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Categorization of Failed and Damaged Spent LWR Fuel Currently in Storage

November 1987

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CATEGORIZATION OF FAILED AND
DAMAGED SPENT LWR FUEL
CURRENTLY IN STORAGE

W. J. Bailey

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Pacific Northwest Laboratory
Richland, Washington 99352

ABSTRACT

The results of a study that was jointly sponsored by the U.S. Department of Energy and the Electric Power Research Institute are described in this report. The purpose of the study was to 1) estimate the number of failed fuel assemblies and damaged fuel assemblies (i.e., ones that have sustained mechanical or chemical damage but with fuel rod cladding that is not breached) in storage, 2) categorize those fuel assemblies, and 3) prepare this report as an authoritative, illustrated source of information on such fuel. Among the more than 45,975 spent light-water reactor fuel assemblies currently in storage in the United States, it appears that there are nearly 5000 failed or damaged fuel assemblies.

SUMMARY

Over 10.6 million fuel rods in over 92,400 fuel assemblies^(a) are in operation, or have completed operation, in U.S. commercial nuclear power reactors. The overall domestic fuel operation experience continues to be excellent: Current fuel rod reliabilities are typically >99.99%, which corresponds to fuel rod failure rates of <0.01%.⁽¹⁾ Average burnup levels have been increasing yearly, but fuel rod failure rates have not exhibited a similar trend; so far, the data indicate that extending burnup has not been detrimental to fuel performance.^(2,3)

Infrequent events have occurred in which fuel failed or was damaged during irradiation or in subsequent operations (e.g., handling, storage, rod consolidation, and shipping). Evaluating data on such defective fuel reported by industry is difficult for several reasons^(1,4): 1) the definition of failed fuel can vary from outage to outage and from reload to reload for each utility; 2) the definition of abnormal degradation is not uniform throughout the industry; 3) in many cases the number of fuel failures is inferred from indirect evidence; 4) in some cases only directly observed failures are counted; and 5) whether or not the fuel is failed can depend on how closely the fuel is inspected and on the capability of the inspection technique being used (it can also depend on when the inspection takes place).^(b)

(a) The terms "fuel assembly" and "fuel bundle" are used interchangeably by the nuclear industry, although generally the former term is associated with fuel for PWRs and the latter term with fuel for BWRs. A BWR fuel assembly consists of a fuel bundle and the open-ended channel that encloses the bundle.

(b) Leak testing (sipping) is not an exact diagnostic technique because it preferentially identifies fuel cladding breaches that occur late in the reactor cycle.⁽⁵⁾ Fuel assemblies with grossly failed fuel rods may not be readily identified by sipping.⁽⁶⁾ Two things can interfere with the detection of old leaks by sipping: The cladding fissure can become closed because of crud or other buildup or the entire fission product inventory may not be readily available (because of less than perfect axial communication) for release and subsequent detection by the sipping equipment. Also, in contrast to dry or vacuum sipping, wet sipping has a rapid signal loss, which means that if wet sipping is to be done it should be performed within a few weeks after the reactor is shut down.

Of the 101 power reactors licensed for commercial operation in the United States, just slightly over half have provided data to the U.S. Department of Energy's (DOE's) Energy Information Administration (EIA) on the number of defective fuel assemblies among the more than 45,975 fuel assemblies currently in storage. The defective fuel assemblies were categorized using a combination of the categories currently employed by the EIA in their RW-859 data file and the earlier failed fuel categories identified in the Nuclear Waste Policy Act, 10 CFR 961. The defective fuel was also categorized in other ways, including by annual discharge date, by rod array type, and by burnup. Based on the data received, it appears that there are nearly 5000 failed or damaged fuel assemblies present; of those, over half of the ones from boiling water reactors (BWRs) have burnup levels in the 10,000 to 20,000 MWd/MTU range and occurred in the 1973-1980 period and over half of the ones from pressurized water reactors (PWRs) have burnup levels in the 25,000 to 35,000 MWd/MTU range and occurred in the 1977-1984 period, which means that most of the defective BWR fuel assemblies have lower burnups and tend to be older than most of the defective PWR fuel assemblies. The utilities that supplied data to EIA indicated that failure or damage was visually observed on 498 fuel assemblies, cladding damage was noted on 907 fuel assemblies, 1083 fuel assemblies exhibited radioactive leakage, 95 fuel assemblies were listed as physically deformed, all fuel assemblies could be consolidated, all fuel assemblies fit into the spent fuel storage pool racks, and category information on 1188 fuel assemblies (847 BWR type, 341 PWR type) is unknown at present but will be supplied later. It is encouraging to note that only 36 defective fuel assemblies required special handling (35 assemblies) or encapsulation (1 assembly). Some fuel rods in about 400 fuel assemblies may have hydrogen-embrittled cladding (a result of primary or secondary hydriding). The utilities provided some information on the rod array types among 4664 defective fuel assemblies (3374 BWR type, 1317 PWR type). Among the BWR fuel assemblies, the distribution is as follows [no. of fuel assemblies (rod array type)]: 1362 (not stated), 168 (6x6), 260 (7x7), 10 (7x7NP), 1234 (8x8), 81 (8x8NP), 128 (8x8R), 24 (9x9), 102 (10x10), and 5 (11x11). Similarly for PWR fuel assemblies, the distribution is as follows: 687 (not stated), 6 (14x14), 200 (15x15), 346 (16x16), and 78 (17x17).

The spent fuel storage pool sections (typically Section 9.2) of the Final Safety Analysis Reports for 131 domestic reactors were checked for information on specific provisions made by those plants for storing failed fuel assemblies. Included in the 131 are 96 operating plants, 3 plants that are shut down, 6 plants that are near operation, and 23 plants that are under construction. Of the 116 spent fuel storage pools at reactors, 69 pools (59%) have no statement about providing specific space(s) for storing failed fuel assemblies, 18 pools (16%) make provisions but do not state the number of spaces, and 29 pools (25%) provide or plan to provide anywhere from 1 to 31 spaces. At some plants, storage or transfer canisters are used for failed fuel; special racks for storing failed fuel are provided at some plants.

Experience to date indicates that failed fuel has had a minimal impact on storage of spent fuel in water.⁽⁷⁾ A world survey showed that most pools store defective fuel assemblies on the same basis as intact assemblies; some pools (~30%) store fuel assemblies with failed rods in canisters.⁽⁸⁾ Further degradation of cladding defects during storage does not appear to be occurring.⁽⁸⁻¹⁰⁾

Tens of thousands of light-water reactor (LWR) fuel assemblies have been satisfactorily moved during normal handling operations at commercial power reactors and independent spent fuel storage facilities in the United States.⁽¹¹⁾ Very few fuel assemblies have sustained major mechanical damage during handling (~250 in the United States) or been damaged during normal transporting operations (<23 in the United States).⁽¹¹⁻¹³⁾

Domestic experience to date indicates that only about seven rods--out of a biased sample of fuel assemblies (ones that were known to contain or suspected of containing defective fuel rods and were selected for examination, reconstitution, or rod consolidation) containing over 54,000 fuel rods--broke during handling, examination, fuel assembly reconstitution, and rod consolidation activities.⁽¹⁴⁾ Over 3100 of those rods have been involved in rod consolidation operations.⁽¹⁴⁻¹⁷⁾ The likelihood for breaking rods is potentially higher with fuel rods with large cladding defects.

Fuel handling experience to date at spent fuel storage pools indicates that failed and damaged fuel assemblies, failed fuel rods, and the inadvertent

breaking of fuel rods (including prepressurized ones) can be accommodated.^(18,19) Results from a recent long-term (seven-year) demonstration test in the Federal Republic of Germany with 18 intact and 10 defective LWR fuel rods also indicate that wet storage of spent LWR fuel, even for extended periods, can be conducted without any problems.⁽²⁰⁾

Over 5100 fuel assemblies have been transported in the United States.^(11,21) There have been two events, one in France and one in the United States, in which substantial radioactive releases have occurred when PWR fuel assemblies containing stainless-steel-clad fuel have been shipped dry.⁽²²⁻²⁴⁾ Because of the latter event,⁽²⁴⁾ which resulted in release of airborne contamination during the underwater unloading of a failed PWR spent fuel assembly, no more shipments of failed fuel with more than small cladding breaches (i.e., with cladding defects larger than pinholes or hairline cracks) in casks with an internal air environment are permitted in the United States.

Current experience indicates that the incidence of cladding failures during dry storage will be low; however, some fuel rod failures cannot be ruled out.⁽²⁵⁾ Inspection techniques are available to detect most fuel assemblies containing reactor-induced defects, although elimination of every defective fuel rod cannot be assured. Even if fuel with cladding defects were placed in dry storage, or if defects develop during storage, such defects would not propagate if an inert cover gas is used.⁽²⁵⁾

The successful experience to date with Zircaloy-clad fuel over a large range of dry storage conditions suggests that none of the potential failure mechanisms (e.g., stress rupture, stress corrosion cracking, hydrogen redistribution) is likely to have a significant influence on dry storage of spent LWR fuel.⁽²⁵⁻³¹⁾ The impacts of cladding defects in dry storage are discussed in detail in PNL-4835⁽²⁵⁾ and in PNL-6207.⁽³⁰⁾ In general, the impact of a cladding defect that develops during dry storage is anticipated to involve release of fission gas to the sealed cask or canister but essentially no release of fuel particles.⁽²⁵⁾ Evidence and analyses have identified no mechanism that will result in growth of cladding defects during storage in inert cover gases.⁽²⁵⁾

It will be important for waste management planning and repository design to continue to monitor the behavior of intact and defective spent fuel that is placed in wet and dry storage to gain additional evidence, in particular with higher burnup fuel, that fuel integrity is being appropriately maintained.

Development and adoption of more uniform definitions of failed fuel and abnormal degradation would be helpful because it would make it easier to more accurately compare data from different reactors, utilities, and fuel vendors.

It would aid spent fuel handling, storage, rod consolidation, and shipping studies a great deal if the utilities representing those plants (about one-half of the total) that supplied no information on defective fuel would provide such data. It would also help if the utilities that said information would be furnished later on the categories for the 1188 defective fuel assemblies in their pools would provide that data to DOE.

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CONTENTS

ABSTRACT	iii
SUMMARY	v
ACKNOWLEDGMENTS	xi
1.0 INTRODUCTION	1.1
2.0 CONCLUSIONS AND RECOMMENDATIONS	2.1
2.1 CONCLUSIONS	2.1
2.1.1 Number of Failed and Damaged Fuel Assemblies in Storage	2.1
2.1.2 Categorization of the Defective Fuel Assemblies	2.2
2.1.3 Burnup Distribution of the Defective Fuel Assemblies	2.2
2.1.4 Distribution of Defective Fuel Assemblies by Rod Array Type	2.3
2.1.5 Fuel Rod Reliability and Fuel Burnup Trends	2.3
2.2 RECOMMENDATIONS	2.3
2.2.1 Extended Burnup Fuel	2.3
2.2.2 Definitions	2.4
2.2.3 Input from Utilities	2.4
3.0 DISCUSSION	3.1
3.1 EXPERIENCE BASE WITH FUEL	3.1
3.1.1 Amount of Fuel Fabricated and Irradiated	3.1
3.1.2 Fuel Reliability	3.1
3.2 METHODS FOR INSPECTING IRRADIATED FUEL	3.3
3.2.1 Limitations	3.3
3.2.2 Visual Inspection	3.5
3.2.3 Mensural Inspection	3.5

3.2.4	Gamma Scanning	3.5
3.2.5	Sipping	3.6
3.2.6	Eddy-Current Testing	3.6
3.2.7	Ultrasonic Testing	3.7
3.3	FUEL FAILURES AND FUEL DAMAGE	3.8
3.3.1	Definitions	3.8
3.3.2	Types and Causes of In-Reactor Fuel Failures or Damage	3.10
3.3.3	Types and Causes of Out-of-Reactor Fuel Failures or Damage	3.27
3.4	NUMBER OF IRRADIATED FUEL ASSEMBLIES CURRENTLY IN STORAGE	3.29
3.5	ESTIMATED NUMBER OF FAILED OR DAMAGED FUEL ASSEMBLIES IN STORAGE	3.31
3.5.1	Reporting of Data	3.31
3.5.2	Cautionary Notes	3.32
3.5.3	Defective Fuel Assemblies Currently in Storage	3.32
3.5.4	Categorization of Defective Fuel Assemblies	3.32
3.5.5	Defective Fuel: Annual Discharge Data	3.36
3.5.6	Defective Fuel: Rod Array Data	3.36
3.5.7	Defective Fuel: Burnup Data	3.39
3.6	PLANTS THAT PROVIDE SPECIFIC SPACE FOR STORING FAILED FUEL	3.55
3.7	EFFECT OF FAILED OR DAMAGED FUEL ASSEMBLIES ON STORAGE, HANDLING, AND OTHER OPERATIONS	3.64
4.0	REFERENCES	4.1
APPENDIX A - DETAILS OF DEFECTIVE FUEL AT INDIVIDUAL DOMESTIC POWER PLANTS AND SPENT FUEL STORAGE FACILITIES		A.1

APPENDIX B - BURNUP DISTRIBUTIONS FOR DEFECTIVE FUEL ASSEMBLIES AT VARIOUS DOMESTIC COMMERCIAL REACTORS FOR SPECIFIC YEARS	B.1
APPENDIX C - SPENT FUEL STORAGE POOLS THAT HAVE OR PLAN TO HAVE SPECIFIC SPACE FOR STORING FAILED FUEL ASSEMBLIES	C.1

FIGURES

3.1	BWR Fuel Rod Failure Attributed to Upper End Cap Weld Contamination	3.11
3.2	Examples of Appearances of BWR Fuel Rods Fabricated from the Same Lot of Cladding	3.12
3.3	Examples of Fuel Rod Failures Due to Hydriding	3.13
3.4	Example of a Fuel Rod that Failed as a Result of Crud-Induced Localized Corrosion	3.14
3.5	Pellet-Cladding Interaction Split on BWR 7x7 Fuel Rod	3.15
3.6	Transverse Cross Section Showing PCI Crack Through Cladding Wall of BWR 8x8 Fuel Rod	3.15
3.7	Incipient Crack that Initiated from the Outer Surface of the Cladding	3.16
3.8	Appearance of a Tight Crack in a PWR Stainless-Steel-Clad Fuel Rod	3.17
3.9	Appearance of the Longer of Two Cracks Observed in a PWR Stainless-Steel-Clad Fuel Rod	3.17
3.10	Typical Cladding Splits Observed in Poolside Examinations of the Connecticut Yankee Batch 9 Fuel Assemblies	3.18
3.11	Fuel Rods with Collapsed Cladding, a Result of In-Reactor Fuel Densification	3.19
3.12	Examples of Fretting Failures During Cycle 6 at a PWR	3.20
3.13	Examples of Fretting Failures Observed in Other PWR Cores	3.21
3.14	Examples of Fuel Rod Failures Due to Fretting	3.22
3.15	Typical Damage to Spacers and Fuel Rods from Baffle Jetting or Coolant Crossflow	3.23
3.16	Closeup of the Stub Ends of Damaged Fuel Assemblies Adhering to the Plenum Structure in the Three Mile Island-2 Reactor Vessel	3.24
3.17	Defective BWR Fuel Assemblies in Annual U.S. Discharges	3.53
3.18	Defective PWR Fuel Assemblies in Annual U.S. Discharges	3.54

3.19	Profile of Annual Burnup Distribution for Defective U.S. BWR Fuel Assemblies	3.61
3.20	Profile of Annual Burnup Distribution for Defective U.S. PWR Fuel Assemblies	3.62
3.21	Special Rack at a BWR for Storing Control Rod Guide Tubes, Defective Fuel Storage Containers, and Control Rods	3.65
3.22	Horizontal Cross Section of a Storage Rack for Defective Fuel at a BWR	3.66
3.23	Failed Fuel Transfer Container at a PWR	3.67

TABLES

3.1	Cumulative Number of BWR and PWR Fuel Assemblies and Fuel Rods that Have Been Irradiated and Discharged and that Are Currently Being Irradiated	3.2
3.2	Fuel Performance Parameters Observable by Poolside Inspection Techniques	3.4
3.3	Fuel Assemblies that Sustained Damage During Various Operations	3.27
3.4	Fuel Assemblies that Tilted, Fell, or Dropped During Various Operations	3.28
3.5	Distances that Fuel Assemblies Have Been Dropped in Water	3.28
3.6	Damage Sustained by BWR Fuel Rods and Bundles/Assemblies	3.29
3.7	Damage Sustained by PWR Fuel Rods and Assemblies	3.30
3.8	Spent Fuel Inventory	3.31
3.9	Defective Fuel Assemblies Currently in Storage, Based on EIA Data	3.33
3.10	Summary of Fuel Assemblies in Table A.1 that Are Categorized by Single and Multiple Entries	3.37
3.11	Combined Number of Fuel Assemblies in a Given Category	3.39
3.12	Defective Fuel Assemblies Currently in Spent Fuel Storage Pools at Domestic Power Plants and Spent Fuel Storage Facilities, Based on EIA Data and Other Data	3.40
3.13	Additional Fuel Assemblies that Sustained Damage or Were Dropped	3.44
3.14	Defective Fuel Assemblies in Annual U.S. Discharges	3.50
3.15	Defective U.S. Fuel Assemblies Grouped by Rod Array Type	3.55
3.16	Summary of Defective Fuel Assemblies by Rod Array Type for Reactors	3.56
3.17	Burnup Distribution for Defective U.S. Fuel Assemblies	3.59
3.18	Annual Burnup Distribution of Defective U.S. Assemblies	3.60

3.19	Summary of Data for Plants and Facilities on Provisions for Storing Failed Fuel Assemblies	3.63
A.1	Details on Defective Fuel at Individual Domestic Power Plants and Spent Fuel Storage Facilities	A.2
B.1	Burnup Distribution for Defective Fuel Assemblies for Reactors Where Year Not Stated	B.2
B.2	Burnup Distribution for Defective Fuel Assemblies for Reactors in 1969	B.2
B.3	Burnup Distribution for Defective Fuel Assemblies for Reactors in 1970	B.2
B.4	Burnup Distribution for Defective Fuel Assemblies for Reactors in 1971	B.3
B.5	Burnup Distribution for Defective Fuel Assemblies for Reactors in 1972	B.3
B.6	Burnup Distribution for Defective Fuel Assemblies for Reactors in 1973	B.4
B.7	Burnup Distribution for Defective Fuel Assemblies for Reactors in 1974	B.5
B.8	Burnup Distribution for Defective Fuel Assemblies for Reactors in 1975	B.6
B.9	Burnup Distribution for Defective Fuel Assemblies for Reactors in 1976	B.7
B.10	Burnup Distribution for Defective Fuel Assemblies for Reactors in 1977	B.8
B.11	Burnup Distribution for Defective Fuel Assemblies for Reactors in 1978	B.9
B.12	Burnup Distribution for Defective Fuel Assemblies for Reactors in 1979	B.10
B.13	Burnup Distribution for Defective Fuel Assemblies for Reactors in 1980	B.11
B.14	Burnup Distribution for Defective Fuel Assemblies for Reactors in 1981	B.12
B.15	Burnup Distribution for Defective Fuel Assemblies for Reactors in 1982	B.13

B.16	Burnup Distribution for Defective Fuel Assemblies for Reactors in 1983	B.14
B.17	Burnup Distribution for Defective Fuel Assemblies for Reactors in 1984	B.15
B.18	Burnup Distribution for Defective Fuel Assemblies for Reactors in 1985	B.16
B.19	Burnup Distribution for Defective Fuel Assemblies for Reactors in 1986	B.16
C.1	Spent Fuel Storage Pools that Have or Plan to Have Specific Space for Storing Failed Fuel Assemblies	C.2

1.0 INTRODUCTION

The remaining unfilled space in at-reactor (AR) spent fuel storage pools is being depleted as more and more spent fuel assemblies are placed in storage; hence, storage of light-water reactor (LWR) spent fuel has emerged as the key near-term factor for future fuel management in the United States. Two promising techniques for increasing AR storage capacities are 1) fuel storage in dry casks and 2) rod consolidation in existing pools. Prediction of the behavior of LWR spent fuel during interim dry storage requires knowledge about the condition of the fuel as it enters dry storage. That knowledge about the condition of the fuel will also aid in planning future rod consolidation operations, in waste management planning, and in repository design.

One objective of the Commercial Spent Fuel Management (CSFM) Program, which is sponsored by the U.S. Department of Energy (DOE) and managed by Pacific Northwest Laboratory (PNL), is to develop data on spent fuel condition and properties that can be used to support the design, licensing, and operation of dry independent spent fuel storage installations (ISFSIs). The DOE spent fuel storage program at PNL started in 1977⁽³²⁾ and has included studies on the behavior of failed and damaged fuel during handling, storage, rod consolidation, and transport.^(7,11,12,14,15,23)

In 1983, DOE and the Electric Power Research Institute (EPRI) mutually agreed that EPRI would assume the lead role in wet storage technology (i.e., behavior of spent fuel in water-filled fuel storage pools and of the pool components). EPRI continues to sponsor the Surveillance of LWR Spent Fuel in Wet Storage Program (RP 2062-11) at PNL. One part of that program involves monitoring the integrity of spent LWR fuel during water storage.^(33,34)

The results of a study that was jointly sponsored by DOE and EPRI are described in this report. The purpose of the study was to 1) estimate the number of failed fuel assemblies and damaged fuel assemblies (i.e., ones that have sustained mechanical or chemical damage but with fuel rod cladding that is not breached) in storage, 2) categorize those fuel assemblies (see last paragraph in this section), and 3) prepare this report as an authoritative, illustrated source of information on such fuel. The extensive listings of defective spent

fuel assemblies were derived from printouts (RW-859 data supplied by utilities to DOE) obtained from DOE's Energy Information Administration (EIA) and from evaluations by PNL of that data. Included in the report are 1) the experience base with fuel in domestic reactors and the reliability of fuel; 2) a section on methods for inspecting fuel; 3) a discussion of fuel failures and fuel damage; 4) a table showing the numbers of boiling water reactor (BWR) and pressurized water reactor (PWR) fuel assemblies in storage in the United States; 5) an estimate of the number of failed and damaged fuel assemblies in storage in the United States; 6) a list of domestic plants showing those that provide specific space for storing failed fuel; and 7) a discussion of the effect of failed or damaged fuel on storage, handling, and other operations (e.g., rod consolidation).

The defective fuel assemblies were sorted into 10 categories, which were a combination of the 10 categories [one, Category 8, has not yet been defined by the EIA and another, "LAT," has been used in input for two plants to indicate that the type of failure or damage is unknown at present and that the information will be supplied by the utility later (LAT)] currently employed by the EIA in the RW-859 data file and the three earlier failed fuel categories (F-1, F-2, and F-3) identified in the Nuclear Waste Policy Act, 10 CFR 961. The 10 categories used in this report (specifically Section 3.5.4 and Appendix A) are shown below:

Categories Used in This Report	Categories Used in EIA RW-859 File	Categories in NWSA, 10 CFR 961	Description
1	1	F-1	Visually observed failure or damage.
2	2	F-3	Encapsulated or other remedial action taken.
3	3	--	Requires special handling.
4	4	--	Cannot be consolidated.
5	5	--	Physically deformed.
6	6	--	Does not fit in pool rack.
7	7	--	Cladding damage (mechanical, chemical, or other--possibly detectable by ultrasonic testing).

<u>Categories Used in This Report</u>	<u>Categories Used in EIA RW-859 File</u>	<u>Categories in NWPA, 10 CFR 961</u>	<u>Description</u>
8	--	F-2	Radioactive "leakage."
9	9	--	Other.
LAT	LAT	--	Unknown, information to be supplied LATer by the utility.

For the purposes of this report, F-2 was assigned as Category 8. The defective fuel assemblies were also categorized in other ways, including annual discharge date, rod array type, and burnup.

Information on failed and damaged fuel assemblies will aid programs in these areas: waste management planning, receiving and handling of spent fuel, rod consolidation, transporting of spent fuel, wet and dry storage of spent fuel, lag storage of spent fuel, monitored retrievable storage (MRS), repository studies, and reprocessing. The information can also be used as input for fuel degradation models and for abnormal event analyses.

2.0 CONCLUSIONS AND RECOMMENDATIONS

The number of failed fuel assemblies and damaged fuel assemblies (i.e., ones that sustained mechanical or chemical damage but with fuel cladding that is not breached) that are currently in storage in the United States was estimated and those defective fuel assemblies were categorized. There are two important points to keep in mind concerning the estimates of the number of defective fuel assemblies and categorizations of those fuel assemblies. The first point is that we are dealing with an incomplete set of data. Of the 101 power reactors licensed for commercial operation in the United States, only slightly over half have provided data to DOE's EIA on the number of defective fuel assemblies among the more than 45,975 spent LWR fuel assemblies currently in storage. The second point is that evaluating data on defective fuel reported by industry is difficult for several reasons:^(1,4,6,35) 1) the definition of failed fuel can vary from outage to outage and from reload to reload for each utility; 2) the definition of abnormal degradation is not uniform throughout the industry; 3) in many cases the number of fuel failures is inferred from indirect evidence; 4) in some cases only directly observed failures are counted; and 5) whether or not the fuel is failed can depend on how closely the fuel is inspected and on the capability of the inspection technique being used (it can also depend on when the inspection takes place, as discussed in Section 3.2.5).

The following sections present specific conclusions and recommendations noted during this study.

2.1 CONCLUSIONS

The results of this study permit the following conclusions.

2.1.1 Number of Failed and Damaged Fuel Assemblies in Storage

- Among the more than 45,975 fuel assemblies currently in storage, it appears, based on the information supplied by the utilities, that there are nearly 5000 defective (i.e., failed or damaged) fuel assemblies.

2.1.2 Categorization of the Defective Fuel Assemblies

- Failure or damage was visually observed on 498 fuel assemblies.
- Cladding damage was noted on 907 fuel assemblies.
- Radioactive leakage from 1083 fuel assemblies was detected.
- A total of 95 fuel assemblies were listed as physically deformed.
- Only 36 defective fuel assemblies required special handling (35 assemblies), encapsulation (1 assembly), or other remedial action.
- Some fuel rods in about 400 fuel assemblies may have hydrogen-embrittled cladding (a result of primary or secondary hydriding).
- The utilities indicated that all of the fuel assemblies are capable of being consolidated.
- The utilities indicated that all of the fuel assemblies fit into the spent fuel storage pool racks.
- Category information on 1188 fuel assemblies (847 BWR and 341 PWR) is unknown at present, but the utilities indicated that they will supply this information later.

2.1.3 Burnup Distribution of the Defective Fuel Assemblies

- When the defective fuel assemblies were listed by burnup by EIA, increments of 5,000 MWd/MTU were used. For the BWR and PWR fuel assemblies, the highest burnup brackets needed were 30,000 to 35,000 MWd/MTU and 40,000 to 45,000 MWd/MTU, respectively.
- Based on burnup distribution data for 4,691 defective fuel assemblies (3,374 BWR and 1,317 PWR), the largest number of defective BWR assemblies (1031) occurred in the 10,000 to 15,000 MWd/MTU burnup range and the largest number of defective PWR assemblies (586) occurred in the 30,000 to 35,000 MWd/MTU burnup range.
- Most of the defective BWR fuel assemblies have lower burnups and tend to be older than most of the defective PWR fuel assemblies. Of the nearly 5,000 defective fuel assemblies, over half the ones from BWRs

have burnups in the 10,000 to 20,000 MWd/MTU range and occurred in the 1973-1980 period (the largest number, 396, occurred in 1974) and over half of the ones from PWRs have burnups in the 25,000 to 35,000 MWd/MTU range and occurred in the 1977-1984 period (the largest number, 174, occurred in 1981).

2.1.4 Distribution of Defective Fuel Assemblies by Rod Array Type

- The utilities provided rod array information for some of the 4,691 defective fuel assemblies (3374 BWR and 1317 PWR). The distribution of the BWR fuel assemblies by rod array type is as follows: 6x6 (5.0%), 7x7 (7.7%), 7x7NP (0.3%), 8x8 (36.6%), 8x8NP (2.4%), 8x8R (3.8%), 9x9 (0.7%), 10x10 (3.0%), 11x11 (0.1%), and unstated (40.4%). The distribution of the PWR fuel assemblies by rod array type is as follows: 14x14 (0.5%), 15x15 (15.2%), 16x16 (26.3%), 17x17 (5.9%), and unstated (52.1%).

2.1.5 Fuel Rod Reliability and Fuel Burnup Trends

- The overall domestic fuel operating experience continues to be excellent: Current fuel rod reliabilities are typically >99.99%, which corresponds to fuel rod failure rates of <0.01%.⁽¹⁾
- Average burnup levels have been increasing yearly, but fuel rod failure rates have not exhibited a similar trend; so far, the data indicate that extending burnup levels has not had an obvious detrimental effect on fuel performance.^(2,3)

2.2 RECOMMENDATIONS

The results and conclusions of this study led to the following recommendations.

2.2.1 Extended Burnup Fuel

- It will be important for waste management planning and repository design to continue to monitor the behavior of intact and defective

spent fuel that is placed in wet and dry storage to gain additional evidence, in particular with higher burnup fuel, that fuel integrity is being appropriately maintained.

2.2.2 Definitions

- Development and adoption of more uniform definitions of failed fuel and abnormal degradation would be helpful because it would make it easier to more accurately compare data from different reactors, utilities, and fuel vendors.

2.2.3 Input from Utilities

- It would aid spent fuel handling, storage, rod consolidation, and shipping studies a great deal if the utilities representing those plants (about one-half of the total) that supplied no information on defective fuel would provide such data.
- It would also help if the utilities that said information would be furnished later on the categories for the 1188 defective fuel assemblies in their pools would provide that data to DOE.

3.0 DISCUSSION

3.1 EXPERIENCE BASE WITH FUEL

The Atomic Industrial Forum⁽³⁶⁾ indicated in 1986 that 1) the U.S. nuclear industry accumulated its 1000th reactor year of experience in mid-August 1986, 2) the United States has 101 nuclear power plants licensed for commercial operation, and 3) the United States generates a reactor year of experience every 3.6 days. Overall operating experience with the fuel continues to be excellent; however, infrequent events have occurred in which fuel failed or was damaged.⁽¹⁾ Information on the total amount of fuel fabricated and irradiated and on the current fuel reliability is discussed in the following subsections.

3.1.1 Amount of Fuel Fabricated and Irradiated

Information supplied by U.S. fuel vendors (see Table 3.1) to the Nuclear Regulatory Commission (NRC)⁽¹⁾ indicates that over 10.6 million fuel rods (~32% BWR; ~68% PWR) in over 92,400 fuel assemblies (~64% in BWRs; ~32% in PWRs) were in operation, or had completed operation, in commercial nuclear power reactors. BWRs and PWRs predominately use fuel assemblies that contain fuel clad with Zircaloy-2 and Zircaloy-4, respectively; a few plants (one small BWR and two PWRs) use stainless-steel-clad fuel.

3.1.2 Fuel Reliability

The overall fuel operating experience continues to be excellent: Current fuel rod reliabilities are typically >99.99%, which corresponds to fuel rod failure rates of <0.01%. Most of the fuel vendors provide fuel performance data in terms of fuel reliability (integrity). One vendor (sometimes two) prefers to evaluate fuel performance in terms of coolant activity level. Historical information on BWR and PWR fuel rod reliability and fuel rod failure rates is available in a number of references^(1-3,37-53) and is summarized in the appendix of one report.⁽³⁹⁾ The inherent difficulties in attempting to combine or directly compare data provided by plants and/or fuel vendors on defective fuel are described in Section 3.2.1. Average burnup levels have been

TABLE 3.1. Cumulative Number (through December 31, 1985) of BWR and PWR Fuel Assemblies and Fuel Rods that Have Been Irradiated and Discharged and that Are Currently Being Irradiated⁽¹⁾

Fuel Vendor	Number of Fuel Assemblies			Number of Fuel Rods		
	Zircaloy- Clad BWR Fuel	Zircaloy- Clad PWR Fuel	Stainless Steel-Clad PWR Fuel	Zircaloy- Clad BWR Fuel	Zircaloy- Clad PWR Fuel	Stainless Steel-Clad PWR Fuel
Babcock & Wilcox Company		4,274	416		889,104	84,864
Combustion Engineering, Inc.		5,629			1,097,166	
Exxon Nuclear Company, Inc.	4,061	4,326		251,304	887,591	
General Electric Company	>55,000 ^(a)			~3,200,000		
Westinghouse Electric Corporation		18,706			4,225,451	
SUBTOTALS	>59,061	32,935	416	~3,451,304	7,099,312	84,864
TOTALS	>59,061	BWR Fuel Assemblies		~3,451,304	BWR Fuel Rods	
	<u>33,351</u>	PWR Fuel Assemblies ^(b)		<u>7,184,176</u>	PWR Fuel Rods ^(c)	
	>92,412	Fuel Assemblies ^(d)		~10,635,480	Fuel Rods ^(e)	

(a) As of January 1985.

(b) Of which 98.75% contain Zircaloy-clad fuel and 1.25% contain stainless-steel-clad fuel.

(c) Of which 98.82% have Zircaloy cladding and 1.18% have stainless steel cladding.

(d) Of which >99.55% contain Zircaloy-clad fuel and <0.45% contain stainless-steel-clad fuel.

(e) Of which ~99.20% have Zircaloy cladding and ~0.80% have stainless steel cladding.

increasing yearly, but fuel failure rates have not shown a similar trend. So far, the data indicate that extending burnup has not had an obvious detrimental effect on fuel performance.^(2,3)

3.2 METHODS FOR INSPECTING IRRADIATED FUEL

Onsite inspections of the irradiated fuel provide important evidence of the condition and performance of the fuel, which can be indicated by many observable parameters (Table 3.2). PNL assessed the onsite inspection techniques--which included visual, mensural, gamma scanning, leak testing (sipping), eddy current, and ultrasonic--in a study for the NRC in 1980-1981. The detailed results are presented in Volumes 1 and 2 of NUREG/CR-1380^(6,35) and are briefly stated in Sections 3.2.1-3.2.7. Additional information on post-irradiation examination methods used on fuel systems has been published.^(54,55)

3.2.1 Limitations

There are inherent difficulties in attempting to combine or directly compare data (i.e., results from onsite inspections of fuel assemblies and fuel rods) from submittals from different utilities and fuel vendors for a number of reasons (see Sections 3.2.2-3.2.7, Section 3.3.1, and Section 3.5.2). One of the problems noted by the NRC in understanding results from poolside inspection techniques is as follows: "The control over the quality of each technique is neither systematic nor uniform. There is limited calibration both among techniques at the same site and between the same technique at different sites. There is no calibration to a consensus standard."⁽⁶⁾ Regarding the poolside inspection techniques assessed in 1980-1981 by PNL in NUREG/CR-1380,^(6,35) it was concluded that it did not appear feasible at that time to use a predetermined threshold (i.e., criterion) for what constitutes fuel failure.

Not all fuel is inspected regularly. At BWRs, if on-line monitors have signaled that fuel failures are present, it is typical for leak testing (sipping) to be performed. At PWRs, if the radioactivity in the effluent is high, it is typical for visual inspection to be performed. It is possible to unintentionally overlook some fuel assemblies with defective fuel rods if you depend on the results of only sipping or of only visual inspection.⁽⁶⁾

**TABLE 3.2. Fuel Performance Parameters Observable by
Poolside Inspection Techniques⁽¹⁾**

Fuel System Component	Parameter	Inspection Technique
BWR Fuel Channel Box	<ul style="list-style-type: none"> ● Bowing ● Corner Wear ● Displacement ● Flatness ● Twist 	<ul style="list-style-type: none"> Mensural, Visual Mensural, Visual Mensural Mensural Mensural
Crud on Fuel Bundle/Assembly, Fuel Rod, and BWR Channel Box	<ul style="list-style-type: none"> ● Composition ● Condition and Pattern ● Thickness 	<ul style="list-style-type: none"> Sampling and Analysis Visual Eddy Current, Mensural
Fuel Bundle/Assembly	<ul style="list-style-type: none"> ● Bowing ● Corner Fuel Rods: <ul style="list-style-type: none"> - Active Fuel Column: <ul style="list-style-type: none"> - Axial Gaps - Height - Relative Power - Profile (OD) ● Fuel Rod-to-Fuel Bundle Upper End Fitting Gap ● Fuel Rod Cladding, End Plug, and Weld Integrity^(a,b) ● Fuel Rod-to-Fuel Rod^(a) Spacing (i.e., water channel width) ● Fuel Rod^(a)-to-Guide Tube Spacing (i.e., water channel width) ● Fuel Rod^(a) Withdrawal Force ● Holddown Spring Force ● Identification ● Length ● Weight 	<ul style="list-style-type: none"> Mensural, Visual Gamma Scanning Gamma Scanning Gamma Scanning Mensural Mensural Sipping, Visual Mensural, Visual Mensural, Visual Mensural Mensural Visual Mensural Mensural
Fuel Rod	<ul style="list-style-type: none"> ● Active Fuel Column: <ul style="list-style-type: none"> - Axial Gaps - Height - Relative Power ● Cladding <ul style="list-style-type: none"> - Corrosion Variations^(a) - Degradation^(a) - Diameter - Fretting Wear^(a) - Fuel-to-Cladding Bonding - Hydriding^(a) - Incipient Defects^(a) - Integrity^(a,b) - Ovality^(a) - Ridge Height^(a) ● End Plug: <ul style="list-style-type: none"> - Identification^(a) for enrichment^(a,b) fuel rods - Integrity^(a,b) ● Identification^(a) ● Length^(a) ● Moisture Inside Fuel Rod^(a) 	<ul style="list-style-type: none"> Gamma Scanning Gamma Scanning Gamma Scanning Eddy Current, Mensural, Ultrasonic, Visual Eddy Current, Mensural, Ultrasonic, Visual Eddy Current, Mensural, Ultrasonic, Visual Eddy Current, Mensural, Ultrasonic, Visual Ultrasonic Eddy Current, Ultrasonic, Visual Eddy Current, Ultrasonic Eddy Current, Ultrasonic, Visual Mensural Mensural Visual Visual Visual Mensural Ultrasonic
Guide Tube	<ul style="list-style-type: none"> ● Structural Integrity ● Inside Diameter ● Wear 	<ul style="list-style-type: none"> Eddy Current, Visual Eddy Current, Mensural (only on part of tube) Eddy Current, Mensural, Visual
Spacer Grid	<ul style="list-style-type: none"> ● Structural Integrity ● Position ● Spring Force 	<ul style="list-style-type: none"> Visual Mensural, Visual Mensural

(a) Also applies to burnable poison rods.

(b) Specifically leak-tight integrity to fluids and structural integrity.

Evaluating data on defective fuel reported by industry is difficult for several reasons:^(1,4,6,35) 1) the definition of failed fuel can vary from outage to outage and from reload to reload for each utility (see Section 3.3.1); 2) the definition of abnormal degradation is not uniform throughout the industry (see Section 3.3.1); 3) in many cases the number of fuel failures is inferred from indirect evidence; 4) in some cases only directly observed failures are counted, and 5) whether or not the fuel is failed can depend on how closely the fuel is inspected and on the capability of the inspection technique being used [it can also depend on when the inspection (i.e., sipping) takes place, as discussed in Section 3.2.5].

3.2.2 Visual Inspection

The key role of visual inspection is to check fuel assembly integrity (i.e., the condition of the fuel rods and the condition of the other components of the fuel assembly) and to identify anomalies. Normally, visual inspection is a very tedious, subjective task and the role of visual inspection is not uniformly emphasized. At BWRs, a visual inspection is used to verify indications from sipping. At PWRs, detailed visual inspection may be the only poolside inspection conducted. Fuel vendors and utilities consider visual inspection to be a poor technique for identifying leaking fuel rods. Small cracks and perforations in the cladding are difficult to see under water unless bubbles are being emitted from the anomalies during the visual inspection.

3.2.3 Mensural Inspection

There is no standard mensural campaign; the effort during each inspection is unique. As a result, there is no conventional approach to calibration standards. There is no uniformity in the design and use of standards, even though standards are important to poolside mensural tasks. However, it would be very difficult to standardize poolside mensuration.

3.2.4 Gamma Scanning

Gamma scanning, a nondestructive technique, is employed primarily to assess new fuel designs and can sense either gross activity changes or specific isotopes. Gamma scanning is not directly useful in detecting a breach in the fuel rod cladding because it is not specifically sensitive to such defects.

Generally, standards are not used during poolside gamma scanning of fuel. Gamma scanning at a pool is performed infrequently (typically less than once a year).

3.2.5 Sipping (Leak Testing)

Sipping is one of the more accurate inspection methods for determining the integrity of fuel assemblies. However, it is a relative measurement, it is not an exact diagnostic technique, and it does not identify the specific rods that have breached cladding. The principle of sipping is based on determining the presence and magnitude of escaping fission products from leaky fuel rods. Sipping yields a quantitative relative measure of the condition of the fuel assembly, especially if the fuel assemblies to be sipped are grouped according to design and performance characteristics.⁽⁴⁷⁾ However, sipping can preferentially detect perforations in the fuel cladding that occur late in a reactor operating cycle.⁽⁵⁾ There are four types of sipping: wet, dry, hybrid (combines the advantages of wet and dry sipping), and vacuum (also known as pressure sipping or pressure differential sipping). In contrast to dry or vacuum sipping, wet sipping has a rapid signal loss (one- to two-day decay half-life), which means if wet sipping is to be done, it should be performed within a few weeks after the reactor is shut down. Fuel assemblies exhibiting "abnormally" high radioactive releases can only be identified after a number of fuel assemblies have been sipped to establish a background level for intact fuel assemblies for comparison purposes. Fuel assembly burnup, time since reactor shutdown, and the crud on the fuel assembly are some of the reasons why the absolute magnitude of the sipping signals can vary. Two things can interfere with the detection of old leaks by sipping: The cladding fissure can become closed because of crud or other buildup or the entire fission product inventory may not be readily available (because of less than perfect axial communication) for release and subsequent detection by the sipping equipment. Fuel assemblies with grossly failed fuel rods may not be readily identified by sipping because the volatile fission products have already escaped from the rods.⁽⁶⁾

3.2.6 Eddy-Current Testing

Eddy-current testing is employed to detect defective fuel rods. The testing is done on individual fuel rods after they have been removed from the fuel

assemblies. Detection of failed fuel rods (i.e., other than visually identified failed rods) is currently a reasonably established procedure, using either or both eddy-current and ultrasonic testing; but the detection of incipiently failed fuel rods is not.^(6,54) Incipient defects are extremely tight (the sides of the crack are in very close contact with each other) stress-corrosion-type cracks that extend part way through the wall of the cladding and are difficult to detect with eddy-current testing. One of the causes of incipient defects can be pellet-cladding interaction (see Section 3.3.2).

The use of eddy-current signal data to assess the leak-tight integrity of fuel cladding is complicated by uncertainties in eddy-current measurements (makes interpretation of the results more difficult), detectability, and reliability. The most apparent difference with eddy-current testing among fuel vendors is the lack of standardization (each vendor has developed its own reference standard). Reporting of eddy-current results is not uniform among fuel vendors because of variations in probes, equipment, standards, test procedures, and evaluation criteria.

3.2.7 Ultrasonic Testing

In the past, ultrasonic testing of irradiated fuel rods (after they were removed from the fuel assemblies) was performed at spent fuel storage pools by two domestic fuel vendors. The ultrasonic testing was performed for several reasons: 1) as a supplemental examination to confirm eddy-current test results; 2) to detect the ingress of water; or 3) to detect bonding of fuel pellets to the cladding. Ultrasonic testing is a rapid means of detecting fuel rods with breached cladding, although crud deposits on fuel rods can complicate the interpretation of ultrasonic test results. In addition, fuel rod dimensional changes can create problems in positioning the ultrasonic transducers.

An ultrasonic testing system was recently developed in the Federal Republic of Germany (FRG)⁽⁵⁶⁻⁵⁸⁾ to detect moisture inside failed fuel rods while the rods are still in the fuel assembly. Two U.S. fuel vendors, Babcock & Wilcox and Exxon Nuclear (now known as Advanced Nuclear Fuels Corporation), have also developed such systems.^(59,60) These systems have two important advantages: they can be used without having to disassemble the fuel assembly and they provide a clear indication of the exact location of the failed fuel

rods in the assembly. Detectability of failed fuel by sipping tends to degrade with storage time but detectability by the ultrasonic method does not degrade provided the moisture remains in the rod. If the certainty factors of the classical sipping method are compared with those of the ultrasonic method, the results are as follows: sipping, 90% to 95%; and ultrasonic inspection, >99%.⁽³⁹⁾ The ultrasonic techniques are rapid, have demonstrated high reliability,⁽⁵⁷⁾ and (since 1983) have been used at more than nine domestic plants. The fuel assemblies loaded into the CASTOR-V/21 storage cask were ultrasonically inspected and did not contain any fuel rods with breached cladding; subsequently, a cask valve leak occurred during cask testing and the fuel rods were exposed to air but there was no oxidation of UO_2 because only intact fuel rods were present.⁽⁶¹⁾

3.3 FUEL FAILURES AND FUEL DAMAGE

The following topics are discussed in this section: definitions of fuel failure and fuel damage; types and causes of fuel failures; and types of mechanical damage sustained by fuel.

3.3.1 Definitions

Regarding the definition of failed fuel and the reporting (see Section 3.5) by utilities and/or fuel vendors to the NRC of abnormal degradation of fuel cladding and fuel failures, the results of a PNL study in 1980-1981 for the NRC on these matters are described in detail in NUREG/CR-1380⁽⁶⁾ and are briefly stated in several other reports^(1,37-41) and below:

- "The threshold for what constitutes abnormal degradation is not uniform throughout the industry and remains a matter of opinion. Therefore, the degree of reported degradation is not uniform."
- "The definition of failed fuel is tied to the functional, legal, and detection requirements on the fuel. The designation of fuel as failed depends on which functional requirement is not met (safety, commercial, design, whether or not there is a legal contingency on that requirement (Technical Specification, fuel warranty, design basis), and which indicator is used (coolant or off-gas activity,

sipping, strain, or deflection). Thus, the definition can vary from outage to outage and from reload to reload for each utility as the considerations change."

Several definitions of failed fuel have been published. Five of these definitions are described below.

In 1974, a definition of fuel failure was published as part of the description in the Nuclear Plant Reliability Data (NPRD) System,⁽⁶²⁾ which was developed by the Equipment Availability Task Force of the Edison Electric Institute (EEI). The NPRD System defines failure of fuel assemblies "...as any breach of the cladding or any structural change, such as distortion or break, that for safety considerations causes abnormal maintenance or early replacement of a fuel assembly."⁽⁶²⁾

In NUREG-0032,⁽⁶³⁾ which was published in 1976, it was noted that the NPRD definition of fuel failure "...would cover most fuel failures; however, inclusion of the words 'for safety considerations' could introduce some degree of interpretation in whether some failures should be included or not. In addition, it could be argued that performance outside the predicted limits can also be considered a failure; these would generally be related to failures in design. The limitations of this definition would generally be most pertinent for an assembly in its last cycle. The fuel rod could contain bulges, collapsed sections, and other irregularities, without a breaching of the cladding. Severe bowing could also be present, but requiring no abnormal maintenance (in this case, maintenance being defined as removal of the assembly from the core)." As a result, fuel failure in NUREG-0032⁽⁶³⁾ was "...defined as (1) any breach of the fuel rod cladding, (2) any structural change of the assembly or its component parts, such as distortion or break, which causes abnormal maintenance or early replacement of the assembly or plant operating restrictions, and (3) any structural changes of the assembly or its component parts which exceed predicted limits of performance."

In 1979, FRG investigators,⁽⁶⁴⁾ following the work in NUREG-0032,⁽⁶³⁾ defined fuel failure as "...perforation or defect of the fuel cladding, or any structural change which causes abnormal maintenance or early replacement of a fuel assembly or its component parts."

Definitions of fuel failure and fuel damage, as used in the licensing process for domestic nuclear power stations, are included in the NRC's Standard Review Plan (NUREG-0800, Rev. 2, issued in 1981).⁽⁶⁵⁾ In that plan, "fuel rod failure" is defined as loss of fuel rod hermeticity, which means that the rod leaks and that therefore the first fission product barrier has been breached. One of the objectives of the safety review by the NRC's Office of Nuclear Reactor Regulations of the fuel system for a domestic plant is to provide assurance that the fuel system is not damaged as a result of normal operation and anticipated operational occurrences. As defined in the plan, "not damaged" means that fuel rods do not fail, that fuel system dimensions remain within operational tolerances, and that functional capabilities are not reduced below those assumed in the safety analysis.

The Transportation Certification Branch of the Division of Fuel Cycle and Material Safety of the NRC's Office of Nuclear Material Safety and Safeguards issued Certificates of Compliance for the TN-8 and TN-8L shipping casks (Docket No. 71-9015) and the TN-9 shipping cask (Docket No. 71-9016) on April 13, 1984. A stated condition in those certifications is that "known or suspected failed fuel assemblies (rods) and fuel with cladding defects greater than pinholes and hairline cracks are not authorized." The NRC also stated that "...the Certificates of Compliance have been revised to require that all spent fuel shipping casks be inerted for shipment to preclude handling problems from oxidized fuel at facilities receiving spent fuel. In addition, shipment of known or suspected failed fuel assemblies (rods) may not be made unless each fuel assembly is appropriately canned and authorized in the Certificate of Compliance for shipment. This is not meant to require a detailed examination of each assembly (rod) prior to shipment." In other words, fuel with small cladding breaches (i.e., pinholes and/or hairline cracks) can be shipped in the same manner as intact fuel.

