Offsite Power Loss Experience

F. H. Clark

Introduction

This report deals with losses of offsite power at nuclear power plants. From experiential and related data, we have assembled, classified, and attempted to evaluate events in order to provide some basis for quantitative assessments of losing power and of regaining it within given time periods.

Information Source

The information sources used for this study include

1. Replies of utilities to an NRC questionnaire on losses of offsite power (1)
2. Licensee Event Reports (2)
3. NRC internal memos (3)
4. Other docketed material available in the files of Nuclear Safety Information Center (4)
5. Reports to the Federal Power Commission (5) relating to specific disturbances
6. Quarterly reports of the Economic Research Administration (DOE) (6)
7. Some computations of electrical outages (7), (8)
8. Electric Power Industry Abstracts
9. British Institute of Physics, Electrotechnology, and Control-Science Abstracts

Of these, 8 and 9 were of very little use. The secondary sources of 7 were helpful in that some events, otherwise missed, were signaled by them; however, resort to primary sources was always necessary. Item 6 is of some use, but limited. This source gives indication of what areas of the country face a supply-demand power problem and to some extent, what areas are subject to severe weather problems in power supply. However, there are often no clear distinctions made between transmission and distribution outages, between controlled and uncontrolled outages, and the extent of storm damage outage is only generally indicated. Items 6, 7, 8, and 9 provide little basis for making quantitative determinations of expected impacts on power plants.

Items 1 through 5 provide the most useful substance for this report. Item 1 proved especially useful since it was composed of answers to well defined and specific questions related directly to the offsite power loss problem and supplied by the organizations subject to offsite power losses. The LER's of item 2 are subject to the usual criticisms of LER's: that they are often vague or incomplete and do not necessarily address the detail the reader is seeking. They are, nonetheless, one of the most complete primary sources.

Item 3 is generally excellent for those cases which have been made subjects of NRC memos. They are almost always complete, cogent, and coherent. The same may be said of item 5.

Item 4 is the docket file. This contains a great deal of information available in most depositories including NSIC, as microfiche. For information recovery, each microfiche has a very brief abstract typed at the top. Since about 1978 when the National Technical Information Service assumed responsibility for LER's, this abstracting has suffered to the point where the abstracts often contain no information other than that there was a cover letter, but they have no indication of the content of the covered material. These substantial amounts of information are becoming virtually unretrievable except by auxiliary indexing.

Experience Data From Losses of All Offsite Power At Nuclear Plants

Table 1 is a reasonably comprehensive compilation of reported losses of all offsite power at nuclear plants in the U. S. through 1980 and part of 1981. We believe our input data has been somewhat better than that available to other compilers, and that we have, therefore, been better able to determine whether certain items belong in the total loss or partial loss of power categories. We do not, however, presume to claim 100% completeness or 100% accuracy of interpretation and classification.

The headings of the table are:

Heading	Meaning
No.	Entry number
Plant	Name
Event date	Date of event
Time out	Time plant was without any offsite power
Common mode Single Protection Independent	Did the multiple sources of offsite power all fail because (1) common mode event occurred, (2) single protection - only one was available, (3) independent events caused them to fail.
Plant condition	Power level at time of offsite power loss
Emergency power	How did the emergency onsite power supply perform.
Event	Short synopsis of the event
Reference	L Date, R Date refer respectively to docketed letter or LER of that date. O-no. refers to accompanying reference list for Tables 1 & 2.

Table 2, under the same headings, presents data for some events which were either definitely not, or possibly not, total losses of offsite power, but whose significance was such as to justify their presentation.

A comparable tabulation of partial losses of offsite power would not provide meaningfully comparable information on account of the very wide disparities in the standards which utilities employ to determine reportability. Information on partial losses is, therefore, extracted in such parts as were usable.

Quite a bit of information can be drawn from Table 1. There are 64 identified total losses of offsite power that we have found documented through the present time.

In almost all cases where there are more than one unit at a nuclear power plant, the loss of offsite power, when it occurs, is a loss to all the units. Moreover, Table 1 deals with losses at plants; there is no increase in the numbers of losses in Table 1 for plants with multiple units. Probability of loss should therefore be computed on a per plant basis. In this computation, we have eliminated figures for the year 1981 and for all years prior to 1972 in order to assure reasonable completeness and uniformity of the data. We have taken as the number of nuclear plants operating in a year that number reported in the September-October issue of Nuclear Safety for that year. We are thereby led to the numbers 357 nuclear plant operating years for the period 1972-80 and 51 complete losses of offsite power during that period.

