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NRC FORM 195  
(2-76)

U.S. NUCLEAR REGULATORY COMMISSION

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## NRC DISTRIBUTION FOR PART 50 DOCKET MATERIAL

TO:

Mr. Edson G. Case

FROM:

Duke Power Company  
Charlotte, North Carolina  
William O. Parker, Jr.DATE OF DOCUMENT  
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DESCRIPTION

ENCLOSURE

Consists of response to NRC request for  
analysis of the Oconee design for the  
potential for and consequences of  
unevaluated moderator dilution incidents..

(2-P)

PLANT NAME: Oconee 1-2-3  
R/L 12/29/77

SAFETY

FOR ACTION/INFORMATION

BRANCH CHIEF: (7)

SCHWENGER

## INTERNAL DISTRIBUTION

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## DUKE POWER COMPANY

POWER BUILDING

422 SOUTH CHURCH STREET, CHARLOTTE, N. C. 28242

WILLIAM O. PARKER, JR.  
VICE PRESIDENT  
STEAM PRODUCTION

December 20, 1977

TELEPHONE: AREA 704  
373-4083

Mr. Edson G. Case, Acting Director  
Office of Nuclear Reactor Regulation  
U. S. Nuclear Regulatory Commission  
Washington, D. C. 20555

Attention: Mr. A. Schwencer, Chief  
Operating Reactors Branch #1

Reference: Oconee Nuclear Station  
Docket Nos. 50-269, -270, -287



Dear Mr. Case:

The following analysis is submitted in response to your request for analysis of the Oconee Nuclear Station design for the potential for and consequences of unevaluated moderator dilution incidents.

The design of the Oconee units contains no unborated water sources, not covered by the FSAR analyses, large enough to create the potential for unplanned moderator dilution criticality. The only unborated liquid volume which could reach the reactor coolant system by the low pressure injection flow path is the content (NaOH) of the caustic mix tank. Although this tank is normally empty, a full tank will be assumed. The volume of this tank is 20 ft<sup>3</sup> with maximum delivery rate by the caustic pump of 2 gpm. Injection of this volume would require the inadvertent opening of three manually operated gate valves in addition to the concurrent operation of the caustic pump. Assuming the pump is operating for another function and assuming a single failure of one of the three valves in series, the contents of the caustic mix tank would still be isolated from the reactor coolant system because of the other two normally closed valves in series. To demonstrate further that this unborated water source does not pose an unsafe condition, analyses have been performed on the core reactivity change for two sub-critical conditions assuming that the NaOH liquid is introduced into the reactor coolant system via the low pressure injection flow path as a result of multiple failures of the three isolation valves.

The first condition occurs with the reactor in decay heat removal mode at temperatures between 250°F and cold shutdown and with a full reactor coolant system. The conservative assumptions in the FSAR of 1400 ppm initial boron concentration and 75 ppm/%  $\Delta k/k$  boron worth applied to the injection of 20 ft<sup>3</sup> of demineralized water at a rate of 2 gpm result in a reactivity addition rate of  $+7.22 \times 10^{-6} \%$   $\Delta k/k/s$  or an integrated

773430091

Mr. Edson G. Case, Acting Director

Page Two

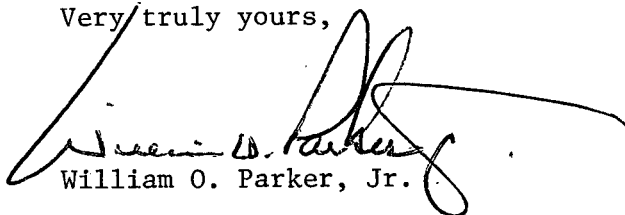
December 20, 1977

reactivity addition of +0.033%  $\Delta k/k$  over the 75 minute dilution event. The values are well within the minimum shutdown margin of 1%  $\Delta k/k$  required by the Technical Specifications.

