

December 28, 2005

Mr. Gene St. Pierre, Site Vice President  
c/o James M. Peschel  
Seabrook Station  
FPL Energy Seabrook, LLC  
PO Box 300  
Seabrook, NH 03874

SUBJECT: SEABROOK STATION, UNIT NO. 1 - ISSUANCE OF AMENDMENT  
RE: RECAPTURE OF ZERO-POWER AND LOW-POWER TESTING TIME  
(TAC NO. MC6548)

Dear Mr. St. Pierre:

The Commission has issued the enclosed Amendment No. 105 to Facility Operating License (FOL) No. NPF-86 for Seabrook Station, Unit No. 1. The amendment consist of a change to the FOL in response to your application dated March 28, 2005, as supplemented by letter dated September 23, 2005.

The amendment extends the expiration date of the FOL from October 17, 2026, to March 15, 2030, to recapture zero- and low-power testing time. The extended date is 40 years from when the full-power license was issued, in accordance with Section 103.c of the Atomic Energy Act of 1954, as amended, Title 10 of the *Code of Federal Regulations* Sections 50.56, and 50.57, and Nuclear Regulatory Commission policy as stated in the Staff Requirements Memorandum SECY-98-296, dated March 30, 1999.

A copy of the related Safety Evaluation is also enclosed. Notice of Issuance will be included in the Commission's biweekly *Federal Register* notice.

Sincerely,

*/RA/*

G. Edward Miller, Project Manager  
Plant Licensing Branch I-2  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket No. 50-443

Enclosures: 1. Amendment No. 105 to  
FOL No. NPF-86  
2. Safety Evaluation

cc w/encls: See next page

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**/RA/**  
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DATE	11/29/05	11/15/05	8/17/05	11/08/05	8/19/05	8/22/05

OFFICE	SPLB/BC	OGC	NRR/LPLI-2/BC
NAME	JHannon	JHull	DRoberts
DATE	8/17/05	11/28/05	12/22/05

FPL ENERGY SEABROOK, LLC, ET AL.\*

DOCKET NO. 50-443

SEABROOK STATION, UNIT NO. 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 105  
License No. NPF-86

1. The Nuclear Regulatory Commission (the Commission) has found that:
  - A. The application for amendment filed by FPL Energy Seabrook, LLC, et al. (the licensee), dated March 28, 2005, as supplemented by letter dated September 23, 2005, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;
  - B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;
  - C. There is reasonable assurance: (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;
  - D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and
  - E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

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\*FPL Energy Seabrook, LLC (FPLE Seabrook) is authorized to act as agent for the following: Hudson Light & Power Department, Massachusetts Municipal Wholesale Electric Company, and Taunton Municipal Light Plant. FPLE Seabrook has exclusive responsibility and control over the physical construction, operation and maintenance of the facility.

2. Accordingly, Facility Operating License NPF-86 is amended by changes to the Operating License as indicated in the attachment to this license amendment.
3. This license amendment is effective as of its date of issuance and shall be implemented within 30 days of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

*/RA/*

Darrell J. Roberts, Chief  
Plant Licensing Branch I-2  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Attachment: Changes to the Operating License

Date of Issuance: December 28, 2005

ATTACHMENT TO LICENSE AMENDMENT NO. 105

FACILITY OPERATING LICENSE NO. NPF-86

DOCKET NO. 50-443

Revise the Facility Operating License No. NPF-86 by removing the page identified below and inserting the enclosed page. The revised page is identified by amendment number and contains marginal lines indicating the areas of change.

Remove  
Page 7

Insert  
Page 7

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
RELATED TO AMENDMENT NO. 105 TO FACILITY OPERATING LICENSE NO. NPF-86

FPL ENERGY SEABROOK, LLC  
SEABROOK STATION, UNIT NO. 1

DOCKET NO. 50-443

## 1.0 INTRODUCTION

By letter dated March 28, 2005, as supplemented by letter dated September 23, 2005, FPL Energy Seabrook, LLC (FPLE or the licensee) submitted a request for a change to the Operating License for Seabrook Station, Unit No. 1 (Seabrook).

The current operating licensed term for Seabrook ends on October 17, 2026. This is 40 years from the date of the zero-power operating license, which was issued on October 17, 1986. The amendment would extend the expiration date of the operating license from October 17, 2026, to March 15, 2030. The extended date for termination of the operating license would be 40 years after issuance of the full-power operating license which was issued on March 15, 1990. This proposed amendment is not a request for license renewal under Title 10 of the *Code of Federal Regulations* (10 CFR) Part 54.

