Mr. Michael R. Kansler
Senior Vice President and
Chief Operating Officer
Entergy Nuclear Operations, Inc.
440 Hamilton Avenue
P.O. Box 5029
White Plains, NY 10601-5029

September 12, 2002

SUBJECT: ARKANSAS NUCLEAR ONE, UNITS 1 AND 2; GRAND GULF NUCLEAR STATION; INDIAN POINT NUCLEAR STATION, UNITS 1, 2 AND 3; JAMES A. FITZPATRICK NUCLEAR POWER PLANT; PILGRIM NUCLEAR POWER STATION; RIVER BEND STATION; VERMONT YANKEE NUCLEAR POWER PLANT; AND WATERFORD STEAM ELECTRIC STATION, UNIT 3 - EXEMPTION FROM THE REQUIREMENTS OF 10 CFR PART 20, SECTION 20.1003 DEFINITION OF TOTAL EFFECTIVE DOSE EQUIVALENT (TAC NOS. MB3456, MB3457, MB3488, MB3439, MB3440, MB3479, MB3489, MB3476, MB3477, MB5847, MB3486)

Dear Mr. Kansler:

The Commission has approved the enclosed exemption from specific requirements of Title 10 of the *Code of Federal Regulations* (10 CFR), Part 20, Section 20.1003, for the subject units. This action is in response to your application dated July 20, 2001, as supplemented by letter dated June 13, 2002. By letter dated November 19, 2001, you adopted the application for Indian Point Nuclear Station, Units 1 and 2; and by letter dated August 7, 2002, you adopted the application for Vermont Yankee Nuclear Power Plant.

Your application requested an exemption from the 10 CFR 20.1003 definition of total effective dose equivalent (TEDE), which is the sum of the deep-dose equivalent (for external exposures) and the committed effective dose equivalent (for internal exposures). The exemption changes the definition of TEDE to mean the sum of the effective dose equivalent or the deep-dose equivalent (for external exposures) and the committed effective dose equivalent (for internal exposures).

A copy of the exemption has been forwarded to the Office of the Federal Register for publication.

Sincerely,

/RA/

Thomas W. Alexion, Project Manager, Section 1
Project Directorate IV
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket Nos. 50-313, 368, 416, 003, 247, 286, 333, 293, 458, 271, and 382

Enclosure: Exemption

cc w/enclosure: See next page

A copy of the exemption has been forwarded to the Office of the Federal Register for publication.

Sincerely,

/RA/

Thomas W. Alexion, Project Manager, Section 1
Project Directorate IV
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket Nos. 50-313, 368, 416, 003, 247, 286, 333, 293, 458, 271, and 382

Enclosure: Exemption

cc w/enclosure: See next page

DISTRIBUTION:
PUBLIC
PDIV-1 r/f
RidsOgcRp
RidsAcrsAcnwMailCenter
RidsNrrDlpmLpdi (SRichards)
RidsNrrDlpmLpdiv (WRuland)
RidsNrrDlpmLpdiv1 (RGramm)
RidsNrrDlpmLpdi1 (RLaufer)
RidsNrrDlpmLpdi2 (JClifford)
RidsOgcRp
RidsAcrsAcnwMailCenter
GHill (22)
TBergman, EDO RI
SMorris, EDO RIV
RidsNrrPMTAlexion
RidsNrrPMWReckley
RidsNrrPMDJaffe
Ri dsNrrPMBVaidya
RidsNrrPMJMinns
RidsNrrPMPMilano
RidsNrrPMGVissing
RidsNrrPMTTate
RidsNrrPMMWebb
RidsNrrPMRPulsifer
RidsNrrPMNKalyanam
RidsNrrLASLittle
RidsNrrLATClark
RidsNrrLADJohnson
RidsRgn4MailCenter (K. Brockman)
RPedersen
LBerry

Accession No.: ML022550559 *parallel concurrence, **see previous concurrence

OFFICE	PDIV-1/PM	PDIV-1/LA	IEHB/SC	PDIV-1/SC	OGC	IEHB/BC	DIPM/D
NAME	TAlexion:	DJohnson	KGibson*	RGramm	CBray**	TQuay	BBoger
DATE	09/06/02	9/6/02	08/15/02	9/6/02	08/27/02	9/11/02	9/12/02

OFFICIAL RECORD COPY

7590-01-P

UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

ENTERGY OPERATIONS, INC.

ENTERGY NUCLEAR OPERATIONS, INC.

