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U. S. Nuclear Regulatory Commission
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SUBJECT: Big Rock Point, "Big Rock Point License Termination Plan," Revision 3

Big Rock Point
Dockets 50-155 and 72-043
License No. DPR-6

- References:
1. NRC Safety Evaluation, "Related to Amendment No. 126 to Facility Operating License No. DPR-6," Consumers Energy Big Rock Point Nuclear Plant, dated March 24, 2005 (ADAMS Accession No. ML050540552)
 2. Consumers Energy letter, "Revision 2 of the Big Rock Point License Termination Plan," dated September 27, 2005 (ADAMS Accession No. ML052770168)
 3. NRC letter, "Big Rock Point – Release of Land from Part 50 License for Unrestricted Use," dated January 8, 2007 (ADAMS Accession No. ML063410361)
 4. NRC "Order Approving Transfer of License and Conforming Amendment," Consumers Energy Big Rock Point Facility, dated April 6, 2007 (ADAMS Accession No. ML070740758)

Dear Sir or Madam:

In accordance with 10 CFR 50.71(e), "Maintenance of records, making of reports," Entergy Nuclear Operations, Inc. (ENO) hereby submits an update, revision 3, to the Big Rock Point (BRP) License Termination Plan (LTP). Revision 3 is a general update that reflects the current final phase status of the BRP decommissioning project.

BRP restoration project phase 1 completion was approved by the NRC on January 8, 2007. This included final site radiological surveys and release of site land for unrestricted use except for the Independent Spent Fuel Storage Installation (ISFSI) parcel.

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The LTP revisions were reviewed in accordance with 10 CFR 50.59, "Changes, tests and experiments," and have no effect on the license conditions of the BRP (DPR-6) license through amendment number 128. No parameters specified in the LTP were altered that would require prior NRC approval.

Enclosure 1 of this letter contains a summary of the changes for revision 3 to the BRP LTP.

Enclosure 2 contains LTP replacement pages. Chapters 1, 3, 4, 5, 7, and 8 are complete chapter replacements. Chapters 2 and 6 were not revised in revision 3 and remain as approved by the NRC in amendment number 126 on March 24, 2005. A single page is provided in Enclosure 2 for Chapters 2 and 6, which should be placed at the beginning of these chapters to indicate that no changes were made as a result of Revision 3 to the LTP.

This letter contains no new commitments and no revision to existing commitments.

I declare under penalty of perjury that the foregoing is true and correct. Executed on July 17, 2013.

Sincerely,



A handwritten signature in black ink, appearing to read "Amy J. Vetter". The signature is fluid and cursive, with a large initial "A" and "V".

ajv/jpm

Enclosures: 1. Big Rock Point License Termination Plan Revision 3 Summary
2. Big Rock Point License Termination Plan Revision 3 Replacement Pages

CC Administrator, Region III, USNRC
BRP Decommissioning Inspector, USNRC
NMSS Project Manager, USNRC
Michigan Department of Environmental Quality

ENCLOSURE 1

BIG ROCK POINT ISFSI ENTERGY PALISADES LLC

Big Rock Point License Termination Plan Revision 3 Summary

1. LICENSE TERMINATION PLAN REVISION HISTORY

Big Rock Point (BRP) license termination plan (LTP) revision 2 was submitted to the NRC on September 27, 2005. It was a general update to the March 24, 2005 approved LTP to reflect the status of phase 1, "BRP restoration project," which included decommissioning of the power reactor facility and associate lands that were both impacted and non-impacted by power generation activities. Since issuance of LTP revision 2, phase 1 has been completed. Significant to phase 1 completion was the NRC approval for unrestricted use of both impacted and non-impacted land, leaving only the Independent Spent Fuel Storage Installation (ISFSI) parcel located on a non-impacted part of the site (see Figures 1 and 2) [Reference 3]. Listed below, for reference, is a chronology of events significant to the decommissioning activities at the BRP site:

