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RBG-45990

August 15, 2002

U. S. Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555

Subject: River Bend Station - Unit 1
Docket No. 50-458
License No. NPF-47
License Amendment Request (LAR) 2002-23, "Request for a Change to the Reactor Vessel Material Surveillance Program"

References:
1. Letter from William H. Bateman (NRC) to Carl Terry (BWRVIP Chairman), "BWRVIP Response to NRC Safety Evaluation Regarding the BWR Integrated Surveillance Program," dated May 28, 2002.
2. Letter from Robert A. Gramm (NRC) to Randall K. Edington, "River Bend Station, Unit 1 - Request To Defer The Testing Of The Reactor Vessel Surveillance Capsule Specimens And Request To Extend The Date For Reporting Testing Results," dated February 26, 2001.
3. Letter from Rick J. King (River Bend Station) to NRC Document Control Desk, "Extension Request for Submittal of Summary Technical Report Regarding Reactor Vessel Material Surveillance Program Capsule Test Results," dated May 29, 2002 (RBG-45971).

Dear Sir or Madam:

Entergy Operations, Inc. (Entergy) hereby requests a change to the River Bend Station (RBS) reactor vessel material surveillance program required by 10CFR50, Appendix H, Section IIIB.3. This change will incorporate the Boiling Water Reactor Vessel & Internals Project (BWRVIP) Integrated Surveillance Program (ISP) into the RBS licensing basis.

The issue of whether this change from the existing surveillance program to the ISP needs to be addressed as a license amendment is not clear. This is related to the applicability of Commission Memorandum and Order CLI 96-13 (commonly referred to as the Perry decision) and the need for license amendments, which is being

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addressed generically between NEI and NRC. However, consistent with the process established between the NRC and the BWRVIP, this change is being processed as a license amendment to facilitate NRC review and approval.

This License Amendment Request proposes a change to our Updated Safety Analysis Report (USAR), Section 5.3.1.6.1, "Compliance with Reactor Vessel Material Surveillance Program Requirements." In addition, redundant references to the RBS capsule withdrawal schedule will be deleted. The redundant references are in Table 3.4.11-1 of the Technical Requirements Manual (TRM) and in Section 5.3.2.1 of the USAR.

The proposed change has been evaluated in accordance with 10CFR50.91(a)(1) using criteria in 10CFR50.92(c) and it has been determined that this change involves no significant hazards considerations. The bases for these determinations are included in the attached submittal.

We understand that submittal of this amendment request obviates the need (see Reference 1) for any extension request related to the RBS surveillance specimen test results presently due in September 2002, per Reference 2. This submittal supercedes our letter dated May 29, 2002 (Reference 3).

No commitments are contained in this submittal.

Entergy requests approval of the proposed amendment within one year. Once approved, the amendment shall be implemented within 60 days. Although this request is neither exigent nor emergency, your prompt review is requested.

If you have any questions regarding this request or require additional information, please contact Mr. Bill Fountain at (225) 381-4625.

I declare under penalty of perjury that the foregoing is true and correct. Executed on August 15, 2002.

PDH/RJK/WJF

Attachments
1. Analysis of Proposed USAR Change
2. Proposed USAR Changes (mark-up)

cc:

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File Nos.: G9.5, G15.4.1
RBEXEC-02-018
RBF1-02-0113
LAR 2002-23

Attachment 1

RBG-45990

Analysis of Proposed USAR Change

1.0 DESCRIPTION

This letter requests a change to the River Bend Station (RBS) Updated Safety Analysis Report (USAR) to reflect participation in the Boiling Water Reactor Vessel and Internals Project (BWRVIP) Integrated Surveillance Program (ISP).

2.0 PROPOSED CHANGE

This change includes a revision to the Reactor Vessel Material Surveillance Program requirements in Section 5.3.1.6.1 of our USAR to reflect participation in the BWRVIP ISP. As a part of this process, redundant capsule withdrawal schedule references contained in USAR Section 5.3.2.1 and in the RBS Technical Requirements Manual (TRM), Table 3.4.11-1 (page TR 3.4-10), will be removed. The proposed revision to the RBS Updated Safety Analysis Report reflecting this change is provided in Attachment 2.

