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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	3/19/73				

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 implant 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) <i>R. Buran</i> <i>EP.</i>	INITIALS DATE	REMARKS		
TO (Name and unit)	INITIALS DATE	REMARKS		
TO (Name and unit)	INITIALS DATE	REMARKS <i>Attached are the exhibit</i> <i>calculations sheet for Monticello</i> <i>and my professional qualifications</i> <i>sheet.</i>		
FROM (Name and unit) <i>J. T. Collins</i> <i>ETSB</i>	REMARKS			
PHONE NO.	DATE <i>3/14/73</i>			

USE OTHER SIDE FOR ADDITIONAL REMARKS

GPO : 1971 O - 445-469

UNIT: 1111 CASE 1 TREATMENT OF EJECTOR OR GLAND SEAL

DESIGN FLOW RATE	1.071E-02 MEGAGALTS
TOTAL STEAM FLOW	6.770E-06 POUNDS/HOUR
PLANT FACTOR	6.000E-01
WEIGHT OF LIQUID IN THE SYSTEM	1.160E-02 POUNDS
WEIGHT OF STEAM IN THE SYSTEM	2.180E-04 POUNDS
CLEAN-UP DRAIN FLOW	6.000E-04 POUNDS/HOUR

FACTOR FOR	1.670E-01 PERCENT
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LEAKS

REACTOR BLDG.	4.300E-02 POUNDS/HOUR
TURBINE BLDG.	2.47E-03 POUNDS/HOUR
GLAND SEAL	6.770E-03 POUNDS/HOUR

1.700th density of plant factor

PARTITION COEFFICIENTS (GUESS)

STEAM/STEAM	.01200E-02 0.0
REACTOR BLDG.	1.000E-03 0.0
TURBINE BLDG.	1.000E-01
GLAND SEAL	1.000E-01 0.0
AIR EJECTOR	.001.000E-03 0.0

$$.32 \times \frac{1}{0.71} \times \frac{1}{0.8} = 0.57$$

FRACTION OF IODINE GETTING THROUGH THE

CORRESPONDING	1.000E-03 0.0
CLEAN-UP DRAIN	1.000E-01 0.0
REACTOR BLDG. FILTER	1.000E-00 0.0
TURBINE BLDG. FILTER	1.000E-00 0.0
GLAND SEAL FILTER	1.000E-00 0.0
AIR EJECTOR FILTER	1.000E-00 0.0

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

HOLD-UP TIMES

REACTOR BLDG. GAS	0.0 HOURS
TURBINE BLDG. GAS	0.0 HOURS
GLAND SEAL GAS	2.5.100E-02 HOURS
AIR EJECTOR GAS	5.0.100E-01 HOURS

CHARCOAL BED HOLD-UP TIME FOR

XYLENES	0.0 DAYS
XYLENES	0.0 DAYS

RELEASE RATE
(CURIES PER YEAR)

(CURIES PER SECOND)

LOCATION	COOLANT CONC. (MICROCURIES/ML)	REACTOR BEDD.	TURBINE BEDD.	GLAND SEAL	AIR EJECTOR	TOTAL	TOTAL
KR-83M	1.719E-03	0.0	1.510E 01 ✓	4.230E 01 ✓	3.594E 04 ✓	3.560E 04	1.120E-03
KR-85M	1.676E-03	0.0	2.476E 01 ✓	7.004E 01 ✓	6.507E 04 ✓	6.517E 04	2.069E-03
KR-86M	1.677E-03	0.0	1.292E-01 ✓	3.664E-01 ✓	3.666E 02 ✓	3.647E 02	1.156E-03
KR-87M	5.624E-03	0.0	7.431E 01 ✓	2.073E 02 ✓	1.605E 05 ✓	1.603E 05	5.070E-03
KR-88M	5.424E-03	0.0	8.078E 01 ✓	2.260E 02 ✓	2.015E 05 ✓	2.010E 05	6.369E-03
KR-89M	1.805E-02	0.0	2.823E 02 ✓	5.142E 02 ✓	1.152E 03 ✓	1.952E 03	6.160E-03
KR-101M	7.550E-06	0.0	1.120E-01 ✓	3.175E-01 ✓	3.172E 02 ✓	3.170E 02	1.000E-03
KR-103M	1.667E-04	0.0	1.583E 00 ✓	4.459E 00 ✓	4.433E 03 ✓	4.437E 03	1.407E-04
KR-105M	2.173E-03	0.0	4.423E 01 ✓	1.240E 02 ✓	1.240E 05 ✓	1.247E 05	3.953E-03
KR-106M	8.654E-03	0.0	1.290E 02 ✓	3.333E 02 ✓	9.670E 04 ✓	9.722E 04	3.061E-03
KR-107M	8.501E-03	0.0	1.267E 02 ✓	3.562E 02 ✓	3.442E 05 ✓	3.447E 05	1.072E-02
KR-108M	3.240E-02	0.0	4.827E 02 ✓	9.520E 02 ✓	5.902E 03 ✓	7.338E 03	2.325E-04
KR-109M	2.720E-02	0.0	4.055E 02 ✓	1.055E 03 ✓	3.363E 05 ✓	5.378E 05	1.070E-02
KR-110M	1.271E-02	0.0	6.271E-01 ✓	6.406E-01 ✓	6.395E 00 ✓	7.297E 00	2.215E-01
KR-111M	6.292E-02	0.0	1.124E 00 ✓	3.109E 00 ✓	3.120E 01 ✓	3.122E 01	1.129E-00

