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Closeout of IE Bulletin 78-08: Radiation Levels From Fuel Element Transfer Tubes

Prepared by W. J. Foley, R. S. Dean, A. Hennick

PARAMETER, Inc.

Prepared for U.S. Nuclear Regulatory Commission

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Closeout of IE Bulletin 78-08: Radiation Levels From Fuel Element Transfer Tubes

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Prepared by W. J. Foley, R. S. Dean, A. Hennick

PARAMETER, Inc. 13380 Watertown Plank Road Elm Grove, WI 53122

Prepared for Division of Emergency Preparedness and Engineering Response Office of Inspection and Enforcement U.S. Nuclear Regulatory Commission Washington, DC 20555 NRC FIN B8729

ABSTRACT

On April 5, 1978, two radiation protection technicians accidentally entered a high radiation area adjacent to an exposed section of the fuel element transfer tube at Trojan Nuclear Power Plant. On June 12, 1978, IE Bulletin 78-08 was issued by the NRC to alert licensees to the event and to reduce the potential for serious personnel wholebody exposure due to uncontrolled access to very high radiation areas. Holders of operating licenses for power and non-power (research and test) reactors with fuel element transfer tubes were required to take specific actions and report results. Evaluation of licensees' responses and NRC/IE inspection reports and memorandums shows that the bulletin can be closed out per specific criteria for 61 (92%) of the 66 operating power facilities and for all of the 64 operating non-power facilities affected by the bulletin. Followup items for the remaining five (5) power facilities are proposed for use by NRC/IE, to document inspection commitments and to ensure satisfactory completion of required action. Conclusions are presented and remaining areas of concern are identified.

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CLOSEOUT OF IE BULLETIN 78-08: RADIATION LEVELS FROM FUEL ELEMENT TRANSFE& TUBES

INTRODUCTION

In accordance with the Statement of Work in Task Order 002 under Contract NRC 05-85-157-02, this report provides documentation for the closeout status of IE Bulletin 78-08. Documentation is based on the records obtained from the NRC Public Document Room and the NRC Document Control System.

IE Bulletin 78-08 was issued June 12, 1978 because of concern about the accidental entry of two radiation protection technicians into a high radiation area adjacent to an exposed section of the fuel element transfer tube at Trojan Nuclear Power Plant. In order to ensure positive control of access to high radiation areas, holders of operating licenses for power and non-power (research and test) reactors with fuel element transfer tubes were required to take specific actions and report results.

For background information, IE Bulletin 78-08, relevant subparagraphs of the Code of Federal Regulations, and a pertinent excerpt from standard technical specifications are included in Appendix A. Evaluation of licensees' responses and NRC/IE inspection reports and memorandums is documented in Appendix B as the basis for bulletin closeout. Followup items are proposed in Appendix C for use by NRC/IE in assuring satisfactory completion of corrective action. Abbreviations used in this report and associated documents are presented in Appendix D.

SUMMARY

1. The bulletin has been closed out for the following facilities because they have been shut down indefinitely (Criterion 1):

(a)	Power Facilities (4)		
	Dresden 1	Indian Point	1
	Humboldt Bay 3	TMI 2	

1

- (b) Non-Power Facilities (4)

 U of Delaware 50-098 (dismantled and terminated)
 Georgia Inst 50-276 (being decommissioned)
 Catholic U of America
 Columbia U

 The bulletin has been closed out for the following facilities because they do not have fuel element transfer tubes
- because they do not have fuel element transfer tubes (Criterion 2):

(a) Power Facilities (25)

Big Rock Point 1	FitzPatrick	Nine Mile Point 1
Browns Ferry 1,2,3	Fort St. Vrain	Oyster Creek 1
Brunswick 1,2	Hatch 1,2	Peach Bottom 2,3
Cooper Station	La Crosse	Pilgrim 1
Dresden 2,3	Millstone 1	Quad Cities 1,2
Duane Arnold	Monticello	Vermont Yankee 1

(b) Non-Power Facilities (62)

Tuskegee Inst U of Arizona U of California, Berkeley RIC Northrop Labs U of California, Irvine U of California, L.A. GA, San Diego (50-163) GA, San Diego (50-089) GE, San Jose (50-070) GE, San Jose (50-073) California State Poly Aerotest Operations U of California, Santa Barbara USGSD U of Florida Georgia Inst (50-160) Idaho State U U of Illinois (50-356) U of Illinois (50-151) W, Zion Purdue U Iowa State U U of Kansas Kansas State U AFRRI U of Maryland MIT U of Lowell Worchester Poly U of Michigan

Michigan State U Dow Chemical U of Missouri, Columbia U of Missouri, Rolla The VA Hospital U of New Mexico Manhatten College Cornell U (50-157) Cornell U (50-097) Union Carbide North Carolina State U Ohio State U U of Oklahoma Oregon State U Reed College Penn State U RINSC Memphis State U U of Texas Texas A&M U (50-059) Texas A&M U (50-128) BYU U of Utah (50-407) U of Utah (50-072) Virginia Poly U of Virginia (50-396) U of Virginia (50-062) B&W, Lynchburg Washington State U U of Washington U of Wisconsin

3. The bulletin has been closed out for the following facilities on the basis of acceptable responses and favorable NRC/IE inspection reports and memorandums (Criterion 3):

(a) Power Facilities (36)

Beaver Valley 1	Indian Point 2,3	Rancho Seco 1
Calvert Cliffs 1,2	Kewaunee	Robinson 2
Cook 1	Maine Yankee	Salem 1
Crystal River 3	Millstone 2	San Onofre 1
Davis-Besse 1	North Anna 1	Surry 1,2
Farley 1	Oconee 1,2,3	TMI 1
Fort Calhoun 1	Palisades	Trojan
Ginna	Point Beach 1	Turkey Point 3,4
Haddam Neck	Prairie Island 1,2	Yankee-Rowe 1
		Zion 1,2

(b) Non-Power Facilities (2)

State U of N.Y. NBS

4. The bulletin is called open for the following facilities. Followup items for these facilities are proposed in Appendix C for use by NRC/IE.