The second condition occurs with the reactor vessel drained to the level of the hot leg and the low pressure injection system functioning for decay heat removal and boron recirculation. Technical Specifications require a boron concentration of 1800 ppm and a 1%  $\Delta k/k$  shutdown margin with all rods out during refueling mode. For this case, the reactivity addition resulting from the assumed injection of the contents of the caustic mix tank would be +0.22%  $\Delta k/k$  over the 75 minute event. Again, this reactivity addition is well within the minimum shutdown margin.

In summary, the only system with potential for unplanned moderator dilution not considered in the FSAR analysis is the caustic mix tank system containing a relatively small amount of unborated NaOH liquid. The probability of an inadvertent injection of the contents of the caustic mix tank into the RCS is very small because of the isolation of the system through multiple valves. However, should multiple valve failures or valve alignment errors occur while the LPI system is operating, the resulting reactivity addition would be very small compared to the minimum subcriticality margin being maintained and such an incident would not result in an inadvertent criticality.

Very truly yours,



William O. Parker, Jr.

GBS:ge

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50-269

UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D. C. 20555

December 21, 1977

All Power Reactor Licensees

Gentlemen:

SUBJECT: REVISED INTRUSION DETECTION SYSTEMS HANDBOOK AND ENTRY-  
CONTROL SYSTEMS HANDBOOK

Enclosed is a revision of the Intrusion Detection Handbook, SAND 76-0554 which may have been sent to you in May 1977. This handbook revision was prepared by the Facilities Protection Department, Sandia Laboratories, Albuquerque, New Mexico under contract with the Division of Safeguards and Security, Department of Energy (DOE) and is made available for your information as a reference source for use in the design, installation, and operation of intrusion detection systems. The attached revision supersedes the previous version. Also enclosed is the Entry-Control Systems Handbook, SAND 77-1033, also prepared by Sandia, which provides guidance for selecting installing and maintaining entry-control equipment.

Although these documents are marked for Official Use Only, there is no restriction on your use and further distribution of them. Feedback on these handbooks is encouraged from all recipients and should be addressed to Dr. Samuel C. T. McDowell, Assistant Director for Research and Development, Division of Safeguards and Security, DOE.

Sincerely,

*Karl R. Goller*

Karl R. Goller, Assistant Director  
for Operating Reactors  
Division of Operating Reactors

Enclosures:  
As stated

cc w/o enclosures:  
See next page

MAY 4  
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Docket No. 50-313

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Arkansas Nuclear One  
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Arkansas Polytechnic College  
Russellville, Arkansas 72801

Docket Nos. 50-317  
and 50-318

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Gaithersburg, Maryland 20760

Combustion Engineering, Inc.  
ATTN: Mr. J. A. Honey  
Project Manager  
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Windsor, Connecticut 06095

Calvert County Library  
Prince Frederick, Maryland 20678

Docket No. 50-293

Boston Edison Company  
M/C NUCLEAR  
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cc: Mr. Paul J. McGuire  
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Henry Herrmann, Esquire  
Massachusetts Wildlife Federation  
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Boston, Massachusetts 02111

Plymouth Public Library  
North Street  
Plymouth, Massachusetts 02360

Docket No. 50-261

Carolina Power & Light Company  
ATTN: Mr. J. A. Jones  
Senior Vice President  
336 Fayetteville Street  
Raleigh, North Carolina 27602

cc: Hartsville Memorial Library  
Home and Fifth Avenue  
Hartsville, South Carolina 29550



Docket Nos. 50-325  
and 50-324

Carolina Power & Light Company  
ATTN: Mr. J. A. Jones  
Executive Vice President  
336 Fayetteville Street  
Raleigh, North Carolina 27602

cc: Richard E. Jones, Esquire  
Carolina Power & Light Company  
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Wilmington, North Carolina 28401

Southport-Brunswick County Library  
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Southport, North Carolina 28461

Docket No. 50-10

Commonwealth Edison Company  
ATTN: Mr. R. L. Bolger  
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cc: Mr. John W. Rowe  
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Mr. B. B. Stephenson  
Plant Superintendent  
Dresden Nuclear Power Station  
Rural Route #1  
Morris, Illinois 60450