0.0 APPEARING IN THE TABLE SHOULD BE INTERPRETED AS INSIGNIFICANT

0.03

Handwritten notes and signatures.

Handwritten notes: 2.30×10^{-1}

Handwritten notes: 1.32×10^{-2}

MONITORING CASE 2 HIGH PRESSURE STORAGE TANKS

DESIGN THERMAL POWER	1.670E-03 MEGAWATTS
TOTAL STEAM FLOW	6.770E-06 POUNDS/HOUR
PLANT FACTOR	3.000E-01
WEIGHT OF LIQUID IN THE SYSTEM	1.107E-06 POUNDS
WEIGHT OF STEAM IN THE SYSTEM	2.100E-04 POUNDS
CLEAN-UP DRAIN. FLOW	6.000E-04 POUNDS/HOUR
FATTY ACID	1.000E-01 PERCENT

LEAKS

REACTOR BLDG.	4.000E-02 POUNDS/HOUR = 7 GPM
TURBINE BLDG.	2.400E-03 POUNDS/HOUR = 5 GPM
GLAND SEAL	6.770E-03 POUNDS/HOUR

PERMEATION COEFFICIENTS (10⁻¹⁰)

STEPPED TUBING	1.200E-02
REACTOR BLDG.	1.000E-03
TURBINE BLDG.	1.000E-01
GLAND SEAL	1.000E-01
AIR EXTRACTOR	1.000E-03

PERMEATION THROUGH THE

CARBONATE DRAIN.	1.000E-03
CLEAN-UP DRAIN.	1.000E-01
REACTOR BLDG. FILTER	1.000E-00
TURBINE BLDG. FILTER	1.000E-00
GLAND SEAL FILTER	1.000E-01
AIR EXTRACTOR FILTER	1.000E-03

7.000E-02
3.000E-01 - 0.01 to 0.1

HOLD-UP TIMES

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

CRASH CASE RED HOLD-UP TIME FOR

KRYPTON	0.0	DAYS
XENON	0.0	DAYS

MONITORING

CASE 2

HIGH PRESSURE STORAGE TANKS

RELEASE RATE

(CURIES PER YEAR)

(CURIES PER SECOND)

