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OAK RIDGE NATIONAL LABORATORY
OPERATED BY
UNION CARBIDE CORPORATION
NUCLEAR DIVISION

POST OFFICE BOX X
OAK RIDGE, TENNESSEE 37830

April 20, 1982

Mr. H. Lowenberg
Office of Nuclear Materials
Safety and Safeguards
U.S. Nuclear Regulatory Commission
7915 Eastern Avenue
Silver Springs, MD 20910

Dear Homer:

Enclosed is the revised ORIGEN2 output for the CRBR that you requested during our recent meeting in Silver Springs. I have made the following changes in the calculations per your request:

1. altered the averaging procedures so that the ORIGEN2 mass flows agree with the physical masses,

2. assumed a 4 y pre-irradiation fuel decay period,

3. eliminated the output sections for the core assembly and the reprocessing outputs from the core + core axial blanket and the inner + radial blankets, and

4. added an output section decaying the entire annual batch of discharged spent fuel.

Enclosed you should find the following items:

1. a summary ORIGEN2 output on paper for the CRBR and a table of contents for same,

2. a detailed ORIGEN2 microfiche output for the CRBR and a table of contents on paper for the same, and

3. a set of tables describing the revised CRBR model.

It will be 1 to 2 weeks before I can work on the graphs since I will not be back in town until April 26 and there are several alterations to be made to the input decks to accommodate the changes that you requested.

However, I think that the material in this package should meet all of the short-term needs. I only had time to give the output a cursory check. Everything appears to be correct, but be wary.

Sincerely,

Allen G. Croff

Allen G. Croff, Manager
Engineering Analysis and Planning
Chemical Technology Division

AGC:il

cc: I. C. Nelson, PNL

Table 2. Details of CRBR irradiation characteristics

Material type	Charge rate, kg/cycle			Inventory, kg			Power, MW(t)			Specific power MW(t)/MTIHM			Effective irradiation duration full-power days	Discharge burnup MWd/MTIHM
	Cycle N	Cycle N + 1	Average	Cycle N	Cycle N + 1	Average	Cycle N	Cycle N + 1	Average	Cycle N	Cycle N + 1	Average		
Core														
Two-cycle residence														
Fuel[a]	5190.2		2595.1	5190.2	5190.2	5190.2	773.6	689.9	731.7	149.1	132.9	141.0	550	77,550
AB[b]	4224.6		2112.3	4224.6	4224.6	4224.6	14.0	19.3	16.7	3.31	4.57	3.94	550	2,167
