LIMITING CONDITION FOR OPERATION (Continued)

ACTION (Continued)

c. In OPERATIONAL CONDITION 4, 5 or *:

1. With one of the required redundant subsystems inoperable, restore the inoperable component(s) to OPERABLE status within 7 days. Otherwise, either:

(a) Initiate and maintain operation of the control room emergency filtration system in the recirculation mode of operation, or

(b) Declare the control room emergency filtration system inoperable.

2. With the control room emergency filtration system inoperable due to failure of an air filter train(s) to provide the required filtration efficiency or to replace charcoal filtration media or to perform Surveillance Requirement 4.7.2.1.h, suspend operations with a potential for draining the reactor vessel.

3. With the control room emergency filtration system otherwise inoperable, suspend CORE ALTERATIONS, handling of irradiated fuel in the secondary containment and operations with a potential for draining the reactor vessel.

d. The provisions of Specification 3.0.3 are not applicable in Operational Condition *.

*When irradiated fuel is being handled in the secondary containment.

DESIGN CALCULATION COVER SHEET

PART 1: DESIGN CALCULATION IDENTIFICATION

A) Design Calculation Number: DC-5549

B) Volume Number: I

C) Revision: 0

D) PIS Number: T4102

E) QA Level: [X] 1 [ ] Non-Q [ ] 1M

F) ASME Code Classification: N/A

G) Certification Required: [ ] Yes [X] No

H) Lead Discipline: MECH.

I) Incorporation Code: F

J) Title: Control Room Dose from Fuel Handling Accident with CCHVAC non-operational

K) Design Change Documents Incorporated (Number and Revision)

This D.C. will support Proposed Tech Spec Change (letter NRC-93-0077). Since this process automatically has a Significant Hazards Consideration, & NRC provides the actual S.E., a P.E. is not required for this D.C.

L) Design Calculations Superseded (Number and Revision)

none

M) Revision Summary

N/A

PART 2: PREPARATION, REVIEW, AND APPROVAL

A) Prepared By

Sign Richard J Beaudry R. BEAUDRY Date 6/30/93

B) Checked By

Sign Daryll J. Grimes Daryll J Grimes Date 6-30-93

C) Verified By

Sign Daryll J. Grimes Date 6-30-93

D) Approved By

Sign R. E. Howard Kenneth Howard Date 7-7-93

ARMS - INFORMATION SERVICES

DSN DC-5549 VOL I Rev 0 Date 7-8-93

DTC TDP MIC File 1801 Recipient

Form NEP-CM1-20 Att1 P1/1 040392

PROBLEM

It is desired to calculate the total thyroid dose to control-center operators during a FHA (fuel-handling accident), when the SGTS is operational, but when the CCHVAC system is not operational. The resultant dose must be below the GDC-19 value of 30 rem thyroid in order to be acceptable.

CONCLUSIONS

The calculated control room dose from a FHA, without CCHVAC operational, is 1.37 rem to thyroid. This is well below the NRC guideline values. (Only the thyroid dose is calculated, since the CCHVAC filters out only iodines; whole-body dose is essentially not affected).

METHODOLOGY

Calculate thyroid dose at location of the control room, and assume no CCHVAC/ filtration at all takes place. Use source terms + data from Revision 6 (3/93) of UFSAR for power upgrade. Use basic equations + data from UFSAR section 15.

CALCULATION

The FHA occurs over a two-hour time period; see UFSAR section 15.7.4. As can be seen, the 7x7 fuel gives the largest source and thyroid dose, so this will be utilized in this calculation. From table 15.7.4-2, the iodine source term (Ci out of SGTS) is:

I	Ci
131	3.8
132	4.52
133	3.89
134	1.75 E-7
135	0.627

The basic equation (with NO CCHVAC) is eq 15A-3 of UFSAR, for one time period:

$$D = \left(\frac{X}{Q}\right)(Br)\sum_i R_i \cdot \frac{D_i}{A}$$

$\frac{X}{Q} = 5.8 \times 10^{-4}$ s/m³ for 0-8 hrs, for control room (UFSAR, pge 15A-5)

$Br = 3.47 \times 10^{-4}$ m³/sec for 0-8 hrs: pge 15A-2

$\frac{D_i}{A}$ = rem/Ci - see UFSAR, table 15A-1

R_i = source term, Ci released to environment see UFSAR, table 15.7.4-2.

$\therefore D = (5.8\ 10^{-4})(3.47\ 10^{-4})\sum R \cdot \frac{D}{A}$

or $\underline{D = 2.013 \times 10^{-7}}\ \left[\sum R \cdot \frac{D}{A} = 6.81 \times 10^{6}\right] = \underline{1.37\ \text{Rem}}$

Isotope	R	D/A	R * D/A
I-131	3.8	$1.49\ 10^{6}$	$5.66\ 10^{6}$
132	4.52	$1.43\ 10^{4}$	$6.46\ 10^{4}$
133	3.89	$2.69\ 10^{5}$	$1.05\ 10^{6}$
134	$1.75\ 10^{-7}$	$3.73\ 10^{2}$	$6.5\ 10^{-5}$
135	.627	$5.6\ 10^{4}$	$3.51\ 10^{4}$
			$6.8097\ 10^{6}$

The above result is 1.37 Rem, well below the GDC 19 limit

A quick check on the above value can be easily made. UFSAR table 15.7.4-3 gives D=.285 rem for site boundary, for FHA, for same (7x7) source term. This value can be directly related to control-center dose, since everything remains the same except for $\frac{X}{Q}$ value. For FHA, the site-boundary $\frac{X}{Q}$ was $1.23\,10^{-4}$ (Tbl. 15.7.4-1). Therefore, for control room:

$$D = [0.285\,\text{rem}]\left[\frac{5.8\cdot 10^{-4}}{1.23\cdot 10^{-4}}\right]$$

$$= 1.34\,\text{rem} = \text{a very good check.}$$