ISOTOPE	COOLANT CONC. (MG/CM ³ OF 57/60)	REACTOR BLOC.	TURBINE BLOC.	GLAND SEAL	AIR EJECTOR	TOTAL	TOTAL
KR-85M	1.014E-03	0.0	1.543E-01	4.230E-01	.0003.474E-04	5.740E-01	1.821E-06
KR-85M	1.076E-03	0.0	2.456E-01	7.004E-01	2.0470E-01	1.218E-02	3.850E-06
KR-85	8.074E-03	0.0	1.202E-01	3.044E-01	3.042E-02	3.047E-02	1.150E-05
KR-87	5.074E-03	0.0	7.441E-01	2.073E-02	.000002.707E-07	2.321E-02	6.930E-06
KR-88	5.744E-03	0.0	8.078E-01	2.208E-02	9.530E-01	3.077E-02	9.152E-06
KR-89	1.055E-02	0.0	2.874E-02	5.173E-02	0.0	7.994E-02	2.533E-05
KR-92M	7.559E-06	0.0	1.120E-01	3.175E-01	2.310E-02	2.814E-02	8.917E-06
KR-92M	1.572E-04	0.0	1.582E-03	4.459E-03	2.359E-03	2.362E-03	7.404E-05
KR-123	2.5475E-03	0.0	4.733E-01	1.244E-02	9.501E-04	9.518E-04	3.016E-03
KR-125M	3.649E-03	0.0	1.240E-02	3.333E-02	0.0	4.023E-02	1.455E-05
KR-125	8.570E-03	0.0	1.207E-02	3.504E-02	8.504E-03	8.707E-03	2.705E-04
KR-125	8.570E-03	0.0	4.034E-02	9.532E-02	0.0	1.456E-03	4.551E-05
KR-127	3.243E-02	0.0	4.035E-02	1.055E-03	0.0	1.461E-03	4.618E-05
KR-128	2.74E-02	0.0	4.035E-02	1.055E-03	0.0	1.461E-03	4.618E-05
TR-123	1.244E-01	0.007	2.271E-01	0.460E-01	0.0535E-03	9.09E-01	2.88E-08
TR-125	1.044E-01	0.007	1.124E-01	3.169E-01	0.0535E-03	1.511E-01	4.911E-08
TR-127	1.044E-01	0.007	1.124E-01	3.169E-01	0.0535E-03	1.511E-01	4.911E-08

0.0 APPARENT IN THE TABLE SHOULD BE INTERPRETED AS INSIGNIFICANT

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

0.0127

0.005 ^{100%} / hr

$$.227 \times 10 \times \frac{0.05}{0.0127} = 0.294 \text{ yr} \quad 10.7 = 0.62 \times .8 = 0.5$$

$$.0127 \text{ } \frac{\text{hr}}{\%} \times \frac{16}{m} \times \frac{372-66}{5} \times \frac{1440 \text{ m}}{d} \times \frac{365 \text{ d}}{\text{yr}} \times 0.8 \times \frac{1}{10} \times \frac{1}{20} = .126 \quad \frac{.227}{0.7 \times 0}$$

RELEASE RATE							(CURIES PER SECOND)	
(CURIES PER YEAR)								
FUNCTION	COOLANT CONC. (% CRITICAL POINT)	REACTOR BUGG.	TURBINE REBO.	GLAND SEAL	AIR EJECTOR	TOTAL	TOTAL	
RP-814	1.019E-03	0.0	1.51E-01	4.230E-01	.0003474E-04	5.748E-01	1.821E-00	
RP-859	1.676E-03	0.0	2.40E-01	1.004E-01	2.676E-01	1.218E-02	3.898E-00	
RP-85	8.871E-05	0.0	1.292E-01	3.844E-01	3.64E-02	3.647E-02	1.198E-05	
RP-87	5.024E-03	0.0	1.401E-01	2.601E-02	.000002767E-07	2.321E-02	8.926E-00	
RP-88	5.424E-03	0.0	3.078E-01	2.201E-02	9.230E-01	3.077E-02	9.192E-00	
RP-89	1.645E-03	0.0	3.801E-02	5.12E-02	0.0	1.094E-02	2.935E-05	
RP-1214	1.556E-03	0.0	1.126E-01	3.175E-01	2.801E-02	2.814E-02	8.927E-00	
RP-1234	1.572E-03	0.0	1.582E-00	4.457E-00	2.351E-03	2.362E-03	1.404E-05	
RP-133	2.971E-03	0.0	4.403E-01	1.24E-02	9.501E-04	9.518E-04	3.016E-05	
RP-1334	8.644E-03	0.0	1.200E-02	3.30E-02	0.0	4.023E-02	1.455E-05	
RP-135	8.510E-03	0.0	1.201E-02	3.500E-02	8.300E-03	3.707E-03	2.785E-04	
RP-137	5.240E-03	0.0	4.63E-02	9.520E-02	0.0	1.436E-03	4.951E-05	
RP-138	2.70E-03	0.0	4.000E-02	1.000E-03	0.0	1.401E-03	4.608E-05	
RP-139	1.271E-03	0.0	2.571E-01	3.070E-01	3.653E-03	4.091E-01	2.001E-05	
RP-140	1.271E-03	0.0	1.224E-00	3.169E-00	1.008E-03	1.571E-00	4.511E-06	
RP-141	1.271E-03	0.0	1.224E-00	3.169E-00	1.008E-03	4.479E-00	1.41E-08	