Power Facilities (5)

Arkansas 1,2 Point Beach 2 Cook 2 St Lucie 1

CONCLUSIONS

- Actual overdoses of radiation from fuel element transfer tubes were reported only for Trojan. The incident at Trojan led to issuance of IEB 78-08.
- The possibility of accidental access to areas of concern near fuel element transfer tubes was reported and corrected for about 19 power facilities. This significant number of affected facilities is an indication of the effectiveness of the bulletin.
- 3. The bulletin is closed out for all of the non-power facilities.

REMAINING AREAS OF CONCERN

- Followup items for five (5) operating power facilities are proposed in Appendix C. The NRC Regions have informed IE Headquarters that they plan to follow up and will attempt to close out the bulletin during the next scheduled, routine inspections.
- 2. As described in Licensee Event Report No. 84-010-00 dated 05-04-84 for Farley units 1 and 2, it was determined on 04-06-84 that proper local leak rate tests of the fuel element transfer tubes had not been made since 05-29-79 for Unit 1 and 09-08-80 for Unit 2. Improper test results had been caused by using test connections which were not specified correctly. This error was corrected by revising test procedures FNP-1-STP-627 and FNP-2-STP-627 (Local Leak Rate Testing of Containment Penetrations) and repeating the tests. Before any repairs were made, it was found that local leak rates were acceptable. The error in test connections was caused indirectly by modifications made per IEB 78-08.
- 3. Although the bulletin has been closed out for the following eight (8) facilities, followup of open items identified in the listed inspection reports (but not igned followup item numbers) is recommended:

P	Inspection		Inspection
Facility	Report	Facility	Report
Beaver Valley 1	78-22(09-22-78)	Oconee 3	78-27(12-04-78)
Haddam Neck	78-23(09-08-78)	San Onofre 1	78-11(09-06-78)
Oconee 1	78-27(12-04-78)	Surry 1	80-11(05-09-80)
Oconee 2	78-26(12-04-78)	Surry 2	80-12(05-09-80)

CRITERIA FOR CLOSEOUT OF BULLETIN

The bulletin is closed out for facilities to which one of the following criteria applies:

- 1. The facility has been shut down indefinitely (SDI).
- 2. A response for the facility or an NRC memorandum indicates that the facility does not have a fuel element transfer tube.

Note:

a) In some cases, the NRC region stated that the facility did not have a fuel element transfer tube and did not issue the bulletin. Criterion 2 is applied in these cases and the NRC letter is noted.

- b) Criterion 2 is applied to certain GE BWRs per Note 6 in Table B.1 and Note 2 in Table B.3.
- c) Criterion 2 is applied to La Crosse on the basis of an inspection report which is identified in Table B.1.
- d) As noted in Table B.3, Criterion 2 is applied to a number of non-power facilities on the basis of regional memorandums to NRC Headquarters.
- 3. An acceptable response for the facility and an NRC/IE inspection report or memorandum indicate compliance with all five actions required by the bulletin.

Note:

- For application of Criterion 3 to a power facility, an inspection report or memorandum signed by a radiation specialist (or equivalent in expertise) is needed.
- b) An inspection report signed by a person who is not a radiation specialist (or equivalent in expertise) suffices for application of Criterion 3 to a non-power facility. This is because the defueling process is much less complex and the likelihood of an unrecognized, serious problem due to defective (or lack of) shielding is very remote at a non-power facility.

APPENDIX A

Background Information

NUCLEAR REGULATORY COMMISSION OFFICE OF INSPECTION AND ENFORCEMENT WASHINGTON, D.C. 20555

June 12, 1978

IE Bulletin 78-08

RADIATION LEVELS FROM FUEL ELEMENT TRANSFER TUBES

Description of Circumstances:

On April 5, 1978, two radiation protection technicians at Portland General Electric Company's Trojan Nuclear Power Plant received whole body radiation doses of 27.3 and 17.1 rem while performing a survey adjacent to an exposed section of the fuel element transfer tube during the plant's first refueling outage. The exposures occurred in a shielded space inside the containment building which housed one of two fuel element transfer tube seismic relief bellows. The second bellows outside of containment had been provided with removable shielding and appropriate access controls. The bellows space inside containment was constructed with labyrinth-type shielding, however, access to the space was not controlled. The technicians were performing surveys in an attempt to identify a reported possible source of higher than expected radiation and had scheduled the survey to coincide with the passage of a fuel element through the fuel element transfer tube. The technicians believed that the fuel element transfer tube was buried in the concrete beyond the compartment they occupied and assumed that the structure passing through the compartment was a ventilation duct.

The licensee staff had performed surveys of all areas of the plant during the outage in an attempt to identify intermittent sources of radiation resulting from refueling activities; however, nothing significant was identified because of the transient nature of the resulting radiation fields. Subsequent to the exposures, the licensee performed surveys in numerous areas surrounding the general area of the fuel transfer tube with an irradiated fuel element stopped in the transfer tube. The surveys identified a number of areas previously unidentified where significant radiation streaming was present. The principal paths of radiation streaming were the narrow seismic relief spaces between the containment and internal and external structures.