The change from the existing surveillance program to the ISP would normally be addressed as part of the 10CFR50.59 process for USAR and TRM revisions. However, consistent with the process established between the NRC and the BWRVIP, this change is being processed as a license amendment to facilitate NRC review and approval. The NRC approved the Integrated Surveillance Program Implementation Plan in its Safety Evaluation (SE) dated February 1, 2002 (Reference 3).

3.0 BACKGROUND

Standard Review Plan 5.3.1, and 10CFR50, Appendix H, require that reactor pressure vessels shall have their beltline regions monitored by a surveillance program that complies with American Society for Testing & Materials (ASTM) E-185, except as modified by Appendix H. ASTM E-185 provides guidelines for designing a minimum surveillance program, selecting materials, and evaluating test results for light-water cooled nuclear power reactor vessels. It also provides recommendations for minimum number of surveillance capsules and their withdrawal schedules. 10CFR50, Appendix H, requires that the proposed withdrawal schedule be submitted with a technical justification and approved prior to implementation.

The RBS reactor pressure vessel material surveillance program was designed in accordance with 10CFR50, Appendix H and the 1973 edition of ASTM E-185. River Bend's original Final Safety Analysis Report (FSAR) surveillance capsule withdrawal schedule was established in accordance with ASTM E-185-73 and later revised (Amendment 21) to be in accordance with the ASTM E-185-82. ASTM E-185-82 states "The first capsule is scheduled for withdrawal early in the vessel life to verify the initial predictions of the surveillance material response to the actual radiation environment. It is removed when the predicted shift exceeds the expected scatter by sufficient margin to be measurable."

The schedule for capsule withdrawals is provided in Section 5.3.1.6 of the RBS Updated Safety Analysis Report (USAR). Section 5.3.2.1 also states (redundantly) that the first capsule is withdrawn for testing at 10.4 EFPY, the second capsule at 15 EFPY, and the third capsule is on standby.

Over the last several years, the Boiling Water Reactor Vessel and Internals Project (BWRVIP) developed an Integrated Surveillance Program (ISP) and submitted it for NRC approval. Per Reference 3, dated 2/1/2002, the staff completed its review of the final proposed BWRVIP ISP Plan and found it acceptable for BWR licensee implementation provided that all licensees use one or more neutron fluence methodologies acceptable to the NRC staff to determine surveillance capsule and reactor pressure vessel (RPV) neutron fluences. The staff also required licensees who elect to participate in the ISP to submit a license amendment to the NRC confirming their incorporation of the ISP into the licensing basis for each BWR facility.

The ISP was developed in response to an issue raised by the NRC staff regarding the potential lack of adequate unirradiated baseline Charpy V-notch (CVN) data for one or more materials in plant-specific RPV surveillance programs at several BWRs. The lack of baseline properties would inhibit a licensee's ability to effectively monitor changes in the fracture toughness properties of RPV materials in accordance with Appendix H to 10 CFR 50. The ISP, as approved by the NRC, resolves this issue.

The first surveillance capsule to be tested under the ISP is the RBS capsule that was withdrawn in March 2000. The BWRVIP ISP test report for this capsule is scheduled to be submitted to the NRC by February 2003.

As discussed in Amendment No. 120 to the RBS Operating License (NPF-47), Figure 3.4.11-1 of the RBS Technical Specifications provides pressure/temperature (P/T) curves based on 32 Effective Full Power Years (EFPY) of operation. Amendment 120 also restricts use of the current Figure 3.4.11-1 P/T curves to 16 EFPY. New fluence analysis work will be conducted in accordance with the recommendations of Regulatory Guide 1.190 using the RPV surveillance capsule testing results/data that will be available through the BWRVIP ISP in 2003. Based on the results of this updated fluence analysis, the current P/T Limit Curves will be reevaluated and new ones will be developed, if needed. NRC approval of updated fluence calculations and use of appropriate P/T Limit Curves beyond 16 EFPY, will be acquired prior to exceeding 16 EFPY. Therefore, there will be no impact to the use of the RBS P/T Limit Curves currently approved up to 16 EFPY of operation.

