility staff to ensure the estimated doses are only a small fraction of the Control limits. Additionally, the doses shall be recalculated using the RIGOROUS METHODS prior to submitting the Radioactive Effluent Release Report.

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Attachment 12
Gaseous Effluent Pathway Dose Factors
GRASS-COW-MEAT DOSE FACTORS
ADULT
(m2*mrem/yr per uCi/sec)

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	GIttract
BA-139	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BA-140	2.880E+07	3.610E+04	1.890E+06	0.000E+00	1.230E+04	2.070E+04	5.920E+07
BA-141	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BA-142	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
LA-140	3.600E-02	1.810E-02	4.790E-03	0.000E+00	0.000E+00	0.000E+00	1.330E+03
LA-142	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CE-141	1.400E+04	9.480E+03	1.080E+03	0.000E+00	4.400E+03	0.000E+00	3.620E+07
CE-143	2.090E-02	1.550E+01	1.710E-03	0.000E+00	6.800E-03	0.000E+00	5.780E+02
CE-144	1.460E+06	6.090E+05	7.830E+04	0.000E+00	3.610E+05	0.000E+00	4.930E+08
PR-143	2.130E+04	8.540E+03	1.060E+03	0.000E+00	4.930E+03	0.000E+00	9.330E+07
PR-144	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ND-147	7.080E+03	8.180E+03	4.900E+02	0.000E+00	4.780E+03	0.000E+00	3.930E+07
EU-154	8.030E+06	9.870E+08	7.020E+05	0.000E+00	4.720E+06	0.000E+00	7.150E+08
EU-155	1.110E+06	1.580E+05	1.020E+05	0.000E+00	7.300E+05	0.000E+00	1.240E+08
W-187	2.160E-02	1.810E-02	6.320E-03	0.000E+00	0.000E+00	0.000E+00	5.920E+00
NP-239	2.560E-01	2.510E-02	1.390E-02	0.000E+00	7.840E-02	0.000E+00	5.150E+03

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Attachment 12
Gaseous Effluent Pathway Dose Factors
GRASS-COW-MEAT DOSE FACTORS
TEEN
(m2*mrem/yr per uCi/sec)

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	GIttract
BA-139	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BA-140	2.380E+07	2.910E+04	1.530E+06	0.000E+00	9.880E+03	1.960E+04	3.670E+07
BA-141	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BA-142	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
LA-140	2.960E-02	1.450E-02	3.870E-03	0.000E+00	0.000E+00	0.000E+00	8.350E+02
LA-142	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CE-141	1.180E+04	7.860E+03	9.030E+02	0.000E+00	3.700E+03	0.000E+00	2.250E+07
CE-143	1.760E-02	1.280E+01	1.430E-03	0.000E+00	5.740E-03	0.000E+00	3.850E+02
CE-144	1.230E+06	5.080E+05	6.600E+04	0.000E+00	3.040E+05	0.000E+00	3.090E+08
PR-143	1.790E+04	7.150E+03	8.920E+02	0.000E+00	4.160E+03	0.000E+00	5.900E+07
PR-144	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ND-147	6.240E+03	6.790E+03	4.060E+02	0.000E+00	3.980E+03	0.000E+00	2.450E+07
EU-154	6.090E+06	7.870E+05	5.540E+05	0.000E+00	3.520E+06	0.000E+00	4.160E+08
EU-155	1.330E+06	1.290E+05	7.970E+04	0.000E+00	5.030E+05	0.000E+00	7.380E+08
W-187	1.810E-02	1.480E-02	5.170E-03	0.000E+00	0.000E+00	0.000E+00	3.990E+00
NP-239	2.230E-01	2.110E-02	1.170E-02	0.000E+00	6.610E-02	0.000E+00	3.390E+03

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Attachment 12
Gaseous Effluent Pathway Dose Factors
GRASS-COW-MEAT DOSE FACTORS
CHILD
(m2*mrem/yr per uCi/sec)

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	GIttract
BA-139	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BA-140	4.390E+07	3.850E+04	2.560E+06	0.000E+00	1.250E+04	2.290E+04	2.220E+07
BA-141	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BA-142	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
LA-140	5.410E-02	1.890E-02	6.380E-03	0.000E+00	0.000E+00	0.000E+00	5.270E+02
LA-142	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CE-141	2.220E+04	1.110E+04	1.640E+03	0.000E+00	4.840E+03	0.000E+00	1.380E+07
CE-143	3.300E-02	1.790E+01	2.590E-03	0.000E+00	7.510E-03	0.000E+00	2.620E+02
CE-144	2.320E+06	7.260E+05	1.240E+05	0.000E+00	4.020E+05	0.000E+00	1.890E+08
PR-143	3.390E+04	1.020E+04	1.680E+03	0.000E+00	5.510E+03	0.000E+00	3.660E+07
PR-144	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ND-147	1.170E+04	9.480E+03	7.340E+02	0.000E+00	5.200E+03	0.000E+00	1.500E+07
EU-154	1.120E+07	1.010E+06	9.190E+05	0.000E+00	4.420E+06	0.000E+00	2.340E+08
EU-155	2.330E+06	1.680E+05	1.310E+05	0.000E+00	6.280E+05	0.000E+00	4.200E+08
W-187	3.360E-02	1.990E-02	8.920E-03	0.000E+00	0.000E+00	0.000E+00	2.790E+00
NP-239	4.200E-01	3.020E-02	2.120E-02	0.000E+00	8.730E-02	0.000E+00	2.230E+03

Attachment 12
Gaseous Effluent Pathway Dose Factors
GRASS-COW-MEAT DOSE FACTORS
INFANT
(m2*mrem/yr per uCi/sec)

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	Gttract
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Attachment 12
Gaseous Effluent Pathway Dose Factors
VEGETATION DOSE FACTORS
ADULT
(m2*mrem/yr per uCi/sec)

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	GIttract
H-3	0.000E+00	2.260E+03	2.260E+03	2.260E+03	2.260E+03	2.260E+03	2.260E+03
C-14	8.970E+05	1.790E+05	1.790E+05	1.790E+05	1.790E+05	1.790E+05	1.790E+05
NA-24	2.760E+05	2.760E+05	2.760E+05	2.760E+05	2.760E+05	2.760E+05	2.760E+05
P-32	1.400E+09	8.730E+07	5.420E+07	0.000E+00	0.000E+00	0.000E+00	1.580E+08
CR-51	0.000E+00	0.000E+00	4.660E+04	2.790E+04	1.030E+04	6.190E+04	1.170E+07
MN-54	0.000E+00	3.110E+08	5.940E+07	0.000E+00	9.270E+07	0.000E+00	9.540E+08
MN-56	0.000E+00	1.610E+01	2.850E+00	0.000E+00	2.040E+01	0.000E+00	5.130E+02
FE-55	2.090E+08	1.450E+08	3.370E+07	0.000E+00	0.000E+00	8.060E+07	8.290E+07
FE-59	1.270E+08	2.990E+08	1.140E+08	0.000E+00	0.000E+00	8.350E+07	9.960E+08
CO-57	0.000E+00	1.170E+07	1.950E+07	0.000E+00	0.000E+00	0.000E+00	2.970E+08
CO-58	0.000E+00	3.090E+07	6.920E+07	0.000E+00	0.000E+00	0.000E+00	6.260E+08
CO-60	0.000E+00	1.670E+08	3.690E+08	0.000E+00	0.000E+00	0.000E+00	3.140E+09
NI-63	1.040E+10	7.210E+08	3.490E+08	0.000E+00	0.000E+00	0.000E+00	1.500E+08
NI-65	6.150E+01	7.990E+00	3.650E+00	0.000E+00	0.000E+00	0.000E+00	2.030E+02
CU-64	0.000E+00	9.270E+03	4.350E+03	0.000E+00	2.340E+04	0.000E+00	7.900E+05
ZN-65	3.170E+08	1.010E+09	4.560E+08	0.000E+00	6.750E+08	0.000E+00	6.360E+08
ZN-69	8.750E-06	1.670E-05	1.160E-06	0.000E+00	1.090E-05	0.000E+00	2.510E-06
BR-82	0.000E+00	0.000E+00	1.510E+06	0.000E+00	0.000E+00	0.000E+00	1.730E+06
BR-83	0.000E+00	0.000E+00	3.210E+00	0.000E+00	0.000E+00	0.000E+00	4.630E+00
BR-84	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-85	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB-86	0.000E+00	2.190E+08	1.020E+08	0.000E+00	0.000E+00	0.000E+00	4.320E+07
RB-88	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB-89	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SR-89	9.960E+09	0.000E+00	2.860E+08	0.000E+00	0.000E+00	0.000E+00	1.600E+09
SR-90	6.050E+11	0.000E+00	1.480E+11	0.000E+00	0.000E+00	0.000E+00	1.750E+10
SR-91	3.200E+05	0.000E+00	1.290E+04	0.000E+00	0.000E+00	0.000E+00	1.520E+06
SR-92	4.270E+02	0.000E+00	1.850E+01	0.000E+00	0.000E+00	0.000E+00	8.460E+03
Y-90	1.330E+04	0.000E+00	3.560E+02	0.000E+00	0.000E+00	0.000E+00	1.410E+08
Y-91M	5.830E-09	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.710E-08
Y-91	5.130E+06	0.000E+00	1.370E+05	0.000E+00	0.000E+00	0.000E+00	2.820E+09
Y-92	9.010E-01	0.000E+00	2.630E-02	0.000E+00	0.000E+00	0.000E+00	1.580E+04
Y-93	1.740E+02	0.000E+00	4.800E+00	0.000E+00	0.000E+00	0.000E+00	5.520E+06

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Attachment 12
Gaseous Effluent Pathway Dose Factors
VEGETATION DOSE FACTORS
ADULT
(m2*mrem/yr per uCi/sec)

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	GIttract
BA-139	2.950E-02	2.100E-05	8.640E-04	0.000E+00	1.960E-05	1.190E-05	5.230E-02
BA-140	1.290E+08	1.620E+05	8.430E+06	0.000E+00	5.490E+04	9.250E+04	2.650E+08
BA-141	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BA-142	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
LA-140	1.970E+03	9.920E+02	2.620E+02	0.000E+00	0.000E+00	0.000E+00	7.280E+07
LA-142	1.400E-04	6.350E-05	1.580E-05	0.000E+00	0.000E+00	0.000E+00	4.640E-01
CE-141	1.960E+05	1.330E+05	1.510E+04	0.000E+00	6.170E+04	0.000E+00	5.080E+08
CE-143	1.000E+03	7.420E+05	8.210E+01	0.000E+00	3.260E+02	0.000E+00	2.770E+07
CE-144	3.290E+07	1.380E+07	1.770E+06	0.000E+00	8.160E+06	0.000E+00	1.110E+10
PR-143	6.340E+04	2.540E+04	3.140E+03	0.000E+00	1.470E+04	0.000E+00	2.780E+08
PR-144	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ND-147	3.340E+04	3.860E+04	2.310E+03	0.000E+00	2.250E+04	0.000E+00	1.850E+08
EU-154	4.850E+07	5.970E+06	4.250E+06	0.000E+00	2.860E+07	0.000E+00	4.320E+09
EU-155	6.710E+06	9.510E+05	6.140E+05	0.000E+00	4.390E+06	0.000E+00	7.490E+08
W-187	3.820E+04	3.190E+04	1.120E+04	0.000E+00	0.000E+00	0.000E+00	1.050E+07
NP-239	1.420E+03	1.400E+02	7.720E+01	0.000E+00	4.370E+02	0.000E+00	2.870E+07

Attachment 12
Gaseous Effluent Pathway Dose Factors
VEGETATION DOSE FACTORS
TEEN
(m2*mrem/yr per uCi/sec)

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	GIttract
H-3	0.000E+00	2.590E+03	2.590E+03	2.590E+03	2.590E+03	2.590E+03	2.590E+03
C-14	1.450E+06	2.910E+05	2.910E+05	2.910E+05	2.910E+05	2.910E+05	2.910E+05
NA-24	2.450E+05	2.450E+05	2.450E+05	2.450E+05	2.450E+05	2.450E+05	2.450E+05
P-32	1.610E+09	9.960E+07	6.230E+07	0.000E+00	0.000E+00	0.000E+00	1.350E+08
CR-51	0.000E+00	0.000E+00	6.200E+04	3.440E+04	1.360E+04	8.850E+04	1.040E+07
MN-54	0.000E+00	4.520E+08	8.970E+07	0.000E+00	1.350E+08	0.000E+00	9.270E+08
MN-56	0.000E+00	1.450E+01	2.580E+00	0.000E+00	1.830E+01	0.000E+00	9.540E+02
FE-55	3.250E+08	2.310E+08	5.380E+07	0.000E+00	0.000E+00	1.460E+08	9.980E+07
FE-59	1.810E+08	4.220E+08	1.630E+08	0.000E+00	0.000E+00	1.330E+08	9.980E+08
CO-57	0.000E+00	1.790E+07	3.000E+07	0.000E+00	0.000E+00	0.000E+00	3.340E+08
CO-58	0.000E+00	4.380E+07	1.010E+08	0.000E+00	0.000E+00	0.000E+00	6.040E+08
CO-60	0.000E+00	2.490E+08	5.600E+08	0.000E+00	0.000E+00	0.000E+00	3.240E+09
NI-63	1.610E+10	1.130E+09	5.450E+08	0.000E+00	0.000E+00	0.000E+00	1.810E+08
NI-65	5.730E+01	7.320E+00	3.330E+00	0.000E+00	0.000E+00	0.000E+00	3.970E+02
CU-64	0.000E+00	8.400E+03	3.950E+03	0.000E+00	2.120E+04	0.000E+00	6.510E+05
ZN-65	4.240E+08	1.470E+09	6.860E+08	0.000E+00	9.410E+08	0.000E+00	6.230E+08
ZN-69	8.190E-06	1.560E-05	1.090E-06	0.000E+00	1.020E-05	0.000E+00	2.880E-05
BR-82	0.000E+00	0.000E+00	1.330E+06	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-83	0.000E+00	0.000E+00	3.010E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-84	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-85	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB-86	0.000E+00	2.730E+08	1.280E+08	0.000E+00	0.000E+00	0.000E+00	4.050E+07
RB-88	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB-89	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SR-89	1.510E+10	0.000E+00	4.330E+08	0.000E+00	0.000E+00	0.000E+00	1.800E+09
SR-90	7.510E+11	0.000E+00	1.850E+11	0.000E+00	0.000E+00	0.000E+00	2.110E+10
SR-91	2.990E+05	0.000E+00	1.190E+04	0.000E+00	0.000E+00	0.000E+00	1.360E+06
SR-92	3.970E+02	0.000E+00	1.690E+01	0.000E+00	0.000E+00	0.000E+00	1.010E+04
Y-90	1.240E+04	0.000E+00	3.340E+02	0.000E+00	0.000E+00	0.000E+00	1.020E+08
Y-91M	5.430E-09	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.560E-07
Y-91	7.870E+06	0.000E+00	2.110E+05	0.000E+00	0.000E+00	0.000E+00	3.230E+09
Y-92	8.470E-01	0.000E+00	2.450E-02	0.000E+00	0.000E+00	0.000E+00	2.320E+04
Y-93	1.630E+02	0.000E+00	4.470E+00	0.000E+00	0.000E+00	0.000E+00	4.980E+06

TEEN
(m2*mrem/yr per uCi/sec)

[illegible]

Attachment 12
Gaseous Effluent Pathway Dose Factors
VEGETATION DOSE FACTORS
TEEN
(m2*mrem/yr per uCi/sec)

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	GIttract
BA-139	2.770E-02	1.950E-05	8.080E-04	0.000E+00	1.840E-05	1.340E-05	2.470E-01
BA-140	1.380E+08	1.690E+05	8.910E+06	0.000E+00	5.750E+04	1.140E+05	2.130E+08
BA-141	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BA-142	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
LA-140	1.800E+03	8.840E+02	2.350E+02	0.000E+00	0.000E+00	0.000E+00	5.080E+07
LA-142	1.280E-04	5.690E-05	1.420E-05	0.000E+00	0.000E+00	0.000E+00	1.730E+00
CE-141	2.820E+05	1.880E+05	2.160E+04	0.000E+00	8.860E+04	0.000E+00	5.380E+08
CE-143	9.370E+02	6.820E+05	7.620E+01	0.000E+00	3.060E+02	0.000E+00	2.050E+07
CE-144	5.270E+07	2.180E+07	2.830E+06	0.000E+00	1.300E+07	0.000E+00	1.330E+10
PR-143	7.120E+04	2.840E+04	3.550E+03	0.000E+00	1.650E+04	0.000E+00	2.340E+08
PR-144	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ND-147	3.630E+04	3.940E+04	2.360E+03	0.000E+00	2.320E+04	0.000E+00	1.420E+08
EU-154	7.060E+07	9.120E+06	6.430E+06	0.000E+00	4.080E+07	0.000E+00	4.820E+09
EU-155	1.540E+07	1.480E+06	9.190E+05	0.000E+00	5.800E+06	0.000E+00	8.510E+09
W-187	3.550E+04	2.900E+04	1.020E+04	0.000E+00	0.000E+00	0.000E+00	7.840E+06
NP-239	1.380E+03	1.300E+02	7.240E+01	0.000E+00	4.090E+02	0.000E+00	2.100E+07

Attachment 12
Gaseous Effluent Pathway Dose Factors
VEGETATION DOSE FACTORS
CHILD
(m²*mrem/yr per uCi/sec)