Fuel + AB	9414.8		4707.4	9414.8	9414.8	9414.8	787.6	709.2	748.4	83.7	75.3	79.5	550	43,725
One-cycle residence														
Fuel		199.6	99.8		199.6	99.8		26.5	13.3		132.9	132.9	275	36,548
AB		162.5	81.3		162.5	81.3		0.741	0.371		4.57	4.57	275	1,257
Fuel + AB		362.1	181.1		362.1	181.1		27.2	13.6		75.1	75.1	275	20,653
Total														
Fuel	5190.2	199.6	2694.9	5190.2	5389.8	5290.0	773.6	716.4	745.0	149.1	132.9	140.9	539.8	76,031
AB	4224.6	162.5	2193.6	4224.6	4387.1	4305.9	14.0	20.0	17.0	3.31	4.57	3.95	539.8	2,133
Fuel + AB	9414.8	362.1	4888.5	9414.8	9776.9	9595.9	787.6	736.4	762.0	83.7	75.1	79.4	539.8	42,870
Inner blanket														
Two-cycle residence														
"Fuel"[c]	4311.3		2155.7	4311.3	4311.3	4311.3	86.0	138.2	112.1	19.9	32.1	26.0	550	14,300
AB	3353.3		1676.7	3353.3	3353.3	3353.3	11.2	17.9	14.6	3.34	5.34	4.34	550	2,387
"Fuel" + AB	7664.6		3832.3	7664.6	7664.6	7664.6	97.2	156.1		12.7	20.4	16.6	550	9,103
One-cycle residence														
"Fuel"	340.4		170.2	340.4		170.2	6.79		3.40	19.9		19.9	275	5,473
AB	264.7		132.4	264.7		132.4	0.885		0.443	3.34		3.34	275	919
"Fuel" + AB	605.1		302.6	605.1		302.6	7.68		3.84	12.7		12.7	275	3,493
Total														
"Fuel"	4651.7		2325.9	4651.7	4311.3	4481.5	92.8	138.2	115.5	19.9	32.1	25.8	529.9	13,654
AB	3618.0		1809.0	3618.0	3353.3	3485.7	12.1	17.9	15.0	3.34	5.34	4.30	529.9	2,280
"Fuel" + AB	8269.7		4134.9	8269.7	7664.6	7967.2	104.9	156.1	130.5	12.7	20.4	16.4	529.9	8,693
Radial blankets														
Inner radial blanket														
"Fuel"			850.9	3403.6	3403.6	3403.6	46.6	46.6	46.6	13.7	13.7	13.7	1100	15,070
AB			661.8	2647.3	2647.3	2647.3	5.1	5.1	5.1	1.93	1.93	1.93	1100	2,123
"Fuel" + AB			1512.7	6050.9	6050.9	6050.9	51.7	51.7	51.7	8.54	8.54	8.54	1100	9,394
Outer radial blanket														
"Fuel"			748.8	3744.0	3744.0	3744.0	27.7	27.7	27.7	7.40	7.40	7.40	1375	10,175
AB			582.4	2912.0	2912.0	2912.0	3.1	3.1	3.1	1.06	1.06	1.06	1375	1,458
"Fuel" + AB			1331.2	6656.0	6656.0	6656.0	30.8	30.8	30.8	4.63	4.63	4.63	1375	6,366
Total radial blanket														
"Fuel"			1599.7	7147.6	7147.6	7147.6	74.3	74.3	74.3	10.4	10.4	10.4	1229	12,779
AB			1244.2	5559.3	5559.3	5559.3	8.2	8.2	8.2	1.48	1.48	1.48	1229	1,819
"Fuel" + AB			2843.9	12,706.9	12,706.9	12,706.9	82.5	82.5	82.5	6.49	6.49	6.49	1229	7,977
Reactor total			11,867.3	30,391.4	30,148.4	30,270	975	975	975	32.10	32.28	32.21		22,600