From this comes an overall probability estimate of 0.14

$$\frac{51}{357} = .14$$

complete losses of offsite power per nuclear plant year. This number has remained surprisingly constant over a number of years. However, it is desirable to make further refinements in it by more detailed examinations of the tabulated data. In these further clarifications we shall consider all 64 of the tabulated events, not simply those which occurred during the 1972-80 period.

Of these for which power level is indicated, 26 occurred at zero power, 35 at power. Zero power is a strongly mitigating condition for most accident scenarios since the dangerous heat inventory is much diminished. Depending on recent history, the fission product inventory may also be less threatening. We examined those which were reported to have occurred at zero power level. Most of the instances of zero power occurrences came during maintenance periods. Of these, 9 were of such nature that they probably would happen only during a maintenance period* - generally personnel and switching errors which occurred in the performance of a maintenance function. Hence, when accident scenarios requiring operation at power are assessed, the probability of loss of offsite power should be reduced by about 1/7 (i.e. to 6/7 its a priori value) to account for these. Other reductions may be possible for other reasons.

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*Events 9, 25, 26, 27, 33, 34, 35, 53, and 62.

The times until at least partial offsite power is restored are from Table 1:

Time to Restoration	No. of Events	Fractions of Total Reporting
0 - 1 min	5	.10
1 - 5 min	3	.06
5 - 30 min	19	.37
30m - 1 hr	6	.12
1 - 3 hr	11	.21
3 - 12 hr	5	.10
12 - 24 hr	2	.04
Not reported	13	
Total	64	

The locations of the event causing the loss of offsite power are:

	No. of Events
Switchyard	29
Plant	19
Grid	20

The total of these three categories is more than the number of events. This is because some events are attributed to causes in more than one category.

The performance of the standby emergency power system is of interest. While there is far more data on the emergency system in LER's, that data has been very difficult to interpret. Failures can be counted, but it has been virtually impossible to find any satisfactory way of determining the number of challenges to the system per failure. Even though the data in Table 1 regarding diesel generator performance is somewhat sparse, there is enough to be statistically significant.

We took the number of diesel generators in the plant that were available at the time of loss of all offsite power as the number of challenges to diesel generators. This number is 117. The number of times that Table 1 records a diesel generator failed to perform entirely as expected is 19. Of the diesel generator failures to function perfectly, those reported in events 6, 10, 11, 14, 25, and 62 do not appear to be of any great consequence. The malfunctions in events 1, 5, 27, 36, 37, 52, and 63, a total of 12, appear more serious in that one or more diesel generators may have been unavailable for more than a very short period of time. Event 5 was especially notable in that all AC power was lost and the reactor had been at power when the event occurred. Events 5, 36, 52 and 63 involved the failure of more than one diesel generator. The reasons were common mode (design or wiring) in 52 and 63, and the errors have been corrected. It is not clear from the reports of 5 and 36 whether the reasons for the multiple diesel failures have been understood or corrected.

Table 3 is a classification by cause and location. To facilitate cross-reference, the event index numbers have been placed in each classification category. The classifications are self explanatory with the possible exception of Area Electrical Condition; this refers to a broad area blackout or undervoltage condition on the grid. Reports of these events are not at all explicit on how the faulted condition affects more than one - or all - of the offsite sources. There is very strong reason to suspect, however, that in virtually all of the switchyard failures and of the plant switching or personnel errors the electrical interconnections in the switchyard provided the common mode for losing all the offsite power sources when more than one line was lost. (Such interconnections were discussed in our report dated June 16, 1981).

The classification Area Electrical Condition (generally blackouts) may be the most important one in Table 3. We will discuss it more fully in a later section.

It is instructive to inquire why with reserve offsite power provided, there were nonetheless these instances of complete loss of offsite power listed in Table 1. Our judgement is that:

a. events 22, 23, 37, and 46 required independent causes to bring on the loss of all offsite power

b. events 3, 5, 12, 34, 45, and 62 occurred when one of the redundant sources had been disabled

c. the remaining events appeared to contain strong elements of common cause.

In Table 2, we have reported events which may not be losses of all offsite power, but which seem, nonetheless, relevant to the problem.