- August 29, 1997 - Operation permanently ceased
- September 20, 1997 - Fuel permanently removed from the BRP reactor vessel and site name changed from "Big Rock Point Nuclear Plant" to "Big Rock Point Restoration Project."
- May 2, 2003 - All Spent Nuclear Fuel, Special Nuclear Material, and greater than Class C waste is stored on an ISFSI.
- March 24, 2005 - NRC approves License Amendment Request 126 that incorporates the LTP into BRP site license. [Reference 1]
- September 27, 2005 - BRP Plant submits to the NRC revision 2 to the Big Rock Point LTP. [Reference 2]
- January 8, 2007 - Release of the power reactor and non-ISFSI portions of the site from the BRP License per NRC Letter, "Big Rock Point – Release of Land from Part 50 License for Unrestricted Use." [Reference 3]

- April 6, 2007 -

License transfer of the BRP ISFSI to Entergy Palisades LLC, project name changed from "Big Rock Point Restoration Project" to "Big Rock ISFSI." [Reference 4]

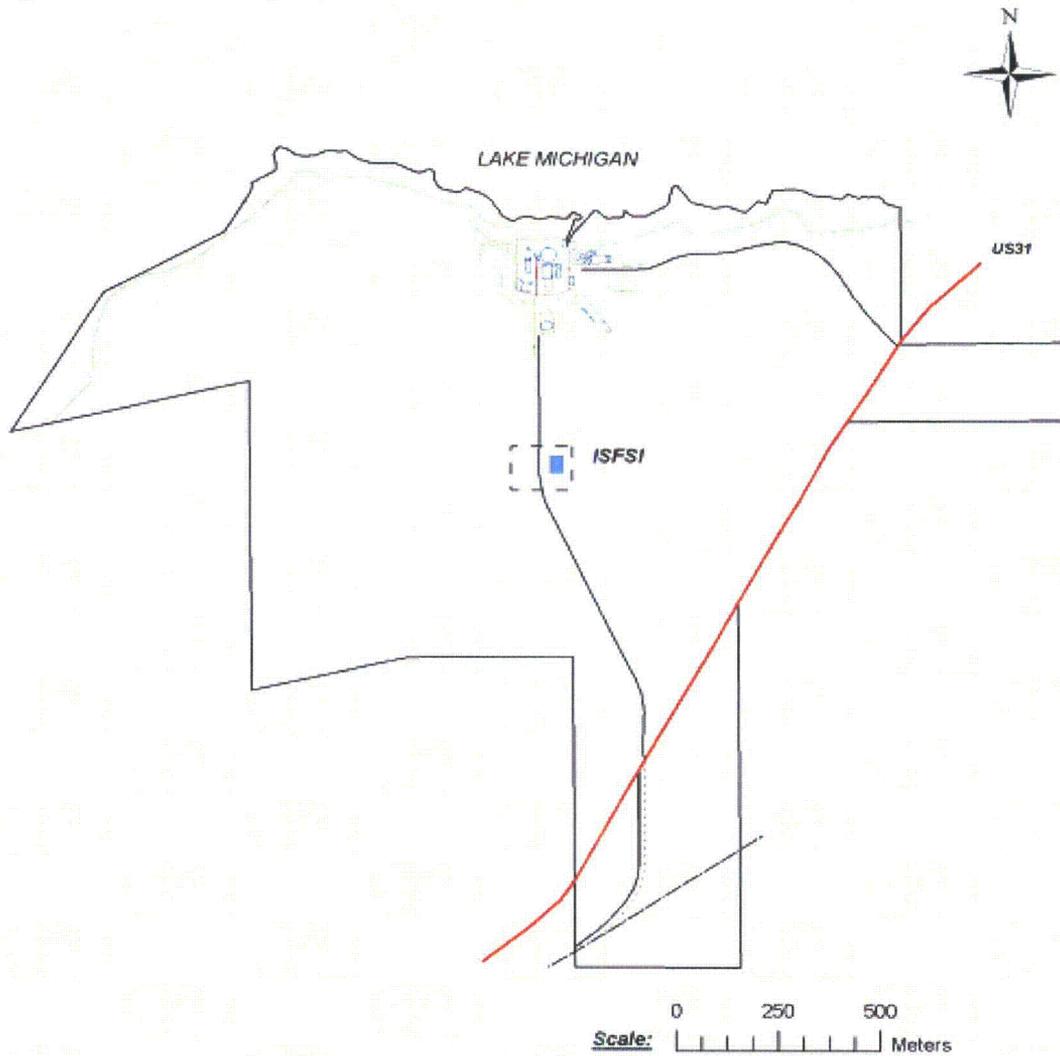
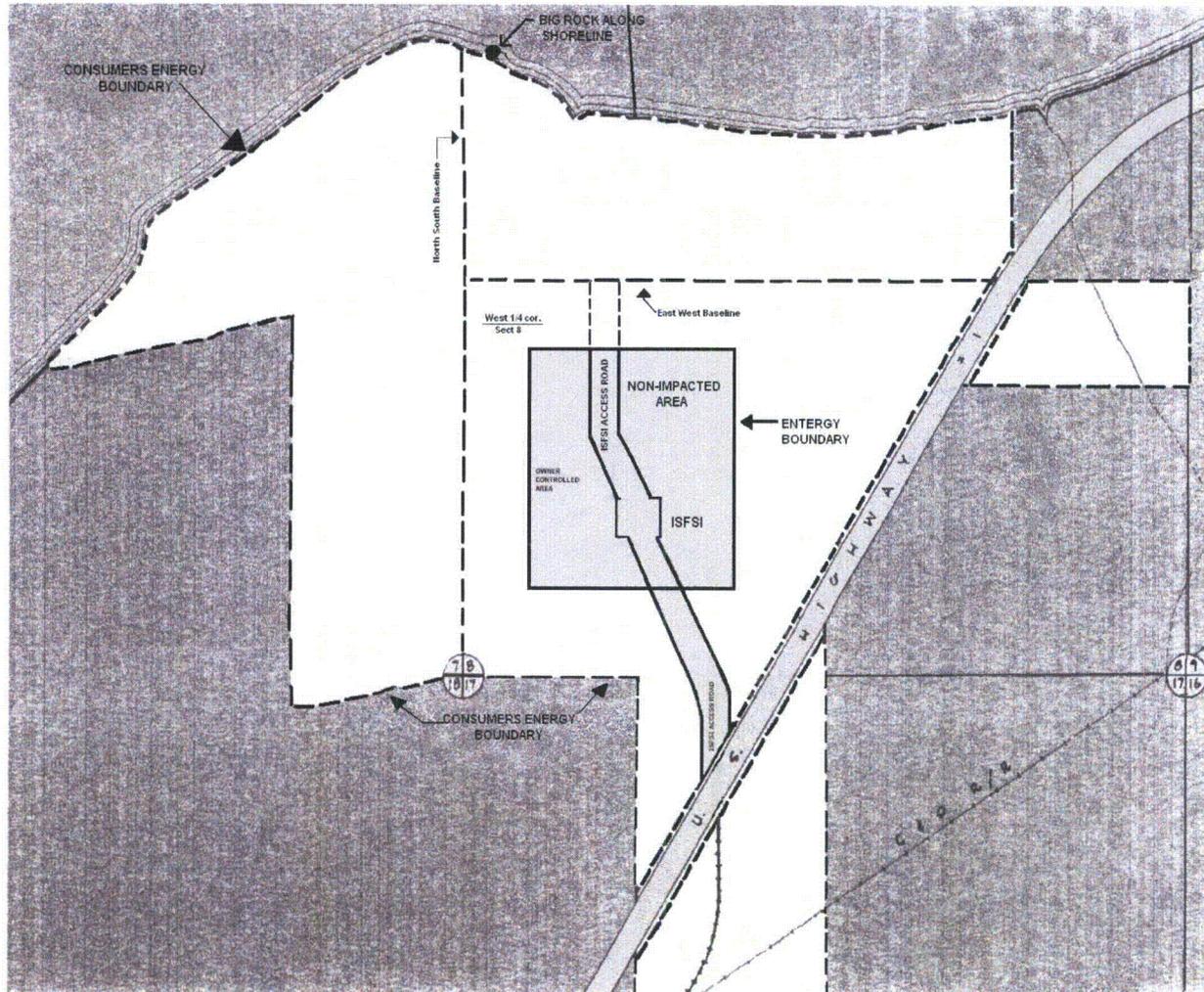