[a]36 in. $(Pu,U)O_2$ region.

[b]Composite of upper (14 in.) and lower (14 in.) UO_2 axial blankets.

[c]UO_2 in UO_2 region at the same axial elevation as the core fuel

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Table 3. Details of the CRBR fuel cycle management for cycles 5-10

Cycle[a]	Parameter	Fuel management schedule, kg heavy metal (fuel assemblies)											
		Core			Inner blanket			Radial blanket 1			Radial blanket 2		
		Fuel[b]	AB[c]	Fuel + AB	"Fuel"[d]	AB	"Fuel" + AB	"Fuel"	AB	"Fuel" + AB	"Fuel"	AB	"Fuel" + AB
EOC4	Inventory	0	0	0 (0)	0	0	0 (0)	0	0	0 (0)	3744.0	2912.0	6656.0 (66)
BOC5	+ Charge	5190.2	4224.6	9414.8 (156)	4651.7	3618.0	8269.7 (82)	3403.6	2647.3	6050.9 (60)	0	0	0 (0)
	= Inventory	5190.2	4224.6	9414.8 (156)	4651.7	3618.0	8269.7 (82)	3403.6	2647.3	6050.9 (60)	3744.0	2912.0	6656.0 (66)
EOC5	- Discharge	0	0	0 (0)	340.4	264.7	605.1 (6)	0	0	0 (0)	3744.0	2912.0	6656.0 (66)
	= Inventory	5190.2	4224.6	9414.8 (156)	4311.3	3353.3	7664.6 (76)	3403.6	2647.3	6050.9 (60)	0	0	0 (0)
BOC6	+ Charge	199.6	162.5	362.1 (6)	0	0	0 (0)	0	0	0 (0)	3744.0	2912.0	6656.0 (66)
	= Inventory	5389.8	4387.1	9766.9 (162)	4311.3	3353.3	7664.6 (76)	3403.6	2647.3	6050.9 (60)	3744.0	2912.0	6656.0 (66)
EOC6	- Discharge	5389.8	4387.1	9766.9 (162)	4311.3	3353.3	7664.6 (76)	0	0	0 (0)	0	0	0 (0)
	= Inventory	0	0	0 (0)	0	0	0 (0)	3403.6	2647.3	6050.9 (60)	3744.0	2912.0	6656.0 (66)
BOC7	+ Charge	5190.2	4224.6	9414.8 (156)	4651.7	3618.0	8269.7 (82)	0	0	0 (0)	0	0	0 (0)
	= Inventory	5190.2	4224.6	9414.8 (156)	4651.7	3618.0	8269.7 (82)	3403.6	2647.3	6050.9 (60)	3744.0	2912.0	6656.0 (66)
EOC7	- Discharge	0	0	0 (0)	340.4	264.7	605.1 (6)	0	0	0 (0)	0	0	0 (0)
	= Inventory	5190.2	4224.6	9414.8 (156)	4311.3	3353.3	7664.6 (76)	3403.6	2647.3	6050.9 (60)	3744.0	2912.0	6656.0 (66)
BOC8	+ Charge	199.6	162.5	362.1 (6)	0	0	0 (0)	0	0	0 (0)	0	0	0 (0)
	= Inventory	5389.8	4387.1	9776.9 (162)	4311.3	3353.3	7664.6 (76)	3403.6	2647.3	6050.9 (60)	3744.0	2912.0	6656.0 (66)
EOC8	- Discharge	5389.8	4387.1	9776.9 (162)	4311.3	3353.3	7664.6 (76)	3403.6	2647.3	6050.9 (60)	0	0	0 (0)
	= Inventory	0	0	0 (0)	0	0	0 (0)	0	0	0 (0)	3744.0	2912.0	6656.0 (66)
BOC9	+ Charge	5190.2	4224.6	9414.8 (156)	4651.7	3618.0	8269.7 (82)	3403.6	2647.3	6050.9 (60)	0	0	0 (0)
	= Inventory	5190.2	4224.6	9414.8 (156)	4651.7	3618.0	8269.7 (82)	3403.6	2647.3	6050.9 (60)	3744.0	2912.0	6656.0 (66)
EOC9	- Discharge	0	0	0 (0)	340.4	264.7	605.1 (6)	0	0	0 (0)	0	0	0 (0)
	= Inventory	5190.2	4224.6	9414.8 (156)	4311.3	3353.3	7664.6 (76)	3403.6	2647.3	6050.9 (60)	3744.0	2912.0	6656.0 (66)
BOC10	+ Charge	199.6	162.5	362.1 (6)	0	0	0 (0)	0	0	0 (0)			
	= Inventory	5389.8	4387.1	9776.9 (162)	4311.3	3353.3	7664.6 (76)	3403.6	2647.3	6050.9 (60)	3744.0	2912.0	6656.0 (66)
EOC10	- Discharge	5389.8	4387.1	9776.9 (162)	4311.3	3353.3	7664.6 (76)	0	0	0 (0)	3744.0	2912.0	6656.0 (66)
	= Inventory	0	0	0 (0)	0	0	0 (0)	3403.6	2647.3	6050.9 (60)	0	0	0 (0)

[a] EOCx = end of cycle x; BOCy = beginning of cycle y.

[b] 36 in. $(Pu,U)O_2$ region.

[c] Composite of upper (14 in.) and lower (14 in.) UO_2 axial blankets.

[d] 36 in. UO_2 region at the same axial elevation as the core fuel.