1 of 2

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IE Bulletin 78-08

June 12, 1978

Action To Be Taken By Licensees:

While the exposures above occurred at a pressurized water reactor, similar situations could occur at any reactor facility designed to transfer spent fuel between the reactor refueling canal and a spent fuel storage pool outside of containment by means of a fuel element transfer tube. Accordingly, holders of power, test and research reactor operating licenses where plant design incorporates a fuel element transfer tube, are to take the following actions:

- Perform a thorough review of shielding design of plant areas adjacent to the fuel transfer tube to identify potential high radiation areas, both continuous and transient, as defined in 10 CFR 20.202(b).
- Assure that positive control of access exists or is included in the facility design for entryways into potential high radiation areas where a portion of a fuel transfer tube is accessible in an unshielded condition.
- Assure that points of access to potential high radiation areas associated with accessible unshielded portions of a fuel transfer tube are conspicuously posted in accordance with 10 CFR 20.203(c).
- 4. If the action from Paragraph 1 above identifies the potential for radiation streaming from shielded spaces, plan and conduct special radiation surveys during the next refueling to identify and control such areas. It is not necessary to survey in areas where the transfer tube is exposed, but if it is found desirable, extreme care should be exercised to control and limit personnel exposure. Care should also be taken in planning surveys and fuel movements such that survey requirements do not override any technical limitations on fuel movement.
- 5. Confirm by written reply to the NRC Regional Office within 60 days that the actions for Items 1-4 above have been or are being taken. A record, detailing findings, actions taken, and actions to be taken, should be retained for review by NRC during subsequent radiological safety inspection.

Approved by GAO, B180225 (R0072); clearance expires 7-31-80. Approval was given under a blanket clearance specifically for identified generic problems.

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Subparagraphs 20.202(b) and 20.203(c) of Title 10 CFR Chapter 1

\$ 20.201

reports of such services to the Commission.

PRECAUTIONARY PROCEDURES

§ 20.201 Surveys.

(a) As used in the regulations in this part, "survey" means an evaluation of the radiation hazards incident to the production, use, release, disposal, or presence of radioactive materials or other sources of radiation under a specific set of conditions. When appropriate, such evaluation includes a physical survey of the location of materials and equipment, and measurements of levels of radiation or concentrations of radioactive material present.

(b) Each licensee shall make or cause to be made such surveys as (1) may be necessary for the licensee to comply with the regulations in this part, and (?) are reasonable under the circumstances to evaluate the extent of radiation hazards that may be present.

125 FR 10914, Nov. 17, 1960, as amended at 46 FR 53648, Oct. 30, 19811

§ 20.202 Personnel monitoring.

(a) Each licensee shall supply appropriate personnel monitoring equipment to, and shall require the use of such equipment by:

(1) Each individual who enters a restricted area under such circumstances that he receives, or is likely to receive, a dose in any calendar quarter in excess of 25 percent of the applicable value specified in paragraph (a) of § 20.101.

(2) Each individual under 18 years of age who enters a restricted area under such circumstances that he receives, or is likely to receive, a dose in any calendar quarter in excess of 5 percent of

10 CFR Ch. I (1-1-86 Edition)

the applicable value specified in paragraph (a) of § 20.101.

(3) Each individual who enters a high radiation area.

(b) As used in this part,

(1) "Personnel monitoring equipment" means devices designed to be worn or carried by an individual for the purpose of measuring the dose received (e.g., film badges, pocket chambers, pocket dosimeters, film rings, etc.);

(2) "Radiation area" means any area, accessible to personnel, in which there exists radiation, originating in whole or in part within licensed material, at such levels that a major por tion of the body could receive in any one hour a dose in excess of 5 millirem, or in any 5 consecutive days a dose in excess of 100 millirems;

(3) "High radiation area" means any area, accessible to personnel, in which there exists radiation originating in whole or in part within licensed material at such levels that a major portion of the body could receive in any one hour a dose in excess of 100 millirem.

\$ 20.203 Caution signs, labels, signals and controls.

(a) General. (1) Except as otherwise authorized by the Commission, symbols prescribed by this section shall use the conventional radiation caution colors (magenta or purple on yellow background). The symbol prescribed by this section is the conventional three-bladed design:

RADIATION SYMBOL

1. Cross-hatched area is to be magenta or purple.

2. Background is to be yellow.

Note: These subparagraphs are mentioned in actions 1 and 3 of the bulletin.

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- 20.202(b)

Nuclear Regulatory Commission



(2) In addition to the contents of signs and labels prescribed in this section, licensees may provide on or near such signs and labels any additional information which may be appropriate in aiding individuals to minimize exposure to radiation or to radioactive material.

(b) Radiation areas. Each radiation area shall be conspicuously posted with a sign or signs bearing the radiation caution symbol and the words:

CAUTION '

RADIATION AREA

20.203 (c) (c) High radiation areas. (1) Each high radiation area shall be conspicuously posted with a sign or signs bearing the radiation caution symbol and the words:

CAUTION 1

HIGH RADIATION AREA

(2) Each entrance or access point to a high radiation area shall be:

'Or "Danger".

Note: Because it does not apply to reactors, 20.203(c)(6) has been omitted from this copy. The majority of nuclear power facilities have opted to control high radiation areas in accordance with the following excerpt from standard technical specifications (or an earlier, similar version). See pages A-5 and A-6.

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(i) Equipped with a control device which shall cause the level of radiation to be reduced below that at which an individual might receive a dose of 100 millirems in 1 hour upon entry into the area; or

(ii) Equipped with a control device which shall energize a conspicuous visible or audible alarm signal in such a manner that the individual entering the high radiation area and the licensee or a supervisor of the activity are made aware of the entry; or

(iii) Maintained locked except during periods when access to the area is required, with positive control over each individual entry.

(3) The controls required by paragraph (c)(2) of this section shall be established in such a way that no individual will be prevented from leaving a high radiation area.

(4) In the case of a high radiation area established for a period of 30 days or less, direct surveillance to prevent unauthorized entry may be substituted for the controls required by paragraph (c)(2) of this section.

(5) Any licensee, or applicant for a license, may apply to the Commission for approval of methods not included in paragraphs (c)(2) and (4) of this section for controlling access to high radiation areas. The Commission will approve the proposed alternatives if the licensee or applicant demonstrates that the alternative methods of control will prevent unauthorized entry into a high radiation area, and that the requirement of paragraph (c)(3) of this section is met.

