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March 19, 1973

Mr. Kenneth Dzugan
Minnesota Pollution Control Agency
717 Delaware Street, S. E.
Minneapolis, Minnesota 55440

RE: MONTICELLO NUCLEAR GENERATING PLANT
(NORTHERN STATES POWER COMPANY, DOCKET NO. 50-263)

Dear Ken:

In further response to your Information Request, I am enclosing the resume of John T. Collins, the radwaste analyst for the Monticello review, and the effluent calculation sheets for the Monticello environmental review.

Please let me know if I can be of further assistance.

Sincerely,

Geoffrey P. Gitner
Counsel for AEC Regulatory Staff

cc (with enclosures):

Howard J. Vogel, Esq.
Daniel L. Ficker, Esq.
Mr. Steve J. Gadler
Gerald Charnoff, Esq. (2)

OFFICE ▶	OGC	OGC				
SURNAME ▶	GPGitner:jdr	JGallo				
DATE ▶	3/19/73	3/ /73				

PROFESSIONAL QUALIFICATIONS OF

JOHN T. COLLINS

DIRECTORATE OF LICENSING

UNITED STATES ATOMIC ENERGY COMMISSION

My name is John T. Collins. I am employed as a lead nuclear engineer on the technical staff of the Effluent Treatment Systems Branch, Directorate of Licensing, U.S. Atomic Energy Commission, Washington, D.C. My responsibilities include the technical review and performance evaluation of liquid, gaseous and solid waste handling and treatment systems and for the assessment of methods, data and assumptions used in determining estimated releases of radioactivity from nuclear power plants.

I attended Pennsylvania State University and Idaho State University where I majored in General Engineering. In addition, I attended specialized courses in the design and operation of ventilation and filtration systems at North Carolina State College and Michigan State University.

From 1955 to 1957, I was employed by the Goodyear Atomic Corporation at the AEC's Gaseous Diffusion Plant, Portsmouth, Ohio as a laboratory analyses, inprocess sampling and analysis and particle size analysis by low-temperature nitrogen adsorption method. In 1957, I accepted a position as Industrial Hygienist with the Nuclear Division of the Beryllium Corporation at Hazelton, Pennsylvania. My duties included the development and supervision of a trace analysis laboratory and the routine analysis of inplant and environmental monitoring samples.

From 1960 to 1963, I held the position of Industrial Hygiene Engineer and was responsible for the company's industrial hygiene program and for the design, procurement, installation and operation of all process ventilation, filtration, and waste treatment systems.

In 1963, I accepted a position as Industrial Hygiene Engineer with the Division of Operational Safety, U.S. Atomic Energy Commission at the National Reactor Testing Station, Idaho. In this position, I was responsible for appraising the AEC contractors performance. Additional duties included the health and safety design review of all new or modified facilities and equipment with particular emphasis on ventilation, filtration, and waste treatment systems used both radioactive and non-radioactive contaminants. Other duties included the performance of research and development effort in the field of particle size sampling and analysis, development and direct supervision of the HEPA filter and charcoal adsorber inplace testing program and the supervision of the NRTS respiratory protection and emergency equipment program. In 1969, I transferred to the Nuclear Technology Division as Pollution Control Engineer. My duties included, the appraisal of the contractor's performance in meeting the requirements of NEPA and for the review and evaluation of installed or proposed radioactive and non-radioactive waste management system.

In 1971, I accepted a position as Materials and Process Engineer with the Division of Waste Management and Transportation, AEC, Washington, D.C. In this position I was responsible for appraising field office performance in carrying out the objectives and goals of the AEC in

the area of waste management and effluent control. Since November 1971, until the present, I have been assigned to the Directorate of Licensing to assist in the evaluation of radwaste treatment systems installed or proposed for nuclear power plants and for the development of source terms for the environmental statements and safety evaluation reports.

I am a member of the American Industrial Hygiene Association, the American Conference of Governmental Industrial Hygienist, the American Conference for Contamination Control, and a member of ANS 34.1 and ANS 34.2, Standards for Radwaste Treatment Systems.

MEMO ROUTE SLIP Form AEC-93 (Rev. May 14, 1947) AECM 0240		See me about this. Note and return.	For concurrence. For signature.	For action. For information.
TO (Name and unit) R. Bevan EP.	INITIALS DATE	REMARKS		
TO (Name and unit)	INITIALS DATE	REMARKS		
TO (Name and unit)	INITIALS DATE	REMARKS Attached are the effluent calculations sheets for Monticello and my professional qualifications sheet.		
FROM (Name and unit) J.T. Collins ETSB		REMARKS		
PHONE NO.	DATE 3/14/73			

USE OTHER SIDE FOR ADDITIONAL REMARKS

GPO : 1971 O - 445-469

MONTICELLO CASE 1 NO TREATMENT OF EJECTOR OR GLAND SEAL

DESIGN THERMAL POWER	1.670E 03 MEGAWATTS
TOTAL STEAM FLOW	6.770E 06 POUNDS/HOUR
PLANT FACTOR	6.000E-01
WEIGHT OF LIQUID IN THE SYSTEM	1.160E 06 POUNDS
WEIGHT OF STEAM IN THE SYSTEM	3.180E 04 POUNDS
CLEAN-UP DEMIN. FLOW	8.000E 04 POUNDS/HOUR
FAILED FUEL	1.600E-01 PERCENT

LEAKS

REACTOR BLDG.	4.300E 02 POUNDS/HOUR
TURBINE BLDG.	~~2.4[illegible]E 03~~ POUNDS/HOUR 1700# density is
GLAND SEAL	6.770E 03 POUNDS/HOUR plant factor

PARTITION COEFFICIENTS (IODINE)

STEAM/LIQUID	.01.200E-02 OK
REACTOR BLDG.	1.000E-03 OK
TURBINE BLDG.	1.000E-01
GLAND SEAL	1.000E-01 OK
AIR EJECTOR	.001.000E-03 OK

$.32 \times \frac{1}{0.7} \times \frac{1}{0.8} = 0.57$

FRACTION OF IODINE GETTING THROUGH THE

CONDENSATE DEMIN.	1.000E-03 OK
CLEAN-UP DEMIN.	1.000E-01 OK
REACTOR BLDG. FILTER	1.000E 00 OK
TURBINE BLDG. FILTER	1.000E 00 OK
GLAND SEAL FILTER	1.000E 00 OK
AIR EJECTOR FILTER	1.000E 00 OK

$.32 \times \frac{1}{.8} = .40$

HOLD-UP TIMES

REACTOR BLDG. GAS	0.0 HOURS
TURBINE BLDG. GAS	0.0 HOURS
GLAND SEAL GAS	.03.300E-02 HOURS
AIR EJECTOR GAS	5.000E-01 HOURS 30

CHARCOAL BED HOLD-UP TIME FOR

KRYPTONS	0.0 DAYS
XENONS	0.0 DAYS

MONTICELLO CASE 1 NO TREATMENT OF EJECTOR OR GLAND SEAL

RELEASE RATE

(CURIES PER YEAR) (CURIES PER SECOND)

NUCLIDE	COOLANT CONC. (MICROCURIES/ML)	REACTOR BLDG.	TURBINE BLDG.	GLAND SEAL 2.0 min hold up	AIR EJECTOR 30 min hold up	TOTAL	TOTAL
KR-83M	1.019E-03	0.0	1.513E 01	4.230E 01	3.554E 04	3.560E 04	1.128E-03
KR-85M	1.676E-03	0.0	2.496E 01	7.004E 01	6.507E 04	6.517E 04	2.065E-03
KR-85	8.673E-06	0.0	1.292E-01	3.644E-01	3.644E 02	3.649E 02	1.156E-05
KR-87	5.024E-03	0.0	7.481E 01	2.073E 02	1.605E 05	1.603E 05	5.096E-03
KR-88	5.424E-03	0.0	8.078E 01	2.260E 02	2.013E 05	2.016E 05	6.369E-03
KR-89	1.895E-02	0.0	2.823E 02	5.172E 02	1.153E 03	1.952E 03	6.166E-05
XE-131M	7.559E-06	0.0	1.126E-01	3.175E-01	3.172E 02	3.176E 02	1.006E-05
XE-133M	1.062E-04	0.0	1.582E 00	4.459E 00	4.433E 03	4.439E 03	1.407E-04
XE-133	2.972E-03	0.0	4.423E 01	1.249E 02	1.246E 05	1.247E 05	3.953E-03
XE-135M	8.659E-03	0.0	1.290E 02	3.332E 02	9.676E 04	9.722E 04	3.081E-03
XE-135	8.507E-03	0.0	1.267E 02	3.565E 02	3.442E 05	3.447E 05	1.092E-02
XE-137	3.248E-02	0.0	4.837E 02	9.526E 02	5.902E 03	7.338E 03	2.325E-04
XE-138	2.724E-02	0.0	4.055E 02	1.055E 03	3.363E 05	3.378E 05	1.070E-02
I-131	(.0032) 1.271E-02 (.0157)	.03 .027E-02 .032	.157 2.271E-01 .28	.16 6.406E-01 .8	8.0 6.395E 00 32.0	8.7 7.299E 00 42.6	2.313E-07
I-133	6.292E-02	1.294E-01	1.124E 00	3.169E 00	3.120E 01	3.562E 01	1.129E-06

drawn by factor of 4.