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Table 4. Initial compositions of 1000 kg of CRBR heavy metal

Nuclide	Material type		
	Fuel		Blankets
	No decay	4-y decay	
U-234, g	0	6	
U-235, g	1,340	1,372	2,000
U-236, g	0	16	
U-238, g	668,660	668,660	998,000
Total uranium, g	670,000	670,054	1,000,000
Np-237, g	0	4	
Pu-236, g	0.005	0.002	
Pu-238, g	198	192	
Pu-239, g	283,932	283,900	
Pu-240, g	38,610	38,594	
Pu-241, g	6,600	5,444	
Pu-242, g	660	660	
Total plutonium, g	330,000	328,790	
Am-241, g	0	1,152	
Total heavy metal, g	1,000,000	1,000,000	1,000,000

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Table 5. Summary characteristics for the CRBR

Parameter	Fuel region(s)[a]					
	Fuel	AB	Fuel + AB	IB	RB[b]	Fuel + AB + IB + RB
Electric power, MW(e) net	267.4	6.1	273.5	46.9	29.6	350.0
Thermal power, MW(t)	745.0	17.0	762.0	130.5	82.5	975.0
Average specific power,[c] MW(t)/MTIHM	140.9	3.95	79.4	16.4	6.49	32.21
Average fuel burnup, MWd/MTIHM	76,031	2133	42,870	8693	7977	22,600
Effective irradiation duration, full-power days	540	540	550	530	1229	
Refueling cycle length, full-power days	275	275	275	275	275	275
Average number of assemblies charged per cycle	81	81	81	41	28.2	
Average charge, kg/refueling cycle[d]						
^{235}U	3.6	4.4	8.0	8.3	5.7	22.0
Total uranium	1805.5	2189.1	3994.6	4134.9	2843.9	10,973
Fissile plutonium[e]	783.0	0	783.0	0	0	783.0
Total plutonium	889.4	0	889.4	0	0	889.4
Total (U + Pu)	2694.9	2193.5	4888.4	4134.9	2843.9	11,867
Average discharge, kg/refueling cycle[d]						
^{235}U	2.6	3.6	6.2	5.9	4.0	16.1
Total uranium	1715.8	2149.0	3864.8	3960.2	2726.9	10,552
Fissile plutonium[e]	627.2	38.5	665.7	131.6	89.1	886.4
Total plutonium	766.7	39.6	806.3	138.3	94.9	1039.5
Total (U + Pu)	2482.5	2188.6	4671.1	4098.5	2821.8	11,591

[a]Fuel = 36 in. $(Pu,U)O_2$ region, AB = UO_2 axial blankets associated with fuel, IB = entire inner blanket, RB = entire radial blanket.

[b]Weighted average of inner radial blanket (4 cycle residence) and outer radial blanket (5 cycle residence).

[c]Based on rated power level.

[d]Averaged over 4 cycles.

[e]$^{239}Pu + ^{241}Pu + ^{239}Np$.

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Table 6. Physical characteristics of CRBR fuel assemblies

	Core and axial blanket	Inner and radial blankets
Assembly component lengths, cm		
Upper end hardware	30.4	29.2
Gas plenum	124.5	124.5
Upper axial blanket	35.6	
Core or radial blanket	91.4	162.6
Lower axial blanket	35.6	
Lower end hardware	109.2	109.2
Overall total	426.7	426.7
Fuel element total	290.6	290.6
Assembly shape	hexagonal	hexagonal
Assembly flats, cm	11.62	11.62
Fuel element arrangement	triangular	triangular
Fuel elements per assembly	217	61
Fuel element OD, cm	0.584	1.285
Fuel pellet OD, cm		
Core	0.491	
Axial blanket	0.483	
Inner and radial blanket		1.194
Fuel pellet density, % of theoretical		
Core	91.3	
Axial blanket	96.0	
Inner and radial blanket		95.6
Fuel element pitch, cm	0.731	1.378
Cladding thickness, cm	0.038	0.038
Channel thickness, cm	0.305	0.305
Channel height, cm	314	314
Circumscribed volume/assembly, m^3	0.0607	0.0607
Heavy metal/assembly, kg	60.35	100.85
MO_2 assembly, kg[b]	68.45	114.39
Stainless steel/assembly, kg	135.5	122.6
Assembly total weight, kg	204	237

[a]Based on data in ref. 10.

[b]$(Pu,U)O_2$ in the core and UO_2 in the axial, inner, and radial blankets.

