

REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

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SUBJECT: Special rept: on 870408, RCS dose equivalent I-131 exceeded Tech Spec limits. Caused by leaking fuel cladding. Leaking fuel will be identified by ultrasonic testing & resolved during next refueling outage.

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	RES SPEIS, T	1 1	RGNS FILE 01	1 1
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INDIANA & MICHIGAN ELECTRIC COMPANY

Donald C. Cook Nuclear Plant
P.O. Box 458, Bridgman, Michigan 49106

May 8, 1987

Document Control Desk
United States Nuclear Regulatory Commission
Washington, D.C. 20555

Operating License DPR-58
Docket No. 50-315

Document Control Manager:

Attached is the special report being submitted in accordance with Technical Specification 3.4.8 and 6.9.1, to inform you that on April 8, 1987 the Unit One reactor coolant DOSEQ Iodine 131 exceeded the ≤ 1.0 $\mu\text{Ci}/\text{gram}$ limit during a controlled shutdown.

Sincerely,

W. G. Smith, Jr.
Plant Manager

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DOSE EQUIVALENT IODINE-131 EXCEEDING TECHNICAL SPECIFICATIONS
FOLLOWING POWER TRANSIENT

This special report is being submitted pursuant to the requirements of Appendix A Technical Specifications 3.4.8 and 6.9.1. Technical Specification 3.4.8 states in part:

"The specific activity of the primary coolant shall be limited to:
a. $\leq 1.0 \mu\text{Ci}/\text{gram}$ DOSE EQUIVALENT I-131..."

On April 8, 1987 with the unit in mode 3, it was found that the Dose Equivalent I-131 activity in the Unit 1 reactor coolant system had exceeded the Technical Specification limit.

Conditions Prior to Occurrence

Unit 1 at 90 percent reactor thermal power.

Description of Event

April 7, 1987

At 2252 hours Unit 1 entered the Excessive Reactor Leakage Procedure. Letdown was isolated and excess letdown was placed in service at 2257 hours.

April 8, 1987

At 0027 hours normal letdown was established at 75 gpm and excess letdown was removed. At 0100 hours the unit started a controlled shutdown from 90% power because of a high reactor coolant system leak rate. At 0104 hours letdown was increased to 120 gpm. An Event Initiated Surveillance was entered at 0142 hours to comply with Technical Specification 3.4.8 Table 4.4-4, Item b, which requires sampling of the primary coolant between 2 and 6 hours following a THERMAL POWER change exceeding 15 percent of RATED THERMAL POWER within a one-hour period and analyzing for iodines.

The unit entered mode 3 at 0503 hours. At 0718 hours letdown was manually isolated when it was discovered that there was a packing leak on QRV-111 (which is in the letdown purification pathway). Laboratory analysis of a reactor coolant sample taken at 0739 hours indicated the reactor coolant Dose Equivalent Iodine-131 concentration was $1.28 \mu\text{Ci}/\text{gram}$ which exceeded the Technical Specification limit of $1.0 \mu\text{Ci}/\text{gram}$. At 0902 hours an Event Initiated Surveillance was entered to comply with Technical Specification 3.4.8 Table 4.4-4 Item 4a, which requires sampling primary coolant once per 4 hours whenever the specific activity exceeds $1.0 \mu\text{Ci}/\text{gram}$ DOSE EQUIVALENT I-131 or $100/\bar{E} \mu\text{Ci}/\text{gram}$ and analyzing for iodines.

April 9, 1987

Dose Equivalent Iodine-131 activity increased to a maximum of $1.72 \mu\text{Ci}/\text{gram}$ at 1500 hours.

April 10, 1987

Unit 1 entered mode 5 at 0230. At 1749 hours letdown purification was established after being isolated because of the leak on QRV-111. Laboratory analysis of a reactor coolant sample taken at 2130 indicated a Dose Equivalent Iodine-131 value of $0.853 \mu\text{Ci}/\text{gram}$.

All subsequent Dose Equivalent Iodine-131 analysis of reactor coolant indicated decreasing levels of iodine.

During this event no degassing activities took place and all applicable Technical specification action items were met.

Fuel burnup by region and all additional data as required by Technical Specification 3.4.8 is found in the attachments.

Cause of Event

Leaking fuel cladding, reacting predictably to a power transient.

Analysis of Event

During this event, iodine release from fuel was consistent with data reported in Westinghouse Electric Corporation WCAP-8637, "Iodine Behavior Under Transient Conditions in the Pressurized Water Reactor". Dose Equivalent Iodine-131 values were in the "acceptable operation" portion of Technical Specification Figure 3.4-1 at all times during this event. All applicable Technical Specification action items were met during this time. It is concluded that the event did not pose a threat to the health and safety of the public.

