NRC Form 366
(9-83)

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED OMB NO. 3150-0104
EXPIRES: 8/31/85

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
DONALD C. COOK NUCLEAR PLANT UNIT 1	0 5 0 0 0 3 1 5	1 OF 0 4

TITLE (4)

CALIBRATION CONSTANTS FOR RADIATION MONITORING SYSTEM

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAMES	DOCKET NUMBER(S)
0 8	2 9	8 4	8 4	0 2 1	0 0	0 9	2 8	8 4	D. C. COOK UNIT 2	0 5 0 0 0 3 1 6
										0 5 0 0 0

OPERATING MODE (9)	1
POWER LEVEL (10)	1 0 0

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)

20.402(b)	20.405(c)	50.73(a)(2)(iv)	73.71(b)
20.405(a)(1)(i)	50.36(c)(1)	X 50.73(a)(2)(v)	73.71(c)
20.405(a)(1)(ii)	50.36(c)(2)	50.73(a)(2)(vii)	OTHER (Specify in Abstract below and in Text, NRC Form 366A)
20.405(a)(1)(iii)	50.73(a)(2)(i)	50.73(a)(2)(viii)(A)	
20.405(a)(1)(iv)	50.73(a)(2)(ii)	50.73(a)(2)(viii)(B)	
20.405(a)(1)(v)	50.73(a)(2)(iii)	50.73(a)(2)(x)	

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER
T. A. KRIESEL - TECHNICAL / PHYSICAL SCIENCES DEPARTMENT	AREA CODE 6 1 6 4 6 5 - 5 9 0 1

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	

SUPPLEMENTAL REPORT EXPECTED (14)		EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
X YES (If yes, complete EXPECTED SUBMISSION DATE)	NO		1 0	2 7	8 4

ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single-space typewritten lines) (16)

ON AUGUST 29, 1984 UNIT 1 AND UNIT 2 REACTOR COOLANT SYSTEMS IN MODE 1 AND BOTH UNITS AT 100 PERCENT REACTOR THERMAL POWER IT WAS DISCOVERED DURING A SPECIAL GAIN VERSUS THRESHOLD COMPARISON THAT THE CALIBRATION CONSTANTS USED BY THE EBERLINE RADIATION MONITORING SYSTEM TO CONVERT A CHANNEL RESPONSE IN COUNTS PER MINUTE INTO THE DESIRED UNITS (E.G., mR/HR, MICROCi/cc, AND MICROCi) HAD BEEN CALCULATED INCORRECTLY. AN ERROR WAS FOUND IN THE PROCEDURE USED TO RELATE THE PRIMARY SOURCE CALIBRATIONS DONE ORIGINALLY AND THE SECONDARY SOURCE CALIBRATIONS USED SUBSEQUENTLY. THUS, CALIBRATION CONSTANTS DETERMINED FROM THE PRIMARY SOURCE CALIBRATIONS WERE CORRECT BUT ALL CALIBRATION CONSTANTS CALCULATED FROM THE SECONDARY SOURCE CALIBRATIONS WERE INCORRECT. THE PROCEDURE USED TO CALCULATE THE CALIBRATION CONSTANTS WAS CHANGED TO CORRECT THE ERROR AND ALL CALIBRATION CONSTANTS WERE CORRECTED AND ENTERED INTO THE COMPUTER MEMORY OF THE RADIATION MONITORING SYSTEM. THE IMPACT OF HAVING INCORRECT CALIBRATION CONSTANTS FOR THE TECHNICAL SPECIFICATION CHANNELS USED TO MONITOR AND CONTROL THE RELEASE OF RADIOACTIVE MATERIAL ARE CURRENTLY UNDER INVESTIGATION. AREAS BEING ADDRESSED INCLUDE:

1. THE MAGNITUDE OF ERROR IN ALARM SETPOINTS.
2. POTENTIAL FOR VIOLATING DOSE LIMITS.
3. POTENTIAL FOR VIOLATING TECHNICAL SPECIFICATIONS.

A SUBSEQUENT LER WILL BE SUBMITTED ONCE THE FULL IMPACT OF THIS SITUATION HAS BEEN DETERMINED.