ARKANSAS NUCLEAR ONE, UNITS 1 AND 2; GRAND GULF NUCLEAR STATION; INDIAN POINT NUCLEAR STATION, UNITS 1, 2 AND 3; JAMES A. FITZPATRICK NUCLEAR POWER PLANT; PILGRIM NUCLEAR POWER STATION; RIVER BEND STATION; VERMONT YANKEE NUCLEAR POWER PLANT; AND WATERFORD STEAM ELECTRIC STATION, UNIT 3

DOCKET NOS. 50-313, 368, 416, 003, 247, 286, 333, 293, 458, 271, and 382

EXEMPTION

1.0 BACKGROUND

Entergy Operations, Inc. and Entergy Nuclear Operations, Inc. (the licensees) are the holders of Renewed Facility Operating License No. DPR-51; Facility Operating License Nos. NPF-6 and NPF-29; Provisional Operating License No. DPR-5; and Facility Operating License Nos. DPR-26, DPR-64, DPR-59, DPR-35, NPF-47, DPR-28, and NPF-38, which authorize operation of Arkansas Nuclear One, Units 1 and 2; Grand Gulf Nuclear Station; Indian Point Nuclear Station, Units 1, 2 and 3; James A. Fitzpatrick Nuclear Power Plant; Pilgrim Nuclear Power Station; River Bend Station; Vermont Yankee Nuclear Power Plant; and Waterford Steam Electric Station, Unit 3. The licenses provide, among other things, that the facilities are subject to all rules, regulations, and orders of the U.S. Nuclear Regulatory Commission (NRC, the Commission) now or hereafter in effect.

The facilities consist of pressurized and boiling water reactors located in Pope County, Arkansas; Claiborne County, Mississippi; Westchester County, New York; Oswego County, New York; Plymouth County, Massachusetts; West Felciana Parish, Louisiana; Windham County, Vermont; and Saint Charles Parish, Louisiana. (The operating authority of Provisional Operating License No. DPR-5 for Indian Point Nuclear Station, Unit 1, was revoked by Commission Order dated June 19, 1980).

2.0 REQUEST/ACTION

Title 10 of the *Code of Federal Regulations* (10 CFR), Part 20, Section 20.1003 states that the definition of total effective dose equivalent (TEDE) is the sum of the deep-dose equivalent (for external exposures) and the committed effective dose equivalent (for internal exposures). The proposed exemption would change the definition of TEDE to mean the sum of the effective dose equivalent or the deep-dose equivalent (for external exposures) and the committed effective dose equivalent (for internal exposures). The licensee requests the exemption because the current method of calculating TEDE, under certain conditions, can significantly overestimate the dose received.

In summary, the licensee’s application dated July 20, 2001, as supplemented by letter dated June 13, 2002, requests an exemption from the 10 CFR 20.1003 definition of TEDE.

3.0 DISCUSSION

Pursuant to 10 CFR 20.2301, the Commission may, upon application by a licensee or upon its own initiative, grant exemptions from the requirements of 10 CFR Part 20 if it determines the exemptions are authorized by law and would not result in undue hazard to life or property.

The staff examined the licensee’s rationale to support the exemption request and concluded that the new method for calculating TEDE, under certain conditions, is a more accurate means of estimating worker radiation exposure and therefore would not result in undue hazard to the workers. The basis for this is as follows.

4.0 REGULATORY EVALUATION

By letter dated July 20, 2001, as supplemented by letter dated June 13, 2002, the licensee requested an exemption from the current definition, and the approval to use an alternate definition, of TEDE in 10 CFR 20.1003. The licensee requested that the definition of TEDE, as used in 10 CFR 20.1003 (i.e., for the purpose of complying with the dose recording requirements, dose reporting requirements, or the dose limits), be changed to mean the sum of the effective dose equivalent or the deep dose equivalent (for external exposures), and the committed effective dose equivalent (for internal exposures). The licensee also requested approval to use a method for estimating the effective dose equivalent for external exposures (EDE_{ex}) published by the Electric Power Research Institute (EPRI) in Technical Report TR-101909, Volumes 1 and 2, and the Implementation Guide TR-109446. (These EPRI documents were provided on the docket as enclosures to a previous May 1, 2001, application from the licensee, which was superseded by the July 20, 2001, application). The effect of granting this request would be to allow the licensee the option to control TEDE using EDE_{ex} in those cases where it is a more accurate predictor of the risk from occupational radiation exposure.

The radiation protection approach and dose limits contained in 10 CFR Part 20 are based on the recommendations of the International Commission on Radiation Protection (ICRP) in their 1977 publication No. 26 (ICRP 26). For stochastic effects, the ICRP-recommended dose limitation is based on the principle that the risk should be equal, whether the whole body is irradiated uniformly or whether there is non-uniform irradiation (such as when radioactive materials are taken into the body and, depending on their physical and chemical properties, concentrate in certain tissues and organs). This condition will be met if

$$\Sigma_T \omega_T H_T \leq H_{wb,L}$$

where ω_T is a weighting factor representing the proportions of the stochastic risk resulting from tissue (T) to the total risk, when the whole body is irradiated uniformly; H_T is the annual dose equivalent in tissue (T); and $H_{wb,L}$ is the recommended annual dose-equivalent limit for uniform irradiation of the whole body, namely 5 rem (50 mSv). The sum $\Sigma_T \omega_T H_T$ is called effective dose equivalent (EDE). The values for ω_T are given in ICRP 26, for the various tissues (T), and are codified in 10 CFR Part 20.