0.0 APPARENTLY IN THE TABLE SHOULD BE INTERPRETED AS INSIGNIFICANT

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

0.0127
0.205

$$.227 \times 10 \times \frac{0.05}{0.0127} = 0.374 \frac{\mu}{yr}$$

$$10.7 - 0.62 \times .8 = 0.5$$

$$.0127 \frac{\mu}{cc} \times \frac{CC}{m} \times 372 \frac{CC}{E} \times 1440 \frac{m}{D} \times 365 \frac{D}{yr} \times 0.8 \times \frac{1}{10} \times \frac{1}{20} = .1.26$$

0.740

CASE 1 TREATMENT OF EJECTOR FOR GLAND SEAL

DESIGN INTERNAL POWER	1.67E-03 MEGAWATTS
TOTAL STEAM FLOW	6.77E-06 POUNDS/HOUR
PLANT FACTOR	0.000E-01
HEIGHT OF LIQUID IN THE SYSTEM	1.16E-06 POUNDS
HEIGHT OF STEAM IN THE SYSTEM	2.18E-06 POUNDS
CLEAN-UP FLOW	8.00E-06 POUNDS/HOUR

FAILED FUEL	1.67E-01 PERCENT
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LEAKS

REACTOR BLDG.	4.30E-02 POUNDS/HOUR
TURBINE BLDG.	2.40E-03 POUNDS/HOUR
GLAND SEAL	6.77E-03 POUNDS/HOUR

1700 density is plant factor

PARTITION COEFFICIENTS (IODOINE)

STEAM/LIQUID	01.200E-02 OK
REACTOR BLDG.	1.00E-03 OK
TURBINE BLDG.	1.00E-01
GLAND SEAL	1.00E-01 OK
AIR EJECTOR	001.00E-03 OK

$$1.32 \times \frac{1}{0.7} \times \frac{1}{0.8} = 0.57$$

FRACTION OF IODINE GETTING THROUGH THE

CONDENSATE BLDG.	1.00E-03 OK
CLEAN-UP FLOW	1.00E-01 OK
REACTOR BLDG. FILTER	1.00E-00 OK
TURBINE BLDG. FILTER	1.00E-00 OK
GLAND SEAL FILTER	1.00E-00 OK
AIR EJECTOR FILTER	1.00E-00 OK

$$1.32 \times \frac{1}{.8} = 1.40$$

HOLD-UP TIMES

REACTOR BLDG. GAS	0.0 HOURS
TURBINE BLDG. GAS	0.0 HOURS
GLAND SEAL GAS	01.200E-02 HOURS
AIR EJECTOR GAS	0.00E-01 HOURS

CARBONATED HOLD-UP TIME FOR

REACTORS	0.0 DAYS
VENTS	0.0 DAYS

MONITORING CASE 2 HIGH PRESSURE STORAGE TANKS

DESIGN THERMAL POWER	1.670E-03 MEGAWATTS
CUTBACK SYSTEM 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
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LEAKS

REACTOR BLDG.	4.800E-02 POUNDS/HOUR - 768M
TURBINE BLDG.	2.400E-03 POUNDS/HOUR - 568M
GLAND SEAL	6.770E-03 POUNDS/HOUR

PARTITION COEFFICIENTS (GROSS)

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 TANGING GETTING THROUGH THE

CORROSION TREAT.	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	3.300E-01	HOURS

ANNUAL RED HOLD-UP TIME FOR

KRYPTONS	0.0	DAYS
XENONS	0.0	DAYS

RELEASE RATE

(CURIES PER YEAR)

(CURIES PER SECOND)