The supplement dated September 23, 2005, provided additional information that clarified the application, did not expand the scope of the application as originally noticed, and did not change the Nuclear Regulatory Commission (NRC or the Commission) staff's original proposed no significant hazards consideration determination as published in the *Federal Register* on May 24, 2005 (70 FR 29797).

## 2.0 REGULATORY EVALUATION

Section 103.c of the Atomic Energy Act of 1954, as amended (the Act), provides that a license is to be issued for a specific period not to exceed 40 years. Section 50.51.(a) of 10 CFR specifies that each license will be issued for a fixed period of time not to exceed 40 years from the date of issuance. Additionally, 10 CFR 50.56 and 10 CFR 50.57 allow the issuance of an operating license pursuant to 10 CFR 50.51 after the construction of the facility has been substantially completed, in conformity with the construction permit and when other provisions specified in 10 CFR 50.57 are met. Consistent with Section 103.c of the Act and Sections 50.51, 50.56, and 50.57 of 10 CFR, the licensee, by its application of March 28, 2005, and supplement dated September 23, 2005, seeks an extension that would permit Seabrook to operate for the full 40-year lifetime from the date when the full-power operating license was issued. The proposed extension is consistent with the Commission's policy stated in the Staff Requirements Memorandum (SRM) dated March 30, 1999, from Andrew L. Bates, Acting

Secretary, to William D. Travers, Executive Director for Operations. The SRM was in response to SECY-98-296, "Agency Policy Regarding Licensee Recapture of Low-Power Testing or Shutdown Time for Nuclear Power Plants," and stated:

The Commission has approved the staff's plans to grant the Grand Gulf license amendment to amend the expiration date of the license to recover the time spent in low power testing before receiving the Full Power Operating License (FPOL). The Commission also approved the granting of similar requests from other licensees provided that the 40-year license term began with the issuance of a Low Power Operating License (LPOL) and a separate FPOL was issued.

### 3.0 TECHNICAL EVALUATION

The NRC staff has evaluated the environmental and safety issues associated with the proposed amendment which would allow 41 months of additional plant operation for Seabrook. The major safety issues are the effects of aging and neutron fluence on plant structures and equipment. This is addressed in Section 3.1.

FPLE's request for an extension of the operating license is based on the fact that a 40-year service life was considered during the design and construction of the plant. Although this does not mean that some components will not wear out during the plant's lifetime, design features were incorporated that provide the ability to inspect structures, systems, and components during this lifetime. Surveillance, ability to inspect, and maintenance practices, that were implemented in accordance with the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (Code) for inservice inspection and testing of pumps and valves and Seabrook's Technical Specifications (TSs), provide assurance that any degradation in the plant's safety equipment will be identified and corrected to provide safe operation of the plant's proposed license extension period. The specific provisions and requirements for ASME Code testing are set forth in 10 CFR 50.55a.

#### 3.1 Safety Assessment

##### 3.1.1 Neutron Damage of the Reactor Pressure Vessel

The reactor pressure vessel (RPV) was designed and fabricated in accordance with the requirements of Section III, Class 1, of the ASME Code Edition, Addenda, and ASME Code Cases applicable at the time of design and construction. Operating limitations of the ASME Code and of Appendix G, "Fracture Toughness Requirements," of 10 CFR Part 50 are also applicable. The RPV and the reactor coolant system were designed to allow inspections in accordance with Section XI of the ASME Code. The NRC staff's evaluation approving the programs and their implementation with respect to these structures is contained in the Seabrook Safety Evaluation Report (NUREG-0896 and its nine supplements).

Over the operating life of a reactor vessel, ferritic materials exposed to neutron irradiation will undergo a decrease in fracture toughness. A surveillance program in accordance with the requirements of Appendix H, "Reactor Vessel Material Surveillance Program Requirements," of 10 CFR Part 50, monitors changes in fracture toughness. The surveillance program ensures that the safety margins remain sufficient to prevent brittle failure of the reactor vessel. According to the currently-approved version of the reactor vessel surveillance program

withdrawal schedule, contained in the Seabrook Technical Requirements Manual, three capsules have been withdrawn to date. Results from capsules U and Y have been reported to the NRC. Capsule V was scheduled to be withdrawn during the refueling outage at the end of Cycle 10.

