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Document Control Desk
U. S. Nuclear Regulatory Commission
Washington, DC 20555

Attention: Mr. J. J. Hayes, Jr.

Subject: Virgil C. Summer Nuclear Station
Docket No. 50/395
Operating License No. NPF-12
Technical Specification Change
VANTAGE 5 Fuel

Gentlemen:

On May 20, 1988, South Carolina Electric & Gas Company (SCE&G) requested a revision to the Technical Specifications for the Virgil C. Summer Nuclear Station in support of refueling and operating with VANTAGE 5 fuel. This submittal contained a Radiological Impact Assessment. It concluded that the transition from current fuel to VANTAGE 5, with its extended burnup characteristics, would result in a small increase in thyroid and whole body doses. Since large margins currently exist relative to the dose limits, detailed dose analyses were not deemed necessary.

To supplement the previous Radiological Impact Assessment, SCE&G is performing a detailed evaluation of the environment consequences for the FSAR Chapter 15 accidents impacted by the fuel change. This letter forwards the revised source terms for the Virgil C. Summer Nuclear Station (with VANTAGE 5 fuel) which will be used as input to the ongoing dose calculations.

Table 1 presents the total core inventory of fission products. These results, expressed as the total inventory of noble gases and 50% of the total halogens, were determined using the ORIGEN code based on expected core loadings with VANTAGE 5 fuel.

Table 2 lists the computed gap release factors for the iodine and noble gas isotopes. These results were calculated using the same methodology described in Section 15.1.7.2 of the Virgil C. Summer Nuclear Station FSAR and are based on a fuel temperature distribution which is bounding for VANTAGE 5 fuel.

Table 3 presents noble gas and iodine inventories corresponding to the highest power assembly in the core region discharged 100 hours after shutdown. These assembly source terms will be used for the determination of radiological consequences of the fuel handling accident. A radial peaking factor of 1.65 has been applied consistent with the guidelines of Regulatory Guide 1.25.

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Lastly, Table 4 lists activities calculated for the reactor coolant corresponding to the assumed release from defective fuel rods generating 1% of the core power. These reactor coolant equilibrium activities were computed with the FIPCO-V1 code using the ORIGEN results as input.

The VANTAGE 5 source terms described above are forwarded at this time to minimize time required to review the SCE&G previous VANTAGE 5 Technical Specification revision requests. The ongoing dose evaluations are being performed on a expedited basis to allow submittal of results as soon as possible.

Should you have any questions, please contact us at your convenience.

Very truly yours,

O. S. Bradham

ARK/OSB:lcd
Attachments

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TABLE 1
VANTAGE 5 FUEL CORE AVERAGE ACTIVITIES

Noble Gases		Halogens (50%)	
Nuclide	Curies Released from Fuel	Nuclide	Curies Released from Fuel
Kr-83m	9.1E+06	Br-82	1.4E+05
Kr-85m	2.0E+07	Br-83	4.6E+06
Kr-85	6.4E+05	Br-84	7.7E+06
Kr-87	3.7E+07		
Kr-88	5.3E+07	I-130	7.9E+05
Kr-89	6.5E+07	I-131	3.9E+07
		I-132	5.6E+07
		I-133	7.9E+07
		I-134	8.5E+07
Xe-131m	5.4E+05	I-135	7.3E+07
Xe-133m	2.3E+07		
Xe-133	1.5E+08	Nuclide	Kilograms (50%)
Xe-135m	3.1E+07		
Xe-135	3.3E+07	I-127	1.4
Xe-138	1.3E+08	I-129	5.6

Note: The Halogen Curie inventory is 50% of the ORIGEN output value.

TABLE 2
VANTAGE 5 FUEL GAP RELEASE FACTORS

Isotope	Percent of Activity in Gap
I-131	1.4
I-132	0.15
I-133	0.46
I-134	0.095
I-135	0.26
Xe-131m	1.7
Xe-133	1.1
Xe-133m	0.74
Xe-135	0.31
Xe-135m	0.52
Xe-138	0.54
Kr-83m	0.14
Kr-85	21.2
Kr-85m	0.21
Kr-87	0.11
Kr-88	0.17
Kr-89	0.023

TABLE 3
VANTAGE 5 FUEL ACTIVITIES IN HIGHEST RATED
ASSEMBLY FOR USE IN FUEL HANDLING ACCIDENT ANALYSIS

Gases		Iodines	
Nuclide	Curies Released from Fuel	Nuclide	Curies Released from Fuel
Kr-85	6.7E+03	I-130	6.2E+01
		I-131	5.8E+05
Xe-131m	5.5E+03	I-132	4.9E+05
Xe-133m	1.0E+05	I-133	6.1E+04
Xe-133	1.2E+06	I-135	4.0E+01
Xe-135m	6.3		
Xe-135	2.1E+03		

Nuclide	Grams Released
I-127	29
I-129	119

Note: The above values are based on source 100 hours after shutdown for a single assembly calculated as follows:

Source = Core average source per assembly x 1.65 radial peaking factor.

TABLE 4
REACTOR COOLANT EQUILIBRIUM FISSION PRODUCT ACTIVITIES

Isotope Fission Products	Activity uCi/gm
Br-84	4.8×10^{-2}
Rb-88	8.9
Sr-89	4.2×10^{-3}
Sr-90	1.6×10^{-4}
Sr-91	6.1×10^{-3}
Sr-92	1.3×10^{-3}
Y-90	1.1×10^{-4}
Y-91	5.3×10^{-4}
Y-92	1.1×10^{-3}
Zr-95	6.3×10^{-4}
Nb-95	6.3×10^{-4}
Mo-99	7.5×10^{-1}
I-131	3.9
I-132	2.9
I-133	4.6
I-134	6.7×10^{-1}
I-135	2.6
Te-132	2.4
Te-134	3.4×10^{-2}
Cs-134	3.1
Cs-136	3.4
Cs-137	1.8
Cs-138	1.1
Ba-140	1.3×10^{-2}
La-140	9.6×10^{-3}
Ce-144	4.2×10^{-4}
Pr-144	4.2×10^{-4}
Kr-85	9.1
Kr-85m	2.0
Kr-87	1.2
Kr-88	3.6
Xe-131m	2.2
Xe-133	2.6×10^{2}
Xe-133m	1.7×10^{1}
Xe-135	8.0
Xe-135m	5.5×10^{-1}
Xe-138	7.2×10^{-1}