3.3.2 Types and Causes of In-Reactor Fuel Failures or Damage

Failure sites on fuel rods can vary over a wide range: from pinholes to small holes, cracks, and large defect areas (rare) in which fuel pellets are visually observable (see Figures 3.1 through 3.16). If defective fuel rods are allowed to continue operation in LWRs, they can sustain substantial secondary

FIGURE 3.1. BWR Fuel Rod Failure Attributed to Upper End Cap Weld Contamination⁽⁷⁷⁾ (photograph courtesy of Exxon Nuclear Company, Inc.)

hydriding that can dominate the visual appearance.⁽⁶⁴⁾ Such hydriding has led (especially in the early days) to misinterpretation of the primary cause of failure. Longitudinal splitting of the cladding (see Figure 3.10) if noted under normal operating conditions is now typically viewed as a secondary defect.⁽⁶⁴⁾ Only a small fraction of the fuel rod cladding breaches are readily visible when fuel assemblies are visually inspected because the defects are generally too small for easy detection or they are located on interior rods. Even with an external viewing aid, such as a periscope, one can only see about three rod rows deep. One fuel vendor estimated that of all the rod surfaces in a fuel assembly, only about 15% of the total can be visually examined.⁽⁶⁾

Causes of fuel failures include: 1) manufacturing defects; 2) internal contaminants; 3) external contaminants; 4) corrosion; 5) pellet-cladding interaction (PCI); 6) cladding collapse; 7) structural changes; and 8) fretting and wear. In the early days (1968-1977), internal contamination (hydriding), PCI, and cladding collapse were the main failure causes. In recent years,

(a) Water Corrosion on BWR Fuel Associated with Fabrication-Related Cause

(b) Companion Rods Showing No Corrosion

FIGURE 3.2. Examples of Appearances of BWR Fuel Rods Fabricated from the Same Lot of Cladding⁽⁷⁷⁾ (photographs courtesy of Exxon Nuclear Company, Inc.)

a) Hydride Blister with Severe Stress Crack

b) Burst Hydride Blister

c) Cracked Hydride Blister

FIGURE 3.3. Examples of Fuel Rod Failures Due to Hydriding (photographs of Canadian fuel rods courtesy of Ontario Hydro)

FIGURE 3.4. Example of a Fuel Rod that Failed as a Result of Crud-Induced Localized Corrosion (CILC)

crud-induced localized corrosion (CILC)^(1,39-42) and debris-induced fretting^(1,37) have been of concern in BWRs and PWRs, respectively. The eight causes of failures are described below.

Manufacturing Defects

Manufacturing defects can include defective materials, defective welding (e.g., cladding to end cap on fuel rods), insufficient inspection, loading of pellets with incorrect enrichment, and mechanical damage (see Figures 3.1, 3.2, and 3.7 through 3.10). One of the key contributing factors to the rod failures in Figures 3.7 through 3.10 was a pellet chipping problem: Fuel chips wedged in the fuel-cladding gap resulted in highly localized cladding stresses. The

FIGURE 3.5. Pellet-Cladding Interaction Split on BWR 7x7 Fuel Rod.⁽⁷⁷⁾
Fuel pellets are visible through crack (photograph
courtesy of Exxon Nuclear Company, Inc.)

FIGURE 3.6. Transverse Cross Section Showing PCI (stress corrosion)
Crack Through Cladding Wall of BWR 8x8 Fuel Rod⁽⁷⁷⁾
(photograph courtesy of Exxon Nuclear Company, Inc.)

FIGURE 3.7. Incipient Crack that Initiated from the Outer Surface of the Cladding (stainless-steel-clad PWR fuel rod).^(75,76) Reprinted with permission from Northeast Utilities and the Electric Power Research Institute.

number of failures due to manufacturing defects has been quite small. Such failures cannot be completely eliminated but the number of occurrences should continue to remain low provided fuel vendor and utility quality assurance programs are maintained and upgraded as needed.⁽⁶³⁾

Internal Contaminants

Contamination of the inside of a fuel rod (i.e., introduction of a foreign material) is of concern because the contaminant may attack the cladding. With Zircaloy-clad fuel, the predominant failure mechanism is hydriding, a result of localized attack of the cladding by extraneous hydrogen.⁽⁶³⁾ Such hydrogen may be introduced during fabrication either as a hydrogenous impurity or from moisture that is present in the fuel pellet itself. A fabrication defect (e.g., a weld flaw or an end cap centerline stringer) could also allow ingress of water into a fuel rod during operation. The hydrogenous impurity attacks

~8X

FIGURE 3.8. Appearance of a Tight Crack in a PWR Stainless-Steel-Clad Fuel Rod. (75,76) Reprinted with permission from Northeast Utilities and the Electric Power Research Institute.

~8X

FIGURE 3.9. Appearance of the Longer of Two Cracks Observed in a PWR Stainless-Steel-Clad Fuel Rod. (75,76) Reprinted with permission from Northeast Utilities and the Electric Power Research Institute.

FIGURE 3.10. Typical Cladding Splits Observed in Poolside Examinations of the Connecticut Yankee Batch 9 Fuel Assemblies (fuel cladding is stainless steel).⁽⁷⁵⁾ Reprinted with permission from Northeast Utilities.

the inside surface of the cladding at various points and results in blisters (typically 1/8- to 1/4-in. in diameter) forming on the exterior surface of the cladding (see Figure 3.2b). The blisters can result in cladding breaches; such breaches typically occur early in the operating life of the fuel rod. In the early 1970s, hydriding of fuel rod cladding led to plant restrictions and early refueling at BWRs and PWRs. Hydriding of fuel rod cladding has occurred in the past at the following plants: Dresden-2 (1971-1972), Dresden-3 (prior to Spring 1973), Monticello (1973-1974), Nine Mile Point-1 (1971), Quad Cities-1 (1973), and Vermont Yankee (1972, 1974).⁽⁶³⁾ Cladding failures due to

FIGURE 3.11. Fuel Rods with Collapsed Cladding, a Result of In-Reactor Fuel Densification⁽¹⁴⁾

hydriding because of fuel pellet moisture content have been practically eliminated because of improvements in fuel fabrication procedures. Hydriding failures (from undetermined causes) occurred in a few (≤ 5) fuel assemblies in 1985.⁽¹⁾

External Contaminants

The presence of certain contaminants (e.g., chlorides, sulfates) in the water are of concern because of their potential for causing intergranular stress corrosion cracking of the stainless steel components of fuel assemblies. One event occurred in 1981 in which the top end fitting (nozzle) separated from the remainder of the PWR fuel assembly as the assembly was being lifted out of a storage rack.⁽³⁹⁾ The cause of the event appeared to be intergranular stress corrosion cracking of the short stainless steel sleeves that are welded to the top nozzle and mechanically joined to the Zircaloy control rod guide tubes (the load-bearing members when the assembly is lifted). Although the exact contaminant was not identified at that time, sulfate contamination was highly

a) Two Adjacent Failed Rods With Metallic Debris

b) Two Adjacent Failed Rods. Rod in Row 1 Has Two Fret Marks (out of focus); Rod in Row 2 Has Debris Lodged in Fret Mark.

c) Failed Rod With Multiple Fret Marks

d) Failed Rod With Two Fret Marks

FIGURE 3.12. Examples of Fretting Failures During Cycle 6 at a PWR⁽⁷⁸⁾ (photographs courtesy of Westinghouse Electric Corporation)

a) Rod With Multiple Fret Marks

b) Adjacent Failed Rods

c) Rod With Fret Mark

d) Failed Rod With Debris Lodged in Fret Holes

FIGURE 3.13. Examples of Fretting Failures Observed in Other PWR Cores⁽⁷⁸⁾
(photographs courtesy of Westinghouse Electric Corporation)

suspected. Twelve other fuel assemblies at that site exhibited evidence of similar corrosion, but no other nozzles were broken off.

Corrosion

Prior to 1976, some domestic commercial BWRs (Big Rock Point, Dresden-1, Humboldt Bay-3) sustained fuel rod failures because of scale or corrosion product (crud) deposit buildup on fuel rod surfaces. Such buildups can lead to overheating of the cladding and subsequently to accelerated corrosion

a) Fretted Hole in Cladding Caused by a Pressure Tube Lap Defect

b) Fretting Damage Caused by Foreign Material

FIGURE 3.14. Examples of Fuel Rod Failures Due to Fretting
(photographs of Canadian fuel rods courtesy
of Ontario Hydro)

FIGURE 3.15. Typical Damage to Spacers and Fuel Rods from Baffle Jetting or Coolant Crossflow⁽⁷⁷⁾ (photograph courtesy of Exxon Nuclear Company, Inc.)

(oxidation) and ultimately to fuel rod failure. A characteristic of these crud deposits was the high copper content. The source of the copper was the cupro-nickel or monel in the feedwater heaters. Improvements in material selection and reactor primary coolant water chemistry appeared (in 1976) to have eliminated the fuel rod failures due to crud buildup.⁽⁶³⁾ However, accelerated waterside corrosion caused rod failures in Vermont Yankee in 1979 and 1980.⁽³⁹⁾ In 1981, similar rod failures were found at Hatch-1 and were reported to be caused by CILC.⁽³⁹⁾ CILC, a new unanticipated but statistically small failure mechanism, was first identified in BWRs in 1979.⁽¹⁾ An example of a fuel rod failure due to CILC is shown in Figure 3.4. The failures (e.g., those at Vermont Yankee and Hatch-1) were highly concentrated among the burnable poison, $(\text{U,Gd})\text{O}_2$, rods and involved only high power density plants with copper-bearing condenser tubing and filter demineralizer cleanup systems. An EPRI report⁽⁶⁶⁾

FIGURE 3.16. Closeup of the Stub Ends of Damaged Fuel Assemblies Adhering to the Plenum Structure in the Three Mile Island-2 Reactor Vessel. The fuel rods are 0.43 in. in diameter. (Photograph courtesy of GPU Nuclear Corporation.)

speculates that there are three important aspects to the waterside corrosion "...problem: (1) the presence of copper in the water, (2) the susceptibility of the cladding to corrosion, and (3) the power (heat flux) history of the rod." Actions that have been taken to eliminate CILC include revised recommendations for water chemistry control and use of a new accelerated corrosion test for cladding.⁽¹⁾

Pellet-Cladding Interaction

Mechanical/chemical fuel-cladding interaction, more commonly referred to as PCI, was identified as a failure mechanism as early as 1971 and has been studied extensively^(63,64) (see Figures 3.5 and 3.6). Light-water reactor fuel is susceptible to breaching of the fuel cladding by PCI when it is subjected to rapid power increases after the fuel has attained moderate to high burnups, at which time the cladding has reduced ductility. Fuel rod failures due to PCI have predominately involved BWR cores; however, PWR fuel rods are not immune to PCI. The propensity of fuel rods to fail because of PCI has been shown to be a generic characteristic of all Zircaloy-clad fuel.⁽⁶⁴⁾ Localized mechanical loading of the cladding adjacent to pellet cracks and at pellet-pellet interfaces is a feature of PCI. The strain imposed by the fuel on the cladding is primarily a function of differential thermal expansion and swelling and is dependent on several factors: burnup, linear heat generation rate, rate of power change, design characteristics, and manufacturing variables.⁽⁶³⁾ Generally, PCI starts at power levels where the release of fission gas from the fuel increases sharply.⁽⁶⁴⁾ Industry implemented modest startup procedures at BWRs and PWRs to eliminate PCI; however, the disadvantage with this approach is that there is an associated loss of some plant capacity. Recently (1983), zirconium barrier fuel has furnished a material solution to PCI in BWRs.⁽¹⁾

Cladding Collapse

Cladding collapse (Figure 3.11), which is generally considered as a design deficiency, does not necessarily result in breached fuel cladding, but the potential exists.⁽⁶⁴⁾ Collapsed cladding was first noted at a foreign reactor (Beznau-1) in 1971 and then observed at a domestic plant (Ginna) in 1972. Eventually, collapsed cladding was of concern at a number of domestic PWRs including Ginna, Point Beach-1 and -2, Robinson-2, San Onofre-1, Surry-1 and -2, and Turkey Point-3 and -4.⁽⁶³⁾ Based on PWR fuel rod failure rates, the largest effect occurred in the early 1970s. The collapsed (flattened) sections of fuel cladding varied in length from 0.5 to 4.0 in. and were caused by the development of gaps (they were too wide for the unsupported cladding to withstand the external pressure) in the fuel pellet column in the fuel rod. Densification of BWR fuel also occurred but to a much lesser degree.⁽⁶³⁾

Modifications to the fuel pellet fabrication process and prepressurization of PWR fuel rods have eliminated the problem of collapsed cladding.

Fuel rods with collapsed cladding, which were discharged from the reactor in 1971-1972, have been involved in two recent rod consolidation demonstrations.^(14,15) Some rods were mechanically reformed to make the rod cross sections in the collapsed areas more circular to facilitate rod consolidation.⁽¹⁵⁾ See comments on rod breakage in Section 3.7.

Structural Changes

The NRC generally considers rod bowing to be a design deficiency.⁽⁶³⁾ Rod bowing has rarely resulted in breached fuel rod cladding or broken rods. In one case,^(1,63) bowing of fuel rods in an early Dresden-1 core resulted in accelerated corrosion and ultimately to failure of some rods. Rod bowing has been observed in a large number of PWRs but no cladding defects due to rod bowing have ever been observed.⁽¹⁾ The largest amount of bowing in PWR fuel rods has been with earlier Westinghouse fuel.⁽⁶⁴⁾ Rod bowing is generally caused by a combination of the azimuthal variations in cladding fluence and temperature (they result in axial variations in irradiation-induced and thermal creep of the fuel rod) and mechanical interaction between the fuel rods and the spacer grids.

Zircaloy growth and fuel rod and fuel assembly bowing are closely connected. Axial rod growth that was larger than anticipated has occurred.^(38,64) The concern with such growth is the potential for interaction with the fuel assembly end fittings, which could lead to rod bowing. Fuel assembly bowing can be a result of Zircaloy growth.⁽⁶⁴⁾

Fretting and Wear

Wear and fretting corrosion have been attributed to a variety of causes. In most cases, the source of the problems has been outside the fuel rod/assembly and has not been directly relevant to fuel performance.⁽⁶⁴⁾ Examples of fuel rod failures due to fretting are shown in Figures 3.12 through 3.14. Both BWR and PWR fuels have encountered these failure mechanisms.⁽⁶⁴⁾ Fuel rod failure or damage due to baffle jetting (caused by vibration of the fuel rods and resulting in fretting) was first observed in domestic PWRs in 1973⁽¹⁾ (see

Figure 3.15). Since that time, eight domestic plants have sustained fuel assembly degradation from baffle jetting. During 1985, the baffle jetting problem continued to persist for at least six domestic PWRs. Fuel rod failures at domestic PWRs due to debris-induced fretting have involved 131 fuel assemblies since 1980.⁽¹⁾ Though a few (16) leaking PWR fuel assemblies were detected in 1985, the corrective measures implemented at PWRs to eliminate debris-induced fretting generally appear to be succeeding.⁽¹⁾ A third cause of fretting is vibration of the fuel rods against the spacer grids. This was an early design problem but still occurs if the spacer grids are damaged enough to allow fuel rod vibration.

3.3.3 Types and Causes of Out-of-Reactor Fuel Failures or Damage

Very few fuel assemblies have sustained major mechanical damage during handling operations or are known to have been damaged during normal transporting operations^(11,12) (examples are listed in Tables 3.3 through 3.7). Fuel assemblies stored under water have been dropped. The one assembly (BWR-type) that was dropped the greatest distance, 9.1 m (30 ft), hit another fuel assembly. Of all of the cases shown in Table 3.5, this was the only one in which there was a momentary release of airborne radioactivity and it was from

TABLE 3.3. Fuel Assemblies that Sustained Damage
During Various Operations⁽¹¹⁾

Operation	Number of Fuel Assemblies ^(a)	
	BWR	PWR
Receiving new fuel		≤7
Refueling reactor core	>21 ^(b,c)	~232 ^(d,e)
Storing and handling of fuel at spent fuel pool	16	13
Transporting irradiated fuel		≤14
Handling irradiated fuel after shipment	>4	>5
	>41	~271 ^(f)

- (a) See Footnote (a) on p. v.
 (b) Includes 1 fresh fuel assembly.
 (c) Includes >17 non-U.S. fuel assemblies.
 (d) Includes 7 fresh fuel assemblies.
 (e) Includes >39 non-U.S. fuel assemblies.
 (f) Of these, >173 had spacer grid damage.

TABLE 3.4. Fuel Assemblies that Tilted, Fell, or Dropped
During Various Operations⁽¹¹⁾

Operation	Number of Fuel Assemblies ^(a)		
	Tilted ^(b)	Fell ^(c)	Dropped ^(d)
Receiving new fuel	--	--	1
Refueling reactor core	2	1	8
Storing and handling of fuel at spent fuel pool	1	1	9
Handling irradiated fuel after shipment:			
• interim fuel storage facility	--	--	16
• non-U.S. reprocessing plants	--	1	--
• hot cell facility	--	--	--
Totals	3	3	34
Distribution by assembly type:			
BWR		2	9
PWR	3		9
Not stated		1	16

(a) See Footnote (a) on p. v.

(b) Fuel assembly tilted (45° or less from vertical) and came to rest against another object (not a fuel assembly).

(c) Fuel assembly fell from a vertical to a horizontal (or to within 20° of horizontal) position on top of other fuel assemblies.

(d) Fuel assembly lifted, then inadvertently dropped.

TABLE 3.5. Distances that Fuel Assemblies Have Been Dropped in Water⁽¹¹⁾

Number of Fuel Assemblies ^(a)	Distance Dropped	
	meters	feet
1 ^(b)	9.1	30
1	8.0	26
1	6.1	20
1	3.7	12
1 ^(c)	1.8	6
6	1.5	5
1	~0.5	~1.6
3	≤0.13	≤0.42
19	Not stated	

(a) See Footnote (a) on p. v.

(b) This assembly was dropped onto another irradiated assembly; there was a momentary release of airborne radioactivity when the latter assembly was moved.

(c) After being dropped, the assembly then tipped over into the corner of the 3-m (10-ft) deep spent fuel cask pit.

TABLE 3.6. Damage Sustained by BWR Fuel Rods and Bundles/Assemblies^{(a)(11)}

Damage	Number Involved	
	Rods	Bundles/Assemblies ^(b)
Grappling problem		>8
Spacer grids damaged		10
Lower tie plate damaged		3
Bail deformed		2
Unspecified damage from handling		a few
Spring clips hung up on core grid		3
Damage by fueling machine		some
Mechanical interference		some
Scratches	60	4
Bundle twisted		some
Bundle bowed		1
Channel spacers bent or disturbed		many (at 1 BWR)
Channel deformed		5
Channel fell off bundle		1 ^(c)
Rod bent	1	
Rod bowed	2	
Rod misplaced (unaccounted for)	1	
Rod dropped	1	
Rod difficult to remove from bundle	a few	a few
Rod fell out of assembly	all ^(c)	1
Rod broken during handling	a few ^(d)	

(a) In addition to those BWR fuel bundles/assemblies that tilted, fell, or were dropped (see Table 3.4).

(b) See Footnote (a) on p. v.

(c) This assembly was dropped 1.8 m (6 ft); then it tipped into cask pit. When assembly subsequently lifted, channel fell off and the rods fell out.

(d) Bundle type not stated (may be BWR and/or PWR).

the assembly that was hit. A few fuel rods have been bent, broken, or dropped out of fuel assemblies during handling operations.^(11,12)

3.4 NUMBER OF IRRADIATED FUEL ASSEMBLIES CURRENTLY IN STORAGE

Table 3.8 shows the disposition of historical spent fuel discharges from domestic commercial power reactors as of December 31, 1985.⁽⁶⁷⁾ Nearly all of the 45,975 fuel assemblies are in wet storage; part of the 80 assemblies used in research and development programs are in dry storage (some in inert gases and some in air).

TABLE 3.7. Damage Sustained by PWR Fuel Rods and Assemblies^{(a)(11)}

Damage	Number Involved	
	Rods	Assemblies
Refueling problem ^(b)		>13
Grappling problem		>3
Spacer grids damaged		>173
Upper nozzle broken off assembly		4
Upper nozzle damaged		1
Lower nozzle damaged		2 ^(c)
Scratches		5
Guide tube nut (1) came off		1
SS guide tube sleeve corroded in pool		12
Assembly skeleton/wrapper/can damaged		3
Nozzle springs bent or broken		>4
Bent nut capture devices (20)		>2
Assembly bumped or lower nozzle jarred		3
Assembly hit by another object		2
Assembly bowed, twisted, or distorted		>9
Assembly difficult to remove from storage rack		3
Unspecified damage due to handling		>2
Damage due to leveling bolts and shims		<12
Object ^(d) difficult to remove from fuel assembly		11
Rod bent or damaged	>7	>7
Rod dropped	3	
Rod fell out of assembly	2	
Rods bowed		>1
Rod bowed outside assembly envelope	1	1
Rods broken during handling and assembly disassembly operations		1; a few ^(e)
Failed rods extremely difficult to remove from assembly	4	

- (a) In addition to those PWR fuel assemblies that tilted, fell, or were dropped (see Table 3.4).
- (b) For example, due to bowed rods, control blade insertion by crane, mispositioning, high loads during removal of assemblies from the core, equipment problems, insufficient clearance, etc.
- (c) Nozzle type not stated.
- (d) Such as a burnable poison rod, burnable poison assembly, secondary source assembly, or plugging device.
- (e) One PWR fuel rod was broken in one case; a few rods were broken in another case, but fuel assembly/bundle type was not stated (may be PWR and/or BWR).

TABLE 3.8. Spent Fuel Inventory (as of December 31, 1985)⁽⁶⁷⁾

Status of Fuel	Assemblies			MTIHM ^(a)		
	BWR	PWR	Total	BWR	PWR	Total
In storage at reactor sites	26,421	17,392	43,813	4,794	7,377	12,171
In storage at Morris, IL	1,527	350	1,877	290	132	422
In storage at West Valley, NY	85	120	205	11	47	58
Reprocessed at West Valley, NY	1,140	77	1,717	115	119	234
Used in R&D ^(b) programs	1	79	80	<0.5	35	35
Total fuel discharged from commercial LWRs ^(c)	29,174	18,518	47,692	5,210	7,710	12,920

(a) Metric ton of initial heavy metal (MTIHM).

(b) Research and development (R&D).

(c) Except for fuel currently or planned to be reinserted in reactors.

3.5 ESTIMATED NUMBER OF FAILED OR DAMAGED FUEL ASSEMBLIES IN STORAGE

Described in this section are the requirements for reporting data on defective fuel assemblies, cautionary notes pertaining to reviews of such data, the estimate of the number of defective fuel assemblies currently in storage, and the categorization of the defective fuel assemblies. Annual discharge, rod array, and burnup data for the defective fuel assemblies are also discussed.

3.5.1 Reporting of Data

As noted in the NRC's fuel performance reports,⁽¹⁾ the requirements for utilities to report fuel performance details have changed over the years. The general trend has been to decrease reporting requirements. By 1975, for example, reportable items included only abnormal degradation of fuel cladding and an indication of failed fuel (see Section 3.3.1 regarding the nonuniformity of the definitions of "abnormal degradation" and "failed fuel"). By 1977, only abnormal degradation of fuel cladding was to be reported and the requirement for an annual operating report was deleted. A new Licensee Event Report (LER) rule, which became effective January 1, 1984, requires events to be reported where the plant, including its principal safety barriers (includes fuel cladding and containment), was seriously degraded or in an unanalyzed condition. Examples of such events noted in this paragraph, 50.73(a)(2)(ii), are "fuel

cladding failures in the reactor or the storage pool that exceed expected values, that are unique or widespread, or that resulted from unexpected factors."

The EIA requests information (Spent Fuel Survey, RW-859) on defective fuel assemblies from the utilities. Some utilities have provided such data for 1985 and 1986.

3.5.2 Cautionary Notes

In reviewing the data on defective fuel in this report, it is important to keep two points in mind. The first point is that we are dealing with an incomplete set of data. To date, utilities have provided the EIA with data on defective fuel assemblies at only slightly over half of the domestic reactors. (The United States has 101 power reactors licensed for commercial operation.)⁽³⁶⁾ The second point is that there are inherent difficulties in attempting to combine or directly compare data provided by various plants, utilities, or fuel vendors on defective fuel. These limitations are discussed in Section 3.2.1.

3.5.3 Defective Fuel Assemblies Currently in Storage

As shown in Table 3.9, which is based on EIA data, there are approximately 4984 defective fuel assemblies currently in storage, of which 3623 (73%) are BWR type and 1361 (27%) are PWR type. Those defective fuel assemblies are located at 24 BWRs, 30 PWRs, and two independent spent fuel storage facilities.

The categorization of the defective fuel assemblies is described in Section 3.5.4. The breakdowns of the defective fuel assemblies by discharge date, rod array type, and burnup are included in Sections 3.5.5, 3.5.6, and 3.5.7, respectively.

3.5.4 Categorization of Defective Fuel Assemblies

The latest annual input (i.e., from the EIA's 1986 RW-859 Spent Fuel Survey) from utilities on defective fuel assemblies in storage is in the detailed list in Appendix A. Table A.1 and Table 3.9 show that there are 4984 fuel assemblies (~73% BWR-type; ~27% PWR-type) in wet storage. The identification number and batch number of each failed or damaged fuel assembly are provided in

TABLE 3.9. Defective Fuel Assemblies Currently in
Storage, Based on EIA Data^(a)

Spent Fuel Storage Pool at Reactor or (Storage Facility)	No. of Fuel Assemblies	
	BWR	PWR
Operating Reactor (Facility)		
Arkansas-1		24
Arkansas-2		6
Beaver Valley-1		
Big Rock Point	29	
Browns Ferry-1	60	
Browns Ferry-2	83	
Browns Ferry-3	1	
Brunswick-1	10	
Brunswick-2	21	
Byron-1		
Callaway-1		
Calvert Cliffs-1		
Calvert Cliffs-2		
Catawba-1		
Catawba-2		
Clinton-1 ^(b)		
Cook-1		28
Cook-2		12
Cooper Station		
Crystal River-3		
Davis Besse-1		
Diablo Canyon-1		
Diablo Canyon-2		
Dresden-2	135 ^(a)	
Dresden-3	246 ^(a)	
Duane Arnold	7	
Farley-1		19
Farley-2		
Fermi-2 ^(c)		
Fitzpatrick		
Ft. Calhoun-1		
(GE-Morris Operation)	0	0
Ginna		0
Grand Gulf-1		
Haddam Neck ^(d)		43
Hatch-1	85	
Hatch-2	45	
Hope Creek-1 ^(c)		
Indian Point-2		
Indian Point-3		
Kewaunee		
La Crosse	105	
La Salle-1		
La Salle-2		

TABLE 3.9. (contd)

Spent Fuel Storage Pool at Reactor or (Storage Facility)	No. of Fuel Assemblies	
	BWR	PWR
Limerick-1		
Maine Yankee		
McGuire-1		0
McGuire-2		
Millstone-1	113	
Millstone-2		37
Millstone-3		
Monticello	225	
Nine Mile Point-1	247	
Nine Mile Point-2		
North Anna-1		21
North Anna-2		7
Oconee-1		12
Oconee-2		17
Oconee-3		1
Oyster Creek		
Palisades		
Palo Verde-1		
Palo Verde-2		
Peach Bottom-2	36 ^(a)	
Peach Bottom-3	115	
Perry-1 ^(b)		
Pilgrim	145	
Point Beach-1		74
Point Beach-2		7
Prairie Island-1		1
Prairie Island-2		
Quad Cities-1	104 ^(a)	
Quad Cities-2	285 ^(a)	
Rancho Seco-1		
River Bend-1 ^(c)		
Robinson-2		1
Salem-1		2
Salem-2		
San Onofre-1		7
San Onofre-2		8
San Onofre-3		13
Sequoyah-1		
Sequoyah-2 ^(b)		
Shoreham ^(b)		
St. Lucie-1		
St. Lucie-2		
Summer-1		
Surry-1		79
Surry-2		28
Susquehanna-1		

TABLE 3.9. (contd)

Spent Fuel Storage Pool at Reactor or (Storage Facility)	No. of Fuel Assemblies	
	BWR	PWR
Susquehanna-2		
Three Mile Island-1		
Trojan		19
Turkey Point-3		14
Turkey Point-4		
Vermont Yankee	1358	
Washington Nuclear Project-2		
Waterford-3		
(West Valley)(e)	0	0
Wolf Creek-1		
Yankee Rowe		341
Zion-1		288 ^(a)
Zion-2		252 ^(a)
Reactors That Are Shut Down		
Dresden-1	168 ^(a)	
Humboldt Bay-3	0	
Indian Point-1		
Total	3623	+ 1361 = 4984

- (a) Source: Data-Set-3 plus Commonwealth Edison's Entries from Data-Set-2 (a total of 1478 fuel assemblies at Dresden-1,-2, and -3, Quad Cities-1 and -2, and Zion-1 and -2) and Philadelphia Electric's entry from Data-Set-2 (36 fuel assemblies at Peach Bottom-2).
- (b) According to a recent NRC publication, NUREG-0020, 10(12):1-2 (June 1987), this plant is licensed for fuel loading and low power testing.
- (c) According to a recent NRC publication, NUREG-0020, 10(12):1-2 (June 1987), this plant is in power ascension.
- (d) Also known as Connecticut Yankee.
- (e) West Valley Demonstration Project at the Western New York Nuclear Service Center, which is located at West Valley, New York, and is managed by West Valley Nuclear Services Co., Inc. (built and previously operated by Nuclear Fuel Services).

Table A.1. Each fuel assembly is also categorized (a given assembly may fall into several of the 10 categories) as described in Section 1.0. Table 3.10 provides a summary of the data in Table A.1 on fuel assemblies that are categorized by single and multiple entries. Table 3.11 shows the combined number of fuel assemblies from Table A.1 that are listed in each of the categories (a given fuel assembly may be listed under one, two, or three categories). Table 3.12 shows the results of combining the data from Table A.1 with the information from Table 3.13 that has been gathered from other sources (Licensee Event Reports, topical reports, etc.). Regarding the total number of failed fuel and damaged assemblies in storage pools, Table 3.12 indicates that over 5600 assemblies (~71% BWR-type; ~29% PWR-type) may be in pools at domestic reactors. According to Table 3.11, only 1 assembly required encapsulation or other remedial action, only 35 assemblies required special handling, only 95 assemblies were physically deformed (however, all plants that provided input said that all of their assemblies fit into the spent fuel storage racks), and all of the plants that provided input indicated that all of their assemblies could be consolidated. We are still tracking fuel assemblies that may have hydrogen-embrittled cladding (a result of primary or secondary hydriding); so far, at least 402 have been identified (131 in Table 3.12 and 271 in Table 3.13). See comments on hydriding under "Internal Contaminants" in Section 3.3.2.

3.5.5 Defective Fuel: Annual Discharge Data

The number of defective BWR and PWR fuel assemblies in annual discharges (1969-1985) for the United States is listed in Table 3.14 and shown in Figures 3.17 and 3.18, respectively.

3.5.6 Defective Fuel: Rod Array Data

Information on defective fuel assemblies grouped by rod array type is furnished in Table 3.15. The number of defective fuel assemblies, grouped by rod array type, at specific reactors is indicated in Table 3.16. The utilities provided the rod array information for some of the 4691 defective fuel assemblies (3374 BWR-type and 1317 PWR-type). The distribution of the BWR fuel assemblies by rod array type is as follows: 6x6 (5.0%), 7x7 (7.7%), 7x7NP (0.3%), 8x8 (36.6%), 8x8NP (2.4%), 8x8R (3.8%), 9x9 (0.7%), 10x10 (3.0%), 11x11

TABLE 3.10. Summary of Fuel Assemblies in Table A.1 that Are Categorized by Single and Multiple Entries

I. Fuel Assemblies Categorized by All Entries (Some fuel assemblies are listed under several categories: see Sections II and III for detailed breakdown for entries in Section I)

<u>Category Number</u>	<u>Category</u>	<u>No. of Fuel Assemblies^(a)</u>
1	Visually observed failure or damage	498
7	Cladding damage (mechanical, chemical, or other--possibly detectable by ultrasonic testing)	907
8	Radioactive leakage	1083
2	Encapsulated or other remedial action taken	1
3	Requires special handling	35
5	Physically deformed	95
6	Does not fit in rack in spent fuel storage pool	0
4	Cannot be consolidated	0
9	Other	0
LAT	Unknown, information to be supplied LATer by the utility	1188

II. Fuel Assemblies Categorized by a Single Entry

<u>Category Number</u>	<u>Category</u>	<u>No. of Fuel Assemblies</u>
1	Visually observed failure or damage	183
7	Cladding damage (mechanical, chemical, or other--possibly detectable by ultrasonic testing)	667
8	Radioactive leakage	1083
2	Encapsulated or other remedial action taken	1
3	Requires special handling	29
5	Physically deformed	2
6	Does not fit in rack in spent fuel storage pool	0
4	Cannot be consolidated	0

TABLE 3.10. (contd)

II. Fuel Assemblies Categorized by a Single Entry (contd)

<u>Category Number</u>	<u>Category</u>	<u>No. of Fuel Assemblies</u>
9	Other	0
LAT	Unknown, information to be supplied LATer by the utility	1188

III. Fuel Assemblies Categorized by Multiple Entries

<u>Category Number</u>	<u>Category</u>	<u>No. of Fuel Assemblies (a)</u>
1 and 5	Visually observed failure or damage; physically deformed	77
1 and 7	Visually observed failure or damage; cladding damage (mechanical, chemical, or other--possibly detectable by ultrasonic testing)	218
3 and 7	Requires special handling; cladding damage; (mechanical, chemical, or other--possibly detectable by ultrasonic testing)	2
1, 3, and 7	Visually observed failure or damage; requires special handling; cladding damage (mechanical, chemical, or other--possibly detectable by ultrasonic testing)	4
1, 5, and 7	Visually observed failure or damage; physically deformed; cladding damage (mechanical, chemical, or other--possibly detectable by ultrasonic testing)	16

(a) The total number of fuel assemblies in this table exceeds the total number of actual defective fuel assemblies listed in Table A.1 because of multiple category entries for certain assemblies in some cases.

TABLE 3.11. Combined Number of Fuel Assemblies in a Given Category

Category Number	Category	No. of Fuel Assemblies		
		Categorized by Single Entry	Categorized by Multiple Entries ^(a)	Total ^(b)
1	Visually observed failure or damage	183	315	498
7	Cladding damage (mechanical, chemical, or other--possibly detectable by ultrasonic testing)	667	240	907
8	Radioactive leakage	1083	0	1083
2	Encapsulated or other remedial action taken	1	0	1
3	Requires special handling	29	6	35
5	Physically deformed	2	93	95
6	Does not fit in rack in spent fuel storage pool	0	0	0
4	Cannot be consolidated	0	0	0
9	Other	0	0	0
LAT	Unknown, information to be supplied LATer by the utility	1188	0	1188

(a) A given fuel assembly may be listed in one, two, or three categories, as shown in Table 3.10.

(b) Total within the group of 3470 fuel assemblies.

(0.1%), and unstated (40.4%). The distribution of the PWR fuel assemblies by rod array type is as follows: 14x14 (0.5%), 15x15 (15.2%), 16x16 (26.3%), 17x17 (5.9%), and unstated (52.1%).

3.5.7 Defective Fuel: Burnup Data

The burnup distribution for defective BWR and PWR fuel assemblies in the United States is shown in Table 3.17. When the defective fuel assemblies were listed by burnup by EIA, increments of 5,000 MWD/MTU were employed. For the

TABLE 3.12. Defective Fuel Assemblies Currently in Spent Fuel Storage Pools at Domestic Power Plants and Spent Fuel Storage Facilities, Based on EIA Data and Other Data (Table 3.13)

Plant or (Facility)	No. of Fuel Assemblies	
	BWR	PWR
Operating Plant (Facility)		
Arkansas-1		24
Arkansas-2		6
Beaver Valley-1		1
Big Rock Point	29(a)	
Browns Ferry-1	60	
Browns Ferry-2	83	
Browns Ferry-3	1	
Brunswick-1	10	
Brunswick-2	21	
Byron-1		--
Callaway-1		--
Calvert Cliffs-1		4
Calvert Cliffs-2		4
Catawba-1		--
Catawba-2		--
Clinton-1(b)	--	
Cook-1		28
Cook-2		12
Cooper Station	3	
Crystal River-3		1
Davis Besse-1		--
Diablo Canyon-1		--
Diablo Canyon-2		--
Dresden-2	135(c)	
Dresden-3	246(d,e)	
Duane Arnold	7	
Farley-1		19
Farley-2		--
Fermi-2(f)	--	
Fitzpatrick	--	
Ft. Calhoun-1		4
(GE-Morris Operation)	----- (g) -----	
Ginna		52(h)
Grand Gulf-1	--	
Haddam Neck(i)		43
Hatch-1	85	
Hatch-2	45	
Hope Creek-1(f)	--	
Indian Point-2		93
Indian Point-3		--
Kewaunee		--
La Crosse	105	
La Salle-1	--	

TABLE 3.12. (contd)

Plant or (Facility)	No. of Fuel Assemblies	
	BWR	PWR
La Salle-2	--	
Limerick-1	--	
Maine Yankee		94
McGuire-1		--
McGuire-2		--
Millstone-1	113	
Millstone-2		37
Millstone-3		--
Monticello	225	
Nine Mile Point-1	247(j)	
Nine Mile Point-2		
North Anna-1		21
North Anna-2		7
Oconee-1		13
Oconee-2		17
Oconee-3		1
Oyster Creek	308	
Palisades		--
Palo Verde-1		--
Palo Verde-2		--
Peach Bottom-2	36	
Peach Bottom-3	115	
Perry-1(b)	--	
Pilgrim	145	
Point Beach-1		74
Point Beach-2		7
Prairie Island-1		14
Prairie Island-2		--
Quad Cities-1	104	
Quad Cities-2	285(k)	
Rancho Seco-1		1
River Bend-1(f)	--	
Robinson-2		25
Salem-1		2
Salem-2		--
San Onofre-1		7
San Onofre-2		8
San Onofre-3		13
Sequoyah-1		--
Sequoyah-2		--
Shoreham(b)	--	
St. Lucie-1		--
St. Lucie-2		--
Summer-1		--
Surry-1		79
Surry-2		28

TABLE 3.12. (contd)

Plant or (Facility)	No. of Fuel Assemblies	
	BWR	PWR
Susquehanna-1	--	
Susquehanna-2	--	
Three Mile Island-1		--
Trojan		20
Turkey Point-3		14
Turkey Point-4		6
Vermont Yankee	1358 ⁽¹⁾	
Washington Nuclear Project-2	--	
Waterford-3		--
(West Valley) ^(m)	--	--
Wolf Creek-1		--
Yankee Rowe		341
Zion-1		288
Zion-2		252
Plants That Are Shut Down		
Dresden-1	168	
Humboldt Bay-3	58	
Indian Point-1		4
TOTALS	3992 +	1664 = 5656

- (a) During 1972-1976, 85 assemblies were reported⁽⁶⁸⁾ as releasing radioactivity.
- (b) According to an NRC publication (NUREG-0020, Vol. 10, No. 12) published in June 1987, this plant is licensed for fuel loading and low power testing.
- (c) Of these, 28 were due to internally initiated localized hydriding.
- (d) Of these leakers, 103 assemblies (a total of 604 defective fuel rods detected) were identified as leakers or suspect leakers and the most probable causes are hydriding and pellet-cladding interaction.
- (e) During 1972-1976, 219 assemblies were reported⁽⁶⁸⁾ as releasing radioactivity.
- (f) According to an NRC publication (NUREG-0020, Vol. 10, No. 12) published in June 1987, this plant is in power ascension.
- (g) In 1977, it was noted that there were "several hundred" defective fuel assemblies (the breakdown by BWR and PWR types was not stated) in storage.⁽³²⁾
- (h) During 1972-1976, 52 assemblies were reported⁽⁶⁸⁾ as releasing radioactivity.
- (i) Also known as Connecticut Yankee.
- (j) During 1972-1976, 211 assemblies were reported⁽⁶⁸⁾ as releasing radioactivity.

TABLE 3.12. (contd)

- (k) During 1972-1976, 230 assemblies were reported⁽⁶⁸⁾ as releasing radioactivity.
- (l) During 1972-1976, 118 assemblies were reported⁽⁶⁸⁾ as releasing radioactivity.
- (m) West Valley Demonstration Project at the Western New York Nuclear Service Center, which is located at West Valley, New York, and is managed by West Valley Nuclear Services Co., Inc. (built and previously operated by Nuclear Fuel Services).

TABLE 3.13. Additional Fuel Assemblies that Sustained Damage or Were Dropped (i.e., Fuel Assemblies in Addition to those Listed in Table 3.9)

Plant	No. of Fuel Assemblies	Comments
Beaver Valley-1	1	Damaged during placement of upper internals in the reactor vessel.
Brunswick-2	1	One fuel assembly (444) was dropped in the spent fuel storage pool but was not visibly damaged.
Calvert Cliffs-1	3	One rod failed in each assembly due to debris-induced fretting.
	1	One peripheral fuel rod (appeared to have cladding failure) bowed outside the envelope of fuel assembly 1B060.
Calvert Cliffs-2	4	One failed rod in each assembly (three from debris-induced fretting; failure cause of fourth not stated).
Cooper	3	Three assemblies were releasing radioactivity in 1976.
Crystal River-3	1	New fuel assembly (3A33) dropped. No rods ruptured, some rods bowed and spacer grids broken, and lower end fitting bent.
	1	Assembly A-48 damaged during handling.
Dresden-1	49	Of the 58 failed rods in the 49 assemblies, some were due to internal hydriding and some were due to pellet-cladding interaction (PCI).
	46	Most probable cause of the fuel rod failures was PCI.
	1	Fuel assembly UN398 dropped 12 ft in fuel handling building. Damage appeared minor.
Dresden-2	1	One assembly (DD-418) reported in 1975 to exhibit evidence of hydriding and to have 1 in. of cladding missing.
	1	One leaker assembly (DD-654) in pool.

TABLE 3.13. (contd)

Plant	No. of Fuel Assemblies	Comments
Ft. Calhoun-1	3	One swollen fuel rod (probably caused by hydriding) observed in fuel assembly C004.
	1	One fuel rod failed by hydriding in this assembly (reported in 1978).
Ginna	32	The fuel rod failures were due to hydriding (source was moisture contained in the fuel).
	?	During Cycle-1 refueling, a large number of rods were observed to be in interference with the top nozzle and a few rods were bowed. Also, flattened fuel rods were observed (cladding collapse was due to fuel densification during irradiation).
	52	52 assemblies (48 in 1972, 4 in 1976) were releasing radioactivity. The 52 may include the 32 shown above.
Humboldt Bay-3	2	Type II assemblies.
	11	These Type III assemblies exhibit early-life hydride failures.
	16	Cause of leakers not stated.
	11	Cause of leakers not stated.
	1	This irradiated fuel assembly was dropped and all the rods fell out of the assembly.
	58	58 defective assemblies (includes the 41 listed above) are in the spent fuel storage pool.
Indian Point-1	3	Top nozzles broke off of the spent fuel assemblies during refueling and cask loading operations.
	1	The assembly was dropped in 1967 during transfer to the transport basket.
Indian Point-2	5	The most probable cause of the cladding degradation on six rods (total) was hydriding.

TABLE 3.13. (contd)

Plant	No. of Fuel Assemblies	Comments
Maine Yankee	1	Fuel assembly E-42 had hydriding in one fuel rod.
	87	Grid spacer damage.
	9	Fuel rod failures (15 to 25 rods were estimated to have failed; 11 were positively identified) were most likely caused by external corrosion associated with crud deposition. Initially, the failure cause was thought to be PCI followed by secondary hydriding.
	43	Fuel rod failures attributed to PCI, fuel densification, and lack of prepressurization. Bulges and blisters were caused by secondary hydriding.
	29	Damaged spacer grids.
Monticello	12	Fuel rod failure cause not stated.
	1	It was reported in 1978 that one fuel assembly was damaged by twisting during refueling operations.
	25	The predominant failure mechanism for the 163 fuel rods was hydriding.
	83	The predominant fuel rod failure mechanism was PCI.
	50	The fuel rod failures were attributed to hydriding and PCI.
Nine Mile Point-1	229	The 229 assemblies (20 in 1973, 83 in 1974, and 126 in 1975) probably include the 158 listed above.
	211	The 211 assemblies (29 in 1972, 104 in 1974, 28 in 1975, and 50 in 1976) were reported as releasing radioactivity.
Oconee-1	1	One damaged corner fuel rod was noted in assembly 1D40.

TABLE 3.13. (contd)

Plant	No. of Fuel Assemblies	Comments
Oyster Creek	24	The failed fuel rods in 44 fuel assemblies exhibited early-life hydriding. Of the 44, 20 were repaired and recharged.
	77	Failure cause not stated.
	27	Failure cause not stated.
	44	Failure cause not stated.
	136	Failure cause not stated.
Peach Bottom-3	3	Accidental release of a fuel assembly during reinsertion caused damage to two other assemblies, which were removed from core.
Pilgrim	1	In 1974, one fuel assembly fell 20 ft during transfer in the spent fuel storage pool. There was no indication of broken fuel rods.
Point Beach-1	1	Excessive fuel rod vibration due to baffle jetting caused damage to three rods. Cladding splits were caused by hydrogen embrittlement (secondary hydriding).
	25	The failed fuel rods exhibited collapsed cladding and leaks.
	1	Two fuel rods damaged by baffle jetting.
	1	Vibration-induced fretting and wear noted on one assembly.
	1	The cladding defect on one fuel rod in the assembly was due to vibration.
Prairie Island-1	1	One rod in each of three fuel assemblies failed; two of the three assemblies were reconstituted.
	1	Top nozzle broke off of assembly D-34 during handling at the spent fuel storage pool.

TABLE 3.13. (contd)

Plant	No. of Fuel Assemblies	Comments
	12	Evidence of corrosion on guide tubes.
Rancho Seco-1	1	It was projected that the one failed rod was caused by hydriding.
Robinson-2	1	The grid strap most likely failed during refueling operations.
	24	These Type A fuel assemblies each have one or more rods with collapsed cladding.
Salem-1	31	Spacer grids on 31 assemblies damaged during refueling operations. No fuel rods damaged.
Trojan	1	One leaker assembly (C18).
Turkey Point-4	1	The assembly had been lifted and was dropped back into the spent fuel storage rack when the cable parted. Bottom spacer grid and two fuel rods pushed out of alignment.
	4	Rods damaged or scratched.
	1	Fuel assembly P41 damaged during handling.
Vermont Yankee	31	75 rods (71 poison, 4 fuel) failed due to external corrosion that involved a metallic incursion in the feedwater.
	3	370 defective fuel rods (failures caused by internal hydriding) were replaced in 51 of 54 leaky fuel assemblies.
	14	The cause of the fuel rod failures was hydriding.
	6	Sipping indicated that six fuel bundles were leaking and they were removed from the core.
Yankee Rowe	1	9 fuel rods (four had circumferential breaks) damaged by vibration-induced fretting. Dummy rods were added to assembly B-574 and it was reused.

TABLE 3.13. (contd)

Plant	No. of Fuel Assemblies	Comments
	1	This leaky fuel assembly was the result of vibration-induced fretting.
	1	The assembly contains one failed fuel rod.
	1	Fuel assembly B636 had 13 damaged fuel rods and other damage; the good fuel rods were moved to fuel assembly B-100-R.
	4	Cladding degradation found in 4 assemblies by sipping; the four assemblies were removed and placed in the spent fuel pit.

BWR and PWR fuel assemblies, the highest burnup brackets needed were 30,000 to 35,000 MWd/MTU and 40,000 to 45,000 MWd/MTU, respectively. Based on burnup distribution data for 4691 defective fuel assemblies (3,374 BWR-type and 1,317 PWR-type), the largest number of defective BWR-type (1031) occurred in the 10,000 to 15,000 MWd/MTU burnup range and the largest number of defective PWR-type (586) occurred in the 30,000 to 35,000 MWd/MTU burnup range. The annual burnup distribution (1969-1986) for defective BWR and PWR fuel assemblies is listed in Table 3.18. The profiles of the number of defective BWR and PWR fuel assemblies versus burnup distribution (covers 1969-1986) are shown in Figure 3.19 and Figure 3.20, respectively. Most of the defective BWR fuel assemblies have lower burnups and tend to be older than most of the defective PWR fuel assemblies. Of the nearly 5000 defective fuel assemblies, over half the BWR-type have burnups in the 10,000 to 20,000 MWd/MTU range and occurred in the 1973-1980 period (the largest number, 396, occurred in 1974) and over half of the PWR-type have burnups in the 25,000 to 35,000 MWd/MTU range and occurred in the 1977-1984 period (the largest number, 1974, occurred in 1981). The burnup distribution for defective fuel assemblies at various domestic commercial reactors in specific years during the period 1969-1986 are provided in Tables B.1 through B.17 in Appendix B.