1,322,002

0.0 APPEARING IN THE TABLE SHOULD BE INTERPRETED AS INSIGNIFICANT

multiply by 1.25

.03 [illegible] = .012

[illegible]

use [illegible] = 2.3 Ci/gr-I-131

MONTICELLO CASE 2 HIGH PRESSURE STORAGE TANKS

DESIGN THERMAL POWER	1.670E 03 MEGAWATTS
TOTAL STEAM FLOW	6.770E 06 POUNDS/HOUR
PLANT FACTOR	8.000E-01
WEIGHT OF LIQUID IN THE SYSTEM	1.100E 06 POUNDS
WEIGHT OF STEAM IN THE SYSTEM	3.160E 04 POUNDS
CLEAN-UP DEMIN. FLOW	8.000E 04 POUNDS/HOUR
FAILED FUEL	1.000E-01 PERCENT

LEAKS

REACTOR BLDG.	4.300E 02 POUNDS/HOUR – 7 GPM
TURBINE BLDG.	2.400E 03 POUNDS/HOUR – 5 GPM
GLAND SEAL	6.770E 03 POUNDS/HOUR

PARTITION COEFFICIENTS (IODINE)

STEAM/LIQUID	1.200E-02
REACTOR BLDG.	1.000E-03
TURBINE BLDG.	1.000E-01
GLAND SEAL	1.000E-01
AIR EJECTOR	1.000E-03

FRACTION OF IODINE GETTING THROUGH THE

CONDENSATE DEMIN.	1.000E-03
CLEAN-UP DEMIN.	1.000E-01
REACTOR BLDG. FILTER	1.000E 00
TURBINE BLDG. FILTER	1.000E 00
GLAND SEAL FILTER	1.000E-01
AIR EJECTOR FILTER	1.000E-03

HOLD-UP TIMES

REACTOR BLDG. GAS	0.0	HOURS
TURBINE BLDG. GAS	0.0	HOURS
GLAND SEAL GAS	3.300E-02	HOURS
AIR EJECTOR GAS	5.000E 01	HOURS

CHARCOAL BED HOLD-UP TIME FOR

KRYPTONS	0.0	DAYS
XENONS	0.0	DAYS

MONTICELLO CASE 2 HIGH PRESSURE STORAGE TANKS

RELEASE RATE

(CURIES PER YEAR) (CURIES PER SECOND)

NUCLIDE	COOLANT CONC. (MICROCURIES/ML)	REACTOR BLDG.	TURBINE BLDG.	GLAND SEAL	AIR EJECTOR	TOTAL	TOTAL
KR-83M	1.019E-03	0.0	1.5[illegible]3E 01	4.230E 01	.0003.474E-04	5.748E 01	1.821E-06
KR-85M	1.676E-03	0.0	2.496E 01	7.004E 01	2.676E 01	1.218E 02	3.856E-06
KR-85	8.673E-06	0.0	1.292E-01	3.644E-01	3.642E 02	3.647E 02	1.156E-05
KR-87	5.024E-03	0.0	7.481E 01	2.073E 02	.0000002.767E-07	2.821E 02	8.936E-06
KR-88	5.424E-03	0.0	8.078E 01	2.260E 02	9.536E-01	3.077E 02	9.752E-06
KR-89	1.895E-02	0.0	2.8[illegible]E 02	5.172E 02	0.0	7.994E 02	2.533E-05
XE-131M	7.559E-06	0.0	1.126E-01	3.175E-01	2.810E 02	2.814E 02	8.917E-06
XE-133M	1.562E-04	0.0	1.582E 00	4.459E 00	2.356E 03	2.362E 03	7.484E-05
XE-133	2.973E-03	0.0	4.4[illegible]E 01	1.249E 02	9.501E 04	9.518E 04	3.016E-03
XE-135M	8.659E-03	0.0	1.290E 02	3.333E 02	0.0	4.623E 02	1.465E-05
XE-135	8.5[illegible]8E-03	0.0	1.267E 02	3.565E 02	8.306E 03	8.789E 03	2.785E-04
XE-137	3.2[illegible]E-02	0.0	4.837E 02	9.526E 02	0.0	1.436E 03	4.551E-05
XE-138	2.7[illegible]E-02	0.0	4.055E 02	1.055E 03	0.0	1.461E 03	4.6[illegible]E-05
I-131	1.271E-02	.009 0.027E-02	.2.271E-01	.0.406E-02-01	.005.354E-03	9.09 E-01	2.88 E-08
[illegible]	[illegible]	1.294E-01	1.124E 00	3.169E-01 00	6.986E-03	1.577E 00	4.9[illegible]
						4.479E 00	1.41 E-07

0.0 APPEARING IN THE TABLE SHOULD BE INTERPRETED AS INSIGNIFICANT

original information had a charcoal filter in gland seal line to stack. Later retracted by Ralph Shinnot for NSP Co 4/

0.0127

0.005 uCi/ml

$.227 \times 10 \times \frac{0.005}{0.0127} = 0.89\ \text{Ci/yr} \times 0.7 = 0.62 \times .8 = 0.5$

Density Load

$.0127\ \text{uCi/cc} \times \frac{\text{cc}}{\text{m}} \times \frac{3785\ \text{cc}}{\text{G}} \times 1440\ \frac{\text{m}}{\text{D}} \times 365\ \frac{\text{D}}{\text{yr}} \times 0.8 \times \frac{1}{10} \times \frac{1}{80} = .1.26$

.227 $\frac{1}{0.7 \times 0}$

MONTICELLO CASE 2 HIGH PRESSURE STORAGE TANKS

RELEASE RATE

(CURIES PER YEAR) (CURIES PER SECOND)

NUCLIDE	COOLANT CONC. (MICROCURIES/ML)	REACTOR BLDG.	TURBINE BLDG.	GLAND SEAL	AIR EJECTOR	TOTAL	TOTAL
KR-83M	1.019E-03	0.0	1.5[illegible]E 01	4.230E 01	.0003.474E-04	5.748E 01	1.821E-06
KR-85M	1.676E-03	0.0	2.4[illegible]E 01	7.004E 01	2.6[illegible]76E 01	1.218E 02	3.858E-06
KR-85	8.673E-06	0.0	1.292E-01	3.644E-01	3.64[illegible]E 02	3.647E 02	1.156E-05
KR-87	5.024E-03	0.0	7.4[illegible]1E 01	2.0[illegible]E 02	.0000002.767E-07	2.821E 02	8.936E-06
KR-88	5.424E-03	0.0	8.0[illegible]78E 01	2.2[illegible]E 02	9.536E-01	3.077E 02	9.752E-06
KR-89	1.695E-03	0.0	2.8[illegible]E 02	5.17[illegible]E 02	0.0	7.994E 02	2.533E-05
XE-131M	7.559E-03	0.0	1.126E-01	3.179E-01	2.8[illegible]E 02	2.814E 02	8.917E-06
XE-133M	1.0[illegible]2E-04	0.0	1.582E 00	4.457E 00	2.35[illegible]E 03	2.362E 03	7.484E-05
XE-133	2.973E-03	0.0	4.4[illegible]8E 01	1.24[illegible]E 02	9.501E 04	9.518E 04	3.016E-03
XE-135M	8.659E-03	0.0	1.2[illegible]E 02	3.3[illegible]E 02	0.0	4.623E 02	1.4[illegible]E-05
XE-135	8.516E-03	0.0	1.2[illegible]E 02	3.56[illegible]E 02	8.306E 03	8.767E 03	2.785E-04
XE-137	3.24[illegible]E-02	0.0	4.63[illegible]E 02	9.52[illegible]E 02	0.0	1.436E 03	4.551E-05
XE-138	2.7[illegible]	0.0	4.0[illegible]E 02	1.05[illegible]E 03	0.0	1.[illegible]E 03	4.[illegible]E-05
[illegible]	1.27[illegible]	.000 [illegible]E-02	.557 2.271E-01	.7[illegible] [illegible]E-01	.07 [illegible]E-03	.75 [illegible] 9.09E-01	[illegible] 2.8[illegible]E-08
[illegible]	[illegible]	1.294E-01	1.124E 00	3.169E-[illegible]00	6.085E-03	1.577E 00 4.479E 00	4.[illegible] 1.41E-07

0.0 APPEARING IN THE TABLE SHOULD BE INTERPRETED AS INSIGNIFICANT

original information had a charcoal filter in gland seal line to stack. Later retracted by Ralph Shimot for NSP Co 4/7