Figure 1, Big Rock Point ISFSI Location in Relation to the Site Map at the Time of LTP Submittal



-  Energy Boundary
-  Consumers Energy Boundary
-  Non-Impacted Area

Figure 2, Big Rock Point ISFSI Non-Impacted Land Areas

2. LISTING OF REVISION 3 NOTABLE CHANGES

BRP LTP revision 3 is a general update to incorporate changes due to the completion of phase 1, "Big Rock Point Restoration Project." Specifically, the changes are associated with the release for unrestricted use of the majority of the site land, other than the BRP ISFSI [Reference 3]. This included final site radiological surveys to support the land release. Also, this update reflects the transfer of the operating license from Consumers Energy to Entergy Palisades LLC., which includes a project name change from "Big Rock Point Restoration Project" to "Big Rock Point ISFSI." Finally, this change removes decommissioning activities that have been completed to date, leaving only site dismantlement activities associated with the ISFSI. These remaining activities, based upon ISFSI operations maintaining the ability to meet the criteria of NUREG-1757, "Consolidated Decommissioning Guidance," Section 7.4, "Group 2: Unrestricted Release Using Screening Criteria," are addressed in revision 3 to the LTP. The performance of final site surveys is not anticipated. The more notable changes associated with revision 3 are listed below:

Chapter 1 – General Information

- Section 1.1 In this section, and throughout the document, content that was applicable to the power reactor was removed based on Reference 3, "Completion of decommissioning for license DPR-6."
- Section 1.3 In this section, and throughout the document, the following title changes were incorporated to reflect the current facility owner and project name. The facility owner, Consumers Energy Company, was changed to Entergy Palisades LLC [Reference 4] and the project name was changed from "Big Rock Point Restoration Project" to "Big Rock Point ISFSI."
- Section 1.4 This section was revised to reflect that the Big Rock Point ISFSI will be decommissioned as a group 2 facility since impacted areas were released in phase 1. It also provides the basis that the remaining areas meet the criteria of NUREG-1757, "Consolidated Decommissioning Guidance," Section 7.4, "Group 2: Unrestricted Release Using Screening Criteria."
- Section 1.5 This section was revised to reflect the current plan for ISFSI dismantlement and release of the ISFSI lands following transfer of the spent fuel and the greater than class C waste to a DOE facility. Plan specifics include surveys to validate

that the ISFSI site remained non-impacted by its ability to meet the criteria of NUREG-1757, "Consolidated Decommissioning Guidance," Section 7.4, "Group 2: Unrestricted Release Screening Criteria."

Chapter 2 – Site Characterization

This section was not revised.

Chapter 3 – Identification of Remaining Site Dismantlement Activities

- Section 3.1 As provided in Chapter 1, it is anticipated that continued ISFSI operations will result in the facility being radiologically non-impacted through the final phase of dismantlement activities. The ISFSI will be surveyed for release and sent for disposal or recycled locally. The need for access to a low level waste disposal site is also not anticipated.
- Section 3.3 Text associated with phase 1 decommissioning activities was deleted and details were added to the remaining activities required to dismantle the BRP ISFSI.
- Section 3.4 Text was revised to add detail and list only activities remaining to decommission the ISFSI facility. Specifically, a schedule is provided for the resumption of decommissioning activities. The schedule start date is dependent upon when the Department of Energy will be able to receive spent fuel. Also, upon resumption, since the spent fuel storage casks are designed without an effluent pathway, which eliminates a source of radioactive contamination, it is anticipated that demolition debris will be radiologically clean and disposed of at a State of Michigan landfill. Any low level radiological debris encountered will be disposed of at a facility licensed to receive radioactive waste.
- Section 3.5 This section was revised to update the expected remaining decommissioning dose to be less than one person-rem based upon radiological survey data and historical occupational dose during ISFSI only operations.