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	GIttract
H-3	0.000E+00	4.010E+03	4.010E+03	4.010E+03	4.010E+03	4.010E+03	4.010E+03
C-14	3.500E+06	7.010E+05	7.010E+05	7.010E+05	7.010E+05	7.010E+05	7.010E+05
NA-24	3.830E+05	3.830E+05	3.830E+05	3.830E+05	3.830E+05	3.830E+05	3.830E+05
P-32	3.370E+09	1.580E+08	1.300E+08	0.000E+00	0.000E+00	0.000E+00	9.300E+07
CR-51	0.000E+00	0.000E+00	1.180E+05	6.540E+04	1.790E+04	1.190E+05	6.250E+06
MN-54	0.000E+00	6.610E+08	1.760E+08	0.000E+00	1.850E+08	0.000E+00	5.550E+08
MN-56	0.000E+00	1.900E+01	4.280E+00	0.000E+00	2.290E+01	0.000E+00	2.750E+03
FE-55	8.000E+08	4.240E+08	1.310E+08	0.000E+00	0.000E+00	2.400E+08	7.860E+07
FE-59	4.010E+08	6.490E+08	3.230E+08	0.000E+00	0.000E+00	1.880E+08	6.760E+08
CO-57	0.000E+00	2.990E+07	6.040E+07	0.000E+00	0.000E+00	0.000E+00	2.450E+08
CO-58	0.000E+00	6.470E+07	1.980E+08	0.000E+00	0.000E+00	0.000E+00	3.770E+08
CO-60	0.000E+00	3.780E+08	1.120E+09	0.000E+00	0.000E+00	0.000E+00	2.100E+09
NI-63	3.950E+10	2.110E+09	1.340E+09	0.000E+00	0.000E+00	0.000E+00	1.420E+08
NI-65	1.050E+02	9.890E+00	5.770E+00	0.000E+00	0.000E+00	0.000E+00	1.210E+03
CU-64	0.000E+00	1.110E+04	6.690E+03	0.000E+00	2.680E+04	0.000E+00	5.200E+05
ZN-65	8.120E+08	2.160E+09	1.350E+09	0.000E+00	1.360E+09	0.000E+00	3.800E+08
ZN-69	1.510E-05	2.180E-05	2.020E-06	0.000E+00	1.320E-05	0.000E+00	1.380E-03
BR-82	0.000E+00	0.000E+00	2.040E+06	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-83	0.000E+00	0.000E+00	5.550E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-84	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-85	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB-86	0.000E+00	4.520E+08	2.780E+08	0.000E+00	0.000E+00	0.000E+00	2.910E+07
RB-88	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB-89	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SR-89	3.590E+10	0.000E+00	1.030E+09	0.000E+00	0.000E+00	0.000E+00	1.390E+09
SR-90	1.240E+12	0.000E+00	3.150E+11	0.000E+00	0.000E+00	0.000E+00	1.670E+10
SR-91	5.500E+05	0.000E+00	2.080E+04	0.000E+00	0.000E+00	0.000E+00	1.210E+06
SR-92	7.280E+02	0.000E+00	2.920E+01	0.000E+00	0.000E+00	0.000E+00	1.380E+04
Y-90	2.300E+04	0.000E+00	6.170E+02	0.000E+00	0.000E+00	0.000E+00	6.560E+07
Y-91M	9.940E-09	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.950E-05
Y-91	1.870E+07	0.000E+00	5.010E+05	0.000E+00	0.000E+00	0.000E+00	2.490E+09
Y-92	1.560E+00	0.000E+00	4.460E-02	0.000E+00	0.000E+00	0.000E+00	4.510E+04
Y-93	3.010E+02	0.000E+00	8.250E+00	0.000E+00	0.000E+00	0.000E+00	4.480E+06

[illegible]

Attachment 12
Gaseous Effluent Pathway Dose Factors
VEGETATION DOSE FACTORS
CHILD
(m²*mrem/yr per uCi/sec)

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	GIttract
BA-139	5.110E-02	2.730E-05	1.480E-03	0.000E+00	2.380E-05	1.610E-05	2.950E+00
BA-140	2.770E+08	2.430E+05	1.620E+07	0.000E+00	7.900E+04	1.450E+05	1.400E+08
BA-141	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BA-142	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
LA-140	3.230E+03	1.130E+03	3.810E+02	0.000E+00	0.000E+00	0.000E+00	3.150E+07
LA-142	2.320E-04	7.400E-05	2.320E-05	0.000E+00	0.000E+00	0.000E+00	1.470E+01
CE-141	6.350E+05	3.260E+05	4.840E+04	0.000E+00	1.430E+05	0.000E+00	4.070E+08
CE-143	1.730E+03	9.360E+05	1.360E+02	0.000E+00	3.930E+02	0.000E+00	1.370E+07
CE-144	1.270E+08	3.980E+07	6.780E+06	0.000E+00	2.210E+07	0.000E+00	1.040E+10
PR-143	1.480E+05	4.460E+04	7.370E+03	0.000E+00	2.410E+04	0.000E+00	1.600E+08
PR-144	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ND-147	7.160E+04	5.800E+04	4.490E+03	0.000E+00	3.180E+04	0.000E+00	9.180E+07
EU-154	1.660E+08	1.500E+07	1.370E+07	0.000E+00	6.570E+07	0.000E+00	3.480E+09
EU-155	3.440E+07	2.480E+06	1.940E+06	0.000E+00	9.280E+06	0.000E+00	6.200E+09
W-187	6.470E+04	3.830E+04	1.720E+04	0.000E+00	0.000E+00	0.000E+00	5.380E+06
NP-239	2.550E+03	1.830E+02	1.290E+02	0.000E+00	5.300E+02	0.000E+00	1.360E+07

Attachment 12
Gaseous Effluent Pathway Dose Factors
VEGETATION DOSE FACTORS
INFANT
(m2*mrem/yr per uCi/sec)

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	Gitract
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THIS PATHWAY IS NOT APPLICABLE

TABLE INTENTIONALLY LEFT BLANK

Attachment 12
Gaseous Effluent Pathway Dose Factors
GROUND PLANE DOSE FACTORS
ADULT
(m2*mrem/yr per uCi/sec)

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	GIttract
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THIS PATHWAY IS NOT APPLICABLE
TABLE INTENTIONALLY LEFT BLANK

[illegible]

TEEN
(m2*mrem/yr per uCi/sec)

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

Attachment 12
Gaseous Effluent Pathway Dose Factors
INHALATION DOSE FACTORS
ADULT
(mrem/yr per uCi/m³)

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	Giltract
H-3	0.000E+00	1.260E+03	1.260E+03	1.260E+03	1.260E+03	1.260E+03	1.260E+03
C-14	1.820E+04	3.410E+03	3.410E+03	3.410E+03	3.410E+03	3.410E+03	3.410E+03
NA-24	1.020E+04	1.020E+04	1.020E+04	1.020E+04	1.020E+04	1.020E+04	1.020E+04
P-32	1.320E+06	7.710E+04	5.010E+04	0.000E+00	0.000E+00	0.000E+00	8.640E+04
CR-51	0.000E+00	0.000E+00	1.000E+02	5.950E+01	2.280E+01	1.440E+04	3.320E+03
MN-54	0.000E+00	3.960E+04	6.300E+03	0.000E+00	9.840E+03	1.400E+06	7.740E+04
MN-56	0.000E+00	1.240E+00	1.830E-01	0.000E+00	1.300E+00	9.440E+03	2.020E+04
FE-55	2.460E+04	1.700E+04	3.940E+03	0.000E+00	0.000E+00	7.210E+04	6.030E+03
FE-59	1.180E+04	2.780E+04	1.060E+04	0.000E+00	0.000E+00	1.020E+06	1.880E+05
CO-57	0.000E+00	6.920E+02	6.710E+02	0.000E+00	0.000E+00	3.700E+05	3.140E+04
CO-58	0.000E+00	1.580E+03	2.070E+03	0.000E+00	0.000E+00	9.280E+05	1.060E+05
CO-60	0.000E+00	1.150E+04	1.480E+04	0.000E+00	0.000E+00	5.970E+06	2.850E+05
NI-63	4.320E+05	3.140E+04	1.450E+04	0.000E+00	0.000E+00	1.780E+05	1.340E+04
NI-65	1.540E+00	2.100E-01	9.120E-02	0.000E+00	0.000E+00	5.600E+03	1.230E+04
CU-64	0.000E+00	1.460E+00	6.150E-01	0.000E+00	4.620E+00	6.780E+03	4.900E+04
ZN-65	3.240E+04	1.030E+05	4.660E+04	0.000E+00	6.900E+04	8.640E+05	5.340E+04
ZN-69	3.380E-02	6.510E-02	4.520E-03	0.000E+00	4.220E-02	9.200E+02	1.630E+01
BR-82	0.000E+00	0.000E+00	1.350E+04	0.000E+00	0.000E+00	0.000E+00	1.040E+04
BR-83	0.000E+00	0.000E+00	2.410E+02	0.000E+00	0.000E+00	0.000E+00	2.320E+02
BR-84	0.000E+00	0.000E+00	3.130E+02	0.000E+00	0.000E+00	0.000E+00	1.640E-03
BR-85	0.000E+00	0.000E+00	1.280E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB-86	0.000E+00	1.350E+05	5.900E+04	0.000E+00	0.000E+00	0.000E+00	1.660E+04
RB-88	0.000E+00	3.870E+02	1.930E+02	0.000E+00	0.000E+00	0.000E+00	3.340E-09
RB-89	0.000E+00	2.560E+02	1.700E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SR-89	3.040E+05	0.000E+00	8.720E+03	0.000E+00	0.000E+00	1.400E+06	3.500E+05
SR-90	9.920E+07	0.000E+00	6.100E+06	0.000E+00	0.000E+00	9.600E+06	7.220E+05
SR-91	6.190E+01	0.000E+00	2.500E+00	0.000E+00	0.000E+00	3.650E+04	1.910E+05
SR-92	6.740E+00	0.000E+00	2.910E-01	0.000E+00	0.000E+00	1.650E+04	4.300E+04
Y-90	2.090E+03	0.000E+00	5.610E+01	0.000E+00	0.000E+00	1.700E+05	5.060E+05
Y-91M	2.610E-01	0.000E+00	1.020E-02	0.000E+00	0.000E+00	1.920E+03	1.330E+00
Y-91	4.620E+05	0.000E+00	1.240E+04	0.000E+00	0.000E+00	1.700E+06	3.850E+05
Y-92	1.030E+01	0.000E+00	3.020E-01	0.000E+00	0.000E+00	1.570E+04	7.350E+04
Y-93	9.440E+01	0.000E+00	2.610E+00	0.000E+00	0.000E+00	4.850E+04	4.220E+05

Attachment 12
Gaseous Effluent Pathway Dose Factors
INHALATION DOSE FACTORS
ADULT
(mrem/yr per uCi/m³)

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	GIttract
ZR-95	1.070E+05	3.440E+04	2.330E+04	0.000E+00	5.420E+04	1.770E+06	1.500E+05
ZR-97	9.680E+01	1.960E+01	9.040E+00	0.000E+00	2.970E+01	7.870E+04	5.230E+05
NB-95	1.410E+04	7.820E+03	4.210E+03	0.000E+00	7.740E+03	5.050E+05	1.040E+05
NB-97	2.220E-01	5.620E-02	2.050E-02	0.000E+00	6.540E-02	2.400E+03	2.420E+02
MO-99	0.000E+00	1.210E+02	2.300E+01	0.000E+00	2.910E+02	9.120E+04	2.480E+05
TC-99M	1.030E-03	2.910E-03	3.700E-02	0.000E+00	4.420E-02	7.640E+02	4.160E+03
TC-101	4.180E-05	6.020E-05	5.900E-04	0.000E+00	1.080E-03	3.990E+02	0.000E+00
RU-103	1.530E+03	0.000E+00	6.580E+02	0.000E+00	5.830E+03	5.050E+05	1.100E+05
RU-105	7.900E-01	0.000E+00	3.110E-01	0.000E+00	1.020E+00	1.100E+04	4.820E+04
RU-106	6.910E+04	0.000E+00	8.720E+03	0.000E+00	1.340E+05	9.360E+06	9.120E+05
RH-103M	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RH-106	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
AG-110M	1.080E+04	1.000E+04	5.940E+03	0.000E+00	1.970E+04	4.630E+06	3.020E+05
SB-122	3.100E+03	4.110E+03	4.110E+04	1.070E+03	1.550E+03	1.670E+05	2.020E+05
SB-124	3.120E+04	5.890E+02	1.240E+04	7.550E+01	0.000E+00	2.480E+06	4.060E+05
SB-125	5.340E+04	5.950E+02	1.260E+04	5.400E+01	0.000E+00	1.740E+06	1.010E+05
TE-125M	3.420E+03	1.580E+03	4.670E+02	1.050E+03	1.240E+04	3.140E+05	7.060E+04
TE-127M	1.260E+04	5.770E+03	1.570E+03	3.290E+03	4.580E+04	9.600E+05	1.500E+05
TE-127	1.400E+00	6.420E-01	3.100E-01	1.060E+00	5.100E+00	6.510E+03	5.740E+04
TE-129M	9.760E+03	4.670E+03	1.580E+03	3.440E+03	3.660E+04	1.160E+06	3.830E+05
TE-129	4.980E-02	2.390E-02	1.240E-02	3.900E-02	1.870E-01	1.940E+03	1.570E+02
TE-131M	6.990E+01	4.360E+01	2.900E+01	5.500E+01	3.090E+02	1.460E+05	5.560E+05
TE-131	1.110E-02	5.950E-03	3.590E-03	9.360E-03	4.370E-02	1.390E+03	1.840E+01
TE-132	2.600E+02	2.150E+02	1.620E+02	1.900E+02	1.460E+03	2.880E+05	5.100E+05
I-130	4.580E+03	1.340E+04	5.280E+03	1.140E+06	2.090E+04	7.690E+03	0.000E+00
I-131	2.520E+04	3.580E+04	2.050E+04	1.190E+07	6.130E+04	0.000E+00	6.280E+03
I-132	1.160E+03	3.260E+03	1.160E+03	1.140E+05	5.180E+03	0.000E+00	4.060E+02
I-133	8.640E+03	1.480E+04	4.520E+03	2.150E+06	2.580E+04	0.000E+00	8.880E+03
I-134	6.440E+02	1.730E+03	6.150E+02	2.980E+04	2.750E+03	0.000E+00	1.010E+00
I-135	2.680E+03	6.980E+03	2.570E+03	4.480E+05	1.110E+04	0.000E+00	5.250E+03
CS-134	3.730E+05	8.480E+05	7.280E+05	0.000E+00	2.870E+05	9.760E+04	1.040E+04
CS-136	3.900E+04	1.460E+05	1.100E+05	0.000E+00	8.560E+04	1.200E+04	1.170E+04
CS-137	4.780E+05	6.210E+05	4.280E+05	0.000E+00	2.220E+05	7.520E+04	8.400E+03
CS-138	3.310E+02	6.210E+02	3.240E+02	0.000E+00	4.800E+02	4.860E+01	1.860E-03

Attachment 12
Gaseous Effluent Pathway Dose Factors
INHALATION DOSE FACTORS
ADULT
(mrem/yr per uCi/m³)

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	GIttract
BA-139	9.360E-01	6.660E-04	2.740E-02	0.000E+00	6.220E-04	3.760E+03	8.960E+02
BA-140	3.900E+04	4.900E+01	2.570E+03	0.000E+00	1.670E+01	1.270E+06	2.180E+05
BA-141	1.000E-01	7.530E-05	3.360E-03	0.000E+00	7.000E-05	1.940E+03	1.160E-07
BA-142	2.630E-02	2.700E-05	1.660E-03	0.000E+00	2.290E-05	1.190E+03	0.000E+00
LA-140	3.440E+02	1.740E+02	4.580E+01	0.000E+00	0.000E+00	1.360E+05	4.580E+05
LA-142	6.830E-01	3.100E-01	7.720E-02	0.000E+00	0.000E+00	6.330E+03	2.110E+03
CE-141	1.990E+04	1.350E+04	1.530E+03	0.000E+00	6.260E+03	3.620E+05	1.200E+05
CE-143	1.860E+02	1.380E+02	1.530E+01	0.000E+00	6.080E+01	7.980E+04	2.260E+05
CE-144	3.430E+06	1.430E+06	1.840E+05	0.000E+00	8.480E+05	7.780E+06	8.160E+05
PR-143	9.360E+03	3.750E+03	4.640E+02	0.000E+00	2.160E+03	2.810E+05	2.000E+05
PR-144	3.010E-02	1.250E-02	1.530E-03	0.000E+00	7.050E-03	1.020E+03	2.150E-08
ND-147	5.270E+03	6.100E+03	3.650E+02	0.000E+00	3.560E+03	2.210E+05	1.730E+05
EU-154	5.920E+06	7.280E+05	5.180E+05	0.000E+00	3.490E+06	4.670E+06	2.720E+05
EU-155	8.080E+05	1.140E+05	7.370E+04	0.000E+00	5.270E+05	7.570E+05	4.760E+04
W-187	8.480E+00	7.080E+00	2.480E+00	0.000E+00	0.000E+00	2.900E+04	1.550E+05
NP-239	2.300E+02	2.260E+01	1.240E+01	0.000E+00	7.000E+01	3.760E+04	1.190E+05

Attachment 12
Gaseous Effluent Pathway Dose Factors
INHALATION DOSE FACTORS
TEEN
(mrem/yr per uCi/m³)