Event P1 reports the loss of five offsite power lines at Arkansas Nuclear One. A sixth reserve line was not lost, but it was not called upon since the diesel generators had picked up the safety load. The sixth line requires manual connections. The Pilgrim station also has a reserve line which depends upon manual connection (in addition to two immediately available offsite power lines). Pilgrim has had six events (not recorded here) where all but one of the preferred offsite power sources were lost. The diesel generators were on, and the remaining manually connectable reserve power line remained in reserve. There has been at least implied criticism of these slow-connect, manually actuated reserves[9, 10] (which, in fact, comply with the requirements of GDC-17). These manually connected reserves are, however, well protected from the switchyard interconnections which appear to be the largest cause, by far, of common mode offsite electric power failures.

Event P2 is a partial loss of offsite power at Calvert Cliffs with accompanying malfunction of a diesel generator. This is noteworthy because two days later there was a complete loss of offsite power accompanied by diesel generator malfunction (see Table 1).

Event P3 occurred at LaCrosse. With the reactor shutdown and offsite power disconnected to permit maintenance work, the system was on emergency diesel. While in that condition, fire broke out in emergency power automatic transfer switching circuitry.

Event P4 occurred at Turkey Point. Each of the nuclear units (3 and 4) has a startup transformer for preferred offsite power source and relies on the other's startup transformer as its alternate reserve source. With its startup transformer out for maintenance Unit 3 tripped. Transfer to the Unit 4 startup transformer is slow so the Unit 3 diesel generators came on. The control rod position indicators for both units are on a bus served by the Unit 3 diesel. When the loads on that bus were shed preparing for loading the diesel, Unit 4 had a reactor trip. Two things are to be noted: (a) this event should recur whenever Unit 3 trips with its startup transformer unavailable; (b) the deficiency caused by the trip of two large generating units is generally in excess of the required spinning reserve of a utility system; hence, though it did not happen in this case, this is an event of a magnitude that could destabilize a broad electrical service area and possibly bring on a blackout. There may be other two unit plants which exhibit this deficiency.

Event P5 occurred at Millstone. A problem in DC switching led to loss of all AC power.

Event P6, also at Millstone, came about as a result of transmission system undervoltage. The undervoltage was not sufficient to activate undervoltage trips. However, it held solenoids in a partly actuated condition drawing excessive currents which blew fuses in a number of components. The NRC approved fix involved control action at a higher level of undervoltage over a sustained time and also provisions to prevent emergency load shedding by such a signal while the diesels are sequence loading. The utility also set its transformer taps for lower than nominal voltage on the grid. It might be useful to explore this last fix for validity and for generic implications since there has apparently been no evaluation of its effects at higher than expected voltages.

The reporting of data on partial losses of offsite power has been so non-uniform as to permit no comparison. Some utilities reported every recorded breaker interruption, including those which lasted less than a second. Others reported only major interruptions of long duration. The significance of partial losses also depends heavily upon the redundancy of the transmission system connections. Palisades, Dresden, Pilgrim, and San Onofre have reported rather fully on their partial losses of offsite power. The information they have provided is summarized in Table 4. This table shows each plant's experience separately and a summary of their combined experience. From the summary figures we have produced, in the last column, a conditional probability for the restoration time, given that it is at least one hour. It is presumed that such a probability distribution would be used in conjunction with a probability distribution for suffering partial losses. If the distribution did not treat events consistently with the restoration time distribution, any numbers coming form their joint application would be meaningless. Therefore, since there appears to be no consistency whatever in recording and reporting short time outages we eliminated them from the probability distribution.

The partial loss data for the separate plants presented in Table 4 is quite disparate, indicating some caution should be used in applying summary data to individual plants. In interpreting the individual plant data one should bear in mind the line redundancy information for those plants which is as follows:

Plant	No. of Transmission Lines
Dresden	12
Palisades	6
Pilgrim	3
San Onofre	7

Evidently, a loss of a line presents more of a challenge for the Pilgrim plant than for the others.

System Improvements

During the extended time period that the events recorded in this note occurred, there were improvements being made in the electrical delivery system and in nuclear power plant design and procedure, often improvements that were dictated by some of these events. Consideration of such improvements should condition the manner in which these data of the past are extrapolated into the future. Where failures have occurred on account of flawed components or designs fixes have been made. Where the nature of the failure or the event sequence appeared to carry a threatening potential, NRC has required special assurances of understanding and repair and has sometimes taken a generic position. We do not have information on all fixes which have been undertaken, but can enumerate some by way of example.