For the purposes of implementing workplace controls, and due to the difference in dosimetry, 10 CFR Part 20 breaks this total EDE, or TEDE, into two components: 1) dose resulting from radioactive sources internal to the body, and 2) dose resulting from sources external to the body. For radioactive material taken into the body, the occupational dose limit is based on the resulting dose equivalent integrated over 50 years (H_{50}) of exposure such that

$$\Sigma_T \omega_T H_{50,T} \leq H_{wb,L}$$

This quantity $\Sigma_T \omega_T H_{50,T}$ is called the Committed Effective Dose Equivalent (CEDE) in 10 CFR Part 20.

Demonstrating compliance with the dose limits from internal exposures is accomplished using direct measurements of concentrations of radioactivity in the air in the work areas, or quantities of radionuclides in the body, or quantities of radionuclides excreted from the body, or a combination of these. Having determined the quantities of radionuclides present or taken into the body, these can be compared to secondary or tertiary limits (e.g., Annual Limits on Intake or Derived Air Concentrations) listed in Appendix B to 10 CFR Part 20. These secondary and tertiary limits have been calculated using standard assumptions of the physical and chemical forms of the radionuclides, the standard physiological parameters from the Reference Man, and the bio-kinetic models adopted in ICRP 26. Alternatively, the regulations allow the licensee to adjust certain of these standard assumptions and calculate CEDE directly, using appropriate models.

The common practice for determining radiation dose from external sources is to measure the radiation intensity at the surface of the body with a monitoring device (dosimeter) calibrated to read in terms of a tissue dose equivalent at a specified tissue depth. In 1991, when 10 CFR Part 20 was revised to adopt the ICRP 26 recommendations on limits and controls, there was little guidance on how to determine the dose to the several tissues necessary to calculate EDE_{ex}. It is impractical to separately monitor (or measure) the dose received by the various organs and tissues that contribute to TEDE. As a practical, conservative simplification, 10 CFR Part 20 limits the dose from external sources in terms of Deep Dose Equivalent (DDE). The DDE is the dose equivalent at a tissue depth of one centimeter, and is required (by 10 CFR Part 20.1201(c)) to be determined for the part of the body receiving the highest exposure. The TEDE annual limit is met if

$$\text{DDE} + \Sigma_T \omega_T H_{50,T} \leq 5 \text{ rem (50 mSv)}.$$

In addition to the annual limit on TEDE, 10 CFR Part 20 provides a non-stochastic annual limit of 50 rem (0.5 Sv) for each individual tissue such that

$$\text{DDE} + H_{50,T} \leq 50 \text{ rem (0.50 Sv)}$$

for all tissues except the skin and lens of the eye.

Using the highest DDE, to bound the individual tissue doses from radioactive sources outside the body, generally results in a slightly conservative estimate of EDE_{ex} from uniform exposures; however, it can be overly conservative for non-uniform exposure situations. Since many high-dose jobs at nuclear power plants are performed under non-uniform exposure conditions, this can lead to a significant overestimation of the actual TEDE dose, and the risk, to the workers. To address this issue, the licensee has requested approval to provide a more accurate dose assessment by replacing DDE with EDE_{ex} when calculating TEDE from non-uniform exposures, where the EDE_{ex} is determined with a method developed by the EPRI.

In developing this method, the EPRI investigators used mathematical equations developed by Cristy and Eckerman to model standard, adult human male and female subjects (phantoms). The Monte Carlo radiation transport computer code MCNP was used to calculate the dose to individual tissues modeled in the phantoms, and simulated dosimeter readings, for a range of different exposure geometries. Dosimeters with an isotropic response were modeled at several locations on the surface of the phantoms. Both broad beam and point radiation sources (with selected photon energies) were considered. Indicated doses (e.g., simulated dosimeter readings) and the actual EDE_{ex} (e.g., the sum of the products of the calculated phantom tissue doses and their respective ICRP 26 weighting factors) were calculated for photons incident on the phantoms from various locations. Empirical algorithms were developed to relate the EDE_{ex} resulting from the full range of exposure situations to the indicated doses that could be measured at the surface of the body. Two algorithms were developed to estimate EDE_{ex} from just two dosimeters worn on the trunk of the whole body (front and back, respectively). The first algorithm is a simple, non-weighted averaging of the front and back dosimeter readings. The second algorithm weights the higher of the two dosimeter readings.