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	GIttract
H-3	0.000E+00	1.270E+03	1.270E+03	1.270E+03	1.270E+03	1.270E+03	1.270E+03
C-14	2.600E+04	4.870E+03	4.870E+03	4.870E+03	4.870E+03	4.870E+03	4.870E+03
NA-24	1.380E+04	1.380E+04	1.380E+04	1.380E+04	1.380E+04	1.380E+04	1.380E+04
P-32	1.890E+06	1.100E+05	7.160E+04	0.000E+00	0.000E+00	0.000E+00	9.280E+04
CR-51	0.000E+00	0.000E+00	1.350E+02	7.500E+01	3.070E+01	2.100E+04	3.000E+03
MN-54	0.000E+00	5.110E+04	8.400E+03	0.000E+00	1.270E+04	1.980E+06	6.680E+04
MN-56	0.000E+00	1.700E+00	2.520E-01	0.000E+00	1.790E+00	1.520E+04	5.740E+04
FE-55	3.340E+04	2.380E+04	5.540E+03	0.000E+00	0.000E+00	1.240E+05	6.390E+03
FE-59	1.590E+04	3.700E+04	1.430E+04	0.000E+00	0.000E+00	1.530E+06	1.780E+05
CO-57	0.000E+00	6.920E+02	9.200E+02	0.000E+00	0.000E+00	5.860E+05	3.140E+04
CO-58	0.000E+00	2.070E+03	2.780E+03	0.000E+00	0.000E+00	1.340E+06	9.520E+04
CO-60	0.000E+00	1.510E+04	1.980E+04	0.000E+00	0.000E+00	8.720E+06	2.590E+05
NI-63	5.800E+05	4.340E+04	1.980E+04	0.000E+00	0.000E+00	3.070E+05	1.420E+04
NI-65	2.180E+00	2.930E-01	1.270E-01	0.000E+00	0.000E+00	9.360E+03	3.670E+04
CU-64	0.000E+00	2.030E+00	8.480E-01	0.000E+00	6.410E+00	1.110E+04	6.140E+04
ZN-65	3.860E+04	1.340E+05	6.240E+04	0.000E+00	8.640E+04	1.240E+06	4.660E+04
ZN-69	4.830E-02	9.200E-02	6.460E-03	0.000E+00	6.020E-02	1.580E+03	2.850E+02
BR-82	0.000E+00	0.000E+00	1.820E+04	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-83	0.000E+00	0.000E+00	3.440E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-84	0.000E+00	0.000E+00	4.330E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-85	0.000E+00	0.000E+00	1.830E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB-86	0.000E+00	1.900E+05	8.400E+04	0.000E+00	0.000E+00	0.000E+00	1.770E+04
RB-88	0.000E+00	5.460E+02	2.720E+02	0.000E+00	0.000E+00	0.000E+00	2.920E-05
RB-89	0.000E+00	3.520E+02	2.330E+02	0.000E+00	0.000E+00	0.000E+00	3.380E-07
SR-89	4.340E+05	0.000E+00	1.250E+04	0.000E+00	0.000E+00	2.420E+06	3.710E+05
SR-90	1.080E+08	0.000E+00	6.680E+06	0.000E+00	0.000E+00	1.650E+07	7.650E+05
SR-91	8.800E+01	0.000E+00	3.510E+00	0.000E+00	0.000E+00	6.070E+04	2.590E+05
SR-92	9.520E+00	0.000E+00	4.060E-01	0.000E+00	0.000E+00	2.740E+04	1.190E+05
Y-90	2.980E+03	0.000E+00	8.000E+01	0.000E+00	0.000E+00	2.930E+05	5.590E+05
Y-91M	3.700E-01	0.000E+00	1.420E-02	0.000E+00	0.000E+00	3.200E+03	3.020E+01
Y-91	6.610E+05	0.000E+00	1.770E+04	0.000E+00	0.000E+00	2.940E+06	4.090E+05
Y-92	1.470E+01	0.000E+00	4.290E-01	0.000E+00	0.000E+00	2.680E+04	1.650E+05
Y-93	1.350E+02	0.000E+00	3.720E+00	0.000E+00	0.000E+00	8.320E+04	5.790E+05

Attachment 12
Gaseous Effluent Pathway Dose Factors
INHALATION DOSE FACTORS
TEEN
(mrem/yr per uCi/m³)

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	GItract
ZR-95	1.460E+05	4.580E+04	3.150E+04	0.000E+00	6.740E+04	2.690E+06	1.490E+05
ZR-97	1.380E+02	2.720E+01	1.260E+01	0.000E+00	4.120E+01	1.300E+05	6.300E+05
NB-95	1.860E+04	1.030E+04	5.660E+03	0.000E+00	1.000E+04	7.510E+05	9.680E+04
NB-97	3.140E-01	7.780E-02	2.840E-02	0.000E+00	9.120E-02	3.930E+03	2.170E+03
MO-99	0.000E+00	1.690E+02	3.220E+01	0.000E+00	4.110E+02	1.540E+05	2.690E+05
TC-99M	1.380E-03	3.860E-03	4.990E-02	0.000E+00	5.760E-02	1.150E+03	6.130E+03
TC-101	5.920E-05	8.400E-05	8.240E-04	0.000E+00	1.520E-03	6.670E+02	8.720E-07
RU-103	2.100E+03	0.000E+00	8.960E+02	0.000E+00	7.430E+03	7.830E+05	1.090E+05
RU-105	1.120E+00	0.000E+00	4.340E-01	0.000E+00	1.410E+00	1.820E+04	9.040E+04
RU-106	9.840E+04	0.000E+00	1.240E+04	0.000E+00	1.900E+05	1.610E+07	9.600E+05
RH-103M	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RH-106	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
AG-110M	1.380E+04	1.310E+04	7.990E+03	0.000E+00	2.500E+04	6.750E+06	2.730E+05
SB-122	3.100E+03	4.110E+03	4.110E+04	1.070E+03	1.550E+03	1.670E+05	2.020E+05
SB-124	4.300E+04	7.940E+02	1.680E+04	9.760E+01	0.000E+00	3.850E+06	3.980E+05
SB-125	7.380E+04	8.080E+02	1.720E+04	7.040E+01	0.000E+00	2.740E+06	9.920E+04
TE-125M	4.880E+03	2.240E+03	6.670E+02	1.400E+03	0.000E+00	5.360E+05	7.500E+04
TE-127M	1.800E+04	8.160E+03	2.180E+03	4.380E+03	6.540E+04	1.660E+06	1.590E+05
TE-127	2.010E+00	9.120E-01	4.420E-01	1.420E+00	7.280E+00	1.120E+04	8.080E+04
TE-129M	1.390E+04	6.580E+03	2.250E+03	4.580E+03	5.190E+04	1.980E+06	4.050E+05
TE-129	7.100E-02	3.380E-02	1.760E-02	5.180E-02	2.660E-01	3.300E+03	1.620E+03
TE-131M	9.840E+01	6.010E+01	4.020E+01	7.250E+01	4.390E+02	2.380E+05	6.210E+05
TE-131	1.580E-02	8.320E-03	5.040E-03	1.240E-02	6.180E-02	2.340E+03	1.510E+01
TE-132	3.600E+02	2.900E+02	2.190E+02	2.460E+02	1.950E+03	4.490E+05	4.630E+05
I-130	6.240E+03	1.790E+04	7.170E+03	1.490E+06	2.750E+04	0.000E+00	9.120E+03
I-131	3.540E+04	4.910E+04	2.640E+04	1.460E+07	8.400E+04	0.000E+00	6.490E+03
I-132	1.590E+03	4.380E+03	1.580E+03	1.510E+05	6.920E+03	0.000E+00	1.270E+03
I-133	1.220E+04	2.050E+04	6.220E+03	2.920E+06	3.590E+04	0.000E+00	1.030E+04
I-134	8.880E+02	2.320E+03	8.400E+02	3.950E+04	3.660E+03	0.000E+00	2.040E+01
I-135	3.700E+03	9.440E+03	3.490E+03	6.210E+05	1.490E+04	0.000E+00	6.950E+03
CS-134	5.020E+05	1.130E+06	5.490E+05	0.000E+00	3.750E+05	1.460E+05	9.760E+03
CS-136	5.150E+04	1.940E+05	1.370E+05	0.000E+00	1.100E+05	1.780E+04	1.090E+04
CS-137	6.700E+05	8.480E+05	3.110E+05	0.000E+00	3.040E+05	1.210E+05	8.480E+03
CS-138	4.660E+02	8.560E+02	4.460E+02	0.000E+00	6.620E+02	7.870E+01	2.700E-01

Attachment 12
Gaseous Effluent Pathway Dose Factors
INHALATION DOSE FACTORS
TEEN
(mrem/yr per uCi/m³)

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	Gitract
BA-139	1.340E+00	9.440E-04	3.900E-02	0.000E+00	8.880E-04	6.460E+03	6.450E+03
BA-140	5.470E+04	6.700E+01	3.520E+03	0.000E+00	2.280E+01	2.030E+06	2.290E+05
BA-141	1.420E-01	1.060E-04	4.740E-03	0.000E+00	9.840E-05	3.290E+03	7.460E-04
BA-142	3.700E-02	3.700E-05	2.270E-03	0.000E+00	3.140E-05	1.910E+03	0.000E+00
LA-140	4.790E+02	2.360E+02	6.260E+01	0.000E+00	0.000E+00	2.140E+05	4.870E+05
LA-142	9.600E-01	4.250E-01	1.060E-01	0.000E+00	0.000E+00	1.020E+04	1.200E+04
CE-141	2.840E+04	1.900E+04	2.170E+03	0.000E+00	8.880E+03	6.140E+05	1.260E+05
CE-143	2.660E+02	1.940E+02	2.160E+01	0.000E+00	8.640E+01	1.300E+05	2.550E+05
CE-144	4.890E+06	2.020E+06	2.620E+05	0.000E+00	1.210E+06	1.340E+07	8.640E+05
PR-143	1.340E+04	5.310E+03	6.620E+02	0.000E+00	3.090E+03	4.830E+05	2.140E+05
PR-144	4.300E-02	1.760E-02	2.180E-03	0.000E+00	1.010E-02	1.750E+03	2.350E-04
ND-147	7.860E+03	8.560E+03	5.130E+02	0.000E+00	5.020E+03	3.720E+05	1.820E+05
EU-154	7.540E+06	9.840E+05	6.880E+05	0.000E+00	4.350E+06	7.300E+06	2.670E+05
EU-155	1.600E+06	1.570E+05	9.680E+04	0.000E+00	6.120E+05	1.210E+07	4.780E+05
W-187	1.200E+01	9.760E+00	3.430E+00	0.000E+00	0.000E+00	4.740E+04	1.770E+05
NP-239	3.380E+02	3.190E+01	1.770E+01	0.000E+00	1.000E+02	6.490E+04	1.320E+05

Attachment 12
Gaseous Effluent Pathway Dose Factors
INHALATION DOSE FACTORS
CHILD
(mrem/yr per uCi/m³)

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	GIttract
H-3	0.000E+00	1.120E+03	1.120E+03	1.120E+03	1.120E+03	1.120E+03	1.120E+03
C-14	3.590E+04	6.730E+03	6.730E+03	6.730E+03	6.730E+03	6.730E+03	6.730E+03
NA-24	1.610E+04	1.610E+04	1.610E+04	1.610E+04	1.610E+04	1.610E+04	1.610E+04
P-32	2.600E+06	1.140E+05	9.880E+04	0.000E+00	0.000E+00	0.000E+00	4.220E+04
CR-51	0.000E+00	0.000E+00	1.540E+02	8.550E+01	2.430E+01	1.700E+04	1.080E+03
MN-54	0.000E+00	4.290E+04	9.510E+03	0.000E+00	1.000E+04	1.580E+06	2.290E+04
MN-56	0.000E+00	1.660E+00	3.120E-01	0.000E+00	1.670E+00	1.310E+04	1.230E+05
FE-55	4.740E+04	2.520E+04	7.770E+03	0.000E+00	0.000E+00	1.110E+05	2.870E+03
FE-59	2.070E+04	3.340E+04	1.670E+04	0.000E+00	0.000E+00	1.270E+06	7.070E+04
CO-57	0.000E+00	9.030E+02	1.070E+03	0.000E+00	0.000E+00	5.070E+05	1.320E+04
CO-58	0.000E+00	1.770E+03	3.160E+03	0.000E+00	0.000E+00	1.110E+06	3.440E+04
CO-60	0.000E+00	1.310E+04	2.260E+04	0.000E+00	0.000E+00	7.070E+06	9.620E+04
NI-63	8.210E+05	4.630E+04	2.800E+04	0.000E+00	0.000E+00	2.750E+05	6.330E+03
NI-65	2.990E+00	2.960E-01	1.640E-01	0.000E+00	0.000E+00	8.180E+03	8.400E+04
CU-64	0.000E+00	1.990E+00	1.070E+00	0.000E+00	6.030E+00	9.580E+03	3.670E+04
ZN-65	4.260E+04	1.130E+05	7.030E+04	0.000E+00	7.140E+04	9.950E+05	1.630E+04
ZN-69	6.700E-02	9.660E-02	8.920E-03	0.000E+00	5.850E-02	1.420E+03	9.510E+03
BR-82	0.000E+00	0.000E+00	2.090E+04	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-83	0.000E+00	0.000E+00	4.740E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-84	0.000E+00	0.000E+00	5.480E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-85	0.000E+00	0.000E+00	2.530E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB-86	0.000E+00	1.980E+05	1.140E+05	0.000E+00	0.000E+00	0.000E+00	7.990E+03
RB-88	0.000E+00	5.620E+02	3.660E+02	0.000E+00	0.000E+00	0.000E+00	1.720E+01
RB-89	0.000E+00	3.450E+02	2.900E+02	0.000E+00	0.000E+00	0.000E+00	1.890E+00
SR-89	5.990E+05	0.000E+00	1.720E+04	0.000E+00	0.000E+00	2.160E+06	1.670E+05
SR-90	1.010E+08	0.000E+00	6.440E+06	0.000E+00	0.000E+00	1.480E+07	3.430E+05
SR-91	1.210E+02	0.000E+00	4.590E+00	0.000E+00	0.000E+00	5.330E+04	1.740E+05
SR-92	1.310E+01	0.000E+00	5.250E-01	0.000E+00	0.000E+00	2.400E+04	2.420E+05
Y-90	4.110E+03	0.000E+00	1.110E+02	0.000E+00	0.000E+00	2.620E+05	2.680E+05
Y-91M	5.070E-01	0.000E+00	1.840E-02	0.000E+00	0.000E+00	2.810E+03	1.720E+03
Y-91	9.140E+05	0.000E+00	2.440E+04	0.000E+00	0.000E+00	2.630E+06	1.840E+05
Y-92	2.040E+01	0.000E+00	5.810E-01	0.000E+00	0.000E+00	2.390E+04	2.390E+05
Y-93	1.860E+02	0.000E+00	5.110E+00	0.000E+00	0.000E+00	7.440E+04	3.890E+05
ZR-95	1.900E+05	4.180E+04	3.700E+04	0.000E+00	5.960E+04	2.230E+06	6.110E+04

Attachment 12
Gaseous Effluent Pathway Dose Factors
INHALATION DOSE FACTORS
CHILD
(mrem/yr per uCi/m³)

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	GIttract
ZR-97	1.880E+02	2.720E+01	1.600E+01	0.000E+00	3.890E+01	1.130E+05	3.510E+05
NB-95	2.350E+04	9.180E+03	6.550E+03	0.000E+00	8.620E+03	6.140E+05	3.700E+04
NB-97	4.290E-01	7.700E-02	3.600E-02	0.000E+00	8.550E-02	3.420E+03	2.780E+04
MO-99	0.000E+00	1.720E+02	4.260E+01	0.000E+00	3.920E+02	1.350E+05	1.270E+05
TC-99M	1.780E-03	3.480E-03	5.770E-02	0.000E+00	5.070E-02	9.510E+02	4.810E+03
TC-101	8.100E-05	8.510E-05	1.080E-03	0.000E+00	1.450E-03	5.850E+02	1.630E+01
RU-103	2.790E+03	0.000E+00	1.070E+03	0.000E+00	7.030E+03	6.620E+05	4.480E+04
RU-105	1.530E+00	0.000E+00	5.550E-01	0.000E+00	1.340E+00	1.590E+04	9.950E+04
RU-106	1.360E+05	0.000E+00	1.690E+04	0.000E+00	1.840E+05	1.430E+07	4.290E+05
RH-103M	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RH-106	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
AG-110M	1.690E+04	1.140E+04	9.140E+03	0.000E+00	2.120E+04	5.480E+06	1.000E+05
SB-122	1.440E+03	1.980E+03	1.900E+04	4.960E+02	7.180E+02	7.730E+04	9.360E+04
SB-124	5.740E+04	7.400E+02	2.000E+04	1.260E+02	0.000E+00	3.240E+06	1.640E+05
SB-125	9.840E+04	7.590E+02	2.070E+04	9.100E+01	0.000E+00	2.320E+06	4.030E+04
TE-125M	6.730E+03	2.330E+03	9.140E+02	1.920E+03	0.000E+00	4.770E+05	3.380E+04
TE-127M	2.490E+04	8.550E+03	3.020E+03	6.070E+03	6.360E+04	1.480E+06	7.140E+04
TE-127	2.770E+00	9.510E-01	6.110E-01	1.960E+00	7.070E+00	1.000E+04	5.620E+04
TE-129M	1.920E+04	6.850E+03	3.040E+03	6.330E+03	5.030E+04	1.760E+06	1.820E+05
TE-129	9.770E-02	3.500E-02	2.380E-02	7.140E-02	2.570E-01	2.930E+03	2.550E+04
TE-131M	1.340E+02	5.920E+01	5.070E+01	9.770E+01	4.000E+02	2.060E+05	3.080E+05
TE-131	2.170E-02	8.440E-03	6.590E-03	1.700E-02	5.880E-02	2.050E+03	1.330E+03
TE-132	4.810E+02	2.720E+02	2.630E+02	3.170E+02	1.840E+03	3.770E+05	1.380E+05
I-130	8.180E+03	1.640E+04	8.440E+03	1.850E+06	2.450E+04	0.000E+00	5.110E+03
I-131	4.810E+04	4.810E+04	2.730E+04	1.620E+07	7.880E+04	0.000E+00	2.840E+03
I-132	2.120E+03	4.070E+03	1.880E+03	1.940E+05	6.250E+03	0.000E+00	3.200E+03
I-133	1.660E+04	2.030E+04	7.700E+03	3.850E+06	3.380E+04	0.000E+00	5.480E+03
I-134	1.170E+03	2.160E+03	9.950E+02	5.070E+04	3.300E+03	0.000E+00	9.550E+02
I-135	4.920E+03	8.730E+03	4.140E+03	7.920E+05	1.340E+04	0.000E+00	4.440E+03
CS-134	6.510E+05	1.010E+06	2.250E+05	0.000E+00	3.300E+05	1.210E+05	3.850E+03
CS-136	6.510E+04	1.710E+05	1.160E+05	0.000E+00	9.550E+04	1.450E+04	4.180E+03
CS-137	9.070E+05	8.250E+05	1.280E+05	0.000E+00	2.820E+05	1.040E+05	3.620E+03
CS-138	6.330E+02	8.400E+02	5.550E+02	0.000E+00	6.220E+02	6.810E+01	2.700E+02

Attachment 12
Gaseous Effluent Pathway Dose Factors
INHALATION DOSE FACTORS
CHILD
(mrem/yr per uCi/m³)