4.0 TECHNICAL ANALYSIS

Implementation of the ISP will provide several benefits. When the original surveillance materials were selected for plant-specific surveillance programs, the state of knowledge concerning RPV material response to irradiation and post-irradiation fracture toughness was not the same as it is today. As a result, many facilities did not include what would be identified today as the plant's limiting RPV materials in their surveillance programs. Hence, the effort to identify and evaluate materials from other BWRs, which may better represent a facility's limiting materials, should improve the overall evaluation of BWR RPV embrittlement. Second, the inclusion of data from the testing of BWR Owners' Group (BWROG) Supplemental Surveillance Program (SSP) capsules will improve overall quality of the data being used to evaluate BWR RPV embrittlement. Finally, implementation of the ISP is expected to reduce the cost of surveillance testing and analysis since surveillance materials that are of little or no value (either because they lack adequate unirradiated baseline CVN data or because they are not the best representative materials) will no longer be tested.

Reference 3 concludes that the proposed ISP, if implemented in accordance with the conditions in the SE, has been determined to be an acceptable alternative to existing BWR plant-specific RPV surveillance programs for the purpose of maintaining compliance with the requirements of Appendix H to 10 CFR Part 50 through the end of current facility 40 year operating licenses. Reference 3 requires that each licensee (1) provide information regarding what specific neutron fluence methodology will be implemented as part of participation in the ISP and (2) address the neutron fluence methodology compatibility issue as it applies to the comparison of neutron fluences calculated for its RPV versus the neutron fluences calculated for surveillance capsules in the ISP which are designated to represent its RPV. This information is provided in the following discussion.

To ensure compatibility between ISP results, RPV and surveillance capsule fluences will be calculated in accordance with Regulatory Guide 1.190. This provides a consistent analysis methodology and acceptable levels of uncertainty.

5.0 REGULATORY ANALYSIS

5.1 Applicable Regulatory Requirements/Criteria

The proposed changes have been evaluated to determine whether applicable regulations and requirements continue to be met.

Entergy has determined that the proposed changes do not require any exemptions or relief from regulatory requirements, other than the proposed change to the USAR, and do not affect conformance with any GDC differently than described in the USAR.

5.2 No Significant Hazards Consideration

In accordance with 10CFR50.92, a proposed change to the operating facility involves no "significant hazards" if operation of the facility, in accordance with the proposed change, would not 1) involve a significant increase in the probability or consequences of any accident previously evaluated, 2) create the possibility of a new or different kind of accident from that previously evaluated, or 3) involve a significant reduction in a margin of safety.

We have evaluated the no significant hazards consideration in this request for a license amendment and have determined that no significant hazards consideration results from the proposed change. The no significant hazards evaluation follows.

1. Does the proposed change involve a significant increase in the probability or consequences of an accident previously evaluated?

   Response: No.

   Pressure-temperature (P/T) limits (RBS Technical Specifications Figure 3.4.11-1) are imposed on the reactor coolant system to ensure that adequate safety margins against nonductile or rapidly propagating failure exist during normal operation, anticipated operational occurrences, and system hydrostatic tests. The P/T limits are related to the nil-ductility reference temperature, RT_{NDT}, as described in ASME Section III, Appendix G. Changes in the fracture toughness properties of RPV beltline materials, resulting from the neutron irradiation and the thermal environment, are monitored by a surveillance program in compliance with the requirements of 10CFR50, Appendix H. The effect of neutron fluence on the shift in the nil-ductility reference temperature of pressure vessel steel is predicted by methods given in RG 1.99, Rev 2.

   River Bend's current P/T and Power Uprate limits were established based on adjusted reference temperatures developed in accordance with the procedures prescribed in RG 1.99, Rev 2, Regulatory Position 1. Calculation of adjusted reference temperature by these procedures includes a margin term to ensure conservative, upper-bound values are used for the calculation of the P/T limits. When permitted (two or more credible surveillance data sets available), Regulatory Position 2 (or other NRC-approved) methods for determining adjusted reference temperature will be followed.