5.0 TECHNICAL EVALUATION

The staff reviewed the technical descriptions of the EPRI method for estimating EDE_{ex}; the resulting data and conclusions contained in Technical Report TR-101909, Volumes 1 and 2; the Implementation Guide TR-109446; and supporting technical papers published by the principal EPRI investigators. The staff also performed independent calculations to verify a sampling of the results tabulated in these documents.

Table 8 in TR-101909, Volume 2, provides a summary of the EDE_{ex} and dosimeter (front and back) readings calculated for parallel beams and point sources used to develop the EPRI algorithms. The staff noted that the magnitude of the units for the parallel beam dose factors listed in Table 8 are low by five orders of magnitude (e.g., "E-15 rad-cm squared per photon" instead of the correct "E-10 rad-cm squared per photon"). The licensee verified, in its June 13, 2002, supplemental letter, that this is a typographical error in the EPRI document. However, this error does not affect the conclusions drawn from the data. The licensee has stated that they will not use the specific dose factors listed in Table 8 to calculate EDE_{ex}.

The EPRI work indicates that a single dosimeter (calibrated to read DDE) worn on the chest provides a reasonably accurate estimate of EDE_{ex} when the individual is exposed to a number of randomly distributed radiation sources during the monitoring period. This is consistent with current allowable dosimetry practices and requires no special approval. The alternate definition of TEDE requested would allow the licensee the option to monitor worker dose with a single DDE measurement, as currently required, or to control TEDE using EDE_{ex} (as determined by the EPRI two-badge method). This would benefit the licensee in situations where monitoring the highest DDE would require moving or supplementing the single badge.

The data presented in the EPRI reports indicate that the weighted, two-dosimeter algorithm provides a reasonably conservative estimate of EDE_{ex}. However, the non-weighted algorithm does not always give a conservative result. The licensee has stated that it will only use the weighted, two-dosimeter algorithm such that

$$EDE_{ex} = ½ (MAX + ½ (R_{front} + R_{back}))$$

where R_{front} is the reading of the dosimeter on the front of the body, R_{back} is the reading of the dosimeter on the back of the body, and MAX is the higher of the front or back dosimeter readings.

Additional issues and limitations noted in the staff's review are included in the following paragraphs.

Partial-body irradiations that preferentially shield the dosimeter could bias the EPRI method results in the non-conservative direction. The licensee has stated that they will ensure that the dosimeters are worn so that at least one of the two badges "sees" the source(s) of radiation. In other words, the radiological work will be conducted and the dosimeters worn in such a way, so that no shielding material is present between the radioactive source(s) and the whole body, that would cast a shadow on the dosimeter(s) and not over other portions of the whole body.

Isotropic dosimeters (e.g., dosimeters that respond independently of the angle of the incident radiation) are impractical and not widely available commercially. Therefore, the licensee must implement the EPRI method using dosimeters that will have an angular-dependent response. If the dosimeter reading decreases more rapidly than EDE_{ex}, with increasing exposure angle, the resulting EDE_{ex} estimate will be biased in the non-conservative direction. The EPRI principle investigators have addressed this issue of angular dependance in their published technical paper entitled, "A Study of the Angular Dependence Problem In Effective Dose Equivalent Assessment" (*Health Physics* Volume 68. No. 2, February 1995, pp. 214-224). The licensee has stated that the dosimeters used to estimate EDE_{ex} will have demonstrated angular response characteristics at least as good as that specified in this technical paper. In addition, the dosimeters will be calibrated to indicate DDE at the monitored location, to ensure their readings reflect electronic equilibrium conditions.

The EPRI method for estimating EDE_{ex} from two dosimeter readings is not applicable to exposure situations where the sources of radiation are nearer than 12 inches (30 cm) from the surface of the body. Tables 5 thru 7 in EPRI TR-101909, Volume 2, provide calculated EDE_{ex} values resulting from exposure to point sources in contact with the torso of the body. However, the staff review determined that the information provided in these tables does not bound all of the pertinent point source exposure situations. The licensee has stated that the use of EDE_{ex} to determine compliance with the TEDE limit, resulting from point sources (i.e., hot particles) on or near the surface of the body, is outside the scope of this request.

The exemption applies only to the TEDE definition and calculations. It does not modify the dose limits for any individual organ or tissue specified in, or method for complying with, 10 CFR Part 20. Also, when DDE is used to calculate TEDE under the revised definition, the requirement that it be for the part of the body receiving the highest exposure in 10 CFR 20.1201(c) is applicable.

6.0 EVALUATION SUMMARY

The staff concludes that calculating TEDE using this EDE_{ex} in place of DDE provides a more accurate estimate of the risk associated with the radiation exposures experienced by radiation workers at a nuclear power plant. Additionally the staff finds that the proposal to limit TEDE such that

$$EDE_{ex} + CEDE \leq 5 \text{ rem}$$

is consistent with the basis for the limits in 10 CFR Part 20. Therefore, subject to the limitations noted above, defining TEDE to mean the sum of EDE_{ex} or DDE (for external exposures) and CEDE (for internal exposures), in lieu of the current 10 CFR 20.1003 definition, is acceptable.