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	GIttract
BA-139	1.840E+00	9.840E-04	5.370E-02	0.000E+00	8.620E-04	5.770E+03	5.770E+04
BA-140	7.400E+04	6.480E+01	4.330E+03	0.000E+00	2.110E+01	1.740E+06	1.020E+05
BA-141	1.960E-01	1.090E-04	6.360E-03	0.000E+00	9.470E-05	2.920E+03	2.750E+02
BA-142	5.000E-02	3.600E-05	2.790E-03	0.000E+00	2.910E-05	1.640E+03	2.740E+00
LA-140	6.440E+02	2.250E+02	7.550E+01	0.000E+00	0.000E+00	1.830E+05	2.260E+05
LA-142	1.300E+00	4.110E-01	1.290E-01	0.000E+00	0.000E+00	8.700E+03	7.590E+04
CE-141	3.920E+04	1.950E+04	2.900E+03	0.000E+00	8.550E+03	5.440E+05	5.660E+04
CE-143	3.660E+02	1.990E+02	2.870E+01	0.000E+00	8.360E+01	1.150E+05	1.270E+05
CE-144	6.770E+06	2.120E+06	3.610E+05	0.000E+00	1.170E+06	1.200E+07	3.890E+05
PR-143	1.850E+04	5.550E+03	9.140E+02	0.000E+00	3.000E+03	4.330E+05	9.730E+04
PR-144	5.960E-02	1.850E-02	3.000E-03	0.000E+00	9.770E-03	1.570E+03	1.970E+02
ND-147	1.080E+04	8.730E+03	6.810E+02	0.000E+00	4.810E+03	3.280E+05	8.210E+04
EU-154	1.010E+07	9.210E+05	8.400E+05	0.000E+00	4.030E+06	6.140E+06	1.100E+05
EU-155	2.070E+06	1.500E+05	1.180E+05	0.000E+00	5.590E+05	1.030E+06	1.990E+05
W-187	1.630E+01	9.660E+00	4.330E+00	0.000E+00	0.000E+00	4.110E+04	9.100E+04
NP-239	4.700E+02	3.340E+01	2.350E+01	0.000E+00	9.730E+01	5.810E+04	6.400E+04

Attachment 12
Gaseous Effluent Pathway Dose Factors
INHALATION DOSE FACTORS
INFANT
(mrem/yr per uCi/m³)

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	GIttract
H-3	0.000E+00	6.470E+02	6.470E+02	6.470E+02	6.470E+02	6.470E+02	6.470E+02
C-14	2.650E+04	5.310E+03	5.310E+03	5.310E+03	5.310E+03	5.310E+03	5.310E+03
NA-24	1.060E+04	1.060E+04	1.060E+04	1.060E+04	1.060E+04	1.060E+04	1.060E+04
P-32	2.030E+06	1.120E+05	7.740E+04	0.000E+00	0.000E+00	0.000E+00	1.610E+04
CR-51	0.000E+00	0.000E+00	8.950E+01	5.750E+01	1.320E+01	1.280E+04	3.570E+02
MN-54	0.000E+00	2.530E+04	4.980E+03	0.000E+00	4.980E+03	1.000E+06	7.060E+03
MN-56	0.000E+00	1.540E+00	2.210E-01	0.000E+00	1.100E+00	1.250E+04	7.170E+04
FE-55	1.970E+04	1.170E+04	3.330E+03	0.000E+00	0.000E+00	8.690E+04	1.090E+03
FE-59	1.360E+04	2.350E+04	9.480E+03	0.000E+00	0.000E+00	1.020E+06	2.480E+04
CO-57	0.000E+00	6.510E+02	6.410E+02	0.000E+00	0.000E+00	3.790E+05	4.860E+03
CO-58	0.000E+00	1.220E+03	1.820E+03	0.000E+00	0.000E+00	7.770E+05	1.110E+04
CO-60	0.000E+00	8.020E+03	1.180E+04	0.000E+00	0.000E+00	4.510E+06	3.190E+04
NI-63	3.390E+05	2.040E+04	1.160E+04	0.000E+00	0.000E+00	2.090E+05	2.420E+03
NI-65	2.390E+00	2.840E-01	1.230E-01	0.000E+00	0.000E+00	8.120E+03	5.010E+04
CU-64	0.000E+00	1.880E+00	7.740E-01	0.000E+00	3.980E+00	9.300E+03	1.500E+04
ZN-65	1.930E+04	6.260E+04	3.110E+04	0.000E+00	3.250E+04	6.470E+05	5.140E+04
ZN-69	5.390E-02	9.670E-02	7.180E-03	0.000E+00	4.020E-02	1.470E+03	1.320E+04
BR-82	0.000E+00	0.000E+00	1.330E+04	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-83	0.000E+00	0.000E+00	3.810E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-84	0.000E+00	0.000E+00	4.000E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-85	0.000E+00	0.000E+00	2.040E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB-86	0.000E+00	1.900E+05	8.820E+04	0.000E+00	0.000E+00	0.000E+00	3.040E+03
RB-88	0.000E+00	5.570E+02	2.870E+02	0.000E+00	0.000E+00	0.000E+00	3.390E+02
RB-89	0.000E+00	3.210E+02	2.060E+02	0.000E+00	0.000E+00	0.000E+00	6.820E+01
SR-89	3.980E+05	0.000E+00	1.140E+04	0.000E+00	0.000E+00	2.030E+06	6.400E+04
SR-90	4.090E+07	0.000E+00	2.590E+06	0.000E+00	0.000E+00	1.120E+07	1.310E+05
SR-91	9.560E+01	0.000E+00	3.460E+00	0.000E+00	0.000E+00	5.260E+04	7.340E+04
SR-92	1.050E+01	0.000E+00	3.910E-01	0.000E+00	0.000E+00	2.380E+04	1.400E+05
Y-90	3.290E+03	0.000E+00	8.820E+01	0.000E+00	0.000E+00	2.690E+05	1.040E+05
Y-91M	4.070E-01	0.000E+00	1.390E-02	0.000E+00	0.000E+00	2.790E+03	2.350E+03
Y-91	5.880E+05	0.000E+00	1.570E+04	0.000E+00	0.000E+00	2.450E+06	7.030E+04
Y-92	1.640E+01	0.000E+00	4.610E-01	0.000E+00	0.000E+00	2.450E+04	1.270E+05
Y-93	1.500E+02	0.000E+00	4.070E+00	0.000E+00	0.000E+00	7.640E+04	1.670E+05

Attachment 12
Gaseous Effluent Pathway Dose Factors
INHALATION DOSE FACTORS
INFANT
(mrem/yr per uCi/m³)

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	GIttract
ZR-95	1.150E+05	2.790E+04	2.030E+04	0.000E+00	3.110E+04	1.750E+06	2.170E+04
ZR-97	1.500E+02	2.560E+01	1.170E+01	0.000E+00	2.590E+01	1.100E+05	1.400E+05
NB-95	1.570E+04	6.430E+03	3.780E+03	0.000E+00	4.720E+03	4.790E+05	1.270E+04
NB-97	3.420E-01	7.290E-02	2.630E-02	0.000E+00	5.700E-02	3.320E+03	2.690E+04
MO-99	0.000E+00	1.650E+02	3.230E+01	0.000E+00	2.650E+02	1.350E+05	4.870E+04
TC-99M	1.400E-03	2.880E-03	3.720E-02	0.000E+00	3.110E-02	8.110E+02	2.030E+03
TC-101	6.510E-05	8.230E-05	8.120E-04	0.000E+00	9.790E-04	5.840E+02	8.440E+02
RU-103	2.020E+03	0.000E+00	6.790E+02	0.000E+00	4.240E+03	5.520E+05	1.610E+04
RU-105	1.220E+00	0.000E+00	4.100E-01	0.000E+00	8.990E-01	1.570E+04	4.840E+04
RU-106	8.680E+04	0.000E+00	1.090E+04	0.000E+00	1.070E+05	1.160E+07	1.640E+05
RH-103M	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RH-106	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
AG-110M	9.980E+03	7.220E+03	5.000E+03	0.000E+00	1.090E+04	3.670E+06	3.300E+04
SB-122	5.430E+02	7.200E+02	7.200E+03	1.880E+02	2.720E+02	2.930E+04	3.540E+04
SB-124	3.790E+04	5.560E+02	1.200E+04	1.010E+02	0.000E+00	2.650E+06	5.910E+04
SB-125	5.170E+04	4.770E+02	1.090E+04	6.230E+01	0.000E+00	1.640E+06	1.470E+04
TE-125M	4.760E+03	1.990E+03	6.580E+02	1.620E+03	0.000E+00	4.470E+05	1.290E+04
TE-127M	1.670E+04	6.900E+03	2.070E+03	4.870E+03	3.750E+04	1.310E+06	2.730E+04
TE-127	2.230E+00	9.530E-01	4.890E-01	1.850E+00	4.860E+00	1.030E+04	2.440E+04
TE-129M	1.410E+04	6.090E+03	2.230E+03	5.470E+03	3.180E+04	1.680E+06	6.900E+04
TE-129	7.880E-02	3.470E-02	1.880E-02	6.750E-02	1.750E-01	3.000E+03	2.630E+04
TE-131M	1.070E+02	5.500E+01	3.630E+01	8.930E+01	2.650E+02	1.990E+05	1.190E+05
TE-131	1.740E-02	8.220E-03	5.000E-03	1.580E-02	3.990E-02	2.060E+03	8.220E+03
TE-132	3.720E+02	2.370E+02	1.760E+02	2.790E+02	1.030E+03	3.400E+05	4.410E+04
I-130	6.360E+03	1.390E+04	5.570E+03	1.600E+06	1.530E+04	0.000E+00	1.990E+03
I-131	3.790E+04	4.440E+04	1.960E+04	1.480E+07	5.180E+04	0.000E+00	1.060E+03
I-132	1.690E+03	3.540E+03	1.260E+03	1.690E+05	3.950E+03	0.000E+00	1.900E+03
I-133	1.320E+04	1.920E+04	5.600E+03	3.560E+06	2.240E+04	0.000E+00	2.160E+03
I-134	9.210E+02	1.880E+03	6.650E+02	4.450E+04	2.090E+03	0.000E+00	1.290E+03
I-135	3.860E+03	7.600E+03	2.770E+03	6.960E+05	8.470E+03	0.000E+00	1.830E+03
CS-134	3.960E+05	7.030E+05	7.450E+04	0.000E+00	1.900E+05	7.970E+04	1.330E+03
CS-136	4.830E+04	1.350E+05	5.290E+04	0.000E+00	5.640E+04	1.180E+04	1.430E+03
CS-137	5.490E+05	6.120E+05	4.550E+04	0.000E+00	1.720E+05	7.130E+04	1.330E+03
CS-138	5.050E+02	7.810E+02	3.980E+02	0.000E+00	4.100E+02	6.540E+01	8.760E+02

Attachment 12
Gaseous Effluent Pathway Dose Factors
INHALATION DOSE FACTORS
INFANT
(mrem/yr per uCi/m³)

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	Gtfract
BA-139	1.480E+00	9.840E-04	4.300E-02	0.000E+00	5.920E-04	5.950E+03	5.100E+04
BA-140	5.600E+04	5.600E+01	2.900E+03	0.000E+00	1.340E+01	1.600E+06	3.840E+04
BA-141	1.570E-01	1.080E-04	4.970E-03	0.000E+00	6.500E-05	2.970E+03	4.750E+03
BA-142	3.980E-02	3.300E-05	1.960E-03	0.000E+00	1.900E-05	1.550E+03	6.930E+02
LA-140	5.050E+02	2.000E+02	5.150E+01	0.000E+00	0.000E+00	1.680E+05	8.480E+04
LA-142	1.030E+00	3.770E-01	9.040E-02	0.000E+00	0.000E+00	8.220E+03	5.950E+04
CE-141	2.770E+04	1.670E+04	1.990E+03	0.000E+00	5.250E+03	5.170E+05	2.160E+04
CE-143	2.930E+02	1.930E+02	2.210E+01	0.000E+00	5.640E+01	1.160E+05	4.970E+04
CE-144	3.190E+06	1.210E+06	1.760E+05	0.000E+00	5.380E+05	9.840E+06	1.480E+05
PR-143	1.400E+04	5.240E+03	6.990E+02	0.000E+00	1.970E+03	4.330E+05	3.720E+04
PR-144	4.790E-02	1.850E-02	2.410E-03	0.000E+00	6.720E-03	1.610E+03	4.280E+03
ND-147	7.940E+03	8.130E+03	5.000E+02	0.000E+00	3.150E+03	3.220E+05	3.120E+04
EU-154	4.140E+06	4.840E+05	3.430E+05	0.000E+00	1.540E+06	4.270E+06	3.980E+04
EU-155	8.360E+05	8.010E+04	4.840E+04	0.000E+00	2.210E+05	7.280E+05	7.270E+04
W-187	1.300E+01	9.020E+00	3.120E+00	0.000E+00	0.000E+00	3.960E+04	3.560E+04
NP-239	3.710E+02	3.320E+01	1.880E+01	0.000E+00	6.620E+01	5.950E+04	2.490E+04

Attachment 12
Gaseous Effluent Pathway Dose Factors
GRASS-COW-MILK DOSE FACTORS
ADULT
(m² *mrem/yr per uCi/sec)

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	GIttract
H-3	0.000E+00	7.630E+02	7.630E+02	7.630E+02	7.630E+02	7.630E+02	7.630E+02
C-14	3.630E+05	7.260E+04	7.260E+04	7.260E+04	7.260E+04	7.260E+04	7.260E+04
NA-24	2.540E+06	2.540E+06	2.540E+06	2.540E+06	2.540E+06	2.540E+06	2.540E+06
P-32	1.710E+10	1.060E+09	6.600E+08	0.000E+00	0.000E+00	0.000E+00	1.920E+09
CR-51	0.000E+00	0.000E+00	2.860E+04	1.710E+04	6.300E+03	3.800E+04	7.200E+06
MN-54	0.000E+00	8.400E+06	1.600E+06	0.000E+00	2.500E+06	0.000E+00	2.570E+07
MN-56	0.000E+00	4.230E-03	7.510E-04	0.000E+00	5.380E-03	0.000E+00	1.350E-01
FE-55	2.510E+07	1.730E+07	4.040E+06	0.000E+00	0.000E+00	9.670E+06	9.950E+06
FE-59	2.980E+07	7.000E+07	2.680E+07	0.000E+00	0.000E+00	1.950E+07	2.330E+08
CO-57	0.000E+00	1.280E+06	2.130E+06	0.000E+00	0.000E+00	0.000E+00	3.250E+07
CO-58	0.000E+00	4.720E+06	1.060E+07	0.000E+00	0.000E+00	0.000E+00	9.570E+07
CO-60	0.000E+00	1.640E+07	3.620E+07	0.000E+00	0.000E+00	0.000E+00	3.080E+08
NI-63	6.730E+09	4.660E+08	2.260E+08	0.000E+00	0.000E+00	0.000E+00	9.730E+07
NI-65	3.700E-01	4.810E-02	2.190E-02	0.000E+00	0.000E+00	0.000E+00	1.220E+00
CU-64	0.000E+00	2.410E+04	1.130E+04	0.000E+00	6.080E+04	0.000E+00	2.050E+06
ZN-65	1.370E+09	4.360E+09	1.970E+09	0.000E+00	2.920E+09	0.000E+00	2.750E+09
ZN-69	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-82	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-83	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-84	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-85	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB-86	0.000E+00	2.590E+09	1.210E+09	0.000E+00	0.000E+00	0.000E+00	5.110E+08
RB-88	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB-89	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SR-89	1.450E+09	0.000E+00	4.160E+07	0.000E+00	0.000E+00	0.000E+00	2.330E+08
SR-90	4.680E+10	0.000E+00	1.150E+10	0.000E+00	0.000E+00	0.000E+00	1.350E+09
SR-91	3.130E+04	0.000E+00	1.270E+03	0.000E+00	0.000E+00	0.000E+00	1.490E+05
SR-92	4.890E-01	0.000E+00	2.110E-02	0.000E+00	0.000E+00	0.000E+00	9.680E+00

Attachment 12
Gaseous Effluent Pathway Dose Factors
GRASS-COW-MILK DOSE FACTORS
ADULT
(m² *mrem/yr per uCi/sec)

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	GIttract
Y-90	7.070E+01	0.000E+00	1.900E+00	0.000E+00	0.000E+00	0.000E+00	7.500E+05
Y-91M	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Y-91	8.600E+03	0.000E+00	2.300E+02	0.000E+00	0.000E+00	0.000E+00	4.730E+06
Y-92	5.420E-05	0.000E+00	1.580E-06	0.000E+00	0.000E+00	0.000E+00	9.490E-01
Y-93	2.330E-01	0.000E+00	6.430E-03	0.000E+00	0.000E+00	0.000E+00	7.390E+03
ZR-95	9.460E+02	3.030E+02	2.050E+02	0.000E+00	4.760E+02	0.000E+00	9.620E+05
ZR-97	4.260E-01	8.590E-02	3.930E-02	0.000E+00	1.300E-01	0.000E+00	2.660E+04
NB-95	8.250E+04	4.590E+04	2.470E+04	0.000E+00	4.540E+04	0.000E+00	2.790E+08
NB-97	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.470E-09
MO-99	0.000E+00	2.520E+07	4.800E+06	0.000E+00	5.720E+07	0.000E+00	5.850E+07
TC-99M	3.250E+00	9.190E+00	1.170E+02	0.000E+00	1.400E+02	4.500E+00	5.440E+03
TC-101	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RU-103	1.020E+03	0.000E+00	4.390E+02	0.000E+00	3.890E+03	0.000E+00	1.190E+05
RU-105	8.570E-04	0.000E+00	3.380E-04	0.000E+00	1.110E-02	0.000E+00	5.240E-01
RU-106	2.040E+04	0.000E+00	2.580E+03	0.000E+00	3.940E+04	0.000E+00	1.320E+06
RH-103M	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RH-106	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
AG-110M	5.830E+07	5.390E+07	3.200E+07	0.000E+00	1.060E+08	0.000E+00	2.200E+10
SB-122	6.010E+05	6.270E+05	7.590E+06	9.960E+04	2.960E+05	1.290E+05	7.470E+07
SB-124	8.580E+08	1.620E+07	3.400E+08	2.080E+06	0.000E+00	6.680E+08	2.440E+10
SB-125	6.810E+08	7.610E+06	1.620E+08	6.930E+05	0.000E+00	5.250E+08	7.500E+09
TE-125M	1.630E+07	5.900E+06	2.180E+06	4.900E+06	6.630E+07	0.000E+00	6.500E+07
TE-127M	4.580E+07	1.640E+07	5.580E+06	1.170E+07	1.860E+08	0.000E+00	1.540E+08
TE-127	6.720E+02	2.410E+02	1.450E+02	4.980E+02	2.740E+03	0.000E+00	5.300E+04
TE-129M	6.040E+07	2.250E+07	9.570E+06	2.080E+07	2.520E+08	0.000E+00	3.040E+08
TE-129	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TE-131M	3.610E+05	1.770E+05	1.470E+05	2.800E+05	1.790E+06	0.000E+00	1.750E+07
TE-131	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TE-132	2.390E+06	1.550E+06	1.450E+06	1.710E+06	1.490E+07	0.000E+00	7.320E+07
I-130	4.260E+05	1.260E+06	4.960E+05	1.070E+08	1.960E+06	0.000E+00	1.080E+06
I-131	2.960E+08	4.240E+08	2.430E+08	1.390E+11	7.270E+08	0.000E+00	1.120E+08
I-132	1.640E-01	4.370E-01	1.530E-01	1.530E+01	6.970E-01	0.000E+00	8.220E-02
I-133	3.970E+06	6.900E+06	2.100E+06	1.010E+09	1.200E+07	0.000E+00	6.200E+06