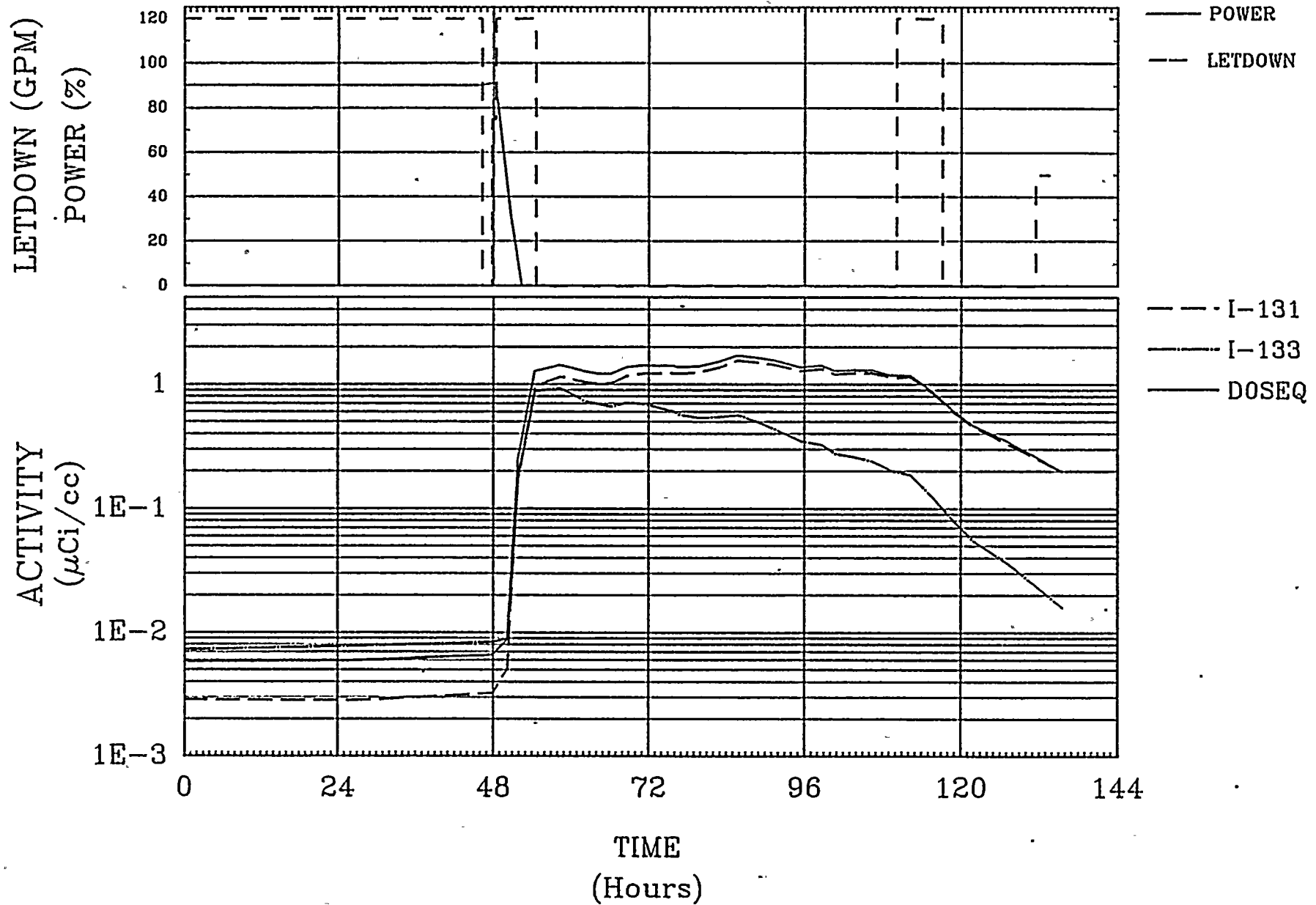
Corrective Action (planned)

Leaking fuel will be identified by ultrasonic testing and resolved during the next refueling outage for Unit 1 currently scheduled for July and August 1987.