TABLE 3.14. Defective Fuel Assemblies in Annual U.S. Discharges^(a)

Shutdown Year	No. of Fuel Assemblies	Cumulative No. of Fuel Assemblies	Average Burnup, MWD/MTU ^(b)	Weight, MTIHM ^(c)	Cumulative Weight, MTIHM	Assay: Average Initial Enrichment, % Uranium-235
● BWR Fuel						
1969	32	32	14,459	3.300	3.300	2.228
1970	--	--	--	--	--	--
1971	115	147	4,128	19.682	22.982	2.136
1972	65	212	8,201	12.145	35.127	2.187
1973	320	532	9,983	54.713	89.840	2.332
1974	662	1,194	10,616	127.130	216.970	2.348
1975	367	1,561	15,288	68.422	285.392	2.200
1976	388	1,949	13,257	74.422	359.814	2.173
1977	219	2,168	18,752	37.756	397.570	2.359
1978	216	2,384	18,654	38.370	435.940	2.235
1979	273	2,657	20,471	49.754	485.694	2.403
1980	135	2,792	23,073	24.987	510.680	2.521
1981	161	2,953	24,771	29.643	540.323	2.677
1982	56	3,009	20,722	10.138	550.461	2.487
1983	131	3,140	28,093	23.962	574.423	2.850
1984	137	3,277	26,759	24.884	599.307	2.842
1985	97	3,374	29,083	17.556	616.863	2.871
● PWR Fuel						
--	1	1	40,717	0.365	0.365	3.496
1972	61	62	21,666	19.728	20.093	2.818
1973	3	65	19,331	0.967	21.060	0.711
1974	68	133	24,193	22.884	43.944	3.141
1975	57	190	24,831	17.238	61.182	3.094
1976	78	268	20,344	35.107	96.289	2.444
1977	71	339	23,729	24.662	120.951	2.941
1978	171	510	31,666	68.378	189.329	3.158

TABLE 3.14. (contd)

Shutdown Year	No. of Fuel Assemblies	Cumulative No. of Fuel Assemblies	Average Burnup, Mwd/MTU ^(b)	Weight, MTIHM ^(c)	Cumulative Weight, MTIHM	Assay: Average Initial Enrichment, % Uranium-235
1979	103	613	31,506	45.357	234.687	3.335
1980	57	670	31,581	25.702	260.389	3.155
1981	191	861	29,752	79.337	339.725	2.939
1982	110	971	27,868	41.252	380.978	3.087
1983	99	1,070	27,551	43.948	424.926	3.072
1984	133	1,203	31,073	52.715	477.641	3.321
1985	73	1,276	30,530	23.424	501.065	3.282
1986 ^(d)	41	1,317	20,310	17.872	518.937	3.138
● BWR and PWR Fuel						
--	1	1	40,717	0.365	0.36	3.496
1969	32	33	14,459	3.300	3.66	2.228
1970	--	--	--	--	--	--
1971	115	148	4,128	19.682	23.35	2.136
1972	126	274	16,535	31.873	55.22	2.578
1973	323	597	10,146	55.680	110.90	2.304
1974	730	1,327	12,687	150.014	260.91	2.469
1975	424	1,751	17,208	85.661	346.57	2.380
1976	466	2,217	15,529	109.529	456.10	2.260
1977	290	2,507	20,718	62.418	518.52	2.589
1978	387	2,894	26,989	106.748	625.27	2.826
1979	376	3,270	25,733	95.111	720.38	2.847
1980	192	3,462	27,387	50.689	771.07	2.843
1981	352	3,814	28,397	108.980	880.05	2.867
1982	166	3,980	26,458	51.390	931.44	2.969
1983	230	4,210	27,742	67.910	999.35	2.994
1984	270	4,480	29,689	77.599	1076.95	3.167
1985	170	4,650	29,910	40.981	1117.93	3.106
1986 ^(d)	41	4,691	20,310	17.872	1135.80	3.138

TABLE 3.14. (contd)

● Overall Totals

<u>Fuel Type</u>	<u>No. of Fuel Assemblies</u>	<u>Average Burnup, MWd/MTU</u>	<u>Assay: Average Initial Enrichment, % Uranium-235</u>
BWR	3,374	16,162	2.376
PWR	1,317	28,106	3.070
BWR and PWR	4,691	21,619	2.693

-
- (a) Source: printout (dated November 19, 1986) from EIA with RW-859 data supplied by utilities to DOE.
- (b) MWd/MTU = megawatt days of thermal energy released by fuel containing one metric ton of heavy-metal atoms (e.g., U = uranium).
- (c) MTIHM = metric ton (1000 kg) of initial heavy metal (uranium).
- (d) Temporary (contains data for only a portion of the year).

FIGURE 3.17. Defective BWR Fuel Assemblies in Annual U.S. Discharges.
 Source: printout (dated November 19, 1986) from EIA with
 RW-859 data supplied by utilities to DOE (see Table 3.14).

*Excludes one Prairie Island-1 defective fuel assembly (burnup was 40,717 MWd/MTU) because year not stated (see Table 3.14)

**Temporary (contains data for only a portion of 1986)

FIGURE 3.18. Defective PWR Fuel Assemblies in Annual U.S. Discharges.
Source: printout (dated November 19, 1986) from EIA with RW-859 data supplied by utilities to DOE (see Table 3.14).

TABLE 3.15. Defective U.S. Fuel Assemblies Grouped by Rod Array Type^(a)

Rod Array Type	BWR Fuel		PWR Fuel	
	No. of Fuel Assemblies	Average Burnup, MWd/MTU	No. of Fuel Assemblies	Average Burnup, MWd/MTU
--(b)	1,346	13,431	598	30,555
--(b)	16	13,601	89	26,206
6x6	168	17,177		
7x7	260	13,456		
7x7NP	10	15,788		
8x8	1,234	18,456		
8x8NP	81	20,848		
8x8R	128	27,774		
9x9	24	13,641		
10x10	102	14,252		
11x11	5	16,846		
14x14			6	24,001
15x15			200	26,395
16x16			346	27,364
17x17			78	17,860

(a) Source: printout (dated November 19, 1986) from EIA with RW-859 data supplied by utilities to DOE.

(b) Information on rod array type was not provided by the utilities.

3.6 PLANTS THAT PROVIDE SPECIFIC SPACE FOR STORING FAILED FUEL

The spent fuel storage pool sections (typically Section 9.2) of the Final Safety Analysis Reports (FSARs) for 131 domestic reactors were reviewed for information on specific provisions made for storing failed irradiated fuel. The NRC's updated FSAR file (microfiche form) was used in the search. Included in the 131 plants are 96 operating plants, 3 plants that are shut down, 6 plants that are near operation, and 23 plants that are under construction. The results are summarized in Table 3.19, which is a brief version of Table C.1 (in Appendix C because of its length). Table 3.19 shows that of the 116 spent fuel pools at reactors, 69 pools (59%) have no statement in the spent fuel storage part of the FSAR about providing specific space(s) for storing failed fuel assemblies, 18 pools (16%) make provision but do not state the number of spaces, and 29 pools (25%) provide or plan to provide anywhere from 1 to 31 spaces. Examples of storage racks at BWRs for containers with defective fuel

TABLE 3.16. Summary of Defective Fuel Assemblies by Rod Array Type for Reactors^(a,b)

Plant or (Facility)	No. of Fuel Assemblies																
	BWR											PWR					
	--(c)	--(d)	6x6	7x7	7x7NP	8x8	8x8NP	8x8R	9x9	10x10	11x11	--(c)	--(d)	14x14	15x15	16x16	17x17
● Operating Plant (Facility)																	
Arkansas-1															24		
Arkansas-2																5	
Beaver Valley-1																	
Big Rock Point									24		5						
Browns Ferry-1(e)				3(f)		8(g)		15(h)									
Browns Ferry-2(e)				6(f)		8(g)		19(h)									
Browns Ferry-3						1											
Brunswick-1						1											
Brunswick-2				16		5											
Byron-1(i)																	
Callaway-1																	
Calvert Cliffs-1(j)																	
Calvert Cliffs-2(j)																	
Catawba-1																	
Catawba-2																	
Clinton-1(k)																	
Cook-1(l)															28		
Cook-2(l)																12	
Cooper Station																	
Crystal River-3																	
Davis Besse-1																	
Diablo Canyon-1																	
Diablo Canyon-2																	
Dresden-2		135															
Dresden-3		246															
Duane Arnold				7													
Farley-1																	19
Farley-2																	
Fermi-2(m)																	
Fitzpatrick																	
Ft. Calhoun-1																	
(GE-Morris Operation)																	
Ginna																	
Grand Gulf-1																	
Haddam Neck(n)												43(o)					
Hatch-1(p)					10	2(q)	58(r)										
Hatch-2(p)						6(q)	23(r)										
Hope Creek-1(m)																	
Indian Point-2																	
Indian Point-3																	
Kewaunee																	
La Crosse											102						
La Salle-1(s)																	
La Salle-2(s)																	
Limerick-1																	
Maine Yankee																	
McGuire-1																	
McGuire-2																	
Millstone-1		113															

TABLE 3.16. (contd)

Plant or (Facility)	No. of Fuel Assemblies																
	BWR											PWR					
	--(c)	--(d)	6x6	7x7	7x7NP	8x8	8x8NP	8x8R	9x9	10x10	11x11	--(c)	--(d)	14x14	15x15	16x16	17x17
Millstone-2												13	19				
Millstone-3																	
Monticello	225																
Nine Mile Point-1	238	9															
Nine Mile Point-2																	
North Anna-1(t)																	21
North Anna-2(t)																	
Oconee-1(u)															11(v)		
Oconee-2(u)															17(v)		
Oconee-3															1(v)		
Oyster Creek																	
Palisades																	
Palo Verde-1																	
Palo Verde-2																	
Peach Bottom-2				36													
Peach Bottom-3				20		1		94									
Perry-1(k)																	
Pilgrim				145													
Point Beach-1(w)													62				
Point Beach-2(w)													7				
Prairie Island-1(x)													1				
Prairie Island-2(x)																	
Quad Cities-1(y)	104																
Quad Cities-2(y)	285																
Rancho Seco-1																	
River Bend-1(m)																	
Robinson-2																	
Salem-1												2					
Salem-2																	
San Onofre-1															6		
San Onofre-2																	
San Onofre-3																	
Sequoyah-1(z)																	
Sequoyah-2(z)																	
Shoreham(k)																	
St. Lucie-1																	
St. Lucie-2																	
Summer-1																	
Surry-1(aa)																	
Surry-2(bb)																	79
Susquehanna-1(bb)																	26
Susquehanna-2(bb)																	
Three Mile Island-1																	
Trojan																	
Turkey Point-3																	
Turkey Point-4																	
Vermont Yankee																	
WNP-2(cc)						1,202											
Waterford-3																	
(West Valley)(dd)																	

TABLE 3.16. (contd)

Plant or (Facility)	No. of Fuel Assemblies																
	BWR											PWR					
	--(c)	--(d)	6x6	7x7	7x7NP	8x8	8x8NP	8x8R	9x9	10x10	11x11	--(c)	--(d)	14x14	15x15	16x16	17x17
Wolf Creek-1																	
Yankee Rowe																	
Zion-1 ^(ee)												288					
Zion-2 ^(ee)												252					
● Plants that Are Shut Down																	
Dresden-1			168														
Humboldt Bay-3																	
Indian Point-1																	
Total	1,346	16	168	260	10	1,234	81	128	24	102	5	598	89	6	200	346	78

- (a) Source: printout (dated November 19, 1986) from EIA with RW-859 data supplied by utilities to DOE.
- (b) Fuel assemblies are stored at the reactor's spent fuel storage pool unless noted otherwise.
- (c) Rod array not identified in EIA printout.
- (d) Rod array not specifically identified (only listed as "0x0") in EIA printout.
- (e) Spent fuel storage pools at Browns Ferry-1 and -2 are connected by a transfer canal.
- (f) All 43 are stored in the Browns Ferry-1 spent fuel storage pool.
- (g) All 16 are stored in the Browns Ferry-1 spent fuel storage pool.
- (h) All 34 are stored in the Browns Ferry-1 spent fuel storage pool.
- (i) Byron-1 and -2 share one spent fuel storage pool.
- (j) Spent fuel storage pools at Calvert Cliffs-1 and -2 are connected by a transfer canal.
- (k) According to a recent NRC publication, NUREG-0200, 10(12):1-2 (June 1987), this plant is licensed for fuel loading and low power testing.
- (l) Cook-1 and -2 share one spent fuel storage pool.
- (m) According to a recent NRC publication, NUREG-0020, 10(12):1-2 (June 1987), this plant is in power ascension.
- (n) Also known as Connecticut Yankee.
- (o) Of the 43, 42 are stored at the reactor and 1 at Battelle Columbus Laboratories
- (p) Spent fuel storage pools at Hatch-1 and -2 are connected by a transfer canal.
- (q) All 8 are stored in the Hatch-1 spent fuel storage pool.
- (r) All 81 are stored in the Hatch-1 spent fuel storage pool.
- (s) Spent fuel storage pools at La Salle-1 and -2 are connected by a transfer canal.
- (t) North Anna-1 and -2 share one spent fuel storage pool.
- (u) Oconee-1 and -2 share one spent fuel storage pool.
- (v) Of the 29, 18 are in the Oconee-1 and -2 spent fuel storage pool and 11 are in the Oconee-3 spent fuel storage pool.
- (w) Point Beach-1 and -2 share one spent fuel storage pool.
- (x) Prairie Island-1 and -2 share one spent fuel storage pool.
- (y) Spent fuel storage pools at Quad Cities-1 and -2 are connected by a transfer canal.
- (z) Sequoyah-1 and -2 share one spent fuel storage pool.
- (aa) Surry-1 and -2 share one spent fuel storage pool.
- (bb) Spent fuel storage pools at Susquehanna-1 and -2 are connected by a transfer canal.
- (cc) Washington Nuclear Project-2 (WNP-2).
- (dd) West Valley Demonstration Project at the Western New York Nuclear Service Center, which is located at West Valley, New York, and is managed by West Valley Nuclear Services Co., Inc. (built and previously operated by Nuclear Fuel Services).
- (ee) Zion-1 and -2 share one spent fuel storage pool.

TABLE 3.17. Burnup Distribution for Defective U.S. Fuel Assemblies^(a)

Range of Burnup, MWd/MTU	BWR Fuel		PWR Fuel		BWR and PWR Fuel	
	No. of Fuel Assemblies	Average Burnup, MWd/MTU	No. of Fuel Assemblies	Average Burnup, MWd/MTU	No. of Fuel Assemblies	Average Burnup, MWd/MTU
0 to 5,000	134	2,446	1	4,244	135	2,463
5,000 to 10,000	488	8,244	24	7,172	512	8,132
10,000 to 15,000	1,031	12,386	34	12,556	1,065	12,398
15,000 to 20,000	777	17,908	138	18,576	915	18,111
20,000 to 25,000	454	22,273	130	22,725	584	22,442
25,000 to 30,000	412	27,271	282	27,353	694	27,314
30,000 to 35,000	78	32,197	586	31,805	664	31,827
35,000 to 40,000			119	36,456	119	36,456
40,000 to 45,000			3	41,001	3	41,001
	3,374		1,317		4,691	

(a) Source: printout (dated November 19, 1986) from EIA with RW-859 data supplied by utilities to DOE.

TABLE 3.18. Annual Burnup Distribution of Defective U.S. Fuel Assemblies(a)

Year	Burnup Range, MWD/MTU																	
	0-5,000		5,000-10,000		10,000-15,000		15,000-20,000		20,000-25,000		25,000-30,000		30,000-35,000		35,000-40,000		40,000-45,000	
	No. of Fuel Assemblies	Average Burnup, MWD/MTU	No. of Fuel Assemblies	Average Burnup, MWD/MTU	No. of Fuel Assemblies	Average Burnup, MWD/MTU	No. of Fuel Assemblies	Average Burnup, MWD/MTU	No. of Fuel Assemblies	Average Burnup, MWD/MTU	No. of Fuel Assemblies	Average Burnup, MWD/MTU	No. of Fuel Assemblies	Average Burnup, MWD/MTU	No. of Fuel Assemblies	Average Burnup, MWD/MTU	No. of Fuel Assemblies	Average Burnup, MWD/MTU
● BWR Fuel																		
1969			2	9,391	14	11,914	16	17,455										
1970																		
1971	70	1,182	17	5,701	13	13,604	14	17,498	1	23,245								
1972	3	3,910	56	8,213	6	11,363												
1973	52	3,729	86	6,983	131	12,784	35	16,703	16	21,701								
1974	6	4,916	260	8,719	367	11,576	29	16,754										
1975	2	3,867	6	7,383	203	13,397	127	17,487	29	20,935								
1976	1	4,802	49	8,947	223	12,327	115	16,985										
1977			1	7,609	10	13,552	161	18,394	47	21,380								
1978			6	7,847	17	12,845	120	18,255	72	21,430	1	25,009						
1979					21	13,771	116	18,828	107	21,694	29	25,737						
1980			2	7,577	2	14,525	18	17,820	80	23,551	33	26,208						
1981			1	8,963	1	14,742	9	19,254	59	22,871	91	26,816						
1982					12	13,914	16	17,759	17	23,898	10	26,897	1	30,171				
1983					4	13,876			9	23,523	42	27,454	36	32,274				
1984			2	6,762	7	11,285	1	18,548	15	23,577	92	27,742	20	31,810				
1985									2	23,108	74	28,238	21	32,533				
● PWR Fuel																		
?																	1	40,717
1972							25	18,841	18	22,109	18	26,445						
1973							3	19,331										
1974	1	4,244			9	12,325	1	15,087	15	23,285	29	27,983	13	30,422				
1975							7	18,216	17	23,137	25	27,862	8	31,345				
1976					1	11,008	52	18,697	16	23,020	8	26,014	1	30,557				
1977							20	19,275	11	22,914	28	26,758	12	30,924				
1978							3	16,888	8	22,977	27	27,124	73	30,521	60	35,585		
1979							3	17,569	3	23,135	1	29,674	88	31,954	8	35,608		
1980									2	22,326			51	31,607	4	36,368		
1981					7	13,883	2	19,435	7	22,961	33	29,963	141	31,297	1	36,633		
1982					1	14,506	7	17,762	19	22,285	19	27,190	64	31,031				
1983			14	7,433	6	12,239	4	17,908	9	21,962	12	26,217	24	33,434	28	38,064	2	41,114
1984					5	11,398	4	16,942	2	23,167	34	26,798	82	33,882	6	37,266		
1985							1	18,327	2	22,935	39	27,807	19	32,434	12	37,207		
1986(b)			10	6,817	5	12,557	5	18,620	1	20,991	9	29,205	10	32,863				
● BWR and PWR Fuel																		
?																	1	40,717
1969			2	9,391	14	11,914	16	17,455										
1970																		
1971	70	1,182	17	5,701	13	13,604	14	17,498	1	23,245								
1972	3	3,910	56	8,213	6	11,363	25	18,841	18	22,109	18	26,445						
1973	52	3,729	86	6,983	131	12,784	38	17,249	16	21,701								
1974	7	4,801	260	8,719	376	11,618	30	16,628	15	23,285	29	27,983	13	30,422				
1975	2	3,867	6	7,383	203	13,397	134	17,571	46	22,147	25	27,862	8	31,345				
1976	1	4,802	49	8,947	224	12,313	167	17,872	16	23,020	8	26,014	1	30,557				
1977			1	7,609	10	13,552	181	18,609	58	21,971	28	26,758	12	30,924				
1978			6	7,847	17	12,845	123	18,175	80	21,634	28	27,096	73	30,521	60	35,585		
1979					21	13,771	119	18,752	110	21,783	30	26,006	88	31,954	8	35,608		
1980			2	7,577	2	14,525	18	17,820	82	23,480	33	26,208	51	31,607	4	36,368		
1981			1	8,963	8	13,931	11	19,319	66	22,891	124	27,238	141	31,297	1	36,633		
1982					13	14,020	23	17,761	36	22,778	29	27,110	65	31,025				
1983			14	7,433	10	12,610	4	17,910	18	22,432	94	27,128	60	32,991	28	38,064	2	41,114
1984			2	6,762	12	11,360	5	17,088	17	23,475	126	27,406	102	33,690	6	37,266		
1985							1	18,327	4	22,984	113	28,035	40	32,477	12	37,207		
1986(b)			10	6,817	5	12,557	6	18,620	1	20,991	9	29,205	10	32,863				

(a) Source: printout (dated November 19, 1986) from EIA with RW-859 data supplied by utilities to DOE.

(b) Table contains data for only a portion of 1986 (data for all of 1986 not available yet).

FIGURE 3.19. Profile of Annual Burnup Distribution for Defective U.S. BWR Fuel Assemblies. Source: printout (dated November 19, 1986) from EIA with RW-859 data supplied by utilities to DOE (see Tables 3.17 and 3.18).

*Temporary (contains data for only a portion of 1986)

FIGURE 3.20. Profile of Annual Burnup Distribution for Defective U.S. PWR Fuel Assemblies. Source: printout (dated November 19, 1986) from EIA with RW-859 data supplied by utilities to DOE (see Tables 3.17 and 3.18).

TABLE 3.19. Summary of Data for Plants and Facilities on Provisions for Storing Failed Fuel Assemblies^(a)

Comment on Provision for Specific Space for Storing Failed Fuel	Pools at Operating Reactors	Pools at Plants that are Shut Down	Pools at Plants Nearing Operation	Pools at Plants Under Construction
No statement in Final Safety Analysis Report	52	3	3	11
Provision made but number of spaces not stated	13	0	1	4
Positions provided for this many fuel assemblies: ^(b)				
1	1			
2	1			1
3	3			
4				
5	3			
6	1			
7				
8	2			
9	2			1
<10	2			
10	2			3
15	1			
16	1			
20	1			
<30			1	2
31	1			

(a) This table is a brief version of Table C.1, which is Appendix C because of its length.

(b) For example, the fifth entry indicates that three pools at operating reactors each provide five positions for storing failed fuel assemblies.

are shown in Figures 3.21 and 3.22. An example of a failed fuel transfer container at a PWR is shown in Figure 3.23.

3.7 EFFECT OF FAILED OR DAMAGED FUEL ASSEMBLIES ON STORAGE, HANDLING, AND OTHER OPERATIONS

Experience to date indicates that failed fuel has had a minimal impact on the storage of spent fuel in water.⁽⁷⁾ A world survey showed that most pools store defective fuel assemblies on the same basis as intact assemblies; some pools (~30%) store fuel assemblies with failed rods in canisters.⁽⁸⁾ In the United States, only one fuel assembly required encapsulation and only 35 required special handling (see Table 3.10). Further degradation of cladding defects during pool storage does not appear to be occurring.⁽⁸⁻¹⁰⁾ There was one case where stress corrosion cracking, which is believed to have occurred during wet storage, of the stainless steel components on a PWR fuel assembly from Prairie Island-1 resulted in separation of the top end fitting (nozzle) from the remainder of the fuel assembly as it was being lifted out of the storage rack.^(33,39) The assembly tipped over (~30°) and came to rest against the wall of the pool. There was no release of radioactivity and no fuel rod damage occurred.

As indicated in Section 3.3.3, very few fuel assemblies have sustained major mechanical damage during handling or have been damaged during normal transporting operations.^(11,12) Domestic experience to date indicates that only about seven rods, out of a biased sample of fuel assemblies (ones that were known or suspected of containing defective fuel rods and selected for examination, reconstitution, or rod consolidation) containing over 54,000 fuel rods, broke during handling, examination, fuel assembly reconstitution, and rod consolidation activities.⁽¹⁴⁾ Over 3100 of those rods have been involved in rod consolidation operations.⁽¹⁴⁻¹⁷⁾ The seven rods that broke were known to be failed or came from fuel assemblies that were known to contain or suspected of containing failed or damaged fuel rods. The rod consolidation standard, ANSI/ANS-57.10, which is currently being readied for issuance by the American Nuclear Society, takes into consideration the potential for rod breakage. The likelihood for breaking rods is potentially higher with fuel rods with large

Bottom View
Scale: None

FIGURE 3.21. Special Rack (5 x 6 spaces) at a BWR for Storing of Control Rod Guide Tubes, Defective Fuel Storage Containers, and Control Rods.⁽⁶⁹⁾ Regular fuel bundles could also be stored in this rack on a temporary basis if necessary.

FIGURE 3.22. Horizontal Cross Section of a Storage Rack for Defective Fuel at a BWR⁽⁷⁰⁾

cladding defects. In the recent case of one rod with collapsed cladding (a result of in-reactor fuel densification) that was being pulled out of a PWR fuel assembly during an underwater rod consolidation demonstration,⁽¹⁵⁾ interference with a spacer grid resulted in the release of a bubble of fission gas estimated by operators to be baseball-to-grapefruit size. There were no significant consequences from the fission gas release, and operators were able to resume activities shortly after vacating the working platform and taking necessary precautions. Subsequent to rod consolidation operations at another site, one PWR fuel rod with collapsed cladding broke during handling in the pool.⁽¹⁴⁾ The broken rod created no facility problems; the rod pieces were encapsulated for subsequent storage. Fuel handling experience to date at spent fuel storage pools indicates that failed and damaged fuel assemblies, failed fuel rods, and the inadvertent breaking of fuel rods (including prepressurized ones) can be

FIGURE 3.23. Failed Fuel Transfer Container at a PWR⁽⁷¹⁾

accommodated.^(18,19) Results from a recent long-term (seven-year) demonstration test in the Federal Republic of Germany with 18 intact and 10 defective LWR fuel rods also indicate that wet storage of spent LWR fuel, even for extended periods, can be conducted without problems.⁽²⁰⁾

There have been two events, one in France and one in the United States, in which substantial radioactive releases have occurred when PWR fuel assemblies containing stainless-steel-clad fuel have been shipped dry.⁽²²⁻²⁴⁾ In the

French case (four assemblies involved), the fuel appeared to be intact prior to shipping but was known to belong to a lot that had sustained fuel failures during in-reactor service. The U.S. case involved one PWR fuel assembly that was known to contain failed rods and that was not encapsulated prior to shipment. Additional degradation occurred during transit and when the fuel was unloaded (underwater) from the shipping cask, airborne contamination was released.

Current experience indicates that the incidence of cladding failures during dry storage will be low; however, some fuel rod failures cannot be ruled out.⁽²⁵⁾ Inspection techniques are available to detect most fuel assemblies containing reactor-induced defects, although elimination of every defective fuel rod cannot be assured. Even if fuel with cladding defects were placed in dry storage, or if defects develop during storage, such defects would not propagate if an inert cover gas is used.⁽²⁵⁾

More than 5600 Zircaloy-clad fuel rods have been monitored during dry storage in inert gases in demonstrations and hot cell tests in the United States^(25,26) and the Federal Republic of Germany.⁽⁷²⁾ A cladding failure would result in release of krypton-85 to the cover gas. There have been three cases where fuel failure indications have been detected during dry storage. One fuel rod is presumed to have failed in a PWR fuel assembly (B02 from Turkey Point-3) during storage in air.^(25,30) The magnitude of the krypton-85 release rate suggests that the cladding breach is very small. One or more fuel rods started to leak during the first horizontal test run of a dry storage cask performance test with a TN-24P cask, which contained 24 PWR fuel assemblies from Surry-2.⁽⁷³⁾ It was concluded that no failed rods had been loaded into the cask and that the size of the leak was small, based on gas sampling results. Gas sampling during a heat transfer and performance test on an REA 2023 spent fuel dry storage cask, which was loaded with 52 BWR fuel bundles from Cooper, indicated a leak in a fuel rod after the cask was fully loaded. The leak rate was calculated to be extremely small. Visual inspections and leak testing (sipping) revealed no indication of failed fuel before or after the performance test.

The successful experience to date with Zircaloy-clad fuel over a large range of dry storage conditions suggests that none of the potential failure

mechanisms (e.g., stress rupture, stress corrosion cracking, hydrogen redistribution) is likely to have a significant influence on dry storage of spent LWR fuel.⁽²⁵⁻³¹⁾ A PNL study on the methodology for determining the criteria for storing spent fuel in air is described in PNL-6018. The impacts of cladding defects in dry storage are discussed in detail in PNL-4835⁽²⁵⁾ and in PNL-6207.⁽³⁰⁾ In general, the impact of a cladding breach that develops during dry storage is anticipated to be minimal: Fission gas would be released to the sealed cask or canister but there would be essentially no release of fuel particles.⁽²⁵⁾ Evidence suggests that there is no mechanism that will result in growth of cladding defects during storage in inert cover gases.⁽²⁵⁾

A need for measurements of carbon-14 releases due to a reaction between oxygen and carbon-14 in the cladding during exposure to air has been identified in connection with waste packages for dry storage of spent fuel in a TUFF repository.⁽⁷⁴⁾

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APPENDIX A

DETAILS OF DEFECTIVE FUEL AT INDIVIDUAL DOMESTIC
POWER PLANTS AND SPENT FUEL STORAGE FACILITIES

APPENDIX A

DETAILS OF DEFECTIVE FUEL AT INDIVIDUAL DOMESTIC POWER PLANTS AND SPENT FUEL STORAGE FACILITIES

This appendix consists of a comprehensive table that provides data on defective fuel assemblies being stored at operating power plants, independent spent fuel storage facilities, and power plants that are no longer operating.

TABLE A.1. Details on Defective Fuel at Individual Domestic Power Plants and Spent Fuel Storage Facilities (based on input from utilities to the 1986 RW-859 Spent Fuel Survey by DOE's Energy Information Administration)

Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	Information Supplied by Utilities on Defective Fuel												(c) Failure Description
			(a)												
			Category												
			(b)												
			1	2	3	4	5	6	7	8	9	LAT			
● Operating Plant (Facility)															
Arkansas-1	04A02	NJ00H0							X					Clad damage	
	04A02	NJ00H2							X					Clad damage	
	04A01	NJ00H5							X					Clad damage	
	04A01	NJ00HG							X					Clad damage	
	04A02	NJ00HZ							X					Clad damage	
	04A01	NJ00J1							X					Clad damage	
	04A01	NJ00J3							X					Clad damage	
	04A01	NJ00J5		X					X					Clad damage, visual fail/dam	
	04A02	NJ00J6							X					Clad damage	
	05A01	NJ00WY							X					Clad damage	
	05A01	NJ00X4							X					Clad damage	
	05A01	NJ00XJ							X					Clad damage	
	05A02	NJ00XM							X					Clad damage	
	05A02	NJ00XS							X					Clad damage	
	05A01	NJ00Y1							X					Clad damage	
	06A01	NJ01E9		X						X					Clad damage, visual fail/dam
	06A02	NJ01EB								X					Clad damage
	06A02	NJ01EV								X					Clad damage
	06A01	NJ01F3								X					Clad damage
	06A01	NJ01F6								X					Clad damage
	06A01	NJ01F7		X						X					Clad damage, visual fail/dam
	06A03	NJ01FC								X					Clad damage
	06A02	NJ01FP								X					Clad damage
	06A02	NJ01FW								X					Clad damage
Arkansas-2	01A01	AKA005							X					Clad damage	
	01A01	AKA006							X					Clad damage	

TABLE A.1. (contd)

Information Supplied by Utilities on Defective Fuel															
Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	(a)											(b)	(c)
			Category												
			1	2	3	4	5	6	7	8	9	LAT			
● Operating Plant (Facility)															
Arkansas-2 (contd)	01A01	AKA017							X					Clad damage	
	01A01	AKA037							X					Clad damage	
	02B01	AKB029							X					Clad damage	
	02B01	AKB032							X					Clad damage	
Beaver Valley-1															
Big Rock Point	12FB0	F04							X					Clad damage	
	12FB0	F07							X					Clad damage	
	13FG0	F08							X					Clad damage	
	12FB0	F09							X					Clad damage	
	12FB0	F10							X					Clad damage	
	12FB0	F11							X					Clad damage	
	12FB0	F16							X					Clad damage	
	13FG0	F17							X					Clad damage	
	12FB0	F20							X					Clad damage	
	12FB0	F21							X					Clad damage	
	13FG0	F22							X					Clad damage	
	13FF0	F27							X					Clad damage	
	12FA0	F29							X					Clad damage	
	13FG0	F30							X					Clad damage	
	12FC0	F33							X					Clad damage	
	12FA0	F34							X					Clad damage	
	13FG0	F37							X					Clad damage	
	12FA0	F39							X					Clad damage	
	12FC0	F40							X					Clad damage	
	12FC0	F46							X					Clad damage	
	12FC0	F54							X					Clad damage	

TABLE A.1. (contd)

Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	Information Supplied by Utilities on Defective Fuel												(c) Failure Description
			(a)												
			Category												
			(b)												
			1	2	3	4	5	6	7	8	9	LAT			
● Operating Plant (Facility)															
Big Rock Point (contd)	13FF1	F55							X					Clad damage	
	13FF1	F59							X					Clad damage	
	13FE0	F77							X					Clad damage	
	20H1E	H118							X					Clad damage	
	19H2B	H206							X					Clad damage	
	19H2B	H207							X					Clad damage	
	19H2B	H208							X					Clad damage	
	20H2F	H216							X					Clad damage	
Browns Ferry-1	02C04	LJ2939							X					Clad damage	
	02C04	LJ2963							X					Clad damage	
	02C03	LJ2977							X					Clad damage	
	02C01	LJ2987							X					Clad damage	
	02C03	LJ3024							X					Clad damage	
	02C06	LJ3043							X					Clad damage	
	02C03	LJ3060							X					Clad damage	
	02C02	LJ3095							X					Clad damage	
	03D02	LJA879							X					Clad damage	
	03D04	LJA889							X					Clad damage	
	03D04	LJA891							X					Clad damage	
	03D04	LJA893							X					Clad damage	
	03D04	LJA916							X					Clad damage	
	03D04	LJA918							X					Clad damage	
	03D04	LJA919							X					Clad damage	
	03D04	LJA920							X					Clad damage	
	03D03	LJA976							X					Clad damage	
	03D03	LJA978							X					Clad damage	
	03D01	LJA984							X					Clad damage	

TABLE A.1. (contd)

Information Supplied by Utilities on Defective Fuel														
Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	(a)											(c)
			Category											
			1	2	3	4	5	6	7	8	9	LAT	(b)	
Failure Description														
● Operating Plant (Facility)														
Browns Ferry-1 (contd)	03D03	LJA987											X	Clad damage
	04E01	LJH446											X	Clad damage
	05E01	LJX270											X	Clad damage
	05E01	LJX323											X	Clad damage
	01B04	TY0175											X	Clad damage
	01B04	TY0182											X	Clad damage
	01B08	TY0183											X	Clad damage
	01B04	TY0184											X	Clad damage
	01B04	TY0186											X	Clad damage
	01B08	TY0194											X	Clad damage
	01B09	TY0209											X	Clad damage
	01B04	TY0217											X	Clad damage
	01B04	TY0224											X	Clad damage
	01B08	TY0225											X	Clad damage
	01B08	TY0227											X	Clad damage
	01B04	TY0230											X	Clad damage
	01B04	TY0231											X	Clad damage
	01B09	TY0240											X	Clad damage
	01B08	TY0259											X	Clad damage
	01B08	TY0262											X	Clad damage
	01B08	TY0279											X	Clad damage
	01B04	TY0325											X	Clad damage
	01B08	TY0326											X	Clad damage
	01B08	TY0339											X	Clad damage
	01B09	TY0351											X	Clad damage
	01B09	TY0392											X	Clad damage
	01B08	TY0403											X	Clad damage
	01B04	TY0410											X	Clad damage

TABLE A.1. (contd)

Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	Information Supplied by Utilities on Defective Fuel												(c) Failure Description
			(a)												
			Category												
			(b)												
			1	2	3	4	5	6	7	8	9	LAT			
● Operating Plant (Facility)															
Browns Ferry-1 (contd)	01B04	TY0412								X				Clad damage	
	01B09	TY0420								X				Clad damage	
	01B04	TY0422								X				Clad damage	
	01B09	TY0425								X				Clad damage	
	01B07	TY0434 ^(g)								X				Clad damage	
	01B02	TY0475								X				Clad damage	
	01B05	TY0489								X				Clad damage	
	01B05	TY0528								X				Clad damage	
	01B02	TY0609								X				Clad damage	
	01B02	TY0658								X				Clad damage	
	01B02	TY0675								X				Clad damage	
	01B02	TY0676								X				Clad damage	
	01B02	TY0758								X				Clad damage	
Browns Ferry-2	02C01	LJ3455								X				Clad damage	
	02C01	LJ3464								X				Clad damage	
	02C01	LJ3469								X				Clad damage	
	02C01	LJ3473								X				Clad damage	
	02C01	LJ3482								X				Clad damage	
	02C01	LJ3484								X				Clad damage	
	02C02	LJ3490								X				Clad damage	
	02C02	LJ5817								X				Clad damage	
	02C03	LJ5847								X				Clad damage	
	02C03	LJ5849								X				Clad damage	
	02C03	LJ5855								X				Clad damage	
	02C01	LJ5865								X				Clad damage	
	02C01	LJ8137								X				Clad damage	
	02C02	LJ8139								X				Clad damage	

TABLE A.1. (contd)

Information Supplied by Utilities on Defective Fuel															
Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	(a)											(b)	(c)
			Category												
			1	2	3	4	5	6	7	8	9	LAT			
● <u>Operating Plant (Facility)</u>															
Browns Ferry-2 (contd)	03C02	LJ8168											X	Clad damage	
	03C02	LJ8169											X	Clad damage	
	03C02	LJ8170											X	Clad damage	
	03C02	LJ8177											X	Clad damage	
	03D01	LJD968											X	Clad damage	
	03D01	LJD969											X	Clad damage	
	03D01	LJD971											X	Clad damage	
	03D01	LJD972											X	Clad damage	
	03D01	LJD973											X	Clad damage	
	03D01	LJD974											X	Clad damage	
	03D01	LJD979											X	Clad damage	
	03D01	LJD980											X	Clad damage	
	03D01	LJD981											X	Clad damage	
	03D01	LJD983											X	Clad damage	
	03D01	LJD988											X	Clad damage	
	03D01	LJE002											X	Clad damage	
	03D01	LJE007											X	Clad damage	
	03D01	LJE047											X	Clad damage	
	03D01	LJE048											X	Clad damage	
	03D01	LJE056											X	Clad damage	
	03D01	LJE059											X	Clad damage	
	03D03	LJE066											X	Clad damage	
	03D03	LJE112											X	Clad damage	
	03D03	LJE121											X	Clad damage	
	03D01	LJE124											X	Clad damage	
	03D03	LJE135											X	Clad damage	
	03D01	LJE153											X	Clad damage	
	03D03	LJE158											X	Clad damage	

TABLE A.1. (contd)

Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	Information Supplied by Utilities on Defective Fuel												Failure Description
			(a)												
			Category												
			(b)												
			1	2	3	4	5	6	7	8	9	LAT	(c)		
● Operating Plant (Facility)															
Browns Ferry-2 (contd)	03D03	LJE160							X					Clad damage	
	03D03	LJE164							X					Clad damage	
	03D03	LJE174							X					Clad damage	
	04D02	LJH372							X					Clad damage	
	04D02	LJH379							X					Clad damage	
	04D02	LJH488							X					Clad damage	
	04D02	LJH548							X					Clad damage	
	04D02	LJP443							X					Clad damage	
	04D02	LJP447							X					Clad damage	
	04D02	LJP450							X					Clad damage	
	04D02	LJP452							X					Clad damage	
	04D02	LJP456							X					Clad damage	
	04D02	LJP465							X					Clad damage	
	04D02	LJP466							X					Clad damage	
	04D02	LJP467							X					Clad damage	
	04D02	LJP468							X					Clad damage	
	04D02	LJP474							X					Clad damage	
	04D02	LJP482							X					Clad damage	
	04D02	LJP484							X					Clad damage	
	04D02	LJP485							X					Clad damage	
	04D02	LJP492							X					Clad damage	
	04D02	LJP499							X					Clad damage	
	04D02	LJP510							X					Clad damage	
	04D02	LJP527							X					Clad damage	
	04D02	LJP531							X					Clad damage	
	04D02	LJP534							X					Clad damage	
	04D02	LJP561							X					Clad damage	
	04D02	LJP563							X					Clad damage	

TABLE A.1. (contd)

Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	Information Supplied by Utilities on Defective Fuel												Failure Description
			(a)												
			Category												
			(b)												
			1	2	3	4	5	6	7	8	9	LAT			
● Operating Plant (Facility)															
Browns Ferry-2 (contd)	04D02	LJP567							X					Clad damage	
	04D02	LJP569							X					Clad damage	
	04D02	LJP570							X					Clad damage	
	04D02	LJP583							X					Clad damage	
	04D02	LJP615							X					Clad damage	
	04D02	LJP638							X					Clad damage	
	04D02	LJP662							X					Clad damage	
	01A01	TZ0150							X					Clad damage	
	01B03	TZ0338							X					Clad damage	
	01B07	TZ0376							X					Clad damage	
	01B03	TZ0468							X					Clad damage	
	01B03	TZ0609							X					Clad damage	
01B03	TZ0679							X					Clad damage		
Browns Ferry-3	01A01	BF0323							X					Clad damage	
Brunswick-1	B2001X	BR138							X					Clad damage	
	B2001X	BR217							X					Clad damage	
	B2001X	BR285							X					Clad damage	
	B2001X	BR394							X					Clad damage	
	B2001X	BR404							X					Clad damage	
	B2001X	BR463							X					Clad damage	
	B2001X	BR485							X					Clad damage	
	B2001X	BR498							X					Clad damage	
	B2001X	BR551							X					Clad damage	
	B1001A	LJ0630							X					Clad damage	
Brunswick-2	B2001C	BR125							X					Clad damage	
	B2001C	BR139							X					Clad damage	

TABLE A.1. (contd)

Information Supplied by Utilities on Defective Fuel															(c)
Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	(a)												
			Category												
			1	2	3	4	5	6	7	8	9	LAT	(b)		
Failure Description															
● Operating Plant (Facility)															
Brunswick-2 (contd)	B2001C	BR165										X		Clad damage	
	B2001C	BR176										X		Clad damage	
	B2001C	BR179										X		Clad damage	
	B2001C	BR184										X		Clad damage	
	B2001C	BR190										X		Clad damage	
	B2001C	BR205										X		Clad damage	
	B2001C	BR219										X		Clad damage	
	B2001C	BR261										X		Clad damage	
	B2001C	BR263										X		Clad damage	
	B2001C	BR265										X		Clad damage	
	B2001C	BR270										X		Clad damage	
	B2001C	BR277										X		Clad damage	
	B2001D	BR358										X		Clad damage	
	B2001D	BR480										X		Clad damage	
	B2006A	LJ6413										X		Clad damage	
	B2006A	LJ6421										X		Clad damage	
	B2006B	LJ6451										X		Clad damage	
	B2007B	LJB250										X		Clad damage	
	B2009A	LJX514										X		Clad damage	
Byron-1															
Callaway-1															
Calvert Cliffs-1															
Calvert Cliffs-2															
Catawba-1															

TABLE A.1. (contd)

Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	Information Supplied by Utilities on Defective Fuel												Failure Description
			(a)												
			Category												
			(b)												
			1	2	3	4	5	6	7	8	9	LAT	(c)		
● Operating Plant (Facility)															
Catawba-2															
Clinton-1 ^(d)															
Cook-1	1A1	A02	X				X							Visual fail/dam, phys. deformed	
	1A2	A33							X					Clad damage	
	4A3	D19	X				X							Visual fail/dam, phys. deformed	
	4A3	D41	X				X							Visual fail/dam, phys. deformed	
	5A1	E34	X				X							Visual fail/dam, phys. deformed	
	8A3	H07							X					Clad damage	
	8A3	H08							X					Clad damage	
	8A3	H10 ^(g)							X					Clad damage	
	8A3	H12 ^(g)							X					Clad damage	
	8A3	H14							X					Clad damage	
	8A2	H17							X					Clad damage	
	8A2	H20							X					Clad damage	
	8A4	H21							X					Clad damage	
	8A2	H22							X					Clad damage	
	8A4	H29							X					Clad damage	
	8A2	H30 ^(g)							X					Clad damage	
	8A2	H38 ^(g)							X					Clad damage	
	8A3	H39 ^(g)							X					Clad damage	
	8A4	H52 ^(g)							X					Clad damage	
	9A1	J08 ^(g)							X					Clad damage	
	9A1	J10 ^(g)							X					Clad damage	

TABLE A.1. (contd)

Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	Information Supplied by Utilities on Defective Fuel												(c) Failure Description
			(a)												
			Category												
			(b)												
			1	2	3	4	5	6	7	8	9	LAT			
● Operating Plant (Facility)															
Cook-1 (contd)	9A1	J11 ^(g)							X					Clad damage	
	9A1	J12							X					Clad damage	
	9A1	J55 ^(g)							X					Clad damage	
	9A1	J58 ^(g)							X					Clad damage	
	9A1	J62 ^(g)							X					Clad damage	
	9A1	J64 ^(g)							X					Clad damage	
	10A2	K33							X					Clad damage	
Cook-2	2A3	M16	X				X							Visual fail/dam, phys. deformed	
	2A1	M52	X				X							Visual fail/dam, phys. deformed	
	3A2	N33	X				X							Visual fail/dam phys. deformed	
	3A4	N48	X				X							Visual fail/dam phys. deformed	
	5A7	R16							X					Clad damage	
	5A6	R27							X					Clad damage	
	5A8	R41							X					Clad damage	
	5A8	R51							X					Clad damage	
	5A7	R55							X					Clad damage	
	5A8	R58							X					Clad damage	
	5A7	R61							X					Clad damage	
	5A6	R63							X					Clad damage	
Cooper Station															
Crystal River-3															

TABLE A.1. (contd)

			Information Supplied by Utilities on Defective Fuel													
			(a)													
			Category												(b)	(c)
Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	1	2	3	4	5	6	7	8	9	LAT	Failure Description			
● Operating Plant (Facility)																
Davis Besse-1																
Diablo Canyon-1																
Diablo Canyon-2																
Dresden-2																
Dresden-3																
Duane Arnold	2	AR0090								X			Pre-1986 F-2			
	2	AR0156		X									Pre-1986 F-3			
	2	AR0239								X			Pre-1986 F-2			
	3	AR0341								X			Pre-1986 F-2			
	3	AR0350								X			Pre-1986 F-2			
	3	AR0356	X										Pre-1986 F-1			
	9	LJ8738								X			Pre-1986 F-2			
Farley-1	02A01	B05	X										Visual fail/dam			
	04A01	D34	X						X				Visual fail/dam, clad damage			
	05A02	E09	X						X				Visual fail/dam, clad damage			
	05A02	E14							X				Clad damage			
	05A02	E50	X						X				Visual fail/dam, clad damage			
	06A01	F02	X				X	X					Visual fail/dam, phys. deformed, clad damage			
	06A01	F05	X				X	X					Visual fail/dam, phys. deformed, clad damage			

TABLE A.1. (contd)

Information Supplied by Utilities on Defective Fuel														
Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	(a)											(c)
			Category											
			1	2	3	4	5	6	7	8	9	LAT	(b)	
Failure Description														
● Operating Plant (Facility)														
Farley-1 (contd)	06A01	F06	X				X		X					Visual fail/dam, phys. deformed, clad damage
	06A01	F15	X				X		X					Visual fail/dam, phys. deformed, clad damage
	06A01	F17	X				X		X					Visual fail/dam, phys. deformed, clad damage
	06A01	F18	X				X		X					Visual fail/dam, phys. deformed, clad damage
	06A01	F19	X				X		X					Visual fail/dam, phys. deformed, clad damage
	06A01	F20	X				X		X					Visual fail/dam, phys. deformed, clad damage
	06A01	F27	X				X		X					Visual fail/dam, phys. deformed, clad damage
	06A01	F30	X				X		X					Visual fail/dam, phys. deformed, clad damage
	06A01	F31	X				X		X					Visual fail/dam, phys. deformed, clad damage
	06A01	F32	X				X		X					Visual fail/dam, phys. deformed, clad damage
	06A03	F36							X					Clad damage
	06A04	F44							X					Clad damage
Farley-2														
Fermi-2 ^(e)														
Fitzpatrick														

TABLE A.1. (contd)

Information Supplied by Utilities on Defective Fuel															
Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	(a)											(b)	(c)
			Category												
			1	2	3	4	5	6	7	8	9	LAT			
Failure Description															
● Operating Plant (Facility)															
Ft. Calhoun-1															
(GE-Morris Operation)															
Ginna															
Grand Gulf-1															
Haddam Neck ^(f)															
	10D8	H01									X			Pre-1986 F-2	
	10D8	H03									X			Pre-1986 F-2	
	10D8	H05									X			Pre-1986 F-2	
	10D8	H07									X			Pre-1986 F-2	
	10D8	H10									X			Pre-1986 F-2	
	10D8	H11									X			Pre-1986 F-2	
	10D8	H13									X			Pre-1986 F-2	
	10D8	H14									X			Pre-1986 F-2	
	10D8	H15									X			Pre-1986 F-2	
	10D8	H16									X			Pre-1986 F-2	
	10D8	H18									X			Pre-1986 F-2	
	10D8	H20									X			Pre-1986 F-2	
	10D8	H21									X			Pre-1986 F-2	
	10D8	H22									X			Pre-1986 F-2	
	10D8	H23									X			Pre-1986 F-2	
	10D8	H24									X			Pre-1986 F-2	
	10D8	H25									X			Pre-1986 F-2	
	10D8	H26									X			Pre-1986 F-2	
	10D8	H27									X			Pre-1986 F-2	
	10D8	H28									X			Pre-1986 F-2	

TABLE A.1. (contd)