The results of the analysis of capsule V must be reported to the NRC within one year of withdrawal. The results from capsules U and Y, as analyzed using the guidance in Regulatory Guide (RG) 1.99, indicate that the surveillance data are credible. Accordingly, the Reference Temperature nil-ductility transition ( $RT_{NDT}$ ), Reference Temperature pressurized thermal shock ( $RT_{PTS}$ ) and upper-shelf energies were determined for each vessel beltline material. It was determined that the plate and weld material upper-shelf energies will remain above 50 ft-lb through the end of the original license period and through the period being sought for recapture. Also, based on surveillance data or based on RG predictions, as appropriate, the  $RT_{PTS}$  values are below the screening criteria at the end of the period being sought for recapture. Finally, the adjusted  $RT_{NDT}$  values have been used to adjust the operating parameters, i.e., reactor coolant system pressure/temperature limitations on heatup, cooldown, and low temperature overpressure protection (LTOP) specified in TS 3/4.4.9.

### 3.1.2 Compliance with Appendices G and H of 10 CFR Part 50, and 10 CFR 50.61

Appendix G of 10 CFR Part 50, and 10 CFR 50.61, contain screening criteria for Charpy upper-shelf energy (USE) and pressurized thermal shock, respectively. Appendix H of 10 CFR Part 50 contains a description of reactor vessel surveillance program requirements.

The screening criteria in Appendix G are that the reactor vessel beltline material have a USE of no less than 50 ft-lb. The data from the licensee's response to Generic Letter 92-01, Revision 1, Supplement 1, as entered into the Reactor Vessel Integrity Database, were evaluated by the NRC staff and the minimum USE at the end of the requested license extension period is above 60 ft-lb for the material with the minimum USE, lower-shell plate R1808-2. The minimum USE is above the minimum required USE of 50 ft-lb which satisfies the requirements of 10 CFR 50, Appendix G.

Appendix G also requires that the plant operating parameters (i.e., reactor coolant system pressure/temperature limitations on heatup, cooldown, and LTOP based on  $RT_{NDT}$ ) must be adjusted to account for the effects of neutron radiation. Seabrook used results of available surveillance capsule data to adjust the plant operating parameters, as required.

The screening criteria in 10 CFR 50.61 are that the reference temperature  $RT_{PTS}$  values be less than 270 °F for plates, forgings, and axial welds, and 300 °F for circumferential welds at the expiration of the license. According to 10 CFR 50.61, the assessment of the beltline materials must be updated upon request for a change in the expiration date for the facility. The request for recapture of testing time constitutes a request for change in the expiration date; therefore, an updated assessment is required. By letter dated September 23, 2005, Seabrook provided updated values for  $RT_{PTS}$  for all of the reactor vessel beltline materials. The values, which are presented in Table 1, satisfy the requirements of 10 CFR 50.61 at the end of the requested period of recapture.

In response to a request for additional information, the licensee provided by letter dated September 23, 2005, a description of the effect of a recapture period on the surveillance

capsule withdrawal schedule. The withdrawal schedule was determined per the guidelines in American Society for Testing and Materials (ASTM) E-185. The  $RT_{NDT}$  temperature shift ( $\Delta RT_{NDT}$ ) values were calculated using updated fluence values assuming 40 effective full-power years (EFPYs) at the end-of-license (EOL) for all reactor vessel beltline materials. The projected maximum EOL transition temperature increase of the beltline materials is less than 100 °F. As the maximum transition temperature shift is less than 100 °F at EOL, the number of surveillance capsules required to be tested per ASTM E-185 is unchanged at three capsules. The Seabrook surveillance capsule program has pulled and tested three capsules to date. A fourth capsule is scheduled to be removed at a time when the capsule fluence corresponds to not-less-than-once or greater-than-twice the peak inside-diameter fluence at EOL. The scheduled removal time is 21 EFPYs with a fluence of approximately  $4.24 \times 10^{19}$  n/cm<sup>2</sup>. With a new EOL fluence of  $2.20 \times 10^{19}$  n/cm<sup>2</sup>, the last capsule will meet the ASTM E-185 criteria removal time criteria and the current reactor vessel surveillance program is unaffected. Therefore, the proposed license expiration date does not require revision of the existing Seabrook surveillance capsule withdrawal schedule.

Based on the above, there is reasonable assurance that Seabrook will, for the proposed license term extension requested, continue to meet the requirements of 10 CFR 50.61, Appendices G and H, and their operating license with respect to the RPV.