Docket Nos. 50-237  
and 50-249

Commonwealth Edison Company  
ATTN: Mr. R. L. Bolger  
Assistant Vice President  
P. O. Box 767  
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cc: Morris Public Library  
604 Liberty Street  
Morris, Illinois 60451

Docket Nos. 50-254  
and 50-265

Commonwealth Edison Company  
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Assistant Vice President  
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Moline Public Library  
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Docket Nos. 50-295  
and 50-304

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Waukegan Public Library  
128 North County Street  
Waukegan, Illinois 60085

Docket No. 50-213

Connecticut Yankee Atomic Power Company  
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President  
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cc: Day, Berry, & Howard  
Counselors at Law  
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Hartford, Connecticut 06103

Russell Library  
119 Broad Street  
Middletown, Connecticut 06457

Docket Nos. 50-3  
and 50-241

Consolidated Edison Company  
of New York, Inc.  
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White Plains Public Library  
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Docket No. 50-286

Consolidated Edison Company  
of New York, Inc.  
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cc: Admiral Paul Early (IP-3)  
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White Plains Public Library  
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Charlevoix Public Library  
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Docket No. 50-255

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Kalamazoo Public Library  
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Docket No. 50-409

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La Crosse Public Library  
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Docket Nos. 50-269  
50-270  
and 50-287

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Oconee County Library  
201 South Spring Street  
Walhalla, South Carolina 29691

Docket No. 50-334

Duquesne Light Company  
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Operations Division  
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cc: Karin Carter, Esq.  
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Beaver Area Memorial Library  
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Docket Nos. 50-250  
and 50-251

Florida Power & Light Company  
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1025 Connecticut Avenue, N. W.  
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Environmental & Urban Affairs Library  
Florida International University  
Miami, Florida 33199

Docket No. 50-335

Florida Power & Light Company  
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Indian River Junior College Library  
3209 Virginia Avenue  
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Docket No. 50-302

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Crystal River, Florida 32629



Docket No. 50-321

Georgia Power Company  
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Municipal Electric Association of Georgia  
City of Dalton, Georgia  
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cc: Ruble A. Thomas  
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Appling County Public Library  
Parker Street  
Baxley, Georgia 31513

Docket No. 50-315

Indiana & Michigan Electric Company  
Indiana & Michigan Power Company

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Maude Reston Palenske Memorial Library  
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St. Joseph, Michigan 49085

Docket No. 50-331

Iowa Electric Light & Power Company  
ATTN: Mr. Duane Arnold  
President

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cc: Cedar Rapids Public Library  
426 Third Avenue, S. E.  
Cedar Rapids, Iowa 52401

Docket No. 50-219

Jersey Central Power & Light Company  
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cc: Steven P. Russo, Esquire  
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Jersey Central Power & Light Company  
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Honorable Joseph W. Ferraro, Jr.  
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State of New Jersey  
Department of Law & Public Safety  
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Ocean County Library  
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Brick Town, New Jersey 08723

Docket No. 50-289

Metropolitan Edison Company  
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Docket No. 50-298

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cc: Mr. G. D. Watson, General Counsel  
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Cooper Nuclear Station  
ATTN: Mr. L. Lessor  
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Brownville, Nebraska 68321

Auburn Public Library  
118 - 15th Street  
Auburn, Nebraska 68305

Docket No. 50-220

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ATTN: Mr. D. P. Dise  
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Docket Nos. 50-245  
and 50-336

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Counselors at Law  
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Northeast Nuclear Energy Company  
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Waterford Public Library  
Rope Ferry Road, Route 156  
Waterford, Connecticut 06385

Docket Nos. 50-282  
and 50-306

Northern States Power Company  
ATTN: Mr. L. O. Mayer, Manager  
Nuclear Support Services

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Plant Manager  
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The Environmental Conservation Library  
Minneapolis Public Library  
300 Nicollet Mall  
Minneapolis, Minnesota 55401

Docket No. 50-263

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The Environmental Conservation Library  
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Minneapolis, Minnesota 55401

Docket No. 50-285

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Blair Public Library  
1665 Lincoln Street  
Blair, Nebraska 68008