Information Supplied by Utilities on Defective Fuel															
Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	(a)											(b)	(c)
			Category												
			1	2	3	4	5	6	7	8	9	LAT			
● Operating Plant (Facility)															
Haddam Neck (contd)	1008	H29											X	Pre-1986 F-2	
	1008	H30											X	Pre-1986 F-2	
	1008	H31											X	Pre-1986 F-2	
	1008	H32											X	Pre-1986 F-2	
	1008	H33											X	Pre-1986 F-2	
	1008	H34											X	Pre-1986 F-2	
	1008	H35											X	Pre-1986 F-2	
	1008	H37											X	Pre-1986 F-2	
	1008	H38											X	Pre-1986 F-2	
	1008	H40											X	Pre-1986 F-2	
	1008	H41											X	Pre-1986 F-2	
	1008	H43											X	Pre-1986 F-2	
	1008	H44											X	Pre-1986 F-2	
	1008	H45											X	Pre-1986 F-2	
	1008	H52											X	Pre-1986 F-2	
	1008	H53											X	Pre-1986 F-2	
	1008	H57											X	Pre-1986 F-2	
	1109	J01												X	Pre-1986 F-2
	1109	J04												X	Pre-1986 F-2
	1109	J12												X	Pre-1986 F-2
	1109	J23												X	Pre-1986 F-2
	1109	J33												X	Pre-1986 F-2
	1109	J42												X	Pre-1986 F-2
Hatch-1	01AA11	HX0048											X	Clad damage	
	01AB11	HX0178											X	Clad damage	
	01AA11	HX0225											X	Clad damage	
	01AB11	HX0463											X	Clad damage	

TABLE A.1. (contd)

Information Supplied by Utilities on Defective Fuel														
Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	(a)											Failure Description
			Category											
			1	2	3	4	5	6	7	8	9	LAT	(b)	
● Operating Plant (Facility)														
Hatch-1 (contd)	01AC11	HX0468							X					Clad damage
	01AC11	HX0477							X					Clad damage
	01AC11	HX0484							X					Clad damage
	01AF21	HX0485							X					Clad damage
	01AB11	HX0542							X					Clad damage
	01AC21	HX0549							X					Clad damage
	02BA11	LJ2118							X					Clad damage
	02BA11	LJ2125							X					Clad damage
	02BA21	LJ5136							X					Clad damage
	02BA21	LJ5139							X					Clad damage
	02BA21	LJ5141							X					Clad damage
	02BA21	LJ5142							X					Clad damage
	02BA21	LJ5144							X					Clad damage
	02BA21	LJ5145							X					Clad damage
	02BA21	LJ5148							X					Clad damage
	02BA21	LJ5159							X					Clad damage
	02BA21	LJ5160							X					Clad damage
	02BA21	LJ5161							X					Clad damage
	02BA21	LJ5162							X					Clad damage
	02BA21	LJ5164							X					Clad damage
	02BA21	LJ5165							X					Clad damage
	02BA21	LJ5169							X					Clad damage
	02BA21	LJ5171							X					Clad damage
	01MB12	LJ7519			X									Req. spec. handling
	01MB12	LJ7537			X									Req. spec. handling
	01MB12	LJ7547			X									Req. spec. handling
	01MB12	LJ7566			X									Req. spec. handling
	01MB12	LJ7594			X									Req. spec. handling

TABLE A.1. (contd)

Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	Information Supplied by Utilities on Defective Fuel												(c) Failure Description
			(a)												
			Category												
			(b)												
1	2	3	4	5	6	7	8	9	LAT						
● Operating Plant (Facility)															
Hatch-1 (contd)	01MB12	LJ7638			X									Req. spec. handling	
	01MB12	LJ7667			X									Req. spec. handling	
	01MB12	LJ7671			X									Req. spec. handling	
	01MB12	LJ7684			X									Req. spec. handling	
	01HL12	LJ7842	LY6607						X					Clad damage	
	01HL12	LJ7910	LY6658						X					Clad damage	
	01HL12	LJ7970	LY6630						X					Clad damage	
	03CA21	LJ9281	LJZ968						X					Clad damage	
	03CA21	LJ9285	LJZ967						X					Clad damage	
	03CC11	LJ9298	LY2659						X					Clad damage	
	03CC11	LJ9306	LY2655						X					Clad damage	
	03CC11	LJ9310	LY2641						X					Clad damage	
	03CC11	LJ9313	LY2630						X					Clad damage	
	03CC11	LJ9314	LY2648	X					X					Clad damage, visual fail/dam	
	03CC11	LJ9341	LY2668						X					Clad damage	
	03CB11	LJ9356	LY2654	X					X					Clad damage, visual fail/dam	
	03CC11	LJ9363	LY2549						X					Clad damage	
	03CA11	LJ9365	LYZ980						X					Clad damage	
	03CC11	LJ9370	LY2541						X					Clad damage	
	03CB11	LJ9376	LY2635	X					X					Visual fail/dam, clad damage	
	03CA21	LJ9383	LYZ976						X					Clad damage	
	03CC11	LJ9385	LY2574						X					Clad damage	
	03CC11	LJ9386	LY2626	X										Visual fail/damage	
	03CB11	LJ9387	LY2639	X					X					Clad damage, visual fail/dam	
	03CC11	LJ9390	LY2561						X					Clad damage	
	03CA11	LJ9393	LYZ949						X					Clad damage	
	03CA21	LJ9394	LYZ969						X					Clad damage	
	03CA21	LJ9396	LYZ958						X					Clad damage	

TABLE A.1. (contd)

Information Supplied by Utilities on Defective Fuel														
Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	(a)											(c) Failure Description
			Category											
			1	2	3	4	5	6	7	8	9	LAT		
● Operating Plant (Facility)														
Hatch-1 (contd)	03CA21	LJ9401	LYZ965										X	Clad damage
	03CA11	LJ9417	LYZ961										X	Clad damage
	03CA21	LJ9418	LYZ951										X	Clad damage
	03CA11	LJ9421	LYZ959										X	Clad damage
	03CC11	LJ9425	LY2572										X	Clad damage
	03CC11	LJ9433	LY2538										X	Clad damage
	03CB11	LJ9436	LY2651	X									X	Clad damage, visual fail/dam
	04CB11	LJE392	LY5134	X				X					X	Clad damage, visual fail/dam, phys. deformed
	04CA11	LJE418	LY5075										X	Clad damage
	04CC11	LJE420	LY5207										X	Clad damage
	04CC11	LJE427	LY5166										X	Clad damage
	04CA11	LJE453	LY5063	X										Visual fail/damage
	04CB11	LJE473	LY5120	X									X	Clad damage, visual fail/dam
	04CB11	LJE477	LY5223	X									X	Clad damage, visual fail/dam
	04CA11	LJE478	LY5074	X										Visual fail/damage
	04CA11	LJE488	LY5091										X	Clad damage
	04CA11	LJE516	LY5085										X	Clad damage
	04CB11	LJE522	LY5177	X					X				X	Clad damage, phys. deformed, visual fail/damage
	04CA11	LJE542	LY5088										X	Clad damage
	04CA11	LJE543	LY5069										X	Clad damage
	04CA11	LJE546	LY5065										X	Clad damage
	02EF12	LJK093	LY7702				X						X	Req spec. handling, clad dam
	05CA11	LJT840					X							Req. spec. handling
	05CE11	LJT905		X										Visual fail/damage
	08CA11	LY5521					X							Req. spec. handling

TABLE A.1. (contd)

Information Supplied by Utilities on Defective Fuel															
Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	(a)												(c)
			Category												
			1	2	3	4	5	6	7	8	9	LAT	(b)		
Failure Description															
● Operating Plant (Facility)															
Hatch-2	01MB12	LJ7519				X								Req. spec. handling	
	01MB12	LJ7537				X								Req. spec. handling	
	01MB12	LJ7547				X								Req. spec. handling	
	01MA32	LJ7554	LY8025						X					Clad damage	
	01MA22	LJ7562	LYA529	X					X					Clad damage, visual fail/dam	
	01MB12	LJ7566				X								Req. spec. handling	
	01MA32	LJ7571	LY8021						X					Clad damage	
	01MA12	LJ7573		X										Visual fail/damage	
	01MB12	LJ7594				X								Req. spec. handling	
	01MA52	LJ7600	LY5967	X										Visual fail/damage	
	01MA32	LJ7603	LY8026	X										Visual fail/damage	
	01MA32	LJ7627	LY8027	X						X				Visual fail/dam, clad damage	
	01MA32	LJ7631	LY8028	X						X				Visual fail/dam, clad damage	
	01MB12	LJ7638				X								Req. spec. handling	
	01MB12	LJ7667				X								Req. spec. handling	
	01MB12	LJ7671				X								Req. spec. handling	
	01MB12	LJ7684				X								Req. spec. handling	
	01HM12	LJ7792					X							Phys. deformed	
	01HL12	LJ7842	LY6607							X				Clad damage	
	01HJ22	LJ7908	LY5172	X										Visual fail/damage	
	01HL12	LJ7910	LY6658							X				Clad damage	
	01HL12	LJ7970	LY6630							X				Clad damage	
	03CC11	LJ9298	LY2659							X				Clad damage	
	03CC11	LJ9306	LY2655							X				Clad damage	
	03CC11	LJ9310	LY2641							X				Clad damage	
	03CC11	LJ9313	LY2630							X				Clad damage	
	03CC11	LJ9314	LY2648	X						X				Clad damage, visual fail/dam	
	03CC11	LJ9341	LY2668							X				Clad damage	
	03CC11	LJ9363	LY2549							X				Clad damage	

TABLE A.1. (contd)

Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	Information Supplied by Utilities on Defective Fuel												(c) Failure Description
			(a)												
			Category												
			(b)												
			1	2	3	4	5	6	7	8	9	LAT			
● Operating Plant (Facility)															
Hatch-2 (contd)	03CC11	LJ9370	LY2541						X					Clad damage	
	03CC11	LJ9385	LY2574						X					Clad damage	
	03CC11	LJ9386	LY2626	X										Visual fail/damage	
	03CC11	LJ9390	LY2561						X					Clad damage	
	03CC11	LJ9425	LY2572						X					Clad damage	
	03CC11	LJ9433	LY2538						X					Clad damage	
	02EB12	LJK034		X					X					Visual fail/dam, clad damage	
	02EF12	LJK093	LY7702			X			X					Req. spec. handling, clad dam	
	02EA12	LJK130	LY7669						X					Clad damage	
	03FA12	LJZ224		X					X					Visual fail/dam, clad damage	
	03FA12	LJZ226		X					X					Visual fail/dam, clad damage	
	03FA12	LJZ238		X					X					Visual fail/dam, clad damage	
	03FA12	LJZ253		X					X					Visual fail/dam, clad damage	
	995A12	LY8030				X								Req. spec. handling	
	995A22	LY8031				X								Req. spec. handling	
	995A32	LY8032				X								Req. spec. handling	
Hope Creek-1 ^(e)															
Indian Point-2															
Indian Point-3															
Kewaunee															
La Crosse	1A101	1-01	X					X						Visual fail/dam, phys. deformed	
	1A102	1-02	X					X						Visual fail/dam, phys. deformed	

TABLE A.1. (contd)

			Information Supplied by Utilities on Defective Fuel													
			(a)													
			Category												(b)	(c)
Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	1	2	3	4	5	6	7	8	9	LAT	Failure Description			
● Operating Plant (Facility)																
La Crosse (contd)	02105	1-05							X				Clad damage			
	01107	1-07							X				Clad damage			
	07108	1-08	X				X						Visual fail/dam, phys. deformed			
	1A110	1-10	X				X						Visual fail/dam, phys. deformed			
	00111	1-11	X				X		X				Visual fail/dam, phys. deformed, clad damage			
	01112	1-12							X				Clad damage			
	01117	1-17	X				X						Visual fail/dam, phys. deformed			
	1A119	1-19	X				X						Visual fail/dam, phys. deformed			
	1A120	1-20	X				X						Visual fail/dam, phys. deformed			
	1A121	1-21							X				Clad damage			
	1A123	1-23	X				X						Visual fail/dam, phys. deformed			
	1A125	1-25							X				Clad damage			
	1A127	1-27	X				X						Visual fail/dam, phys. deformed			
	02129	1-29							X				Clad damage			
	02130	1-30							X				Clad damage			
	1A131	1-31							X				Clad damage			
	1A133	1-33	X				X						Visual fail/dam, phys. deformed			
	02134	1-34							X				Clad damage			
	02135	1-35							X				Clad damage			
	1A136	1-36	X				X						Visual fail/dam, phys. deformed			
	02138	1-38	X				X						Visual fail/dam, phys. deformed			

TABLE A.1. (contd)

Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	Information Supplied by Utilities on Defective Fuel											Failure Description
			(a)											
			Category											
			(b)											
			1	2	3	4	5	6	7	8	9	LAT	(c)	
● Operating Plant (Facility)														
La Crosse (contd)	02139	1-39							X				Clad damage	
	1A140	1-40	X				X						Visual fail/dam, phys. deformed	
	03141	1-41	X				X						Visual fail/dam, phys. deformed	
	02142	1-42	X				X						Visual fail/dam, phys. deformed	
	02144	1-44							X				Clad damage	
	02145	1-45	X				X						Visual fail/dam, phys. deformed	
	1A146	1-46	X				X						Visual fail/dam, phys. deformed	
	1A147	1-47							X				Clad damage	
	02148	1-48							X				Clad damage	
	02149	1-49	X				X						Visual fail/dam, phys. deformed	
	03150	1-50							X				Clad damage	
	02151	1-51	X				X						Visual fail/dam, phys. deformed	
	03152	1-52	X				X						Visual fail/dam, phys. deformed	
	1A153	1-53	X				X						Visual fail/dam, phys. deformed	
	02154	1-54	X				X						Visual fail/dam, phys. deformed	
	03157	1-57	X				X						Visual fail/dam, phys. deformed	
	1A158	1-58	X				X						Visual fail/dam, phys. deformed	
	03159	1-59	X				X						Visual fail/dam, phys. deformed	
	02160	1-60	X				X						Visual fail/dam, phys. deformed	

TABLE A.1. (contd)

Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	Information Supplied by Utilities on Defective Fuel											(c) Failure Description
			(a)											
			Category											
			(b)											
			1	2	3	4	5	6	7	8	9	LAT		
● Operating Plant (Facility)														
La Crosse (contd)	1A162	1-62	X				X							Visual fail/dam, phys. deformed
	01163	1-63								X				Clad damage
	01164	1-64	X				X							Visual fail/dam, phys. deformed
	01165	1-65	X				X							Visual fail/dam, phys. deformed
	01166	1-66	X				X							Visual fail/dam, phys. deformed
	02167	1-67								X				Clad damage
	02168	1-68	X				X							Visual fail/dam, phys. deformed
	03169	1-69								X				Clad damage
	1A170	1-70	X				X							Visual fail/dam, phys. deformed
	01171	1-71								X				Clad damage
	02172	1-72	X				X							Visual fail/dam, phys. deformed
	02173	1-73	X				X							Visual fail/dam, phys. deformed
	02175	1-75	X				X							Visual fail/dam, phys. deformed
	1A176	1-76								X				Clad damage
	03177	1-77								X				Clad damage
	03179	1-79								X				Clad damage
	03182	1-82								X				Clad damage
	03183	1-83								X				Clad damage
	05201	2-01								X				Clad damage
	02203	2-03								X				Clad damage
	04204	2-04								X				Clad damage
	04206	2-06								X				Clad damage

TABLE A.1. (contd)

			Information Supplied by Utilities on Defective Fuel													
			(a)													
			Category												(b)	(c)
Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	1	2	3	4	5	6	7	8	9	LAT	Failure Description			
● Operating Plant (Facility)																
La Crosse (contd)	04207	2-07							X				Clad damage			
	04208	2-08	X				X						Visual fail/dam, phys. deformed			
	04210	2-10							X				Clad damage			
	04211	2-11	X				X						Visual fail/dam, phys. deformed			
	03212	2-12					X						Phys. deformed			
	05213	2-13	X				X						Visual fail/dam, phys. deformed			
	04214	2-14							X				Clad damage			
	04215	2-15	X				X						Visual fail/dam, phys. deformed			
	04217	2-17							X				Clad damage			
	04218	2-18							X				Clad damage			
	04219	2-19							X				Clad damage			
	04221	2-21	X				X						Visual fail/dam, phys. deformed			
	05223	2-23							X				Clad damage			
	05225	2-25							X				Clad damage			
	04226	2-26							X				Clad damage			
	04227	2-27							X				Clad damage			
	04228	2-28							X				Clad damage			
	04230	2-30							X				Clad damage			
	05233	2-33	X				X						Visual fail/dam, phys. deformed			
	04234	2-34							X				Clad damage			
	04235	2-35							X				Clad damage			
	04238	2-38							X				Clad damage			
	04239	2-39	X				X						Visual fail/dam, phys. deformed			

TABLE A.1. (contd)

Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	Information Supplied by Utilities on Defective Fuel												(c) Failure Description
			(a)												
			Category												
			(b)												
			1	2	3	4	5	6	7	8	9	LAT			
● Operating Plant (Facility)															
La Crosse (contd)	05240	2-40	X				X							Visual fail/dam, phys. deformed	
	05241	2-41							X					Clad damage	
	04242	2-42							X					Clad damage	
	04243	2-43	X				X							Visual fail/dam, phys. deformed	
	04244	2-44	X				X							Visual fail/dam, phys. deformed	
	04245	2-45							X					Clad damage	
	04246	2-46							X					Clad damage	
	05248	2-48	X				X							Visual fail/dam, phys. deformed	
	05251	2-51	X				X							Visual fail/dam, phys. deformed	
	05252	2-52							X					Clad damage	
	05255	2-55	X				X							Visual fail/dam, phys. deformed	
	06258	2-58							X					Clad damage	
	05259	2-59							X					Clad damage	
	05262	2-62							X					Clad damage	
	05263	2-63							X					Clad damage	
	05265	2-65	X				X							Visual fail/dam, phys. deformed	
	05270	2-70							X					Clad damage	
	05272	2-72							X					Clad damage	

La Salle-1

La Salle-2

TABLE A.1. (contd)

			Information Supplied by Utilities on Defective Fuel												
			(a)												
			Category											(b)	(c)
Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	1	2	3	4	5	6	7	8	9	LAT	Failure Description		
● Operating Plant (Facility)															
Limerick-1															
Maine Yankee															
McGuire-1															
McGuire-2															
Millstone-1	3D3	GEA074									X		Pre-1986 F-2		
	3D5	GEA075									X		Pre-1986 F-2		
	3D3	GEA088									X		Pre-1986 F-2		
	3D4	GEA090									X		Pre-1986 F-2		
	3D3	GEA091									X		Pre-1986 F-2		
	3D4	GEA097									X		Pre-1986 F-2		
	3D3	GEA099									X		Pre-1986 F-2		
	3D3	GEA105									X		Pre-1986 F-2		
	3D2	GEA110									X		Pre-1986 F-2		
	3D3	GEA114									X		Pre-1986 F-2		
	3D3	GEA116									X		Pre-1986 F-2		
	3D4	GEA120									X		Pre-1986 F-2		
	3D2	GEA121									X		Pre-1986 F-2		
	3D5	GEA125									X		Pre-1986 F-2		
	3D2	GEA136									X		Pre-1986 F-2		
	3D4	GEA137									X		Pre-1986 F-2		
	3D3	GEA140									X		Pre-1986 F-2		
	1D1	MS001									X		Pre-1986 F-2		
	1D1	MS016									X		Pre-1986 F-2		
	1D1	MS039									X		Pre-1986 F-2		

TABLE A.1. (contd)

Information Supplied by Utilities on Defective Fuel																
Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	(a)												(b)	(c)
			Category													
			1	2	3	4	5	6	7	8	9	LAT				
Failure Description																
● Operating Plant (Facility)																
Millstone-1 (contd)	1D1	MS042											X	Pre-1986 F-2		
	1D3	MS053											X	Pre-1986 F-2		
	1D3	MS061											X	Pre-1986 F-2		
	1D1	MS112											X	Pre-1986 F-2		
	1D2	MS133											X	Pre-1986 F-2		
	1D3	MS136											X	Pre-1986 F-2		
	1D3	MS180											X	Pre-1986 F-2		
	1D3	MS181											X	Pre-1986 F-2		
	1D2	MS182											X	Pre-1986 F-2		
	1D3	MS184											X	Pre-1986 F-2		
	1D2	MS189											X	Pre-1986 F-2		
	1D2	MS193											X	Pre-1986 F-2		
	1D5	MS203											X	Pre-1986 F-2		
	1D2	MS207											X	Pre-1986 F-2		
	1D2	MS213											X	Pre-1986 F-2		
	1D2	MS221											X	Pre-1986 F-2		
	1D1	MS232											X	Pre-1986 F-2		
	1D2	MS241											X	Pre-1986 F-2		
	1D2	MS243											X	Pre-1986 F-2		
	1D5	MS248											X	Pre-1986 F-2		
	1D1	MS262											X	Pre-1986 F-2		
	1D3	MS268											X	Pre-1986 F-2		
	1D2	MS273											X	Pre-1986 F-2		
	1D2	MS276											X	Pre-1986 F-2		
	1D2	MS277											X	Pre-1986 F-2		
	1D2	MS281											X	Pre-1986 F-2		
	1D2	MS282											X	Pre-1986 F-2		
	1D2	MS283											X	Pre-1986 F-2		

TABLE A.1. (contd)

Information Supplied by Utilities on Defective Fuel															
Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	(a)												(c) Failure Description
			Category												
			1	2	3	4	5	6	7	8	9	LAT	(b)		
● Operating Plant (Facility)															
Millstone-1 (contd)	1D2	MS285										X		Pre-1986 F-2	
	1D1	MS288										X		Pre-1986 F-2	
	1D2	MS295										X		Pre-1986 F-2	
	1D1	MS296										X		Pre-1986 F-2	
	1D2	MS297										X		Pre-1986 F-2	
	1D1	MS298										X		Pre-1986 F-2	
	1D3	MS300										X		Pre-1986 F-2	
	1D2	MS303										X		Pre-1986 F-2	
	1D5	MS307										X		Pre-1986 F-2	
	1D2	MS309										X		Pre-1986 F-2	
	1D5	MS313										X		Pre-1986 F-2	
	1D4	MS315										X		Pre-1986 F-2	
	1D2	MS317										X		Pre-1986 F-2	
	1D2	MS320										X		Pre-1986 F-2	
	1D2	MS321										X		Pre-1986 F-2	
	1D3	MS323										X		Pre-1986 F-2	
	1D3	MS324										X		Pre-1986 F-2	
	1D4	MS325										X		Pre-1986 F-2	
	1D3	MS326										X		Pre-1986 F-2	
	1D3	MS327										X		Pre-1986 F-2	
	1D1	MS330										X		Pre-1986 F-2	
	1D4	MS334										X		Pre-1986 F-2	
	1D3	MS338										X		Pre-1986 F-2	
	1D4	MS345										X		Pre-1986 F-2	
	1D3	MS347										X		Pre-1986 F-2	
	1D3	MS349										X		Pre-1986 F-2	
	1D3	MS350										X		Pre-1986 F-2	
	1D3	MS352										X		Pre-1986 F-2	

TABLE A.1. (contd)

Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	Information Supplied by Utilities on Defective Fuel											Failure Description
			(a)											
			Category											
			(b)											
			1	2	3	4	5	6	7	8	9	LAT		
● Operating Plant (Facility)														
Millstone-1 (contd)	1D3	MS354									X			Pre-1986 F-2
	1D1	MS357									X			Pre-1986 F-2
	1D3	MS360									X			Pre-1986 F-2
	1D3	MS381									X			Pre-1986 F-2
	1D1	MS390									X			Pre-1986 F-2
	1D3	MS394									X			Pre-1986 F-2
	1D3	MS400									X			Pre-1986 F-2
	1D3	MS414									X			Pre-1986 F-2
	1D3	MS422									X			Pre-1986 F-2
	1D3	MS431									X			Pre-1986 F-2
	1D3	MS438									X			Pre-1986 F-2
	1D3	MS447									X			Pre-1986 F-2
	2D2	MS451									X			Pre-1986 F-2
	2D1	MS468									X			Pre-1986 F-2
	2D1	MS473									X			Pre-1986 F-2
	2D1	MS480									X			Pre-1986 F-2
	2D2	MS490									X			Pre-1986 F-2
	2D2	MS491									X			Pre-1986 F-2
	2D1	MS507									X			Pre-1986 F-2
	2D1	MS514									X			Pre-1986 F-2
	2D1	MS521									X			Pre-1986 F-2
	2D1	MS523									X			Pre-1986 F-2
	2D3	MS530									X			Pre-1986 F-2
	2D3	MS533									X			Pre-1986 F-2
	2D3	MS534									X			Pre-1986 F-2
	2D1	MS548									X			Pre-1986 F-2
	2D1	MS550									X			Pre-1986 F-2
	2D1	MS557									X			Pre-1986 F-2

TABLE A.1. (contd)

Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	Information Supplied by Utilities on Defective Fuel												Failure Description
			(a)												
			Category												
			(b)												
			1	2	3	4	5	6	7	8	9	LAT	(c)		
● Operating Plant (Facility)															
Millstone-1 (contd)	2D2	MS562								X				Pre-1986 F-2	
	2D1	MS564								X				Pre-1986 F-2	
	2D1	MS567								X				Pre-1986 F-2	
	2D1	MS568								X				Pre-1986 F-2	
	2D3	MS576								X				Pre-1986 F-2	
	2D1	MS580								X				Pre-1986 F-2	
	5D5	MSB061								X				Pre-1986 F-2	
	5D5	MSB092								X				Pre-1986 F-2	
	5D5	MSB102								X				Pre-1986 F-2	
Millstone-2	9D5	F33								X				Pre-1986 F-2	
	9D5	F37 ^(g)								X				Pre-1986 F-2	
	9D5	F38 ^(g)								X				Pre-1986 F-2	
	9D5	F41								X				Pre-1986 F-2	
	9D5	F42 ^(g)								X				Pre-1986 F-2	
	9D5	F75 ^(g)								X				Pre-1986 F-2	
	11D5	G04 ^(g)								X				Pre-1986 F-2	
	11D8	G05								X				Pre-1986 F-2	
	11D9	G08							X					Clad damage	
	11D8	G10								X				Pre-1986 F-2	
	11D14	G12							X					Clad damage	
	11D15	G16							X					Clad damage	
	11D5	G24 ^(g)								X				Pre-1986 F-2	
	12D10	G26								X				Pre-1986 F-2	
	12D5	G32 ^(g)								X				Pre-1986 F-2	
	12D5	G35 ^(g)								X				Pre-1986 F-2	
	12D5	G41 ^(g)								X				Pre-1986 F-2	
	12D14	G45							X					Clad damage	

TABLE A.1. (contd)

Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	Information Supplied by Utilities on Defective Fuel											(c) Failure Description
			(a)											
			Category											
			(b)											
			1	2	3	4	5	6	7	8	9	LAT		
● Operating Plant (Facility)														
Millstone-2 (contd)	12D5	G47 ^(g)								X				Pre-1986 F-2
	12D15	G48							X					Clad damage
	12D15	G54							X					Clad damage
	12D5	G56								X				Pre-1986 F-2
	12D10	G57								X				Pre-1986 F-2
	12D5	G60 ^(g)								X				Pre-1986 F-2
	12D15	G61							X					Clad damage
	12D8	G62								X				Pre-1986 F-2
	12D8	G66								X				Pre-1986 F-2
	12D8	G68								X				Pre-1986 F-2
	13E12	H03							X					Clad damage
	13E10	H14							X					Clad damage
	13D10	H16							X					Clad damage
	13E12	H17							X					Clad damage
	13E13	H23							X					Clad damage
	14D10	H31							X					Clad damage
	14D10	H33							X					Clad damage
	14D10	H43							X					Clad damage
	14D10	H50							X					Clad damage
	Millstone-3													
Monticello	01C	MT01								X				Pre-1986 F-2
	01A	MT0103								X				Pre-1986 F-2
	01A	MT0104								X				Pre-1986 F-2
	01A	MT0105								X				Pre-1986 F-2
	01C	MT0106								X				Pre-1986 F-2
	01C	MT0107								X				Pre-1986 F-2

TABLE A.1. (contd)

Information Supplied by Utilities on Defective Fuel															
Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	(a)											(b)	(c)
			Category												
			1	2	3	4	5	6	7	8	9	LAT			
Failure Description															
● Operating Plant (Facility)															
Monticello (contd)	01A	MT012											X	Pre-1986 F-2	
	01D	MT0125											X	Pre-1986 F-2	
	01D	MT0128											X	Pre-1986 F-2	
	01B	MT0137											X	Pre-1986 F-2	
	01B	MT0157											X	Pre-1986 F-2	
	01C	MT0158											X	Pre-1986 F-2	
	01B	MT0160											X	Pre-1986 F-2	
	01D	MT0161											X	Pre-1986 F-2	
	01B	MT0162											X	Pre-1986 F-2	
	01C	MT0164											X	Pre-1986 F-2	
	01B	MT0165											X	Pre-1986 F-2	
	01C	MT0166											X	Pre-1986 F-2	
	01B	MT0170											X	Pre-1986 F-2	
	01D	MT0171											X	Pre-1986 F-2	
	01D	MT0173											X	Pre-1986 F-2	
	01A	MT0174											X	Pre-1986 F-2	
	01B	MT0176											X	Pre-1986 F-2	
	01B	MT0178											X	Pre-1986 F-2	
	01B	MT0179											X	Pre-1986 F-2	
	01D	MT0180											X	Pre-1986 F-2	
	01C	MT0183											X	Pre-1986 F-2	
	01D	MT0187											X	Pre-1986 F-2	
	01D	MT0188											X	Pre-1986 F-2	
	01D	MT0189											X	Pre-1986 F-2	
	01C	MT019											X	Pre-1986 F-2	
	01D	MT0196											X	Pre-1986 F-2	
	01B	MT0197											X	Pre-1986 F-2	
	01D	MT0198											X	Pre-1986 F-2	

TABLE A.1. (contd)

Information Supplied by Utilities on Defective Fuel															
Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	(a)											(b)	(c)
			Category												
			1	2	3	4	5	6	7	8	9	LAT			
● Operating Plant (Facility)															
Monticello (contd)	01D	MT0199											X	Pre-1986 F-2	
	01A	MT02											X	Pre-1986 F-2	
	01D	MT0200											X	Pre-1986 F-2	
	01D	MT0203											X	Pre-1986 F-2	
	01D	MT0204											X	Pre-1986 F-2	
	01D	MT0207											X	Pre-1986 F-2	
	01A	MT0208											X	Pre-1986 F-2	
	01F	MT0209											X	Pre-1986 F-2	
	01D	MT0213											X	Pre-1986 F-2	
	01B	MT0215											X	Pre-1986 F-2	
	01B	MT0216											X	Pre-1986 F-2	
	01C	MT0217											X	Pre-1986 F-2	
	01C	MT0218											X	Pre-1986 F-2	
	01B	MT0220											X	Pre-1986 F-2	
	01C	MT0221											X	Pre-1986 F-2	
	01D	MT0222											X	Pre-1986 F-2	
	01C	MT0223											X	Pre-1986 F-2	
	01C	MT0227											X	Pre-1986 F-2	
	01B	MT023											X	Pre-1986 F-2	
	01D	MT0230											X	Pre-1986 F-2	
	01D	MT0231											X	Pre-1986 F-2	
	01D	MT0233											X	Pre-1986 F-2	
	01D	MT0235											X	Pre-1986 F-2	
	01B	MT0237											X	Pre-1986 F-2	
	01D	MT0239											X	Pre-1986 F-2	
	01F	MT0241											X	Pre-1986 F-2	
	01C	MT0242											X	Pre-1986 F-2	
	01D	MT0243											X	Pre-1986 F-2	

TABLE A.1. (contd)

Information Supplied by Utilities on Defective Fuel																
Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	(a)												(b)	(c)
			Category													
			1	2	3	4	5	6	7	8	9	LAT				
● Operating Plant (Facility)																
Monticello (contd)	01D	MT0244											X	Pre-1986 F-2		
	01D	MT0245											X	Pre-1986 F-2		
	01D	MT0248											X	Pre-1986 F-2		
	01D	MT0250											X	Pre-1986 F-2		
	01D	MT0252											X	Pre-1986 F-2		
	01D	MT0256											X	Pre-1986 F-2		
	01B	MT0258											X	Pre-1986 F-2		
	01B	MT0259											X	Pre-1986 F-2		
	01D	MT0265											X	Pre-1986 F-2		
	01C	MT0267											X	Pre-1986 F-2		
	01C	MT0268											X	Pre-1986 F-2		
	01B	MT0269											X	Pre-1986 F-2		
	01D	MT0270											X	Pre-1986 F-2		
	01B	MT0271											X	Pre-1986 F-2		
	01C	MT0272											X	Pre-1986 F-2		
	01C	MT0273											X	Pre-1986 F-2		
	01C	MT0274											X	Pre-1986 F-2		
	01B	MT0275											X	Pre-1986 F-2		
	01D	MT0279											X	Pre-1986 F-2		
	01D	MT0281											X	Pre-1986 F-2		
	01C	MT0282											X	Pre-1986 F-2		
	01D	MT0283											X	Pre-1986 F-2		
	01C	MT0284											X	Pre-1986 F-2		
	01D	MT0285											X	Pre-1986 F-2		
	01D	MT0287											X	Pre-1986 F-2		
	01D	MT0290											X	Pre-1986 F-2		
	01D	MT0292											X	Pre-1986 F-2		
	01D	MT0293											X	Pre-1986 F-2		

TABLE A.1. (contd)

Information Supplied by Utilities on Defective Fuel															
Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	(a)											(b)	(c)
			Category												
			1	2	3	4	5	6	7	8	9	LAT			
● Operating Plant (Facility)															
Monticello (contd)	01C	MT0477											X	Pre-1986 F-2	
	01D	MT0478											X	Pre-1986 F-2	
	01D	MT0479											X	Pre-1986 F-2	
	01A	MT0480											X	Pre-1986 F-2	
	01B	MT0481											X	Pre-1986 F-2	
	01B	MT0483											X	Pre-1986 F-2	
	01B	MT0484											X	Pre-1986 F-2	
	01D	MT049											X	Pre-1986 F-2	
	01B	MT058											X	Pre-1986 F-2	
	01B	MT060											X	Pre-1986 F-2	
	01B	MT063											X	Pre-1986 F-2	
	01C	MT067											X	Pre-1986 F-2	
	01B	MT070											X	Pre-1986 F-2	
	01C	MT071											X	Pre-1986 F-2	
	01D	MT072											X	Pre-1986 F-2	
	01B	MT073											X	Pre-1986 F-2	
	01D	MT075											X	Pre-1986 F-2	
	01D	MT076											X	Pre-1986 F-2	
	01A	MT083											X	Pre-1986 F-2	
	01B	MT087											X	Pre-1986 F-2	
	01A	MT092											X	Pre-1986 F-2	
	01C	MT093											X	Pre-1986 F-2	
	01B	MT098											X	Pre-1986 F-2	
Nine Mile Point-1	1C3	GEA002											X	Pre-1986 F-2	
	1C3	GEA032											X	Pre-1986 F-2	
	1C3	GEA033											X	Pre-1986 F-2	
	1C3	GEA044											X	Pre-1986 F-2	

TABLE A.1. (contd)

Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	Information Supplied by Utilities on Defective Fuel												(c) Failure Description
			(a)												
			Category												
			(b)												
			1	2	3	4	5	6	7	8	9	LAT			
● Operating Plant (Facility)															
Nine Mile Point-1 (contd)	1A3	NM003								X			Pre-1986 F-2		
	1A2	NM007								X			Pre-1986 F-2		
	1A1C	NM013								X			Pre-1986 F-2		
	1A1C	NM020								X			Pre-1986 F-2		
	1A1C	NM023								X			Pre-1986 F-2		
	1A3	NM025								X			Pre-1986 F-2		
	1A1B	NM028								X			Pre-1986 F-2		
	1A1A	NM029								X			Pre-1986 F-2		
	1A3	NM032								X			Pre-1986 F-2		
	1A2	NM039								X			Pre-1986 F-2		
	1A2	NM040								X			Pre-1986 F-2		
	1A1C	NM042								X			Pre-1986 F-2		
	1A1C	NM048								X			Pre-1986 F-2		
	1A1C	NM049								X			Pre-1986 F-2		
	1A1C	NM050								X			Pre-1986 F-2		
	1A2	NM054								X			Pre-1986 F-2		
	1A1C	NM057								X			Pre-1986 F-2		
	1A1B	NM063								X			Pre-1986 F-2		
	1A1C	NM064								X			Pre-1986 F-2		
	1A3	NM065								X			Pre-1986 F-2		
	1A3	NM068								X			Pre-1986 F-2		
	1A3	NM072								X			Pre-1986 F-2		
	1A3	NM081								X			Pre-1986 F-2		
	1A2	NM084								X			Pre-1986 F-2		
	1A1C	NM086								X			Pre-1986 F-2		
	1A2	NM087								X			Pre-1986 F-2		
	1A2	NM088								X			Pre-1986 F-2		
	1A3	NM089								X			Pre-1986 F-2		

TABLE A.1. (contd)

Information Supplied by Utilities on Defective Fuel														
Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	(a)											(c)
			Category											
			1	2	3	4	5	6	7	8	9	LAT		
(b)														
Failure Description														
● Operating Plant (Facility)														
Nine Mile Point-1 (contd)	1A2	NM204										X		Pre-1986 F-2
	1A1C	NM205										X		Pre-1986 F-2
	1A1C	NM206										X		Pre-1986 F-2
	1A3	NM207										X		Pre-1986 F-2
	1A1C	NM209										X		Pre-1986 F-2
	1A1B	NM210										X		Pre-1986 F-2
	1A2	NM213										X		Pre-1986 F-2
	1A1B	NM214										X		Pre-1986 F-2
	1A1C	NM215										X		Pre-1986 F-2
	1A3	NM216										X		Pre-1986 F-2
	1A1C	NM217										X		Pre-1986 F-2
	1A1C	NM218										X		Pre-1986 F-2
	1A1C	NM219										X		Pre-1986 F-2
	1A1B	NM220										X		Pre-1986 F-2
	1A1B	NM221										X		Pre-1986 F-2
	1A3	NM222										X		Pre-1986 F-2
	1A1C	NM223										X		Pre-1986 F-2
	1A1B	NM224										X		Pre-1986 F-2
	1A2	NM226										X		Pre-1986 F-2
	1A1C	NM228										X		Pre-1986 F-2
	1A1C	NM229										X		Pre-1986 F-2
	1A1C	NM230										X		Pre-1986 F-2
	1A1C	NM231										X		Pre-1986 F-2
	1A3	NM232										X		Pre-1986 F-2
	1A1C	NM233										X		Pre-1986 F-2
	1A1C	NM234										X		Pre-1986 F-2
	1A1C	NM236										X		Pre-1986 F-2
	1A1C	NM237										X		Pre-1986 F-2

TABLE A.1. (contd)

Information Supplied by Utilities on Defective Fuel														
Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	(a)											(c) Failure Description
			Category											
			1	2	3	4	5	6	7	8	9	LAT		
● Operating Plant (Facility)														
Nine Mile Point-1 (contd)	1A2	NM239									X			Pre-1986 F-2
	1A1C	NM241									X			Pre-1986 F-2
	1A1C	NM242									X			Pre-1986 F-2
	1A3	NM243									X			Pre-1986 F-2
	1A3	NM244									X			Pre-1986 F-2
	1A1C	NM245									X			Pre-1986 F-2
	1A3	NM246									X			Pre-1986 F-2
	1A3	NM247									X			Pre-1986 F-2
	1A1A	NM248									X			Pre-1986 F-2
	1A1C	NM251									X			Pre-1986 F-2
	1A1C	NM252									X			Pre-1986 F-2
	1A1C	NM253									X			Pre-1986 F-2
	1A1B	NM263									X			Pre-1986 F-2
	1A3	NM264									X			Pre-1986 F-2
	1A3	NM273									X			Pre-1986 F-2
	1A3	NM283									X			Pre-1986 F-2
	1A2	NM286									X			Pre-1986 F-2
	1A3	NM287									X			Pre-1986 F-2
	1A3	NM290									X			Pre-1986 F-2
	1A3	NM294									X			Pre-1986 F-2
	1A2	NM296									X			Pre-1986 F-2
	1A3	NM299									X			Pre-1986 F-2
	1A4	NM300									X			Pre-1986 F-2
	1A1C	NM308									X			Pre-1986 F-2
	1A1B	NM310									X			Pre-1986 F-2
	1A1C	NM311									X			Pre-1986 F-2
	1A1B	NM320									X			Pre-1986 F-2
	1A1C	NM322									X			Pre-1986 F-2

TABLE A.1. (contd)

			Information Supplied by Utilities on Defective Fuel												
			(a)												
			Category												
			(b)												
Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	1	2	3	4	5	6	7	8	9	LAT	(c)		
● Operating Plant (Facility)															
Nine Mile Point-1 (contd)	1A1C	NM334								X			Pre-1986 F-2		
	1A1A	NM337								X			Pre-1986 F-2		
	1A3	NM339								X			Pre-1986 F-2		
	1A2	NM343								X			Pre-1986 F-2		
	1A1A	NM345								X			Pre-1986 F-2		
	1A3	NM346								X			Pre-1986 F-2		
	1A3	NM347								X			Pre-1986 F-2		
	1A1C	NM350								X			Pre-1986 F-2		
	1A1C	NM351								X			Pre-1986 F-2		
	1A1C	NM353								X			Pre-1986 F-2		
	1A1A	NM355								X			Pre-1986 F-2		
	1A3	NM356								X			Pre-1986 F-2		
	1A1C	NM361								X			Pre-1986 F-2		
	1A1C	NM363								X			Pre-1986 F-2		
	1A1C	NM365								X			Pre-1986 F-2		
	1A1C	NM366								X			Pre-1986 F-2		
	1A1A	NM368								X			Pre-1986 F-2		
	1A1A	NM369								X			Pre-1986 F-2		
	1A1B	NM370								X			Pre-1986 F-2		
	1A1B	NM372								X			Pre-1986 F-2		
	1A3	NM375								X			Pre-1986 F-2		
	1A1C	NM376								X			Pre-1986 F-2		
	1A3	NM377								X			Pre-1986 F-2		
	1A1C	NM378								X			Pre-1986 F-2		
	1A1A	NM379								X			Pre-1986 F-2		
	1A1C	NM382								X			Pre-1986 F-2		
	1A3	NM387								X			Pre-1986 F-2		
	1A1B	NM388								X			Pre-1986 F-2		

TABLE A.1. (contd)

Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	Information Supplied by Utilities on Defective Fuel												Failure Description
			(a)												
			Category												
			(b)												
			1	2	3	4	5	6	7	8	9	LAT	(c)		
● Operating Plant (Facility)															
Nine Mile Point-1 (contd)	1A1C	NM389								X			Pre-1986 F-2		
	1A3	NM394								X			Pre-1986 F-2		
	1A1A	NM396								X			Pre-1986 F-2		
	1A1C	NM397								X			Pre-1986 F-2		
	1A1B	NM398								X			Pre-1986 F-2		
	1A3	NM402								X			Pre-1986 F-2		
	1A1A	NM405								X			Pre-1986 F-2		
	1A1C	NM407								X			Pre-1986 F-2		
	1A1B	NM409								X			Pre-1986 F-2		
	1A2	NM410								X			Pre-1986 F-2		
	1A4	NM412								X			Pre-1986 F-2		
	1A1A	NM414								X			Pre-1986 F-2		
	1A1C	NM416								X			Pre-1986 F-2		
	1A1C	NM417								X			Pre-1986 F-2		
	1A4	NM418								X			Pre-1986 F-2		
	1A1C	NM419								X			Pre-1986 F-2		
	1A1B	NM421								X			Pre-1986 F-2		
	1A3	NM423								X			Pre-1986 F-2		
	1A1C	NM424								X			Pre-1986 F-2		
	1A3	NM425								X			Pre-1986 F-2		
	1A1A	NM427								X			Pre-1986 F-2		
	1A4	NM429								X			Pre-1986 F-2		
	1A1B	NM430								X			Pre-1986 F-2		
	1A1B	NM431								X			Pre-1986 F-2		
	1A1C	NM437								X			Pre-1986 F-2		
	1A1C	NM439								X			Pre-1986 F-2		
	1A1C	NM440								X			Pre-1986 F-2		
	1A2	NM443								X			Pre-1986 F-2		

TABLE A.1. (contd)

			Information Supplied by Utilities on Defective Fuel												
			(a)												
			Category												
			(b)												(c)
Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	1	2	3	4	5	6	7	8	9	LAT	Failure Description		
● Operating Plant (Facility)															
Nine Mile Point-1 (contd)	1A3	NM445								X			Pre-1986 F-2		
	1A2	NM446								X			Pre-1986 F-2		
	1A2	NM449								X			Pre-1986 F-2		
	1A3	NM450								X			Pre-1986 F-2		
	1A1C	NM454								X			Pre-1986 F-2		
	1A1C	NM455								X			Pre-1986 F-2		
	1A3	NM457								X			Pre-1986 F-2		
	1A3	NM459								X			Pre-1986 F-2		
	1A1C	NM463								X			Pre-1986 F-2		
	1A2	NM465								X			Pre-1986 F-2		
	1A3	NM469								X			Pre-1986 F-2		
	1A3	NM475								X			Pre-1986 F-2		
	1A1B	NM476								X			Pre-1986 F-2		
	1A1C	NM477								X			Pre-1986 F-2		
	1A1C	NM478								X			Pre-1986 F-2		
	1A1C	NM482								X			Pre-1986 F-2		
	1A1C	NM484								X			Pre-1986 F-2		
	1A3	NM486								X			Pre-1986 F-2		
	1A1C	NM487								X			Pre-1986 F-2		
	1A1C	NM488								X			Pre-1986 F-2		
	1A1C	NM489								X			Pre-1986 F-2		
	1A3	NM490								X			Pre-1986 F-2		
	1A1A	NM493								X			Pre-1986 F-2		
	1A1C	NM494								X			Pre-1986 F-2		
	1A1B	NM499								X			Pre-1986 F-2		
	1A3	NM502								X			Pre-1986 F-2		
	1A3	NM504								X			Pre-1986 F-2		
	1A1C	NM505								X			Pre-1986 F-2		

TABLE A.1. (contd)

			Information Supplied by Utilities on Defective Fuel														
			(a)														
			Category													(b)	(c)
Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	1	2	3	4	5	6	7	8	9	LAT	Failure Description				
● Operating Plant (Facility)																	
Nine Mile Point-1 (contd)	1A1A	NM510								X			Pre-1986 F-2				
	1A1C	NM511								X			Pre-1986 F-2				
	1A2	NM512								X			Pre-1986 F-2				
	1A1C	NM514								X			Pre-1986 F-2				
	1A1B	NM517								X			Pre-1986 F-2				
	1A1A	NM521								X			Pre-1986 F-2				
	1A1B	NM522								X			Pre-1986 F-2				
	1A1A	NM523								X			Pre-1986 F-2				
	1A2	NM525								X			Pre-1986 F-2				
	1A3	NM527								X			Pre-1986 F-2				
	1A1B	NM528								X			Pre-1986 F-2				
	1A1C	NM532								X			Pre-1986 F-2				
	2 4	NMA001									X		Pre-1986 F-2				
	1B4	NMA007									X		Pre-1986 F-2				
	1B4	NMA014									X		Pre-1986 F-2				
	2 4	NMA017									X		Pre-1986 F-2				
	1B4	NMA025									X		Pre-1986 F-2				
	2 4	NMA038									X		Pre-1986 F-2				
	2 4	NMA053									X		Pre-1986 F-2				
Nine Mile Point-2																	
North Anna-1	N1-1A1	A10	X										Visual fail/dam				
	N1-4A2	D01							X				Clad damage				
	N1-4A2	D13							X				Clad damage				
	N1-4A1	D15							X				Clad damage				
	N1-4A3	D47	X										Visual fail/damage				
	N1-4A1	D49							X				Clad damage				

TABLE A.1. (contd)

Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	Information Supplied by Utilities on Defective Fuel												(c) Failure Description
			(a)												
			Category												
			(b)												
			1	2	3	4	5	6	7	8	9	LAT			
● Operating Plant (Facility)															
Oconee-3	49	NJ0297	X										Pre-1986 F-1		
Oyster Creek															
Palisades															
Palo Verde-1															
Palo Verde-2															
Peach Bottom-2															
Peach Bottom-3	300	LJ4975	X						X				Visual fail/dam, clad damage		
	600	LJH037	X						X				Visual fail/dam, clad damage		
	600	LJH038	X						X				Visual fail/dam, clad damage		
	600	LJH039	X						X				Visual fail/dam, clad damage		
	600	LJH040	X						X				Visual fail/dam, clad damage		
	600	LJH041	X						X				Visual fail/dam, clad damage		
	600	LJH042	X						X				Visual fail/dam, clad damage		
	600	LJH043	X						X				Visual fail/dam, clad damage		
	600	LJH045	X						X				Visual fail/dam, clad damage		
	600	LJH050	X						X				Visual fail/dam, clad damage		
	600	LJH056	X						X				Visual fail/dam, clad damage		
	600	LJH059	X						X				Visual fail/dam, clad damage		
	600	LJH060	X						X				Visual fail/dam, clad damage		
	600	LJH062	X						X				Visual fail/dam, clad damage		
	600	LJH066	X						X				Visual fail/dam, clad damage		
	600	LJH073	X						X				Visual fail/dam, clad damage		

TABLE A.1. (contd)