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ON 29 AUGUST 1984, WITH UNIT 1 and UNIT 2 REACTOR COOLANT SYSTEMS IN MODE 1 AND BOTH UNITS AT 100 PERCENT REACTOR THERMAL POWER, IT WAS DISCOVERED DURING A SPECIAL GAIN VERSUS THRESHOLD COMPARISON THAT THE CALIBRATION CONSTANTS USED BY THE EBERLINE RADIATION MONITORING SYSTEM HAD BEEN CALCULATED INCORRECTLY. AN ERROR WAS FOUND IN THE PROCEDURE USED TO RELATE THE PRIMARY SOUCE CALIBRATIONS DONE ORIGINALLY AND THE SECONDARY SOURCE CALIBRATIONS USED SUBSEQUENTLY. THUS, CALIBRATION CONSTANTS DETERMINED FROM THE PRIMARY SOURCE CALIBRATION WERE CORRECT BUT ALL CALIBRATION CONSTANTS CALCULATED FROM THE SECONDARY SOURCE CALIBRATIONS WERE INCORRECT.

THE CALIBRATION CONSTANTS ARE STORED IN A COMPUTER MEMORY FILE AND USED BY THE EBERLINE MICROCOMPUTER TO CONVERT A CHANNEL RESPONSE IN COUNTS PER MINUTE INTO THE DESIRED UNITS (E.G. mR/HR., MICROCi/cc AND MICROCi).

FORTY-EIGHT OF A PLANT TOTAL OF FIFTY-TWO RADIATION MONITORING CHANNELS ASSOCIATED WITH THE EBERLINE SYSTEM WERE AFFECTED BY THE PROCEDURAL ERROR. THE FOUR RADIATION MONITORING CHANNELS NOT AFFECTED ARE NOT CALIBRATED USING THE ERRONEOUS PROCEDURE.

ON 29 AUGUST 1984, THE PROCEDURE USED TO CALCULATE THE CALIBRATION CONSTANTS WAS CHANGED TO CORRECT THE ERROR. CALIBRATION CONSTANTS FOR THE EIGHTEEN CHANNELS REFERENCED IN TECHNICAL SPECIFICATIONS WERE CORRECTED AND ENTERED IN THE COMPUTER MEMORY ON 29 AUGUST. CALIBRATION CONSTANTS FOR THE REMAINING AFFECTED CHANNELS WERE CORRECTED AND ENTERED DURING THE FOLLOWING TWO WEEKS.

THE DIFFERENCE BETWEEN THE INCORRECT AND CORRECTED CALIBRATION CONSTANTS VARIED FROM -99 PERCENT TO +95 PERCENT. NEGATIVE PERCENT DIFFERENCES MEAN THAT THE INCORRECT CALIBRATION CONSTANTS WERE LESS THAN CORRECTED VALUES (I.E., NON CONSERVATIVE). THIRTY-EIGHT OF THE FORTY-EIGHT CHANNELS HAD INCORRECT CALIBRATION CONSTANTS WHICH WERE NON-CONSERVATIVE, THE REMAINING TEN WERE CONSERVATIVE. THE DIFFERENCE BETWEEN INCORRECT AND CORRECTED CALIBRATION CONSTANTS FOR THE EIGHTEEN TECHNICAL SPECIFICATION CHANNELS RANGED FROM -72 PERCENT TO +5 PERCENT. ALL BUT ONE OF THESE EIGHTEEN CHANNELS HAD INCORRECT CALIBRATION CONSTANTS THAT WERE NON-CONSERVATIVE. SEE ATTACHED TABLE FOR A LIST OF THESE CHANNELS.

DURING 1983, VRS-1505/2505 WERE USED ELEVEN TIMES TO QUANTIFY RELEASES MADE DURING CONTAINMENT PRESSURE RELIEF WHICH WOULD ADD 0.35 CURIES TO THE TOTAL NOBLE GAS RELEASED USING THE ADJUSTED CALIBRATION CONSTANTS. THIS IS .005 OF THE TOTAL NOBLE GAS RELEASED FOR ALL RELEASE POINTS. DURING THE FIRST SIX MONTHS OF 1984 THE MONITORS WERE USED MORE FREQUENTLY FOR QUANTIFICATION AND, USING THE ADJUSTED CALIBRATION CONSTANTS, THIS WOULD ADD 2.0 CURIES TO THE TOTAL NOBLE GAS RELEASED WHICH ALSO REPRESENTS .005 OF THE NOBLE GAS TOTAL FOR ALL RELEASE POINTS. RELEASES QUANTIFIED USING VRS-1505/2505 DURING JULY AND AUGUST 1984 HAVE BEEN CORRECTED AND WILL BE INCLUDED IN THE SEMI-ANNUAL REPORT FOR THE SECOND HALF OF 1984.

TECHNICAL SPECIFICATION CONTAINMENT MONITORS (SEE ATTACHED TABLE) HAVE ALARM SETPOINTS WHICH ARE TWICE THE "NORMAL" CHANNEL READING. IF THE RESPONSE FROM THESE CHANNELS HAD INCREASED BY A FACTOR OF TWO, ALARMS WOULD HAVE ANNUNCIATED AND APPROPRIATE TRIP FUNCTIONS ACTUATED.