§ 20.203

EXCERPT FROM STANDARD TECHNICAL SPECIFICATIONS

ADMINISTRATIVE CONTROLS

6.2 HIGH RADIATION AREA (Optional)

6.12.1 In lieu of the "control device" or "alarm signal" required by paragraph 20.203(c)(2) of 10 CFR Part 20, each high radiation area, as defined in 10 CFR Part 20, in which the intensity of radiation is equal to or less than 1000 mR/h at 45 cm (18 in.) from the radiation source or from any surface which the radiation penetrates shall be barricaded and conspicuously posted as a high radiation area and entrance thereto shall be controlled by requiring issuance of a Radiation Work Permit (RWP). Individuals qualified in radiation protection procedures (e.g., Health Physics Technician) or personnel continuously escorted by such individuals may be exempt from the RWP issuance requirement during the performance of their assigned duties in high radiation areas with exposure rates equal to or less than 1000 mR/h, provided they are otherwise following plant radiation protection procedures for entry into such high radiation areas. Any individual or group of individuals permitted to enter such areas shall be provided with or accompanied by one or more of the following:

- a. A radiation monitoring device which continuously indicates the radiation dose rate in the area, or
- b. A radiation monitoring device which continuously integrates the radiation dose rate in the area and alarms when a preset integrated dose is received. Entry into such areas with this monitoring device may be made after the dose rate levels in the area have been established and personnel have been made knowledgeable of them, or
- c. An individual qualified in radiation protection procedures with a radiation dose rate monitoring device, who is responsible for providing positive control over the activities within the area and shall perform periodic radiation surveillance at the frequency specified by the (Radiation Protection Manager) in the RWP.

6.12.2 In addition to the requirements of Specification 6.12.1, areas accessible to personnel with radiation levels greater than 1000 mR/h. at 45 cm (18 in.) from the radiation source or from any surface which the radiation penetrates shall be provided with locked doors to prevent unauthorized entry, and the keys shall be maintained under the administrative control of the Shift Foreman on duty and/or health physics supervision. Doors shall remain locked except during periods of access by personnel under an approved RWP which shall specify the dose rate levels in the immediate work areas and the maximum allowable stay time for individuals in that area. In lieu of the stay time specification of the RWP, direct or remote (such as closed circuit TV cameras) continuous surveillance may be made by personnel qualified in radiation protection procedures to provide positive exposure control over the activities being performed within the area. For individual high radiation areas accessible to personnel with radiation levels of greater than 1000 mR/h that are located within large areas, such as PWR containment where no enclosure exists for purposes of locking, and where no enclosure can be reasonably constructed around the individual area, that individual area shall be barricaded, conspicuously posted, and a flashing light shall be activiated as a warning device.

APPENDIX B

Documentation of Bulletin Closeout

					Utility		Closeo	ut
			Facility	NRC	Response	Inspection	Status	and
Facility	Utility	Docket	Status	Region	Date	Report and Date	Criter	ion
Arkansas 1	AP&L	50-313	OL.	IV	08-14-78		Open	
Arkansas 2	AP&L	50-368	OL	IV	08-14-78	86-17(08-11-86)	Open	
Beaver Valley 1	DLC	50-334	OL	I	08-07-78	See Note 4	Closed	3
						78-22(09-22-78)		
Big Rock Point 1	CPC	50-155	OL	III		See Note 6	Closed	2
Browns Ferry 1	TVA	50-259	OL	II		See Note 6	Closed	2
Browns Ferry 2	TVA	50-260	OL	II		See Note 6	Closed	2
Browns Ferry 3	TVA	50-296	OL	II		See Note 6	Closed	2
Brunswick 1	CP&L	50-325	OL	II	07-18-78	84-13(07-19-84)	Closed	2
Brunswick 2	CP&L	50-324	OL	II	07-18-78	84-13(07-19-84)	Closed	2
Calvert Cliffs 1	BG&E	50-317	OL	I	07-21-78	See Note 4	Closed	3
Calvert Cliffs 2	BG&E	50-318	OL	I	07-21-78	See Note 4 79-07(08-06-79)	Closed	3
Cook 1	IMECO	50-315	OL	III	08-11-78	79-14(06-20-79)	Closed	3
Cook 2	IMECO	50-316	OL	III	08-11-78		Open	-
Cooper Station	NPPD	50-298	OL	IV		See Note 6	Closed	2
Crystal River 3	FP	50-302	OL	II	08-15-78	81-08(06-22-81)	Closed	3
Davis-Besse 1	TECO	50-346	OL	III	08-10-78	86-21(08-08-86)	Closed	3
Dresden 1	CECO	50-010	SDI	III			Closed	1
Dresden 2	CECO	50-237	OL	JII		84-03(04-10-84)	Closed	2
Dresden 3	CECO	50-249	OL	III		84-02(04-10-84)	Closed	2
Duane Arnold	IELPCO	50-331	OL	III		See Note 6	Closed	2
Farley 1	APCO	50-348	OL	II	08-08-78	50-364/81-09	Closed	3
FitzPatrick	PASNY	50-333	01	т	11-01-70	See Note 4	Closed	2
Fort Calhoun 1	OPPD	50-285	OL	TV	08-18-78	<u>81-12(07-28-81)</u>	Closed	2
tore darnoun i	ULLD	50-205	OL	1.	03-27-80	51-12(07-20-01)	crosed	2
Fort St. Vrain	PSCC	50-267	01.	TV	08-11-78		Closed	2
Ginna	RG&E	50-244	OL	I	08-11-78	See Note 4 78-25(12-13-78)	Closed	3

TABLE B.1 BULLETIN CLOSEOUT STATUS OF OPERATING POWER REACTORS

See notes at end of table.

TABLE B.1 (contd.)