UNIT 1 CYCLE 9

RCS RADIOCHEMISTRY

STARTING 0043 4/6/87



REACTOR COOLANT IODINE SPIKING DATA (UNIT ONE)

Date/Time of Reactor Trip or Shutdown 4-8-87/0100
 Date/Time RCS DOSEQ I-131 exceeded 1.0 $\mu\text{Ci/gm}$ 4-8-87/0739

<u>DATE</u>	<u>TIME</u>	<u>POWER (%)</u>	<u>LETDOWN (GPM)</u>	<u>I-131 $\mu\text{Ci/cc}$</u>	<u>DOSEQ I-131 ($\mu\text{Ci/cc}$)</u>
4/6/87	0043	90.5	120	2.85 ⁻³	5.76 ⁻³
4/7/87	0300	90.5	120	2.81 ⁻³	5.92 ⁻³
4/8/87	0037	90	75	3.25 ⁻³	6.61 ⁻³
4/8/87	0325	32	120 (E)	5.18 ⁻³	8.81 ⁻³
4/8/87	0506	0 (A)	120	1.88 ⁻³	.250
4/8/87	0739	0	0 (B)	.984	1.28
4/8/87	0930	0	0	1.06	1.35
4/8/87	1130	0	0	1.15	1.44
4/8/87	1330	0	0	1.04	1.28
4/8/87	1513	0	0	1.04	1.27
4/8/87	1727	0	0	.999	1.21
4/8/87	1926	0	0	1.02	1.21
4/8/87	2138	0	0	1.16	1.37
4/8/87	2252	0	0	1.19	1.40
4/9/87	0049	0	0	1.23	1.43
4/9/87	0249	0	0	1.22	1.41
4/9/87	0452	0	0	1.23	1.41
4/9/87	0652	0	0	1.21	1.37
4/9/87	0958	0	0	1.25	1.40
4/9/87	1200	0	0	1.36	1.52
4/9/87	1500	0	0	1.56	1.72
4/9/87	1800	0	0	1.49	1.63
4/9/87	2055	0	0	1.42	1.54
4/10/87	0041	0	0	1.27	1.36
4/10/87	0355	0	0	1.33	1.42
4/10/87	0555	0	0	1.19	1.27
4/10/87	0915	0	0	1.23	1.30
4/10/87	1200	0	0	1.23	1.30
4/10/87	1456	0	0	1.12	1.17
4/10/87	1753	0	120 (C)	1.14	1.19
4/10/87	2130	0	120	.821	.853 (D)
4/11/87	0023	0	120	.592	.614
4/11/87	0330	0	0	.447	.462
4/11/87	0904	0	0	.321	.339
4/11/87	1707	0	50	.195	.199

(A) Unit Subcritical at 0503

(B) Excess letdown only, Demineralizers bypassed at 0718.

(C) CVCS Demineralizer in service 120 gpm at 1749

(D) Less than 1 $\mu\text{Ci/gram}$.

(E) CVCS Demineralizer in service 120 gpm at 0104.

CORE-PACKAGE: BURNUP 12 APRIL 1985

BURNUP CALCULATION SUMMARY SHEET
D.C. COOK NUCLEAR PLANT (SPECIAL RUN-IODINE SPIKE)

UNIT NO. 1
CYCLE NO. 9

REPORT NO. 52A
DATE: APRIL 8, 1987
PERIOD: APRIL 1. - 8, 1987

<u>REGION NO.</u>	<u>BURNUP FOR PERIOD (MWD/MTU)</u>	<u>CUMULATIVE BURNUP (MWD/MTU)</u>	<u>ENERGY FOR PERIOD (BTU)</u>	<u>CUMULATIVE ENERGY (BTU)</u>
H 1	0.1552E+03	0.3202E+05	0.7600E+11	0.1568E+14
J 2	0.2203E+03	0.3504E+05	0.1541E+12	0.2450E+14
K1-K44 3	0.2374E+03	0.3222E+05	0.3845E+12	0.5218E+14
K45-K80 4	0.2270E+03	0.2800E+05	0.3086E+12	0.3807E+14
AA1 - AA48 5	0.3097E+03	0.1757E+05	0.5598E+12	0.3175E+14
AA49 - AA80 6	<u>0.2669E+03</u>	<u>0.1501E+05</u>	<u>0.3217E+12</u>	<u>0.1810E+14</u>
CORE TOTAL	0.2513E+03	0.2510E+05	0.1805E+13	0.1803E+15



REACTOR COOLANT SYSTEM

SPECIFIC ACTIVITY

LIMITING CONDITION FOR OPERATION

3.4.8 The specific activity of the primary coolant shall be limited to:

- a. $\leq 1.0 \mu\text{Ci}/\text{gram}$ DOSE EQUIVALENT I-131, and
- b. $\leq 100/\bar{E} \mu\text{Ci}/\text{gram}$.