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For Paper Output

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  129          RADIOACTIVE INGESTION HAZARD,   M**3 WATER AT RCG        SUMMARY TABLE:
  131          (ALPHA,N) NEUTRON SOURCE
  132          SPONTANEOUS FISSION NEUTRON SOURCE

  133  OUTPUT TABLES--TITLE=DECAY OF RADIAL BLANKET FUEL AND STRUCTURAL MATERIAL                    RECYCLE # =  0
  133          REACTIVITY AND BURNUP DATA
               *ACTIVATION PRODUCTS*****ACTIVATION PRODUCTS*****ACTIVATION PRODUCTS*****ACTIVATION PRODUCTS****
  134          CONCENTRATIONS, GRAMS        SUMMARY TABLE:
  136          RADIOACTIVITY,  CURIES       SUMMARY TABLE:
  138          THERMAL POWER,  WATTS        SUMMARY TABLE:
  140          RADIOACTIVE INHALATION HAZARD,  M**3 AIR AT RCG     SUMMARY TABLE:
  142          RADIOACTIVE INGESTION HAZARD,   M**3 WATER AT RCG       SUMMARY TABLE:
               *ACTINIDES + DAUGHTERS***ACTINIDES + DAUGHTERS***ACTINIDES + DAUGHTERS***ACTINIDES + DAUGHTERS**
  144          CONCENTRATIONS, GRAMS        SUMMARY TABLE:
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ATC 150        RADIOACTIVE INHALATION HAZARD,  M**3 AIR AT RCG     SUMMARY TABLE:
  152          RADIOACTIVE INGESTION HAZARD,   M**3 WATER AT RCG       SUMMARY TABLE:
  154          ALPHA RADIOACTIVITY CURIES   SUMMARY TABLE:
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  159          RADIOACTIVITY,  CURIES       SUMMARY TABLE:
  161          THERMAL POWER,  WATTS        SUMMARY TABLE:
  163          RADIOACTIVE INHALATION HAZARD,  M**3 AIR AT RCG     SUMMARY TABLE:
  165          RADIOACTIVE INGESTION HAZARD,   M**3 WATER AT RCG       SUMMARY TABLE:
  167          (ALPHA,N) NEUTRON SOURCE
  168          SPONTANEOUS FISSION NEUTRON SOURCE

  169  OUTPUT TABLES--TITLE=DECAY OF INNER BLANKET FUEL AND STRUCTURAL MATERIAL                    RECYCLE # =  0
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  172          RADIOACTIVITY,  CURIES       SUMMARY TABLE:
  174          THERMAL POWER,  WATTS        SUMMARY TABLE:
  176          RADIOACTIVE INHALATION HAZARD,  M**3 AIR AT RCG     SUMMARY TABLE:
  178          RADIOACTIVE INGESTION HAZARD,   M**3 WATER AT RCG       SUMMARY TABLE:
               *ACTINIDES + DAUGHTERS***ACTINIDES + DAUGHTERS***ACTINIDES + DAUGHTERS***ACTINIDES + DAUGHTERS**
  180          CONCENTRATIONS, GRAMS        SUMMARY TABLE:
  182          RADIOACTIVITY,  CURIES       SUMMARY TABLE:
  184          THERMAL POWER,  WATTS        SUMMARY TABLE:
ATC 186        RADIOACTIVE INHALATION HAZARD,  M**3 AIR AT RCG     SUMMARY TABLE:
  188          RADIOACTIVE INGESTION HAZARD,   M**3 WATER AT RCG       SUMMARY TABLE:
  190          ALPHA RADIOACTIVITY CURIES   SUMMARY TABLE:
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  201          RADIOACTIVE INGESTION HAZARD,   M**3 WATER AT RCG       SUMMARY TABLE:
  203          (ALPHA,N) NEUTRON SOURCE
  204          SPONTANEOUS FISSION NEUTRON SOURCE