0.0127

0.005 uci/ml

$.227 \times 10 \times \frac{0.005}{0.0127} = 0.89\ \text{ci/yr} \times 0.7 = 0.62 \times .8 = 0.5$

Density Load

$.0127\ \text{uci/cc} \times \frac{\text{cc}}{\text{m}} \times 3725\ \frac{\text{cc}}{\text{G}} \times 1440\ \frac{\text{m}}{\text{D}} \times 365\ \frac{\text{D}}{\text{yr}} \times 0.8 \times \frac{1}{10} \times \frac{1}{80} = .1.26$

.227 $\frac{1}{0.7 \times 0.}$

MONTICELLO CASE 1 NO TREATMENT OF EJECTOR OR GLAND SEAL

DESIGN THERMAL POWER	1.670E 03 MEGAWATTS
TOTAL STEAM FLOW	6.770E 06 POUNDS/HOUR
PLANT FACTOR	8.000E-01
WEIGHT OF LIQUID IN THE SYSTEM	1.160E 06 POUNDS
WEIGHT OF STEAM IN THE SYSTEM	3.180E 04 POUNDS
CLEAN-UP DEMIN. FLOW	8.000E 04 POUNDS/HOUR
FAILED FUEL	1.600E-01 PERCENT

LEAKS

REACTOR BLDG.	4.300E 02 POUNDS/HOUR
TURBINE BLDG.	~~2.400E-03~~ POUNDS/HOUR 1700# density is
GLAND SEAL	6.770E 03 POUNDS/HOUR plant factor

PARTITION COEFFICIENTS (IODINE)

STEAM/LIQUID	.01.200E-02 ok
REACTOR BLDG.	1.000E-03 ok
TURBINE BLDG.	.1.000E-01
GLAND SEAL	.1.000E-01 ok
AIR EJECTOR	.001.000E-03 ok

$.32 \times \frac{1}{0.7} \times \frac{1}{0.8} = 0.57$

FRACTION OF IODINE GETTING THROUGH THE

CONDENSATE DEMIN.	1.000E-03 ok
CLEAN-UP DEMIN.	1.000E-01 ok
REACTOR BLDG. FILTER	1.000E 00 ok
TURBINE BLDG. FILTER	1.000E 00 ok
GLAND SEAL FILTER	1.000E 00 ok
AIR EJECTOR FILTER	1.000E 00 ok

$.32 \times \frac{1}{.8} = .40$

HOLD-UP TIMES

REACTOR BLDG. GAS	0.0 HOURS
TURBINE BLDG. GAS	0.0 HOURS
GLAND SEAL GAS	.01.300E-02 HOURS 2 [illegible]
AIR EJECTOR GAS	.5.000E-01 HOURS 3000 [illegible]

CHARCOAL BED HOLD-UP TIME FOR

KRYPTONS	0.0 DAYS
XENONS	0.0 DAYS

MONTICELLO CASE 2 HIGH PRESSURE STORAGE TANKS

DESIGN THERMAL POWER	1.670E 03 MEGAWATTS
TOTAL STEAM FLOW	6.770E 06 POUNDS/HOUR
PLANT FACTOR	8.000E-01
WEIGHT OF LIQUID IN THE SYSTEM	1.160E 06 POUNDS
WEIGHT OF STEAM IN THE SYSTEM	3.100E 04 POUNDS
CLEAN-UP DEMIN. FLOW	8.000E 04 POUNDS/HOUR
FAILED FUEL	1.600E-01 PERCENT

LEAKS

REACTOR BLDG.	4.300E 02 POUNDS/HOUR - 1.68M
TURBINE BLDG.	2.400E 03 POUNDS/HOUR - 5.68M
GLAND SEAL	6.770E 03 POUNDS/HOUR

PARTITION COEFFICIENTS (IODINE)

STEAM/LIQUID	1.200E-02
REACTOR BLDG.	1.000E-03
TURBINE BLDG.	1.000E-01
GLAND SEAL	1.000E-01
AIR EJECTOR	1.000E-03

FRACTION OF IODINE GETTING THROUGH THE

CONDENSATE DEMIN.	1.000E-03
CLEAN-UP DEMIN.	1.000E-01
REACTOR BLDG. FILTER	1.000E 00
TURBINE BLDG. FILTER	1.000E 00
GLAND SEAL FILTER	1.000E-01
AIR EJECTOR FILTER	1.000E-03

HOLD-UP TIMES

REACTOR BLDG. GAS	0.0	HOURS
TURBINE BLDG. GAS	0.0	HOURS
GLAND SEAL GAS	3.300E-02	HOURS
AIR EJECTOR GAS	5.000E 01	HOURS

ACCUMULATED HOLD-UP TIME FOR

KRYPTONS	0.0	DAYS
XENONS	0.0	DAYS

[illegible] CASE 1 NO TREATMENT OF EJECTOR OR GLAND SEAL

RELEASE RATE

(CURIES PER YEAR) (CURIES PER SECOND)

NUCLIDE	COOLANT CONC. (MICROCURIES/ML)	REACTOR BLDG.	TURBINE BLDGS	GLAND SEAL 2.0 min hold up	AIR EJECTOR 30 min hold up	TOTAL	TOTAL
KR-83M [illegible]	1.019E-03	0.0	1.318E 01	4.230E 01	3.554E 04	3.560E 04	1.128E-03
KR-85M [illegible]	1.576E-03	0.0	2.496E 01	7.004E 01	6.507E 04	6.517E 04	2.065E-03
KR-85 [illegible]	8.672E-06	0.0	1.292E-01	3.644E-01	3.644E 02	3.644E 02	1.156E-05
KR-87 [illegible]	5.024E-03	0.0	7.481E 01	2.073E 02	1.605E 05	1.603E 05	5.096E-03
KR-88 [illegible]	5.424E-03	0.0	8.078E 01	2.260E 02	2.013E 05	2.016E 05	6.369E-03
KR-89 [illegible]	1.895E-02	0.0	2.822E 02	5.172E 02	1.153E 03	1.952E 03	6.166E-05
XE-131M [illegible]	7.559E-06	0.0	1.126E-01	3.175E-01	3.172E 02	3.176E 02	1.006E-05
XE-133M [illegible]	1.062E-04	0.0	1.582E 00	4.459E 00	4.433E 03	4.439E 03	1.407E-04
XE-133 [illegible]	2.972E-03	0.0	4.423E 01	1.249E 02	1.246E 05	1.247E 05	3.953E-03
XE-135M [illegible]	8.659E-03	0.0	1.290E 02	3.332E 02	9.676E 04	9.722E 04	3.081E-03
XE-135 [illegible]	8.508E-03	0.0	1.267E 02	3.565E 02	3.442E 05	3.447E 05	1.092E-02
XE-137 [illegible]	3.248E-02	0.0	4.837E 02	9.526E 02	5.902E 03	7.338E 03	2.325E-04
XE-138 [illegible]	2.729E-02	0.0	4.055E 02	1.055E 03	3.363E 05	3.378E 05	1.070E-02
I-131 [illegible]	(.0032) 1.271E-02 (.0157)	.03 .0627E-02	.57 2.271E-01	.16 6.466E-01	8.0 6.395E 00	8.4 7.299E 00	2.313E-07
I-133 [illegible]	6.292E-02	.032 1.294E-01	2.8 1.124E 00	.8 3.169E 00	32.0 3.120E 01	43.6 3.562E 01	1.129E-06

0.0 APPEARING IN THE TABLE SHOULD BE INTERPRETED AS INSIGNIFICANT

.03 [illegible] = .012

[illegible]