Attachment 12
Gaseous Effluent Pathway Dose Factors
GRASS-COW-MILK DOSE FACTORS
ADULT
(m² *mrem/yr per uCi/sec)

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	Gitract
I-134	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
I-135	1.390E+04	3.630E+04	1.340E+04	2.400E+06	5.830E+04	0.000E+00	4.100E+04
CS-134	5.650E+09	1.340E+10	1.100E+10	0.000E+00	4.350E+09	1.440E+09	2.350E+08
CS-136	2.610E+08	1.030E+09	7.420E+08	0.000E+00	5.740E+08	7.870E+07	1.170E+08
CS-137	7.380E+09	1.010E+10	6.610E+09	0.000E+00	3.430E+09	1.140E+09	1.950E+08
CS-138	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BA-139	4.700E-08	0.000E+00	1.380E-09	0.000E+00	0.000E+00	0.000E+00	8.340E-08
BA-140	2.690E+07	3.380E+04	1.760E+06	0.000E+00	1.150E+04	1.930E+04	5.540E+07
BA-141	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BA-142	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
LA-140	4.490E+00	2.260E+00	5.970E-01	0.000E+00	0.000E+00	0.000E+00	1.660E+05
LA-142	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.030E-08
CE-141	4.840E+03	3.270E+03	3.710E+02	0.000E+00	1.520E+03	0.000E+00	1.250E+07
CE-143	4.190E+01	3.090E+04	3.420E+00	0.000E+00	1.360E+01	0.000E+00	1.160E+06
CE-144	3.580E+05	1.500E+05	1.920E+04	0.000E+00	8.870E+04	0.000E+00	1.210E+08
PR-143	1.590E+02	6.370E+01	7.880E+00	0.000E+00	3.680E+01	0.000E+00	6.960E+05
PR-144	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ND-147	9.420E+01	1.090E+02	6.520E+00	0.000E+00	6.370E+01	0.000E+00	5.230E+05
EU-154	2.370E+04	2.910E+03	2.070E+03	0.000E+00	1.390E+04	0.000E+00	2.110E+06
EU-155	3.300E+03	4.680E+02	3.020E+02	0.000E+00	2.160E+03	0.000E+00	3.680E+05
W-187	6.560E+03	5.480E+03	1.920E+03	0.000E+00	0.000E+00	0.000E+00	1.800E+06
NP-239	3.660E+00	3.600E-01	1.980E-01	0.000E+00	1.120E+00	0.000E+00	7.390E+04

Attachment 12
Gaseous Effluent Pathway Dose Factors
GRASS-COW-MILK DOSE FACTORS
TEEN
(m² *mrem/yr per uCi/sec)

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	GIttract
H-3	0.000E+00	9.940E+02	9.940E+02	9.940E+02	9.940E+02	9.940E+02	9.940E+02
C-14	6.700E+05	1.340E+05	1.340E+05	1.340E+05	1.340E+05	1.340E+05	1.340E+05
NA-24	4.440E+06	4.440E+06	4.440E+06	4.440E+06	4.440E+06	4.440E+06	4.440E+06
P-32	3.150E+10	1.950E+09	1.220E+09	0.000E+00	0.000E+00	0.000E+00	2.650E+09
CR-51	0.000E+00	0.000E+00	5.000E+04	2.780E+04	1.100E+04	7.130E+04	8.400E+06
MN-54	0.000E+00	1.400E+07	2.780E+06	0.000E+00	4.170E+06	0.000E+00	2.870E+07
MN-56	0.000E+00	7.510E-03	1.330E-03	0.000E+00	9.500E-03	0.000E+00	4.940E-01
FE-55	4.450E+07	3.160E+07	7.360E+06	0.000E+00	0.000E+00	2.000E+07	1.370E+07
FE-59	5.200E+07	1.210E+08	4.680E+07	0.000E+00	0.000E+00	3.820E+07	2.870E+08
CO-57	0.000E+00	2.250E+06	3.760E+06	0.000E+00	0.000E+00	0.000E+00	4.190E+07
CO-58	0.000E+00	7.950E+06	1.830E+07	0.000E+00	0.000E+00	0.000E+00	1.100E+08
CO-60	0.000E+00	2.780E+07	6.260E+07	0.000E+00	0.000E+00	0.000E+00	3.620E+08
NI-63	1.180E+10	8.350E+08	4.010E+08	0.000E+00	0.000E+00	0.000E+00	1.330E+08
NI-65	6.780E-01	8.660E-02	3.940E-02	0.000E+00	0.000E+00	0.000E+00	4.700E+00
CU-64	0.000E+00	4.290E+04	2.020E+04	0.000E+00	1.090E+05	0.000E+00	3.330E+06
ZN-65	2.110E+09	7.310E+09	3.410E+09	0.000E+00	4.680E+09	0.000E+00	3.100E+09
ZN-69	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-82	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-83	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-84	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-85	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB-86	0.000E+00	4.730E+09	2.220E+09	0.000E+00	0.000E+00	0.000E+00	7.000E+08
RB-88	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB-89	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SR-89	2.670E+09	0.000E+00	7.660E+07	0.000E+00	0.000E+00	0.000E+00	3.180E+08
SR-90	6.610E+10	0.000E+00	1.630E+10	0.000E+00	0.000E+00	0.000E+00	1.860E+09
SR-91	5.750E+04	0.000E+00	2.290E+03	0.000E+00	0.000E+00	0.000E+00	2.610E+05
SR-92	8.950E-01	0.000E+00	3.810E-02	0.000E+00	0.000E+00	0.000E+00	2.280E+01
Y-90	1.300E+02	0.000E+00	3.500E+00	0.000E+00	0.000E+00	0.000E+00	1.070E+06
Y-91M	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Y-91	1.580E+04	0.000E+00	4.240E+02	0.000E+00	0.000E+00	0.000E+00	6.480E+06
Y-92	1.000E-04	0.000E+00	2.900E-06	0.000E+00	0.000E+00	0.000E+00	2.750E+00
Y-93	4.300E-01	0.000E+00	1.180E-02	0.000E+00	0.000E+00	0.000E+00	1.310E+04

[illegible]

Attachment 12
Gaseous Effluent Pathway Dose Factors
GRASS-COW-MILK DOSE FACTORS
TEEN
(m² *mrem/yr per uCi/sec)

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	GIttract
BA-139	8.690E-08	0.000E+00	2.530E-09	0.000E+00	0.000E+00	0.000E+00	7.750E-07
BA-140	4.850E+07	5.950E+04	3.130E+06	0.000E+00	2.020E+04	4.000E+04	7.490E+07
BA-141	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BA-142	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
LA-140	8.060E+00	3.960E+00	1.050E+00	0.000E+00	0.000E+00	0.000E+00	2.270E+05
LA-142	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.230E-07
CE-141	8.870E+03	5.920E+03	6.810E+02	0.000E+00	2.790E+03	0.000E+00	1.690E+07
CE-143	7.690E+01	5.600E+04	6.250E+00	0.000E+00	2.510E+01	0.000E+00	1.680E+06
CE-144	6.580E+05	2.720E+05	3.540E+04	0.000E+00	1.630E+05	0.000E+00	1.660E+08
PR-143	2.920E+02	1.170E+02	1.450E+01	0.000E+00	6.770E+01	0.000E+00	9.610E+05
PR-144	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ND-147	1.810E+02	1.970E+02	1.180E+01	0.000E+00	1.160E+02	0.000E+00	7.110E+05
EU-154	3.920E+04	5.060E+03	3.570E+03	0.000E+00	2.260E+04	0.000E+00	2.670E+06
EU-155	8.600E+03	8.310E+02	5.140E+02	0.000E+00	3.250E+03	0.000E+00	4.760E+06
W-187	1.200E+04	9.780E+03	3.430E+03	0.000E+00	0.000E+00	0.000E+00	2.650E+06
NP-239	6.990E+00	6.590E-01	3.660E-01	0.000E+00	2.070E+00	0.000E+00	1.060E+05

Attachment 12
Gaseous Effluent Pathway Dose Factors
GRASS-COW-MILK DOSE FACTORS
CHILD
(m² *mrem/yr per uCi/sec)

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	GIttract
H-3	0.000E+00	1.570E+03	1.570E+03	1.570E+03	1.570E+03	1.570E+03	1.570E+03
C-14	1.650E+06	3.290E+05	3.290E+05	3.290E+05	3.290E+05	3.290E+05	3.290E+05
NA-24	9.230E+06	9.230E+06	9.230E+06	9.230E+06	9.230E+06	9.230E+06	9.230E+06
P-32	7.770E+10	3.640E+09	3.000E+09	0.000E+00	0.000E+00	0.000E+00	2.150E+09
CR-51	0.000E+00	0.000E+00	1.020E+05	5.660E+04	1.550E+04	1.030E+05	5.410E+06
MN-54	0.000E+00	2.090E+07	5.580E+06	0.000E+00	5.870E+06	0.000E+00	1.760E+07
MN-56	0.000E+00	1.310E-02	2.950E-03	0.000E+00	1.580E-02	0.000E+00	1.900E+00
FE-55	1.120E+08	5.930E+07	1.840E+07	0.000E+00	0.000E+00	3.350E+07	1.100E+07
FE-59	1.200E+08	1.950E+08	9.710E+07	0.000E+00	0.000E+00	5.650E+07	2.030E+08
CO-57	0.000E+00	3.840E+06	7.770E+06	0.000E+00	0.000E+00	0.000E+00	3.140E+07
CO-58	0.000E+00	1.210E+07	3.720E+07	0.000E+00	0.000E+00	0.000E+00	7.080E+07
CO-60	0.000E+00	4.320E+07	1.270E+08	0.000E+00	0.000E+00	0.000E+00	2.390E+08
NI-63	2.960E+10	1.590E+09	1.010E+09	0.000E+00	0.000E+00	0.000E+00	1.070E+08
NI-65	1.660E+00	1.560E-01	9.110E-02	0.000E+00	0.000E+00	0.000E+00	1.910E+01
CU-64	0.000E+00	7.550E+04	4.560E+04	0.000E+00	1.820E+05	0.000E+00	3.540E+06
ZN-65	4.130E+09	1.100E+10	6.850E+09	0.000E+00	6.940E+09	0.000E+00	1.930E+09
ZN-69	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.140E-09
BR-82	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-83	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-84	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-85	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB-86	0.000E+00	8.770E+09	5.390E+09	0.000E+00	0.000E+00	0.000E+00	5.640E+08
RB-88	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB-89	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SR-89	6.620E+09	0.000E+00	1.890E+08	0.000E+00	0.000E+00	0.000E+00	2.560E+08
SR-90	1.120E+11	0.000E+00	2.830E+10	0.000E+00	0.000E+00	0.000E+00	1.510E+09
SR-91	1.410E+05	0.000E+00	5.330E+03	0.000E+00	0.000E+00	0.000E+00	3.120E+05
SR-92	2.190E+00	0.000E+00	8.760E-02	0.000E+00	0.000E+00	0.000E+00	4.140E+01
Y-90	3.220E+02	0.000E+00	8.610E+00	0.000E+00	0.000E+00	0.000E+00	9.150E+05
Y-91M	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Y-91	3.910E+04	0.000E+00	1.040E+03	0.000E+00	0.000E+00	0.000E+00	5.210E+06
Y-92	2.460E-04	0.000E+00	7.030E-06	0.000E+00	0.000E+00	0.000E+00	7.100E+00
Y-93	1.060E+00	0.000E+00	2.900E-02	0.000E+00	0.000E+00	0.000E+00	1.570E+04

$(\text{m}^2 \cdot \text{mrem}/\text{yr per uCi}/\text{sec})$ [illegible]

Attachment 12
Gaseous Effluent Pathway Dose Factors
GRASS-COW-MILK DOSE FACTORS
CHILD
(m² *mrem/yr per uCi/sec)

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	GIttract
BA-139	2.140E-07	0.000E+00	6.190E-09	0.000E+00	0.000E+00	0.000E+00	1.230E-05
BA-140	1.170E+08	1.030E+05	6.840E+06	0.000E+00	3.340E+04	6.120E+04	5.940E+07
BA-141	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BA-142	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
LA-140	1.930E+01	6.740E+00	2.270E+00	0.000E+00	0.000E+00	0.000E+00	1.880E+05
LA-142	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.510E-06
CE-141	2.190E+04	1.090E+04	1.620E+03	0.000E+00	4.780E+03	0.000E+00	1.360E+07
CE-143	1.890E+02	1.020E+05	1.480E+01	0.000E+00	4.290E+01	0.000E+00	1.500E+06
CE-144	1.620E+06	5.090E+05	8.660E+04	0.000E+00	2.820E+05	0.000E+00	1.330E+08
PR-143	7.230E+02	2.170E+02	3.590E+01	0.000E+00	1.170E+02	0.000E+00	7.800E+05
PR-144	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ND-147	4.450E+02	3.600E+02	2.790E+01	0.000E+00	1.980E+02	0.000E+00	5.710E+05
EU-154	9.420E+04	8.470E+03	7.740E+03	0.000E+00	3.720E+04	0.000E+00	1.970E+06
EU-155	1.970E+04	1.420E+03	1.110E+03	0.000E+00	5.300E+03	0.000E+00	3.540E+06
W-187	2.910E+04	1.720E+04	7.730E+03	0.000E+00	0.000E+00	0.000E+00	2.420E+06
NP-239	1.720E+01	1.230E+00	8.680E-01	0.000E+00	3.570E+00	0.000E+00	9.140E+04

Attachment 12
Gaseous Effluent Pathway Dose Factors
GRASS-COW-MILK DOSE FACTORS
INFANT
(m² *mrem/yr per uCi/sec)

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	GIttract
H-3	0.000E+00	2.380E+03	2.380E+03	2.380E+03	2.380E+03	2.380E+03	2.380E+03
C-14	3.230E+06	6.890E+05	6.890E+05	6.890E+05	6.890E+05	6.890E+05	6.890E+05
NA-24	1.610E+07	1.610E+07	1.610E+07	1.610E+07	1.610E+07	1.610E+07	1.610E+07
P-32	1.600E+11	9.420E+09	6.210E+09	0.000E+00	0.000E+00	0.000E+00	2.170E+09
CR-51	0.000E+00	0.000E+00	1.610E+05	1.050E+05	2.300E+04	2.050E+05	4.710E+06
MN-54	0.000E+00	3.890E+07	8.830E+06	0.000E+00	8.630E+06	0.000E+00	1.430E+07
MN-56	0.000E+00	3.210E-02	5.530E-03	0.000E+00	2.760E-02	0.000E+00	2.910E+00
FE-55	1.350E+08	8.720E+07	2.330E+07	0.000E+00	0.000E+00	4.270E+07	1.110E+07
FE-59	2.250E+08	3.930E+08	1.550E+08	0.000E+00	0.000E+00	1.160E+08	1.880E+08
CO-57	0.000E+00	8.950E+06	1.460E+07	0.000E+00	0.000E+00	0.000E+00	3.050E+07
CO-58	0.000E+00	2.430E+07	6.060E+07	0.000E+00	0.000E+00	0.000E+00	6.050E+07
CO-60	0.000E+00	8.810E+07	2.080E+08	0.000E+00	0.000E+00	0.000E+00	2.100E+08
NI-63	3.490E+10	2.160E+09	1.210E+09	0.000E+00	0.000E+00	0.000E+00	1.070E+08
NI-65	3.510E+00	3.970E-01	1.810E-01	0.000E+00	0.000E+00	0.000E+00	3.020E+01
CU-64	0.000E+00	1.880E+05	8.690E+04	0.000E+00	3.170E+05	0.000E+00	3.850E+06
ZN-65	5.550E+09	1.900E+10	8.780E+09	0.000E+00	9.230E+09	0.000E+00	1.610E+10
ZN-69	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.360E-09
BR-82	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-83	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-84	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-85	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB-86	0.000E+00	2.220E+10	1.100E+10	0.000E+00	0.000E+00	0.000E+00	5.690E+08
RB-88	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB-89	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SR-89	1.260E+10	0.000E+00	3.610E+08	0.000E+00	0.000E+00	0.000E+00	2.590E+08
SR-90	1.220E+11	0.000E+00	3.100E+10	0.000E+00	0.000E+00	0.000E+00	1.520E+09
SR-91	2.940E+05	0.000E+00	1.060E+04	0.000E+00	0.000E+00	0.000E+00	3.480E+05
SR-92	4.650E+00	0.000E+00	1.730E-01	0.000E+00	0.000E+00	0.000E+00	5.010E+01
Y-90	6.800E+02	0.000E+00	1.820E+01	0.000E+00	0.000E+00	0.000E+00	9.390E+05
Y-91M	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Y-91	7.330E+04	0.000E+00	1.950E+03	0.000E+00	0.000E+00	0.000E+00	5.260E+06
Y-92	5.220E-04	0.000E+00	1.470E-05	0.000E+00	0.000E+00	0.000E+00	9.970E+00
Y-93	2.250E+00	0.000E+00	6.130E-02	0.000E+00	0.000E+00	0.000E+00	1.780E+04

[illegible]

Attachment 12
Gaseous Effluent Pathway Dose Factors
GRASS-COW-MILK DOSE FACTORS
INFANT
(m² *mrem/yr per uCi/sec)

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	GItract
BA-139	4.550E-07	0.000E+00	1.320E-08	0.000E+00	0.000E+00	0.000E+00	2.880E-05
BA-140	2.410E+08	2.410E+05	1.240E+07	0.000E+00	5.730E+04	1.480E+05	5.920E+07
BA-141	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BA-142	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
LA-140	4.030E+01	1.590E+01	4.090E+00	0.000E+00	0.000E+00	0.000E+00	1.870E+05
LA-142	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.210E-06
CE-141	4.330E+04	2.640E+04	3.110E+03	0.000E+00	8.150E+03	0.000E+00	1.370E+07
CE-143	4.000E+02	2.650E+05	3.020E+01	0.000E+00	7.720E+01	0.000E+00	1.550E+06
CE-144	2.330E+06	9.520E+05	1.300E+05	0.000E+00	3.850E+05	0.000E+00	1.330E+08
PR-143	1.490E+03	5.590E+02	7.410E+01	0.000E+00	2.080E+02	0.000E+00	7.890E+05
PR-144	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ND-147	8.820E+02	9.060E+02	5.550E+01	0.000E+00	3.490E+02	0.000E+00	5.740E+05
EU-154	1.080E+05	1.500E+04	9.010E+03	0.000E+00	4.070E+04	0.000E+00	1.880E+06
EU-155	2.210E+04	2.550E+03	1.320E+03	0.000E+00	5.710E+03	0.000E+00	3.410E+06
W-187	6.120E+04	4.260E+04	1.470E+04	0.000E+00	0.000E+00	0.000E+00	2.500E+06
NP-239	3.640E+01	3.250E+00	1.840E+00	0.000E+00	6.490E+00	0.000E+00	9.400E+04