THE RADIATION MONITORING CHANNELS WERE STILL OPERABLE IN THAT THE CHANNELS WERE CAPABLE OF MONITORING CHANGES IN RADIATION LEVELS. IF THE RADIATION LEVELS HAD INCREASED, THE APPROPRIATE CONTROL ROOM READINGS WOULD HAVE INCREASED. IF THE RADIATION MONITORS HAD BEEN USED FOR EMERGENCY DOSE ASSESSMENT THE DOSES WOULD HAVE BEEN NON-CONSERVATIVE DUE TO THE NON-CONSERVATIVE CALIBRATION CONSTANTS.

THE ERROR IN THE PROCEDURE USED TO CALCULATE THE CALIBRATION CONSTANTS WAS CAUSED BY PERSONNEL ERROR ON THE PART OF THE ORIGINATOR AND THE MISTAKE NOT BEING FOUND DURING THE REVIEW OF THE PROCEDURE PRIOR TO ISSUE. OTHER PROCEDURES USED TO PERFORM SECONDARY SOURCE CALIBRATIONS ARE BEING CAREFULLY EVALUATED TO SEE WHAT, IF ANY, CHANGES ARE NEEDED.

THE IMPACT OF HAVING INCORRECT CALIBRATION CONSTANTS FOR THE TECHNICAL SPECIFICATION CHANNELS USED TO MONITOR AND CONTROL THE RELEASE OF RADIOACTIVE MATERIAL ARE CURRENTLY UNDER INVESTIGATION. AREAS BEING ADDRESSED INCLUDE:

1. MAGNITUDE OF ERROR IN ALARM SETPOINTS.
2. POTENTIAL FOR VIOLATING DOSE LIMITS.
3. POTENTIAL FOR VIOLATING TECHNICAL SPECIFICATIONS.

A SUBSEQUENT LER WILL BE SUBMITTED ONCE THE FULL IMPACT OF THE SITUATION HAS BEEN DETERMINED.

LIST OF TECHNICAL SPECIFICATION CHANNELS
UNIT 1

TAG NO.	DESCRIPTION	PERCENT DIFFERENCE
VRS-1101	NORMAL RANGE CONTAINMENT AREA MONITOR	-67.4
VRS-1201	NORMAL RANGE CONTAINMENT AREA MONITOR	-71.6
ERS-1301	LOWER CONTAINMENT AIRBORNE PARTICULATE	- 9.3
ERS-1401	LOWER CONTAINMENT AIRBORNE PARTICULATE	-68
ERS-1305	LOWER CONTAINMENT AIRBORNE NOBLE GAS	-70
ERS-1405	LOWER CONTAINMENT AIRBORNE NOBLE GAS	-68.5
VRS-1505	UNIT VENT - NOBLE GAS	- 6.3
SRA-1805	GLAND STEAM CONDENSER VENT - NOBLE GAS	-10.1
SRA-1905	STEAM JET AIR EJECTOR - NOBLE GAS	- 3.2

UNIT 2

VRS-2101	NORMAL RANGE CONTAINMENT AREA MONITOR	-19
VRS-2201	NORMAL RANGE CONTAINMENT AREA MONITOR	-25
ERS-2301	LOWER CONTAINMENT AIRBORNE PARTICULATE	- 9.0
ERS-2401	LOWER CONTAINMENT AIRBORNE PARTICULATE	-14.0
ERS-2305	LOWER CONTAINMENT AIRBORNE NOBLE GAS	-68.1
ERS-2405	LOWER CONTAINMENT AIRBORNE NOBLE GAS	+ 5.0
VRS-2505	UNIT VENT - NOBLE GAS	-68.0
SRA-2805	GLAND STEAM CONDENSER VENT - NOBLE GAS	- 9.5
SRA-2905	STEAM JET AIR EJECTOR - NOBLE GAS	-13.7

$$\text{PERCENT DIFFERENCE} = \frac{\text{INCORRECT CALIBRATION CONSTANT} - \text{CORRECTED CALIBRATION CONSTANT}}{\text{CORRECTED CALIBRATION CONSTANT}}$$

American Electric Power System
INDIANA & MICHIGAN ELECTRIC COMPANY
DONALD C. COOK NUCLEAR PLANT
P.O. Box 458, Bridgman, Michigan 49106
(616) 465-5901

September 28, 1984

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Document Control Manager:

In accordance with the criteria established by 10CFR50.73 entitled Licensee Event Reporting System, the following report/s are being submitted:

RO 84-021-0

Sincerely,

W.G. Smith, Jr.
Plant Manager

/cbm

Attachment

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