					Utility		Closeou	it
			Facility	NRC	Response	Inspection	Status	and
Facility	Utility	Docket	Status	Region	Date	Report and Date	Criteri	lon
Haddam Neck	СУАРСО	50-213	OL	I	08-15-78	See Note 4 78-23(09-08-78)	Closed	3
Hatch 1	GPC	50-321	OL	II		See Note 6	Closed	2
Hatch 2	GPC	50-366	OL	II		See Note 6	Closed	2
Humboldt Bay 3	PG&E	50-133	SDI	V		See Note 5	Closed	1
Indian Point 1	ConEd	50-003	SDI	I	07-14-78	See Note 4 78-11(09-20-78)	Closed	1
Indian Point 2	ConEd	50-247	OL	I	07-14-78	See Note 4 78-29(09-20-78)	Closed	3
Indian Point 3	PASNY	50-286	OL	I	08-02-78	See Note 4 78-22(09-05-78)	Closed	3
Kewaunee	WPS	50-305	OL	III	08-11-78	78-18(11-28-78)	Closed	3
La Crosse	DPC	50-409	OL	III		78-07(07-31-78)	Closed	2
Maine Yankee	MYAPCO	50-309	OL	I	08-04-78	See Note 4 81-11(01-18-82)	Closed	3
Millstone 1	NNECO	50-245	OL	I		See Note 6	Closed	2
Millstone 2	NNECO	50-336	OL	I	07-18-78	See Note 4 78-33(11-21-78) 80-12(10-14-80)	Closed	3
Monticello	NSP	50-263	UL	III		See Note 6	Closed	2
Nine Mile Point 1	NMP	50-220	OL	I		See Note 4	Closed	2
North Anna 1	VEPCO	50-338	OL	II	08-14-78	78-28(10-24-78) 79-45(12-04-79) 81-16(08-18-81)	Closed	3
Oconee 1	DUPCO	50-269	OL	II	08-11-78	78-27(12-04-78)	Closed	3
Oconee 2	DUPCO	50-270	OL	II	08-11-78	78-26(12-04-78)	Closed	3
Oconee 3	DUPCO	50-287	OL	11	08-11-78	78-27(12-04-78)	Closed	3
Oyster Creek 1	JCP&L	50-219	OL	I		See Note 4	Closed	2
Palisades	CPC	50-255	OL	III	08-11-78 03-04-80	79-19(02-06-80)	Closed	3
Peach Bottom 2	PECO	50-277	OL	I		See Note 4	Closed	2
Peach Bottom 3	PECO	50-278	OL	I		See Note 4	Closed	2
Pilgrim 1	BECO	50-293	OL	I		See Note 4	Closed	2

See notes at end of table.

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TABLE B.1 (contd.)

						Utility	Closeout
			Facility	NRC	Response	Inspection	Status and
Facility	Utility	Docket	Status	Region	Date	Report and Date	Criterion
Point Beach 1	WEPCO	50-266	OL	III	07-06-78	78-18(12-01-78)	Closed 3
Point Beach 2	WEPCO	50-301	OL	III	07-06-78	78-21(12-01-78)	Open
Prairie Island 1	NSP	50-282	OL	III	07-12-78	78-18(01-08-79)	Closed 3
Prairie Island 2	NSP	50-306	0L	III	07-12-78	78-18(01-08-79)	Closed 3
Quad Cities 1	CECO	50-254	OL	III		See Note 6	Closed 2
Quad Cities 2	CECO	50-265	OL	III		See Note 6	Closed 2
Rancho Seco 1	SMUD	50-312	OL	V	08-15-78	See Note 5 78-15(10-20-78)	Closed 3
Robinson 2	CP&L	50-261	OL	II	08-14-78	79-14(07-19-79) 79-22(10-18-79)	Closed 3
Salem 1	PSE&G	50-272	OL	Ι	08-07-78	See Note 4 78-30(12-28-78)	Closed 3
San Onofre 1	SCE	50-206	OL	V	08-09-78	See Note 5 78-11(09-06-78)	Closed 3
St. Lucie 1	FPL	50-335	OL	II	08-11-78	78-19(09-27-78) 79-32(01-03-80)	Open
Surry 1	VEPCO	50-280	OL	II	08-14-78	80-11(05-09-80)	Closed 3
Surry 2	VEPCO	50-281	OL	II	08-14-78	80-12(05-09-80)	Closed 3
TMI 1	Met-Ed	50-289	OL	Ι	08-15-78	See Note 4 81-29(11-05-81)	Closed 3
TMI 2	Met-Ed	50-320	SDI	I	08-15-78	See Note 4	Closed 1
Trojan	PGE	50-344	OL	V	08-14-78	See Note 5 78-21(10-19-78)	Closed 3
Turkey Point 3	FPL	50-250	OL	II	08-11-78	79-10(04-20-79)	Closed 3
Turkey Point 4	FPL	50-251	OL	II	08-11-78	78-21(11-03-78)	Closed 3
Vermont Yankee 1	VYNP	50-271	OL	Ι		See Note 4	Closed 2
Yankee-Rowe 1	YAECO	50-029	OL	Ι	07-24-78	See Note 4 78-19(12-20-78) 81-21(01-18-82)	Closed 3
Zion 1	CECO	50-295	OL	III		86-04(09-03-86)	Closed 3
Zion 2	CECO	50-304	OL	III		86-04(09-03-86)	Closed 3

See notes on following page.

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Notes for Table B.1:

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- 1. Facility Status is based on Reference 1, Page B-10.
- 2. The following abbreviations apply to facility status:

OL. Operating License; SDI, Shut Down Indefinitely.