Attachment 12
Gaseous Effluent Pathway Dose Factors
GRASS-GOAT-MILK DOSE FACTORS
ADULT
(m² *mrem/yr per uCi/sec)

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	GIttract
H-3	0.000E+00	1.560E+03	1.560E+03	1.560E+03	1.560E+03	1.560E+03	1.560E+03
C-14	3.630E+05	7.260E+04	7.260E+04	7.260E+04	7.260E+04	7.260E+04	7.260E+04
NA-24	3.050E+05	3.050E+05	3.050E+05	3.050E+05	3.050E+05	3.050E+05	3.050E+05
P-32	2.050E+10	1.270E+09	7.930E+08	0.000E+00	0.000E+00	0.000E+00	2.310E+09
CR-51	0.000E+00	0.000E+00	3.430E+03	2.050E+03	7.560E+02	4.560E+03	8.640E+05
MN-54	0.000E+00	1.010E+06	1.920E+05	0.000E+00	3.000E+05	0.000E+00	3.090E+06
MN-56	0.000E+00	5.080E-04	9.010E-05	0.000E+00	6.450E-04	0.000E+00	1.620E-02
FE-55	3.260E+05	2.250E+05	5.260E+04	0.000E+00	0.000E+00	1.260E+05	1.290E+05
FE-59	3.870E+05	9.090E+05	3.490E+05	0.000E+00	0.000E+00	2.540E+05	3.030E+06
CO-57	0.000E+00	1.540E+05	2.550E+05	0.000E+00	0.000E+00	0.000E+00	3.900E+06
CO-58	0.000E+00	5.660E+05	1.270E+06	0.000E+00	0.000E+00	0.000E+00	1.150E+07
CO-60	0.000E+00	1.970E+06	4.340E+06	0.000E+00	0.000E+00	0.000E+00	3.700E+07
NI-63	8.070E+08	5.600E+07	2.710E+07	0.000E+00	0.000E+00	0.000E+00	1.170E+07
NI-65	4.440E-02	5.770E-03	2.630E-03	0.000E+00	0.000E+00	0.000E+00	1.460E-01
CU-64	0.000E+00	2.690E+03	1.260E+03	0.000E+00	6.770E+03	0.000E+00	2.290E+05
ZN-65	1.650E+08	5.240E+08	2.370E+08	0.000E+00	3.500E+08	0.000E+00	3.300E+08
ZN-69	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-82	0.000E+00	0.000E+00	3.900E+06	0.000E+00	0.000E+00	0.000E+00	4.470E+06
BR-83	0.000E+00	0.000E+00	1.240E-02	0.000E+00	0.000E+00	0.000E+00	1.790E-02
BR-84	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-85	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB-86	0.000E+00	3.110E+08	1.450E+08	0.000E+00	0.000E+00	0.000E+00	6.140E+07
RB-88	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB-89	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SR-89	3.050E+09	0.000E+00	8.740E+07	0.000E+00	0.000E+00	0.000E+00	4.890E+08
SR-90	9.830E+10	0.000E+00	2.410E+10	0.000E+00	0.000E+00	0.000E+00	2.840E+09
SR-91	6.580E+04	0.000E+00	2.660E+03	0.000E+00	0.000E+00	0.000E+00	3.130E+05
SR-92	1.030E+00	0.000E+00	4.440E-02	0.000E+00	0.000E+00	0.000E+00	2.030E+01
Y-90	8.480E+00	0.000E+00	2.280E-01	0.000E+00	0.000E+00	0.000E+00	8.990E+04
Y-91M	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Y-91	1.030E+03	0.000E+00	2.760E+01	0.000E+00	0.000E+00	0.000E+00	5.680E+05
Y-92	6.510E-06	0.000E+00	1.900E-07	0.000E+00	0.000E+00	0.000E+00	1.140E-01
Y-93	2.800E-02	0.000E+00	7.720E-04	0.000E+00	0.000E+00	0.000E+00	8.870E+02
ZR-95	1.140E+02	3.640E+01	2.470E+01	0.000E+00	5.710E+01	0.000E+00	1.150E+05

Attachment 12
Gaseous Effluent Pathway Dose Factors
GRASS-GOAT-MILK DOSE FACTORS
ADULT
(m² *mrem/yr per uCi/sec)

[illegible]

Attachment 12
Gaseous Effluent Pathway Dose Factors
GRASS-GOAT-MILK DOSE FACTORS
ADULT
(m² *mrem/yr per uCi/sec)

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	GIttract
BA-139	5.640E-09	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.000E-08
BA-140	3.230E+06	4.050E+03	2.110E+05	0.000E+00	1.380E+03	2.320E+03	6.650E+06
BA-141	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BA-142	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
LA-140	5.380E-01	2.710E-01	1.990E+04	0.000E+00	0.000E+00	0.000E+00	1.990E+04
LA-142	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.640E-09
CE-141	5.810E+02	3.930E+02	4.450E+01	0.000E+00	1.820E+02	0.000E+00	1.500E+06
CE-143	5.020E+00	3.710E+03	4.110E-01	0.000E+00	1.630E+00	0.000E+00	1.390E+05
CE-144	4.290E+04	1.790E+04	2.300E+03	0.000E+00	1.060E+04	0.000E+00	1.450E+07
PR-143	1.910E+01	7.650E+00	9.450E-01	0.000E+00	4.410E+00	0.000E+00	8.350E+04
PR-144	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ND-147	1.130E+01	1.310E+01	7.820E-01	0.000E+00	7.640E+00	0.000E+00	6.270E+04
EU-154	2.840E+03	3.490E+02	2.480E+02	0.000E+00	1.670E+03	0.000E+00	2.530E+05
EU-155	3.950E+02	5.610E+01	3.620E+01	0.000E+00	2.590E+02	0.000E+00	4.410E+04
W-187	7.870E+02	6.580E+02	2.300E+02	0.000E+00	0.000E+00	0.000E+00	2.160E+05
NP-239	4.390E-01	4.320E-02	2.380E-02	0.000E+00	1.350E-01	0.000E+00	8.860E+03

Attachment 12
Gaseous Effluent Pathway Dose Factors
GRASS-GOAT-MILK DOSE FACTORS
TEEN
(m² *mrem/yr per uCi/sec)

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	GIttract
H-3	0.000E+00	2.030E+03	2.030E+03	2.030E+03	2.030E+03	2.030E+03	2.030E+03
C-14	6.700E+05	1.340E+05	1.340E+05	1.340E+05	1.340E+05	1.340E+05	1.340E+05
NA-24	5.330E+05	5.330E+05	5.330E+05	5.330E+05	5.330E+05	5.330E+05	5.330E+05
P-32	3.780E+10	2.340E+09	1.470E+09	0.000E+00	0.000E+00	0.000E+00	3.180E+09
CR-51	0.000E+00	0.000E+00	6.000E+03	3.330E+03	1.310E+03	8.560E+03	1.010E+06
MN-54	0.000E+00	1.680E+06	3.330E+05	0.000E+00	5.010E+05	0.000E+00	3.440E+06
MN-56	0.000E+00	9.010E-04	1.600E-04	0.000E+00	1.140E-03	0.000E+00	5.930E-02
FE-55	5.790E+05	4.100E+05	9.570E+04	0.000E+00	0.000E+00	2.600E+05	1.780E+05
FE-59	6.750E+05	1.580E+06	6.090E+05	0.000E+00	0.000E+00	4.970E+05	3.730E+06
CO-57	0.000E+00	2.690E+05	4.520E+05	0.000E+00	0.000E+00	0.000E+00	5.030E+06
CO-58	0.000E+00	9.540E+05	2.200E+06	0.000E+00	0.000E+00	0.000E+00	1.310E+07
CO-60	0.000E+00	3.340E+06	7.510E+06	0.000E+00	0.000E+00	0.000E+00	4.350E+07
NI-63	1.420E+09	1.000E+08	4.810E+07	0.000E+00	0.000E+00	0.000E+00	1.590E+07
NI-65	8.130E-02	1.040E-02	4.730E-03	0.000E+00	0.000E+00	0.000E+00	5.640E-01
CU-64	0.000E+00	4.790E+03	2.250E+03	0.000E+00	1.210E+04	0.000E+00	3.710E+05
ZN-65	2.530E+08	8.780E+08	4.090E+08	0.000E+00	5.620E+08	0.000E+00	3.720E+08
ZN-69	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-82	0.000E+00	0.000E+00	6.670E+06	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-83	0.000E+00	0.000E+00	2.290E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-84	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-85	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB-86	0.000E+00	5.670E+08	2.670E+08	0.000E+00	0.000E+00	0.000E+00	8.400E+07
RB-88	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB-89	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SR-89	5.620E+09	0.000E+00	1.160E+08	0.000E+00	0.000E+00	0.000E+00	6.690E+08
SR-90	1.390E+11	0.000E+00	3.430E+11	0.000E+00	0.000E+00	0.000E+00	3.900E+09
SR-91	1.210E+05	0.000E+00	4.810E+03	0.000E+00	0.000E+00	0.000E+00	5.480E+05
SR-92	1.880E+00	0.000E+00	8.010E-02	0.000E+00	0.000E+00	0.000E+00	4.790E+01
Y-90	1.560E+01	0.000E+00	4.200E-01	0.000E+00	0.000E+00	0.000E+00	1.290E+05
Y-91M	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Y-91	1.900E+03	0.000E+00	5.090E+01	0.000E+00	0.000E+00	0.000E+00	7.780E+05
Y-92	1.200E-05	0.000E+00	3.480E-07	0.000E+00	0.000E+00	0.000E+00	3.300E-01
Y-93	5.160E-02	0.000E+00	1.410E-03	0.000E+00	0.000E+00	0.000E+00	1.580E+03

[illegible]

Attachment 12
Gaseous Effluent Pathway Dose Factors
GRASS-GOAT-MILK DOSE FACTORS
TEEN
(m² *mrem/yr per uCi/sec)

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	GIttract
BA-139	1.040E-08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.310E-08
BA-140	5.830E+06	7.140E+03	3.750E+05	0.000E+00	2.420E+03	4.800E+03	8.980E+06
BA-141	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BA-142	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
LA-140	9.760E-01	4.750E-01	1.260E-01	0.000E+00	0.000E+00	0.000E+00	2.730E+04
LA-142	1.980E-12	8.780E-13	2.190E-13	0.000E+00	0.000E+00	0.000E+00	2.670E-08
CE-141	1.060E+03	7.110E+02	8.170E+01	0.000E+00	3.350E+02	0.000E+00	2.030E+06
CE-143	9.230E+00	6.720E+03	7.500E-01	0.000E+00	3.010E+00	0.000E+00	2.020E+05
CE-144	7.900E+04	3.270E+04	4.240E+03	0.000E+00	1.950E+04	0.000E+00	1.990E+07
PR-143	3.500E+01	1.400E+01	1.740E+00	0.000E+00	8.130E+00	0.000E+00	1.150E+05
PR-144	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ND-147	2.180E+01	2.370E+01	1.420E+00	0.000E+00	1.390E+01	0.000E+00	8.530E+04
EU-154	4.700E+03	6.070E+02	4.280E+02	0.000E+00	2.720E+03	0.000E+00	3.210E+05
EU-155	1.030E+03	9.970E+01	6.170E+01	0.000E+00	3.900E+02	0.000E+00	5.710E+05
W-187	1.440E+03	1.170E+03	4.110E+02	0.000E+00	0.000E+00	0.000E+00	3.180E+05
NP-239	8.390E-01	7.910E-02	4.390E-02	0.000E+00	2.480E-01	0.000E+00	1.270E+04

Attachment 12
Gaseous Effluent Pathway Dose Factors
GRASS-GOAT-MILK DOSE FACTORS
CHILD
(m² *mrem/yr per uCi/sec)

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	GIttract
H-3	0.000E+00	3.200E+03	3.200E+03	3.200E+03	3.200E+03	3.200E+03	3.200E+03
C-14	1.650E+06	3.290E+05	3.290E+05	3.290E+05	3.290E+05	3.290E+05	3.290E+05
NA-24	1.110E+06	1.110E+06	1.110E+06	1.110E+06	1.110E+06	1.110E+06	1.110E+06
P-32	9.330E+10	4.370E+09	3.600E+09	0.000E+00	0.000E+00	0.000E+00	2.580E+09
CR-51	0.000E+00	0.000E+00	1.220E+04	6.790E+03	1.860E+03	1.240E+04	6.490E+05
MN-54	0.000E+00	2.510E+06	6.690E+05	0.000E+00	7.050E+05	0.000E+00	2.110E+06
MN-56	0.000E+00	1.570E-03	3.550E-04	0.000E+00	1.900E-03	0.000E+00	2.280E-01
FE-55	1.450E+06	7.700E+05	2.390E+05	0.000E+00	0.000E+00	4.360E+05	1.430E+05
FE-59	1.570E+06	2.530E+06	1.260E+06	0.000E+00	0.000E+00	7.350E+05	2.640E+06
CO-57	0.000E+00	4.600E+05	9.320E+05	0.000E+00	0.000E+00	0.000E+00	3.770E+06
CO-58	0.000E+00	1.460E+06	4.460E+06	0.000E+00	0.000E+00	0.000E+00	8.500E+06
CO-60	0.000E+00	5.180E+06	1.530E+07	0.000E+00	0.000E+00	0.000E+00	2.870E+07
NI-63	3.560E+09	1.900E+08	1.210E+08	0.000E+00	0.000E+00	0.000E+00	1.280E+07
NI-65	1.990E-01	1.870E-02	1.090E-02	0.000E+00	0.000E+00	0.000E+00	2.290E+00
CU-64	0.000E+00	8.410E+03	5.080E+03	0.000E+00	2.030E+04	0.000E+00	3.950E+05
ZN-65	4.960E+08	1.320E+09	8.220E+08	0.000E+00	8.330E+08	0.000E+00	2.320E+08
ZN-69	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-82	0.000E+00	0.000E+00	1.390E+07	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-83	0.000E+00	0.000E+00	5.620E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-84	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-85	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB-86	0.000E+00	1.050E+09	6.470E+08	0.000E+00	0.000E+00	0.000E+00	6.770E+07
RB-88	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB-89	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SR-89	1.390E+10	0.000E+00	3.970E+08	0.000E+00	0.000E+00	0.000E+00	5.380E+08
SR-90	2.350E+11	0.000E+00	5.950E+10	0.000E+00	0.000E+00	0.000E+00	3.190E+09
SR-91	2.970E+05	0.000E+00	1.120E+04	0.000E+00	0.000E+00	0.000E+00	6.550E+05
SR-92	4.590E+10	0.000E+00	1.840E-01	0.000E+00	0.000E+00	0.000E+00	8.690E+01
Y-90	3.860E+01	0.000E+00	1.030E+00	0.000E+00	0.000E+00	0.000E+00	1.100E+05
Y-91M	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Y-91	4.690E+03	0.000E+00	1.250E+02	0.000E+00	0.000E+00	0.000E+00	6.250E+05
Y-92	2.950E-05	0.000E+00	8.440E-07	0.000E+00	0.000E+00	0.000E+00	8.520E-01
Y-93	1.270E-01	0.000E+00	3.480E-03	0.000E+00	0.000E+00	0.000E+00	1.890E+03
ZR-95	4.610E+02	1.010E+02	9.030E+01	0.000E+00	1.450E+02	0.000E+00	1.060E+05

$(\text{m}^2 \cdot \text{mrem}/\text{yr per } \mu\text{Ci}/\text{sec})$ [illegible]

Attachment 12
Gaseous Effluent Pathway Dose Factors
GRASS-GOAT-MILK DOSE FACTORS
CHILD
(m² *mrem/yr per uCi/sec)

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	GIttract
BA-139	2.560E-08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.480E-06
BA-140	1.410E+07	1.230E+04	8.210E+05	0.000E+00	4.010E+03	7.340E+03	7.120E+06
BA-141	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BA-142	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
LA-140	2.310E+00	8.090E-01	2.730E-01	0.000E+00	0.000E+00	0.000E+00	2.260E+04
LA-142	4.770E-12	1.520E-12	4.770E-13	0.000E+00	0.000E+00	0.000E+00	3.020E-07
CE-141	2.620E+03	1.310E+03	1.940E+02	0.000E+00	5.730E+02	0.000E+00	1.630E+06
CE-143	2.270E+01	1.230E+04	1.780E+00	0.000E+00	5.150E+00	0.000E+00	1.800E+05
CE-144	1.950E+05	6.100E+04	1.040E+04	0.000E+00	3.380E+04	0.000E+00	1.590E+07
PR-143	8.670E+01	2.600E+01	4.300E+00	0.000E+00	1.410E+01	0.000E+00	9.350E+04
PR-144	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ND-147	5.340E+01	4.320E+01	3.350E+00	0.000E+00	2.370E+01	0.000E+00	6.850E+04
EU-154	1.130E+04	1.020E+03	9.290E+02	0.000E+00	4.470E+03	0.000E+00	2.360E+05
EU-155	2.360E+03	1.700E+02	1.330E+02	0.000E+00	6.630E+02	0.000E+00	4.250E+05
W-187	3.490E+03	2.070E+03	9.270E+02	0.000E+00	0.000E+00	0.000E+00	2.900E+05
NP-239	2.060E+00	1.480E-01	1.040E-01	0.000E+00	4.280E-01	0.000E+00	1.100E+04

Attachment 12
Gaseous Effluent Pathway Dose Factors
GRASS-GOAT-MILK DOSE FACTORS
INFANT
(m² *mrem/yr per uCi/sec)