Information Supplied by Utilities on Defective Fuel															
Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	(a)											(b)	(c)
			Category												
			1	2	3	4	5	6	7	8	9	LAT			
Failure Description															
● Operating Plant (Facility)															
Peach Bottom-3 (contd)	600	LJH074	X						X					Visual fail/dam, clad damage	
	600	LJH075	X						X					Visual fail/dam, clad damage	
	600	LJH077	X						X					Visual fail/dam, clad damage	
	600	LJH078	X						X					Visual fail/dam, clad damage	
	600	LJH079	X						X					Visual fail/dam, clad damage	
	600	LJH080	X						X					Visual fail/dam, clad damage	
	600	LJH090	X						X					Visual fail/dam, clad damage	
	600	LJH094	X						X					Visual fail/dam, clad damage	
	600	LJH095	X						X					Visual fail/dam, clad damage	
	600	LJH096	X						X					Visual fail/dam, clad damage	
	600	LJH097	X						X					Visual fail/dam, clad damage	
	600	LJH099	X						X					Visual fail/dam, clad damage	
	600	LJH100	X						X					Visual fail/dam, clad damage	
	600	LJH101	X						X					Visual fail/dam, clad damage	
	600	LJH102	X						X					Visual fail/dam, clad damage	
	600	LJH103	X						X					Visual fail/dam, clad damage	
	600	LJH105	X						X					Visual fail/dam, clad damage	
	600	LJH106	X						X					Visual fail/dam, clad damage	
	600	LJH107	X						X					Visual fail/dam, clad damage	
	600	LJH108	X						X					Visual fail/dam, clad damage	
	600	LJH109	X						X					Visual fail/dam, clad damage	
	600	LJH118	X						X					Visual fail/dam, clad damage	
	600	LJH119	X						X					Visual fail/dam, clad damage	
	600	LJH132	X						X					Visual fail/dam, clad damage	
	600	LJH149	X						X					Visual fail/dam, clad damage	
	600	LJH150	X						X					Visual fail/dam, clad damage	
	600	LJH152	X						X					Visual fail/dam, clad damage	
	600	LJH154	X						X					Visual fail/dam, clad damage	

TABLE A.1. (contd)

Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	Information Supplied by Utilities on Defective Fuel												(c) Failure Description
			(a)												
			Category												
			(b)												
			1	2	3	4	5	6	7	8	9	LAT			
● Operating Plant (Facility)															
Peach Bottom-3 (contd)	600	LJH155	X						X					Visual fail/dam, clad damage	
	600	LJH157	X						X					Visual fail/dam, clad damage	
	600	LJH158	X						X					Visual fail/dam, clad damage	
	600	LJH159	X						X					Visual fail/dam, clad damage	
	600	LJH160	X						X					Visual fail/dam, clad damage	
	600	LJH162	X						X					Visual fail/dam, clad damage	
	600	LJH163	X						X					Visual fail/dam, clad damage	
	600	LJH165	X						X					Visual fail/dam, clad damage	
	600	LJH197	X						X					Visual fail/dam, clad damage	
	600	LJH199	X						X					Visual fail/dam, clad damage	
	600	LJH201	X						X					Visual fail/dam, clad damage	
	600	LJH202	X						X					Visual fail/dam, clad damage	
	600	LJH203	X						X					Visual fail/dam, clad damage	
	600	LJH204	X						X					Visual fail/dam, clad damage	
	600	LJH206	X						X					Visual fail/dam, clad damage	
	600	LJH207	X						X					Visual fail/dam, clad damage	
	600	LJH208	X						X					Visual fail/dam, clad damage	
	600	LJH209	X						X					Visual fail/dam, clad damage	
	600	LJH210	X						X					Visual fail/dam, clad damage	
	600	LJH211	X						X					Visual fail/dam, clad damage	
	600	LJH212	X						X					Visual fail/dam, clad damage	
	600	LJH213	X						X					Visual fail/dam, clad damage	
	600	LJH214	X						X					Visual fail/dam, clad damage	
	600	LJH215	X						X					Visual fail/dam, clad damage	
	600	LJH217	X						X					Visual fail/dam, clad damage	
	600	LJH218	X						X					Visual fail/dam, clad damage	
	600	LJH223	X						X					Visual fail/dam, clad damage	
	600	LJH231	X						X					Visual fail/dam, clad damage	

TABLE A.1. (contd)

Information Supplied by Utilities on Defective Fuel														
Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	(a)											Failure Description
			Category											
			1	2	3	4	5	6	7	8	9	LAT	(b)	
● Operating Plant (Facility)														
Peach Bottom-3 (contd)	600	LJH248	X							X				Visual fail/dam, clad damage
	600	LJH253	X							X				Visual fail/dam, clad damage
	600	LJH260	X							X				Visual fail/dam, clad damage
	600	LJH265	X							X				Visual fail/dam, clad damage
	600	LJH268	X							X				Visual fail/dam, clad damage
	600	LJH274	X							X				Visual fail/dam, clad damage
	600	LJH278	X							X				Visual fail/dam, clad damage
	600	LJH280	X							X				Visual fail/dam, clad damage
	600	LJH284	X							X				Visual fail/dam, clad damage
	600	LJH285	X							X				Visual fail/dam, clad damage
	600	LJH288	X							X				Visual fail/dam, clad damage
	600	LJH289	X							X				Visual fail/dam, clad damage
	600	LJH290	X							X				Visual fail/dam, clad damage
	600	LJH291	X							X				Visual fail/dam, clad damage
	600	LJH292	X							X				Visual fail/dam, clad damage
	600	LJH294	X							X				Visual fail/dam, clad damage
	600	LJH295	X							X				Visual fail/dam, clad damage
	600	LJH296	X							X				Visual fail/dam, clad damage
	600	LJH297	X							X				Visual fail/dam, clad damage
	600	LJW890	X							X				Visual fail/dam, clad damage
	600	LJW901	X							X				Visual fail/dam, clad damage
	600	LJW902	X							X				Visual fail/dam, clad damage
	600	LJW916	X							X				Visual fail/dam, clad damage
	300	PB0175	X							X				Visual fail/dam, clad damage
	300	PB0176	X							X				Visual fail/dam, clad damage
	300	PB0178	X							X				Visual fail/dam, clad damage
	300	PB0217	X							X				Visual fail/dam, clad damage
	200	PB0227	X							X				Visual fail/dam, clad damage

TABLE A.1. (contd)

Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	Information Supplied by Utilities on Defective Fuel												(c) Failure Description
			(a)												
			Category												
			(b)												
			1	2	3	4	5	6	7	8	9	LAT			
● Operating Plant (Facility)															
Peach Bottom-3 (contd)	300	PB0240	X						X					Visual fail/dam, clad damage	
	300	PB0241	X						X					Visual fail/dam, clad damage	
	100	PB0263	X						X					Visual fail/dam, clad damage	
	100	PB0270	X						X					Visual fail/dam, clad damage	
	300	PB0344	X						X					Visual fail/dam, clad damage	
	300	PB0345	X						X					Visual fail/dam, clad damage	
	300	PB0358	X						X					Visual fail/dam, clad damage	
	200	PB0370	X						X					Visual fail/dam, clad damage	
	300	PB0373	X						X					Visual fail/dam, clad damage	
	300	PB0415	X						X					Visual fail/dam, clad damage	
	300	PB0418	X						X					Visual fail/dam, clad damage	
	200	PB0421	X						X					Visual fail/dam, clad damage	
	300	PB0428	X						X					Visual fail/dam, clad damage	
	300	PB0429	X						X					Visual fail/dam, clad damage	
	100	PB0521	X						X					Visual fail/dam, clad damage	
	Perry-1 ^(d)														
Pilgrim	2000	BE11							X					Clad damage	
	2000	BE17							X					Clad damage	
	2000	BE29							X					Clad damage	
	1000	BE37							X					Clad damage	
	2000	BE49							X					Clad damage	
	2000	BE50							X					Clad damage	
	2000	BE53							X					Clad damage	
	2000	BE57							X					Clad damage	
	2000	BE58							X					Clad damage	
1000	BE59							X					Clad damage		

TABLE A.1. (contd)

Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	Information Supplied by Utilities on Defective Fuel												Failure Description
			(a)												
			Category												
			(b)												
			1	2	3	4	5	6	7	8	9	LAT	(c)		
● Operating Plant (Facility)															
Pilgrim (contd)	2000	BE62							X					Clad damage	
	2000	BE63							X					Clad damage	
	2000	BE71							X					Clad damage	
	2000	BE74							X					Clad damage	
	2000	BE88							X					Clad damage	
	1000	BE99							X					Clad damage	
	2000	BE101							X					Clad damage	
	2000	BE103							X					Clad damage	
	2000	BE105							X					Clad damage	
	2000	BE106							X					Clad damage	
	1000	BE112							X					Clad damage	
	1000	BE120							X					Clad damage	
	2000	BE126							X					Clad damage	
	2000	BE138							X					Clad damage	
	1000	BE140							X					Clad damage	
	1000	BE141							X					Clad damage	
	2000	BE142							X					Clad damage	
	2000	BE144							X					Clad damage	
	2000	BE147							X					Clad damage	
	1000	BE148							X					Clad damage	
	2000	BE154							X					Clad damage	
	2000	BE159							X					Clad damage	
	2000	BE160							X					Clad damage	
	1000	BE164							X					Clad damage	
	1000	BE165							X					Clad damage	
	3000	BE166							X					Clad damage	
	2000	BE167							X					Clad damage	
	2000	BE172							X					Clad damage	

TABLE A.1. (contd)

Information Supplied by Utilities on Defective Fuel														
Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	(a)											(c)
			Category											
			1	2	3	4	5	6	7	8	9	LAT		
Failure Description														
● <u>Operating Plant (Facility)</u>														
Pilgrim (contd)	2000	BE173								X				Clad damage
	2000	BE174								X				Clad damage
	2000	BE175								X				Clad damage
	1000	BE180								X				Clad damage
	2000	BE202								X				Clad damage
	1000	BE206								X				Clad damage
	2000	BE211								X				Clad damage
	2000	BE223								X				Clad damage
	2000	BE228								X				Clad damage
	1000	BE235								X				Clad damage
	2000	BE244								X				Clad damage
	2000	BE245								X				Clad damage
	2000	BE247								X				Clad damage
	2000	BE249								X				Clad damage
	2000	BE250								X				Clad damage
	2000	BE257								X				Clad damage
	2000	BE278								X				Clad damage
	2000	BE287								X				Clad damage
	2000	BE290								X				Clad damage
	2000	BE292								X				Clad damage
	2000	BE294								X				Clad damage
	2000	BE295								X				Clad damage
	2000	BE297								X				Clad damage
	2000	BE301								X				Clad damage
	2000	BE313								X				Clad damage
	2000	BE342								X				Clad damage
	2000	BE343								X				Clad damage
	2000	BE355								X				Clad damage

TABLE A.1. (contd)

Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	Information Supplied by Utilities on Defective Fuel											Failure Description
			(a)											
			Category											
			(b)											
			1	2	3	4	5	6	7	8	9	LAT	(c)	
● Operating Plant (Facility)														
Pilgrim (contd)	2000	BE358							X					Clad damage
	2000	BE360							X					Clad damage
	2000	BE364							X					Clad damage
	2000	BE368							X					Clad damage
	2000	BE372							X					Clad damage
	2000	BE378							X					Clad damage
	2000	BE379							X					Clad damage
	2000	BE380							X					Clad damage
	2000	BE383							X					Clad damage
	2000	BE385							X					Clad damage
	1000	BE391							X					Clad damage
	2000	BE392							X					Clad damage
	2000	BE393							X					Clad damage
	2000	BE394							X					Clad damage
	2000	BE396							X					Clad damage
	2000	BE398							X					Clad damage
	2000	BE401							X					Clad damage
	2000	BE404							X					Clad damage
	2000	BE405							X					Clad damage
	2000	BE410							X					Clad damage
	2000	BE411							X					Clad damage
	2000	BE415							X					Clad damage
	2000	BE417							X					Clad damage
	2000	BE419							X					Clad damage
	2000	BE427							X					Clad damage
	2000	BE429							X					Clad damage
	2000	BE430							X					Clad damage
	2000	BE431							X					Clad damage

TABLE A.1. (contd)

Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	Information Supplied by Utilities on Defective Fuel												(c) Failure Description
			(a)												
			Category												
			(b)												
			1	2	3	4	5	6	7	8	9	LAT			
● Operating Plant (Facility)															
Pilgrim (contd)	2000	BE433							X					Clad damage	
	2000	BE434							X					Clad damage	
	2000	BE436							X					Clad damage	
	2000	BE440							X					Clad damage	
	2000	BE441							X					Clad damage	
	2000	BE447							X					Clad damage	
	2000	BE451							X					Clad damage	
	2000	BE485							X					Clad damage	
	2000	BE486							X					Clad damage	
	2000	BE489							X					Clad damage	
	2000	BE490							X					Clad damage	
	2000	BE493							X					Clad damage	
	2000	BE494							X					Clad damage	
	2000	BE496							X					Clad damage	
	2000	BE497							X					Clad damage	
	2000	BE498							X					Clad damage	
	2000	BE500							X					Clad damage	
	2000	BE503							X					Clad damage	
	2000	BE504							X					Clad damage	
	2000	BE507							X					Clad damage	
	2000	BE508							X					Clad damage	
	2000	BE510							X					Clad damage	
	2000	BE511							X					Clad damage	
	2000	BE515							X					Clad damage	
	2000	BE518							X					Clad damage	
	2000	BE520							X					Clad damage	
	2000	BE524							X					Clad damage	
	2000	BE526							X					Clad damage	

TABLE A.1. (contd)

Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	Information Supplied by Utilities on Defective Fuel												(c) Failure Description
			(a)												
			Category												
			(b)												
			1	2	3	4	5	6	7	8	9	LAT			
● Operating Plant (Facility)															
Pilgrim (contd)	2000	BE528							X					Clad damage	
	2000	BE531							X					Clad damage	
	2000	BE532							X					Clad damage	
	2000	BE535							X					Clad damage	
	2000	BE537							X					Clad damage	
	2000	BE538							X					Clad damage	
	2000	BE540							X					Clad damage	
	2000	BE541							X					Clad damage	
	2000	BE544							X					Clad damage	
	2000	BE545							X					Clad damage	
	2000	BE546							X					Clad damage	
	1000	BE549							X					Clad damage	
	2000	BE550							X					Clad damage	
	2000	BE551							X					Clad damage	
	2000	BE552							X					Clad damage	
	2000	BE554							X					Clad damage	
	2000	BE555							X					Clad damage	
	2000	BE556							X					Clad damage	
	2000	BE558							X					Clad damage	
	2000	BE562							X					Clad damage	
	2000	BE563							X					Clad damage	
	1000	BE566							X					Clad damage	
	2000	BE578							X					Clad damage	
Point Beach-1	A01	A01	X						X					Visual fail/dam, clad damage	
	A02	A02	X						X					Visual fail/dam, clad damage	
	A03	A03	X						X					Visual fail/dam, clad damage	
	A04	A04	X						X					Visual fail/dam, clad damage	

TABLE A.1. (contd)

Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	Information Supplied by Utilities on Defective Fuel												(c) Failure Description
			(a)												
			Category												
			(b)												
			1	2	3	4	5	6	7	8	9	LAT			
● Operating Plant (Facility)															
Point Beach-1 (contd)	A05	A05	X						X					Visual fail/dam, clad damage	
	A06	A06	X						X					Visual fail/dam, clad damage	
	A07	A07	X						X					Visual fail/dam, clad damage	
	A08	A08	X						X					Visual fail/dam, clad damage	
	A09	A09	X						X					Visual fail/dam, clad damage	
	A10	A10	X						X					Visual fail/dam, clad damage	
	A11	A11	X						X					Visual fail/dam, clad damage	
	A12	A12	X						X					Visual fail/dam, clad damage	
	A13	A13							X					Clad damage	
	A17	A17	X						X					Visual fail/dam, clad damage	
	A18	A18	X						X					Visual fail/dam, clad damage	
	A19	A19	X						X					Visual fail/dam, clad damage	
	A20	A20	X						X					Visual fail/dam, clad damage	
	A22	A22	X						X					Visual fail/dam, clad damage	
	A24	A24	X						X					Visual fail/dam, clad damage	
	A26	A26	X						X					Visual fail/dam, clad damage	
	A28	A28	X						X					Visual fail/dam, clad damage	
	A29	A29	X						X					Visual fail/dam, clad damage	
	A31	A31	X											Visual fail/dam	
	A33	A33	X						X					Visual fail/dam, clad damage	
	A34	A34	X						X					Visual fail/dam, clad damage	
	A35	A35	X						X					Visual fail/dam, clad damage	
	A36	A36	X						X					Visual fail/dam, clad damage	
	A37	A37	X						X					Visual fail/dam, clad damage	
	A38	A38	X						X					Visual fail/dam, clad damage	
	A39	A39							X					Clad damage	
	A40	A40	X						X					Visual fail/dam, clad damage	
	A41	A41	X						X					Visual fail/dam, clad damage	

TABLE A.1. (contd)

			Information Supplied by Utilities on Defective Fuel													
			(a)													
			Category												(b)	(c)
Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	1	2	3	4	5	6	7	8	9	LAT	Failure Description			
● Operating Plant (Facility)																
Point Beach-1 (contd)	A67	A67	X										Visual fail/dam			
	B02	B02	X						X				Visual fail/dam, clad damage			
	B03	B03	X						X				Visual fail/dam, clad damage			
	B04	B04	X						X				Visual fail/dam, clad damage			
	B05	B05	X						X				Visual fail/dam, clad damage			
	B06	B06	X						X				Visual fail/dam, clad damage			
	B07	B07	X						X				Visual fail/dam, clad damage			
	B08	B08	X						X				Visual fail/dam, clad damage			
	B16	B16	X						X				Visual fail/dam, clad damage			
	B18	B18	X						X				Visual fail/dam, clad damage			
	B20	B20	X						X				Visual fail/dam, clad damage			
	B21	B21	X						X				Visual fail/dam, clad damage			
	B23	B23	X										Visual fail/dam			
	B26	B26	X						X				Visual fail/dam, clad damage			
	B27	B27	X						X				Visual fail/dam, clad damage			
	B33	B33	X						X				Visual fail/dam, clad damage			
	B38	B38	X						X				Visual fail/dam, clad damage			
	B40	B40	X						X				Visual fail/dam, clad damage			
	C09	C09	X										Visual fail/dam			
	C20	C20	X						X				Visual fail/dam, clad damage			
	C28	C28	X						X				Visual fail/dam, clad damage			
	C34	C34	X						X				Visual fail/dam, clad damage			
	C37	C37	X						X				Visual fail/dam, clad damage			
	C40	C40	X						X				Visual fail/dam, clad damage			
	D03	D03	X						X				Visual fail/dam, clad damage			
	D14	D14	X										Visual fail/dam			
	D34	D34	X										Visual fail/dam			
	G18	LM0264	X										Visual fail/dam			

TABLE A.1. (contd)

Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	Information Supplied by Utilities on Defective Fuel											(c) Failure Description
			(a)											
			Category											
			(b)											
			1	2	3	4	5	6	7	8	9	LAT		
● Operating Plant (Facility)														
Point Beach-1 (contd)	H09	LM036C	X						X					Visual fail/dam, clad damage
	K23	LM05UM	X											Visual fail/dam
	H83	LM06E6	X						X					Visual fail/dam, clad damage
	H86	LM06E9	X						X					Visual fail/dam, clad damage
	L04	LM07MD	X						X					Visual fail/dam, clad damage
	L09	LM07MJ							X					Clad damage
	L27	LM07MR	X											Visual fail/dam
	L21	LM07MT							X					Clad damage
	L24	LM07MY							X					Clad damage
	L12	LM07N5							X					Clad damage
	M10	LM08SH							X					Clad damage
	M16	LM08SK							X					Clad damage
	M19	LM08T1							X					Clad damage
	N23	LM0AVT	X						X					Visual fail/dam, clad damage
	Point Beach-2	B80	B80							X				
K77		LM03P1	X											Visual fail/dam
ZD3		LM03PM	X						X					Visual fail/dam, clad damage
J67		LM07WA	X											Visual fail/dam
L59		LM0AFS	X						X					Visual fail/dam, clad damage
L56		LM0AFV	X						X					Visual fail/dam, clad damage
M55		LM0AVD	X											Visual fail/dam
Prairie Island-1	10B	J32								X			Pre-1986 F-2	
Prairie Island-2														
Quad Cities-1														

TABLE A.1. (contd)

Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	Information Supplied by Utilities on Defective Fuel												Failure Description
			(a)												
			Category												
			(b)												
			1	2	3	4	5	6	7	8	9	LAT	(c)		
● Operating Plant (Facility)															
Quad Cities-2															
Rancho Seco-1															
River Bend-1 ^(e)															
Robinson-2	R NONE	GAD-basket	X											Visual fail/dam	
Salem-1	3.0	C04 ^(g)									X			Pre-1986 F-2	
	4.0	D20									X			Pre-1986 F-2	
Salem-2															
San Onofre-1	2	A006	X		X					X				Visual fail/dam, req. spec. handling, clad damage	
	2	A026			X									Req. spec. handling	
	2	A040	X		X					X				Visual fail/dam, req. spec. handling, clad damage	
	4	D049X			X									Req. spec. handling	
	4	D050X			X									Req. spec. handling	
	4	D051X			X									Req. spec. handling	
	4	D052X			X									Req. spec. handling	
San Onofre-2	C	4 rods	X		X					X				Visual fail/dam, req. spec. handling, clad damage	
	B	B031	X											Visual fail/dam	
	B	B080	X											Visual fail/dam	
	C	C040	X											Visual fail/dam	
	CD	C107	X											Visual fail/dam	

TABLE A.1. (contd)

Information Supplied by Utilities on Defective Fuel															
Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	(a)												(c) Failure Description
			Category												
			(b)												
			1	2	3	4	5	6	7	8	9	LAT			
● Operating Plant (Facility)															
San Onofre-2 (contd)	OP	C203	X											Visual fail/dam	
	OP	C206	X											Visual fail/dam	
	OP	C207	X											Visual fail/dam	
San Onofre-3	A	A004	X						X					Visual fail/dam, clad damage	
	A	A005	X						X					Visual fail/dam, clad damage	
	A	A014	X						X					Visual fail/dam, clad damage	
	A	A017	X						X					Visual fail/dam, clad damage	
	A	A035	X						X					Visual fail/dam, clad damage	
	A	A036	X						X					Visual fail/dam, clad damage	
	A	A042	X						X					Visual fail/dam, clad damage	
	A	A050	X						X					Visual fail/dam, clad damage	
	A	A058	X						X					Visual fail/dam, clad damage	
	A	A070	X						X					Visual fail/dam, clad damage	
	A	A072	X						X					Visual fail/dam, clad damage	
	A	A073	X						X					Visual fail/dam, clad damage	
	B&OP	C208B051	X		X				X					Visual fail/dam, req. spec. handling, clad damage	
Sequoyah-1															
Sequoyah-2															
Shoreham ^(d)															
St. Lucie-1															
St. Lucie-2															

TABLE A.1. (contd)

Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	Information Supplied by Utilities on Defective Fuel											(c) Failure Description
			(a)											
			Category											
			(b)											
			1	2	3	4	5	6	7	8	9	LAT		
● Operating Plant (Facility)														
Summer-1														
Surry-1	S1-7A1	0A3	X						X					Visual fail/dam, clad damage
	S1-7A1	0A4							X					Clad damage
	S1-7A1	0A7							X					Clad damage
	S1-7A1	0A9							X					Clad damage
	S1-7A1	1A0							X					Clad damage
	S1-7A1	1A1							X					Clad damage
	S1-7A1	1A4							X					Clad damage
	S1-7A1	1A8							X					Clad damage
	S1-8A2	1B6	X				X							Visual fail/dam, phys. deformed
	S1-7A1	2A0							X					Clad damage
	S1-7B2	2A3							X					Clad damage
	S1-7B1	2A4							X					Clad damage
	S1-8B1	2C7	X				X							Visual fail/dam, phys. deformed
	S1-7B1	3A0	X				X		X					Visual fail/dam, phys. deformed, clad damage
	S1-7B1	3A2	X						X					Visual fail/dam, clad damage
	S1-7B1	3A3							X					Clad damage
	S1-7B1	3A8							X					Clad damage
	S1-7B1	4A0							X					Clad damage
	S1-7B1	4A5	X						X					Visual fail/dam, clad damage
	S1-8B1	4C3 ^(g)	X				X							Visual fail/dam, phys. deformed
	S1-7B1	5A0	X						X					Visual fail/dam, clad damage
	S1-7B1	5A3	X				X							Visual fail/dam, phys. deformed
	S1-7B1	5A4	X				X							Visual fail/dam, phys. deformed

TABLE A.1. (contd)

Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	Information Supplied by Utilities on Defective Fuel												(c) Failure Description
			(a)												
			Category												
			(b)												
			1	2	3	4	5	6	7	8	9	LAT			
● Operating Plant (Facility)															
Surry-1 (contd)	S1-7B1	5A6	X				X							Visual fail/dam, phys. deformed	
	S1-7B1	5A8	X						X					Visual fail/dam, clad damage	
	S1-7B1	5A9							X					Clad damage	
	S1-7B1	6A1							X					Clad damage	
	S1-7B1	6A2	X						X					Visual fail/dam, clad damage	
	S1-7B1	6A4							X					Clad damage	
	S1-1A2	A27							X					Clad damage	
	S1-1A1	A30							X					Clad damage	
	S1-1A2	A34							X					Clad damage	
	S1-1A3	A36							X					Clad damage	
	S1-1A2	A38							X					Clad damage	
	S1-1A1	A39							X					Clad damage	
	S1-1A2	A41							X					Clad damage	
	S1-1A1	A42							X					Clad damage	
	S1-1A3	A43							X					Clad damage	
	S1-2	B06							X					Clad damage	
	S1-2	B17							X					Clad damage	
	S1-2	B21							X					Clad damage	
	S1-2	B38							X					Clad damage	
	S1-2	B41							X					Clad damage	
	S1-2	B42							X					Clad damage	
	S1-2	B43							X					Clad damage	
	S1-2	B52							X					Clad damage	
	S1-3	C01							X					Clad damage	
	S1-3	C07							X					Clad damage	
	S1-3	C08							X					Clad damage	
	S1-3	C09							X					Clad damage	

TABLE A.1. (contd)

Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	Information Supplied by Utilities on Defective Fuel											(c) Failure Description
			(a)											
			Category											
			(b)											
			1	2	3	4	5	6	7	8	9	LAT		
● Operating Plant (Facility)														
Surry-1 (contd)	S1-3	C11							X					Clad damage
	S1-3	C20							X					Clad damage
	S1-3	C21							X					Clad damage
	S1-3	C25							X					Clad damage
	S1-3	C26							X					Clad damage
	S1-3	C28							X					Clad damage
	S1-3	C32							X					Clad damage
	S1-3	C35							X					Clad damage
	S1-3	C36							X					Clad damage
	S1-3	C37							X					Clad damage
	S1-3	C52							X					Clad damage
	S1-4C3	D05		X				X						Visual fail/dam, phys. deformed
	S1-4C1	D07								X				Clad damage
	S1-4C1	D08								X				Clad damage
	S1-4C1	D19								X				Clad damage
	S1-4C2	D24								X				Clad damage
	S1-4C1	D28								X				Clad damage
	S1-4C3	D32								X				Clad damage
	S1-4C2	D37								X				Clad damage
	S1-4C3	D48								X				Clad damage
	S1-4C1	D51								X				Clad damage
	S1-4C1	D52								X				Clad damage
	S1-4A	F09								X				Clad damage
	S1-4A	F11								X				Clad damage
	S1-6C2	J03								X				Clad damage
	S1-6C2	J15		X						X				Visual fail/dam, clad damage
	S1-6C3	J51		X				X						Visual fail/dam, phys. deformed

TABLE A.1. (contd)

Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	Information Supplied by Utilities on Defective Fuel												Failure Description
			(a)												
			Category												
			(b)												
			1	2	3	4	5	6	7	8	9	LAT	(c)		
● Operating Plant (Facility)															
Surry-1 (contd)	S2-4A4	S20							X					Clad damage	
	S2-6B3	W31							X					Clad damage	
Surry-2	S2-7A1	OL1							X					Clad damage	
	S2-7A1	OL9							X					Clad damage	
	S2-1A1	L33	X				X							Visual fail/dam, phys. deformed	
	S2-1A1	L35							X					Clad damage	
	S2-1A1	L49	X				X							Visual fail/dam, phys. deformed	
	S2-2	N01							X					Clad damage	
	S2-2	N03							X					Clad damage	
	S2-2	N06							X					Clad damage	
	S2-2	N08							X					Clad damage	
	S2-2	N10	X											Visual fail/dam	
	S2-2	N20	X						X					Visual fail/dam, clad damage	
	S2-2	N22							X					Clad damage	
	S2-2	N50							X					Clad damage	
	S2-3A1	P15							X					Clad damage	
	S2-4B1	R50		X				X						Visual fail/dam, phys. deformed	
	S2-4A6	S06		X				X						Visual fail/dam, phys. deformed	
	S2-4A5	S19								X				Clad damage	
	S2-4A4	S20								X				Clad damage	
	S2-5A1	T24								X				Clad damage	
	S2-6A1	V28								X				Clad damage	
	S2-6B5	W04		X				X						Visual fail/dam, phys. deformed	
	S2-6B2	W07		X				X						Visual fail/dam, phys. deformed	

TABLE A.1. (contd)

Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	Information Supplied by Utilities on Defective Fuel												(c) Failure Description
			(a)												
			Category												
			1	2	3	4	5	6	7	8	9	LAT	(b)		
● Operating Plant (Facility)															
	S2-6B1	W08	X				X							Visual fail/dam, phys. deformed	
	S2-6B5	W11	X				X							Visual fail/dam, phys. deformed	
	S2-6B2	W22	X				X							Visual fail/dam, phys. deformed	
	S2-6B2	W24	X				X							Visual fail/dam, phys. deformed	
	S2-6B5	W29	X				X							Visual fail/dam, phys. deformed	
	S2-6B3	W31								X				Clad damage	
Susquehana-1															
Susquehana-2															
Three Mile Island-1															
Trojan	1H	A09								X				Pre-1986 F-2	
	1H	A45								X				Pre-1986 F-2	
	2A	B22								X				Pre-1986 F-2	
	4A	D38								X				Pre-1986 F-2	
	5A	E10								X				Pre-1986 F-2	
	5A	E16								X				Pre-1986 F-2	
	5A	E41								X				Pre-1986 F-2	
	5A	E43								X				Pre-1986 F-2	
	6A	F02								X				Pre-1986 F-2	
	6A	F03								X				Pre-1986 F-2	
	6A	F04								X				Pre-1986 F-2	
	6A	F05								X				Pre-1986 F-2	

TABLE A.1. (contd)

Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	Information Supplied by Utilities on Defective Fuel												(c) Failure Description
			(a)												
			Category												
			1	2	3	4	5	6	7	8	9	LAT	(b)		
● Operating Plant (Facility)															
Trojan (contd)	6A	F07									X			Pre-1986 F-2	
	6A	F11									X			Pre-1986 F-2	
	6A	F18									X			Pre-1986 F-2	
	6A	F19									X			Pre-1986 F-2	
	6A	F21									X			Pre-1986 F-2	
	6A	F30									X			Pre-1986 F-2	
	6A	F56									X			Pre-1986 F-2	
Turkey Point-3	07	H03	X											Pre-1986 F-1	
	09B	K24	X											Pre-1986 F-1	
	09A	K33	X											Pre-1986 F-1	
	10D	M20								X				Pre-1986 F-2	
	10D	M21								X				Pre-1986 F-2	
	10D	M30								X				Pre-1986 F-2	
	10D	M45								X				Pre-1986 F-2	
	08A	V15	X											Pre-1986 F-1	
	08A	V16	X											Pre-1986 F-1	
	08A	V19								X				Pre-1986 F-2	
	08A	V21								X				Pre-1986 F-2	
	08A	V27	X											Pre-1986 F-1	
	08A	V32	X											Pre-1986 F-1	
	08A	V37								X				Pre-1986 F-2	
	Turkey Point-4														
Vermont Yankee	GED003	GED003										LAT		Unknown (LATER)	
	GED006	GED006										LAT		Unknown (LATER)	
	GED010	GED010										LAT		Unknown (LATER)	

TABLE A.1. (contd)

Information Supplied by Utilities on Defective Fuel																
Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	(a)												(b)	(c)
			Category													
			1	2	3	4	5	6	7	8	9	LAT	Failure Description			
● Operating Plant (Facility)																
Vermont Yankee (contd)	GED013	GED013											LAT	Unknown (LATer)		
	GED017	GED017											LAT	Unknown (LATer)		
	GED021	GED021											LAT	Unknown (LATer)		
	GED022	GED022											LAT	Unknown (LATer)		
	GED023	GED023											LAT	Unknown (LATer)		
	GED024	GED024											LAT	Unknown (LATer)		
	GED025	GED025											LAT	Unknown (LATer)		
	GED026	GED026											LAT	Unknown (LATer)		
	GED027	GED027											LAT	Unknown (LATer)		
	GED028	GED028											LAT	Unknown (LATer)		
	GED029	GED029											LAT	Unknown (LATer)		
	GED030	GED030											LAT	Unknown (LATer)		
	GED032	GED032											LAT	Unknown (LATer)		
	GED033	GED033											LAT	Unknown (LATer)		
	GED034	GED034											LAT	Unknown (LATer)		
	GED035	GED035											LAT	Unknown (LATer)		
	GED036	GED036											LAT	Unknown (LATer)		
	GED037	GED037											LAT	Unknown (LATer)		
	GED038	GED038											LAT	Unknown (LATer)		
	GED040	GED040											LAT	Unknown (LATer)		
	GED041	GED041											LAT	Unknown (LATer)		
	GED043	GED043											LAT	Unknown (LATer)		
	GED044	GED044											LAT	Unknown (LATer)		
	GED045	GED045											LAT	Unknown (LATer)		
	GED046	GED046											LAT	Unknown (LATer)		
	GED047	GED047											LAT	Unknown (LATer)		
	GED048	GED048											LAT	Unknown (LATer)		
	GED049	GED049											LAT	Unknown (LATer)		

TABLE A.1. (contd)

Information Supplied by Utilities on Defective Fuel															
Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	(a)											(b)	(c)
			Category												
			1	2	3	4	5	6	7	8	9	LAT	Failure Description		
● Operating Plant (Facility)															
Vermont Yankee (contd)	GED050	GED050											LAT	Unknown (LATER)	
	GED051	GED051											LAT	Unknown (LATER)	
	GED052	GED052											LAT	Unknown (LATER)	
	GED054	GED054											LAT	Unknown (LATER)	
	GED055	GED055											LAT	Unknown (LATER)	
	GED056	GED056											LAT	Unknown (LATER)	
	GED058	GED058											LAT	Unknown (LATER)	
	GED059	GED059											LAT	Unknown (LATER)	
	GED060	GED060											LAT	Unknown (LATER)	
	LJ0756	LJ0756											LAT	Unknown (LATER)	
	LJ0757	LJ0757											LAT	Unknown (LATER)	
	LJ0758	LJ0758											LAT	Unknown (LATER)	
	LJ0759	LJ0759											LAT	Unknown (LATER)	
	LJ0760	LJ0760											LAT	Unknown (LATER)	
	LJ0761	LJ0761											LAT	Unknown (LATER)	
	LJ0762	LJ0762											LAT	Unknown (LATER)	
	LJ0763	LJ0763											LAT	Unknown (LATER)	
	LJ0764	LJ0764											LAT	Unknown (LATER)	
	LJ0765	LJ0765											LAT	Unknown (LATER)	
	LJ0766	LJ0766											LAT	Unknown (LATER)	
	LJ0767	LJ0767											LAT	Unknown (LATER)	
	LJ0768	LJ0768											LAT	Unknown (LATER)	
	LJ0769	LJ0769											LAT	Unknown (LATER)	
	LJ0770	LJ0770											LAT	Unknown (LATER)	
	LJ0771	LJ0771											LAT	Unknown (LATER)	
	LJ0772	LJ0772											LAT	Unknown (LATER)	
	LJ0773	LJ0773											LAT	Unknown (LATER)	
	LJ0774	LJ0774											LAT	Unknown (LATER)	

TABLE A.1. (contd)

Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	Information Supplied by Utilities on Defective Fuel												Failure Description
			(a)												
			Category												
			(b)												
			1	2	3	4	5	6	7	8	9	LAT	(c)		
● Operating Plant (Facility)															
Vermont Yankee (contd)	LJ0775	LJ0775											LAT	Unknown (LATER)	
	LJ0776	LJ0776											LAT	Unknown (LATER)	
	LJ0777	LJ0777											LAT	Unknown (LATER)	
	LJ0778	LJ0778											LAT	Unknown (LATER)	
	LJ0779	LJ0779											LAT	Unknown (LATER)	
	LJ0780	LJ0780											LAT	Unknown (LATER)	
	LJ0781	LJ0781											LAT	Unknown (LATER)	
	LJ0782	LJ0782											LAT	Unknown (LATER)	
	LJ0783	LJ0783											LAT	Unknown (LATER)	
	LJ0784	LJ0784											LAT	Unknown (LATER)	
	LJ0785	LJ0785											LAT	Unknown (LATER)	
	LJ0786	LJ0786											LAT	Unknown (LATER)	
	LJ0787	LJ0787											LAT	Unknown (LATER)	
	LJ0788	LJ0788											LAT	Unknown (LATER)	
	LJ0789	LJ0789											LAT	Unknown (LATER)	
	LJ0790	LJ0790											LAT	Unknown (LATER)	
	LJ0791	LJ0791											LAT	Unknown (LATER)	
	LJ0792	LJ0792											LAT	Unknown (LATER)	
	LJ0793	LJ0793											LAT	Unknown (LATER)	
	LJ0794	LJ0794											LAT	Unknown (LATER)	
	LJ0795	LJ0795											LAT	Unknown (LATER)	
	LJ0796	LJ0796											LAT	Unknown (LATER)	
	LJ0797	LJ0797											LAT	Unknown (LATER)	
	LJ0798	LJ0798											LAT	Unknown (LATER)	
	LJ0799	LJ0799											LAT	Unknown (LATER)	
	LJ0800	LJ0800											LAT	Unknown (LATER)	
	LJ0801	LJ0801											LAT	Unknown (LATER)	
	LJ0802	LJ0802											LAT	Unknown (LATER)	

TABLE A.1. (contd)

Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	Information Supplied by Utilities on Defective Fuel												(b)	(c)
			(a)													
			Category													
			1	2	3	4	5	6	7	8	9	LAT				
Failure Description																
● Operating Plant (Facility)																
Vermont Yankee (contd)	LJ0803	LJ0803											LAT	Unknown (LATER)		
	LJ0804	LJ0804											LAT	Unknown (LATER)		
	LJ0805	LJ0805											LAT	Unknown (LATER)		
	LJ0806	LJ0806											LAT	Unknown (LATER)		
	LJ0807	LJ0807											LAT	Unknown (LATER)		
	LJ0808	LJ0808											LAT	Unknown (LATER)		
	LJ0809	LJ0809											LAT	Unknown (LATER)		
	LJ0810	LJ0810											LAT	Unknown (LATER)		
	LJ0811	LJ0811											LAT	Unknown (LATER)		
	LJ0812	LJ0812											LAT	Unknown (LATER)		
	LJ0813	LJ0813											LAT	Unknown (LATER)		
	LJ0814	LJ0814											LAT	Unknown (LATER)		
	LJ0815	LJ0815											LAT	Unknown (LATER)		
	LJ0816	LJ0816											LAT	Unknown (LATER)		
	LJ0817	LJ0817											LAT	Unknown (LATER)		
	LJ0818	LJ0818											LAT	Unknown (LATER)		
	LJ0819	LJ0819											LAT	Unknown (LATER)		
	LJ0820	LJ0820											LAT	Unknown (LATER)		
	LJ0821	LJ0821											LAT	Unknown (LATER)		
	LJ0822	LJ0822											LAT	Unknown (LATER)		
	LJ0823	LJ0823											LAT	Unknown (LATER)		
	LJ0824	LJ0824											LAT	Unknown (LATER)		
	LJ0825	LJ0825											LAT	Unknown (LATER)		
	LJ0826	LJ0826											LAT	Unknown (LATER)		
	LJ0827	LJ0827											LAT	Unknown (LATER)		
	LJ0828	LJ0828											LAT	Unknown (LATER)		
	LJ0829	LJ0829											LAT	Unknown (LATER)		
	LJ0830	LJ0830											LAT	Unknown (LATER)		

TABLE A.1. (contd)

Information Supplied by Utilities on Defective Fuel															
Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	(a)											(b)	(c)
			Category												
			1	2	3	4	5	6	7	8	9	LAT			
Failure Description															
● Operating Plant (Facility)															
Vermont Yankee (contd)	LJ0831	LJ0831											LAT	Unknown (LATER)	
	LJ0832	LJ0832											LAT	Unknown (LATER)	
	LJ0833	LJ0833											LAT	Unknown (LATER)	
	LJ0834	LJ0834											LAT	Unknown (LATER)	
	LJ0835	LJ0835											LAT	Unknown (LATER)	
	LJ0836	LJ0836											LAT	Unknown (LATER)	
	LJ0837	LJ0837											LAT	Unknown (LATER)	
	LJ0838	LJ0838											LAT	Unknown (LATER)	
	LJ0839	LJ0839											LAT	Unknown (LATER)	
	LJ0840	LJ0840											LAT	Unknown (LATER)	
	LJ0841	LJ0841											LAT	Unknown (LATER)	
	LJ0842	LJ0842											LAT	Unknown (LATER)	
	LJ0843	LJ0843											LAT	Unknown (LATER)	
	LJ0844	LJ0844											LAT	Unknown (LATER)	
	LJ0845	LJ0845											LAT	Unknown (LATER)	
	LJ0846	LJ0846											LAT	Unknown (LATER)	
	LJ0847	LJ0847											LAT	Unknown (LATER)	
	LJ0848	LJ0848											LAT	Unknown (LATER)	
	LJ0849	LJ0849											LAT	Unknown (LATER)	
	LJ0850	LJ0850											LAT	Unknown (LATER)	
	LJ0851	LJ0851											LAT	Unknown (LATER)	
	LJ0852	LJ0852											LAT	Unknown (LATER)	
	LJ0853	LJ0853											LAT	Unknown (LATER)	
	LJ0854	LJ0854											LAT	Unknown (LATER)	
	LJ0855	LJ0855											LAT	Unknown (LATER)	
	LJ0856	LJ0856											LAT	Unknown (LATER)	
	LJ0857	LJ0857											LAT	Unknown (LATER)	
	LJ0858	LJ0858											LAT	Unknown (LATER)	

TABLE A.1. (contd)

Information Supplied by Utilities on Defective Fuel																
Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	(a)												(b)	(c)
			Category													
			1	2	3	4	5	6	7	8	9	LAT	Failure Description			
● Operating Plant (Facility)																
Vermont Yankee (contd)	LJ0859	LJ0859											LAT	Unknown (LATER)		
	LJ0860	LJ0860											LAT	Unknown (LATER)		
	LJ0861	LJ0861											LAT	Unknown (LATER)		
	LJ0862	LJ0862											LAT	Unknown (LATER)		
	LJ0863	LJ0863											LAT	Unknown (LATER)		
	LJ0864	LJ0864											LAT	Unknown (LATER)		
	LJ0865	LJ0865											LAT	Unknown (LATER)		
	LJ0866	LJ0866											LAT	Unknown (LATER)		
	LJ0867	LJ0867											LAT	Unknown (LATER)		
	LJ0868	LJ0868											LAT	Unknown (LATER)		
	LJ0869	LJ0869											LAT	Unknown (LATER)		
	LJ0870	LJ0870											LAT	Unknown (LATER)		
	LJ0871	LJ0871											LAT	Unknown (LATER)		
	LJ0872	LJ0872											LAT	Unknown (LATER)		
	LJ0873	LJ0873											LAT	Unknown (LATER)		
	LJ0874	LJ0874											LAT	Unknown (LATER)		
	LJ0875	LJ0875											LAT	Unknown (LATER)		
	LJ0876	LJ0876											LAT	Unknown (LATER)		
	LJ0877	LJ0877											LAT	Unknown (LATER)		
	LJ0878	LJ0878											LAT	Unknown (LATER)		
	LJ0879	LJ0879											LAT	Unknown (LATER)		
	LJ0880	LJ0880											LAT	Unknown (LATER)		
	LJ0881	LJ0881											LAT	Unknown (LATER)		
	LJ0882	LJ0882											LAT	Unknown (LATER)		
	LJ0883	LJ0883											LAT	Unknown (LATER)		
	LJ0884	LJ0884											LAT	Unknown (LATER)		
	LJ0885	LJ0885											LAT	Unknown (LATER)		
	LJ0886	LJ0886											LAT	Unknown (LATER)		

TABLE A.1. (contd)

Information Supplied by Utilities on Defective Fuel															
Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	(a)												Failure Description
			Category												
			1	2	3	4	5	6	7	8	9	LAT	(b)	(c)	
● Operating Plant (Facility)															
Vermont Yankee (contd)	LJ0887	LJ0887											LAT	Unknown (LATer)	
	LJ0888	LJ0888											LAT	Unknown (LATer)	
	LJ0889	LJ0889											LAT	Unknown (LATer)	
	LJ0890	LJ0890											LAT	Unknown (LATer)	
	LJ0891	LJ0891											LAT	Unknown (LATer)	
	LJ0892	LJ0892											LAT	Unknown (LATer)	
	LJ0893	LJ0893											LAT	Unknown (LATer)	
	LJ0894	LJ0894											LAT	Unknown (LATer)	
	LJ0895	LJ0895											LAT	Unknown (LATer)	
	LJ0896	LJ0896											LAT	Unknown (LATer)	
	LJ0897	LJ0897											LAT	Unknown (LATer)	
	LJ0898	LJ0898											LAT	Unknown (LATer)	
	LJ0899	LJ0899											LAT	Unknown (LATer)	
	LJ0900	LJ0900											LAT	Unknown (LATer)	
	LJ0901	LJ0901											LAT	Unknown (LATer)	
	LJ0902	LJ0902											LAT	Unknown (LATer)	
	LJ0903	LJ0903											LAT	Unknown (LATer)	
	LJ0904	LJ0904											LAT	Unknown (LATer)	
	LJ0905	LJ0905											LAT	Unknown (LATer)	
	LJ0906	LJ0906											LAT	Unknown (LATer)	
	LJ0907	LJ0907											LAT	Unknown (LATer)	
	LJ0908	LJ0908											LAT	Unknown (LATer)	
	LJ0909	LJ0909											LAT	Unknown (LATer)	
	LJ0910	LJ0910											LAT	Unknown (LATer)	
	LJ0911	LJ0911											LAT	Unknown (LATer)	
	LJ0912	LJ0912											LAT	Unknown (LATer)	
	LJ0913	LJ0913											LAT	Unknown (LATer)	
	LJ0914	LJ0914											LAT	Unknown (LATer)	

TABLE A.1. (contd)

Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	Information Supplied by Utilities on Defective Fuel												(c) Failure Description
			(a)												
			Category												
			(b)												
			1	2	3	4	5	6	7	8	9	LAT			
● Operating Plant (Facility)															
Vermont Yankee (contd)	LJ0915	LJ0915											LAT	Unknown (LATER)	
	LJ0916	LJ0916											LAT	Unknown (LATER)	
	LJ0917	LJ0917											LAT	Unknown (LATER)	
	LJ0918	LJ0918											LAT	Unknown (LATER)	
	LJ0919	LJ0919											LAT	Unknown (LATER)	
	LJ0920	LJ0920											LAT	Unknown (LATER)	
	LJ0921	LJ0921											LAT	Unknown (LATER)	
	LJ0922	LJ0922											LAT	Unknown (LATER)	
	LJ0923	LJ0923											LAT	Unknown (LATER)	
	LJ0924	LJ0924											LAT	Unknown (LATER)	
	LJ0925	LJ0925											LAT	Unknown (LATER)	
	LJ0926	LJ0926											LAT	Unknown (LATER)	
	LJ0927	LJ0927											LAT	Unknown (LATER)	
	LJ0928	LJ0928											LAT	Unknown (LATER)	
	LJ0929	LJ0929											LAT	Unknown (LATER)	
	LJ0930	LJ0930											LAT	Unknown (LATER)	
	LJ0931	LJ0931											LAT	Unknown (LATER)	
	LJ0932	LJ0932											LAT	Unknown (LATER)	
	LJ0933	LJ0933											LAT	Unknown (LATER)	
	LJ0934	LJ0934											LAT	Unknown (LATER)	
	LJ0935	LJ0935											LAT	Unknown (LATER)	
	LJ0936	LJ0936											LAT	Unknown (LATER)	
	LJ0937	LJ0937											LAT	Unknown (LATER)	
	LJ0938	LJ0938											LAT	Unknown (LATER)	
	LJ0939	LJ0939											LAT	Unknown (LATER)	
	LJ0940	LJ0940											LAT	Unknown (LATER)	
	LJ0941	LJ0941											LAT	Unknown (LATER)	
	LJ0942	LJ0942											LAT	Unknown (LATER)	

TABLE A.1. (contd)