- 3. Refer to Page 4 for Bulletin Closeout Criteria.
- 4. Refer to memorandum of August 30, 1978 for L. J. Cunningham (IE/HQ) from H. W. Crocker, Acting Chief, Fuel Facility and Material Safety Branch (RI).
- Refer to memorandum of August 24, 1978 for L. J. Cunningham (IE/HQ) from F. Wenslawski, Chief, Reactor Radiation Safety Section (RV).
- 6. As documented per Reference 4 (see Page B-10), this facility does not have a fuel element transfer tube. Refer to Table B.3, Note 2, Page B-9.

				Licensee		Closeout
			NRC	Response	Inspection	Status and
State	Licensee	Docket	Region	Date	Report and Date	Criterion
AL	Tuskegee Inst	50-406	II	06-29-78		Closed 2
AZ	U of Arizona	50-113	V		See Note 4	Closed 2
CA	U of California, Berkeley	50-224	V		See Note 4	Closed 2
CA	RIC	50-375	V		See Note 4	Closed 2
CA	Northrop Labs	50-187	V		See Note 4	Closed 2
CA	U of California, Irvine	50-326	V		See Note 4	Closed 2
CA	U of California, L.A.	50-142	V		See Note 4	Closed 2
CA	GA, San Diego	50-163	V		See Note 4	Closed 2
CA	GA, San Diego	50-089	V		See Note 4	Closed 2
CA	GE, San Jose	50-073	V		See Note 4	Closed 2
CA	GE, San Jose	50-070	V		See Note 4	Closed 2
CA	California State Poly	50-394	V		See Note 4	Closed 2
CA	Aerotest Operations	50-228	V		See Note 4	Closed 2
CA	U of California, Santa Barbara	50-433	V		See Note 4	Closed 2
CO	USGSD	50-274	IV		See Note 5	Closed 2
DE	U of Delaware	50-098	I		See Note 7	Closed 1
DC	Catholic U of America	50-077	I		See Note 10	Closed 1
DC	NBS	50-184	I		See Note 3	Closed 3
FL	U of Florida	50-083	II		See Note 11	Closed 2
GA	Georgia Inst	50-276	II		See Note 8	Closed 1
GA	Georgia Inst	50-160	II	06-15-78		Closed 2
ID	Idaho State U	50-284	IV		See Note 5	Closed 2
IL	U of Illinois	50-356	III	06-16-78		Closed 2
IL	U of Illinois -	50-151	III	06-16-78		Closed 2
IL	W, Zion	50-087	III	10-05-78		Closed 2
IN	Purdue U	50-182	III	06-20-78		Closed 2
IA	Iowa State U	50-116	III	06-19-78		Closed 2

TABLE B.2 BULLETIN CLOSEOUT STATUS OF OPERATING NON-POWER REACTORS

See notes at end of table.

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				Licensee	1	Closeout
			NRC	Response	Inspection	Status and
State	Licensee	Docket	Region	Date	Report and Date	Criterion
KS	U of Kansas	50-148	IV		See Note 5	Closed 2
KS	Kansas State U	50-188	IV		See Note 5	Closed 2
MD	AFRRI	50-170	Ι		See Note 3	Closed 2
MD	U of Maryland	50-166	Ι		See Note 10	Closed 2
MA	MIT	50-020	Ι		See Note 3	Closed 2
MA	U of Lowell	50-223	Ι		See Note 3	Closed 2
MA	Worchester Poly	50-134	Ι		See Note 10	Closed 2
MI	U of Michigan	50-002	III	06-21-78	See Note 9	Closed 2
MI	Michigan State U	50-294	III		See Note 9	Closed 2
MI	Dow Chemical	50-264	III		See Note 9	Closed 2
MO	U of Missouri, Columbia	50-186	III	06-19-78		Closed 2
MO	U of Missouri, Rolla	50-123	III	06-15-78	See Note 9	Closed 2
NE	The VA Hospital	50-131	IV		See Note 5	Closed 2
NM	U of New Mexico	50-252	IV		See Note 5	Closed 2
NY	Manhattan College	50-199	I		See Note 10	Closed 2
NY	State U of N.Y.	50-057	I		See Note 3	Closed 3
NY	Cornell U	50-157	I		See Note 10	Closed 2
NY	Cornell U	50-097	Ι		See Note 10	Closed 2
NY	Columbia U	50-208	I		See Note 10	Closed 1
NY	Union Carbide	50-054	I	05-04-79	See Note 3	Closed 2
NC	North Carolina State U	50-297	II		See Note 11	Closed 2
ОН	Ohio State U	50-150	III	07-20-78		Closed 2
OK	U of Oklahoma	50-112	IV		See Note 5	Closed 2
OR	Oregon State U	50-243	V		See Note 4	Closed 2
OR	Reed College	50-288	V		See Note 4	Closed 2
PA	Penn State U	50-005	Ι		See Note 3	Closed 2

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TABLE B.2 BULLETIN CLOSEOUT STATUS OF OPERATING NON-POWER REACTORS

See notes on following page.

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State	Licensee	Docket	NRC Region	Licensee Response Date	Inspection Report and Date	Closeout Status and Criterion
RI	RINS	50-193	I		See Note 3	Closed 2
TN	Memphis State U	50-538	II		See Note 11	Closed 2
ΤX	U of Texas	50-192	IV		See Note 5	Closed 2
ΤX	Texas A&M U	50-059	IV		See Noté 5	Closed 2
ТХ	Texas A&M U	50-128	IV		See Note 5	Closed 2
UT	BYU	50-262	IV		See Note 5	Closed 2
UT	U of Utah	50-407	IV		See Note 5	Closed 2
UT	U of Utah	50-072	IV		See Note 5	Closed 2
VA	Virginia Poly	50-124	II	07-14-78		Closed 2
VA	U of Virginia	50-396	II		See Note 11	Closed 2
VA	U of Virginia	50-062	II	08-31-78		Closed 2
VA	B&W, Lynchburg	50-099	II		See Note 11	Closed 2
WA	Washington State U	50-027	V		See Note 4	Closed 2
WA	U of Washington	50-139	V		See Note 4	Closed 2
WI	U of Wisconsin	50-156	III	06-15-78		Closed 2