use [illegible] = 2.3 Ci/gr-I-131

multiply by 1.25

MONTICELLO NPS LIQUID EFFLUENTS

NUCLIDE	HALF-LIFE	CONCENTRATION IN PRIMARY COOLANT AT 77 F (MICRO CI/ML)	ANNUAL RELEASE TO DISCHARGE CANAL: CLEAN WASTE (CURIES)	DIRTY WASTE (CURIES)	CHEMICAL WASTE (CURIES)	TOTAL (CURIES)	CONCENTRATION IN CANAL (MICRO CI/ML)	PERCENT OF 10CFR20
U237	6.75E 00 D	7.35E-06	1.46E-04	5.72E-07	3.49E-09	1.47E-04	3.30E-13	3.30E-11
NP238	2.10E 00 D	2.77E-06	3.93E-05	1.54E-07	9.36E-09	3.95E-05	8.85E-14	8.85E-12
NP239	2.35E 00 D	6.27E-04	9.40E-03	3.67E-05	2.24E-06	9.44E-03	2.12E-11	2.12E-05
PU241	5.33E 03 D	8.65E-07	2.01E-05	7.84E-08	4.78E-09	2.02E-05	4.52E-14	2.26E-08
PU243	2.07E-01 D	2.76E-06	6.56E-07	2.56E-09	1.56E-10	6.59E-07	1.48E-15	4.92E-10
AM242	6.67E-01 D	1.05E-06	5.37E-06	2.10E-08	1.28E-09	5.39E-06	1.21E-14	1.21E-08
CM242	1.63E 02 D	1.60E-07	3.76E-06	1.47E-08	8.96E-10	3.78E-06	8.47E-15	4.24E-08
H 3	4.49E 03 D	4.62E-02	1.07E 02	4.19E-01	0.0	1.08E 02	2.42E-07	8.05E-03
AS 77	1.61E 00 D	8.95E-08	1.30E-06	5.09E-09	3.11E-10	1.31E-06	2.94E-15	3.67E-09
BR 82	1.47E 00 D	2.93E-05	3.39E-04	1.32E-06	8.07E-08	3.40E-04	7.63E-13	1.91E-06
BR 83	1.00E-01 D	1.05E-02	3.54E-05	1.38E-07	8.42E-09	3.55E-05	7.97E-14	7.97E-12
RB 86	1.87E 01 D	4.33E-07	9.50E-05	3.71E-07	2.26E-08	9.54E-05	2.14E-13	1.07E-06
RB 88	1.24E-02 D	2.58E-02	2.67E-03	1.04E-05	6.35E-07	2.68E-03	6.00E-12	6.00E-10
SR 89	5.20E 01 D	2.68E-03	6.11E-02	2.39E-04	1.45E-05	6.14E-02	1.38E-10	4.59E-03
SR 90	1.03E 04 D	1.51E-04	3.51E-03	1.37E-05	8.36E-07	3.53E-03	7.91E-12	2.64E-03
Y 90	2.67E 00 D	8.29E-06	1.26E-02	4.91E-05	2.99E-06	1.26E-02	2.83E-11	1.42E-04
SR 91	4.03E-01 D	2.06E-02	4.09E-02	1.60E-04	9.75E-06	4.11E-02	9.22E-11	1.84E-04
Y 91M	3.47E-02 D	9.49E-03	2.64E-0102	1.03E-2304	6.30E-0506	2.65E-0102	5.95E-10	1.98E-05
Y 91	5.88E 01 D	5.63E-05	4.34E-02	1.69E-04	1.03E-05	4.36E-02	9.77E-11	3.26E-04
SR 92	1.13E-01 D	1.93E-02	1.58E-04	6.15E-07	3.75E-08	1.59E-04	3.55E-13	5.91E-07
Y 92	1.47E-01 D	8.80E-03	2.67E-02	1.04E-04	6.35E-06	2.68E-02	6.01E-11	1.00E-04
Y 93	4.25E-01 D	2.29E-03	5.14E-02	2.01E-04	1.22E-05	5.16E-02	1.16E-10	3.85E-04
ZR 95	6.50E 01 D	2.78E-05	6.36E-04	2.48E-06	1.51E-07	6.38E-04	1.43E-12	2.38E-06
NB 95M	3.75E 00 D	7.70E-07	1.67E-05	6.50E-08	3.96E-09	1.67E-05	3.75E-14	3.75E-12
NB 95	3.50E 01 D	2.39E-05	5.58E-04	2.18E-06	1.33E-07	5.60E-04	1.26E-12	1.26E-06
ZR 97	7.08E-01 D	7.78E-05	4.32E-04	1.69E-06	1.03E-07	4.35E-04	9.75E-13	4.88E-06
NB 97M	6.94E-04 D	9.01E-05	4.16E-04	1.63E-06	9.91E-08	4.18E-04	9.37E-13	9.37E-11
NB 97	5.00E-02 D	1.65E-04	4.36E-04	1.70E-06	1.04E-07	4.37E-04	9.81E-13	1.09E-07
MO 99	2.79E 00 D	7.00E-03	1.12E-01	4.38E-04	2.67E-05	1.13E-01	2.53E-10	6.32E-04
TC 99M	2.50E-01 D	2.08E-03	1.05E-01	4.10E-04	2.50E-05	1.05E-01	2.36E-10	7.88E-06
RU103	3.96E 01 D	1.79E-05	4.05E-04	1.58E-06	9.64E-08	4.07E-04	9.12E-13	1.14E-06
RH103M	3.96E-02 D	8.09E-05	4.06E-04	1.58E-06	9.65E-08	4.07E-04	9.13E-13	9.13E-09
RU105	1.85E-01 D	6.98E-05	9.40E-06	3.67E-08	2.24E-09	9.44E-06	2.12E-14	2.12E-08
RH105M	5.21E-04 D	7.22E-05	9.43E-06	3.68E-08	2.24E-09	9.47E-06	2.12E-14	2.12E-12
RH105	1.50E 00 D	2.76E-05	4.31E-04	1.68E-06	1.03E-07	4.32E-04	9.70E-13	9.70E-07
RU106	3.67E 02 D	5.20E-06	1.20E-04	4.70E-07	2.86E-08	1.21E-04	2.71E-13	2.71E-06
RH106	3.47E-04 D	8.46E-06	1.20E-04	4.70E-07	2.86E-08	1.21E-04	2.71E-13	2.71E-11
PD109	5.63E-01 D	8.76E-06	3.41E-05	1.33E-07	8.12E-09	3.42E-05	7.68E-14	1.10E-07
AG109M	4.63E-04 D	1.01E-05	3.41E-05	1.33E-07	8.12E-09	3.42E-05	7.68E-14	7.68E-12
AG111	7.50E 00 D	5.07E-07	1.03E-05	4.03E-08	2.46E-09	1.04E-05	2.32E-14	5.81E-08
PD112	8.75E-01 D	6.67E-07	4.84E-06	1.89E-08	1.15E-09	4.86E-06	1.09E-14	1.09E-12
AG112	1.33E-01 D	1.34E-06	5.73E-06	2.24E-08	1.36E-09	5.75E-06	1.29E-14	1.29E-12
CD115	2.23E 00 D	2.01E-07	2.95E-06	1.15E-08	7.01E-10	2.96E-06	6.63E-15	2.21E-08
IN115M	1.80E-01 D	4.97E-07	3.26E-06	1.27E-08	7.76E-10	3.27E-06	7.34E-15	1.83E-09
SN121	1.13E 00 D	3.28E-07	3.07E-06	1.20E-08	7.31E-10	3.08E-06	6.91E-15	6.91E-13
SN125	9.40E 00 D	1.62E-07	3.36E-06	1.31E-08	8.00E-10	3.37E-06	7.56E-15	3.78E-08
SB125	9.86E 02 D	8.34E-08	1.94E-06	7.57E-09	4.61E-10	1.95E-06	4.36E-15	4.36E-09
TE125M	5.80E 01 D	7.20E-07	1.64E-05	6.41E-08	3.91E-09	1.65E-05	3.70E-14	3.70E-08
SB127	3.88E 00 D	1.61E-06	3.03E-05	1.18E-07	7.21E-09	3.04E-05	6.82E-14	6.82E-12

MONTICELLO NPS LIQUID EFFLUENTS (CONTINUED)