Information Supplied by Utilities on Defective Fuel															
Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	(a)											(b)	(c)
			Category												
			1	2	3	4	5	6	7	8	9	LAT			
Failure Description															
● Operating Plant (Facility)															
Vermont Yankee (contd)	LJ0943	LJ0943											LAT	Unknown (LATER)	
	LJ0944	LJ0944											LAT	Unknown (LATER)	
	LJ0945	LJ0945											LAT	Unknown (LATER)	
	LJ0946	LJ0946											LAT	Unknown (LATER)	
	LJ0947	LJ0947											LAT	Unknown (LATER)	
	LJ0948	LJ0948											LAT	Unknown (LATER)	
	LJ0949	LJ0949											LAT	Unknown (LATER)	
	LJ0950	LJ0950											LAT	Unknown (LATER)	
	LJ0951	LJ0951											LAT	Unknown (LATER)	
	LJ0952	LJ0952											LAT	Unknown (LATER)	
	LJ0953	LJ0953											LAT	Unknown (LATER)	
	LJ0954	LJ0954											LAT	Unknown (LATER)	
	LJ0955	LJ0955											LAT	Unknown (LATER)	
	LJ0956	LJ0956											LAT	Unknown (LATER)	
	LJ0957	LJ0957											LAT	Unknown (LATER)	
	LJ0958	LJ0958											LAT	Unknown (LATER)	
	LJ0959	LJ0959											LAT	Unknown (LATER)	
	LJ0960	LJ0960											LAT	Unknown (LATER)	
	LJ0961	LJ0961											LAT	Unknown (LATER)	
	LJ0962	LJ0962											LAT	Unknown (LATER)	
	LJ0963	LJ0963											LAT	Unknown (LATER)	
	LJ0964	LJ0964											LAT	Unknown (LATER)	
	LJ0965	LJ0965											LAT	Unknown (LATER)	
	LJ0966	LJ0966											LAT	Unknown (LATER)	
	LJ0967	LJ0967											LAT	Unknown (LATER)	
	LJ0968	LJ0968											LAT	Unknown (LATER)	
	LJ0969	LJ0969											LAT	Unknown (LATER)	
	LJ0970	LJ0970											LAT	Unknown (LATER)	

TABLE A.1. (contd)

Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	Information Supplied by Utilities on Defective Fuel												(b) LAT	(c) Failure Description
			(a)													
			Category													
			1	2	3	4	5	6	7	8	9					
● Operating Plant (Facility)																
Vermont Yankee (contd)	LJ0971	LJ0971												LAT	Unknown (LATer)	
	LJ0972	LJ0972												LAT	Unknown (LATer)	
	LJ0973	LJ0973												LAT	Unknown (LATer)	
	LJ0974	LJ0974												LAT	Unknown (LATer)	
	LJ0975	LJ0975												LAT	Unknown (LATer)	
	LJ0976	LJ0976												LAT	Unknown (LATer)	
	LJ0977	LJ0977												LAT	Unknown (LATer)	
	LJ0978	LJ0978												LAT	Unknown (LATer)	
	LJ0979	LJ0979												LAT	Unknown (LATer)	
	LJ0980	LJ0980												LAT	Unknown (LATer)	
	LJ0981	LJ0981												LAT	Unknown (LATer)	
	LJ0982	LJ0982												LAT	Unknown (LATer)	
	LJ0983	LJ0983												LAT	Unknown (LATer)	
	LJ0984	LJ0984												LAT	Unknown (LATer)	
	LJ0985	LJ0985												LAT	Unknown (LATer)	
	LJ0986	LJ0986												LAT	Unknown (LATer)	
	LJ0987	LJ0987												LAT	Unknown (LATer)	
	LJ0988	LJ0988												LAT	Unknown (LATer)	
	LJ0989	LJ0989												LAT	Unknown (LATer)	
	LJ0990	LJ0990												LAT	Unknown (LATer)	
LJ0991	LJ0991												LAT	Unknown (LATer)		
LJ0992	LJ0992												LAT	Unknown (LATer)		
LJ0993	LJ0993												LAT	Unknown (LATer)		
LJ0994	LJ0994												LAT	Unknown (LATer)		
LJ0995	LJ0995												LAT	Unknown (LATer)		
LJ0996	LJ0996												LAT	Unknown (LATer)		
LJ0997	LJ0997												LAT	Unknown (LATer)		
LJ0998	LJ0998												LAT	Unknown (LATer)		

TABLE A.1. (contd)

Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	Information Supplied by Utilities on Defective Fuel												Failure Description
			(a)												
			Category												
			(b)												
			1	2	3	4	5	6	7	8	9	LAT	(c)		
● Operating Plant (Facility)															
Vermont Yankee (contd)	LJ0999	LJ0999											LAT	Unknown (LATER)	
	LJ1000	LJ1000											LAT	Unknown (LATER)	
	LJ1001	LJ1001											LAT	Unknown (LATER)	
	LJ1002	LJ1002											LAT	Unknown (LATER)	
	LJ1003	LJ1003											LAT	Unknown (LATER)	
	LJ1004	LJ1004											LAT	Unknown (LATER)	
	LJ1005	LJ1005											LAT	Unknown (LATER)	
	LJ1006	LJ1006											LAT	Unknown (LATER)	
	LJ1007	LJ1007											LAT	Unknown (LATER)	
	LJ1008	LJ1008											LAT	Unknown (LATER)	
	LJ1009	LJ1009											LAT	Unknown (LATER)	
	LJ1010	LJ1010											LAT	Unknown (LATER)	
	LJ1011	LJ1011											LAT	Unknown (LATER)	
	LJ1012	LJ1012											LAT	Unknown (LATER)	
	LJ1013	LJ1013											LAT	Unknown (LATER)	
	LJ1014	LJ1014											LAT	Unknown (LATER)	
	LJ1015	LJ1015											LAT	Unknown (LATER)	
	LJ1016	LJ1016											LAT	Unknown (LATER)	
	LJ1017	LJ1017											LAT	Unknown (LATER)	
	LJ1018	LJ1018											LAT	Unknown (LATER)	
	LJ1019	LJ1019											LAT	Unknown (LATER)	
	LJ1020	LJ1020											LAT	Unknown (LATER)	
	LJ1021	LJ1021											LAT	Unknown (LATER)	
	LJ1022	LJ1022											LAT	Unknown (LATER)	
	LJ1023	LJ1023											LAT	Unknown (LATER)	
	LJ1024	LJ1024											LAT	Unknown (LATER)	
LJ1025	LJ1025											LAT	Unknown (LATER)		
LJ1026	LJ1026											LAT	Unknown (LATER)		

TABLE A.1. (contd)

			Information Supplied by Utilities on Defective Fuel												
			(a)												
			Category												
			(b)												
Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	1	2	3	4	5	6	7	8	9	LAT	(c)		
Failure Description															
● Operating Plant (Facility)															
Vermont Yankee (contd)	LJ1027	LJ1027										LAT	Unknown (LATer)		
	LJ1028	LJ1028										LAT	Unknown (LATer)		
	LJ1029	LJ1029										LAT	Unknown (LATer)		
	LJ1030	LJ1030										LAT	Unknown (LATer)		
	LJ1031	LJ1031										LAT	Unknown (LATer)		
	LJ1032	LJ1032										LAT	Unknown (LATer)		
	LJ1033	LJ1033										LAT	Unknown (LATer)		
	LJ1034	LJ1034										LAT	Unknown (LATer)		
	LJ1035	LJ1035										LAT	Unknown (LATer)		
	LJ1036	LJ1036										LAT	Unknown (LATer)		
	LJ1037	LJ1037										LAT	Unknown (LATer)		
	LJ1038	LJ1038										LAT	Unknown (LATer)		
	LJ1039	LJ1039										LAT	Unknown (LATer)		
	LJ1040	LJ1040										LAT	Unknown (LATer)		
	LJ1041	LJ1041										LAT	Unknown (LATer)		
	LJ1042	LJ1042										LAT	Unknown (LATer)		
	LJ1043	LJ1043										LAT	Unknown (LATer)		
	LJ1044	LJ1044										LAT	Unknown (LATer)		
	LJ1045	LJ1045										LAT	Unknown (LATer)		
	LJ1046	LJ1046										LAT	Unknown (LATer)		
	LJ1047	LJ1047										LAT	Unknown (LATer)		
	LJ1048	LJ1048										LAT	Unknown (LATer)		
	LJ1049	LJ1049										LAT	Unknown (LATer)		
	LJ1050	LJ1050										LAT	Unknown (LATer)		
	LJ1051	LJ1051										LAT	Unknown (LATer)		
	LJ1052	LJ1052										LAT	Unknown (LATer)		
	LJ1053	LJ1053										LAT	Unknown (LATer)		
	LJ1054	LJ1054										LAT	Unknown (LATer)		

TABLE A.1. (contd)

Information Supplied by Utilities on Defective Fuel															
Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	(a)											(b)	(c)
			Category												
			1	2	3	4	5	6	7	8	9	LAT			
● Operating Plant (Facility)															
Vermont Yankee (contd)	LJ1055	LJ1055											LAT	Unknown (LATER)	
	LJ1056	LJ1056											LAT	Unknown (LATER)	
	LJ1057	LJ1057											LAT	Unknown (LATER)	
	LJ1058	LJ1058											LAT	Unknown (LATER)	
	LJ1059	LJ1059											LAT	Unknown (LATER)	
	LJ1060	LJ1060											LAT	Unknown (LATER)	
	LJ1061	LJ1061											LAT	Unknown (LATER)	
	LJ1062	LJ1062											LAT	Unknown (LATER)	
	LJ1063	LJ1063											LAT	Unknown (LATER)	
	LJ1064	LJ1064											LAT	Unknown (LATER)	
	LJ1065	LJ1065											LAT	Unknown (LATER)	
	LJ1066	LJ1066											LAT	Unknown (LATER)	
	LJ1067	LJ1067											LAT	Unknown (LATER)	
	LJ1068	LJ1068											LAT	Unknown (LATER)	
	LJ1069	LJ1069											LAT	Unknown (LATER)	
	LJ1070	LJ1070											LAT	Unknown (LATER)	
	LJ1071	LJ1071											LAT	Unknown (LATER)	
	LJ1072	LJ1072											LAT	Unknown (LATER)	
	LJ1073	LJ1073											LAT	Unknown (LATER)	
	LJ1074	LJ1074											LAT	Unknown (LATER)	
	LJ1075	LJ1075											LAT	Unknown (LATER)	
	LJ1076	LJ1076											LAT	Unknown (LATER)	
	LJ1077	LJ1077											LAT	Unknown (LATER)	
	LJ1078	LJ1078											LAT	Unknown (LATER)	
	LJ1079	LJ1079											LAT	Unknown (LATER)	
	LJ1080	LJ1080											LAT	Unknown (LATER)	
	LJ1081	LJ1081											LAT	Unknown (LATER)	
	LJ1082	LJ1082											LAT	Unknown (LATER)	

TABLE A.1. (contd)

Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	Information Supplied by Utilities on Defective Fuel												(c) Failure Description
			(a)												
			Category												
			(b)												
			1	2	3	4	5	6	7	8	9	LAT			
● Operating Plant (Facility)															
Vermont Yankee (contd)	LJ1083	LJ1083											LAT	Unknown (LATer)	
	LJ3860	LJ3860											LAT	Unknown (LATer)	
	LJ3861	LJ3861	X											Pre-1986 F-1	
	LJ3862	LJ3862	X											Pre-1986 F-1	
	LJ3863	LJ3863	X											Pre-1986 F-1	
	LJ3864	LJ3864	X											Pre-1986 F-1	
	LJ3865	LJ3865	X											Pre-1986 F-1	
	LJ3866	LJ3866	X											Pre-1986 F-1	
	LJ3867	LJ3867	X											Pre-1986 F-1	
	LJ3868	LJ3868	X											Pre-1986 F-1	
	LJ3869	LJ3869	X											Pre-1986 F-1	
	LJ3870	LJ3870	X											Pre-1986 F-1	
	LJ3871	LJ3871	X											Pre-1986 F-1	
	LJ3872	LJ3872	X											Pre-1986 F-1	
	LJ3873	LJ3873	X											Pre-1986 F-1	
	LJ3874	LJ3874	X											Pre-1986 F-1	
	LJ3875	LJ3875	X											Pre-1986 F-1	
	LJ3876	LJ3876	X											Pre-1986 F-1	
	LJ3877	LJ3877	X											Pre-1986 F-1	
	LJ3878	LJ3878	X											Pre-1986 F-1	
	LJ3879	LJ3879	X											Pre-1986 F-1	
	LJ3880	LJ3880	X											Pre-1986 F-1	
	LJ3881	LJ3881	X											Pre-1986 F-1	
	LJ3882	LJ3882	X											Pre-1986 F-1	
	LJ3883	LJ3883	X											Pre-1986 F-1	
	LJ3884	LJ3884	X											Pre-1986 F-1	
	LJ3885	LJ3885	X											Pre-1986 F-1	
	LJ3886	LJ3886	X											Pre-1986 F-1	

TABLE A.1. (contd)

Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	Information Supplied by Utilities on Defective Fuel												(c) Failure Description
			(a)												
			Category												
			1	2	3	4	5	6	7	8	9	LAT	(b)		
● Operating Plant (Facility)															
Vermont Yankee (contd)	LJ3887	LJ3887	X											Pre-1986 F-1	
	LJ3888	LJ3888	X											Pre-1986 F-1	
	LJ3889	LJ3889	X											Pre-1986 F-1	
	LJ3890	LJ3890	X											Pre-1986 F-1	
	LJ3891	LJ3891	X											Pre-1986 F-1	
	LJ3892	LJ3892	X											Pre-1986 F-1	
	LJ3893	LJ3893	X											Pre-1986 F-1	
	LJ3894	LJ3894	X											Pre-1986 F-1	
	LJ3895	LJ3895	X											Pre-1986 F-1	
	LJ3896	LJ3896	X											Pre-1986 F-1	
	LJ3897	LJ3897	X											Pre-1986 F-1	
	LJ3898	LJ3898	X											Pre-1986 F-1	
	LJ3899	LJ3899	X											Pre-1986 F-1	
	LJ3900	LJ3900	X											Pre-1986 F-1	
	LJ3901	LJ3901	X											Pre-1986 F-1	
	LJ3902	LJ3902	X											Pre-1986 F-1	
	LJ3903	LJ3903	X											Pre-1986 F-1	
	LJ3904	LJ3904	X											Pre-1986 F-1	
	LJ3905	LJ3905	X											Pre-1986 F-1	
	LJ3906	LJ3906	X											Pre-1986 F-1	
	LJ3907	LJ3907	X											Pre-1986 F-1	
	LJ3908	LJ3908	X											Pre-1986 F-1	
	LJ3909	LJ3909	X											Pre-1986 F-1	
	LJ3910	LJ3910	X											Pre-1986 F-1	
	LJ3911	LJ3911	X											Pre-1986 F-1	
	LJ3912	LJ3912	X											Pre-1986 F-1	
	LJ3913	LJ3913	X											Pre-1986 F-1	
	LJ3914	LJ3914	X											Pre-1986 F-1	

TABLE A.1. (contd)

Information Supplied by Utilities on Defective Fuel														
Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	(a)											(c) Failure Description
			Category											
			1	2	3	4	5	6	7	8	9	LAT		
● Operating Plant (Facility)														
Vermont Yankee (contd)	LJ3915	LJ3915	X											Pre-1986 F-1
	LJ3916	LJ3916	X											Pre-1986 F-1
	LJ3917	LJ3917	X											Pre-1986 F-1
	LJ3918	LJ3918	X											Pre-1986 F-1
	LJ3919	LJ3919	X											Pre-1986 F-1
	LJ3920	LJ3920	X											Pre-1986 F-1
	LJ3921	LJ3921	X											Pre-1986 F-1
	LJ3922	LJ3922	X											Pre-1986 F-1
	LJ3923	LJ3923	X											Pre-1986 F-1
	LJ3924	LJ3924	X											Pre-1986 F-1
	LJ3925	LJ3925	X											Pre-1986 F-1
	LJ3926	LJ3926	X											Pre-1986 F-1
	LJ3927	LJ3927	X											Pre-1986 F-1
	LJ3928	LJ3928	X											Pre-1986 F-1
	LJ3929	LJ3929	X											Pre-1986 F-1
	LJ3930	LJ3930	X											Pre-1986 F-1
	LJ3931	LJ3931	X											Pre-1986 F-1
	LJ3932	LJ3932	X											Pre-1986 F-1
	LJ3933	LJ3933	X											Pre-1986 F-1
	LJ3934	LJ3934	X											Pre-1986 F-1
	LJ3935	LJ3935	X											Pre-1986 F-1
	LJ3936	LJ3936	X											Pre-1986 F-1
	LJ3937	LJ3937	X											Pre-1986 F-1
	LJ3938	LJ3938	X											Pre-1986 F-1
	LJ3939	LJ3939	X											Pre-1986 F-1
	LJ3940	LJ3940	X											Pre-1986 F-1
	LJ3941	LJ3941	X											Pre-1986 F-1
	LJ3942	LJ3942	X											Pre-1986 F-1

TABLE A.1. (contd)

			Information Supplied by Utilities on Defective Fuel													
			(a)													
			Category												(b)	(c)
Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	1	2	3	4	5	6	7	8	9	LAT	Failure Description			
● Operating Plant (Facility)																
Vermont Yankee (contd)	LJ3943	LJ3943	X										Pre-1986 F-1			
	LJ3944	LJ3944	X										Pre-1986 F-1			
	LJ3945	LJ3945										LAT	Unknown (LATER)			
	LJ3948	LJ3948										LAT	Unknown (LATER)			
	LJ3949	LJ3949	X										Pre-1986 F-1			
	LJ3950	LJ3950	X										Pre-1986 F-1			
	LJ3951	LJ3951	X										Pre-1986 F-1			
	LJ3952	LJ3952	X										Pre-1986 F-1			
	LJ3953	LJ3953	X										Pre-1986 F-1			
	LJ3954	LJ3954	X										Pre-1986 F-1			
	LJ3955	LJ3955	X										Pre-1986 F-1			
	LJ3956	LJ3956	X										Pre-1986 F-1			
	LJ3957	LJ3957	X										Pre-1986 F-1			
	LJ3958	LJ3958	X										Pre-1986 F-1			
	LJ3959	LJ3959	X										Pre-1986 F-1			
	LJ3960	LJ3960	X										Pre-1986 F-1			
	LJ3961	LJ3961	X										Pre-1986 F-1			
	LJ3962	LJ3962	X										Pre-1986 F-1			
	LJ3963	LJ3963	X										Pre-1986 F-1			
	LJ3964	LJ3964	X										Pre-1986 F-1			
	LJ3965	LJ3965	X										Pre-1986 F-1			
	LJ3966	LJ3966	X										Pre-1986 F-1			
	LJ3967	LJ3967	X										Pre-1986 F-1			
	LJ3968	LJ3968	X										Pre-1986 F-1			
	LJ3969	LJ3969	X										Pre-1986 F-1			
	LJ3970	LJ3970	X										Pre-1986 F-1			
	LJ3971	LJ3971	X										Pre-1986 F-1			
	LJ3972	LJ3972	X										Pre-1986 F-1			

TABLE A.1. (contd)

Information Supplied by Utilities on Defective Fuel															
Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	(a)											(b)	(c)
			Category												
			1	2	3	4	5	6	7	8	9	LAT			
● Operating Plant (Facility)															
Vermont Yankee (contd)	LJ3973	LJ3973	X											Pre-1986 F-1	
	LJ3974	LJ3974	X											Pre-1986 F-1	
	LJ3975	LJ3975	X											Pre-1986 F-1	
	LJ3976	LJ3976	X											Pre-1986 F-1	
	LJ3977	LJ3977	X											Pre-1986 F-1	
	LJ3978	LJ3978	X											Pre-1986 F-1	
	LJ3979	LJ3979	X											Pre-1986 F-1	
	LJ3980	LJ3980	X											Pre-1986 F-1	
	LJ3981	LJ3981	X											Pre-1986 F-1	
	LJ3982	LJ3982	X											Pre-1986 F-1	
	LJ3983	LJ3983	X											Pre-1986 F-1	
	LJ3984	LJ3984	X											Pre-1986 F-1	
	LJ3985	LJ3985	X											Pre-1986 F-1	
	LJ3986	LJ3986	X											Pre-1986 F-1	
	LJ3987	LJ3987	X											Pre-1986 F-1	
	LJ3988	LJ3988	X											Pre-1986 F-1	
	LJ3989	LJ3989	X											Pre-1986 F-1	
	LJ3990	LJ3990	X											Pre-1986 F-1	
	LJ3991	LJ3991	X											Pre-1986 F-1	
	LJ3992	LJ3992	X											Pre-1986 F-1	
	LJ3993	LJ3993	X											Pre-1986 F-1	
	LJ3994	LJ3994	X											Pre-1986 F-1	
	LJ3995	LJ3995											LAT	Unknown (LATer)	
	LJ7026	LJ7026											LAT	Unknown (LATer)	
	LJ7027	LJ7027											LAT	Unknown (LATer)	
	LJ7028	LJ7028											LAT	Unknown (LATer)	
	LJ7029	LJ7029											LAT	Unknown (LATer)	
	LJ7030	LJ7030											LAT	Unknown (LATer)	

TABLE A.1. (contd)

Information Supplied by Utilities on Defective Fuel															
Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	(a)												Failure Description (c)
			Category												
			(b)												
			1	2	3	4	5	6	7	8	9	LAT			
● Operating Plant (Facility)															
Vermont Yankee (contd)	LJ7031	LJ7031										LAT	Unknown (LATer)		
	LJ7032	LJ7032										LAT	Unknown (LATer)		
	LJ7033	LJ7033										LAT	Unknown (LATer)		
	LJ7034	LJ7034										LAT	Unknown (LATer)		
	LJ7035	LJ7035										LAT	Unknown (LATer)		
	LJ7036	LJ7036										LAT	Unknown (LATer)		
	LJ7037	LJ7037										LAT	Unknown (LATer)		
	LJ7038	LJ7038										LAT	Unknown (LATer)		
	LJ7039	LJ7039										LAT	Unknown (LATer)		
	LJ7040	LJ7040										LAT	Unknown (LATer)		
	LJ7041	LJ7041										LAT	Unknown (LATer)		
	LJ7042	LJ7042										LAT	Unknown (LATer)		
	LJ7043	LJ7043										LAT	Unknown (LATer)		
	LJ7044	LJ7044										LAT	Unknown (LATer)		
	LJ7045	LJ7045										LAT	Unknown (LATer)		
	LJ7046	LJ7046										LAT	Unknown (LATer)		
	LJ7047	LJ7047										LAT	Unknown (LATer)		
	LJ7048	LJ7048										LAT	Unknown (LATer)		
	LJ7049	LJ7049										LAT	Unknown (LATer)		
	LJ7050	LJ7050										LAT	Unknown (LATer)		
	LJ7051	LJ7051										LAT	Unknown (LATer)		
	LJ7052	LJ7052										LAT	Unknown (LATer)		
	LJ7053	LJ7053										LAT	Unknown (LATer)		
	LJ7054	LJ7054										LAT	Unknown (LATer)		
	LJ7055	LJ7055										LAT	Unknown (LATer)		
	LJ7056	LJ7056										LAT	Unknown (LATer)		
	LJ7057	LJ7057										LAT	Unknown (LATer)		
	LJ7058	LJ7058										LAT	Unknown (LATer)		

TABLE A.1. (contd)

Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	Information Supplied by Utilities on Defective Fuel											Failure Description
			(a)											
			Category											
			(b)											
			1	2	3	4	5	6	7	8	9	LAT	(c)	
● <u>Operating Plant (Facility)</u>														
Vermont Yankee (contd)	LJ7059	LJ7059											LAT	Unknown (LATER)
	LJ7060	LJ7060											LAT	Unknown (LATER)
	LJ7061	LJ7061											LAT	Unknown (LATER)
	LJ7062	LJ7062											LAT	Unknown (LATER)
	LJ7063	LJ7063											LAT	Unknown (LATER)
	LJ7064	LJ7064											LAT	Unknown (LATER)
	LJ7065	LJ7065											LAT	Unknown (LATER)
	LJ7066	LJ7066											LAT	Unknown (LATER)
	LJ7067	LJ7067											LAT	Unknown (LATER)
	LJ7068	LJ7068											LAT	Unknown (LATER)
	LJ7069	LJ7069											LAT	Unknown (LATER)
	LJ7070	LJ7070											LAT	Unknown (LATER)
	LJ7071	LJ7071											LAT	Unknown (LATER)
	LJ7072	LJ7072											LAT	Unknown (LATER)
	LJ7073	LJ7073											LAT	Unknown (LATER)
	LJ7074	LJ7074											LAT	Unknown (LATER)
	LJ7075	LJ7075											LAT	Unknown (LATER)
	LJ7076	LJ7076											LAT	Unknown (LATER)
	LJ7077	LJ7077											LAT	Unknown (LATER)
	LJ7078	LJ7078											LAT	Unknown (LATER)
	LJ7079	LJ7079											LAT	Unknown (LATER)
	LJ7080	LJ7080											LAT	Unknown (LATER)
	LJ7081	LJ7081											LAT	Unknown (LATER)
	LJ7082	LJ7082											LAT	Unknown (LATER)
	LJ7083	LJ7083											LAT	Unknown (LATER)
	LJ7084	LJ7084											LAT	Unknown (LATER)
	LJ7085	LJ7085											LAT	Unknown (LATER)
	LJ7086	LJ7086											LAT	Unknown (LATER)

TABLE A.1. (contd)

Information Supplied by Utilities on Defective Fuel														
Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	(a)											(c) Failure Description
			Category											
			1	2	3	4	5	6	7	8	9	LAT		
● Operating Plant (Facility)														
Vermont Yankee (contd)	LJ7087	LJ7087											LAT	Unknown (LATER)
	LJ7088	LJ7088											LAT	Unknown (LATER)
	LJ7089	LJ7089											LAT	Unknown (LATER)
	LJ7090	LJ7090											LAT	Unknown (LATER)
	LJ7091	LJ7091											LAT	Unknown (LATER)
	LJ7092	LJ7092											LAT	Unknown (LATER)
	LJ7093	LJ7093											LAT	Unknown (LATER)
	LJ7094	LJ7094											LAT	Unknown (LATER)
	LJ7095	LJ7095											LAT	Unknown (LATER)
	LJ7096	LJ7096											LAT	Unknown (LATER)
	LJ7097	LJ7097											LAT	Unknown (LATER)
	LJ7098	LJ7098											LAT	Unknown (LATER)
	LJ7099	LJ7099											LAT	Unknown (LATER)
	LJ7100	LJ7100											LAT	Unknown (LATER)
	LJ7101	LJ7101											LAT	Unknown (LATER)
	LJ7102	LJ7102											LAT	Unknown (LATER)
	LJ7103	LJ7103											LAT	Unknown (LATER)
	LJ7104	LJ7104											LAT	Unknown (LATER)
	LJ7105	LJ7105											LAT	Unknown (LATER)
	LJ7106	LJ7106											LAT	Unknown (LATER)
	LJ7107	LJ7107											LAT	Unknown (LATER)
	LJ7108	LJ7108											LAT	Unknown (LATER)
	LJ7109	LJ7109											LAT	Unknown (LATER)
	LJ7110	LJ7110											LAT	Unknown (LATER)
	LJ7111	LJ7111											LAT	Unknown (LATER)
	LJ7112	LJ7112											LAT	Unknown (LATER)
	LJ7113	LJ7113											LAT	Unknown (LATER)
	LJ7114	LJ7114											LAT	Unknown (LATER)

TABLE A.1. (contd)

Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	Information Supplied by Utilities on Defective Fuel													(c) Failure Description
			(a)													
			Category													
			(b)													
			1	2	3	4	5	6	7	8	9	LAT				
● Operating Plant (Facility)																
Vermont Yankee (contd)	LJ7115	LJ7115											LAT	Unknown (LATer)		
	LJ7116	LJ7116											LAT	Unknown (LATer)		
	LJ7117	LJ7117											LAT	Unknown (LATer)		
	LJ7118	LJ7118											LAT	Unknown (LATer)		
	LJ7119	LJ7119											LAT	Unknown (LATer)		
	LJ7120	LJ7120											LAT	Unknown (LATer)		
	LJ7121	LJ7121											LAT	Unknown (LATer)		
	LJ7122	LJ7122											LAT	Unknown (LATer)		
	LJ7123	LJ7123											LAT	Unknown (LATer)		
	LJ7124	LJ7124											LAT	Unknown (LATer)		
	LJ7125	LJ7125											LAT	Unknown (LATer)		
	LJ7126	LJ7126											LAT	Unknown (LATer)		
	LJ7127	LJ7127											LAT	Unknown (LATer)		
	LJ7128	LJ7128											LAT	Unknown (LATer)		
	LJ7129	LJ7129											LAT	Unknown (LATer)		
	LJ7130	LJ7130											LAT	Unknown (LATer)		
	LJ7131	LJ7131											LAT	Unknown (LATer)		
	LJ7132	LJ7132											LAT	Unknown (LATer)		
	LJ7133	LJ7133											LAT	Unknown (LATer)		
	LJ7134	LJ7134											LAT	Unknown (LATer)		
	LJ7135	LJ7135											LAT	Unknown (LATer)		
	LJ7136	LJ7136											LAT	Unknown (LATer)		
	LJ7137	LJ7137											LAT	Unknown (LATer)		
	LJ7138	LJ7138											LAT	Unknown (LATer)		
	LJ7139	LJ7139											LAT	Unknown (LATer)		
	LJ7140	LJ7140											LAT	Unknown (LATer)		
	LJ7141	LJ7141											LAT	Unknown (LATer)		
	LJ7142	LJ7142											LAT	Unknown (LATer)		

TABLE A.1. (contd)

Information Supplied by Utilities on Defective Fuel															
Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	(a)											(b) LAT	(c) Failure Description
			Category												
			1	2	3	4	5	6	7	8	9				
● Operating Plant (Facility)															
Vermont Yankee (contd)	LJ7143	LJ7143											LAT	Unknown (LATer)	
	LJ7144	LJ7144											LAT	Unknown (LATer)	
	LJ7145	LJ7145											LAT	Unknown (LATer)	
	LJB710	LJB710											LAT	Unknown (LATer)	
	LJB711	LJB711											LAT	Unknown (LATer)	
	LJB712	LJB712											LAT	Unknown (LATer)	
	LJB713	LJB713											LAT	Unknown (LATer)	
	LJB714	LJB714											LAT	Unknown (LATer)	
	LJB715	LJB715											LAT	Unknown (LATer)	
	LJB716	LJB716											LAT	Unknown (LATer)	
	LJB717	LJB717											LAT	Unknown (LATer)	
	LJB718	LJB718											LAT	Unknown (LATer)	
	LJB719	LJB719											LAT	Unknown (LATer)	
	LJB720	LJB720											LAT	Unknown (LATer)	
	LJB721	LJB721											LAT	Unknown (LATer)	
	LJB722	LJB722											LAT	Unknown (LATer)	
	LJB723	LJB723											LAT	Unknown (LATer)	
	LJB724	LJB724											LAT	Unknown (LATer)	
	LJB725	LJB725											LAT	Unknown (LATer)	
	LJB726	LJB726											LAT	Unknown (LATer)	
	LJB727	LJB727											LAT	Unknown (LATer)	
	LJB728	LJB728											LAT	Unknown (LATer)	
	LJB729	LJB729											LAT	Unknown (LATer)	
	LJB730	LJB730											LAT	Unknown (LATer)	
	LJB731	LJB731											LAT	Unknown (LATer)	
	LJB732	LJB732											LAT	Unknown (LATer)	
	LJB733	LJB733											LAT	Unknown (LATer)	
	LJB734	LJB734											LAT	Unknown (LATer)	

TABLE A.1. (contd)

Information Supplied by Utilities on Defective Fuel															
Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	(a)										(b)	(c)	
			Category												
			1	2	3	4	5	6	7	8	9	LAT			
Failure Description															
● Operating Plant (Facility)															
Vermont Yankee (contd)	LJB735	LJB735											LAT	Unknown (LATer)	
	LJB736	LJB736											LAT	Unknown (LATer)	
	LJB737	LJB737											LAT	Unknown (LATer)	
	LJB738	LJB738											LAT	Unknown (LATer)	
	LJB739	LJB739											LAT	Unknown (LATer)	
	LJB740	LJB740											LAT	Unknown (LATer)	
	LJB741	LJB741											LAT	Unknown (LATer)	
	LJB742	LJB742											LAT	Unknown (LATer)	
	LJB743	LJB743											LAT	Unknown (LATer)	
	LJB744	LJB744											LAT	Unknown (LATer)	
	LJB745	LJB745											LAT	Unknown (LATer)	
	LJB746	LJB746											LAT	Unknown (LATer)	
	LJB747	LJB747											LAT	Unknown (LATer)	
	LJB748	LJB748											LAT	Unknown (LATer)	
	LJB749	LJB749											LAT	Unknown (LATer)	
	LJB750	LJB750											LAT	Unknown (LATer)	
	LJB751	LJB751											LAT	Unknown (LATer)	
	LJB752	LJB752											LAT	Unknown (LATer)	
	LJB753	LJB753											LAT	Unknown (LATer)	
	LJB754	LJB754											LAT	Unknown (LATer)	
	LJB755	LJB755											LAT	Unknown (LATer)	
	LJB756	LJB756											LAT	Unknown (LATer)	
	LJB757	LJB757											LAT	Unknown (LATer)	
	LJB758	LJB758											LAT	Unknown (LATer)	
	LJB759	LJB759											LAT	Unknown (LATer)	
	LJB760	LJB760											LAT	Unknown (LATer)	
	LJB761	LJB761											LAT	Unknown (LATer)	
	LJB762	LJB762											LAT	Unknown (LATer)	

TABLE A.1. (contd)

Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	Information Supplied by Utilities on Defective Fuel												(c) Failure Description
			(a)												
			Category												
			(b)												
			1	2	3	4	5	6	7	8	9	LAT			
● Operating Plant (Facility)															
Vermont Yankee (contd)	LJB763	LJB763											LAT	Unknown (LATER)	
	LJB764	LJB764											LAT	Unknown (LATER)	
	LJB765	LJB765											LAT	Unknown (LATER)	
	LJB766	LJB766											LAT	Unknown (LATER)	
	LJB767	LJB767											LAT	Unknown (LATER)	
	LJB768	LJB768											LAT	Unknown (LATER)	
	LJB769	LJB769											LAT	Unknown (LATER)	
	LJG930	LJG930											LAT	Unknown (LATER)	
	LJG931	LJG931											LAT	Unknown (LATER)	
	LJG932	LJG932											LAT	Unknown (LATER)	
	LJG933	LJG933											LAT	Unknown (LATER)	
	LJG934	LJG934											LAT	Unknown (LATER)	
	LJG935	LJG935											LAT	Unknown (LATER)	
	LJG936	LJG936											LAT	Unknown (LATER)	
	LJG937	LJG937											LAT	Unknown (LATER)	
	LJG938	LJG938											LAT	Unknown (LATER)	
	LJG939	LJG939											LAT	Unknown (LATER)	
	LJG940	LJG940											LAT	Unknown (LATER)	
	LJG941	LJG941											LAT	Unknown (LATER)	
	LJG942	LJG942											LAT	Unknown (LATER)	
	LJG943	LJG943											LAT	Unknown (LATER)	
	LJG944	LJG944											LAT	Unknown (LATER)	
	LJG945	LJG945											LAT	Unknown (LATER)	
	LJG946	LJG946											LAT	Unknown (LATER)	
	LJG947	LJG947											LAT	Unknown (LATER)	
	LJG948	LJG948											LAT	Unknown (LATER)	
	LJG949	LJG949											LAT	Unknown (LATER)	
	LJG950	LJG950											LAT	Unknown (LATER)	

TABLE A.1. (contd)

Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	Information Supplied by Utilities on Defective Fuel												(c) Failure Description
			(a)												
			Category												
			(b)												
			1	2	3	4	5	6	7	8	9	LAT			
● Operating Plant (Facility)															
Vermont Yankee (contd)	LJG951	LJG951											LAT	Unknown (LATer)	
	LJG952	LJG952											LAT	Unknown (LATer)	
	LJG953	LJG953											LAT	Unknown (LATer)	
	LJG954	LJG954											LAT	Unknown (LATer)	
	LJG955	LJG955											LAT	Unknown (LATer)	
	LJG956	LJG956											LAT	Unknown (LATer)	
	LJG957	LJG957											LAT	Unknown (LATer)	
	LJG958	LJG958											LAT	Unknown (LATer)	
	LJG959	LJG959											LAT	Unknown (LATer)	
	LJG960	LJG960											LAT	Unknown (LATer)	
	LJG961	LJG961											LAT	Unknown (LATer)	
	LJG962	LJG962											LAT	Unknown (LATer)	
	LJG963	LJG963											LAT	Unknown (LATer)	
	LJG964	LJG964											LAT	Unknown (LATer)	
	LJG965	LJG965											LAT	Unknown (LATer)	
	LJG966	LJG966											LAT	Unknown (LATer)	
	LJG967	LJG967											LAT	Unknown (LATer)	
	LJG968	LJG968											LAT	Unknown (LATer)	
	LJG969	LJG969											LAT	Unknown (LATer)	
	LJG970	LJG970											LAT	Unknown (LATer)	
	LJG971	LJG971											LAT	Unknown (LATer)	
	LJG972	LJG972											LAT	Unknown (LATer)	
	LJG973	LJG973											LAT	Unknown (LATer)	
	LJG974	LJG974											LAT	Unknown (LATer)	
	LJG975	LJG975											LAT	Unknown (LATer)	
	LJG976	LJG976											LAT	Unknown (LATer)	
	LJG977	LJG977											LAT	Unknown (LATer)	
	LJG978	LJG978											LAT	Unknown (LATer)	

TABLE A.1. (contd)

Information Supplied by Utilities on Defective Fuel															
Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	(a)											(b)	(c)
			Category												
			1	2	3	4	5	6	7	8	9	LAT	Failure Description		
● Operating Plant (Facility)															
Vermont Yankee (contd)	LJG979	LJG979											LAT	Unknown (LATer)	
	LJG980	LJG980											LAT	Unknown (LATer)	
	LJG981	LJG981											LAT	Unknown (LATer)	
	LJG982	LJG982											LAT	Unknown (LATer)	
	LJG983	LJG983											LAT	Unknown (LATer)	
	LJG984	LJG984											LAT	Unknown (LATer)	
	LJG985	LJG985											LAT	Unknown (LATer)	
	LJG986	LJG986											LAT	Unknown (LATer)	
	LJG987	LJG987											LAT	Unknown (LATer)	
	LJG988	LJG988											LAT	Unknown (LATer)	
	LJG989	LJG989											LAT	Unknown (LATer)	
	LJG990	LJG990											LAT	Unknown (LATer)	
	LJG991	LJG991											LAT	Unknown (LATer)	
	LJG992	LJG992											LAT	Unknown (LATer)	
	LJG993	LJG993											LAT	Unknown (LATer)	
	LJG994	LJG994											LAT	Unknown (LATer)	
	LJG995	LJG995											LAT	Unknown (LATer)	
	LJG996	LJG996											LAT	Unknown (LATer)	
	LJG997	LJG997											LAT	Unknown (LATer)	
	LJG998	LJG998											LAT	Unknown (LATer)	
	LJG999	LJG999											LAT	Unknown (LATer)	
	LJH001	LJH001											LAT	Unknown (LATer)	
	LJH002	LJH002											LAT	Unknown (LATer)	
	LJH003	LJH003											LAT	Unknown (LATer)	
	LJH004	LJH004											LAT	Unknown (LATer)	
	LJH005	LJH005											LAT	Unknown (LATer)	
	LJH006	LJH006											LAT	Unknown (LATer)	
	LJH007	LJH007											LAT	Unknown (LATer)	

TABLE A.1. (contd)

Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	Information Supplied by Utilities on Defective Fuel												(b) LAT	(c) Failure Description
			(a)													
			Category													
			1	2	3	4	5	6	7	8	9					
● Operating Plant (Facility)																
Vermont Yankee (contd)	LJH008	LJH008												Unknown (LATer)		
	LJH009	LJH009												Unknown (LATer)		
	LJH010	LJH010												Unknown (LATer)		
	LJH011	LJH011												Unknown (LATer)		
	LJH012	LJH012												Unknown (LATer)		
	LJH013	LJH013												Unknown (LATer)		
	LJH014	LJH014												Unknown (LATer)		
	LJH015	LJH015												Unknown (LATer)		
	LJH016	LJH016												Unknown (LATer)		
	LJH017	LJH017												Unknown (LATer)		
	LJH018	LJH018												Unknown (LATer)		
	LJH019	LJH019												Unknown (LATer)		
	LJH020	LJH020												Unknown (LATer)		
	LJH021	LJH021												Unknown (LATer)		
	LJH022	LJH022												Unknown (LATer)		
	LJH023	LJH023												Unknown (LATer)		
	LJH024	LJH024												Unknown (LATer)		
	LJL746	LJL746												Unknown (LATer)		
	LJL747	LJL747												Unknown (LATer)		
	LJLTA6	LJLTA6		X										Pre-1986 F-1		
	LJLTA7	LJLTA7		X										Pre-1986 F-1		
	LJP191	LJP191												Unknown (LATer)		
	LJP192	LJP192												Unknown (LATer)		
	LJP193	LJP193												Unknown (LATer)		
	LJP194	LJP194												Unknown (LATer)		
	LJP195	LJP195												Unknown (LATer)		
	LJP196	LJP196												Unknown (LATer)		
	LJP197	LJP197												Unknown (LATer)		

TABLE A.1. (contd)

Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	Information Supplied by Utilities on Defective Fuel												Failure Description
			(a)												
			Category												
			(b)												
			1	2	3	4	5	6	7	8	9	LAT	(c)		
● Operating Plant (Facility)															
Vermont Yankee (contd)	LJP198	LJP198										LAT	Unknown (LATER)		
	LJP199	LJP199										LAT	Unknown (LATER)		
	LJP200	LJP200										LAT	Unknown (LATER)		
	LJP201	LJP201										LAT	Unknown (LATER)		
	LJP202	LJP202										LAT	Unknown (LATER)		
	LJP203	LJP203										LAT	Unknown (LATER)		
	LJP204	LJP204										LAT	Unknown (LATER)		
	LJP205	LJP205										LAT	Unknown (LATER)		
	LJP206	LJP206										LAT	Unknown (LATER)		
	LJP207	LJP207										LAT	Unknown (LATER)		
	LJP208	LJP208										LAT	Unknown (LATER)		
	LJP209	LJP209										LAT	Unknown (LATER)		
	LJP210	LJP210										LAT	Unknown (LATER)		
	LJP211	LJP211										LAT	Unknown (LATER)		
	LJP212	LJP212										LAT	Unknown (LATER)		
	LJP213	LJP213										LAT	Unknown (LATER)		
	LJP214	LJP214										LAT	Unknown (LATER)		
	LJP215	LJP215										LAT	Unknown (LATER)		
	LJP216	LJP216										LAT	Unknown (LATER)		
	LJP217	LJP217										LAT	Unknown (LATER)		
	LJP218	LJP218										LAT	Unknown (LATER)		
	LJP219	LJP219										LAT	Unknown (LATER)		
	LJP220	LJP220										LAT	Unknown (LATER)		
	LJP221	LJP221										LAT	Unknown (LATER)		
	LJP222	LJP222										LAT	Unknown (LATER)		
	LJP223	LJP223										LAT	Unknown (LATER)		
	LJP224	LJP224										LAT	Unknown (LATER)		
	LJP225	LJP225										LAT	Unknown (LATER)		

TABLE A.1. (contd)

Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	Information Supplied by Utilities on Defective Fuel											(c) Failure Description
			(a)											
			Category											
			1	2	3	4	5	6	7	8	9	(b) LAT		
● Operating Plant (Facility)														
Vermont Yankee (contd)	LJP226	LJP226	X										Pre-1986 F-1	
	LJP227	LJP227										LAT	Unknown (LATer)	
	LJP228	LJP228										LAT	Unknown (LATer)	
	LJP229	LJP229										LAT	Unknown (LATer)	
	LJP230	LJP230										LAT	Unknown (LATer)	
	LJP231	LJP231										LAT	Unknown (LATer)	
	LJP232	LJP232										LAT	Unknown (LATer)	
	LJP233	LJP233										LAT	Unknown (LATer)	
	LJP234	LJP234										LAT	Unknown (LATer)	
	LJP235	LJP235										LAT	Unknown (LATer)	
	LJP236	LJP236										LAT	Unknown (LATer)	
	LJP237	LJP237										LAT	Unknown (LATer)	
	LJP238	LJP238										LAT	Unknown (LATer)	
	LJP239	LJP239										LAT	Unknown (LATer)	
	LJP240	LJP240										LAT	Unknown (LATer)	
	LJP241	LJP241										LAT	Unknown (LATer)	
	LJP242	LJP242										LAT	Unknown (LATer)	
	LJP243	LJP243										LAT	Unknown (LATer)	
	LJP244	LJP244										LAT	Unknown (LATer)	
	LJP245	LJP245										LAT	Unknown (LATer)	
	LJP246	LJP246										LAT	Unknown (LATer)	
	LJP247	LJP247										LAT	Unknown (LATer)	
	LJP248	LJP248										LAT	Unknown (LATer)	
	LJP249	LJP249										LAT	Unknown (LATer)	
	LJP250	LJP250										LAT	Unknown (LATer)	
	LJP251	LJP251										LAT	Unknown (LATer)	
	LJP252	LJP252										LAT	Unknown (LATer)	
	LJP253	LJP253										LAT	Unknown (LATer)	

TABLE A.1. (contd)

Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	Information Supplied by Utilities on Defective Fuel											Failure Description
			(a)											
			Category											
			(b)											
			1	2	3	4	5	6	7	8	9	LAT	(c)	
● Operating Plant (Facility)														
Vermont Yankee (contd)	LJP254	LJP254											LAT	Unknown (LATER)
	LJP255	LJP255											LAT	Unknown (LATER)
	LJP256	LJP256											LAT	Unknown (LATER)
	LJP257	LJP257											LAT	Unknown (LATER)
	LJP258	LJP258											LAT	Unknown (LATER)
	LJP259	LJP259											LAT	Unknown (LATER)
	LJP260	LJP260											LAT	Unknown (LATER)
	LJP261	LJP261											LAT	Unknown (LATER)
	LJP262	LJP262											LAT	Unknown (LATER)
	LJP263	LJP263											LAT	Unknown (LATER)
	LJP264	LJP264											LAT	Unknown (LATER)
	LJP265	LJP265											LAT	Unknown (LATER)
	LJP266	LJP266											LAT	Unknown (LATER)
	LJP267	LJP267											LAT	Unknown (LATER)
	LJP268	LJP268											LAT	Unknown (LATER)
	LJT034	LJT034											LAT	Unknown (LATER)
	LJT035	LJT035											LAT	Unknown (LATER)
	LJT036	LJT036											LAT	Unknown (LATER)
	LJT037	LJT037											LAT	Unknown (LATER)
	LJT038	LJT038											LAT	Unknown (LATER)
	LJT039	LJT039											LAT	Unknown (LATER)
	LJT040	LJT040											LAT	Unknown (LATER)
	LJT041	LJT041											LAT	Unknown (LATER)
	LJT042	LJT042											LAT	Unknown (LATER)
	LJT043	LJT043											LAT	Unknown (LATER)
	LJT044	LJT044											LAT	Unknown (LATER)
	LJT045	LJT045											LAT	Unknown (LATER)
	LJU719	LJU719											LAT	Unknown (LATER)

TABLE A.1. (contd)

Information Supplied by Utilities on Defective Fuel															
Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	(a)											(b)	(c)
			Category												
			1	2	3	4	5	6	7	8	9	LAT			
● Operating Plant (Facility)															
Vermont Yankee (contd)	LJU720	LJU720											LAT	Unknown (LATER)	
	LJZ057	LJZ057											LAT	Unknown (LATER)	
	LJZ058	LJZ058											LAT	Unknown (LATER)	
	LJZ059	LJZ059											LAT	Unknown (LATER)	
	LJZ060	LJT060											LAT	Unknown (LATER)	
	LJZ061	LJZ061											LAT	Unknown (LATER)	
	LJZ062	LJZ062											LAT	Unknown (LATER)	
	LJZ063	LJZ063											LAT	Unknown (LATER)	
	LJZ064	LJZ064											LAT	Unknown (LATER)	
	LJZ065	LJZ065											LAT	Unknown (LATER)	
	LJZ066	LJZ066											LAT	Unknown (LATER)	
	LJZ067	LJZ067											LAT	Unknown (LATER)	
	LJZ068	LJZ068											LAT	Unknown (LATER)	
	LJZ069	LJZ069											LAT	Unknown (LATER)	
	LJZ070	LJT070											LAT	Unknown (LATER)	
	LJZ071	LJZ071											LAT	Unknown (LATER)	
	LJZ072	LJZ072											LAT	Unknown (LATER)	
	LJZ073	LJZ073											LAT	Unknown (LATER)	
	LJZ074	LJZ074											LAT	Unknown (LATER)	
	LJZ075	LJZ075											LAT	Unknown (LATER)	
	LJZ076	LJZ076											LAT	Unknown (LATER)	
	LJZ077	LJZ077											LAT	Unknown (LATER)	
	LJZ078	LJZ078											LAT	Unknown (LATER)	
	LJZ079	LJZ079											LAT	Unknown (LATER)	
	LJZ080	LJT080											LAT	Unknown (LATER)	
	LJZ081	LJZ081											LAT	Unknown (LATER)	
	LJZ082	LJZ082											LAT	Unknown (LATER)	
	LJZ083	LJZ083											LAT	Unknown (LATER)	