Additionally, the staff concludes that the methods for estimating EDE_{ex} described in EPRI Technical Report TR-101909, Volumes 1 and 2, and Implementation Guide TR-109446 are based on sound technical principles. The proposed EPRI weighted, two-dosimeter algorithm provides an acceptably conservative estimate of EDE_{ex} with a degree of certainty that is comparable to that inherent in the methods allowed by 10 CFR Part 20 for estimating CEDE.

Therefore, subject to the limitations noted above, using the EPRI weighted, two-dosimeter algorithm so that

$$EDE_{ex} = \frac{1}{2} (MAX + \frac{1}{2} (R_{front} + R_{back}))$$

for the purposes of demonstrating compliance with 10 CFR 20.1003 is acceptable.

7.0 CONCLUSION

Accordingly, the Commission has determined that, pursuant to 10 CFR 20.2301, the exemption is authorized by law and would not result in undue hazard to life or property. Therefore, the Commission hereby grants Entergy Operations, Inc. and Entergy Nuclear Operations, Inc. an exemption from the requirements of 10 CFR 20.1003 for Arkansas Nuclear One, Units 1 and 2; Grand Gulf Nuclear Station; Indian Point Nuclear Station, Units 1, 2 and 3; James A. Fitzpatrick Nuclear Power Plant; Pilgrim Nuclear Power Station; River Bend Station; Vermont Yankee Nuclear Power Plant; and Waterford Steam Electric Station, Unit 3. The exemption changes the definition of TEDE to mean the sum of EDE_{ex} or DDE (for external exposures) and CEDE (for internal exposures). This Exemption is granted to allow the licensee the option to monitor worker dose using EDE_{ex} based on the following conditions:

1. Only the EPRI weighted, two-dosimeter algorithm will be used such that

   $$EDE_{ex} = \frac{1}{2} (MAX + \frac{1}{2} (R_{front} + R_{back}))$$

   where R_{front} is the reading of the dosimeter on the front of the body, R_{back} is the reading of the dosimeter on the back of the body, and MAX is the higher of the front or back dosimeter readings.

2. The radiological work will be conducted and the dosimeters worn in such a way, so that no shielding material is present between the radioactive source(s) and the whole body, that would cast a shadow on the dosimeter(s) and not over other portions of the whole body.

3. The dosimeters used to estimate EDE_{ex} will have demonstrated angular response characteristics at least as good as that specified in the technical paper entitled, “A Study of the Angular Dependence Problem In Effective Dose Equivalent Assessment” (*Health Physics* Volume 68. No. 2, February 1995, pp. 214-224). Also, the dosimeters will be calibrated to indicate DDE at the monitored location, to ensure their readings reflect electronic equilibrium conditions.

4. The EPRI method for estimating EDE_{ex} from two dosimeter readings is not applicable to exposure situations where the sources of radiation are nearer than 12 inches (30 cm) from the surface of the body.

Pursuant to 10 CFR 51.32, the Commission has determined that the granting of this exemption will not have a significant effect on the quality of the human environment (67 FR 56603, dated September 4, 2002).

This exemption is effective upon issuance.

Dated at Rockville, Maryland, this 12th day of September 2002.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

Bruce A. Boger, Director
Division of Inspection Program Management
Office of Nuclear Reactor Regulation

Arkansas Nuclear One, Units 1 and 2; Grand Gulf Nuclear Station; River Bend Station; and Waterford Steam Electric Station, Unit 3

cc:

Executive Vice President
& Chief Operating Officer
Entergy Operations, Inc.
P. O. Box 31995
Jackson, MS 39286-1995

Winston & Strawn
1400 L Street, N.W.
Washington, DC 20005-3502

Senior Resident Inspector - ANO
U.S. Nuclear Regulatory Commission
P. O. Box 310
London, AR 72847

Senior Resident Inspector - GGNS
U. S. Nuclear Regulatory Commission
P. O. Box 399
Port Gibson, MS 39150

Senior Resident Inspector - RBS
U.S. Nuclear Regulatory Commission
P. O. Box 1050
London, AR 72847

Resident Inspector/Waterford NPS
Post Office Box 822
Killona, LA 70066

Regional Administrator, Region IV
U.S. Nuclear Regulatory Commission
611 Ryan Plaza Drive, Suite 1000
Arlington, TX 76011-8064

Vice President, Operations Support
Entergy Operations, Inc.
P. O. Box 31995
Jackson, MS 39286-1995