   This change is not related to any accidents previously evaluated. This change will not affect P/T limits as given in RBS Technical Specifications Figure 3.4.11-1 or USAR Figures 5.3-4a and 5.3-4b. This change will not affect any plant safety limits or limiting conditions of operation. The proposed change will not affect reactor pressure vessel performance as no physical changes are involved and RBS vessel P/T limits will remain conservative in accordance with Reg. Guide 1.99, Rev 2 requirements. The proposed change will not cause the reactor pressure vessel or interfacing systems to be operated outside of their design or testing limits. Also, the proposed change will not alter any assumptions previously made in evaluating the radiological consequences of accidents. Therefore, the proposed change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. Does the proposed change create the possibility of a new or different kind of accident from any accident previously evaluated?

   Response: No.

   The proposed change revises the RBS license basis to reflect participation in the ISP. This proposed change does not involve a modification of the design of plant structures, systems, or components. The proposed change will not impact the manner in which the plant is operated as plant operating and testing procedures will not be affected by the change. The proposed change will not degrade the reliability of structures, systems, or components important to safety as equipment protection features will not be deleted or modified, equipment redundancy or independence will not be reduced, supporting system performance will not be downgraded, the frequency of operation of equipment will not be increased, and increased or more severe testing of equipment will not be imposed. No new accident types or failure modes will be introduced as a result of the proposed change. Therefore, the proposed changes do not create the possibility of a new or different kind of accident from that previously evaluated.

3. Does the proposed change involve a significant reduction in a margin of safety?

   Response: No.

   As stated in the River Bend SER, "Appendices G and H of 10CFR50 describe the conditions that require pressure-temperature limits and provide the general bases for these limits. These appendices specifically require that pressure-temperature limits must provide safety margins at least as great as those recommended in the ASME Code, Section III, Appendix G. .... Until the results from the reactor vessel surveillance program become available, the staff will use Regulatory Guide (RG) 1.99, Revision 1 [now Revision 2], to predict the amount of neutron irradiation damage. .... The use of operating limits based on these criteria--as defined by applicable regulations, codes, and standards--will provide reasonable assurance that nonductile or rapidly propagating failure will not occur, and will constitute an acceptable basis for satisfying the applicable requirements of General Design Criteria (GDC) 31."

Bases for RBS Technical Specification 3.4.11 states: "The P/T limits are not derived from Design Basis Accident (DBA) analyses. They are prescribed during normal operation to avoid encountering pressure, temperature, and temperature rate of change conditions that might cause undetected flaws to propagate and cause nonductile failure of the RCPB, a condition that is unanalyzed. .... Since the P/T limits are not derived from any DBA, there are no acceptance limits related to the P/T limits. Rather, the P/T limits are acceptance limits themselves since they preclude operation in an unanalyzed condition."

The proposed change will not affect any safety limits, limiting safety system settings, or limiting conditions of operation. The proposed change does not represent a change in initial conditions, or in a system response time, or in any other parameter affecting the course of an accident analysis supporting the Bases of any Technical Specification. The proposed change does not involve revision of the P/T limits but rather a revision to the surveillance capsule withdrawal schedule. The current P/T limits were established based on adjusted reference temperatures for vessel beltline materials calculated in accordance with Regulatory Position 1 of RG 1.99, Rev 2. P/T limits will continue to be revised as necessary for changes in adjusted reference temperature due to changes in fluence according to Regulatory Position 1 until two or more credible surveillance data sets become available. When two or more credible surveillance data sets become available, P/T limits will be revised as prescribed by Regulatory Position 2 of RG 1.99, Rev 2, or other NRC-approved guidance. Therefore, the proposed change does not involve a significant reduction in any margins of safety.

5.3 Environmental Considerations

We have reviewed this request against the criteria of 10CFR51.22 for environmental considerations. Since this request involves (i) no significant hazard consideration, (ii) no significant change in the types or significant increase in the amounts of any effluents that may be released offsite, and (iii) no significant increase in individual or cumulative occupational radiation exposure, we have concluded that the proposed change meets the criteria given in 10CFR51.22 (c)(9) for a categorical exclusion from the requirement for an environmental impact statement.