  205  OUTPUT TABLES--TITLE=  DECAY OF ALL SPENT FUEL DISCHARGED ANNUALLY FROM CRBR                RECYCLE # =  0
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  208          RADIOACTIVITY,  CURIES         SUMMARY TABLE:
  210          THERMAL POWER,  WATTS          SUMMARY TABLE:
  212          RADIOACTIVE INHALATION HAZARD,  M**3 AIR AT RCG      SUMMARY TABLE:
  214          RADIOACTIVE INGESTION HAZARD,   M**3 WATER AT RCG        SUMMARY TABLE:
               *ACTINIDES + DAUGHTERS***ACTINIDES + DAUGHTERS***ACTINIDES + DAUGHTERS***ACTINIDES + DAUGHTERS**
  216          CONCENTRATIONS, GRAMS          SUMMARY TABLE:
  218          RADIOACTIVITY,  CURIES         SUMMARY TABLE:
  220          THERMAL POWER,  WATTS          SUMMARY TABLE:
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  224          RADIOACTIVE INGESTION HAZARD,   M**3 WATER AT RCG        SUMMARY TABLE:
  226          ALPHA RADIOACTIVITY CURIES     SUMMARY TABLE:
               *FISSION PRODUCTS********FISSION PRODUCTS********FISSION PRODUCTS********FISSION PRODUCTS********
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ATC 230        RADIOACTIVITY,  CURIES         SUMMARY TABLE:
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  236          RADIOACTIVE INGESTION HAZARD,   M**3 WATER AT RCG        SUMMARY TABLE:
  238          (ALPHA,N) NEUTRON SOURCE
  240          SPONTANEOUS FISSION NEUTRON SOURCE

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  248          RADIOACTIVE INGESTION HAZARD,   M**3 WATER AT RCG        SUMMARY TABLE:
               *ACTINIDES + DAUGHTERS***ACTINIDES + DAUGHTERS***ACTINIDES + DAUGHTERS***ACTINIDES + DAUGHTERS**
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ATC 252        RADIOACTIVITY,  CURIES         SUMMARY TABLE:
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  256          RADIOACTIVE INGESTION HAZARD,   M**3 WATER AT RCG        SUMMARY TABLE:
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  265          RADIOACTIVE INGESTION HAZARD,   M**3 WATER AT RCG        SUMMARY TABLE:
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  268          SPONTANEOUS FISSION NEUTRON SOURCE