Wise, Carter, Child & Caraway
P. O. Box 651
Jackson, MS 39205
Director
Division of Solid Waste Management
Mississippi Department of Natural
Resources
P. O. Box 10385
Jackson, MS 39209

President
Claiborne County Board of Supervisors
P. O. Box 339
Port Gibson, MS 39150

General Manager, GGNS
Entergy Operations, Inc.
P. O. Box 756
Port Gibson, MS 39150

State Health Officer
State Board of Health
P. O. Box 1700
Jackson, MS 39205

Office of the Governor
State of Mississippi
Jackson, MS 39201

Attorney General
Asst. Attorney General
State of Mississippi
P. O. Box 22947
Jackson, MS 39225

Director, Nuclear Safety Assurance - GGNS
Entergy Operations, Inc.
P.O. Box 756
Port Gibson, MS 39150

Arkansas Nuclear One, Units 1 and 2; Grand Gulf Nuclear Station; River Bend Station; and Waterford Steam Electric Station, Unit 3

cc:

Mr. William A. Eaton
Vice President, Operations GGNS
Entergy Operations, Inc.
P. O. Box 756
Port Gibson, MS 39150

Manager - Licensing
Entergy Operations, Inc.
River Bend Station
P. O. Box 220
St. Francisville, LA 70775

President of West Feliciana
Police Jury
P. O. Box 1921
St. Francisville, LA 70775

Ms. H. Anne Plettinger
3456 Villa Rose Drive
Baton Rouge, LA 70806

General Manager - Plant Operations
Entergy Operations, Inc.
River Bend Station
P. O. Box 220
St. Francisville, LA 70775

Director - Nuclear Safety - RBS
Entergy Operations, Inc.
River Bend Station
P. O. Box 220
St. Francisville, LA 70775

Attorney General
State of Louisiana
P. O. Box 94095
Baton Rouge, LA 70804-9095

Attorney General
State of Louisiana
P. O. Box 94005
Baton Rouge, LA 70804-9005

Mr. Paul D. Hinnenkamp
Vice President - Operations
Entergy Operations, Inc.
River Bend Station
P. O. Box 220
St. Francisville, LA 70775

Director
Nuclear Safety Assurance - W3
Entergy Operations, Inc.
17265 River Road
Killona, LA 70066-0751

General Manager Plant Operations
Entergy Operations, Inc.
17265 River Road
Killona, LA 70066-0751

Licensing Manager
Entergy Operations, Inc.
17265 River Road
Killona, LA 70066-0751

Parish President Council
St. Charles Parish
P. O. Box 302
Hahnville, LA 70057

Chairman
Louisiana Public Service Commission
Baton Rouge, LA 70825-1697

Mr. Joseph E. Venable
Vice President Operations
Entergy Operations, Inc.
17265 River Road
Killona, LA 70066-0751

Mr. Craig G. Anderson
Vice President Operations, ANO
Entergy Operations, Inc.
1448 S. R. 333
Russellville, AR 72801

Arkansas Nuclear One, Units 1 and 2; Grand Gulf Nuclear Station; River Bend Station; and Waterford Steam Electric Station, Unit 3

cc:

Mr. Michael E. Henry, Administrator
and State Liaison Officer
Department of Environmental Quality
P. O. Box 82135
Baton Rouge, LA 70884-2135

Director, Division of Radiation
Control and Emergency Management
Arkansas Department of Health
4815 West Markham Street, Slot 30
Little Rock, AR 72205-3867

Mr. Mike Schoppman
Framatome ANP, Richland, Inc.
Suite 705
1911 North Fort Myer Drive
Rosslyn, VA 22209

County Judge of Pope County
Pope County Courthouse
Russellville, AR 72801

cc:

Mr. Jerry Yelverton
Chief Executive Officer
Entergy Operations
1340 Echelon Parkway
Jackson, MS 39213

Mr. Theodore H. Sullivan
Vice President Operations
Entergy Nuclear Operations, Inc.
James A. FitzPatrick Nuclear Power Plant
P.O. Box 110
Lycoming, NY 13093

Mr. Fred Dacimo
Vice President Operations
Entergy Nuclear Operations, Inc.
Indian Point Nuclear Generating Units 1 & 2
295 Broadway, Suite 1
P.O. Box 249
Buchanan, NY 10511-0249

Mr. Robert J. Barrett
Vice President - Operations
Entergy Nuclear Operations, Inc.
Indian Point Nuclear Generating Unit 3
295 Broadway, Suite 3
P.O. Box 308
Buchanan, NY 10511-0308

Mr. Dan Pace
Vice President Engineering
Entergy Nuclear Operations, Inc.
440 Hamilton Avenue
White Plains, NY 10601

Mr. James Knubel
Vice President Operations Support
Entergy Nuclear Operations, Inc.
440 Hamilton Avenue
White Plains, NY 10601