Events 38, 40, and 41 at Palisades were found to be due to a hyperactive switchyard control circuit. The circuit was modified and the problem has not recurred. Millstone events P6 and 63 have been studied, fixes have been applied, and a generic position adopted by NRC. Event 60 occurred at Yankee Rowe as part of the Northeast blackout of 1965. Substantial revisions were made throughout the national grid as a result of that blackout. It might be excessively optimistic to assert that a blackout of such magnitude could not happen again, but it seems safe to state that a blackout of that kind and proceeding in that manner will not again occur.

The lower part of the Florida peninsula has presented difficulties of offsite power supply to nuclear plants located there throughout the 70's. Florida is peninsular and connects to the continental transmission system only through its northern regions. Miami is a very heavy electrical load located near the end of the peninsula. When there is a generating deficiency in the Miami area, imported power must flow from the north. In the early 70's, there was a need for more generation in the area, the transmission pathways to the area were limited, and, as events developed, the system's protective relaying schemes were not well adapted to the needs of the 70's. The blackouts that occurred in 1973 and 1974 were evidence of system weaknesses. An extensive program of re-adjusting the relay timing in the transmission system was undertaken and a (large capacity) 500kv line was built from the west central to the Miami area. These improvements greatly strengthened the system. Nevertheless, in 1977 another systemic blackout occurred, event 50, 58. Investigation showed that the event had occurred with Turkey Point Unit 4 down for refueling and the 500kv line down for calibration. That is, the system had

the inherent strength to handle the strain placed upon it that day, but an administrative decision had made the 500kv line unavailable. While there have been subsequent losses of offsite power at nuclear plants reported by this utility (events P4 and 51) they have not been of the kind indicative of transmission system weakness, but rather of the kind experienced by other utilities throughout the land (switch setting error, design flaw). Investigations of ERA reports of Bulk Power System outages show a significant number of reports of such outages from Florida Power and Light (the utility in question). They are, however, for the most part controlled outages and reductions of service. Where in previous years the system may have tried to ride out the effects of disturbances (and sometimes, but not always, succeeded) this utility, with the aid of newly installed computer control devices, now responds more often to system disturbances with controlled load shedding, one of the most effective defenses against system de-stabilization. In short, this system is much stronger, both in hardware resources and in procedures than it was in the 1973-74 period.

The Consolidated Edison system has experienced two broad area disturbances recorded in Table 1 (21 and 22). Event 21 has not been explained in any report we have found. Event 22 was a highly publicized and serious blackout, initiated by two lightning strikes. While lightning initiated the blackout, but for systemic weaknesses, the blackout could have been avoided or held to much less significance as indicated by reference O-2. The utility has revised administrative procedures to cope with such situations and probably is much stronger as a result.

We have no information on any special corrective measures which may have been taken in consequence of event 48, the only other wide area disturbance in Table 3.

Our experience with widespread total blackouts of areas indicates that the blackouts are linked to systemic weakness, whatever may be the initiating cause. Systemic weaknesses are correctable as they are disclosed, and it appears that many of the major weaknesses of the grid affecting nuclear plants during the 70's have been addressed. Whether serious newly discovered weaknesses will appear cannot be ascertained.

One can reasonably hypothesize that very extensive damage to a transmission system could lead to blackouts in a system which is not inherently weak. Most storm damage can be repaired or patched around in a matter of hours or the order of a day. A storm of the violence and breadth of a major hurricane just as it penetrates the coastal areas from the Gulf of Mexico might cause more extensive damage and some account should be taken of that possibility in those vulnerable areas.

It would appear that one of the most effective options open to limit the duration of power outages would be to require reasonably detailed plans for prompt restoration of power to a nuclear facility be available in advance for various scenarios of extensive power loss [8, 11].