NUCLIDE	HALF-LIFE	CONCENTRATION IN PRIMARY COOLANT AT 77 F (MICRO CI/ML)	ANNUAL RELEASE TO DISCHARGE CANAL CLEAN WASTE (CURIES)	DIRTY WASTE (CURIES)	CHEMICAL WASTE (CURIES)	TOTAL (CURIES)	CONCENTRATION IN CANAL (MICRO CI/ML)	PERCENT OF 10CFR20
TE127M	1.09E 02 D	4.73E-06	1.09E-04	4.25E-07	2.59E-08	1.09E-04	2.45E-13	4.90E-07
TE127	3.92E-01 D	9.04E-05	2.90E-04	1.13E-06	6.90E-08	2.91E-04	6.53E-13	3.26E-07
SB128	3.75E-01 D	1.47E-06	2.47E-06	9.66E-09	5.89E-10	2.48E-06	5.57E-15	5.57E-13
SB129	1.79E-01 D	3.16E-05	4.16E-06	1.62E-08	9.90E-10	4.17E-06	9.36E-15	9.36E-13
TE129M	3.40E 01 D	4.75E-05	1.07E-03	4.19E-06	2.55E-07	1.08E-03	2.41E-12	1.21E-05
TE129	4.79E-02 D	5.03E-04	6.91E-04	2.70E-06	1.65E-07	6.94E-04	1.56E-12	1.95E-07
I130	5.17E-01 D	6.10E-04	2.04E-03	7.96E-06	4.85E-07	2.05E-03	4.59E-12	4.59E-10
TE131M	1.25E 00 D	1.33E-04	1.36E-03	5.31E-06	3.24E-07	1.37E-03	3.06E-12	7.65E-06
TE131	1.74E-02 D	9.71E-04	2.48E-04	9.69E-07	5.91E-08	2.49E-04	5.59E-13	5.59E-11
I131	8.05E 00 D	1.64E-02	3.36E-01	1.31E-03	7.99E-05	3.37E-01	7.56E-10	2.52E-01
TE132	3.25E 00 D	8.13E-04	1.37E-02	5.36E-05	3.27E-06	1.38E-02	3.09E-11	1.55E-04
I132	9.58E-02 D	1.43E-01	1.45E-02	5.66E-05	3.45E-06	1.46E-02	3.26E-11	4.08E-04
I133	8.75E-01 D	9.53E-02	6.93E-01	2.70E-03	1.65E-04	6.96E-01	1.56E-09	1.56E-01
CS134M	1.21E-01 D	2.77E-05	3.61E-06	1.41E-08	8.59E-10	3.62E-06	8.12E-15	8.12E-10
CS134	7.49E 02 D	2.02E-04	4.68E-02	1.83E-04	1.11E-05	4.70E-02	1.05E-10	1.17E-03
I135	2.79E-01 D	1.35E-01	9.68E-02	3.78E-04	2.30E-05	9.72E-02	2.18E-10	5.45E-03
CS136	1.30E 01 D	8.28E-05	1.77E-02	6.93E-05	4.22E-06	1.78E-02	3.99E-11	6.66E-05
CS137	1.10E 04 D	1.92E-04	4.46E-02	1.74E-04	1.06E-05	4.48E-02	1.00E-10	5.02E-04
BA137M	1.77E-03 D	3.64E-04	4.17E-03	1.63E-05	9.92E-07	4.19E-03	9.38E-12	9.38E-10
BA139	5.76E-02 D	1.09E-01	1.28E-06	4.99E-09	3.04E-10	1.28E-06	2.88E-15	2.88E-13
BA140	1.28E 01 D	4.68E-03	1.09E-01	3.91E-04	2.39E-05	1.01E-01	2.26E-10	1.13E-03
LA140	1.67E 00 D	3.72E-04	5.23E-02	2.04E-04	1.24E-05	5.25E-02	1.18E-10	5.99E-04
LA141	1.62E-01 D	7.85E-03	6.04E-04	2.36E-06	1.44E-07	6.07E-04	1.36E-12	1.36E-10
CE141	3.24E 01 D	5.46E-05	2.15E-03	8.40E-06	5.12E-07	2.16E-03	4.85E-12	5.38E-06
PR142	8.00E-01 D	8.90E-07	5.81E-06	2.27E-09	1.38E-09	5.83E-06	1.31E-14	4.36E-08
CE143	1.38E 00 D	1.56E-04	1.72E-03	6.73E-06	4.10E-07	1.73E-03	3.88E-12	9.70E-06
PR143	1.37E 01 D	2.38E-05	6.96E-04	2.72E-06	1.66E-07	6.99E-04	1.57E-12	3.14E-06
CE144	2.84E 02 D	1.63E-05	3.76E-04	1.47E-06	8.96E-08	3.78E-04	8.47E-13	8.47E-06
PR144	1.20E-02 D	5.62E-05	3.76E-04	1.47E-06	8.96E-08	3.78E-04	8.47E-13	8.47E-11
PR145	2.49E-01 D	7.15E-05	3.46E-05	1.35E-07	8.25E-09	3.48E-05	7.80E-14	7.80E-12
ND147	1.11E 01 D	1.03E-05	2.18E-04	8.51E-07	5.19E-08	2.19E-04	4.91E-13	8.18E-07
PM147	9.57E 02 D	2.24E-06	5.23E-05	2.04E-07	1.24E-08	5.25E-05	1.18E-13	5.89E-08
PM148M	4.20E 01 D	8.60E-08	1.95E-06	7.61E-09	4.64E-10	1.96E-06	4.39E-15	4.39E-13
PM148	5.40E 00 D	5.26E-06	1.01E-04	3.93E-07	2.40E-08	1.01E-04	2.27E-13	2.27E-11
PM149	2.21E 00 D	1.39E-05	2.17E-04	8.46E-07	5.16E-08	2.17E-04	4.88E-13	1.22E-06
PM151	1.17E 00 D	7.26E-06	7.02E-05	2.74E-07	1.67E-08	7.05E-05	1.58E-13	1.58E-11
SM151	3.18E 04 D	1.93E-08	4.51E-07	1.76E-09	1.07E-10	4.53E-07	1.01E-15	2.54E-10
SM153	1.96E 00 D	7.17E-06	9.84E-05	3.84E-07	2.34E-08	9.88E-05	2.22E-13	2.77E-07
EU154	5.84E 03 D	3.63E-06	8.44E-07	3.29E-09	2.01E-10	8.47E-07	1.90E-15	9.50E-09
EU155	6.61E 02 D	6.15E-08	1.43E-06	5.57E-09	3.40E-10	1.43E-06	3.21E-15	1.61E-09
SM156	3.92E-01 D	8.50E-07	1.58E-06	6.15E-09	3.75E-10	1.58E-06	3.55E-15	3.55E-13
EU156	1.50E 01 D	1.03E-06	2.27E-05	8.86E-08	5.40E-09	2.28E-05	5.11E-14	5.11E-12
EU157	6.33E-01 D	5.16E-07	2.44E-06	9.52E-09	5.80E-10	2.45E-06	5.49E-15	5.49E-13
GD159	7.50E-01 D	1.36E-07	8.22E-07	3.21E-09	1.96E-10	8.25E-07	1.85E-15	2.31E-09
ALL OTHERS		1.01E 00	1.91E-06	7.45E-09	4.66E-10	2.86E-06	3.55E-15	5.96E-08
TOTAL(EXCLUDING TRITIUM)		1.64E 00	2.17E 00	8.47E-03	5.17E-04	2.18E 00	4.89E-09	4.26E-01