Docket No. 50-133

Pacific Gas and Electric Company  
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Docket Nos. 50-277  
and 50-278

Philadelphia Electric Company  
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Assistant Attorney General  
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Philadelphia Electric Company  
ATTN: Mr. W. T. Ullrich  
Peach Bottom Atomic  
Power Station  
Delta, Pennsylvania 17314

Martin Memorial Library  
159 E. Market Street  
York, Pennsylvania 17401

Mr. M. J. Cooney, Superintendent  
Generation Division - Nuclear  
Philadelphia Electric Company  
2301 Market Street  
Philadelphia, Pennsylvania 19101

Docket No. 50-344

Portland General Electric Company  
ATTN: Mr. Charles Goodwin, Jr.  
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cc: Mr. H. H. Phillips  
Portland General Electric Company  
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Portland General Electric Company  
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Columbia County Courthouse  
Law Library, Circuit Court Room  
St. Helens, Oregon 97051

Docket No. 50-333

Power Authority of the State  
of New York

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cc: Lewis R. Bennett, General Counsel  
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Oswego County Office Building  
46 E. Bridge Street  
Oswego, New York 13126

Docket No. 50-272

Public Service Electric & Gas Company  
ATTN: Mr. R. P. Librizzi  
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Production Department  
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cc: Richard Fryling, Jr., Esquire  
Assistant General Counsel  
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ATTN: Deputy Attorney General  
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Public Service Electric & Gas Company  
ATTN: Herbert J. Heller  
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Station  
Hancocks Bridge, New Jersey 08038

Salem Free Library  
112 West Broadway  
Salem, New Jersey 08079

Public Service Electric & Gas Company  
ATTN: R. L. Mittl  
General Manager - Licensing  
and Environment  
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Newark, New Jersey 07101

Docket No. 50-244

Rochester Gas & Electric Corporation  
ATTN: Mr. Leon D. White, Jr.  
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Empire State Plaza  
Albany, New York 12223

Rochester Public Library  
115 South Avenue  
Rochester, New York 14627

Docket No. 50-312

Sacramento Municipal Utility District  
ATTN: Mr. J. J. Mattimoe  
Assistant General Manager  
and Chief Engineer  
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cc: David S. Kaplan, Secretary and  
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Business and Municipal Department  
Sacramento City-County Library  
828 I Street  
Sacramento, California 95814

Docket No. 50-206

Southern California Edison Company  
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cc: Rollin E. Woodbury, Vice President  
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San Diego Gas & Electric Company  
111 Sutter Street  
San Francisco, California 94104

Mission Viejo Branch Library  
24851 Chrisanta Drive  
Mission Viejo, California 92676

Docket Nos. 50-259  
50-260  
and 50-296

Tennessee Valley Authority  
ATTN: Mr. Godwin Williams, Jr.  
Manager of Power  
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cc: H. S. Sanger, Jr., Esquire  
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Athens Public Library  
South and Forrest  
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Docket Nos. 50-280  
and 50-281

Virginia Electric & Power Company  
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Swem Library  
College of William & Mary  
Williamsburg, Virginia 23185

Docket Nos. 50-266  
and 50-301

Wisconsin Electric Power Company  
Wisconsin Michigan Power Company  
ATTN: Mr. Sol Burstein  
Executive Vice President  
231 West Michigan Street  
Milwaukee, Wisconsin 53201

cc: Mr. Arthur M. Fish  
Document Department  
University of Wisconsin -  
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Stevens Point, Wisconsin 54481

Docket No. 50-305

Wisconsin Public Service Corporation  
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314 Milwaukee Street  
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Docket No. 50-29

Yankee Atomic Electric Company  
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Licensing Engineer  
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Westboro, Massachusetts 01581

cc: Mr. Donald G. Allen, President  
Yankee Atomic Electric Company  
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Greenfield Public Library  
40 Main Street  
Greenfield, Massachusetts 01581



Docket No. 50-271

Yankee Atomic Electric Company  
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Docket No. 50-309

Yankee Atomic Electric Company  
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