Summary

Our principal findings are as f ..s:

1. The gross rate of loss of offsite power per nuclear plant year is 0.14, consistent with previous determinations.
2. Of the 61 cases for which power level was reported or indicated 26, or over 40% occurred at zero power, a less threatening condition.
3. Of the 26 zero power cases, 9 were initiated by circumstances which would obtain only during shutdown and should therefore be excluded from accident scenarios for operating conditions.
4. Offsite power was restored in less than 30 minutes for 53% of the cases; in from 3 to 24 hours in 14% of the cases. (We hypothesize that a requirement to give priority to restoration of service to nuclear plants by using pre-existing plans for such restoration would materially shorten the longer times.)
5. About 70% of the outages appear to be initiated in the switchyard and the plant, as opposed to the transmission grid.
6. Our judgment is that in 84% of the cases where total loss of offsite power occurred there was a common cause. (We hypothesize that the largest contribution to common cause is the switchyard interconnections; that a factor of perhaps two improvement in the common cause outage might be obtained with an isolated connection to offsite power).

7. We identify 117 challenges to diesel generators with 19 responses less than perfect. Of the 19, six seem trivial. Hence, we are left with 13/117 or about 11% unsatisfactory responses to challenge.

8. The area blackout appears to be the most threatening possibility for sustained loss of offsite power (although the longest such outage recorded here was 7 hours). We have recorded nine in Table 2, The above noted system improvements have been such, however, that we feel the underlying causes have been removed from 2/3 of these. We would therefore estimate .01 (rather than .03) as a reasonable number for losses of offsite power per nuclear plant per year on account of area blackouts.

9. An additional estimate should be made in some regions for the possibility of very extensive storm damage.

References for Tables 1 and 2

O-1 Operation Report 68-4, April 1968, Connecticut Yankee.

O-2 System Blackout and System Restoration, July 13-14, 1977, Consolidated Edison, July 26, 1977.

O-3 NRC Memo, E. A. Licitra to S. A. Varga, September 4, 1979.

O-4 FP&L Report to FPC, Report on System Disturbance of May 16, 1977, September 20, 1977.

O-5 Report to Fla-PSC from Stone & Webster, FP&L Electric Power System Disturbance of April 3, 4, 1973.

O-6 NRC, IE Information Notice 79-25, September 28, 1979.

O-7 NRC Memo, D. G. Eisenhut to S. Hanauer, March 31, 1981.

O-8 NRC Memo, C. Michelson to H. R. Denton, November 5, 1980.

O-9 NRC Memo, F. Rosa to C. Michelson, December 15, 1980.

O-10 Report to FPC by Eastern New York - New England System Studies Group, September 15, 1966, Eastern New York - New England Power Systems Behavior During Northeast Power Interruption.

O-11 NRC, IE Information Notice 7904, February 16, 1979.

Table 3 Classification of Losses of Offsite Power By Cause and Location

Cause	Switchyard	Plant	Grid
Switching Error	9, 31, 38, 39, 40, 41, 51, 57	6	
Personnel Error	25, 26, 27, 28, 46	5, 10, 29, 33, 34, 35, 36, 53, 54, 62	
Equipment Failure	1, 4, 11, 16, 24, 37, 61	52	15, 17, 19
Lightning Storm	12, 45, 47, 33, 44		7, 8, 22, 23, 2, 20, 42, 43
Area Electrical Condition			21, 22, 48, 50, 55, 56, 57, 58, 60
Design		63, 64	
Electrical Fault (Unspecified Cause)	14, 18, 49	3	37, 57
Reactor Trip		55, 56, 58	
Other	30	13	

Table 4 Time To Recover Power After Partial Loss

Time	Dresden	Palisades	Pilgram	See Quota	Sum (>1 hr)	Prob* (>1 hr)
0 - 1 min	70	72	9	6		
1 - 5 min	5		2	15		
5 - 30 min	6	11	11	15		
30m - 1 hr	8	2	6	2		
1 - 2 hr			10	2	12	.21
2 - 3 hr	4	1	1	6	12	.21
3 - 5 hr	2			2	4	.07
5 - 8 hr	2		2	7	11	.20
8 - 12 hr	2		3		5	.09
12 hr - 1d	3		3	2	8	.14
1 - 2d			2		2	.04
2 - 3d	1				1	.02
3 - 5d						
5 - 10d	1				1	.02
					56	1.00

* This is the estimate of the probable time the power line will be out, given that it is out at least one hour.