~1.8 Ci

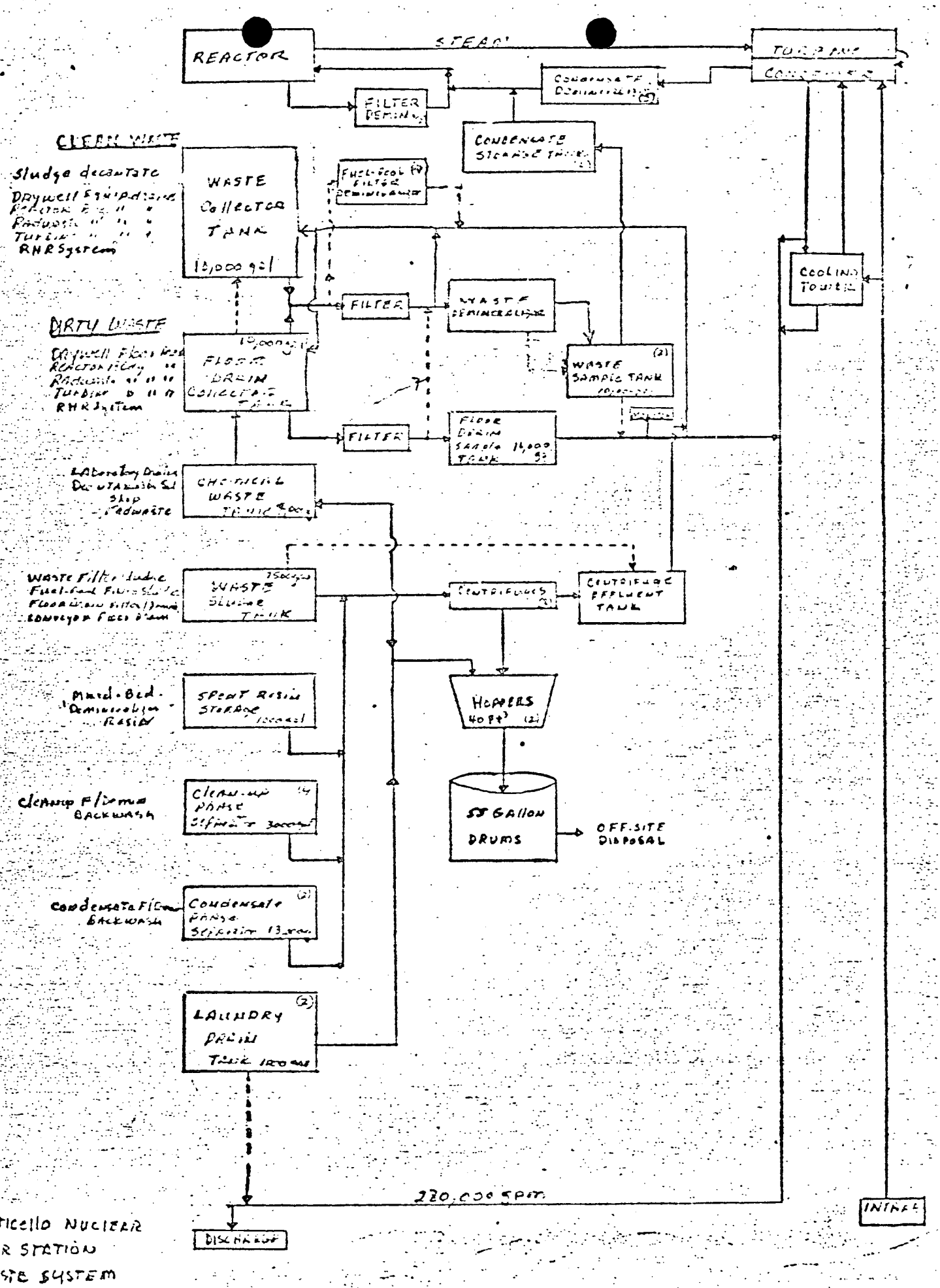
Values normalized to ~5.1 Ci/yr

H-3 20 Ci/yr

MONTICELLO NPS 1670. MW(TH) AT 0.80 PLANT FACTOR TYPE = BWR
FRACTION OF FAILED FUEL = (0.0025)
PRIMARY COOLANT WATER VOL 7800.FT3 LETDOWN 160. GPM 0
STEAM FLOW RATE 6.77MPPH FP CARRY-OVER 0.0010 HALOGEN CARRY-OVER0.012
CONTAINMENT PURGE (4 /YR)
GAS DECAY TANK 30.MIN HOLDUP
AIR EJECTOR RATE 0.
COOLANT LEAK RATE WATER 7900.GPD GAS 0.SCFD
TURBINE GLAND SEAL LEAK 25000.GPD
MIXED BED DEMINERALIZER DF 10. 0.
DILUTION FLOW 280000. GPM

STREAM	FLOW RATE (GPD)	FRACTION OF PCA	FRACTION DISCHARGED	HOLD UP (DAYS)	DECONTAMINATION FACTORS I	CS	MO	Y	OTHERS
CLEAN WASTE	2.10E 04	1.000	0.100	1.000	1.00E 02	1.00E 01	1.00E 02	1.00E 01	1.00E 02
DIRTY WASTE	8.20E 03	0.010	0.100	1.000	1.00E 02	1.00E 01	1.00E 02	1.00E 01	1.00E 02
CHEMICAL WASTE	5.00E 02	0.010	0.100	1.000	1.00E 02	1.00E 01	1.00E 02	1.00E 01	1.00E 02

[illegible]



MONTICELLO NUCLEAR POWER STATION
RADWASTE SYSTEM

MONTICELLO NPS 1670. MW(TH) AT 0.80 PLANT FACTOR TYPE = BWR
FRACTION OF FAILED FUEL = 0.0025
PRIMARY COOLANT WATER VOL 7800.FT3 LETDOWN 160. GPM
STEAM FLOW RATE 6.77MPPH FP CARRY-OVER 0.0010 HALOGEN CARRY-OVER0.012
CONTAINMENT PURGE 4 /YR
GAS DECAY TANK 30.MIN HOLDUP
AIR EJECTOR RATE 0.
COOLANT LEAK RATE WATER 7900.GPD GAS 0.SCFD
TURBINE GLAND SEAL LEAK 25000.GPD
MIXED BED DEMINERALIZER DF 10. 0.
DILUTION FLOW 280000. GPM

STREAM	FLOW RATE (GPD)	FRACTION OF PCA	FRACTION DISCHARGED	HOLD UP (DAYS)	DECONTAMINATION FACTORS I	CS	MO	Y	OTHERS
CLEAN WASTE	2.10E 04	1.000	0.100	1.000	1.00E 02	1.00E 01	1.00E 02	1.00E 01	1.00E 02
DIRTY WASTE	8.20E 03	0.010	0.100	1.000	1.00E 02	1.00E 01	1.00E 02	1.00E 01	1.00E 02
CHEMICAL WASTE	5.00E 02	0.010	0.100	1.000	1.00E 02	1.00E 01	1.00E 02	1.00E 01	1.00E 02

MONTICELLO NPS LIQUID EFFLUENTS

NUCLIDE	HALF-LIFE	CONCENTRATION IN PRIMARY COOLANT AT 77 F (MICRO CI/ML)	ANNUAL RELEASE TO DISCHARGE CANAL: CLEAN WASTE (CURIES)	DIRTY WASTE (CURIES)	CHEMICAL WASTE (CURIES)	TOTAL (CURIES)	CONCENTRATION IN CANAL (MICRO CI/ML)	PERCENT OF 10CFR20
U237	6.75E 00 D	7.35E-06	1.46E-04	5.72E-07	3.49E-08	1.47E-04	3.30E-13	3.30E-11
NP238	2.10E 00 D	2.77E-06	3.93E-05	1.54E-07	9.36E-09	3.95E-05	8.85E-14	8.85E-12
NP239	2.35E 00 D	6.27E-04	9.40E-03	3.67E-05	2.24E-06	9.44E-03	2.12E-11	2.12E-05
PU241	5.32E 03 D	8.65E-07	2.01E-05	7.84E-08	4.78E-09	2.02E-05	4.52E-14	2.26E-08
PU243	2.07E-01 D	2.76E-06	6.56E-07	2.54E-09	1.56E-10	6.59E-07	1.48E-15	4.92E-10
AM242	6.67E-01 D	1.05E-06	5.37E-06	2.10E-08	1.28E-09	5.39E-06	1.21E-14	1.21E-08
CM242	1.63E 02 D	1.60E-07	3.76E-06	1.47E-08	8.96E-10	3.78E-06	8.47E-15	4.24E-08
H 3	4.49E 03 D	4.62E-02	1.07E 02	4.19E-01	0.0	1.08E 02	2.42E-07	8.06E-03
AS 77	1.61E 00 D	8.95E-08	1.30E-06	5.09E-09	3.11E-10	1.31E-06	2.94E-15	3.67E-09
BR 82	1.47E 00 D	2.93E-05	3.39E-04	1.32E-06	8.07E-08	3.40E-04	7.63E-13	1.91E-06
BR 83	1.00E-01 D	1.05E-02	3.54E-05	1.38E-07	8.42E-09	3.55E-05	7.97E-14	7.97E-12
RB 86	1.87E 01 D	4.33E-07	9.50E-05	3.71E-07	2.26E-08	9.54E-05	2.14E-13	1.07E-06
RB 88	1.24E-02 D	2.58E-02	2.67E-03	1.04E-05	6.35E-07	2.68E-03	6.00E-12	6.00E-10
SR 89	5.20E 01 D	2.68E-03	6.11E-02	2.39E-04	1.45E-05	6.14E-02	1.38E-10	4.59E-03
SR 90	1.03E 04 D	1.51E-04	3.51E-03	1.37E-05	8.36E-07	3.53E-03	7.91E-12	2.64E-03
Y 90	2.67E 00 D	8.29E-06	1.26E-02	4.91E-05	2.99E-06	1.26E-02	2.83E-11	1.42E-04
SR 91	4.03E-01 D	2.06E-02	4.09E-02	1.60E-04	9.75E-06	4.11E-02	9.22E-11	1.84E-04
Y 91M	3.47E-02 D	9.49E-03	2.64E-0102	1.03E-2104	6.30E-0306	2.65E-0102	5.95E-10	1.98E-05
Y 91	5.88E 01 D	5.63E-05	4.34E-02	1.69E-04	1.03E-05	4.36E-02	9.77E-11	3.26E-04
SR 92	1.13E-01 D	1.93E-02	1.58E-04	6.15E-07	3.75E-08	1.58E-04	3.55E-13	5.91E-07
Y 92	1.47E-01 D	8.90E-03	2.67E-02	1.04E-04	6.35E-06	2.68E-02	6.01E-11	1.00E-04
Y 93	4.25E-01 D	2.29E-03	5.14E-02	2.01E-04	1.22E-05	5.16E-02	1.16E-10	3.85E-04
ZR 95	6.50E 01 D	2.78E-05	6.36E-04	2.48E-06	1.51E-07	6.38E-04	1.43E-12	2.38E-06
NB 95M	3.75E 00 D	7.70E-07	1.67E-05	6.50E-08	3.96E-09	1.67E-05	3.75E-14	3.75E-12
NB 95	3.50E 01 D	2.39E-05	5.58E-04	2.18E-06	1.33E-07	5.60E-04	1.26E-12	1.26E-06
ZR 97	7.00E-01 D	7.78E-05	4.33E-04	1.69E-06	1.03E-07	4.35E-04	9.75E-13	4.88E-06
NB 97M	6.94E-04 D	9.01E-05	4.16E-04	1.63E-06	9.91E-08	4.18E-04	9.37E-13	9.37E-11
NB 97	5.00E-02 D	1.65E-04	4.36E-04	1.70E-06	1.04E-07	4.37E-04	9.81E-13	1.09E-07
MO 99	2.79E 00 D	7.00E-03	1.12E-01	4.38E-04	2.67E-05	1.13E-01	2.53E-10	6.32E-04
TC 99M	2.50E-01 D	2.08E-03	1.05E-01	4.10E-04	2.50E-05	1.05E-01	2.36E-10	7.88E-06
RU103	3.96E 01 D	1.79E-05	4.05E-04	1.58E-06	9.64E-08	4.07E-04	9.12E-13	1.14E-06
RH103M	3.96E-02 D	8.09E-05	4.06E-04	1.58E-06	9.65E-08	4.07E-04	9.13E-13	9.13E-09
RU105	1.85E-01 D	6.59E-05	9.40E-06	3.67E-08	2.24E-09	9.44E-06	2.12E-14	2.12E-08
RH105M	5.21E-04 D	7.22E-05	9.43E-06	3.68E-08	2.24E-09	9.47E-06	2.12E-14	2.12E-12
RH105	1.50E 00 D	2.76E-05	4.31E-04	1.68E-06	1.03E-07	4.32E-04	9.70E-13	9.70E-07
RH106	3.67E 02 D	5.20E-06	1.20E-04	4.70E-07	2.86E-08	1.21E-04	2.71E-13	2.71E-06
RH106	3.47E-04 D	8.46E-06	1.20E-04	4.70E-07	2.86E-08	1.21E-04	2.71E-13	2.71E-11
PD109	5.63E-01 D	8.76E-06	3.41E-05	1.33E-07	8.12E-09	3.42E-05	7.68E-14	1.10E-07
AG109M	4.63E-04 D	1.01E-05	3.41E-05	1.33E-07	8.12E-09	3.42E-05	7.68E-14	7.68E-12
AG111	7.50E 00 D	5.07E-07	1.03E-05	4.03E-08	2.46E-09	1.04E-05	2.32E-14	5.81E-08
PD112	8.75E-01 D	6.67E-07	4.84E-06	1.89E-08	1.15E-09	4.86E-06	1.09E-14	1.09E-12
AG112	1.33E-01 D	1.34E-06	5.73E-05	2.24E-08	1.36E-09	5.75E-06	1.29E-14	1.29E-12
CD115	2.23E 00 D	2.01E-07	2.95E-06	1.15E-08	7.01E-10	2.96E-06	6.63E-15	2.21E-08
IN115M	1.80E-01 D	4.97E-07	3.26E-06	1.27E-08	7.76E-10	3.27E-06	7.34E-15	1.83E-09
SN121	1.13E 00 D	3.28E-07	3.07E-06	1.20E-08	7.31E-10	3.08E-06	6.91E-15	6.91E-13
SN125	9.40E 00 D	1.62E-07	3.36E-06	1.31E-08	8.00E-10	3.37E-06	7.56E-15	3.78E-08
SN125	9.86E 02 D	8.34E-08	1.94E-06	7.57E-09	4.61E-10	1.95E-06	4.36E-15	4.36E-09
TE125M	5.80E 01 D	7.20E-07	1.64E-05	6.41E-08	3.91E-09	1.65E-05	3.70E-14	3.70E-08
SB127	3.80E 00 D	1.61E-06	3.03E-05	1.18E-07	7.21E-09	3.04E-05	6.82E-14	6.82E-12