TABLE B.2 BULLETIN CLOSEOUT STATUS OF OPERATING NON-POWER REACTORS

Notes for Table B.2:

- 1. These facilities are listed on the final pages of Reference 1 (see Page B-10).
- 2. Refer to Page 4 for Bulletin Closeout Criteria.
- 3. Refer to memorandum of August 30, 1978 for L. J. Cunningham (IE/HQ) from H. W. Crocker, Acting Chief, Fuel Facility and Material Safety Branch (RI).
- 4. Refer to memorandum of August 24, 1978 for L. J. Cunningham (IE/HQ) from F. Wenslawski, Chief, Reactor Radiation Safety Section (RV).
- 5. Refer to memorandum of September 11, 1978 for L. J. Cunningham (IE/HQ) from R. J. Everett, Radiation Specialist (RIV).

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Notes for Table B.2 (contd):

- 6. GE, San Jose (50-070) (CA) and NBS (DC) have experimental and test reactors; all other facilities have research reactors.
- 7. The U of Delaware facility was terminated by NRC 2-26-79 per letter by Jerome Saltzman (NRR).
- 8. Per the letter of August 15, 1985 to C. O. Thomas (DL) from R. A. Karam (GIT), the Georgia Institute of Technology facility (50-276) was being decommissioned.
- 9. The closeout status is based on Reference 6 (see Page B-10).
- 10. The closeout status is based on Reference 7 (see Page B-10).
- 11. The closeout status is based on Reference 8 (see Page B-10).

		Product	Year Class
Facility	Class	Line	Introduced
Big Rock Point 1	1		1955
Browns Ferry 1,2,3	4	67	1966
Brunswick 1,2	4	67	1966
Cooper Station	4	67	1966
Dresden 2	3	65	1965
Dresden 3	3	66	1965
Duane Arnold	4	67	1966
Fitzpatrick	4	67	1966
Hatch 1,2	4	67	1966
Millstone 1	3	65	1965
Monticello	3	66	1965
Nine Mile Point 1	2	63	1963
Oyster Creek 1	2	63	1963
Peach Bottom 2,3	4	67	1966
Pilgrim 1	3	66	1965
Quad Cities 1,2	3	66	1965
Vermont Yankee 1	4	67	1966

TABLE B.3 CLASS AND PRODUCT LINE NUMBERS OF AFFECTED GENERAL ELECTRIC BWRs

Notes for Table B.3:

- This information has been taken from Reference 3 (see Page B-10).
- Per Reference 4 (see Page B-10), these facilities do not have fuel element transfer tubes. Closeout Criterion 2 applies.

REFERENCES

- United States Nuclear Regulatory Commission, <u>Licensed</u> <u>Operating Reactors, Status Summary Report, Data as of</u> <u>03-31-86</u>, NUREG-0020, Volume 10, Number 4, April 1986
- United States Nuclear Regulatory Commission, <u>Code of Federal</u> <u>Regulations</u>, <u>Energy</u>, Title 10, Chapter 1, January 1, 1986, cited as 10CFR 0.735.1
- 3. United States Nuclear Regulatory Commission Reactor Training Center, <u>Technology Manual</u>, <u>Boiling Water Reactors</u>, <u>BWR/6</u> <u>Design</u>
- United States Nuclear Regulatory Commission, Letter of December 10, 1985, to Richard A. Lofy (Parameter, Inc.) from Robert L. Baer (NRC/HQ)
- 5. United States Nuclear Regulatory Commission, Memorandum of April 28, 1986, for Ronald R. Bellamy (RI), Douglas M. Collins (RII) and Wayne D. Shafer (RIII) from Robert L. Baer (NRC/HQ)
- United States Nuclear Regulatory Commission, Memorandum of May 5, 1986, for Robert L. Baer (NRC/HQ) from W. D. Shafer (RIII)
- United States Nuclear Regulatory Commission, Memorandum of May 20, 1986, for Robert L. Baer (NRC/HQ) from Ronald R. Bellamy (RI)
- United States Nuclear Regulatory Commission, Memorandum of June 4, 1986, for Robert L. Baer (NRC/HQ) from Douglas M. Collins (R II)

APPENDIX C

Proposed Followup Items

Region II

St. Lucie 1

Utility personnel responded August 11, 1978, indicating that (1) investigation of the shield design and the radiation associated with the fuel transfer tube would be completed prior to the April 1979 refueling and (2) the fuel transfer tube area would be surveyed during the April 1979 refueling.

In Inspection Report 50-335/78-19 (09-27-78), a radiation specialist identified survey repetition planned for the Spring 1979 refueling as Followup Item 78-19-08. Repetition of the survey was necessary because documentation of the initial survey was missing. Although Followup Item 78-19-08 and the bulletin were closed out per Inspection Report 50-335/79-32 (01-03-80), verification of results and documentation of the second survey by a radiation specialist is incomplete or not fully documented.

Region II has informed IE Headquarters that it plans to follow up and will attempt to close out the bulletin during the next scheduled, routine inspection.

Region III

1. Cook 2

Utility personnel responded acceptably August 11, 1978, indicating that (1) actions required by the bulletin had been performed, (2) additional shielding had been installed, (3) gates, locks and posters had been added to control a critical entrance and (4) surveys of significant areas had been completed.

Although the bulletin is called closed per Inspection Report 50-316/79-20 (10-22-79), verification of the utility's actions by a radiation specialist is incomplete or not fully documented.

Region III has informed IE Headquarters that it plans to follow up and will attempt to close out the bulletin during the next scheduled, routine inspection.

2. Point Beach 2

Utility personnel responded July 6, 1978, indicating that (1) in-containment areas near the fuel transfer tube had been upgraded in April 1977, (2) upgrading of areas outside the containment were being planned for completion before the next refueling and (3) no further action was necessary. They did not mention radiation surveys explicitly.