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	GIttract
H-3	0.000E+00	4.860E+03	4.860E+03	4.860E+03	4.860E+03	4.860E+03	4.860E+03
C-14	3.230E+06	6.890E+05	6.890E+05	6.890E+05	6.890E+05	6.890E+05	6.890E+05
NA-24	1.930E+06	1.930E+06	1.930E+06	1.930E+06	1.930E+06	1.930E+06	1.930E+06
P-32	1.920E+11	1.130E+10	7.450E+09	0.000E+00	0.000E+00	0.000E+00	2.600E+09
CR-51	0.000E+00	0.000E+00	1.940E+04	1.260E+04	2.760E+03	2.460E+04	5.650E+05
MN-54	0.000E+00	4.670E+06	1.060E+06	0.000E+00	1.040E+06	0.000E+00	1.720E+06
MN-56	0.000E+00	3.850E-03	6.630E-04	0.000E+00	3.310E-03	0.000E+00	3.490E-01
FE-55	1.760E+06	1.130E+06	3.030E+05	0.000E+00	0.000E+00	5.540E+05	1.440E+05
FE-59	2.920E+06	5.110E+06	2.010E+06	0.000E+00	0.000E+00	1.510E+06	2.440E+06
CO-57	0.000E+00	1.070E+06	1.750E+06	0.000E+00	0.000E+00	0.000E+00	3.660E+06
CO-58	0.000E+00	2.910E+06	7.270E+06	0.000E+00	0.000E+00	0.000E+00	7.260E+06
CO-60	0.000E+00	1.060E+07	2.500E+07	0.000E+00	0.000E+00	0.000E+00	2.520E+07
NI-63	4.190E+09	2.590E+08	1.450E+08	0.000E+00	0.000E+00	0.000E+00	1.290E+07
NI-65	4.210E-01	4.770E-02	2.170E-02	0.000E+00	0.000E+00	0.000E+00	3.630E+00
CU-64	0.000E+00	2.090E+04	9.680E+03	0.000E+00	3.540E+04	0.000E+00	4.290E+05
ZN-65	6.660E+08	2.280E+09	1.050E+09	0.000E+00	1.110E+09	0.000E+00	1.930E+09
ZN-69	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-82	0.000E+00	0.000E+00	2.330E+07	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-83	0.000E+00	0.000E+00	1.190E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-84	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-85	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB-86	0.000E+00	2.670E+09	1.320E+09	0.000E+00	0.000E+00	0.000E+00	6.830E+07
RB-88	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB-89	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SR-89	2.640E+10	0.000E+00	7.580E+08	0.000E+00	0.000E+00	0.000E+00	5.430E+08
SR-90	2.550E+11	0.000E+00	6.500E+10	0.000E+00	0.000E+00	0.000E+00	3.190E+09
SR-91	6.180E+05	0.000E+00	2.240E+04	0.000E+00	0.000E+00	0.000E+00	7.310E+05
SR-92	9.760E+00	0.000E+00	3.620E-01	0.000E+00	0.000E+00	0.000E+00	1.050E+02
Y-90	8.160E+01	0.000E+00	2.190E+00	0.000E+00	0.000E+00	0.000E+00	1.130E+05
Y-91M	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Y-91	8.800E+03	0.000E+00	2.340E+02	0.000E+00	0.000E+00	0.000E+00	6.310E+05
Y-92	6.270E-05	0.000E+00	1.760E-06	0.000E+00	0.000E+00	0.000E+00	1.200E+10
Y-93	2.700E-01	0.000E+00	7.350E-03	0.000E+00	0.000E+00	0.000E+00	2.130E+03
ZR-95	8.190E+02	2.000E+02	1.420E+02	0.000E+00	2.150E+02	0.000E+00	9.940E+00

[illegible]

Attachment 12
Gaseous Effluent Pathway Dose Factors
GRASS-GOAT-MILK DOSE FACTORS
INFANT
(m² *mrem/yr per uCi/sec)

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	GIttract
BA-139	5.450E-08	0.000E+00	1.580E-09	0.000E+00	0.000E+00	0.000E+00	3.450E-06
BA-140	2.890E+07	2.890E+04	1.490E+06	0.000E+00	6.870E+03	1.780E+04	7.110E+06
BA-141	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BA-142	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
LA-140	4.840E+00	1.910E+00	4.900E-01	0.000E+00	0.000E+00	0.000E+00	2.240E+04
LA-142	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CE-141	5.200E+03	3.170E+03	3.730E+02	0.000E+00	9.780E+02	0.000E+00	1.640E+06
CE-143	4.800E+01	3.180E+04	3.630E+00	0.000E+00	9.270E+00	0.000E+00	1.860E+05
CE-144	2.790E+05	1.140E+05	1.560E+04	0.000E+00	4.620E+04	0.000E+00	1.600E+07
PR-143	1.790E+02	6.710E+01	8.890E+00	0.000E+00	2.490E+01	0.000E+00	9.470E+04
PR-144	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ND-147	1.060E+02	1.090E+02	6.660E+00	0.000E+00	4.190E+01	0.000E+00	6.890E+04
EU-154	1.300E+04	1.800E+03	1.080E+03	0.000E+00	4.890E+03	0.000E+00	2.250E+05
EU-155	2.650E+03	3.060E+02	1.580E+02	0.000E+00	6.850E+02	0.000E+00	4.100E+05
W-187	7.350E+03	5.110E+03	1.770E+03	0.000E+00	0.000E+00	0.000E+00	3.000E+05
NP-239	4.360E+00	3.900E-01	2.210E-01	0.000E+00	7.780E-01	0.000E+00	1.130E+04

Attachment 13
Environmental Monitoring Sites for REMP

SAMPLE SITE	SECTOR	DISTANCE ¹		DESCRIPTION
		km	mi	
DR1	NW	0.6	0.4	Onsite, Along Cliffs
DR2	WNW	2.7	1.7	Rt. 765, Auto Dump
DR3	W	2.3	1.4	Rt. 765, Giovanni's Tavern (Knotty Pine)
DR4	WSW	2.0	1.2	Rt. 765, Across from White Sand Drive
DR5	SW	2.4	1.5	Rt. 765 at Johns Creek
DR6, A4	SSW	2.9	1.8	Rt. 765 at Lusby, Frank's Garage
DR7, A1, Ib4, Ib5, Ib6	S	0.7	0.5	Onsite, before entrance to Camp Conoy
DR8, A2	SSE	2.5	1.5	Camp Conoy Road at Emergency Siren
DR9, A3	SE	2.6	1.6	Bay Breeze Road
DR10	NW	6.4	4.0	Calvert Beach Rd & Decatur St
DR11	WNW	6.6	4.1	Dirt Road off Mackall Rd & Parran Rd
DR12	W	6.7	4.2	Bowen Rd & Mackall Rd
DR13	WSW	6.1	3.8	Mackall Rd near Wallville
DR14	SW	6.4	4.0	Rodney Point
DR15	SSW	6.2	3.9	Mill Bridge Rd & Turner Rd
DR16	S	6.5	4.1	Across from Appeal School
DR17	SSE	5.9	3.7	Cove Point Rd & Little Cove Point Rd
DR18	SE	7.1	4.5	Cove Point
DR19	NW	4.4	2.8	Long Beach
DR20	NNW	0.4	0.3	Onsite, near shore
DR21, A5, Ib7, Ib8, Ib9	WNW	19.3	12.1	Emergency Operations Facility
DR22	S	12.5	7.8	Solomons Island
DR23	ENE	12.6	7.9	Taylor's Island, Carpenter's Property
Wa1	NNE	0.2	0.1	Intake Area
Wa2, Ia1, Ia2	N	0.3	0.2	Discharge Area
Wb1	ESE	0.6	0.4	Shoreline at Barge Road
Ib1, Ib2, Ib3, Ia4, Ia5	SSE	2.6	1.6	Garden Plot off Bay Breeze Rd
	(Area not influenced by Plant Discharge)			Patuxent River
Ia3	E	0.9	0.6	Camp Conoy
Ia6	NNW	10.7	6.7	Kenwood Beach

¹ Distance and direction from the central point of the two containment buildings.

Attachment 14
Radiological Environmental Monitoring Program
Surveillances for Direct Radiation

PARAMETER	UNITS	FREQUENCY	LLD	ACTION LEVEL
GAMMA DOSE ⁽¹⁾	mR	at least quarterly	⁽²⁾	N/A

- (1) Each sample point shall be monitored using two or more dosimeters **OR** one instrument for measuring and recording dose rate continuously.
- (2) LLD for TLDs used for environmental measurements shall be in accordance with the recommendations of Regulatory Guide 4.13.

Attachment 15
Radiological Environmental Monitoring Program
Surveillances for Airborne Activity

RADIOIODINE CANNISTER

PARAMETER	UNITS	FREQUENCY	LLD	ACTION LEVEL ⁽⁵⁾
I-131	pCi/m ³	at least weekly	0.07	0.9

PARTICULATE FILTER (1)

PARAMETER	UNITS	FREQUENCY	LLD	ACTION LEVEL ⁽⁵⁾
Gross Beta Activity	pCi/m ³	at least weekly ⁽²⁾	0.01	N/A ⁽³⁾
Cs-134	pCi/m ³	at least quarterly ⁽⁴⁾	0.05	10.0
Cs-137	pCi/m ³	at least quarterly ⁽⁴⁾	0.06	20.0

- (1) All samples consist of continuous sampler operation with sample collection weekly, or more frequently if required by dust loading.
- (2) Analyze for gross beta activity 24 hours or more after sampling to allow for radon and thoron daughter decay.
- (3) Although there is not an ACTION Level for gross beta activity, if this parameter is greater than ten times the yearly mean of the control sample, perform **GAMMA ISOTOPIC ANALYSIS** on the individual sample.
- (4) Perform a **GAMMA ISOTOPIC ANALYSIS** of a quarterly **COMPOSITE SAMPLE**. A separate **COMPOSITE SAMPLE** shall be prepared for each sample location, A1 thru A5. Each **COMPOSITE SAMPLE** shall be a prepared from individual particulate filter samples collected during the applicable calendar quarter and from a single location.
- (5) If an ACTION Level is exceeded, check the initiating conditions listed in Radiological Environmental Monitoring Program section 5.c and Radiological Environmental Monitoring Program section 5.d, and perform the corrective actions specified in Radiological Environmental Monitoring Program section 7.d and/or Radiological Environmental Monitoring Program section 7.e.

Attachment 16
Radiological Environmental Monitoring Program
Surveillances for Waterborne Activity

SURFACE WATER SAMPLE ⁽¹⁾

PARAMETER	UNITS	FREQUENCY	LLD	ACTION LEVEL ⁽²⁾
H-3	pCi/l	at least quarterly	2000 ⁽³⁾	20,000 ⁽⁴⁾
Mn-54	pCi/l	at least monthly	15	1000
Fe-59	pCi/l	at least monthly	30	400
Co-58	pCi/l	at least monthly	15	1000
Co-60	pCi/l	at least monthly	15	300
Zn-65	pCi/l	at least monthly	30	300
Zr-95 / Nb-95	pCi/l	at least monthly	15	400
I-131	pCi/l	at least monthly	1 ⁽⁵⁾	2
Cs-134	pCi/l	at least monthly	15	30
Cs-137	pCi/l	at least monthly	18	50
Ba-140 / La-140	pCi/l	at least monthly	15	200

SHORELINE SEDIMENT SAMPLE

PARAMETER	UNITS	FREQUENCY	LLD	ACTION LEVEL ⁽²⁾
Cs-134	pCi/kg, dry	at least semiannually	150	N/A
Cs-137	pCi/kg, dry	at least semiannually	180	N/A

- (1) The water sample shall be a composite of individual samples collected over a 1 month period.
 (2) If an ACTION Level is exceeded, check the initiating conditions listed in sections REMP SECTION 5.c and REMP SECTION 5.d, and perform the corrective actions specified in section REMP SECTION 7.d and/or REMP SECTION 7.e.
 (3) If a drinking water pathway does not exist, a value of 3000 pCi/l may be used.
 (4) If a drinking water pathway does not exist, a value of 30,000 pCi/l may be used.
 (5) LLD for drinking water samples. If no drinking water pathway exists, the LLD of the gamma isotopic analysis may be used.

Attachment 17
Radiological Environmental Monitoring Program
Surveillances for Ingestible Activity

FISH AND INVERTEBRATES ⁽¹⁾

PARAMETER	UNITS	FREQUENCY	LLD	ACTION LEVEL ⁽⁵⁾
Mn-54	pCi/kg, wet	(2)	130	30,000
Fe-59	pCi/kg, wet	(2)	260	10,000
Co-58	pCi/kg, wet	(2)	130	30,000
Co-60	pCi/kg, wet	(2)	130	10,000
Zn-65	pCi/kg, wet	(2)	260	20,000
Cs-134	pCi/kg, wet	(2)	130	1000
Cs-137	pCi/kg, wet	(2)	150	2000

MILK

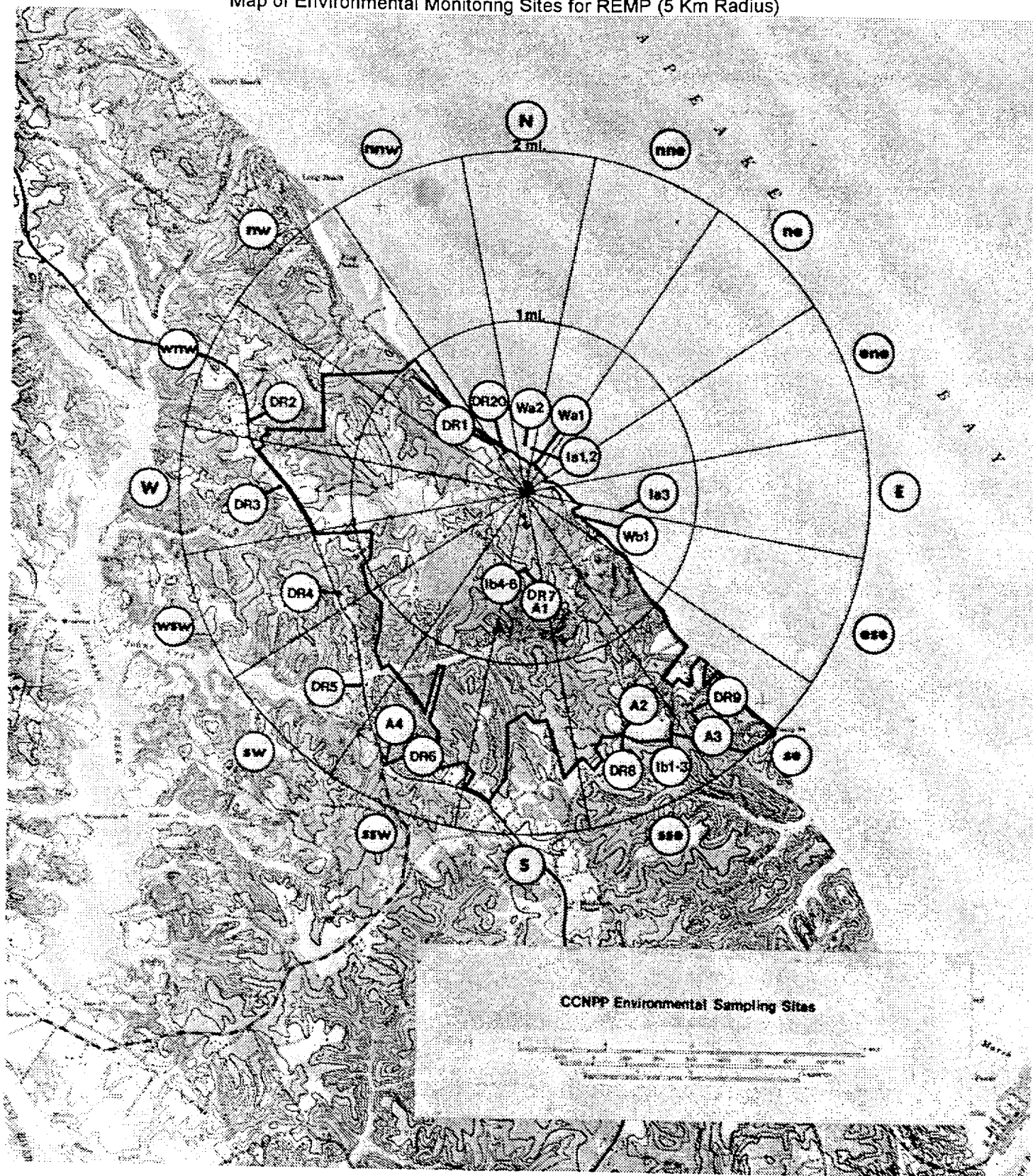
PARAMETER	UNITS	FREQUENCY	LLD	ACTION LEVEL ⁽⁵⁾
I-131	pCi/l, wet	at least monthly ⁽⁴⁾	1	3
Cs-134	pCi/l, wet	at least monthly ⁽⁴⁾	15	60
Cs-137	pCi/l, wet	at least monthly ⁽⁴⁾	18	70
Ba-140 / La-140	pCi/l, wet	at least monthly ⁽⁴⁾	15	300