MONTICELLO NPS LIQUID EFFLUENTS (CONTINUED)

NUCLIDE	HALF-LIFE	CONCENTRATION IN PRIMARY COOLANT AT 77 F (MICRO CI/ML)	ANNUAL RELEASE TO DISCHARGE CANAL: CLEAN WASTE (CURIES)	DIRTY WASTE (CURIES)	CHEMICAL WASTE (CURIES)	TOTAL (CURIES)	CONCENTRATION IN CANAL (MICRO CI/ML)	PERCENT OF 10CFR20
TE127M	1.09E 02 D	4.73E-06	1.09E-04	4.25E-07	2.59E-08	1.09E-04	2.45E-13	4.90E-07
TE127	3.92E-01 D	9.04E-05	2.90E-08	1.13E-06	6.90E-08	2.91E-04	6.53E-13	3.26E-07
SB128	3.79E-01 D	1.47E-06	2.47E-06	9.66E-09	5.89E-10	2.48E-06	5.57E-15	5.57E-13
SB129	1.79E-01 D	3.16E-05	4.16E-06	1.62E-08	9.90E-10	4.17E-06	9.36E-15	9.36E-13
TE129M	3.40E 01 D	4.75E-05	1.07E-03	4.19E-06	2.55E-07	1.08E-03	2.41E-12	1.21E-05
TE129	4.79E-02 D	5.03E-04	6.91E-04	2.70E-06	1.65E-07	6.94E-04	1.56E-12	1.95E-07
I130	5.17E-01 D	6.10E-04	2.04E-03	7.96E-06	4.85E-07	2.05E-03	4.59E-12	4.59E-10
TE131M	1.25E 00 D	1.33E-04	1.36E-03	5.31E-06	3.24E-07	1.37E-03	3.06E-12	7.65E-06
TE131	1.74E-02 D	9.71E-04	2.48E-04	9.69E-07	5.91E-08	2.49E-04	5.59E-13	5.59E-11
I131	8.05E 00 D	8.64E-02	3.36E-01	1.31E-03	7.99E-05	3.37E-01	7.56E-10	2.52E-01
TE132	3.25E 00 D	8.13E-04	1.37E-02	5.36E-05	3.27E-06	1.38E-02	3.09E-11	1.55E-04
I132	9.58E-02 D	1.43E-01	1.45E-02	5.66E-05	3.45E-06	1.45E-02	3.26E-11	4.04E-04
I133	8.75E-01 D	9.53E-02	6.93E-01	2.70E-03	1.65E-04	6.96E-01	1.56E-09	1.56E-01
CS134M	1.21E-01 D	2.77E-05	3.61E-06	1.41E-08	8.59E-10	3.62E-06	8.12E-15	8.12E-10
CS134	7.49E 02 D	2.02E-04	4.68E-02	1.83E-04	1.11E-05	4.70E-02	1.05E-10	1.17E-03
I135	2.79E-01 D	1.35E-01	9.68E-02	3.78E-04	2.30E-05	9.72E-02	2.18E-10	5.45E-03
CS136	1.30E 01 D	8.28E-05	1.77E-02	6.93E-05	4.22E-06	1.78E-02	3.99E-11	6.66E-05
CS137	1.10E 04 D	1.92E-04	4.46E-02	1.74E-04	1.06E-05	4.48E-02	1.00E-10	5.02E-04
BA137M	1.77E-03 D	3.64E-04	4.17E-03	1.63E-05	9.92E-07	4.19E-03	9.38E-12	9.38E-10
BA139	5.76E-02 D	1.09E-01	1.28E-06	4.99E-09	3.04E-10	1.28E-06	2.88E-15	2.88E-13
BA140	1.28E 01 D	4.68E-03	1.00E-01	3.91E-04	2.39E-05	1.01E-01	2.26E-10	1.13E-03
LA140	1.67E 00 D	3.72E-04	5.23E-02	2.04E-04	1.24E-05	5.25E-02	1.18E-10	5.88E-04
LA141	1.62E-01 D	7.85E-03	6.04E-04	2.36E-06	1.44E-07	6.07E-04	1.36E-12	1.36E-10
CE141	3.24E 01 D	5.46E-05	2.15E-03	8.40E-06	5.12E-07	2.16E-03	4.85E-12	5.38E-06
PR142	8.00E-01 D	8.90E-07	5.81E-06	2.27E-08	1.38E-09	5.83E-06	1.31E-14	4.36E-08
CE143	1.38E 00 D	1.56E-04	1.72E-03	6.73E-06	4.10E-07	1.73E-03	3.88E-12	9.70E-06
PR143	1.37E 01 D	2.38E-05	6.96E-04	2.72E-06	1.66E-07	6.99E-04	1.57E-12	3.14E-06
CE144	2.84E 02 D	1.63E-05	3.76E-04	1.47E-06	8.96E-08	3.78E-04	8.47E-13	8.47E-06
PR144	1.20E-02 D	5.62E-05	3.76E-04	1.47E-06	8.96E-08	3.78E-04	8.47E-13	8.47E-11
PR145	2.49E-01 D	7.15E-05	3.46E-05	1.35E-07	8.25E-09	3.48E-05	7.80E-14	7.80E-12
ND147	1.11E 01 D	1.03E-05	2.18E-04	8.51E-07	5.19E-08	2.19E-04	4.91E-13	8.18E-07
PM147	9.57E 02 D	2.24E-06	5.23E-05	2.04E-07	1.24E-08	5.25E-05	1.18E-13	5.89E-08
PM148M	4.20E 01 D	8.60E-08	1.95E-06	7.61E-09	4.64E-10	1.96E-06	4.39E-15	4.39E-13
PM148	5.40E 00 D	5.26E-06	1.01E-04	3.94E-07	2.40E-08	1.01E-04	2.27E-13	2.27E-11
PM149	2.21E 00 D	1.39E-05	2.17E-04	8.46E-07	5.16E-08	2.17E-04	4.88E-13	1.22E-06
PM151	1.17E 00 D	7.26E-06	7.02E-05	2.74E-07	1.67E-08	7.05E-05	1.58E-13	1.58E-11
SM151	3.18E 04 D	1.93E-08	4.51E-07	1.76E-09	1.07E-10	4.53E-07	1.01E-15	2.54E-10
SM153	1.96E 00 D	7.17E-06	9.84E-05	3.84E-07	2.34E-08	9.88E-05	2.22E-13	2.77E-07
EU154	5.84E 03 D	3.63E-08	8.44E-07	3.29E-09	2.01E-10	8.47E-07	1.90E-15	9.50E-09
EU155	6.61E 02 D	6.15E-08	1.43E-06	5.57E-09	3.40E-10	1.43E-06	3.21E-15	1.61E-09
SM156	3.92E-01 D	8.50E-07	1.58E-06	6.15E-09	3.75E-10	1.58E-06	3.55E-15	3.55E-13
EU156	1.50E 01 D	1.03E-06	2.27E-05	8.86E-08	5.40E-09	2.28E-05	5.11E-14	5.11E-12
EU157	6.33E-01 D	5.16E-07	2.44E-06	9.52E-09	5.80E-10	2.45E-06	5.49E-15	5.49E-13
GD159	7.50E-01 D	1.36E-07	8.22E-07	3.21E-09	1.96E-10	8.25E-07	1.85E-15	2.31E-09
ALL OTHERS		1.01E 00	1.91E-06	7.45E-09	4.66E-10	2.86E-06	3.55E-15	5.96E-08
TOTAL(EXCLUDING TRITIUM)		1.64E 00	2.17E 00	8.47E-03	5.17E-04	2.18E 00	4.89E-09	4.26E-01