TABLE A.1. (contd)

Information Supplied by Utilities on Defective Fuel															
Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	(a)											(b)	(c)
			Category												
			1	2	3	4	5	6	7	8	9	LAT			
● Operating Plant (Facility)															
Vermont Yankee (contd)	LJZ084	LJZ084											LAT	Unknown (LATER)	
	LJZ085	LJZ085											LAT	Unknown (LATER)	
	LJZ086	LJZ086											LAT	Unknown (LATER)	
	LJZ087	LJZ087											LAT	Unknown (LATER)	
	LJZ088	LJZ088											LAT	Unknown (LATER)	
	LJZ089	LJZ089											LAT	Unknown (LATER)	
	LJZ090	LJT090											LAT	Unknown (LATER)	
	LJZ091	LJZ091											LAT	Unknown (LATER)	
	LJZ092	LJZ092											LAT	Unknown (LATER)	
	LJZ093	LJZ093											LAT	Unknown (LATER)	
	LJZ094	LJZ094											LAT	Unknown (LATER)	
	LJZ095	LJZ095											LAT	Unknown (LATER)	
	LJZ096	LJZ096											LAT	Unknown (LATER)	
	LJZ097	LJZ097											LAT	Unknown (LATER)	
	LJZ098	LJZ098											LAT	Unknown (LATER)	
	LJZ099	LJZ099											LAT	Unknown (LATER)	
	LJZ100	LJT100											LAT	Unknown (LATER)	
	LJZ101	LJZ101											LAT	Unknown (LATER)	
	LJZ102	LJZ102											LAT	Unknown (LATER)	
	LJZ103	LJZ103											LAT	Unknown (LATER)	
	LJZ104	LJZ104											LAT	Unknown (LATER)	
	LJZ105	LJZ105											LAT	Unknown (LATER)	
	LJZ106	LJZ106											LAT	Unknown (LATER)	
	LJZ107	LJZ107											LAT	Unknown (LATER)	
	LJZ108	LJZ108											LAT	Unknown (LATER)	
	LJZ109	LJZ109											LAT	Unknown (LATER)	
	LJZ110	LJT110											LAT	Unknown (LATER)	
	LJZ111	LJZ111											LAT	Unknown (LATER)	

TABLE A.1. (contd)

Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	Information Supplied by Utilities on Defective Fuel												Failure Description
			(a)												
			Category												
			(b)												
			1	2	3	4	5	6	7	8	9	LAT	(c)		
● Operating Plant (Facility)															
Vermont Yankee (contd)	LJZ112	LJZ112											LAT	Unknown (LATer)	
	LJZ113	LJZ113											LAT	Unknown (LATer)	
	LJZ114	LJZ114											LAT	Unknown (LATer)	
	LJZ115	LJZ115											LAT	Unknown (LATer)	
	LJZ116	LJZ116											LAT	Unknown (LATer)	
	LJZ117	LJZ117											LAT	Unknown (LATer)	
	LJZ118	LJZ118											LAT	Unknown (LATer)	
	LJZ119	LJZ119											LAT	Unknown (LATer)	
	LJZ120	LJT120											LAT	Unknown (LATer)	
	LJZ121	LJZ121											LAT	Unknown (LATer)	
	LJZ122	LJZ122											LAT	Unknown (LATer)	
	LJZ123	LJZ123											LAT	Unknown (LATer)	
	LJZ124	LJZ124											LAT	Unknown (LATer)	
	LJZ125	LJZ125											LAT	Unknown (LATer)	
	LJZ126	LJZ126											LAT	Unknown (LATer)	
	LJZ127	LJZ127											LAT	Unknown (LATer)	
	LJZ128	LJZ128											LAT	Unknown (LATer)	
	LJZ129	LJZ129											LAT	Unknown (LATer)	
	LJZ130	LJT130											LAT	Unknown (LATer)	
	LJZ131	LJZ131											LAT	Unknown (LATer)	
	LJZ132	LJZ132											LAT	Unknown (LATer)	
	LJZ133	LJZ133											LAT	Unknown (LATer)	
	LJZ134	LJZ134											LAT	Unknown (LATer)	
	LJZ135	LJZ135											LAT	Unknown (LATer)	
	LJZ136	LJZ136											LAT	Unknown (LATer)	
	LJZ918	LJZ918											LAT	Unknown (LATer)	
	LJZ919	LJZ919											LAT	Unknown (LATer)	
	LJZ920	LJT920											LAT	Unknown (LATer)	

TABLE A.1. (contd)

Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	Information Supplied by Utilities on Defective Fuel												Failure Description
			(a)												
			Category												
			(b)												
			1	2	3	4	5	6	7	8	9	LAT	(c)		
● Operating Plant (Facility)															
Vermont Yankee (contd)	LJZ921	LJZ921											LAT	Unknown (LATer)	
	LJZ922	LJZ922											LAT	Unknown (LATer)	
	LJZ923	LJZ923											LAT	Unknown (LATer)	
	LJZ924	LJZ924											LAT	Unknown (LATer)	
	LJZ925	LJZ925											LAT	Unknown (LATer)	
	LJZ926	LJZ926											LAT	Unknown (LATer)	
	LJZ927	LJZ927											LAT	Unknown (LATer)	
	LJZ928	LJZ928											LAT	Unknown (LATer)	
	LJZ929	LJZ929											LAT	Unknown (LATer)	
	LJZ930	LJT930											LAT	Unknown (LATer)	
	LJZ931	LJZ931											LAT	Unknown (LATer)	
	LJZ932	LJZ932											LAT	Unknown (LATer)	
	LJZ933	LJZ933											LAT	Unknown (LATer)	
	LJZ934	LJZ934											LAT	Unknown (LATer)	
	LJZ935	LJZ935											LAT	Unknown (LATer)	
	LJZ936	LJZ936											LAT	Unknown (LATer)	
	LJZ937	LJZ937											LAT	Unknown (LATer)	
	LJZ938	LJZ938											LAT	Unknown (LATer)	
	LJZ939	LJZ939											LAT	Unknown (LATer)	
	LJZ940	LJT940											LAT	Unknown (LATer)	
	LJZ941	LJZ941											LAT	Unknown (LATer)	
	LJZ942	LJZ942											LAT	Unknown (LATer)	
	LJZ943	LJZ943											LAT	Unknown (LATer)	
	LJZ944	LJZ944											LAT	Unknown (LATer)	
	LJZ945	LJZ945											LAT	Unknown (LATer)	
	SCRAP1	SCRAP1										X		Pre-1986 F-2	
	SCRAP2	SCRAP2										X		Pre-1986 F-2	
	VT0001	VT0001										X		Pre-1986 F-2	

TABLE A.1. (contd)

Information Supplied by Utilities on Defective Fuel															
Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	(a)											(b)	(c)
			Category												
			1	2	3	4	5	6	7	8	9	LAT			
● Operating Plant (Facility)															
Vermont Yankee (contd)	VT0002	VT0002									X			Pre-1986 F-2	
	VT0003	VT0003									X			Pre-1986 F-2	
	VT0004	VT0004									X			Pre-1986 F-2	
	VT0005	VT0005									X			Pre-1986 F-2	
	VT0006	VT0006									X			Pre-1986 F-2	
	VT0007	VT0007									X			Pre-1986 F-2	
	VT0008	VT0008									X			Pre-1986 F-2	
	VT0009	VT0009									X			Pre-1986 F-2	
	VT0010	VT0010									X			Pre-1986 F-2	
	VT0011	VT0011									X			Pre-1986 F-2	
	VT0012	VT0012									X			Pre-1986 F-2	
	VT0013	VT0013									X			Pre-1986 F-2	
	VT0014	VT0014									X			Pre-1986 F-2	
	VT0015	VT0015									X			Pre-1986 F-2	
	VT0016	VT0016									X			Pre-1986 F-2	
	VT0017	VT0017									X			Pre-1986 F-2	
	VT0018	VT0018									X			Pre-1986 F-2	
	VT0019	VT0019									X			Pre-1986 F-2	
	VT0020	VT0020									X			Pre-1986 F-2	
	VT0021	VT0021									X			Pre-1986 F-2	
	VT0022	VT0022									X			Pre-1986 F-2	
	VT0023	VT0023									X			Pre-1986 F-2	
	VT0024	VT0024									X			Pre-1986 F-2	
	VT0025	VT0025									X			Pre-1986 F-2	
	VT0026	VT0026									X			Pre-1986 F-2	
	VT0027	VT0027									X			Pre-1986 F-2	
	VT0028	VT0028									X			Pre-1986 F-2	
	VT0029	VT0029									X			Pre-1986 F-2	

TABLE A.1. (contd)

Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	Information Supplied by Utilities on Defective Fuel												(c) Failure Description
			(a)												
			Category												
			(b)												
			1	2	3	4	5	6	7	8	9	LAT			
● Operating Plant (Facility)															
Vermont Yankee (contd)	VT0030	VT0030								X				Pre-1986 F-2	
	VT0031	VT0031								X				Pre-1986 F-2	
	VT0032	VT0032								X				Pre-1986 F-2	
	VT0033	VT0033								X				Pre-1986 F-2	
	VT0034	VT0034								X				Pre-1986 F-2	
	VT0035	VT0035								X				Pre-1986 F-2	
	VT0036	VT0036								X				Pre-1986 F-2	
	VT0037	VT0037								X				Pre-1986 F-2	
	VT0038	VT0038								X				Pre-1986 F-2	
	VT0039	VT0039								X				Pre-1986 F-2	
	VT0040	VT0040								X				Pre-1986 F-2	
	VT0041	VT0041								X				Pre-1986 F-2	
	VT0042	VT0042								X				Pre-1986 F-2	
	VT0043	VT0043								X				Pre-1986 F-2	
	VT0044	VT0044								X				Pre-1986 F-2	
	VT0045	VT0045								X				Pre-1986 F-2	
	VT0046	VT0046								X				Pre-1986 F-2	
	VT0047	VT0047								X				Pre-1986 F-2	
	VT0048	VT0048								X				Pre-1986 F-2	
	VT0049	VT0049								X				Pre-1986 F-2	
	VT0050	VT0050								X				Pre-1986 F-2	
	VT0051	VT0051								X				Pre-1986 F-2	
	VT0052	VT0052								X				Pre-1986 F-2	
	VT0053	VT0053								X				Pre-1986 F-2	
	VT0054	VT0054								X				Pre-1986 F-2	
	VT0055	VT0055								X				Pre-1986 F-2	
	VT0056	VT0056								X				Pre-1986 F-2	
	VT0057	VT0057								X				Pre-1986 F-2	

TABLE A.1. (contd)

Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	Information Supplied by Utilities on Defective Fuel											(c) Failure Description
			(a)											
			Category											
			(b)											
			1	2	3	4	5	6	7	8	9	LAT		
● Operating Plant (Facility)														
Vermont Yankee (contd)	VT0058	VT0058								X			Pre-1986 F-2	
	VT0059	VT0059								X			Pre-1986 F-2	
	VT0060	VT0060								X			Pre-1986 F-2	
	VT0061	VT0061								X			Pre-1986 F-2	
	VT0062	VT0062								X			Pre-1986 F-2	
	VT0063	VT0063								X			Pre-1986 F-2	
	VT0064	VT0064								X			Pre-1986 F-2	
	VT0065	VT0065								X			Pre-1986 F-2	
	VT0066	VT0066								X			Pre-1986 F-2	
	VT0067	VT0067								X			Pre-1986 F-2	
	VT0068	VT0068								X			Pre-1986 F-2	
	VT0069	VT0069								X			Pre-1986 F-2	
	VT0070	VT0070								X			Pre-1986 F-2	
	VT0071	VT0071								X			Pre-1986 F-2	
	VT0072	VT0072								X			Pre-1986 F-2	
	VT0073	VT0073								X			Pre-1986 F-2	
	VT0074	VT0074								X			Pre-1986 F-2	
	VT0075	VT0075								X			Pre-1986 F-2	
	VT0076	VT0076								X			Pre-1986 F-2	
	VT0077	VT0077								X			Pre-1986 F-2	
	VT0078	VT0078								X			Pre-1986 F-2	
	VT0079	VT0079								X			Pre-1986 F-2	
	VT0080	VT0080								X			Pre-1986 F-2	
	VT0081	VT0081								X			Pre-1986 F-2	
	VT0082	VT0082								X			Pre-1986 F-2	
	VT0083	VT0083								X			Pre-1986 F-2	
	VT0084	VT0084								X			Pre-1986 F-2	
	VT0085	VT0085								X			Pre-1986 F-2	

TABLE A.1. (contd)

Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	Information Supplied by Utilities on Defective Fuel												Failure Description
			(a)												
			Category												
			(b)												
			1	2	3	4	5	6	7	8	9	LAT			
● Operating Plant (Facility)															
Vermont Yankee (contd)	VT0086	VT0086								X				Pre-1986 F-2	
	VT0087	VT0087								X				Pre-1986 F-2	
	VT0088	VT0088								X				Pre-1986 F-2	
	VT0089	VT0089								X				Pre-1986 F-2	
	VT0090	VT0090								X				Pre-1986 F-2	
	VT0091	VT0091								X				Pre-1986 F-2	
	VT0092	VT0092								X				Pre-1986 F-2	
	VT0093	VT0093								X				Pre-1986 F-2	
	VT0094	VT0094								X				Pre-1986 F-2	
	VT0095	VT0095								X				Pre-1986 F-2	
	VT0096	VT0096								X				Pre-1986 F-2	
	VT0097	VT0097								X				Pre-1986 F-2	
	VT0098	VT0098								X				Pre-1986 F-2	
	VT0099	VT0099								X				Pre-1986 F-2	
	VT0100	VT0100								X				Pre-1986 F-2	
	VT0101	VT0101								X				Pre-1986 F-2	
	VT0102	VT0102								X				Pre-1986 F-2	
	VT0103	VT0103								X				Pre-1986 F-2	
	VT0104	VT0104								X				Pre-1986 F-2	
	VT0105	VT0105								X				Pre-1986 F-2	
	VT0106	VT0106								X				Pre-1986 F-2	
	VT0107	VT0107								X				Pre-1986 F-2	
	VT0108	VT0108								X				Pre-1986 F-2	
	VT0109	VT0109								X				Pre-1986 F-2	
	VT0110	VT0110								X				Pre-1986 F-2	
	VT0111	VT0111								X				Pre-1986 F-2	
	VT0112	VT0112								X				Pre-1986 F-2	
	VT0113	VT0113								X				Pre-1986 F-2	

TABLE A.1. (contd)

Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	Information Supplied by Utilities on Defective Fuel												(b)	(c)
			(a)													
			Category													
			1	2	3	4	5	6	7	8	9	LAT				
● Operating Plant (Facility)																
Vermont Yankee (contd)	VT0114	VT0114								X					Pre-1986 F-2	
	VT0115	VT0115								X					Pre-1986 F-2	
	VT0116	VT0116								X					Pre-1986 F-2	
	VT0117	VT0117								X					Pre-1986 F-2	
	VT0118	VT0118								X					Pre-1986 F-2	
	VT0119	VT0119								X					Pre-1986 F-2	
	VT0120	VT0120								X					Pre-1986 F-2	
	VT0121	VT0121								X					Pre-1986 F-2	
	VT0122	VT0122								X					Pre-1986 F-2	
	VT0123	VT0123								X					Pre-1986 F-2	
	VT0124	VT0124								X					Pre-1986 F-2	
	VT0125	VT0125								X					Pre-1986 F-2	
	VT0126	VT0126								X					Pre-1986 F-2	
	VT0127	VT0127								X					Pre-1986 F-2	
	VT0128	VT0128								X					Pre-1986 F-2	
	VT0129	VT0129								X					Pre-1986 F-2	
	VT0130	VT0130								X					Pre-1986 F-2	
	VT0131	VT0131								X					Pre-1986 F-2	
	VT0132	VT0132								X					Pre-1986 F-2	
	VT0133	VT0133								X					Pre-1986 F-2	
	VT0134	VT0134								X					Pre-1986 F-2	
	VT0135	VT0135								X					Pre-1986 F-2	
	VT0136	VT0136								X					Pre-1986 F-2	
	VT0137	VT0137								X					Pre-1986 F-2	
	VT0138	VT0138								X					Pre-1986 F-2	
	VT0139	VT0139								X					Pre-1986 F-2	
	VT0140	VT0140								X					Pre-1986 F-2	
	VT0141	VT0141								X					Pre-1986 F-2	

TABLE A.1. (contd)

Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	Information Supplied by Utilities on Defective Fuel												Failure Description
			(a)												
			Category												
			(b)												
			1	2	3	4	5	6	7	8	9	LAT	(c)		
● Operating Plant (Facility)															
Vermont Yankee (contd)	VT0142	VT0142								X			Pre-1986 F-2		
	VT0143	VT0143								X			Pre-1986 F-2		
	VT0144	VT0144								X			Pre-1986 F-2		
	VT0145	VT0145								X			Pre-1986 F-2		
	VT0146	VT0146								X			Pre-1986 F-2		
	VT0147	VT0147								X			Pre-1986 F-2		
	VT0148	VT0148								X			Pre-1986 F-2		
	VT0149	VT0149								X			Pre-1986 F-2		
	VT0150	VT0150								X			Pre-1986 F-2		
	VT0151	VT0151								X			Pre-1986 F-2		
	VT0152	VT0152								X			Pre-1986 F-2		
	VT0153	VT0153								X			Pre-1986 F-2		
	VT0154	VT0154								X			Pre-1986 F-2		
	VT0155	VT0155								X			Pre-1986 F-2		
	VT0156	VT0156								X			Pre-1986 F-2		
	VT0157	VT0157								X			Pre-1986 F-2		
	VT0158	VT0158								X			Pre-1986 F-2		
	VT0159	VT0159								X			Pre-1986 F-2		
	VT0160	VT0160								X			Pre-1986 F-2		
	VT0161	VT0161								X			Pre-1986 F-2		
	VT0162	VT0162								X			Pre-1986 F-2		
	VT0163	VT0163								X			Pre-1986 F-2		
	VT0164	VT0164								X			Pre-1986 F-2		
	VT0165	VT0165								X			Pre-1986 F-2		
	VT0166	VT0166								X			Pre-1986 F-2		
	VT0167	VT0167								X			Pre-1986 F-2		
	VT0168	VT0168								X			Pre-1986 F-2		
	VT0169	VT0169								X			Pre-1986 F-2		

TABLE A.1. (contd)

Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	Information Supplied by Utilities on Defective Fuel												(c) Failure Description
			(a)												
			Category												
			1	2	3	4	5	6	7	8	9	LAT	(b)		
● Operating Plant (Facility)															
Vermont Yankee (contd)	VT0170	VT0170									X			Pre-1986 F-2	
	VT0171	VT0171									X			Pre-1986 F-2	
	VT0172	VT0172									X			Pre-1986 F-2	
	VT0173	VT0173									X			Pre-1986 F-2	
	VT0174	VT0174									X			Pre-1986 F-2	
	VT0175	VT0175									X			Pre-1986 F-2	
	VT0176	VT0176									X			Pre-1986 F-2	
	VT0177	VT0177									X			Pre-1986 F-2	
	VT0178	VT0178									X			Pre-1986 F-2	
	VT0179	VT0179									X			Pre-1986 F-2	
	VT0180	VT0180									X			Pre-1986 F-2	
	VT0181	VT0181									X			Pre-1986 F-2	
	VT0182	VT0182									X			Pre-1986 F-2	
	VT0183	VT0183									X			Pre-1986 F-2	
	VT0184	VT0184									X			Pre-1986 F-2	
	VT0185	VT0185									X			Pre-1986 F-2	
	VT0186	VT0186									X			Pre-1986 F-2	
	VT0187	VT0187									X			Pre-1986 F-2	
	VT0188	VT0188									X			Pre-1986 F-2	
	VT0189	VT0189									X			Pre-1986 F-2	
	VT0190	VT0190									X			Pre-1986 F-2	
	VT0191	VT0191									X			Pre-1986 F-2	
	VT0192	VT0192									X			Pre-1986 F-2	
	VT0193	VT0193									X			Pre-1986 F-2	
	VT0194	VT0194									X			Pre-1986 F-2	
	VT0195	VT0195									X			Pre-1986 F-2	
	VT0196	VT0196									X			Pre-1986 F-2	
	VT0197	VT0197									X			Pre-1986 F-2	

TABLE A.1. (contd)

Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	Information Supplied by Utilities on Defective Fuel												Failure Description
			(a)												
			Category												
			(b)												
			1	2	3	4	5	6	7	8	9	LAT	(c)		
● Operating Plant (Facility)															
Vermont Yankee (contd)	VT0198	VT0198								X			Pre-1986 F-2		
	VT0199	VT0199								X			Pre-1986 F-2		
	VT0200	VT0200								X			Pre-1986 F-2		
	VT0201	VT0201								X			Pre-1986 F-2		
	VT0202	VT0202								X			Pre-1986 F-2		
	VT0203	VT0203								X			Pre-1986 F-2		
	VT0204	VT0204								X			Pre-1986 F-2		
	VT0205	VT0205								X			Pre-1986 F-2		
	VT0206	VT0206								X			Pre-1986 F-2		
	VT0207	VT0207								X			Pre-1986 F-2		
	VT0208	VT0208								X			Pre-1986 F-2		
	VT0209	VT0209								X			Pre-1986 F-2		
	VT0210	VT0200								X			Pre-1986 F-2		
	VT0211	VT0211								X			Pre-1986 F-2		
	VT0212	VT0212								X			Pre-1986 F-2		
	VT0213	VT0213								X			Pre-1986 F-2		
	VT0214	VT0214								X			Pre-1986 F-2		
	VT0215	VT0215								X			Pre-1986 F-2		
	VT0216	VT0216								X			Pre-1986 F-2		
	VT0217	VT0217								X			Pre-1986 F-2		
	VT0218	VT0218								X			Pre-1986 F-2		
	VT0219	VT0219								X			Pre-1986 F-2		
	VT0220	VT0220								X			Pre-1986 F-2		
	VT0221	VT0221								X			Pre-1986 F-2		
	VT0222	VT0222								X			Pre-1986 F-2		
	VT0223	VT0223								X			Pre-1986 F-2		
	VT0224	VT0224								X			Pre-1986 F-2		
	VT0225	VT0225								X			Pre-1986 F-2		

TABLE A.1. (contd)

Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	Information Supplied by Utilities on Defective Fuel												(b)	(c)
			(a)													
			Category													
			1	2	3	4	5	6	7	8	9	LAT				
● Operating Plant (Facility)																
Vermont Yankee (contd)	VT0226	VT0226											X		Pre-1986 F-2	
	VT0227	VT0227											X		Pre-1986 F-2	
	VT0228	VT0228											X		Pre-1986 F-2	
	VT0229	VT0229											X		Pre-1986 F-2	
	VT0230	VT0230											X		Pre-1986 F-2	
	VT0231	VT0231											X		Pre-1986 F-2	
	VT0232	VT0232											X		Pre-1986 F-2	
	VT0233	VT0233											X		Pre-1986 F-2	
	VT0234	VT0234											X		Pre-1986 F-2	
	VT0235	VT0235											X		Pre-1986 F-2	
	VT0236	VT0236											X		Pre-1986 F-2	
	VT0237	VT0237											X		Pre-1986 F-2	
	VT0238	VT0238											X		Pre-1986 F-2	
	VT0239	VT0239											X		Pre-1986 F-2	
	VT0240	VT0240											X		Pre-1986 F-2	
	VT0241	VT0241											X		Pre-1986 F-2	
	VT0242	VT0242											X		Pre-1986 F-2	
	VT0243	VT0243											X		Pre-1986 F-2	
	VT0244	VT0244											X		Pre-1986 F-2	
	VT0245	VT0245											X		Pre-1986 F-2	
	VT0246	VT0246											X		Pre-1986 F-2	
	VT0247	VT0247											X		Pre-1986 F-2	
	VT0248	VT0248											X		Pre-1986 F-2	
	VT0249	VT0249											X		Pre-1986 F-2	
	VT0250	VT0250											X		Pre-1986 F-2	
	VT0251	VT0251											X		Pre-1986 F-2	
VT0252	VT0252											X		Pre-1986 F-2		
VT0253	VT0253											X		Pre-1986 F-2		

TABLE A.1. (contd)

Information Supplied by Utilities on Defective Fuel																
Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	(a)												(b)	(c)
			Category													
			1	2	3	4	5	6	7	8	9	LAT				
● Operating Plant (Facility)																
Vermont Yankee (contd)	VT0254	VT0254										X		Pre-1986 F-2		
	VT0255	VT0255										X		Pre-1986 F-2		
	VT0256	VT0256										X		Pre-1986 F-2		
	VT0257	VT0257										X		Pre-1986 F-2		
	VT0258	VT0258										X		Pre-1986 F-2		
	VT0259	VT0259										X		Pre-1986 F-2		
	VT0260	VT0260										X		Pre-1986 F-2		
	VT0261	VT0261										X		Pre-1986 F-2		
	VT0262	VT0262										X		Pre-1986 F-2		
	VT0263	VT0263										X		Pre-1986 F-2		
	VT0264	VT0264										X		Pre-1986 F-2		
	VT0265	VT0265										X		Pre-1986 F-2		
	VT0266	VT0266										X		Pre-1986 F-2		
	VT0267	VT0267										X		Pre-1986 F-2		
	VT0268	VT0268										X		Pre-1986 F-2		
	VT0269	VT0269										X		Pre-1986 F-2		
	VT0270	VT0270										X		Pre-1986 F-2		
	VT0271	VT0271										X		Pre-1986 F-2		
	VT0272	VT0272										X		Pre-1986 F-2		
	VT0273	VT0273										X		Pre-1986 F-2		
	VT0274	VT0274										X		Pre-1986 F-2		
	VT0275	VT0275										X		Pre-1986 F-2		
	VT0276	VT0276										X		Pre-1986 F-2		
	VT0277	VT0277										X		Pre-1986 F-2		
	VT0278	VT0278										X		Pre-1986 F-2		
	VT0279	VT0279										X		Pre-1986 F-2		
	VT0280	VT0280										X		Pre-1986 F-2		
	VT0281	VT0281										X		Pre-1986 F-2		

TABLE A.1. (contd)

			Information Supplied by Utilities on Defective Fuel													
			(a)													
			Category												(b)	(c)
Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	1	2	3	4	5	6	7	8	9	LAT	Failure Description			
● Operating Plant (Facility)																
Vermont Yankee (contd)	VT0282	VT0282								X			Pre-1986 F-2			
	VT0283	VT0283								X			Pre-1986 F-2			
	VT0284	VT0284								X			Pre-1986 F-2			
	VT0285	VT0285								X			Pre-1986 F-2			
	VT0286	VT0286								X			Pre-1986 F-2			
	VT0287	VT0287								X			Pre-1986 F-2			
	VT0288	VT0288								X			Pre-1986 F-2			
	VT0289	VT0289								X			Pre-1986 F-2			
	VT0290	VT0290								X			Pre-1986 F-2			
	VT0291	VT0291								X			Pre-1986 F-2			
	VT0292	VT0292								X			Pre-1986 F-2			
	VT0293	VT0293								X			Pre-1986 F-2			
	VT0294	VT0294								X			Pre-1986 F-2			
	VT0295	VT0295								X			Pre-1986 F-2			
	VT0296	VT0296								X			Pre-1986 F-2			
	VT0297	VT0297								X			Pre-1986 F-2			
	VT0298	VT0298								X			Pre-1986 F-2			
	VT0299	VT0299								X			Pre-1986 F-2			
	VT0300	VT0300								X			Pre-1986 F-2			
	VT0301	VT0301								X			Pre-1986 F-2			
	VT0302	VT0302								X			Pre-1986 F-2			
	VT0303	VT0303								X			Pre-1986 F-2			
	VT0304	VT0304								X			Pre-1986 F-2			
	VT0305	VT0305								X			Pre-1986 F-2			
	VT0306	VT0306								X			Pre-1986 F-2			
	VT0307	VT0307								X			Pre-1986 F-2			
	VT0308	VT0308								X			Pre-1986 F-2			
	VT0309	VT0309								X			Pre-1986 F-2			

TABLE A.1. (contd)

Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	Information Supplied by Utilities on Defective Fuel												Failure Description
			(a)												
			Category												
			(b)												
			1	2	3	4	5	6	7	8	9	LAT		(c)	
● Operating Plant (Facility)															
Vermont Yankee (contd)	VT0310	VT0310									X			Pre-1986 F-2	
	VT0311	VT0311									X			Pre-1986 F-2	
	VT0312	VT0312									X			Pre-1986 F-2	
	VT0313	VT0313									X			Pre-1986 F-2	
	VT0314	VT0314									X			Pre-1986 F-2	
	VT0315	VT0315									X			Pre-1986 F-2	
	VT0316	VT0316									X			Pre-1986 F-2	
	VT0317	VT0317									X			Pre-1986 F-2	
	VT0318	VT0318									X			Pre-1986 F-2	
	VT0319	VT0319									X			Pre-1986 F-2	
	VT0320	VT0320									X			Pre-1986 F-2	
	VT0321	VT0321									X			Pre-1986 F-2	
	VT0322	VT0322									X			Pre-1986 F-2	
	VT0323	VT0323									X			Pre-1986 F-2	
	VT0324	VT0324									X			Pre-1986 F-2	
	VT0325	VT0325									X			Pre-1986 F-2	
	VT0326	VT0326									X			Pre-1986 F-2	
	VT0327	VT0327									X			Pre-1986 F-2	
	VT0328	VT0328									X			Pre-1986 F-2	
	VT0329	VT0329									X			Pre-1986 F-2	
	VT0330	VT0330									X			Pre-1986 F-2	
	VT0331	VT0331									X			Pre-1986 F-2	
	VT0332	VT0332									X			Pre-1986 F-2	
	VT0333	VT0333									X			Pre-1986 F-2	
	VT0334	VT0334									X			Pre-1986 F-2	
	VT0335	VT0335									X			Pre-1986 F-2	
	VT0336	VT0336									X			Pre-1986 F-2	
	VT0337	VT0337									X			Pre-1986 F-2	

TABLE A.1. (contd)

Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	Information Supplied by Utilities on Defective Fuel												(c) Failure Description
			(a)												
			Category												
			(b)												
1	2	3	4	5	6	7	8	9	LAT						
● Operating Plant (Facility)															
Vermont Yankee (contd)	VT0338	VT0338							X					Pre-1986 F-2	
	VT0339	VT0339							X					Pre-1986 F-2	
	VT0340	VT0340							X					Pre-1986 F-2	
	VT0341	VT0341							X					Pre-1986 F-2	
	VT0342	VT0342							X					Pre-1986 F-2	
	VT0343	VT0343							X					Pre-1986 F-2	
	VT0344	VT0344							X					Pre-1986 F-2	
	VT0345	VT0345							X					Pre-1986 F-2	
	VT0346	VT0346							X					Pre-1986 F-2	
	VT0347	VT0347							X					Pre-1986 F-2	
	VT0348	VT0348							X					Pre-1986 F-2	
	VT0349	VT0349							X					Pre-1986 F-2	
	VT0350	VT0350							X					Pre-1986 F-2	
	VT0351	VT0351							X					Pre-1986 F-2	
	VT0352	VT0352							X					Pre-1986 F-2	
	VT0353	VT0353							X					Pre-1986 F-2	
	VT0354	VT0354							X					Pre-1986 F-2	
	VT0355	VT0355							X					Pre-1986 F-2	
	VT0356	VT0356							X					Pre-1986 F-2	
	VT0357	VT0357							X					Pre-1986 F-2	
	VT0358	VT0358							X					Pre-1986 F-2	
	VT0359	VT0359							X					Pre-1986 F-2	
	VT0360	VT0360							X					Pre-1986 F-2	
	VT0361	VT0361							X					Pre-1986 F-2	
	VT0362	VT0362							X					Pre-1986 F-2	
	VT0363	VT0363							X					Pre-1986 F-2	
	VT0364	VT0364							X					Pre-1986 F-2	
	VT0365	VT0365							X					Pre-1986 F-2	

TABLE A.1. (contd)

Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	Information Supplied by Utilities on Defective Fuel												Failure Description
			(a)												
			Category												
			(b)												
			1	2	3	4	5	6	7	8	9	LAT	(c)		
● Operating Plant (Facility)															
Vermont Yankee (contd)	VT0366	VT0366									X		Pre-1986 F-2		
	VT0367	VT0367									X		Pre-1986 F-2		
	VT0368	VT0368									X		Pre-1986 F-2		
	VT0369	VT0369									X		Pre-1986 F-2		
	VT0370	VT0370									X		Pre-1986 F-2		
	VT0371	VT0371									X		Pre-1986 F-2		
	VT0372	VT0372									X		Pre-1986 F-2		
	VT0373	VT0373									X		Pre-1986 F-2		
	VT0374	VT0374									X		Pre-1986 F-2		
	VT0375	VT0375									X		Pre-1986 F-2		
	VT0376	VT0376									X		Pre-1986 F-2		
Washington Nuclear Project-2															
Waterford-3															
(West Valley) ^(h)															
Wolf Creek															
Yankee Rowe	A325	A325										LAT	Unknown (LATER)		
	A326	A326										LAT	Unknown (LATER)		
	A330	A330										LAT	Unknown (LATER)		
	A332	A332										LAT	Unknown (LATER)		
	A351	A351										LAT	Unknown (LATER)		
	A352	A352										LAT	Unknown (LATER)		
	A353	A353										LAT	Unknown (LATER)		
	A354	A354										LAT	Unknown (LATER)		

TABLE A.1. (contd)

Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	Information Supplied by Utilities on Defective Fuel												(c) Failure Description
			(a)												
			Category												
			(b)												
			1	2	3	4	5	6	7	8	9	LAT			
● Operating Plant (Facility)															
Yankee Rowe (contd)	A355	A355											LAT	Unknown (LATer)	
	A356	A356											LAT	Unknown (LATer)	
	A357	A357											LAT	Unknown (LATer)	
	A358	A358											LAT	Unknown (LATer)	
	A359	A359											LAT	Unknown (LATer)	
	A360	A360											LAT	Unknown (LATer)	
	A361	A361											LAT	Unknown (LATer)	
	A362	A362											LAT	Unknown (LATer)	
	A363	A363											LAT	Unknown (LATer)	
	A364	A364											LAT	Unknown (LATer)	
	A365	A365											LAT	Unknown (LATer)	
	A366	A366											LAT	Unknown (LATer)	
	A385	A385											LAT	Unknown (LATer)	
	A386	A386											LAT	Unknown (LATer)	
	A387	A387											LAT	Unknown (LATer)	
	A388	A388											LAT	Unknown (LATer)	
	A389	A389											LAT	Unknown (LATer)	
	A390	A390											LAT	Unknown (LATer)	
	A391	A391											LAT	Unknown (LATer)	
	A392	A392											LAT	Unknown (LATer)	
	A393	A393											LAT	Unknown (LATer)	
	A394	A394											LAT	Unknown (LATer)	
	A395	A395											LAT	Unknown (LATer)	
	A396	A396											LAT	Unknown (LATer)	
	A397	A397											LAT	Unknown (LATer)	
	A398	A398											LAT	Unknown (LATer)	
	A399	A399											LAT	Unknown (LATer)	
	A400	A400											LAT	Unknown (LATer)	

TABLE A.1. (contd)

Information Supplied by Utilities on Defective Fuel														
Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	(a)											Failure Description
			Category											
			(b)											
			1	2	3	4	5	6	7	8	9	LAT	(c)	
● Operating Plant (Facility)														
Yankee Rowe (contd)	A401	A401											LAT	Unknown (LATer)
	A402	A402											LAT	Unknown (LATer)
	A403U	A403U											LAT	Unknown (LATer)
	A405U	A405U											LAT	Unknown (LATer)
	A407U	A407U											LAT	Unknown (LATer)
	A409U	A409U											LAT	Unknown (LATer)
	A411U	A411U											LAT	Unknown (LATer)
	A413U	A413U											LAT	Unknown (LATer)
	A415U	A415U											LAT	Unknown (LATer)
	A417U	A417U											LAT	Unknown (LATer)
	A419U	A419U											LAT	Unknown (LATer)
	A421U	A421U											LAT	Unknown (LATer)
	A423U	A423U											LAT	Unknown (LATer)
	A425U	A425U											LAT	Unknown (LATer)
	A427U	A427U											LAT	Unknown (LATer)
	A429U	A429U											LAT	Unknown (LATer)
	A431U	A431U											LAT	Unknown (LATer)
	A433U	A433U											LAT	Unknown (LATer)
	A435U	A435U											LAT	Unknown (LATer)
	A437U	A437U											LAT	Unknown (LATer)
	A439U	A439U											LAT	Unknown (LATer)
	A441U	A441U											LAT	Unknown (LATer)
	A443U	A443U											LAT	Unknown (LATer)
	A445U	A445U											LAT	Unknown (LATer)
	A447U	A447U											LAT	Unknown (LATer)
	A449U	A449U											LAT	Unknown (LATer)
	A451U	A451U											LAT	Unknown (LATer)
	A453U	A453U											LAT	Unknown (LATer)

TABLE A.1. (contd)

Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	Information Supplied by Utilities on Defective Fuel												Failure Description
			(a)												
			Category												
			(b)												
			1	2	3	4	5	6	7	8	9	LAT	(c)		
● Operating Plant (Facility)															
Yankee Rowe (contd)	A455U	A455U											LAT	Unknown (LATer)	
	A457U	A457U											LAT	Unknown (LATer)	
	A459U	A459U											LAT	Unknown (LATer)	
	A461U	A461U											LAT	Unknown (LATer)	
	A463U	A463U											LAT	Unknown (LATer)	
	A465U	A465U											LAT	Unknown (LATer)	
	A467U	A467U											LAT	Unknown (LATer)	
	A469U	A469U											LAT	Unknown (LATer)	
	A471U	A471U											LAT	Unknown (LATer)	
	A473U	A473U											LAT	Unknown (LATer)	
	A475U	A475U											LAT	Unknown (LATer)	
	A477E	A477E											LAT	Unknown (LATer)	
	A479E	A479E											LAT	Unknown (LATer)	
	A481E	A481E											LAT	Unknown (LATer)	
	A483E	A483E											LAT	Unknown (LATer)	
	A485E	A485E											LAT	Unknown (LATer)	
	A487E	A487E											LAT	Unknown (LATer)	
	A489E	A489E											LAT	Unknown (LATer)	
	A491E	A491E											LAT	Unknown (LATer)	
	A493E	A493E											LAT	Unknown (LATer)	
	A495E	A495E											LAT	Unknown (LATer)	
	A497E	A497E											LAT	Unknown (LATer)	
	A499E	A499E											LAT	Unknown (LATer)	
	A501E	A501E											LAT	Unknown (LATer)	
	A503E	A503E											LAT	Unknown (LATer)	
	A505E	A505E											LAT	Unknown (LATer)	
	A507E	A507E											LAT	Unknown (LATer)	
	A509E	A509E											LAT	Unknown (LATer)	

TABLE A.1. (contd)

Information Supplied by Utilities on Defective Fuel															
Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	(a)											(b)	(c)
			Category												
			1	2	3	4	5	6	7	8	9	LAT			
● Operating Plant (Facility)															
Yankee Rowe (contd)	A511E	A511E											LAT	Unknown (LATER)	
	A513E	A513E											LAT	Unknown (LATER)	
	A515E	A515E											LAT	Unknown (LATER)	
	A517E	A517E											LAT	Unknown (LATER)	
	A519E	A519E											LAT	Unknown (LATER)	
	A521E	A521E											LAT	Unknown (LATER)	
	A523E	A523E											LAT	Unknown (LATER)	
	A525E	A525E											LAT	Unknown (LATER)	
	A527E	A527E											LAT	Unknown (LATER)	
	A529E	A529E											LAT	Unknown (LATER)	
	A531E	A531E											LAT	Unknown (LATER)	
	A533E	A533E											LAT	Unknown (LATER)	
	A535E	A535E											LAT	Unknown (LATER)	
	A537E	A537E											LAT	Unknown (LATER)	
	A539E	A539E											LAT	Unknown (LATER)	
	A541E	A541E											LAT	Unknown (LATER)	
	A543E	A543E											LAT	Unknown (LATER)	
	A545E	A545E											LAT	Unknown (LATER)	
	A547E	A547E											LAT	Unknown (LATER)	
	A549E	A549E											LAT	Unknown (LATER)	
	A551E	A551E											LAT	Unknown (LATER)	
	A553E	A553E											LAT	Unknown (LATER)	
	A555E	A555E											LAT	Unknown (LATER)	
	A557E	A557E											LAT	Unknown (LATER)	
	A559E	A559E											LAT	Unknown (LATER)	
	A561E	A561E											LAT	Unknown (LATER)	
	A563E	A563E											LAT	Unknown (LATER)	
	A565E	A565E											LAT	Unknown (LATER)	

TABLE A.1. (contd)

Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	Information Supplied by Utilities on Defective Fuel											(c) Failure Description
			(a)											
			Category											
			(b)											
			1	2	3	4	5	6	7	8	9	LAT		
● Operating Plant (Facility)														
Yankee Rowe (contd)	A567E	A567E											LAT	Unknown (LATer)
	A569E	A569E											LAT	Unknown (LATer)
	A571E	A571E											LAT	Unknown (LATer)
	A573E	A573E											LAT	Unknown (LATer)
	A575E	A575E											LAT	Unknown (LATer)
	A577E	A577E											LAT	Unknown (LATer)
	A579E	A579E											LAT	Unknown (LATer)
	A581E	A581E											LAT	Unknown (LATer)
	A583E	A583E											LAT	Unknown (LATer)
	A585E	A585E											LAT	Unknown (LATer)
	A587E	A587E											LAT	Unknown (LATer)
	A589E	A589E											LAT	Unknown (LATer)
	A591E	A591E											LAT	Unknown (LATer)
	A593F	A593F											LAT	Unknown (LATer)
	A595F	A595F											LAT	Unknown (LATer)
	A597F	A597F											LAT	Unknown (LATer)
	A599F	A599F											LAT	Unknown (LATer)
	A601F	A601F											LAT	Unknown (LATer)
	A603F	A603F											LAT	Unknown (LATer)
	A605F	A605F											LAT	Unknown (LATer)
	A607F	A607F											LAT	Unknown (LATer)
	A609F	A609F											LAT	Unknown (LATer)
	A611F	A611F											LAT	Unknown (LATer)
	A613F	A613F											LAT	Unknown (LATer)
	A615F	A615F											LAT	Unknown (LATer)
	A617F	A617F											LAT	Unknown (LATer)
	A619F	A619F											LAT	Unknown (LATer)
	A621F	A621F											LAT	Unknown (LATer)

TABLE A.1. (contd)

Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	Information Supplied by Utilities on Defective Fuel												Failure Description
			(a)												
			Category												
			(b)												
			1	2	3	4	5	6	7	8	9	LAT	(c)		
● Operating Plant (Facility)															
Yankee Rowe (contd)	A623F	A623F										LAT	Unknown (LATER)		
	A625F	A625F										LAT	Unknown (LATER)		
	A627F	A627F										LAT	Unknown (LATER)		
	A629G	A629G										LAT	Unknown (LATER)		
	A631G	A631G										LAT	Unknown (LATER)		
	A633G	A633G										LAT	Unknown (LATER)		
	A635G	A635G										LAT	Unknown (LATER)		
	A637G	A637G										LAT	Unknown (LATER)		
	A639G	A639G										LAT	Unknown (LATER)		
	A641G	A641G										LAT	Unknown (LATER)		
	A643G	A643G										LAT	Unknown (LATER)		
	A645G	A645G										LAT	Unknown (LATER)		
	A647G	A647G										LAT	Unknown (LATER)		
	A649G	A649G										LAT	Unknown (LATER)		
	A651G	A651G										LAT	Unknown (LATER)		
	A653G	A653G										LAT	Unknown (LATER)		
	A655G	A655G										LAT	Unknown (LATER)		
	A657G	A657G										LAT	Unknown (LATER)		
	A659G	A659G										LAT	Unknown (LATER)		
	A661G	A661G										LAT	Unknown (LATER)		
	A663G	A663G										LAT	Unknown (LATER)		
	A665G	A665G										LAT	Unknown (LATER)		
	A667G	A667G										LAT	Unknown (LATER)		
	B300	B300										LAT	Unknown (LATER)		
	B305	B305										LAT	Unknown (LATER)		
	B309	B309										LAT	Unknown (LATER)		
	B311	B311										LAT	Unknown (LATER)		
	B335	B335										LAT	Unknown (LATER)		

TABLE A.1. (contd)

Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	Information Supplied by Utilities on Defective Fuel												(c) Failure Description
			(a)												
			Category												
			(b)												
			1	2	3	4	5	6	7	8	9	LAT			
● Operating Plant (Facility)															
Yankee Rowe (contd)	B336	B336											LAT	Unknown (LATER)	
	B337	B337											LAT	Unknown (LATER)	
	B338	B338											LAT	Unknown (LATER)	
	B339	B339											LAT	Unknown (LATER)	
	B340	B340											LAT	Unknown (LATER)	
	B341	B341											LAT	Unknown (LATER)	
	B342	B342											LAT	Unknown (LATER)	
	B343	B343											LAT	Unknown (LATER)	
	B344	B344											LAT	Unknown (LATER)	
	B345	B345											LAT	Unknown (LATER)	
	B346	B346											LAT	Unknown (LATER)	
	B347	B347											LAT	Unknown (LATER)	
	B348	B348											LAT	Unknown (LATER)	
	B349	B349											LAT	Unknown (LATER)	
	B350	B350											LAT	Unknown (LATER)	
	B367	B367											LAT	Unknown (LATER)	
	B368	B368											LAT	Unknown (LATER)	
	B369	B369											LAT	Unknown (LATER)	
	B370	B370											LAT	Unknown (LATER)	
	B371	B371											LAT	Unknown (LATER)	
	B372	B372											LAT	Unknown (LATER)	
	B373	B373											LAT	Unknown (LATER)	
	B374	B374											LAT	Unknown (LATER)	
	B375	B375											LAT	Unknown (LATER)	
	B376	B376											LAT	Unknown (LATER)	
	B377	B377											LAT	Unknown (LATER)	
	B378	B378											LAT	Unknown (LATER)	
	B379	B379											LAT	Unknown (LATER)	

TABLE A.1. (contd)

Information Supplied by Utilities on Defective Fuel																
Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	(a)												(b)	(c)
			Category													
			1	2	3	4	5	6	7	8	9	LAT	Failure Description			
● Operating Plant (Facility)																
Yankee Rowe (contd)	B380	B380											LAT	Unknown (LATer)		
	B381	B381											LAT	Unknown (LATer)		
	B382	B382											LAT	Unknown (LATer)		
	B383	B383											LAT	Unknown (LATer)		
	B384	B384											LAT	Unknown (LATer)		
	B404U	B404U											LAT	Unknown (LATer)		
	B406U	B406U											LAT	Unknown (LATer)		
	B408U	B408U											LAT	Unknown (LATer)		
	B410U	B410U											LAT	Unknown (LATer)		
	B412U	B412U											LAT	Unknown (LATer)		
	B414U	B414U											LAT	Unknown (LATer)		
	B416U	B416U											LAT	Unknown (LATer)		
	B418U	B418U											LAT	Unknown (LATer)		
	B420U	B420U											LAT	Unknown (LATer)		
	B422U	B422U											LAT	Unknown (LATer)		
	B424U	B424U											LAT	Unknown (LATer)		
	B426U	B426U											LAT	Unknown (LATer)		
	B428U	B428U											LAT	Unknown (LATer)		
	B430U	B430U											LAT	Unknown (LATer)		
	B432U	B432U											LAT	Unknown (LATer)		
	B434U	B434U											LAT	Unknown (LATer)		
	B436U	B436U											LAT	Unknown (LATer)		
	B438U	B438U											LAT	Unknown (LATer)		
	B440U	B440U											LAT	Unknown (LATer)		
	B442U	B442U											LAT	Unknown (LATer)		
	B444U	B444U											LAT	Unknown (LATer)		
	B446U	B446U											LAT	Unknown (LATer)		
	B448U	B448U											LAT	Unknown (LATer)		

TABLE A.1. (contd)

Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	Information Supplied by Utilities on Defective Fuel												(c) Failure Description
			(a)												
			Category												
			(b)												
1	2	3	4	5	6	7	8	9	LAT						
● Operating Plant (Facility)															
Yankee Rowe (contd)	B450U	B450U										LAT	Unknown (LATer)		
	B452U	B452U										LAT	Unknown (LATer)		
	B454U	B454U										LAT	Unknown (LATer)		
	B456U	B456U										LAT	Unknown (LATer)		
	B458U	B458U										LAT	Unknown (LATer)		
	B460U	B460U										LAT	Unknown (LATer)		
	B462U	B462U										LAT	Unknown (LATer)		
	B464U	B464U										LAT	Unknown (LATer)		
	B466U	B466U										LAT	Unknown (LATer)		
	B468U	B468U										LAT	Unknown (LATer)		
	B470U	B470U										LAT	Unknown (LATer)		
	B472U	B472U										LAT	Unknown (LATer)		
	B474U	B474U										LAT	Unknown (LATer)		
	B476E	B476E										LAT	Unknown (LATer)		
	B478E	B478E										LAT	Unknown (LATer)		
	B480E	B480E										LAT	Unknown (LATer)		
	B482E	B482E										LAT	Unknown (LATer)		
	B484E	B484E										LAT	Unknown (LATer)		
	B486E	B486E										LAT	Unknown (LATer)		
	B488E	B488E										LAT	Unknown (LATer)		
	B490E	B490E										LAT	Unknown (LATer)		
	B492E	B492E										LAT	Unknown (LATer)		
	B494E	B494E										LAT	Unknown (LATer)		
	B496E	B496E										LAT	Unknown (LATer)		
	B498E	B498E										LAT	Unknown (LATer)		
	B500E	B500E										LAT	Unknown (LATer)		
	B502E	B502E										LAT	Unknown (LATer)		
	B504E	B504E										LAT	Unknown (LATer)		

TABLE A.1. (contd)

Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	Information Supplied by Utilities on Defective Fuel												Failure Description
			(a)												
			Category												
			(b)												
			1	2	3	4	5	6	7	8	9	LAT	(c)		
● Operating Plant (Facility)															
Yankee Rowe (contd)	B506E	B506E										LAT	Unknown (LATer)		
	B508E	B508E										LAT	Unknown (LATer)		
	B510E	B510E										LAT	Unknown (LATer)		
	B512E	B512E										LAT	Unknown (LATer)		
	B514E	B514E										LAT	Unknown (LATer)		
	B516E	B516E										LAT	Unknown (LATer)		
	B518E	B518E										LAT	Unknown (LATer)		
	B520E	B520E										LAT	Unknown (LATer)		
	B522E	B522E										LAT	Unknown (LATer)		
	B524E	B524E										LAT	Unknown (LATer)		
	B526E	B526E										LAT	Unknown (LATer)		
	B528E	B528E										LAT	Unknown (LATer)		
	B530E	B530E										LAT	Unknown (LATer)		
	B532E	B532E										LAT	Unknown (LATer)		
	B534E	B534E										LAT	Unknown (LATer)		
	B536E	B536E										LAT	Unknown (LATer)		
	B538E	B538E										LAT	Unknown (LATer)		
	B540E	B540E										LAT	Unknown (LATer)		
	B542E	B542E										LAT	Unknown (LATer)		
	B544E	B544E										LAT	Unknown (LATer)		
	B546E	B546E										LAT	Unknown (LATer)		
	B548E	B548E										LAT	Unknown (LATer)		
	B550E	B550E										LAT	Unknown (LATer)		
	B552E	B552E										LAT	Unknown (LATer)		
	B554E	B554E										LAT	Unknown (LATer)		
	B556E	B556E										LAT	Unknown (LATer)		
	B558E	B558E										LAT	Unknown (LATer)		
	B560E	B560E										LAT	Unknown (LATer)		

TABLE A.1. (contd)

Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	Information Supplied by Utilities on Defective Fuel												(c) Failure Description
			(a)												
			Category												
			(b)												
			1	2	3	4	5	6	7	8	9	LAT			
● Operating Plant (Facility)															
Yankee Rowe (contd)	B562E	B562E											LAT	Unknown (LATer)	
	B564E	B564E											LAT	Unknown (LATer)	
	B566E	B566E											LAT	Unknown (LATer)	
	B568E	B568E											LAT	Unknown (LATer)	
	B570E	B570E											LAT	Unknown (LATer)	
	B572E	B572E											LAT	Unknown (LATer)	
	B574E	B574E											LAT	Unknown (LATer)	
	B576E	B576E											LAT	Unknown (LATer)	
	B578E	B578E											LAT	Unknown (LATer)	
	B580E	B580E											LAT	Unknown (LATer)	
	B582E	B582E											LAT	Unknown (LATer)	
	B584E	B584E											LAT	Unknown (LATer)	
	B586E	B586E											LAT	Unknown (LATer)	
	B588E	B588E											LAT	Unknown (LATer)	
	B590E	B590E											LAT	Unknown (LATer)	
	B592F	B592F											LAT	Unknown (LATer)	
	B594F	B594F											LAT	Unknown (LATer)	
	B596F	B596F											LAT	Unknown (LATer)	
	B598F	B598F											LAT	Unknown (LATer)	
	B600F	B600F											LAT	Unknown (LATer)	
	B602F	B602F											LAT	Unknown (LATer)	
	B604F	B604F											LAT	Unknown (LATer)	
	B606F	B606F											LAT	Unknown (LATer)	
	B608F	B608F											LAT	Unknown (LATer)	
	B610F	B610F											LAT	Unknown (LATer)	
	B612F	B612F											LAT	Unknown (LATer)	
	B614F	B614F											LAT	Unknown (LATer)	
	B616F	B616F											LAT	Unknown (LATer)	

TABLE A.1. (contd)

Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	Information Supplied by Utilities on Defective Fuel												(c) Failure Description
			(a)												
			Category												
			(b)												
			1	2	3	4	5	6	7	8	9	LAT			
● Operating Plant (Facility)															
Yankee Rowe (contd)	B618F	B618F											LAT	Unknown (LATER)	
	B620F	B620F											LAT	Unknown (LATER)	
	B622F	B622F											LAT	Unknown (LATER)	
	B624F	B624F											LAT	Unknown (LATER)	
	B626F	B626F											LAT	Unknown (LATER)	
	B628G	B628G											LAT	Unknown (LATER)	
	B630G	B630G											LAT	Unknown (LATER)	
	B632G	B632G											LAT	Unknown (LATER)	
	B634G	B634G											LAT	Unknown (LATER)	
	B636G	B636G											LAT	Unknown (LATER)	
	B638G	B638G											LAT	Unknown (LATER)	
	B640G	B640G											LAT	Unknown (LATER)	
	B642G	B642G											LAT	Unknown (LATER)	
	B644G	B644G											LAT	Unknown (LATER)	
	B646G	B646G											LAT	Unknown (LATER)	
	B648G	B648G											LAT	Unknown (LATER)	
	B650G	B650G											LAT	Unknown (LATER)	
	B652G	B652G											LAT	Unknown (LATER)	
	B654G	B654G											LAT	Unknown (LATER)	
	B656G	B656G											LAT	Unknown (LATER)	
	B658G	B658G											LAT	Unknown (LATER)	
	B660G	B660G											LAT	Unknown (LATER)	
	B662G	B662G											LAT	Unknown (LATER)	
	B664G	B664G											LAT	Unknown (LATER)	
	B666G	B666G											LAT	Unknown (LATER)	

TABLE A.1. (contd)

Plant or (Facility)	Batch No.	Fuel Assembly Identification No.	Information Supplied by Utilities on Defective Fuel											Failure Description
			(a)											
			Category											
			(b)											
			1	2	3	4	5	6	7	8	9	LAT	(c)	

● Operating Plant (Facility)

Zion-2

● Plants that are Shutdown

Dresden-1

Humboldt Bay-3

Indian Point-1

(a) Categories:

Used In Table A.1	Categories Used in EIA's RW-859 File	Categories Used in NHPA, 10 CFR961	Description
1	1	F-1	Visually observed failure or damage.
2	2	F-3	Encapsulated or other remedial action taken.
3	3	--	Requires special handling.
4	4	--	Cannot be consolidated.
5	5	--	Physically deformed.
6	6	--	Does not fit in pool rack.
7	7	--	Cladding damage (mechanical, chemical, or other - possibly detectable by ultrasonic testing).
8	--	F-2	Radioactive "leakage".
9	9	--	Other.