FOOD PRODUCTS

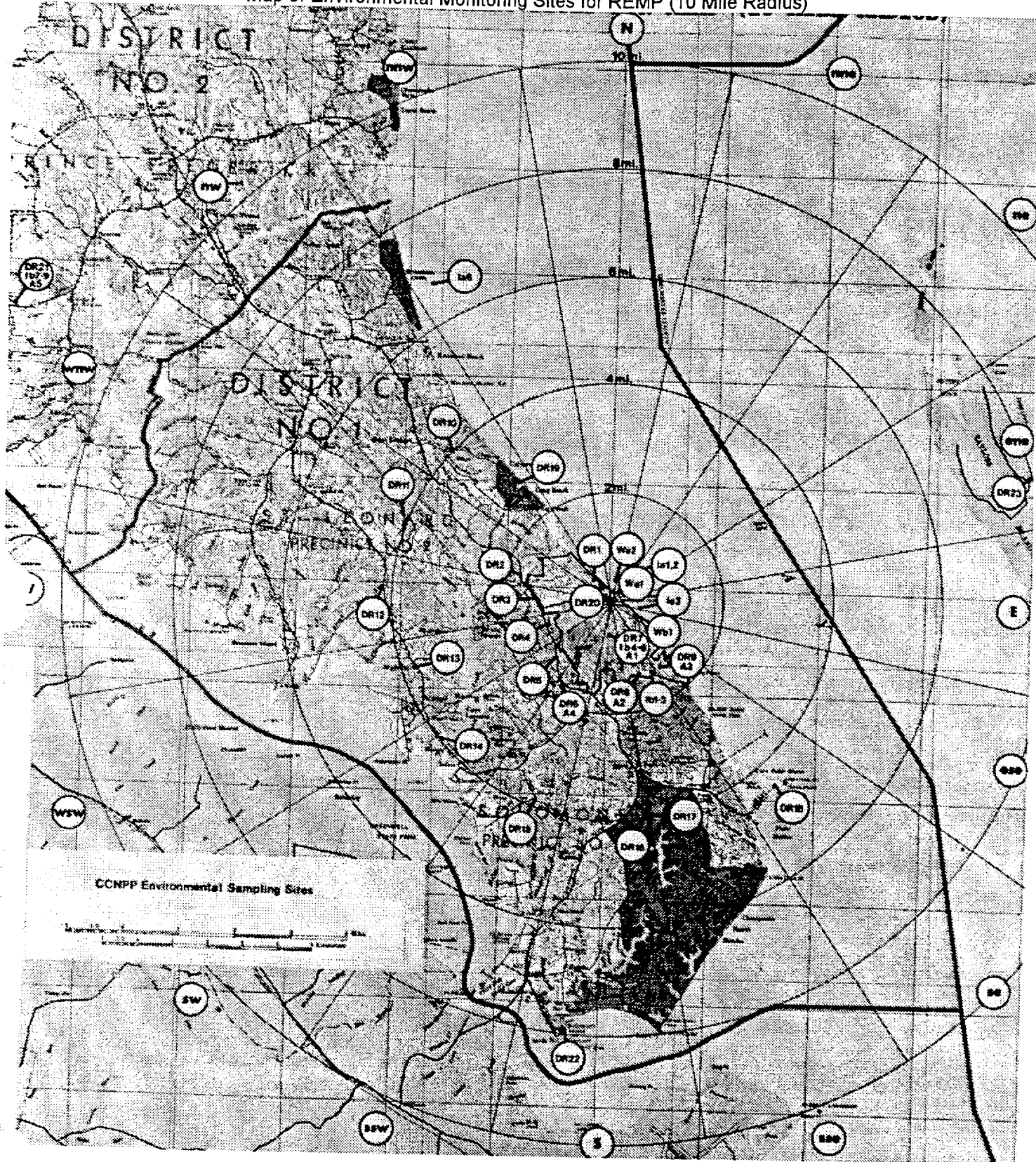
PARAMETER	UNITS	FREQUENCY	LLD	ACTION LEVEL ⁽⁵⁾
I-131	pCi/kg, wet	at least monthly ⁽³⁾	60	100
Cs-134	pCi/kg, wet	at least monthly ⁽³⁾	60	1000
Cs-137	pCi/kg, wet	at least monthly ⁽³⁾	80	2000

- (1) Edible portions of the fish and invertebrates shall be used for analysis.
 (2) The fish and invertebrates shall be sampled at least once per year in season, or semiannually if they are not seasonal.
 (3) The food products shall be sampled during the growing season.
 (4) The milk samples need be collected and analyzed only if the milk is commercially available in quantities greater than 310 liters per year (see NUREG-0133, 5.3.1.1).
 (5) If an ACTION Level is exceeded, check the initiating conditions listed in Radiological Environmental Monitoring Program section 5.c and Radiological Environmental Monitoring Program section 5.d, and perform the corrective actions specified in Radiological Environmental Monitoring Program section 7.d and/or Radiological Environmental Monitoring Program section 7.e.

Attachment 18
Map of Environmental Monitoring Sites for REMP (5 Km Radius)



Attachment 19
Map of Environmental Monitoring Sites for REMP (10 Mile Radius)

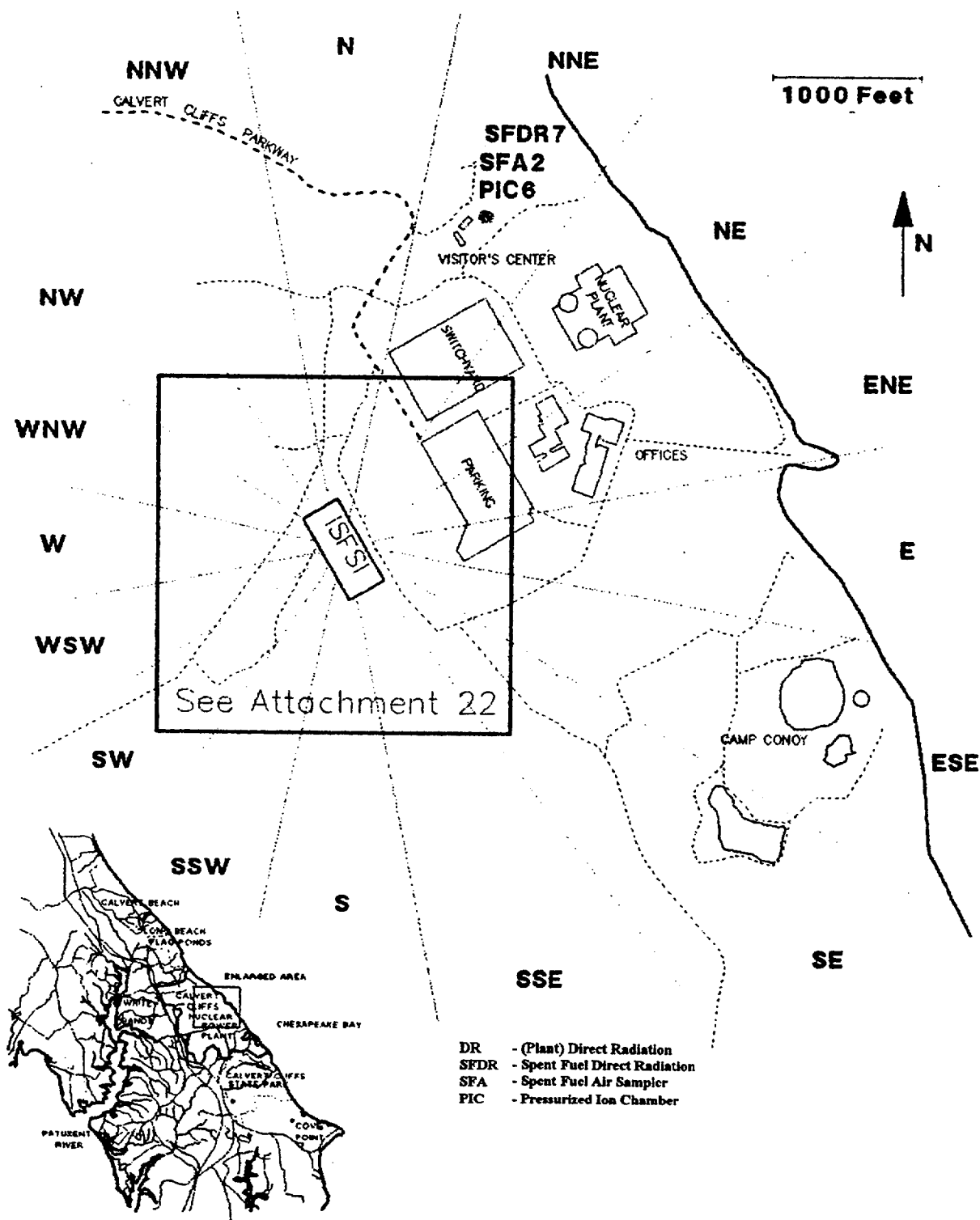


Attachment 20
Environmental Monitoring Sites for ISFSI

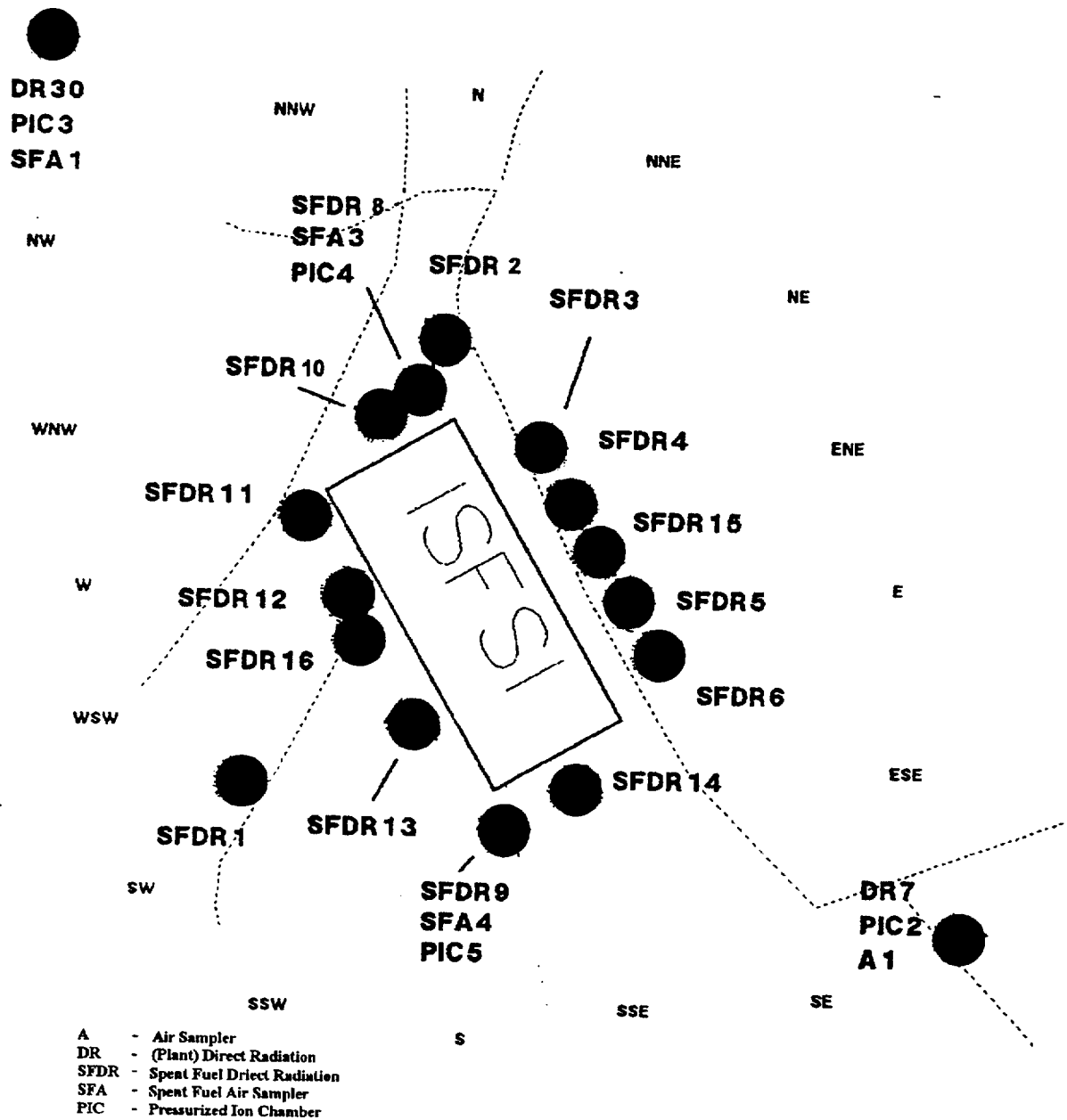
STATION	DESCRIPTION	DISTANCE ¹ (Kilometers)	DIRECTION ¹ (Sector)
<u>AIR SAMPLERS</u>			
A1 ²	On Site Before Entrance to Camp Conoy	0.7	SE
SFA1	Meteorological Station	0.4	NW
SFA2	CCNPP Visitor's Center	0.7	NNE
SFA3	North Northwest of ISFSI	0.1	NNW
SFA4	South of ISFSI	0.1	S
<u>TLD LOCATIONS</u>			
SFDR1	Collocated with Plant TLD #159	0.1	SW
SFDR2	Collocated with Plant TLD #160	0.1	N
SFDR3	Collocated with Plant TLD #161	0.1	NNE
SFDR4	Collocated with Plant TLD #162	<0.1	NE
SFDR5	Collocated with Plant TLD #163	<0.1	E
SFDR6	Collocated with Plant TLD #164	0.1	ESE
SFDR7	CCNPP Visitor's Center	0.7	NNE
SFDR8	North Northwest of ISFSI	0.1	NNW
SFDR9	South of ISFSI	0.1	S
SFDR10	North Northwest of ISFSI	0.1	NNW
SFDR11	West Northwest of ISFSI	0.1	WNW
SFDR12	West of ISFSI	<0.1	W
SFDR13	South Southwest of ISFSI	<0.1	SSW
SFDR14	South Southeast of ISFSI	0.1	SSE
SFDR15	East Northeast of ISFSI	<0.1	ENE
SFDR16	West Southwest of ISFSI	<0.1	WSW
DR7 ²	On Site Before Entrance to Camp Conoy	0.7	SE
DR30	Meteorological Station	0.4	NW
<u>VEGETATION</u>			
SFb1	Meteorological Station	0.4	NW
SFb2	CCNPP Visitor's Center	0.7	NNE
SFb3	North Northwest of ISFSI	0.1	NNW
SFb4	South of ISFSI	0.1	S
SFb5	On Site Before Entrance to Camp Conoy	0.7	SE
<u>SOIL</u>			
SFS1	Meteorological Station	0.4	NW
SFS2	CCNPP Visitor's Center	0.7	NNE
SFS3	North Northwest of ISFSI	0.1	NNW
SFS4	South of ISFSI	0.1	S
SFS5	On Site Before Entrance to Camp Conoy	0.7	SE

¹ Distance and direction from the Central Point of the ISFSI.
² Common to both the REMP and the ISFSIMP.

Attachment 21
Map of Environmental Monitoring Sites for ISFSI



Attachment 22
Map of Environmental Monitoring Sites for ISFSI (ENLARGED)



Attachment 23
Effluent Radiation Monitors

Description	Radiation Element	Radiation Indicator
Liquid Waste Discharge Radiation Monitor	0-RE-2201	0-RI-2201
Steam Generator Blowdown Effluent Radiation Monitor	1-RE-4095	1-RI-4095
Steam Generator Blowdown Effluent Radiation Monitor	2-RE-4095	2-RI-4095
Steam Generator Blowdown Tank Radiation Monitor	1-RE-4014	1-RI-4014
Steam Generator Blowdown Tank Radiation Monitor	2-RE-4014	2-RI-4014
Wide Range Gas Monitor, Low Range	1-RE-5416	1-RI-5415
Wide Range Gas Monitor, Low Range	2-RE-5416	2-RI-5415
Westinghouse Plant Vent Stack Monitor	1-RE-5415	1-RI-5415
Westinghouse Plant Vent Stack Monitor	2-RE-5415	2-RI-5415
GASEOUS RADWASTE TREATMENT SYSTEM Radiation Monitor	0-RE-2191	0-RE-2191

Accident Monitors Not Addressed By The ODCM

Wide Range Gas Monitor, Mid Range	1-RE-5417
Wide Range Gas Monitor, High Range	1-RE-5418
Wide Range Gas Monitor, Mid Range	2-RE-5417
Wide Range Gas Monitor, High Range	2-RE-5418

Attachment 24
List of Effective Pages

Page No.	Change No.	Page No.	Change No.	Page No.	Change No.	Page No.	Change No.
1	0	31	0	61	0	91	0
2	0	32	0	62	0	92	0
3	0	33	0	63	0	93	0
4	0	34	0	64	0	94	0
5	0	35	0	65	0	95	0
6	0	36	0	66	0	96	0
7	0	37	0	67	0	97	0
8	0	38	0	68	0	98	0
9	0	39	0	69	0	99	0
10	0	40	0	70	0	100	0
11	0	41	0	71	0	101	0
12	0	42	0	72	0	102	0
13	0	43	0	73	0	103	0
14	0	44	0	74	0	104	0
15	0	45	0	75	0	105	0
16	0	46	0	76	0	106	0
17	0	47	0	77	0	107	0
18	0	48	0	78	0	108	0
19	0	49	0	79	0	109	0
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21	0	51	0	81	0	111	0
22	0	52	0	82	0	112	0
23	0	53	0	83	0	113	0
24	0	54	0	84	0	114	0
25	0	55	0	85	0	115	0
26	0	56	0	86	0	116	0
27	0	57	0	87	0	117	0
28	0	58	0	88	0	118	0
29	0	59	0	89	0	119	0
30	0	60	0	90	0	120	0

Attachment 24
List of Effective Pages

Page No	Change No.	Page No	Change No.	Page No.	Change No.	Page No	Change No.
121	0	151	0	181	0	211	0
122	0	152	0	182	0	212	0
123	0	153	0	183	0	213	0
124	0	154	0	184	0	214	0
125	0	155	0	185	0	215	0
126	0	156	0	186	0	216	0
127	0	157	0	187	0	217	0
128	0	158	0	188	0	218	0
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131	0	161	0	191	0	221	0
132	0	162	0	192	0	222	0
133	0	163	0	193	0	223	0
134	0	164	0	194	0	224	0
135	0	165	0	195	0	225	0
136	0	16	0	196	0	226	0
137	0	167	0	197	0	227	0
138	0	168	0	198	0	228	0
139	0	169	0	199	0	229	0
140	0	170	0	200	0	230	0
141	0	171	0	201	0	231	0
142	0	172	0	202	0	232	0
143	0	173	0	203	0	233	0
144	0	174	0	204	0	234	0
145	0	175	0	205	0	235	0
146	0	176	0	206	0	236	0
147	0	177	0	207	0	237	0
148	0	178	0	208	0	238	0
149	0	179	0	209	0	239	0
150	0	180	0	210	0	240	0

Attachment 24
List of Effective Pages

Page No	Change No.	Page No.	Change No.	Page No	Change No.	Page No	Change No.
241	0	271	0	301	0		
242	0	272	0	302	0		
243	0	273	0	303	0		
244	0	274	0	304	0		
245	0	275	0	305	0		
246	0	276	0	306	0		
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248	0	278	0	308	0		
249	0	279	0	309	0		
250	0	280	0	310	0		
251	0	281	0	311	0		
252	0	282	0	312	0		
253	0	283	0	313	0		
254	0	284	0	314	0		
255	0	285	0	315	0		
256	0	286	0	316	0		
257	0	287	0	317	0		
258	0	288	0	318	0		
259	0	289	0	319	0		
260	0	290	0	320	0		
261	0	291	0	321	0		
262	0	292	0	322	0		
263	0	293	0				
264	0	294	0				
265	0	295	0				
266	0	296	0				
267	0	297	0				
268	0	298	0				
269	0	299	0				
270	0	300	0				