REFERENCES

1. Letter from William H. Bateman (NRC) to Carl Terry (BWRVIP Chairman), "BWRVIP Response to NRC Safety Evaluation Regarding the BWR Integrated Surveillance Program," dated May 28, 2002.
2. Letter from Robert A. Gramm (NRC) to Randall K. Edington, "River Bend Station, Unit 1 - Request To Defer The Testing Of The Reactor Vessel Surveillance Capsule Specimens And Request To Extend The Date For Reporting Testing Results," dated February 26, 2001.
3. Letter from William H. Bateman (NRC) to Carl Terry (BWRVIP Chairman), "Safety Evaluation Regarding EPRI Proprietary Reports "BWR Vessel and Internals Project, BWR Integrated Surveillance Program Plan (BWRVIP-78)" and "BWRVIP-86: BWR Vessel and Internals Project, BWR Integrated Surveillance Program Implementation Plan," dated February 1, 2002.
4. NRC Regulatory Issue Summary 2002-05: NRC Approval of Boiling Water Reactor Pressure Vessel Integrated Surveillance Program, April 8, 2002.
5. Letter from Carl Terry (BWRVIP Chairman) to Document Control Desk (NRC), "Project No. 704 – BWRVIP Response to NRC Safety Evaluation of the BWR Integrated Surveillance Program," dated April 29, 2002.
6. Letter from Carl Terry (BWRVIP Chairman) to Document Control Desk (NRC), "PROJECT NO. 704 – BWRVIP Response to Second NRC Request for Additional Information on the BWR Integrated Surveillance Program," dated May 30, 2001

ATTACHMENT 2

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USAR & TRM PAGE MARK-UPS

Reactor vessel materials surveillance specimens are provided in accordance with requirements of ASTM E185-73 and 10CFR50, Appendix H. Materials for the program are selected to represent materials used in the reactor beltline region. Specimens are manufactured from a plate actually used in the beltline region and a weld typical of those in the beltline region and thus represent base metal, weld material, and the weld heat affected zone material. The plate and weld are heat treated in a manner which simulates the actual heat treatment performed on the core region shell plates of the completed vessel. The plate and heat affected zone (HAZ) heat numbers and chemical compositions are provided in Table 5.3-1. Those heat numbers labeled with an asterisk on Table 5.3-1 are the materials selected for use as RBS reactor vessel test specimens. The preheat treatment procedure requires that a minimum preheat of 300°F be applied uniformly to the full thickness of the weld joint and adjacent base material for a minimum distance of T or, 6 in, whichever is least, where T is the material thickness. A minimum temperature of 300°F will be maintained until the start of post-weld heat treatment, except for longitudinal and circumferential shell and head seams, preheat may be dropped to 250°F minimum, 8 hours after completion of welding. The interpass temperature will not exceed 500°F maximum. The procedure requires post-weld heat treatment at a temperature of 1,150°F +25°/-50°F for a period of 50 hr.

There are three surveillance capsules, each containing 36 Charpy V-notch specimens (i.e., 12 transverse base metal, 12 HAZ material, and 12 weld metal). The weld specimen electrode type is CBI 1NMM or equal. The lot identification, chemical composition, and heat and flux type are provided in Table 5.3-1. Bare rod (i.e., both single and tandem wire) is used in the submerged arc welding process. A set of out-of-reactor baseline Charpy V-notch specimens and archive material are provided with the surveillance test specimens.
•→10 •→4
In accordance with the requirements of the edition of 10CFR50, Appendix H, that was current on the issue date of the ASME Code to which the reactor vessel was purchased, three capsules are provided since the predicted end-of-life adjusted reference temperature of the reactor vessel steel, as predicted at the time of design, was less than 100°F. The proposed withdrawal schedule is in accordance with~~10CFR50, Appendix H~~ BWRVIP-86 (including future revisions), as approved by the NRC in their Safety Evaluation for the Boiling Water Reactors Vessel Internals Project (BWRVIP) Integrated Surveillance Program (ISP) Plan requirements per Reference 5.~~the 1982 revision of ASTM E185~~
4←• 10←•

•→15

First capsule – was withdrawn at ~10 EFPY, ~~or at the time when the accumulated neutron fluence of the capsule exceeds $5x10^{22}$ n/m^2 ($5x10^{18}$ n/cm^2), or at the time when the highest predicted $ΔRT_{NDT}$ of all encapsulated materials is 28°C (50°F), whichever comes first~~ and is the first capsule tested by the ISP.