A radiation specialist indicated in Inspection Report 50-301/78-21 (12-01-78) that (1) specified actions were scheduled for completion by the 1979 refueling outage and (2) the licensee's completed actions were to be reviewed during a future inspection. Verification is incomplete or not fully documented that corrective action was completed satisfactorily.

Region III has informed IE Headquarters that it plans to follow up and will attempt to close out the bulletin during the next scheduled, routine inspection.

Region IV

Arkansas 1,2

Utility personnel responded August 14, 1978, indicating that (1) posting and positive control of very difficult access to an exposed section of fuel transfer tube would be implemented for units 1 and 2, (2) they had "determined that there is no potential for radiation streaming to produce abnormally high radiation in normally physically accessible areas" and (3) "special radiation surveys are unnecessary".

Although the bulletin is called closed per Inspection Report 50-313/78-19; 50-368/78-26 (12-14-78), verification of the utility's actions by a radiation specialist is incomplete or not fully documented.

A Region IV radiation specialist recently visited the Arkansas site and during a tour of Unit 2 containment noted that a grating (bolted down) providing access to the spent fuel tube was not posted. This lack of posting is an apparent deviation from the bulletin's requirement to warn personnel of the tube's potential hazards. Because the reactor was at power, the inspector could not enter to inspect the Unit 1 containment area. The bulletin remains open pending further Regional followup and action.

APPENDIX D

Abbreviations

AEP AFRRI	American Electric Power Service Corporation Armed Forces Radiobiology Research Institute
ALARA ·	As Low as Reasonably Achievable
Allis	Allis-Chalmers Corporation
APCO	Alabama Power Company
AP&L	Arkansas Power and Light Company
APSCO	Arizona Public Service Company
BECO	Boston Edison Company
BG&E	Baltimore Gas and Electric Company
B&W	Babcock & Wilcox
BYU	Brigham Young University
C-E	Combustion Engineering Inc.
CECO	Commonwealth Edison Company
CEI	Cleveland Electric Illuminating Company
CFR	Code of Federal Regulations
CG&E	Cincinnati Gas and Electric Company
ConEd	Consolidated Edison Company of New York, Inc.
CPC	Consumers Power Company
CP&L	Carolina Power and Light Company
CR	Contractor Report
CYAPCO	Connecticut Yankee Atomic Power Company
DECO	Detroit Edison Company
DL	Division of Licensing (NRC)
DLC	Duquesne Light Company
DPC	Dairyland Power Cooperative
DUPCO	Duke Power Company
FFMS	Fuel Facility and Material Safety (Branch, NRC)
FP	Florida Power Corporation
FPI.	Florida Power & Light Company
GA	General Atomic, Inc.
GAO	Government Accounting Office
GE	General Electric Company
GPC	Georgia Power Company
GSU	Gulf States Utilities Company
HL&P	Houston Lighting and Power Company
HQ	Headquarters (NRC)
IE	(See NRC/IE)
IEB	Inspection and Enforcement Bulletin (NRC)
IELPCO	Iowa Electric Light and Power Company
IMECO	Indiana and Michigan Electric Company
Inst	Institute

IP	Illinois Power Company
IR	Inspection Report (NRC/IE)
JCP&L	Jersey Central Power and Light Company
KG&E	Kansas Gas and Electric Company
L.A.	Los Angeles
Labs	Laboratories
LER	Licensee Event Report
LILCO	Long Island Lighting Company
LP&L	Louisiana Power and Light Company
MAR	Modification Approval Request
Met-Ed	Metropolitan Edison Company
MIT	Massachusetts Institute of Technology
MP&L	Mississippi Power and Light Company
MYAPCO	Maine Yankee Atomic Power Company
NBS	National Bureau of Standards
NIPSCO	Northern Indiana Public Service Company
NMP	Niagara Mohawk Power Company
NNECO	Northeast Nuclear Energy Company
NPPD	Nebraska Public Power District
NRC	Nuclear Regulatory Commission
NRC/IE	Nuclear Regulatory Commission/
	Office of Inspection & Enforcement
NSP	Northern States Power Company
NU	Northeast Utilities
N.Y.	New York
OL	Operating License
OPPD	Omaha Public Power District
PASNY	Power Authority of the State of New York
PECO	Philadelphia Electric Company
Penn	Pennsylvania
PGE	Portland General Electric Company
PG&E	Pacific Gas and Electric Company
Poly	Polytechnic
PP&L	Pennsylvania Power and Light Company
PSCC	Public Service Company of Colorado
PSCO	Public Service Company of Oklahoma
PSE&G	Public Service Electric and Gas Company
PSI	Public Service Indiana
PSNH	Public Service Company of New Hampshire
R	Region (NRC)
RG&E	Rochester Gas and Electric Corporation
RIC	Rockwell International Corp.
RINSC	Rhode Island Nuclear Science Center
SCE	Southern California Edison Company
SCE&G	South Carolina Electric and Gas Company
SDI	Shut Down Indefinitely
SMUD	Sacramento Municipal Utility District
SNUPPS	Standardized Nuclear Unit Power Plant Systems
TECO	Toledo Edison Company
TMI	Three Mile Island

TUGCO	Texas Utilities Generating Company
TVA	Tennessee Valley Authority
U	University
UE	Union Electric Company
USGSD	United States Geological Survey Department
VA	Veterans Administration
VEPCO	Virginia Electric and Power Company
VYNP	Vermont Yankee Nuclear Power Corporation
W	Westinghouse Electric Corporation
WEPCO	Wisconsin Electric Power Company
WNP	Washington Nuclear Project
WPPSS	Washington Public Power Supply System
WPS	Wisconsin Public Service Corporation
YAECO	Yankee Atomic Electric Company