Chapter 4 – Site Remediation Plan

- Section 4.1 This section was revised to remove site remediation details since it is complete for phase 1 and is not anticipated to be necessary for the final phase. The basis for this change is that BRP Final Status Survey Report (FSSR) has been completed and accepted by the NRC. The report provided the necessary data to demonstrate compliance with the requirements of 10 CFR 20.1402, “Radiological criteria for unrestricted use.” Subsequently, the power reactor and associated land areas decommissioned during phase 1 were released from the NRC license.
- Section 4.2 This section was revised to remove remediation actions for soil and water since they were completed in phase one. Text was added to document that remediation actions are not anticipated for the final phase. This is based upon the radiological controls in place when the spent fuel was loaded into the inner casks, and during the subsequent transfer to the ISFSI. Further, in the unlikely event that contamination is identified, the contaminated item will be decontaminated. Then, based upon the identified contamination, an evaluation will be conducted to determine if the contaminated item has changed the radiologically non-impacted status of the ISFSI land areas. Additionally, FuelSolutions™ W74 “Canister Storage Final Safety Analysis Report, Chapter 7, Confinement,” provides that confinement of all radioactive material in the FuelSolutions™ Storage System is provided by a FuelSolutions™ canister. Finally, the design of the FuelSolutions™ W74 canister confinement boundary assures that there are no credible design basis events that would result in a radiological release to the environment.
- Section 4.4 This section was revised to document that an explicit ALARA, “As Low As Reasonably Achievable,” analysis is not required for final phase. This is based on NUREG-1727, “NMSS Decommissioning Standard Review Plan,” which states, “In addition, if residual radioactivity cannot be detected, it may be assumed that it has been reduced to levels that are ALARA. Therefore, the licensee does not need to conduct an explicit analysis to meet the ALARA requirement.” Phase 1 removed residual radioactivity and the ISFSI was built on a non-impacted parcel of the site.

Chapter 5 – Final Status Survey Plan

Section 5.1 This section was revised to remove the FSS plan since the BRP FSS plan was prepared for and implemented during the initial phase of decommissioning using the applicable regulatory and industry guidance. The FSSR supported the determination by the NRC to approve release of the BRP power reactor and associated land areas from the NRC license [Reference 3].

The final phase will not require a final status survey plan because it is anticipated that the ISFSI site will remain non-impacted. The basis for this is that the ISFSI is, and will continue to be, operated such that it will meet the criteria of NUREG-1757, "Consolidated Decommissioning Guidance," Section 7.4, "Group 2: Unrestricted Release Using Screening Criteria."

Chapter 6 – Compliance with the Radiological Criteria for License Termination

This section was not revised.

Chapter 7 – Update of Site Specific Decommissioning Costs

Section 7.0 This chapter has been revised in its entirety to remove decommissioning costs associated with the completion of phase 1. The final phase decommissioning cost estimate has been further detailed based on the methodology utilized in 10 CFR 72.30, "Financial assurance and recordkeeping for decommissioning."

Chapter 8 – Supplement To the Environmental Report

Section 8.2 This section was revised to reflect completion of phase 1 and update the site description after the final phase of decommissioning. Specifically, it describes that the ISFSI will be dismantled, demolished, and Entergy Nuclear Operations, Inc. (ENO) will determine the disposition of the support buildings at the time of decommissioning.

Section 8.5 A paragraph was added to document that the transfer cask coating substrate has become contaminated and that the

ISFSI site was not contaminated as a result of this event.
Therefore the site remains radiologically non-impacted.

3. CONCLUSION

Revision 3 of the LTP reflects completion of phase 1, "Big Rock Point Restoration Project," and updates the final phase, "Big Rock Point ISFSI," details. This includes the following changes: an ownership change from Consumers Energy to Entergy Palisades LLC, the ISFSI site being located on non-impacted land only, site remediation plans are no longer required, ALARA plan is no longer required, and, through the demolition of the ISFSI, the site will retain the non-impacted status. Further, the revisions were reviewed in accordance with 10 CFR 50.59 and have no effect on the license conditions of the BRP license through amendment number 127. No parameters specified in the LTP were altered that would require prior NRC approval.