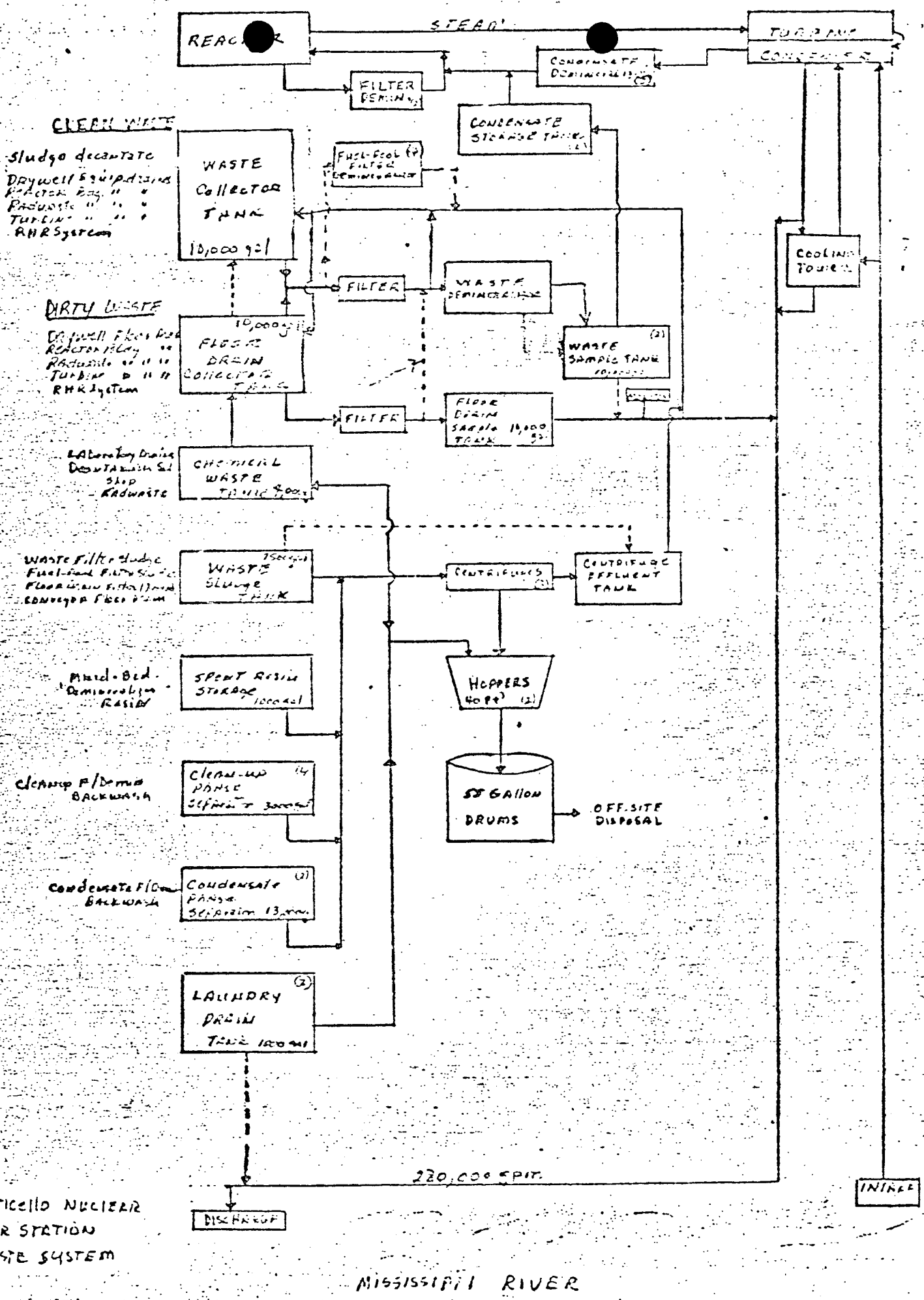
~1.8 Ci

Values normalized to ~5.0 Ci/yr

H-3 26 Ci/yr

MONTICELLO NPS 1670. MW(TH) AT 0.80 PLANT FACTOR TYPE = BWR
FRACTION OF FAILED FUEL = (0.0025)
PRIMARY COOLANT WATER VOL 7800.FT3 LETDOWN 160. GPM 0
STEAM FLOW RATE 6.778PPH FP CARRY-OVER 0.0010 HALOGEN CARRY-OVER0.012
CONTAINMENT PURGE (4 /YR)
GAS DECAY TANK 30.MIN HOLDUP
AIR EJECTOR RATE 0.
COOLANT LEAK RATE WATER 7900.GPD GAS 0.SCFD
TURBINE GLAND SEAL LEAK 25000.GPD
MIXED BED DEMINERALIZER DF 10. 0.
DILUTION FLOW 280000. GPM

STREAM	FLOW RATE (GPD)	FRACTION OF PCA	FRACTION DISCHARGED	HOLD UP (DAYS)	DECONTAMINATION FACTORS I	CS	MO	Y	OTHERS
CLEAN WASTE	2.10E 04	1.000	0.100	1.000	1.00E 02	1.00E 01	1.00E 02	1.00E 01	1.00E 02
DIRTY WASTE	8.20E 03	0.010	0.100	1.000	1.00E 02	1.00E 01	1.00E 02	1.00E 01	1.00E 02
CHEMICAL WASTE	5.00E 02	0.010	0.100	1.000	1.00E 02	1.00E 01	1.00E 02	1.00E 01	1.00E 02



MONTICELLO NUCLEAR POWER STATION RADWASTE SYSTEM

MONTICELLO NPS 1670. MW(TH) AT 0.80 PLANT FACTOR TYPE = BWR
FRACTION OF FAILED FUEL = 0.0025
PRIMARY COOLANT WATER VOL 7800.FT3 LETDOWN 160. GPM 0
STEAM FLOW RATE 6.77MPPH FP CARRY-OVER 0.0010 HALOGEN CARRY-OVER0.012
CONTAINMENT PURGE 4 /YR
GAS DECAY TANK 30.MIN HOLDUP
AIR EJECTOR RATE 0.
COOLANT LEAK RATE WATER 7900.GPD GAS 0.SCFD
TURBINE GLAND SEAL LEAK 25000.GPD
MIXED BED DEMINERALIZER DF 10. 0.
DILUTION FLOW 280000. GPM

STREAM	FLOW RATE (GPD)	FRACTION OF PCA	FRACTION DISCHARGED	HOLD UP (DAYS)	DECONTAMINATION FACTORS I	CS	MO	Y	OTHERS
CLEAN WASTE	2.10E 04	1.000	0.100	1.000	1.00E 02	1.00E 01	1.00E 02	1.00E 01	1.00E 02
PRTY WASTE	8.20E 03	0.010	0.100	1.000	1.00E 02	1.00E 01	1.00E 02	1.00E 01	1.00E 02
CHEMICAL WASTE	5.00E 02	0.010	0.100	1.000	1.00E 02	1.00E 01	1.00E 02	1.00E 01	1.00E 02