SOURCE	CORRECTION (PERCENTAGE)	REACTOR REDG.	TURBINE REDG.	GLAND SEAL	EJECTOR	TOTAL	TOTAL
KE-834 T5	1.719E-03	0.0	1.518E 01 ✓	4.230E 01 ✓	3.550E 04 ✓	3.550E 04	1.120E-03
KE-854	1.570E-03	0.0	2.470E 01 ✓	7.004E 01 ✓	6.507E 04 ✓	6.517E 04	2.060E-03
KE-86 T5	1.719E-03	0.0	1.272E-01 ✓	3.077E-01 ✓	3.077E 02 ✓	3.077E 02	1.150E-03
KE-87 T5	5.024E-03	0.0	7.451E 01 ✓	2.073E 02 ✓	1.605E 05 ✓	1.605E 05	5.090E-03
KE-88	5.424E-03	0.0	8.078E 01 ✓	2.260E 02 ✓	2.015E 05 ✓	2.016E 05	6.30E-03
KE-89	1.719E-03	0.0	2.822E 02 ✓	5.172E 02 ✓	1.15E 03 ✓	1.952E 03	6.160E-03
KE-1314 T5	7.950E-03	0.0	1.130E-01 ✓	3.175E-01 ✓	3.172E 02 ✓	3.170E 02	1.000E-03
KE-1334	1.652E-04	0.0	1.582E 03 ✓	4.459E 03 ✓	4.433E 03 ✓	4.437E 03	1.407E-04
KE-133 T5	2.475E-03	0.0	4.423E 01 ✓	1.249E 02 ✓	1.240E 05 ✓	1.247E 05	3.953E-03
KE-1354 T5	8.050E-03	0.0	1.240E 02 ✓	3.333E 02 ✓	4.070E 04	4.72E 04	3.081E-03
KE-135	4.507E-03	0.0	1.267E 02 ✓	3.505E 02 ✓	3.442E 05 ✓	3.447E 05	1.092E-02
KE-137	3.248E-03	0.0	4.027E 02 ✓	9.520E 02 ✓	5.902E 03 ✓	7.324E 03	2.320E-04
KE-138	2.15E-03	0.0	4.055E 02 ✓	1.055E 03 ✓	3.365E 05 ✓	3.370E 05	1.070E-02
KE-139	1.571E-03	0.0	2.271E 02 ✓	0.406E-01 ✓	0.395E 00	1.277E 00	2.215E-01
KE-141	6.349E-03	0.0	1.124E 00 ✓	3.169E 00 ✓	3.169E 01	3.302E 01	1.120E-03

0.0 APPROPRIATE IN THE TABLE SHOULD BE INTERPRETED AS INSIGNIFICANT

0.3 0.05 0.012

uncertainty of 1
= 2.3 a 7 - In 131

uncertainty by 125

CONCENTRATION IN PRIMARY COOLANT AT 77 F			ANNUAL RELEASE TO DISCHARGE CANAL				CONCENTRATION IN CANAL		PERCENT OF
NUCLIDE	HALF-LIFE	(MICRO CI/ML)	CLEAN WASTE (CURIES)	DIRTY WASTE (CURIES)	CHEMICAL WASTE (CURIES)	TOTAL (CURIES)	(MICRO CI/ML)	100 PPM	
U237	6.75E 00 D	7.35E-06	1.46E-04	5.72E-07	3.42E-09	1.47E-04	3.30E-13	3.20E-11	
NP238	2.10E 00 D	2.77E-06	5.93E-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	4.73E-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	1.40E-15	4.97E-10	
AM242	6.67E-01 D	1.05E-06	5.37E-06	2.10E-06	1.28E-09	5.38E-06	1.21E-14	1.21E-08	
CM242	1.62E 02 D	1.40E-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	4.42E-02	1.07E 02	4.19E-01	0.0	1.09E 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	1.21E-06	2.94E-15	3.67E-09	
BR 82	1.47E 00 D	2.97E-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	1.39E-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	2.60E-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	
R 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-01 02	1.03E-04 04	6.30E-05 06	2.65E-01 02	5.95E-10	1.98E-05	
Y 91	5.84E 01 D	5.63E-05	4.34E-02	1.69E-04	1.02E-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	8.80E-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	2.40E-06	1.51E-07	6.38E-04	1.43E-12	2.38E-06	
NR 95M	3.75E 00 D	7.70E-07	1.67E-05	6.50E-08	2.96E-07	1.67E-05	3.75E-14	3.75E-12	
NR 95	3.50E 01 D	2.39E-05	5.50E-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	4.33E-04	9.75E-13	4.89E-06	
NR 97M	6.54E-04 D	9.01E-05	4.16E-04	1.63E-06	9.21E-08	4.18E-04	9.37E-13	9.37E-11	
NR 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	4.30E-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	
RU102	2.96E-01 D	1.79E-05	4.05E-04	1.58E-06	9.64E-08	4.07E-04	9.12E-13	1.14E-06	
RU103M	3.96E-02 D	8.09E-05	4.06E-04	1.53E-06	9.65E-08	4.07E-04	9.13E-13	9.13E-09	
RU105	1.85E-01 D	6.58E-05	9.40E-06	3.67E-08	2.24E-09	9.44E-06	2.12E-14	2.12E-08	
RU105M	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	
RU105	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	4.79E-07	2.86E-08	1.21E-04	2.71E-13	2.71E-11	
RU106	3.47E-04 D	8.46E-06	1.20E-04	4.79E-07	2.86E-08	1.21E-04	2.71E-13	2.71E-11	
PD109	5.62E-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	
CU115	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	1.03E-09	
SN121	1.13E 00 D	3.28E-07	3.07E-06	1.20E-08	7.31E-10	3.09E-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	5.86E 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	
SA127	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	