Michael J. Colomb
General Manager
Entergy Nuclear Operations, Inc.
James A. FitzPatrick Nuclear Power Plant
P.O. Box 110
Lycoming, NY 13093

Mr. Lawrence G. Temple
General Manager Operations
Entergy Nuclear Operations, Inc.
Indian Point Nuclear Generating Unit 2
295 Broadway, Suite 1
P.O. Box 249
Buchanan, NY 10511-0249

Mr. Joseph DeRoy
General Manager Operations
Entergy Nuclear Operations, Inc.
Indian Point Nuclear Generating Unit 3
295 Broadway, Suite 3
P.O. Box 308
Buchanan, NY 10511-0308

Mr. John Kelly
Director of Licensing
Entergy Nuclear Operations, Inc.
440 Hamilton Avenue
White Plains, NY 10601

Ms. Charlene Fiason
Manager, Licensing
Entergy Nuclear Operations, Inc.
440 Hamilton Avenue
White Plains, NY 10601

Mr. Arthur Zaremba, Licensing Manager
Director, Safety Assurance
Entergy Nuclear Operations, Inc.
James A. FitzPatrick Nuclear Power Plant
P.O. Box 110
Lycoming, NY 13093

cc:

Mr. John McCann
Manager, Nuclear Safety and Licensing
Indian Point Nuclear Generating Unit 2
Entergy Nuclear Operations, Inc.
295 Broadway, Suite 1
P.O. Box 249
Buchanan, NY 10511-0249

Mr. Harry P. Salmon, Jr.
Director of Oversight
Entergy Nuclear Operations, Inc.
440 Hamilton Avenue
White Plains, NY 10601

Mr. George Tasick
Licensing Manager
Entergy Nuclear Operations, Inc.
James A. FitzPatrick Nuclear Power Plant
P.O. Box 110
Lycoming, NY 13093

Mr. John Donnelly
Licensing Manager
Entergy Nuclear Operations, Inc.
Indian Point Nuclear Generating Unit 3
295 Broadway, Suite 3
P.O. Box 308
Buchanan, NY 10511-0308

Mr. Thomas Walsh
Secretary - NFSC
Entergy Nuclear Operations, Inc.
Indian Point Nuclear Generating Unit 2
295 Broadway, Suite 1
P.O. Box 249
Buchanan, NY 10511-0249

Regional Administrator, Region I
U.S. Nuclear Regulatory Commission
475 Allendale Road
King of Prussia, PA 19406

Resident Inspector's Office
U. S. Nuclear Regulatory Commission
P.O. Box 136
Lycoming, NY 13093

Senior Resident Inspector, Indian Point 2
U. S. Nuclear Regulatory Commission
295 Broadway, Suite 1
P.O. Box 38
Buchanan, NY 10511-0038

Resident Inspector's Office, Indian Point 3
U.S. Nuclear Regulatory Commission
295 Broadway, Suite 3
P.O. Box 337
Buchanan, NY 10511-0337

Mr. John M. Fulton
Assistant General Counsel
Entergy Nuclear Operations, Inc.
440 Hamilton Avenue
White Plains, NY 10601

Ms. Stacey Lousteau
Treasury Department
Entergy Services, Inc.
639 Loyola Avenue
Mail Stop: L-ENT-15E
New Orleans, LA 70113

Mr. William M. Flynn, President
New York State Energy, Research, and
Development Authority
17 Columbia Circle
Albany, NY 12203-6399

Mr. J. Spath, Program Director
New York State Energy, Research, and
Development Authority
17 Columbia Circle
Albany, NY 12203-6399

cc:

Mr. Paul Eddy
Electric Division
New York State Department
of Public Service
3 Empire State Plaza, 10th Floor
Albany, NY 12223

Mr. Charles Donaldson, Esquire
Assistant Attorney General
New York Department of Law
120 Broadway
New York, NY 10271

Mr. Ronald Schwartz
SRC Consultant
64 Walnut Drive
Spring Lake Heights, NJ 07762

Mr. Ronald J. Toole
SRC Consultant
Toole Insight
605 West Horner Street
Ebensburg, PA 15931

Mr. Charles W. Hehl
SRC Consultant
Charles Hehl, Inc.
1486 Matthew Lane
Pottstown, PA 19465

Supervisor
Town of Scriba
Route 8, Box 382
Oswego, NY 13126

Mayor, Village of Buchanan
236 Tate Avenue
Buchanan, NY 10511

Mr. Ray Albanese
Executive Chair
Four County Nuclear Safety Committee
Westchester County Fire Training Center
4 Dana Road
Valhalla, NY 10592

Alex Matthiessen
Executive Director
Riverkeeper, Inc.
25 Wing & Wing
Garrison, NY 10524

Paul Leventhal
The Nuclear Control Institute
1000 Connecticut Avenue NW
Suite 410
Washington, DC, 20036