**Table 1: RTPTS Calculations for Seabrook Beltline Region Materials, 40 EFPYs**

Material	Fluence ( $\times 10^{11}$ n/cm <sup>2</sup> , E>1.0 MeV)	FF	CF (°F)	$\Delta RT_{PTS}$ (c) (°F)	Margin (°F)	$RT_{NDT(U)}$ (a) (°F)	$RT_{PTS}$ (b) (°F)
Intermediate Shell Plate R-1806-1	2.20	1.21	28.5	34.5	34	40	109
Intermediate Shell Plate R-1806-2	2.20	1.21	37	44.8	34	0	79
Intermediate Shell Plate R-1806-3	2.20	1.21	47.5	57.5	34	10	102
Lower Shell Plate R-1808-1	2.20	1.21	37	44.8	34	40	119
Lower Shell Plate R-1808-2	2.20	1.21	37	44.8	34	10	89
Lower Shell Plate R-1808-3	2.20	1.21	44	53.2	34	40	127
Using C/S Data <sup>(d)</sup>	2.20	1.21	39.5	47.8	17 <sup>(d)</sup>	40	105
Intermediate and Longitudinal Weld Seams (Heat # 4P6052)	2.20	1.21	30.7	37.1	37.1	-60	14
Using C/S Data <sup>(d)</sup>	2.20	1.21	12.4	15.0	15 <sup>(d)</sup>	-60	-30

Material	Fluence ( $\times 10^{11}$ n/cm <sup>2</sup> , E>1.0 MeV)	FF	CF ( <sup>β</sup> F)	$\Delta RT_{PTS}$ <sup>(c)</sup> ( <sup>β</sup> F)	Margin ( <sup>β</sup> F)	$RT_{NDT(U)}$ <sup>(a)</sup> ( <sup>β</sup> F)	$RT_{PTS}$ <sup>(b)</sup> ( <sup>β</sup> F)
Intermediate to Lower Shell Girth Weld Seams (Heat # 4P6052)	2.20	1.21	30.7	37.1	37.1	-60	14
Using C/S Data <sup>(d)</sup>	2.20	1.21	12.4	15.0	15 <sup>(d)</sup>	-60	-30

Notes:

- (a) Initial  $RT_{NDT}$  values are measured values
- (b)  $RT_{PTS} = RT_{NDT(U)} + \Delta RT_{PTS} + \text{Margin}$  (<sup>β</sup>F)
- (c)  $\Delta RT_{PTS} = CF * FF$
- (d) Using Credible Surveillance Data

### 3.1.3 Structures

The concrete and steel Category I structures at Seabrook were designed and constructed in accordance with the General Design Criteria of Appendix A, "General Design Criteria for Nuclear Power Plants," to 10 CFR Part 50. This is discussed in Sections 3.1 and 3.2 of the Updated Final Safety Evaluation Report. The licensee's design basis, fabrication, construction, and implementation of quality assurance (QA) criteria for the plant were reviewed by the NRC staff when the plant was being licensed for low-power operation. The NRC staff's evaluation approving the programs and its implementation with respect to these structures are contained in NUREG-0896 and its nine supplements. Industrial experience with concrete and steel structures confirms that a service life in excess of 40 years may be anticipated.

The major codes and specifications used in the design and construction of the Category I concrete and steel structures were, respectively, American Concrete Institute (ACI) 318-71, "Building Code Requirements for Reinforced Concrete," and the American Institute of Steel Construction Specification, "Specification for the Design, Fabrication, and Erection of Structural Steel for Buildings." The foundations of the seismic Category I structures are reinforced concrete designed to ACI 318-71. Section 3.8 of NUREG-0896 stated that the criteria that were used in the analysis, design, and construction of seismic Category I structures at Seabrook account for anticipated loadings and postulated conditions that may be imposed on the structures during their service lifetime, which would include the requested 3.4 years of additional power operation.

These criteria are in conformance with the established criteria, codes, standards, and specifications acceptable to the NRC staff. The licensee's use of the indicated codes, standards, and specifications in the plant's design, analyses, and construction, and the licensee's QA program required by Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," to 10 CFR Part 50, as approved by NUREG-0896 and its supplements, provide reasonable assurance that the concrete and steel structures will, for the proposed license term extension requested by the licensee, continue to meet the applicable provisions of the rules and regulations of the Commission, and the Seabrook license.

### 3.1.4 Mechanical Equipment

With regard to equipment lifetime, Seabrook was designed, licensed, and constructed for a 40-year service life. The reactor coolant system components and support systems were analyzed for the integrated effects of radiation damage and cyclic loadings (with added margin) that could reasonably be expected to occur in the 40-year lifetime from the FPOL. Surveillance and maintenance practices were implemented in accordance with the ASME Code for inservice inspection and inservice testing of pumps and valves, a maintenance program satisfying 10 CFR 50.65 requirements, and the facility's TSs. These TSs are part of the plant's operating license and have been approved by the NRC, as are all subsequent changes to the TSs. The specific provisions and requirements for ASME Code testing are set forth in 10 CFR 50.55a.