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RB 274         THERMAL POWER,  WATTS          SUMMARY TABLE:
  276          RADIOACTIVE INHALATION HAZARD,  M**3 AIR AT RCG      SUMMARY TABLE:
  278          RADIOACTIVE INGESTION HAZARD,   M**3 WATER AT RCG        SUMMARY TABLE:
               *ACTINIDES + DAUGHTERS***ACTINIDES + DAUGHTERS***ACTINIDES + DAUGHTERS***ACTINIDES + DAUGHTERS**
  280          CONCENTRATIONS, GRAMS          SUMMARY TABLE:
  282          RADIOACTIVITY,  CURIES         SUMMARY TABLE:
  284          THERMAL POWER,  WATTS          SUMMARY TABLE:
```

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  286          RADIOACTIVE INHALATION HAZARD,  M**3 AIR AT RCG      SUMMARY TABLE:
  288          RADIOACTIVE INGESTION HAZARD,   M**3 WATER AT RCG        SUMMARY TABLE:
  290          ALPHA RADIOACTIVITY CURIES      SUMMARY TABLE:
               *FISSION PRODUCTS********FISSION PRODUCTS********FISSION PRODUCTS********FISSION PRODUCTS********
  292          CONCENTRATIONS, GRAMS           SUMMARY TABLE:
  295          RADIOACTIVITY,  CURIES          SUMMARY TABLE:
  297          THERMAL POWER,  WATTS           SUMMARY TABLE:
  299          RADIOACTIVE INHALATION HAZARD,  M**3 AIR AT RCG      SUMMARY TABLE:
  301          RADIOACTIVE INGESTION HAZARD,   M**3 WATER AT RCG        SUMMARY TABLE:
  303          (ALPHA,N) NEUTRON SOURCE
  304          SPONTANEOUS FISSION NEUTRON SOURCE

  305  OUTPUT TABLES--TITLE=DECAY OF HIGH-LEVEL WASTE FROM BLENDED FUEL                    RECYCLE # =  0
  305          REACTIVITY AND BURNUP DATA
               *ACTIVATION PRODUCTS*****ACTIVATION PRODUCTS*****ACTIVATION PRODUCTS*****ACTIVATION PRODUCTS****
  306          CONCENTRATIONS, GRAMS           SUMMARY TABLE:
  308          RADIOACTIVITY,  CURIES          SUMMARY TABLE:
  310          THERMAL POWER,  WATTS           SUMMARY TABLE:
  312          RADIOACTIVE INHALATION HAZARD,  M**3 AIR AT RCG      SUMMARY TABLE:
  314          RADIOACTIVE INGESTION HAZARD,   M**3 WATER AT RCG        SUMMARY TABLE:
               *ACTINIDES + DAUGHTERS***ACTINIDES + DAUGHTERS***ACTINIDES + DAUGHTERS***ACTINIDES + DAUGHTERS**
  316          CONCENTRATIONS, GRAMS           SUMMARY TABLE:
  318          RADIOACTIVITY,  CURIES          SUMMARY TABLE:
  320          THERMAL POWER,  WATTS           SUMMARY TABLE:
  322          RADIOACTIVE INHALATION HAZARD,  M**3 AIR AT RCG      SUMMARY TABLE:
  324          RADIOACTIVE INGESTION HAZARD,   M**3 WATER AT RCG        SUMMARY TABLE:
  326          ALPHA RADIOACTIVITY CURIES      SUMMARY TABLE:
               *FISSION PRODUCTS********FISSION PRODUCTS********FISSION PRODUCTS********FISSION PRODUCTS********
  328          CONCENTRATIONS, GRAMS           SUMMARY TABLE:
  331          RADIOACTIVITY,  CURIES          SUMMARY TABLE:
  333          THERMAL POWER,  WATTS           SUMMARY TABLE:
  335          RADIOACTIVE INHALATION HAZARD,  M**3 AIR AT RCG      SUMMARY TABLE:
  337          RADIOACTIVE INGESTION HAZARD,   M**3 WATER AT RCG        SUMMARY TABLE:
  339          (ALPHA,N) NEUTRON SOURCE
  340          SPONTANEOUS FISSION NEUTRON SOURCE

  341  OUTPUT TABLES--TITLE=DECAY OF STRUCTURAL MATERIAL WASTES                            RECYCLE # =  0
  341          REACTIVITY AND BURNUP DATA
               *ACTIVATION PRODUCTS*****ACTIVATION PRODUCTS*****ACTIVATION PRODUCTS*****ACTIVATION PRODUCTS****
  342          CONCENTRATIONS, GRAMS           SUMMARY TABLE:
  344          RADIOACTIVITY,  CURIES          SUMMARY TABLE:
  346          THERMAL POWER,  WATTS           SUMMARY TABLE:
  348          RADIOACTIVE INHALATION HAZARD,  M**3 AIR AT RCG      SUMMARY TABLE:
  350          RADIOACTIVE INGESTION HAZARD,   M**3 WATER AT RCG        SUMMARY TABLE:
               *ACTINIDES + DAUGHTERS***ACTINIDES + DAUGHTERS***ACTINIDES + DAUGHTERS***ACTINIDES + DAUGHTERS**
  352          CONCENTRATIONS, GRAMS           SUMMARY TABLE:
  354          RADIOACTIVITY,  CURIES          SUMMARY TABLE:
  356          THERMAL POWER,  WATTS           SUMMARY TABLE:
  358          RADIOACTIVE INHALATION HAZARD,  M**3 AIR AT RCG      SUMMARY TABLE:
  360          RADIOACTIVE INGESTION HAZARD,   M**3 WATER AT RCG        SUMMARY TABLE:
  362          ALPHA RADIOACTIVITY CURIES      SUMMARY TABLE:
               *FISSION PRODUCTS********FISSION PRODUCTS********FISSION PRODUCTS********FISSION PRODUCTS********
  364          CONCENTRATIONS, GRAMS           SUMMARY TABLE:
  367          RADIOACTIVITY,  CURIES          SUMMARY TABLE:
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