APPLICABILITY: MODES 1, 2, 3, 4 and 5

ACTION:

MODES 1, 2 and 3*

- a. With the specific activity of the primary coolant $> 1.0 \mu\text{Ci}/\text{gram}$ DOSE EQUIVALENT I-131 but within the allowable limit (below and to the left of the line) shown on Figure 3.4-1, operation may continue for up to 48 hours provided that operation under these circumstances shall not exceed 10 percent of the unit's total yearly operating time. The provisions of Specification 3.0.4 are not applicable.
- b. With the specific activity of the primary coolant $> 1.0 \mu\text{Ci}/\text{gram}$ DOSE EQUIVALENT I-131 for more than 48 hours during one continuous time interval or exceeding the limit line shown on Figure 3.4-1, be in HOT STANDBY with $T_{\text{avg}} < 500^\circ\text{F}$ within 6 hours.
- c. With the specific activity of the primary coolant $> 100/\bar{E} \mu\text{Ci}/\text{gram}$, be in HOT STANDBY with $T_{\text{avg}} < 500^\circ\text{F}$ within 6 hours.

MODES 1, 2, 3, 4 and 5

- a. With the specific activity of the primary coolant $> 1.0 \mu\text{Ci}/\text{gram}$ DOSE EQUIVALENT I-131 or $> 100/\bar{E} \mu\text{Ci}/\text{gram}$, perform the sampling and analysis requirements of item 4a of Table 4.4-4 until the specific activity of the primary coolant is restored to within its limits. A REPORTABLE OCCURRENCE shall be prepared and submitted to the Commission pursuant to Specification 6.9.1. This report shall contain the results of the specific activity analyses together with the following information:

*With $T_{\text{avg}} \geq 500^\circ\text{F}$.



REACTOR COOLANT SYSTEM

ACTION: (Continued)

1. Reactor power history starting 48 hours prior to the first sample in which the limit was exceeded,
2. Fuel burnup by core region,
3. Clean-up flow history starting 48 hours prior to the first sample in which the limit was exceeded,
4. History of de-gassing operations, if any, starting 48 hours prior to the first sample in which the limit was exceeded, and
5. The time duration when the specific activity of the primary coolant exceeded 1.0 $\mu\text{Ci}/\text{gram}$ DOSE EQUIVALENT I-131.

SURVEILLANCE REQUIREMENTS

4.4.8 The specific activity of the primary coolant shall be determined to be within the limits by performance of the sampling and analysis program of Table 4.4-4.