References

1. See multiple references in Tables 1 and 2
2. See multiple references in Tables 1 and 2
3. See multiple references in reference list accompanying Tables 1 and 2; see also below reference
4. See multiple references in Tables 1 and 2
5. See reference list accompanying Tables 1 and 2, in particular
6. Bulk Electric Energy Supply System Outages and Load Reduction Measures, Quarterly Reports, 1979-81
7. NUREG 0807, Bickel & Abbot, An Analyses of Licensee Event Reports Related to Nuclear Generating Station Onsite, Electrical System Malfunction
8. NUREG/CR-1464, R. E. Battle et al., Review of Nuclear Power Plant Offsite Power Source Reliability, etc.
9. NRC memo, C. Michelson to H. R. Denton, November 5, 1980
10. NRC memo, O. D. Parr to S. A. Varga, September 4, 1979
11. DOE/EP-0005, National Electric Reliability Study, April, 1981

UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
WASHINGTON, D. C. 20555

April 5, 1982

Mr. Willian J. Dircks
Executive Director for Operations
U. S. Nuclear Regulatory Commission
Washington, DC 20555

Dear Mr. Dircks:

Subject: RELIABILITY OF THE SHUTDOWN HEAT REMOVAL SYSTEM ON THE SYSTEM 80 DESIGN

The ACRS in its December 15, 1981 report to Chairman Palladino on the Combustion Engineering, Inc. Standard Reference System 80 commented on the reliability of the decay heat removal system. These comments addressed the lack of a capability for rapid, direct depressurization of the primary system to allow feed and bleed operations and the reliance placed upon the secondary system for heat removal capability. The ACRS Subcommittee on Decay Heat Removal Systems met with representatives of Combustion Engineering, Inc. and the NRC Staff on March 16, 1982 to discuss these issues. The ACRS discussed these issues further during its 264th meeting, April 1-2, 1982.

Representatives of Combustion Engineering have defended their design, stating that:

1. The System 80 NSSS will be coupled with highly reliable emergency feedwater systems (EFWS) by addition of an interface requirement that the EFWS have an unavailability in the range of 10^{-4} to 10^{-5} per demand.

2. The System 80 NSSS is capable of achieving cold shutdown conditions using only safety grade systems even without offsite power and with an added single failure.

3. The System 80 steam generator design includes many features that will assure adequate tube integrity, minimizing concerns associated with operating reactors.

4. Even if all auxiliary feedwater supply were somehow lost, the secondary side of the steam generators could be depressurized to allow use of low head pumps which might be aligned to provide water to the steam generators from a number of sources.

5. Probabilistic analyses have not shown that installing PORVs will result in a significant improvement in safety. The added costs are not justified.

ANO not 4/9
designated

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Combustion Engineering has proposed that the issues associated with the Committee's comments on the System 80 design be resolved in a continuing dialogue among the ACRS, the NRC Staff, and Combustion Engineering. It is the NRC Staff's intention to address these issues on an expeditious schedule with all applicants requesting licenses for Combustion Engineering NSSS designs which do not have capability for rapid depressurization independent of the steam generator. We concur with this approach and wish to be kept informed.

The Combustion Engineering response to the Committee's comments on the System 80 design emphasizes the expected very high reliability of the feedwater systems and the integrity of the steam generators. We believe that these are necessary goals but note that past operating experience indicates that these goals are difficult to achieve. We believe that for this reason Combustion Engineering and the NRC Staff should consider further the addition of valves of a size to facilitate rapid depressurization of the System 80 primary coolant system as stated in the Committee's December 15, 1981 letter on the System 80 design. We believe that a plan for addressing this issue should be formulated in the near future. We wish to be kept informed and to discuss this further with Combustion Engineering and the NRC Staff.

We believe that, while this evaluation should be conducted expeditiously, its resolution should not now be a condition for operation of System 80 plants at full power, or of plants having similar features. The need for future hardware or procedural changes should be contingent upon results of this evaluation.

Sincerely,

P. Shewmon

P. Shewmon
Chairman

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
LOUISIANA POWER AND LIGHT COMPANY	)	Docket No. 50-382
	)	
(Waterford Steam Electric Station, Unit 3)	)	

CERTIFICATE OF SERVICE

I hereby certify that copies of "NRC STAFF'S ANSWER IN SUPPORT OF APPLICANT'S MOTION FOR RECONSIDERATION OF MARCH 18, 1982 MEMORANDUM AND ORDER RAISING SUA SPONTE ISSUE" in the above-captioned proceeding have been served on the following by deposit in the United States mail, first class, or, as indicated by an asterisk, through deposit in the Nuclear Regulatory Commission's internal mail system, this 12th day of April, 1982:

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