Surveillance, maintenance, and testing requirements for mechanical equipment are in place at the plant to verify operability, or to detect degradation and ensure that the equipment that does degrade is replaced or other corrective actions are taken. In addition, subcomponents such as nonmetallics (e.g., gaskets and O-rings) are inspected and replaced as necessary, as part of routine maintenance in order to ensure the design life of equipment. The licensee stated that surveillance, inspection, and testing requirements at Seabrook, which apply during the operating life of the plant, include the following:

ASME Code Section XI: Equipment that is safety-related is ASME Code Class 1, 2, or 3 and is subject to the inservice inspection and testing requirements of Section XI and 10 CFR 50.55a, except where relief has been granted in writing from these requirements. These requirements apply throughout the operating life of a plant and will provide reasonable assurance that mechanical components will be properly monitored throughout the plant lifetime.

Technical Specifications (TSs): 10 CFR 50.36 requires the establishment of limiting conditions for operation (LCOs) for certain equipment. (LCOs are the lowest functional capability or performance levels of equipment required for safe operation of the facility). This equipment is subject to the surveillance and testing requirements in the TSs to assure systems are operable. These surveillance requirements include calibration and inspection of systems and components to ensure that operation of the plant will remain in accordance with the [LCOs].

10 CFR Part 50, Appendix J: Equipment and components associated with containment penetrations, including containment isolation valves, are subject to the leak testing requirements in Appendix J, "Primary Reactor Containment Leakage Testing for Water-Cooled Power Reactors." This is for Type B and C testing of valves and penetrations, and Type A testing of the overall containment structure. These tests verify the integrity of the containment and associated components, and confirm that the containment and associated components are capable of performing their designed safety function as assumed in the accident analysis for Seabrook.

From this evaluation, the NRC staff considers that compliance with the codes, standards, and regulatory requirements to which mechanical equipment were analyzed, constructed, tested, and inspected provide adequate assurance that the structural integrity of equipment important

to safety will be maintained during the operating lifetime of the plant and during the additional period authorized by this amendment. Any significant degradation by such equipment would be discovered and the equipment restored to an acceptable and operable condition.

### 3.1.5 Electrical Equipment

Aging analysis has been performed for all safety-related electrical equipment in accordance with 10 CFR 50.49, "Environmental qualification of electric equipment important to safety for nuclear power plants," identifying qualified lifetimes for this equipment. These lifetimes have been incorporated into plant equipment maintenance and replacement practices to ensure that all electrical equipment important to safety remains qualified and available to perform its safety function regardless of the overall age of the plant. If a component has a qualified life of less than 40 years, its replacement is scheduled through the maintenance program. Therefore, the NRC staff considers that the environmental qualification program will support the proposed amendment.

### 3.1.6 QA and Maintenance Programs

In licensing Seabrook, the NRC staff reviewed the QA programs and the conduct of operations including the maintenance procedures at Seabrook. The QA programs for Seabrook's operations will assess how the organization is following procedures and meeting requirements for these operations. This would include the maintenance programs at Seabrook that assure the equipment is operable. In NUREG-0896, the NRC staff concluded that the QA programs and maintenance procedures were acceptable. The maintenance programs must operate in conformance with 10 CFR 50.65, "Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants."

Inspections by the NRC staff of the QA and maintenance programs at Seabrook, since the plant was licensed, found that these programs remain acceptable. The QA programs meet the requirements of Appendix B to 10 CFR Part 50.

Therefore, the NRC staff considers that the licensee's implementation and use of these programs at Seabrook provides reasonable assurance that equipment important to safety will, for the proposed license term extension requested by the licensee, be in conformity with the applicable provisions of the rules and regulations of the Commission, and the Seabrook license.

Based on the discussion above and on the safety and environmental issues involved with granting an extension to the operating license, there are no safety issues that would preclude the additional operation of Seabrook. Based on this, the NRC staff concludes that the proposed amendment is acceptable; however, it should be noted that the above evaluation would not be sufficient for license renewal under 10 CFR Part 54.

#### 4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the New Hampshire and Massachusetts State officials were notified of the proposed issuance of the amendment. The State officials had no comments.

#### 5.0 ENVIRONMENTAL CONSIDERATION

Pursuant to 10 CFR 51.21, 51.32, and 51.35, an environmental assessment and finding of no significant impact has been prepared for the proposed amendment and published in the *Federal Register* on December 20, 2005 (70 FR 75487). Accordingly, based upon the environmental assessment, the staff has determined that the issuance of the amendment will not have a significant effect on the quality of the human environment.

#### 6.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributor: V. Nerses  
R. Hardies

Date: December 28, 2005