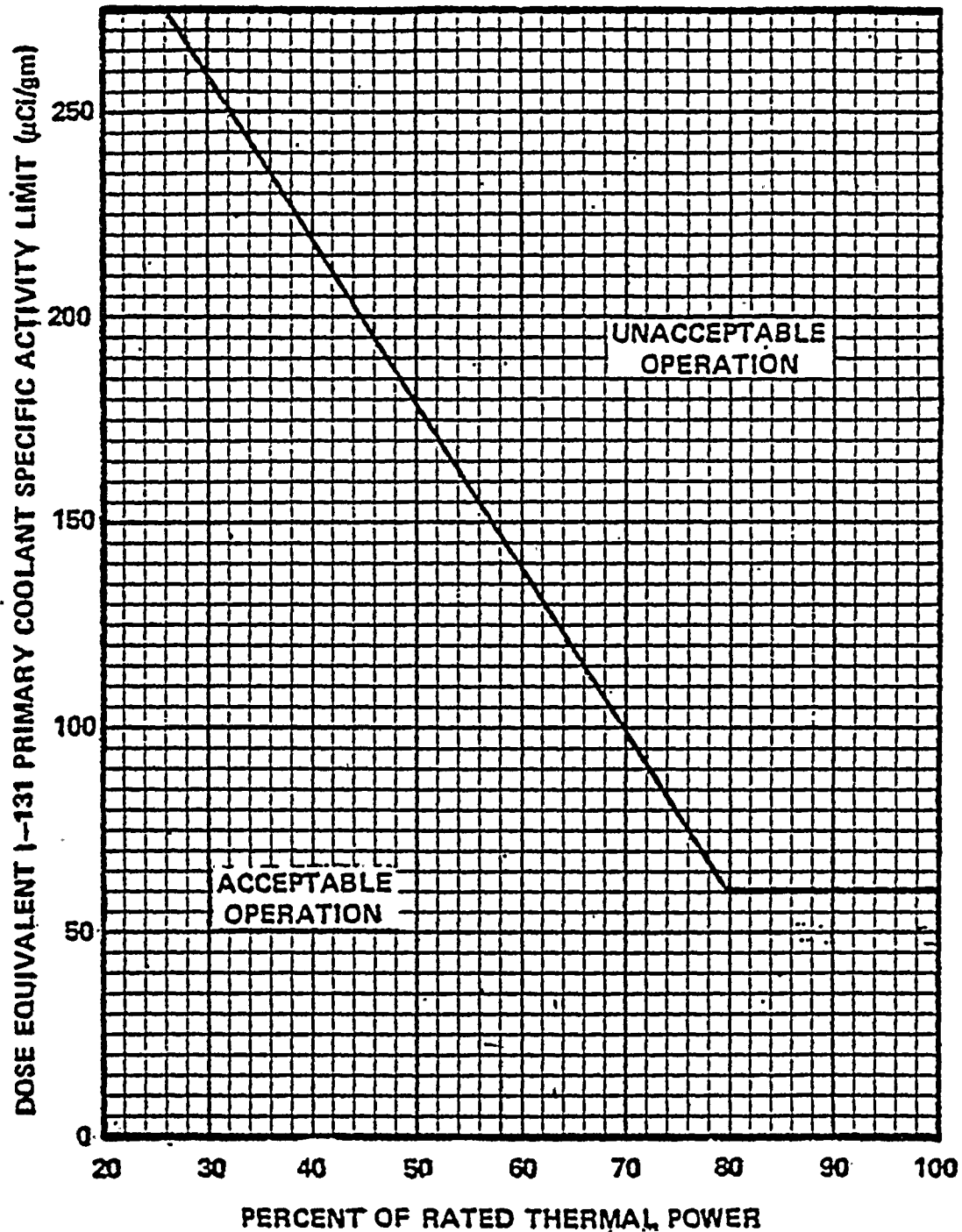


FIGURE 3.4-1

DOSE EQUIVALENT I-131 Primary Coolant Specific Activity Limit Versus Percent of RATED THERMAL POWER with the Primary Coolant Specific Activity $> 1.0 \mu\text{Ci}/\text{gram}$ Dose Equivalent I-131

TABLE 4.4-4

PRIMARY COOLANT SPECIFIC ACTIVITY SAMPLE
AND ANALYSIS PROGRAM

<u>TYPE OF MEASUREMENT AND ANALYSIS</u>	<u>MINIMUM FREQUENCY</u>	<u>MODES IN WHICH SAMPLE AND ANALYSIS REQUIRED</u>
1. Gross Activity Determination	3 times per 7 days with a maximum time of 72 hours between samples.	1, 2, 3, 4
2. Isotopic Analysis for DOSE EQUIVALENT I-131 Concentration	1 per 14 days	1
3. Radiochemical for \bar{E} Determination	1 per 6 months*	1
4. Isotopic Analysis for Iodine Including I-131, I-133, and I-135	a) Once per 4 hours, whenever the specific activity exceeds 1.0 $\mu\text{Ci}/\text{gram}$ DOSE EQUIVALENT I-131 or $100/\bar{E}$ $\mu\text{Ci}/\text{gram}$, and	1 [#] , 2 [#] , 3 [#] , 4 [#] , 5 [#]
	b) One sample between 2 & 6 hours following a THERMAL POWER change exceeding 15 percent of the RATED THERMAL POWER within a one hour period.	1, 2, 3

[#]Until the specific activity of the primary coolant system is restored within its limits.

*Sample to be taken after a minimum of 2 EFPD and 20 days of POWER OPERATION have elapsed since reactor was last subcritical for 48 hours or longer.

INDIANA & MICHIGAN POWER COMPANY
DONALD C. COOK NUCLEAR PLANT

TABLE 1
SUMMARY OF RELEASE RATES DURING POWER TRANSIENT CONDITIONS

<u>TIME</u>		<u>R/R₀</u>
0	- 0.5 hr	13
0.5	- 1.0 hr	19
1.0	- 3.5 hr	40.5
3.5	- 5.0 hr	56
5.0	- 5.25 hr	65
5.25	- 7.5 hr	39
7.5	- 10 hr	25
10.0	- 14 hr	14
14.0	-	0.0

Reference: Westinghouse Electric Corp., WCAP-8637, "Iodine Behavior Under Transient Conditions In The Pressurized Water Reactor", November, 1975.