(b) Defective fuel category listed as "LAT" (i.e., information to be supplied LATer) and description listed as "Unknown, information to be supplied LATer."

(c) Comments in addition to those descriptions associated with the categories that are used in the table.

(d) Licensed for fuel loading and low power testing (see NUREG-0020, Vol. 10, No. 12, December 1986).

(e) In power ascension (see NUREG-0020, Vol. 10, No. 12, December 1986).

(f) Also known as Connecticut Yankee.

TABLE A.1. (contd)

- (g) This fuel assembly is not present on the April 15, 1987, composite data tape (EIA's RW-859 Spent Fuel Survey) that PNL received from DOE's Energy Information Administration (EIA).
- (h) West Valley Demonstration Project at the Western New York Nuclear Service Center, which is located at West Valley, New York, and is managed by West Valley Nuclear Services Co., Inc. (built and previously operated by Nuclear Fuel Services).

APPENDIX B

BURNUP DISTRIBUTIONS FOR DEFECTIVE FUEL ASSEMBLIES
AT VARIOUS DOMESTIC COMMERCIAL REACTORS FOR
SPECIFIC YEARS (1969-1986)

APPENDIX B

BURNUP DISTRIBUTIONS FOR DEFECTIVE FUEL ASSEMBLIES AT VARIOUS DOMESTIC COMMERCIAL REACTORS FOR SPECIFIC YEARS (1969-1986)

Burnup distributions for defective fuel assemblies at various domestic commercial reactors for specific years during the period 1969-1986 are provided in comprehensive tables in this Appendix.

TABLE B.1. Burnup Distribution for Defective Fuel Assemblies for Reactors Where Year Not Stated^(a)

Reactor	No. of Fuel Assemblies										Total	
	Burnup Range, MWd/MTU											
	0- 5,000	5,000- 10,000	10,000- 15,000	15,000- 20,000	20,000- 25,000	25,000- 30,000	30,000- 35,000	35,000- 40,000	40,000- 45,000	BWR	PWR	
Prairie Island-1									1		1	

(a) Source: printout (dated November 19, 1986) from EIA with RW-859 data supplied by utilities to DOE.

TABLE B.2. Burnup Distribution for Defective Fuel Assemblies for Reactors in 1969^(a)

Reactor	No. of Fuel Assemblies										Total	
	Burnup Range, MWd/MTU											
	0- 5,000	5,000- 10,000	10,000- 15,000	15,000- 20,000	20,000- 25,000	25,000- 30,000	30,000- 35,000	35,000- 40,000	40,000- 45,000	BWR	PWR	
Dresden-1		2	14	16							32	

(a) Source: printout (dated November 19, 1986) from EIA with RW-859 data supplied by utilities to DOE.

TABLE B.3. Burnup Distribution for Defective Fuel Assemblies for Reactors in 1970^(a)

Reactor	No. of Fuel Assemblies										Total	
	Burnup Range, MWd/MTU											
	0- 5,000	5,000- 10,000	10,000- 15,000	15,000- 20,000	20,000- 25,000	25,000- 30,000	30,000- 35,000	35,000- 40,000	40,000- 45,000	BWR	PWR	
No data supplied to EIA												

(a) Source: printout (dated November 19, 1986) from EIA with RW-859 data supplied by utilities to DOE.

TABLE B.4. Burnup Distribution for Defective Fuel Assemblies for Reactors in 1971^(a)

Reactor	No. of Fuel Assemblies										Total	
	Burnup Range, MWd/MTU											
	0- 5,000	5,000- 10,000	10,000- 15,000	15,000- 20,000	20,000- 25,000	25,000- 30,000	30,000- 35,000	35,000- 40,000	40,000- 45,000	BWR	PWR	
Dresden-1			13	14	1						28	
Dresden-2	70										70	
Nine Mile Point-1		17									17	
											115	

(a) Source: printout (dated November 19, 1986) from EIA with RW-859 data supplied by utilities to DOE.

TABLE B.5. Burnup Distribution for Defective Fuel Assemblies for Reactors in 1972^(a)

Reactor	No. of Fuel Assemblies										Total	
	Burnup Range, MWd/MTU											
	0- 5,000	5,000- 10,000	10,000- 15,000	15,000- 20,000	20,000- 25,000	25,000- 30,000	30,000- 35,000	35,000- 40,000	40,000- 45,000	BWR	PWR	
Dresden-2	2									2		
La Crosse			6							6		
Millstone-1	1	27								28		
Nine Mile Point-1		29								29		
Point Beach-1				21	2						23	
San Onofre-1						2					2	
Yankee-Rowe				4	16	16				36		
										65	61	

(a) Source: printout (dated November 19, 1986) from EIA with RW-859 data supplied by utilities to DOE.

TABLE B.6. Burnup Distribution for Defective Fuel Assemblies for Reactors in 1973^(a)

Reactor	No. of Fuel Assemblies										Total	
	Burnup Range, MWd/MTU											
	0- 5,000	5,000- 10,000	10,000- 15,000	15,000- 20,000	20,000- 25,000	25,000- 30,000	30,000- 35,000	35,000- 40,000	40,000- 45,000	BWR	PWR	
Dresden-1				30	16					46		
Dresden-3	1	50								51		
La Crosse		8	27	5						40		
Nine Mile Point-1			104							104		
Monticello		13								13		
Pilgrim	1	15								16		
San Onofre-1				3							3	
Vermont Yankee	50									50		
										320	3	

(a) Source: printout (dated November 19, 1986) from EIA with RW-859 data supplied by utilities to DOE.

TABLE B.7. Burnup Distribution for Defective Fuel Assemblies for Reactors in 1974^(a)

Reactor	No. of Fuel Assemblies										Total	
	Burnup Range, MWd/MTU										BWR	PWR
	0- 5,000	5,000- 10,000	10,000- 15,000	15,000- 20,000	20,000- 25,000	25,000- 30,000	30,000- 35,000	35,000- 40,000	40,000- 45,000			
Big Rock Point		4	9	2							15	
Dresden-2		1	37								38	
Dresden-3		5	27								32	
Millstone-1		3	26								29	
Monticello		2	84								86	
Nine Mile Point-1			4	27							31	
Oconee-1			7									7
Point Beack-1					3	9	9					21
Quad Cities-1		29									29	
Quad Cities-2			74								74	
Surry-1			2	1								3
Vermont Yankee	6	216	106								328	
Yankee-Rowe	1				12	20	4					
											662	68

(a) Source: printout (dated November 19, 1986) from EIA with RW-859 data supplied by utilities to DOE.

TABLE B.8. Burnup Distribution for Defective Fuel Assemblies for Reactors in 1975^(a)

Reactor	No. of Fuel Assemblies										Total	
	Burnup Range, MWd/MTU											
	0- 5,000	5,000- 10,000	10,000- 15,000	15,000- 20,000	20,000- 25,000	25,000- 30,000	30,000- 35,000	35,000- 40,000	40,000- 45,000	BWR	PWR	
Dresden-1	1	3	10	3	4					21		
Dresden-3			113							113		
Duane Arnold	1	1								2		
La Crosse		1	6		4					11		
Millstone-1			24	15						39		
Monticello		1	47	75	3					126		
Nine Mile Point-1			3	34	18					55		
Point Beach-1					2						2	
Surry-1				4	8						12	
Surry-2				3							3	
Yankee-Rowe					7	25	8				40	
										367	57	

(a) Source: printout (dated November 19, 1986) from EIA with RW-859 data supplied by utilities to DOE.

TABLE B.9. Burnup Distribution for Defective Fuel Assemblies for Reactors in 1976^(a)

Reactor	No. of Fuel Assemblies										Total	
	Burnup Range, MWd/MTU											
	0- 5,000	5,000- 10,000	10,000- 15,000	15,000- 20,000	20,000- 25,000	25,000- 30,000	30,000- 35,000	35,000- 40,000	40,000- 45,000	BWR	PWR	
Big Rock Point	1		3	5						9		
Cook-1				2							2	
Dresden-2				2						2		
Dresden-3				27						27		
Millstone-1				8						8		
Peachbottom-2		4	20							24		
Peachbottom-3			3							3		
Pilgrim		25	103							128		
Point Beach-1						1					1	
Point Beach-2							1				1	
Quad Cities-1		1	2	31						34		
Quad Cities-2		19	92	42						153		
Surry-1				5	14						19	
Surry-2			1		2	7					10	
Zion-1				45							45	
										388	78	

(a) Source: printout (dated November 19, 1986) from EIA with RW-859 data supplied by utilities to DOE.

TABLE B.10. Burnup Distribution for Defective Fuel Assemblies for Reactors in 1977^(a)

Reactor	No. of Fuel Assemblies										Total	
	Burnup Range, MWd/MTU											
	0- 5,000	5,000- 10,000	10,000- 15,000	15,000- 20,000	20,000- 25,000	25,000- 30,000	30,000- 35,000	35,000- 40,000	40,000- 45,000	BWR	PWR	
Browns Ferry-1			6							6		
Dresden-1				3	13					16		
Dresden-2					17					17		
Hatch-1			2							2		
La Crosse		1	2	23						26		
Nine Mile Point-1				4	7					11		
Oconee-2				1	10	5					16	
Peachbottom-2				12						12		
Pilgrim				1						1		
Quad Cities-1				16						16		
Vermont Yankee				102	10					112		
Yankee-Rowe					1	23	12				36	
Zion-2				19								
										219	71	

(a) Source: printout (dated November 19, 1986) from EIA with RW-859 data supplied by utilities to DOE.

TABLE B.11. Burnup Distribution for Defective Fuel Assemblies for Reactors in 1978^(a)

Reactor	No. of Fuel Assemblies										Total	
	Burnup Range, MWd/MTU											
	0- 5,000	5,000- 10,000	10,000- 15,000	15,000- 20,000	20,000- 25,000	25,000- 30,000	30,000- 35,000	35,000- 40,000	40,000- 45,000		BWR	PWR
Browns Ferry-1		2	5	9							16	
Browns Ferry-2		2	1								3	
Browns Ferry-3			1								1	
Dresden-1		2	5	2	15	1					25	
Dresden-3				5	4						9	
Duane Arnold			1	3							4	
Hatch-1			3								3	
Millstone-1				4	5						9	
Oconee-1						3	1					4
Peachbottom-3			1	2							3	
Point Beach-1						1						1
Quad Cities-2				5	32						37	
San Onofre-1							1					1
Surry-1						3	3					6
Trojan				3								3
Vermont Yankee				90	16						106	
Yankee-Rowe					8	20	12					40
Zion-1								60				60
Zion-2							56					
											216	171

(a) Source: printout (dated November 19, 1986) from EIA with RW-859 data supplied by utilities to DOE.

TABLE B.12. Burnup Distribution for Defective Fuel Assemblies for Reactors in 1979^(a)

Reactor	No. of Fuel Assemblies										Total	
	Burnup Range, MWd/MTU										BWR	PWR
	0- 5,000	5,000- 10,000	10,000- 15,000	15,000- 20,000	20,000- 25,000	25,000- 30,000	30,000- 35,000	35,000- 40,000	40,000- 45,000			
Browns Ferry-2				2						2		
Brunswick-1			1							1		
Brunswick-2			3	1						4		
Cook-1					2							2
Cook-2				1								1
Dresden-2				3						3		
Farley-1				1								1
Haddam Neck						1	27	8				36
Hatch-1				3	1					4		
La Crosse			17							17		
North Anna-1				1								1
Peach Bottom-3				1	14					15		
Quad Cities-1				1	16	7				24		
Quad Cities-2					1	20				21		
Surry-2							1					1
Vermont Yankee				105	75	2				182		
Zion-1					1		60					61
										273		103

(a) Source: printout (dated November 19, 1986) from EIA with RW-859 data supplied by utilities to DOE.

TABLE B.13. Burnup Distribution for Defective Fuel Assemblies for Reactors in 1980^(a)

Reactor	No. of Fuel Assemblies										Total	
	Burnup Range, MWd/MTU											
	0- 5,000	5,000- 10,000	10,000- 15,000	15,000- 20,000	20,000- 25,000	25,000- 30,000	30,000- 35,000	35,000- 40,000	40,000- 45,000	BWR	PWR	
Browns Ferry-1		1	2	5	6	1				15		
Brunswick-2		1		12						13		
Dresden-3					14					14		
Haddam Neck							3	4			7	
La Crosse				1						1		
Vermont Yankee					60	32				92		
Zion-2					2		48				50	
										135	57	

(a) Source: printout (dated November 19, 1986) from EIA with RW-859 data supplied by utilities to DOE.

TABLE B.14. Burnup Distribution for Defective Fuel Assemblies for Reactors in 1981^(a)

Reactor	No. of Fuel Assemblies										Total	
	Burnup Range, MWd/MTU											
	0- 5,000	5,000- 10,000	10,000- 15,000	15,000- 20,000	20,000- 25,000	25,000- 30,000	30,000- 35,000	35,000- 40,000	40,000- 45,000		BWR	PWR
Arkansas-1			4	2	4	6	3					19
Arkansas-2			3									3
Browns Ferry-1		1	1		2	6				10		
Cook-1							1					1
Cook-2						2						2
Dresden-2						1				1		
Duane Arnold				1						1		
Hatch-1				4	25					29		
Oconee-2								1				1
Surry-2					1	2						3
Vermont Yankee				4	32	84				120		
Yankee-Rowe						24	12					36
Zion-1							62					62
Zion-2					3		61					64
										161	191	

(a) Source: printout (dated November 19, 1986) from EIA with RW-859 data supplied by utilities to DOE.

TABLE B.15. Burnup Distribution for Defective Fuel Assemblies for Reactors in 1982^(a)

Reactor	No. of Fuel Assemblies										Total	
	Burnup Range, MWd/MTU											
	0- 5,000	5,000- 10,000	10,000- 15,000	15,000- 20,000	20,000- 25,000	25,000- 30,000	30,000- 35,000	35,000- 40,000	40,000- 45,000	BWR	PWR	
Arkansas-1				1	3	1					5	
Arkansas-2					1	1					2	
Browns Ferry-2					17	10	1			28		
Brunswick-2				2						2		
Cook-2			1	4	4						9	
Hatch-1			6	11						17		
Hatch-2			5	3						8		
La Crosse			1							1		
North Anna-1					2						2	
North Anna-2				2							2	
Point Beach-2					1						1	
Salem-1					1		1				2	
Yankee-Rowe					7	17	16				40	
Zion-1							47				47	
										56	110	

(a) Source: printout (dated November 19, 1986) from EIA with RW-859 data supplied by utilities to DOE.

TABLE B.16. Burnup Distribution for Defective Fuel Assemblies for Reactors in 1983^(a)

Reactor	No. of Fuel Assemblies										Total	
	Burnup Range, MWd/MTU										BWR	PWR
	0- 5,000	5,000- 10,000	10,000- 15,000	15,000- 20,000	20,000- 25,000	25,000- 30,000	30,000- 35,000	35,000- 40,000	40,000- 45,000			
Browns Ferry-1			2			7	4				13	
Dresden-2					1	1					2	
Farley-1		11	1	2		1						15
Hatch-1			1		8						9	
Hatch-2			1								1	
Millstone-2		3	5		6							14
Point Beach-1				1		2	6	1				10
Point Beach-2				1								1
Surry-1					3	5	12	11				31
Surry-2						1	1	2	2			6
Turkey Point-3						3	5	1				9
Vermont Yankee						74	32				106	
Zion-1								13				
											131	99

(a) Source: printout (dated November 19, 1986) from EIA with RW-859 data supplied by utilities to DOE.

TABLE B.17. Burnup Distribution for Defective Fuel Assemblies for Reactors in 1984^(a)

Reactor	No. of Fuel Assemblies										Total	
	Burnup Range, MWd/MTU											
	0- 5,000	5,000- 10,000	10,000- 15,000	15,000- 20,000	20,000- 25,000	25,000- 30,000	30,000- 35,000	35,000- 40,000	40,000- 45,000	BWR	PWR	
Big Rock Point			3							3		
Brunswick-2		1			1					2		
Farley-1			2			1					3	
Hatch-1		1				5				6		
Hatch-2			4	1	14					19		
North Anna-1			2	4	1	3	7				17	
North Anna-2					1		3	1			5	
Oconee-3						1					1	
Point Beach-2			1					1			2	
Quad Cities-1						1				1		
Surry-1						1	1	4			6	
Vermont Yankee						86	20			106		
Yankee-Rowe						28	8				36	
Zion-2							63				63	
										137	133	

(a) Source: printout (dated November 19, 1986) from EIA with RW-859 data supplied by utilities to DOE.

TABLE B.18. Burnup Distribution for Defective Fuel Assemblies for Reactors in 1985^(a)

Reactor	No. of Fuel Assemblies										Total	
	Burnup Range, MWd/MTU											
	0- 5,000	5,000- 10,000	10,000- 15,000	15,000- 20,000	20,000- 25,000	25,000- 30,000	30,000- 35,000	35,000- 40,000	40,000- 45,000	BWR	PWR	
Big Rock Point					1	1				2		
Cook-1				1		13	1	8			23	
Hatch-2					1					1		
North Anna-1							1				1	
Peachbottom-3						73	21			94		
Point Beach-1					2	1		1			4	
Point Beach-2						1	1				2	
Surry-2								3			3	
Yankee-Rowe						24	16				40	
										97	73	

(a) Source: printout (dated November 19, 1986) from EIA with RW-859 data supplied by utilities to DOE.

TABLE B.19 Burnup Distribution for Defective Fuel Assemblies for Reactors in 1986^(a,b)

Reactor	No. of Fuel Assemblies										Total	
	Burnup Range, MWd/MTU											
	0- 5,000	5,000- 10,000	10,000- 15,000	15,000- 20,000	20,000- 25,000	25,000- 30,000	30,000- 35,000	35,000- 40,000	40,000- 45,000	BWR	PWR	
Millstone-2						8	10				18	
Surry-1			1	1							2	
Trojan		10	2	3	1						16	
Turkey Point-3			2	2	1						5	
										0	41	

(a) Source: printout (dated November 19, 1986) from EIA with RW-859 data supplied by utilities to DOE.

(b) Temporary (contains data for only a portion of 1986).

APPENDIX C

SPENT FUEL STORAGE POOLS THAT HAVE OR PLAN TO HAVE
SPECIFIC SPACE FOR STORING FAILED FUEL ASSEMBLIES

APPENDIX C

SPENT FUEL STORAGE POOLS THAT HAVE OR PLAN TO HAVE SPECIFIC SPACE FOR STORING FAILED FUEL ASSEMBLIES

This appendix consists of a table that provides details on plants or facilities that have or plan to have specific storage pool space for storing failed fuel assemblies.

TABLE C.1. Spent Fuel Storage Pools that Have or Plan to Have Specific Space for Storing Failed Fuel Assemblies

Domestic Power Plant (Spent Fuel Storage Facility)	Plant Type		Present/Max. Pool Capacity ^(a)	Comments on Pools that Provide Specific Space for Storing Failed Fuel	FSAR ^(b) Reference No. (Issue Date)
	BWR	PWR			
● Operating Plant (Facility)					
Arkansas-1		X	968/968	In addition, there is one position for a failed fuel element container.	U313-09-001 (November 1984)
Arkansas-2		X	988/988	No statement in FSAR.	U368-09-001 (February 1985)
Beaver Valley-1		X	833/835	If sampling ^(c) shows the presence of fission products indicative of a cladding failure, the fuel element is placed in a failed fuel storage can, which is removed to the spent fuel storage racks to await shipment.	334-09-001 (83-00) (1983)
Big Rock Point	X		193/441	No statement in FSAR.	Amendment No. 70
Browns Ferry-1	X		3471/3471 ^(d)	In addition, there are five extra positions in the pool for storage of defective fuel.	U259-09-001 (February 1985)
Browns Ferry-2	X		2119/3471 ^(d)	In addition, there are five extra positions in the pool for storage of defective fuel.	U259-09-001 (February 1985)
Browns Ferry-3	X		1958/3471	In addition, there are five extra positions in the pool for storage of defective fuel.	U259-09-001 (February 1985)
Brunswick-1	X		1325/1803 (BWR) 160/160 (PWR)	No statement in FSAR.	324-09-001 (November 1984)
Brunswick-2	X		1361/1839 (BWR) 144/144 (PWR)	No statement in FSAR.	324-09-001 (November 1984)
Byron-1 ^(e)		X	1050/1050	In addition, the failed fuel rack provides storage for 10 failed (or damaged) fuel assemblies.	454-09-001 (October 1984)
Callaway-1		X	1340/1340	No statement in FSAR.	483-09-001 (February 1985)
Calvert Cliffs-1		X	830/830 ^(f)	No statement in FSAR.	U317-09-001 (November 1984)

TABLE C.1. (contd)

Domestic Power Plant (Spent Fuel Storage Facility)	Plant Type		Present/Max. Pool Capacity ^(a)	Comments on Pools that Provide Specific Space for Storing Failed Fuel	FSAR ^(b) Reference No. (Issue Date)
	BWR	PWR			
Calvert Cliffs-2		X	1000/1000 ^(f)	No statement in FSAR.	U317-09-001 (November 1984)
Catawba-1		X	1418/3100	No statement in FSAR.	413-09-001 (August 1985)
Cook-1 and -2 ^(g)		X	2048/2270	No statement in FSAR.	U315-09-001 (August 1985)
Cooper	X		2366/2366	No statement in FSAR.	U298-10-001 (December 1984)
Crystal River-3		X	676/1157	In addition, there are 16 spaces for failed fuel containers. If sampling shows the presence of fission products indicative of cladding failures, the fuel element may be transferred to the spent fuel pool in a transfer container, which will prevent the gross dispersion fuel particles in the transfer carriage.	302-09-001 (1983)
Davis Besse-1		X	735/735	The stated capacity includes 15 failed fuel containers.	U346-09-001 (October 1984)
Diablo Canyon-1		X	270/1311	No statement in FSAR.	U275-09-001 (December 1984)
Diablo Canyon-2		X	270/1311	No statement in FSAR.	U275-09-001 (December 1984)
Dresden-2	X		2880/3537	No statement in FSAR.	U237-10-001 (August 1984)
Dresden-3	X		2880/3537	No statement in FSAR.	U237-10-001 (August 1984)
Duane Arnold	X		2050/2050	The unsalvageable failed fuel assemblies will be stored in the spent fuel storage racks for cooling before shipment to a reprocessing plant.	U331-09-001 (October 1984)
Farley-1		X	1407/1407	In addition, loose fuel pellets and fuel rod debris from fuel rod failures may be stored in a pellet canister trap inside a transport container in the spent fuel storage racks.	U348-09-001 (November 1985)

TABLE C.1. (contd)

Domestic Power Plant (Spent Fuel Storage Facility)	Plant Type		Present/Max. Pool Capacity ^(a)	Comments on Pools that Provide Specific Space for Storing Failed Fuel	FSAR ^(b) Reference No. (Issue Date)
	BWR	PWR			
Farley-2		X	1407/1407	In addition, loose fuel pellets and fuel rod debris from fuel rod failures may be stored in a pellet canister trap inside a transport container in the spent fuel storage racks.	U348-09-001 (November 1985)
Fermi-2		X	2305/2305	In addition, a stainless steel rack provides positions for 31 defective fuel assemblies and/or control rods and 4 storage cells for control rod guide tubes.	341-09-001 (March 1985)
Fitzpatrick		X	2244/2244	A special rack in the northeast corner of the spent fuel pool was installed to contain "failed fuel" assemblies.	U333-09-001 (September 1985)
Ft. Calhoun-1		X	729/729	No statement in FSAR.	U285-09-001 (October 1984)
(GE-Morris Operation)	X	X	3735/3735 (BWR) 1660/1660 (PWR)	Several hundred Zircaloy-clad fuel assemblies that developed one or more defects in-reactor are stored in the pool without need for isolation in special cans.	U282-10-001 (February 1985); also see BNWL-2256
Ginna		X	595/1015	No statement in FSAR.	U244-09-001 (March 1985)
Grand Gulf-1		X	1440/5148	In addition, the racks have the capacity to hold 9 defective fuel containers, 18 control rods, and 9 control rod guide tubes.	U416-09-001 (March 1986)
Haddam Neck ^(h)		X	1168/1168	No statement in FSAR.	213-05-001 (1983)
Hatch-1		X	3181/3181 ⁽ⁱ⁾	No statement in FSAR.	321-10-001 (1983) and U366-09-001 (November 1984)
Hatch-2		X	2765/2845 ⁽ⁱ⁾	The stated capacity includes 10 locations for defective fuel. Defective fuel assemblies are placed in defective fuel storage containers, which in turn are normally stored in the defective fuel storage rack.	U366-09-001 (November 1984)

TABLE C.1. (contd)

Domestic Power Plant (Spent Fuel Storage Facility)	Plant Type		Present/Max. Pool Capacity ^(a)	Comments on Pools that Provide Specific Space for Storing Failed Fuel	FSAR ^(b) Reference No. (Issue Date)
	BWR	PWR			
Indian Point-2		X	980/980	Space is provided to accommodate two failed fuel cans. The spent fuel storage pit is designed for underwater storage of spent fuel assemblies, failed fuel cans if required, and control rods after removal from the reactor.	U247-09-001 (October 1984)
Indian Point-3		X	840/840	Includes space to accommodate three failed fuel cans.	U286-09-001 (November 1984)
Kewaunee		X	603/963	If sampling ^(c) shows the presence of products indicative of cladding failure, the sampling lines are closed off by valves on the can and the encapsulated fuel assembly is removed to the spent fuel storage pool to await shipment.	305-09-001 (1983)
LaCrosse	X		440/440	No statement in FSAR.	U409-05-001 (February 1986)
LaSalle-1	X		1080/1080 ^(j)	No statement in FSAR.	U373-09-001 (September 1985)
LaSalle-2	X		1080/1080 ^(j)	No statement in FSAR.	U373-09-001 (September 1985)
Limerick-1	X		2040/2862	Defective fuel assemblies are placed in defective fuel storage containers, which in turn are stored in the defective fuel storage racks (number of containers and racks not stated).	352-09-001 (June 1985)
Maine Yankee		X	945/1476	No statement in FSAR.	U309-09-001 (November 1985)
McGuire-1		X	500/1463	No statement in FSAR.	369-09-001 (October 1985)
McGuire-2		X	1463/1463	No statement in FSAR.	369-09-001 (October 1985)
Millstone-1	X		2184/2184	Space is provided to accommodate 8 special containers for defective fuel bundles.	245-10-001 (December 1985)
Millstone-2		X	667/667	No statement in FSAR.	U336-09-001 (November 1984)

TABLE C.1. (contd)

Domestic Power Plant (Spent Fuel Storage Facility)	Plant Type		Present/Max. Pool Capacity ^(a)	Comments on Pools that Provide Specific Space for Storing Failed Fuel	FSAR ^(b) Reference No. (Issue Date)
	BWR	PWR			
Millstone-3		X	756/756	No statement in FSAR.	423-09-001 (March 1986)
Monticello		X	2217/2237	The spent fuel storage pool holds, in addition to the fuel assemblies, defective fuel containers (number not stated), control rod blades on temporary storage hangers, temporary control curtains, used flow channels, and small reactor vessel components to provide for a complete core unloading.	U263-10-001 (December 1984)
Nine Mile Point-1		X	2776/3000	No statement in FSAR.	U220-10-001 (March 1985)
North Anna-1 and -2 ^(g)		X	966/1737	No statement in FSAR.	U338-09-001 (September 1985)
Oconee-1 and -2 ^(g)		X	1312/1312	Suspected defective fuel is removed from the core and tested for leakage. Leakage verification will utilize a container that can be sealed and allow for sampling of fission products. If sampling shows the presence of fission products indicative of cladding failures, the fuel element may be transferred to the spent fuel pool in a transfer container, which will prevent the gross dispersion of fuel particles in the transfer carriage. The defective assemblies may be stored to await shipment utilizing required precautions to minimize release of fission products.	269-09-001 (April 1984)
Oconee-3		X	474/825	Included in the 825 spaces are 3 failed fuel locations. Suspected defective fuel is removed from the core and tested for leakage. Leakage verification will utilize a container that can be sealed and allow for sampling of fission products. If sampling shows the presence of fission products indicative of cladding failure, the fuel element may be transferred to the spent fuel pool in a transfer container, which will prevent the gross dispersion of fuel particles in the transfer carriage. The defective assemblies may be stored to await shipment utilizing required precautions to minimize release of fission products.	269-09-001 (April 1984)

TABLE C.1. (contd)

Domestic Power Plant (Spent Fuel Storage Facility)	Plant Type		Present/Max ^(a) Pool Capacity	Comments on Pools that Provide Specific Space for Storing Failed Fuel	FSAR ^(b) Reference No. (Issue Date)
	BWR	PWR			
Oyster Creek	X		1370/2600	The defective fuel storage container is a remotely sealable container sized to contain a complete fuel assembly after removal from the core and confirmation by sipping that a fuel assembly is defective. The container is built to be stored in the defective fuel storage rack (a control rod storage rack set aside for defective fuel). The container is designed so that a complete fuel assembly can be inserted and the fastener and channel subsequently removed to prevent loss of broken cladding or fuel fragments into the pool and environment.	U219-09-001 (May 1985)
Palisades		X	798/798	Control rods and dimensionally abnormal fuel assemblies may be stored in one rack with slightly larger cans than those used in other racks.	U255-09-001 (September 1984)
Palo Verde-1		X	665/1329	No statement in FSAR.	528-09-001 (June 1985)
Peach Bottom-2	X		2608/2608	No statement in FSAR.	U277-10-001 (October 1984)
Peach Bottom-3	X		2608/2608	No statement in FSAR.	U277-10-001 (October 1984)
Pilgrim	X		1770/2320	No statement in FSAR.	U293-10-001 (November 1984)
Point Beach-1 and -2 ^(g)		X	1502/1502	No statement in FSAR.	U266-09-001 (November 1984)
Prairie Island-1 and -2 ^(g)		X	1117/1117	No statement in FSAR (however, the effect of fuel failure on the spent fuel pool is described on pp. 10.2-15 and 10.2-16).	U282-10-001 (February 1985)
Quad Cities-1	X		2907/3657 ^(k)	No statement in FSAR.	U254-01-001 (September 1984)
Quad Cities-2	X		1140/3897 ^(k)	No statement in FSAR.	U254-10-001 (September 1984)
Rancho Seco-1		X	1080/1080	No statement in FSAR.	U312-09-001 (November 1984)

TABLE C.1. (contd)

Domestic Power Plant (Spent Fuel Storage Facility)	Plant Type		Present/Max. Pool Capacity ^(a)	Comments on Pools that Provide Specific Space for Storing Failed Fuel	FSAR ^(b) Reference No. (Issue Date)
	BWR	PWR			
River Bend-1	X		3172/3172	The pool holds 3172 fuel assemblies plus 9 defective fuel assemblies with their storage canisters	458-09-001 (January 1986)
Robinson-2		X	544/544	No statement in FSAR.	U261-09-001 (October 1984)
Salem-1		X	1170/1170	No statement in FSAR.	U272-09-001 (November 1984)
Salem-2		X	1170/1170	No statement in FSAR.	U272-09-001 (November 1984)
San Onofre-1		X	216/216	No statement in FSAR.	206-02-001 (1983)
San Onofre-2		X	800/800	No statement in FSAR.	U361-09-001 (July 1985)
San Onofre-3		X	800/800	No statement in FSAR.	U361-09-001 (July 1985)
Sequoyah-1 and -2 ^(g)		X	1386/1386	No statement in FSAR.	U327-09-001 (November 1985)
St. Lucie-1		X	728/728	Space for 20 failed fuel assemblies is provided.	(335-09-001 (March 1985)
St. Lucie-2		X	1076/1076	No statement in FSAR.	389-09-001 (March 1984)
Summer-1		X	1276/1276	No statement in FSAR.	U395-09-001 (November 1984)
Surry-1 and -2 ^(g)		X	1044/1044	Leaking fuel assemblies that require encapsulation will be placed in sealed containers filled with water. The assembly and its container will be stored in the spent fuel storage pool. Space is provided to accommodate six failed fuel cans.	U280-09-001 (April 1985)
Susquehanna-1		X	2840/2840 ⁽¹⁾	In addition, the fuel storage rack design provides storage of 10 various reactor internal components such as: defective fuel storage containers, control rods, control rod guide tubes, and "out-of-core" shipping containers.	387-09-001 (September 1985)

TABLE C.1. (contd)

Domestic Power Plant (Spent Fuel Storage Facility)	Plant Type		Present/Max. Pool Capacity ^(a)	Comments on Pools that Provide Specific Space for Storing Failed Fuel	FSAR ^(b) Reference No. (Issue Date)
	BWR	PWR			
Susquehanna-2	X		2840/2840 ⁽¹⁾	In addition, the fuel storage rack design provides storage of 10 various reactor internal components such as: defective fuel storage containers, control rods, control rod guide tubes, and "out-of-core" slipping containers.	387-09-001 (September 1985)
Three Mile Island-1		X	752/2283	Three additional spaces are provided for failed fuel canisters.	U288-09-001 (September 1984)
Trojan		X	651/1408	No statement in FSAR.	U344-09-001 (December 1984)
Turkey Point-3		X	1404/1404	No statement in FSAR.	U250-09-001 (November 1985)
Turkey Point-4		X	614/636	No statement in FSAR.	U250-09-001 (November 1985)
Vermont Yankee	X		1410/2700	Defective fuel assemblies can be placed in special fuel cans, which are normally stored in the defective fuel storage rack. Space is provided for eight defective fuel storage containers.	271-10-001 (February 1985)
Wash. Nucl. Project-2	X		2658/2658	If a defective fuel bundle is found (e.g., by slipping), it is taken to the fuel pool and, if required, may be stored in a special defective fuel storage container to prevent the spread of contamination in the pool.	397-09-001 (1983)
Waterford-3		X	1088/1366	No statement in FSAR.	382-09-001 (September 1984)
(West Valley) ^(m)	X	X	442/442 (BWR) 442/442 (PWR)	The inventory of spent fuel has included over 100 bundles with rods that leaked in reactors. None of the defective fuel is or was canned.	See BNWL-2256 and ANS Topical Meet- ing, Savannah, Georgia, September 1982.
Wolf Creek		X	1340/1340	No statement in FSAR	482-00-001 (December 1984)
Yankee Rowe		X	395/721	No statement in FSAR.	U029-02-001 (February 1986)

TABLE C.1. (contd)

Domestic Power Plant (Spent Fuel Storage Facility)	Plant Type		Present/Max. Pool Capacity ^(a)	Comments on Pools that Provide Specific Space for Storing Failed Fuel	FSAR ^(b) Reference No. (Issue Date)
	BWR	PWR			
Zion-1 and -2 ^(g)		X	2079/2079	A suspected defective fuel assembly is placed in a failed fuel can and sealed to provide an isolated chamber for testing for the presence of fission products. If sampling shows that fission products indicative of a cladding failure are present the sampling lines are closed off by valves on the can and the encapsulated fuel assembly is removed to the spent fuel storage racks to await shipment. Design of the cans allows the defective fuel to be stored and shipped while sealed in the failed fuel can.	295-09-001 (1983)
● <u>Plants that Are Shut Down</u>					
Dresden-1	X		720/720		
Humboldt Bay-3	X		486/486	No statement in FSAR.	50133-1 (September 1, 1961)
Indian Point-1		X	756/756		
● <u>Plants Near Operation</u>					
Palo Verde-2		X	665/1329	No statement in FSAR.	528-09-001 (June 1985)
Perry-1	X		1620/1620 ⁽ⁿ⁾	Defective fuel assemblies are placed in special fuel storage containers, which are stored in the defective fuel storage rack. These may be used to isolate leaking or defective fuel while in the fuel pool and during shipping. The racks provide 30 spaces for multipurpose storage of containers of failed fuel, channels, or control rods.	440-09-001 (April 1985)
Seabrook-1		X	660/1236	No statement in FSAR.	443-09-001 (November 1985)

TABLE C.1. (contd)

Domestic Power Plant (Spent Fuel Storage Facility)	Plant Type		Present/Max. Pool Capacity ^(a)	Comments on Pools that Provide Specific Space for Storing Failed Fuel	FSAR ^(b) Reference No. (Issue Date)
	BWR	PWR			
Shoreham	X		2176/3100	Defective fuel assemblies are placed in defective fuel storage containers, which, in turn, are normally stored in the defective fuel storage rack. These storage containers may be used to isolate leaking or defective fuel while in the fuel pool. Defective fuel storage containers can be picked up and moved with a fuel bundle in them.	322-09-001 (September 1985)
Watts Bar-1 and -2 ^(g)	X		1294/1312		
● <u>Plants Under Construction</u>					
Beaver Valley-2		X	1088/1088	No statement in FSAR.	412-09-001 (March 1985)
Bellefonte-1		X	1058/1058	No statement in FSAR (however, Figure 9.14-7 shows the failed fuel transfer container).	438-09-001 (June 1985)
Bellefonte-2		X	1058/1058	No statement in FSAR (however, Figure 9.1.4-7 shows the failed fuel transfer container).	438-09-001 (June 1985)
Braidwood-1 and -2 ^(a)		X	1050/1050	In addition, the failed fuel rack provides storage for 10 failed (or damaged) fuel assemblies.	454-09-001 (October 1984)
Byron-2 ^(e)		X	1050/1050	In addition, the failed fuel rack provides storage for 10 failed (or damaged) fuel assemblies.	454-09-001 (October 1984)
Catawba-2		X	1418/3100	No statement in FSAR.	413-09-001 (August 1985)
Clinton-1	X		2672/2672	In addition, the racks can store 10 failed fuel canisters	461-09-001 (May 1985)
Comanche Peak-1		X	1116/1364 ^(o)	Included are spaces for 2 damaged fuel containers, which each hold 1 fuel assembly.	445-09-001 (May 1986)
Comanche Peak-2		X	1116/1364 ^(o)	No statement in FSAR.	445-09-001 (May 1986)
Grand Gulf-2 ^(p)	X		4524/5148	In addition, space is provided for 9 defective fuel containers	U416-09-001 (March 1986)

TABLE C.1. (contd)

Domestic Power Plant (Spent Fuel Storage Facility)	Plant Type		Present/Max. Pool Capacity ^(a)	Comments on Pools that Provide Specific Space for Storing Failed Fuel	FSAR ^(b) Reference No. (Issue Date)
	BWR	PWR			
Harris-1		X	1360/1408	No statement in FSAR.	400-09-001 (April 1986)
Hope Creek	X		1078/4054	Defective fuel assemblies are placed in special defective fuel storage containers, which are stored in the spent fuel storage racks in spaces designed for the defective fuel containers. These containers isolate leaking or defective fuel assemblies in the fuel pool and during shipping. In addition, to the stated capacity, 30 multipurpose cavities are provided for storage of defective fuel containers, control rods, and control rod guide tubes.	354-09-001 (November 1984)
Limerick-2	X		2040/2862	Defective fuel assemblies are placed in special fuel storage containers, which in turn are stored in the defective fuel storage racks (number of containers and racks not stated).	352-09-001 (June 1985)
Nine Mile Point-2	X		4049/4049	Defective fuel assemblies are placed in special fuel storage containers, which are stored in the defective fuel storage rack, both of which are designed for the defective fuel. These may be used to isolate leaking or defective fuel while in the fuel pool and during shipping.	410-09-001 (May 1985)
Palo Verde-3		X	665/1329	No statement in FSAR.	528-09-001 (June 1985)
Perry-2	X		2400/2400 ⁽ⁿ⁾	Defective fuel assemblies are placed in special fuel storage containers, which are stored in the defective fuel storage rack. These may be used to isolate leaking or defective fuel while in the fuel pool and during shipping. The racks provide 30 spaces for multipurpose storage of containers of failed fuel, channels, or control rods.	440-09-001 (April 1985)
Seabrook-2		X	--/1236	No statement in FSAR.	443-09-001 (November 1985)
South Texas-1		X	724/2100	No statement in FSAR.	498-09-001 (January 1985)

TABLE C.1. (contd)

Domestic Power Plant (Spent Fuel Storage Facility)	Plant Type		Present/Max. Pool Capacity ^(a)	Comments on Pools that Provide Specific Space for Storing Failed Fuel	FSAR ^(b) Reference No. (Issue Date)
	BWR	PWR			
South Texas-2		X	724/2100	No statement in FSAR.	498-09-001 (January 1985)
Vogtle-1		X	936/936 ^(g)	No statement in FSAR.	424-09-001 (April 1985)
Vogtle-2		X	936/936 ^(g)	No statement in FSAR.	424-09-001 (April 1985)

(a) Number of fuel assemblies (source: DOE/RL-85-2, Table A.1).

(b) Final Safety Analysis Report (FSAR).

(c) Any fuel assembly that is suspected to be defective is placed in a failed fuel holder (stainless steel cylinder with lids that can be bolted in place remotely) and sealed to provide an isolated chamber for testing for the presence of fission products.

(d) Pools at Browns Ferry-1 and -2 are connected by transfer canal: capacities are combined with only full core reserve (source: DOE/RL-85-2, Table A.1).

(e) Byron-1 and -2 share one pool.

(f) Pools at Calvert Cliffs-1 and -2 are connected by transfer canal: capacities are combined with only full core reserve (source: DOE/RL-85-2, Table A.1).

(g) Two reactors share one pool.

(h) Also known as Connecticut Yankee.

(i) Pools at Hatch-1 and -2 are connected by transfer canal: capacities are combined with only full core reserve (source: DOE/RL-85-2, Table A.1).

(j) Pools at LaSalle-1 and -2 are connected by transfer canal: capacities are combined with only full core reserve (source: DOE/RL-85-2, Table A.1).

(k) Pools at Quad Cities-1 and -2 are connected by transfer canal: capacities are combined with only full core reserve (source: DOE/RL-85-2, Table A.1).

(l) Pools at Susquehanna-1 and -2 are connected by transfer canal: capacities are combined with only full core reserve (source: DOE/RL-85-2, Table A.1).

(m) West Valley Demonstration Project at the Western New York Nuclear Service Center, which is located at West Valley, New York, and is managed by West Valley Nuclear Services Co., Inc. (built and previously operated by Nuclear Fuel Services).

(n) Pools at Perry-1 and -2 are connected by transfer canal: capacities are combined with only full core reserve (source: DOE/RL-85-2, Table A.1).

(o) Pools at Comanche Peak-1 and -2 are connected by transfer canal: capacities are combined with only full core reserve (source: DOE/RL-85-2, Table A.1).

(p) Suspended indefinitely.

(q) Pools at Vogtle-1 and -2 are connected by transfer canal: capacities are combined with only full core reserve (source: DOE/RL-85-2, Table A.1).

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