CONCENTRATION IN PRIMARY COOLANT AT 77 F			ANNUAL RELEASE TO DISCHARGE CANAL				CONCENTRATION IN CANAL		PERCENT OF	
NUCLIDE	HALF-LIFE	(MICRO CI/ML)	CLEAN WASTE (CURIES)	DIRTY WASTE (CURIES)	CHEMICAL WASTE (CURIES)	TOTAL (CURIES)	(MICRO CI/ML)	CO-60	CE-137	
TE127M	1.09E-02 D	4.73E-06	1.09E-04	4.25E-07	2.59E-08	1.09E-04	2.45E-13	4.70E-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	2.66E-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	3.02E-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	2.53E-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	2.76E-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	1.20E-06	4.99E-09	3.04E-10	1.20E-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	5.94E-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	4.34E-08		
CE143	1.38E-00 D	1.55E-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		
SA153	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-01 D	3.63E-06	5.44E-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		
SB156	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	8.96E-08	5.40E-09	2.28E-05	5.11E-14	5.11E-12		
CU157	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		
GO159	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	5.26E-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		

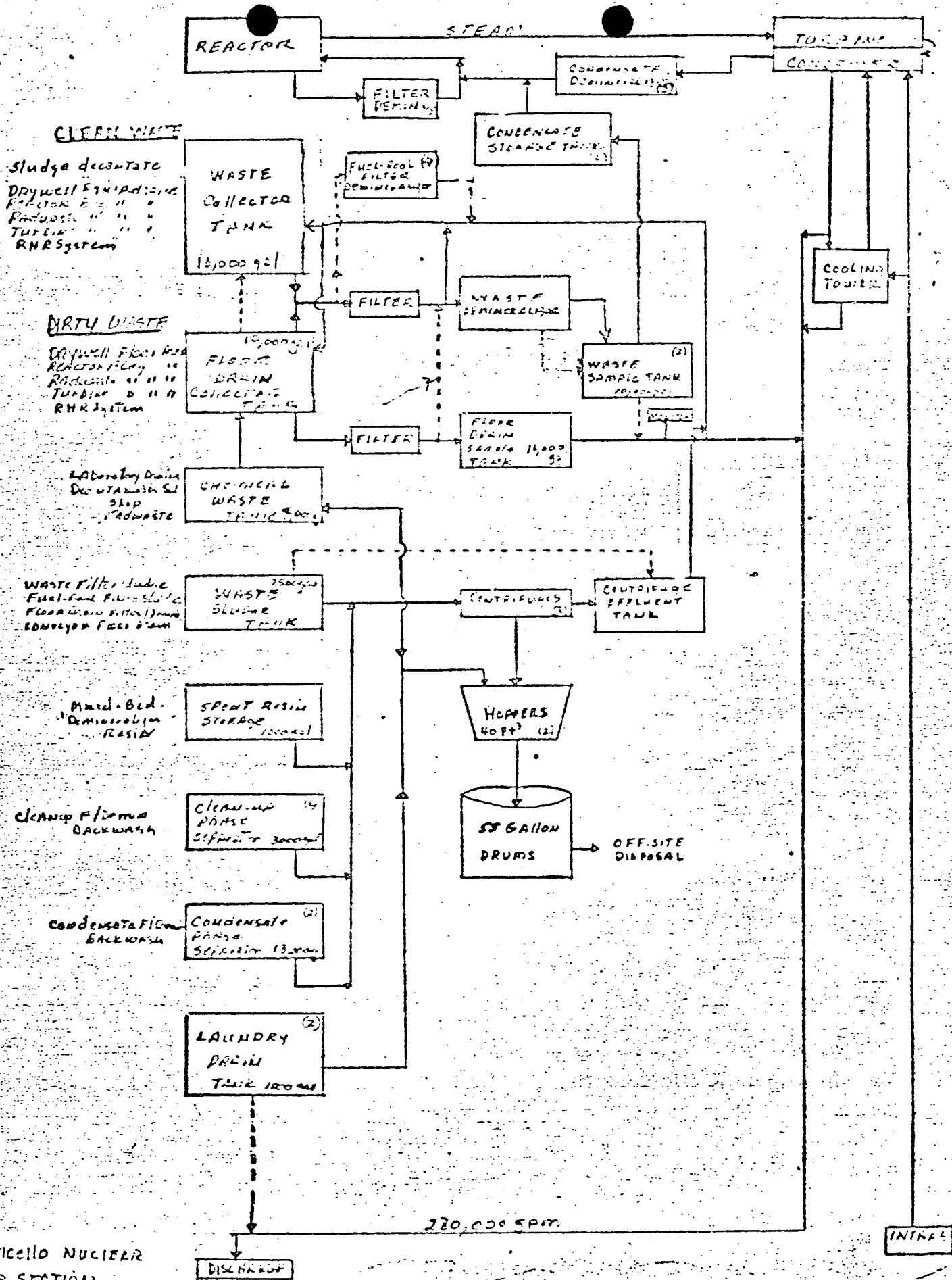
~1.8 Ci

Values normalized to 2.5 Ci/yr
H-3 2.6 Ci/yr

MONTICELLO NPS 1670. MW(TH) AT 0.80 PLANT FACTOR TYPE = DWR
 FRACTION OF FAILED FUEL = (0.0025)
 PRIMARY COOLANT WATER VOL 7800. FT3 LETDOWN 160. GPM 0
 STEAM FLOW RATE 6.77 MBPM TP CARRY-OVER 0.0010 HALOGEN CARRY-OVER 0.012
 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 OF 10. C.
 DILUTION FLOW 280000. GPM

STREAM	FLOW RATE (GPD)	FRACTION OF PCA	FRACTION DISCHARGED	HOLD UP (DAYS)	DECONTAMINATION FACTORS					OTHERS
					I	CS	MO	Y		
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	

plus 2.10E 04 gpd of radioactive liquid



MONTICELLO NUCLEAR
POWER STATION
RAIOWASTE SYSTEM

MISSISSIPPI RIVER

MONTICELLO NPS 1670. MW(TH) AT 0.90 PLANT FACTOR TYPE = BWR
 FRACTION OF FAILED FUEL = 0.0025
 PRIMARY COOLANT WATER VOL 7800. FT³ LETDOWN 160. GPM
 STEAM FLOW RATE 6.77 MPPH FP CARRY-OVER 0.0010 HALOGEN CARRY-OVER 0.012
 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 290000. GPH