15←•

Second capsule – Per the ISP schedule, this capsule is to be withdrawn for testing in the year 2025.~~15 EFPY, or at the time when the accumulated neutron fluence of the capsule corresponds to the approximate EOL fluence at the reactor vessel inner wall location, whichever comes first.~~

Third capsule – The ISP schedule reflects permanent deferral.~~EOL (not less than once or greater than twice the peak EOL vessel fluence. This may be modified on the basis of previous tests. This capsule may be held without testing following withdrawal).~~

Fracture toughness testing of irradiated capsule specimens is to be in accordance with requirements of 10CFR50, Appendix H.

5.3.1.6.2 Neutron Flux and Fluence Calculations

A description of the methods of analysis is contained in Sections 4.1.4.5 and 4.3.2.8.

•→14 •→4

The peak fluence at the inside surface of the vessel beltline shell is $7.95(10)^{18}$ n/cm^2 after 40 yr of service. All predictions of radiation damage to the reactor vessel beltline material were made using peak fluence values.

Future neutron fluence calculations will be performed in accordance with Regulatory Guide 1.190.

5.3.1.6.3 Predicted Irradiation Effects on Vessel Beltline Materials

Estimated maximum changes in vessel beltline RT_{NDT} (initial reference temperature) values as a function of the 32 effective full power year (EFPY) fluence are listed in Table 5.3-1. The predicted peak 32 EFPY fluence at the inside surface of the vessel beltline is $7.95(10)^{18}$ n/cm^2. Transition temperature changes and changes in upper shelf energy were calculated in accordance with the rules of Regulatory Guide 1.99, Revision 2. Reference temperatures were established in accordance with 10CFR50, Appendix G, and NB-2330 of the ASME Code.

14←•

The lead factors for each surveillance capsule are 0.67 vessel i.d. and 0.89 1/4 T. Due to the geometry, the lead factors for all three capsule specimens will be the same.

4←•

References - 5.3

1. An Analytical Study on Brittle Fracture of GE-BWR Vessel Subject to the Design Basis Accident. NEDO-10029.

2. Watanabe, H. Boiling Water Reactor Feedwater Nozzle/Sparger Final Report. NEDO-21821-2, Proprietary Version, and NEDO-21821-2, Nonproprietary Version, August 1979.

3. Cooke, F. Transient Pressure Rises Affecting Fracture Toughness Requirements for Boiling Water Reactors. NEDO-21778-A, December 1978.

4. Artigas, Dr. R. Flow Deflector Effects on LPCI Parameters and Plant Safety, to R. L. Tedesco (NRC), May 18, 1982.

5. Letter from W. H. Bateman (NRC) to C. Terry (BWRVIP Chairman) titled, "Safety Evaluation Regarding EPRI Proprietary Report 'BWR Vessel and Internals Project, BWR Integrated Surveillance Program Plan (BWRVIP-78)' and 'BWRVIP-86: BWR Vessel and Internals Project, BWR Integrated Surveillance Program Implementation Plan,'" dated February 1, 2002.

Regulatory Guide 1.190, Rev. 0 (March 2001)

Calculational and Dosimetry Methods for Determining Pressure Vessel Neutron Fluence

Project Position - Comply

USAR Section - 5.3

(new page to be added to USAR)

TR 3.4.11 RCS Pressure and Temperature (P/T) Limits

Note: The pressure-temperature limits given in Technical Specification Figure 3.4.11-1 are limited for use up to 16 EFPY based on the NRC Safety Evaluation Report for Amendments 114 and 120.

Table 3.4.11-1
REACTOR VESSEL MATERIAL SURVEILLANCE PROGRAM
WITHDRAWAL SCHEDULE

~~CAPSULE WITHDRAWAL~~	~~WITHDRAWAL TIME - EFPY~~
~~First~~	~~10.4~~
~~Second~~	~~15~~
~~Third~~	~~Standby~~

Table Deleted

Table 3.4.11-2
REACTOR VESSEL MATERIAL SURVEILLANCE PROGRAM
CAPSULE DATA

CAPSULE NUMBER	VESSEL LOCATION	LEAD FACTOR at I.D./¼T
1*	3°	0.67/0.89
2	177°	0.67/0.89
3	183°	0.67/0.89

* Note: Capsule No. 1 was removed from and remained out of vessel during cycle 7. This capsule is designated as the "standby" capsule.