Karl Copeland
Pace Environmental Litigation Clinic
78 No. Broadway
White Plains, NY 10603

Jim Riccio
Greenpeace
702 H Street, NW
Suite 300
Washington, DC 20001

Mr. Tim Judson
Organizer
Citizens Awareness Network
140 Bassett St.
Syracuse, NY 13210

Deborah Katz
Executive Director
Citizens Awareness Network
P.O. Box 83
Shelburne Falls, MA 01370

Shawn McConnell
NYPIRG Project Coordinator
13 Hewitt Union
SUNY Oswego
Oswego, NY 13126

cc:

Tom Dellwo
Oswego NYPIRG Environmental
Project Leader
13 Hewitt Union
SUNY Owego
Oswego, NY 13126

Oswego County Administrator
Jack Tierney
46 East Bridge Street
Oswego, New York 13126

cc:

Resident Inspector
U. S. Nuclear Regulatory Commission
Pilgrim Nuclear Power Station
Post Office Box 867
Plymouth, MA 02360

Chairman, Board of Selectmen
11 Lincoln Street
Plymouth, MA 02360

Chairman, Duxbury Board of Selectmen
Town Hall
878 Tremont Street
Duxbury, MA 02332

Office of the Commissioner
Massachusetts Department of
Environmental Protection
One Winter Street
Boston, MA 02108

Office of the Attorney General
One Ashburton Place
20th Floor
Boston, MA 02108

Dr. Robert M. Hallisey, Director
Radiation Control Program
Commonwealth of Massachusetts
Executive Offices of Health and
Human Services
174 Portland Street
Boston, MA 02114

John M. Fulton
Assistant General Counsel
Pilgrim Nuclear Power Station
600 Rocky Hill Road
Plymouth, MA 02360-5599

Mr. C. Stephen Brennion
Licensing Superintendent
Pilgrim Nuclear Power Station
600 Rocky Hill Road
Plymouth, MA 02360-5599

Mr. Jack Alexander
Manager, Reg. Relations and
Quality Assurance
Pilgrim Nuclear Power Station
600 Rocky Hill Road
Plymouth, MA 02360-5599

Mr. David F. Tarantino
Nuclear Information Manager
Pilgrim Nuclear Power Station
600 Rocky Hill Road
Plymouth, MA 02360-5599

Ms. Jane Perlov
Secretary of Public Safety
Executive Office of Public Safety
One Ashburton Place
Boston, MA 02108

Mr. Stephen J. McGrail, Director
Attn: James Muckerheide
Massachusetts Emergency Management
Agency
400 Worcester Road
Framingham, MA 01702-5399

Chairman
Nuclear Matters Committee
Town Hall
11 Lincoln Street
Plymouth, MA 02360

Mr. William D. Meinert
Nuclear Engineer
Massachusetts Municipal Wholesale
Electric Company
P.O. Box 426
Ludlow, MA 01056-0426

Vermont Yankee Nuclear Power Station

cc:

Mr. David R. Lewis
Shaw, Pittman, Potts & Trowbridge
2300 N Street, N.W.
Washington, DC 20037-1128

Ms. Christine S. Salembier, Commissioner
Vermont Department of Public Service
112 State Street
Montpelier, VT 05620-2601

Mr. Michael H. Dworkin, Chairman
Public Service Board
State of Vermont
112 State Street
Montpelier, VT 05620-2701

Chairman, Board of Selectmen
Town of Vernon
P.O. Box 116
Vernon, VT 05354-0116

Mr. Michael Hamer
Operating Experience Coordinator
Entergy Nuclear Vermont Yankee, LLC
P.O. Box 250
Governor Hunt Road
Vernon, VT 05354

G. Dana Bisbee, Esq.
Deputy Attorney General
33 Capitol Street
Concord, NH 03301-6937

Chief, Safety Unit
Office of the Attorney General
One Ashburton Place, 19th Floor
Boston, MA 02108

Ms. Deborah B. Katz
Box 83
Shelburne Falls, MA 01370

Mr. Raymond N. McCandless
Vermont Department of Health
Division of Occupational
and Radiological Health
108 Cherry Street
Burlington, VT 05402

Mr. Gautam Sen
Manager, Licensing
Entergy Nuclear Vermont Yankee, LLC
P.O. Box 0500
185 Old Ferry Road
Brattleboro, VT 05302-0500

Resident Inspector
Vermont Yankee Nuclear Power Station
U. S. Nuclear Regulatory Commission
P.O. Box 176
Vernon, VT 05354

Director, Massachusetts Emergency
Management Agency
ATTN: James Muckerheide
400 Worcester Rd.
Framingham, MA 01702-5399

Jonathan M. Block, Esq.
Main Street
P. O. Box 566
Putney, VT 05346-0566