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

NUCLIDE	HALF-LIFE	ANNUAL RELEASE TO DISCHARGE CANAL				CONCENTRATION		PERCENT OF 100120
		IN PRIMARY				IN CANAL		
		COOLANT AT 77 F (MICRO CI/ML)	CLEAN WASTE (CURIES)	DIRTY WASTE (CURIES)	CHEMICAL WASTE (CURIES)	TOTAL (CURIES)	(MICRO CI/ML)	
U237	6.79E 00 D	7.39E-06	1.46E-04	5.72E-07	3.49E-08	1.47E-04	3.30E-13	3.30E-11
NP228	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	2.25E 00 D	6.27E-04	5.40E-03	3.67E-05	2.24E-06	9.44E-03	2.12E-11	2.12E-09
PU241	5.32E 03 D	8.65E-07	2.01E-05	7.44E-08	4.78E-09	2.07E-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	1.40E-15	4.97E-10
AM242	6.67E-01 D	1.05E-06	5.37E-06	2.13E-06	1.28E-07	5.39E-06	1.21E-14	1.21E-08
CM242	1.62E 02 D	1.60E-07	3.76E-06	1.75E-08	8.26E-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	1.09E 02	2.42E-07	8.05E-03
AS 77	1.61E 00 D	8.25E-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	1.30E-07	8.42E-09	3.59E-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	2.69E-03	6.11E-02	2.39E-04	1.45E-05	6.14E-02	1.38E-10	4.59E-03
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
90	2.67E 00 D	8.27E-06	1.26E-07	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-0404	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	1.02E-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	8.80E-03	2.67E-02	1.04E-04	6.35E-06	2.68E-02	6.01E-11	1.09E-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	2.39E-06
NU 95M	3.75E 00 D	7.70E-07	1.67E-05	6.50E-08	2.96E-09	1.67E-05	3.75E-14	3.75E-12
NR 95	2.50E 01 D	2.32E-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	4.80E-06
NA 97M	6.94E-04 D	9.01E-05	4.16E-04	1.63E-06	9.21E-08	4.18E-04	9.37E-13	9.37E-11
NR 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	2.96E 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	1.51E-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
1105	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
1106	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	2.36E-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	8.79E-01 D	6.67E-07	4.84E-06	1.89E-08	1.15E-09	4.84E-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
CU115	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	1.03E-09
SN121	1.13E 00 D	3.28E-07	3.07E-06	1.20E-08	7.31E-10	3.09E-06	6.91E-15	6.91E-13
SN125	9.45E 00 D	1.62E-07	3.36E-06	1.31E-08	8.00E-10	3.37E-06	7.54E-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
SN127	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

NUCLIDE	HALF-LIFE	CONCENTRATION IN PRIMARY	ANNUAL RELEASE TO DISCHARGE CANAL				CONCENTRATION IN CANAL	PERCENT OF
		COOLANT AT 77 F. (MICRO CI/ML)	CLEAN WASTE (CURIES)	DIRTY WASTE (CURIES)	CHEMICAL WASTE (CURIES)	TOTAL (CURIES)	(MICRO CI/ML)	100F20
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	2.79E-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	11.74E-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	2.75E-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-04	4.99E-09	3.04E-10	1.28E-04	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	5.44E-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-03	1.38E-09	5.83E-06	1.31E-14	4.24E-08
CE143	1.38E-00 D	1.55E-04	1.72E-03	6.73E-06	4.10E-07	1.73E-03	3.88E-12	9.70E-06
PR143	1.37E-01 D	2.39E-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-05	9.84E-05	3.84E-07	2.34E-08	9.88E-05	2.32E-13	2.77E-07
EU154	5.84E-03 D	3.63E-08	8.44E-07	3.22E-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	8.46E-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-09
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 = DWR
 FRACTION OF FAILED FUEL = (0.0025)
 PRIMARY COOLANT WATER VOL 7800. FT³ LETDOWN 160. GPM
 STEAM FLOW RATE 6.77BPPH FP CARRY-OVER 0.0010 HALOGEN CARRY-OVER 0.012
 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 DE 10. 0.
 DILUTION FLOW 230000. GPM

STREAM	FLOW RATE (GPD)	FRACTION OF PCA	FRACTION DISCHARGED	HOLD UP (DAYS)	DECONTAMINATION FACTORS					OTHERS
					I	CS	MO	Y		
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	

Flow rates are based on present fuel

MONTICELLO NPS 1670. MW(TH) AT 0.50 PLANT FACTOR TYPE = DWR
 FRACTION OF FAILED FUEL = 0.0025
 PRIMARY COOLANT WATER VOL 7800. FT3 LETDOWN 160. GPM 0
 STEAM FLOW RATE 6.77 MPPH FP CARRY-OVER 0.0010 HALOGEN CARRY-OVER 0.012
 CONTAINMENT PURGE 4 /YR
 GAS DECAY TANK 20. MIN HOLDUP
 AIR EJECTOR RATE 0.
 COOLANT LEAK RATE WATER 7900. GPD GAS 0. SCFD
 TOWING SEAL LEAK 25000. GPD
 MIXED BED DEMINERALIZER DE 10. 0.
 DILUTION FLOW 230000. GPH

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
RTY 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