4. REFERENCES

1. NRC Safety Evaluation, "Related to Amendment No. 126 to Facility Operating License No. DPR-6," Consumers Energy Big Rock Point Nuclear Plant, dated March 24, 2005 (ADAMS Accession No. ML050540552)
2. Consumers Energy Letter, "Revision 2 of the "Big Rock Point License Termination Plan," dated September 27, 2005 (ADAMS Accession No. ML052770168)
3. NRC letter, "Big Rock Point – Release of Land from Part 50 License for Unrestricted Use," dated January 8, 2007 (ADAMS Accession No. ML063410361)
4. NRC "Order Approving Transfer of License and Conforming Amendment," Consumers Energy Big Rock Point Facility, dated April 6, 2007 (ADAMS Accession No. ML070740758)

5. ATTACHMENTS

1. Big Rock Point Plant License Termination Plan Revision Matrix, Revision 3

ATTACHMENT 1

**BIG ROCK POINT ISFSI
ENERGY PALISADES LLC**

Big Rock Point License Termination Plan Revision Matrix

| CHAPTER 1 – GENERAL INFORMATION | | | |
|--|-------------|---|--|
| Section | Page | Revision | Basis |
| 1.1 | 1-1 | Clarifying text was added to the first paragraph of the section which further describes the phased approach. | The original LTP, as submitted to, and approved by the NRC, discussed the decommissioning of the power reactor facility and the release of the license for that portion of the property. The LTP also discussed to a lesser extent the decommissioning of the ISFSI and associated land areas post transfer of the spent fuel and the greater than Class C waste. Revision 3 to this LTP eliminates those portions of the text related to the power reactor that are no longer applicable as it has been released from the NRC license. Revision 3 to this LTP also provides enhanced detail on the remaining decommissioning activities and how unrestricted release will be achieved after the fuel has been transferred and ISFSI operations cease. |
| 1.2 | 1-1 | Revised the first sentence of the section, adding “remaining” and adding “for the final phase of decommissioning” and removing “the process for performing final status surveys.” | Updated the text to reflect the current status of decommissioning activities. |

CHAPTER 1 – GENERAL INFORMATION

| Section | Page | Revision | Basis |
|------------------------|-------------|--|---|
| 1.3 and footnote | 1-2 | In the first sentence of the section, changed “Big Rock Point Restoration Project ¹ ” to “Big Rock Point ISFSI”. In the second sentence, changed “Consumers Energy Company” to “Entergy Palisades LLC.” In the second sentence of the section, changed “the BRP site” to “the original BRP site.” Added the reference to Figure 1-2. Added two bullets to the second paragraph. | <p>The project name change reflects the completion of the restoration of the power reactor facility and subsequent release from the license and the transition to ISFSI only operations.</p> <p>The name change from Consumers Energy Company to Entergy Palisades LLC reflects the transfer of the NRC license upon transfer of ownership of the facility.</p> <p>Added the reference to Figure 1-2 to provide a drawing of the property boundaries in relation to the previous license for Consumers Energy and the property boundary for the Entergy Palisades LLC license for the ISFSI.</p> <p>Added the bullets to reference release of the power reactor and non-ISFSI land areas from the NRC license and also to reference license transfer.</p> |
| 1.4.1 | 1-3 | In the first sentence of the first paragraph, changed “Consumers Energy’s approach to decommissioning the BRP site” to “Palisades Entergy LLC’s approach to the final phase of decommissioning the BRP site.” | Transfer of NRC license to Entergy Palisades LLC. |
| 1.4.1 | 1-3 | In the second paragraph added the words “The final phase of” and changed “Consumers Energy Quality Program Description for Nuclear Power Plants (Part 1) - Big Rock Point (CPC-2A)” to “Entergy’s Quality Assurance Program Manual.” | Transfer of NRC License to Palisades required updating to Entergy programs and documents. |

CHAPTER 1 – GENERAL INFORMATION

| Section | Page | Revision | Basis |
|----------------|-------------|--|---|
| 1.4.1 | 1-3 | In the third paragraph revised the text to state that the remaining decommissioning activities will not pose a greater radiological or safety risk and provided the basis for the statement. | The basis for this statement is the result of the completion of phase 1 and ISFSI operational data to date. Specifically, the final dose and radiological data from the first phase of decommissioning and the current dose and radiological data from ISFSI operations. |
| 1.4.1 | 1-3 | Revised the text in the fourth paragraph to reflect past tense. | The past tense is the correct tense for the information provided since these activities have been performed in the past. |
| 1.4.1 | 1-3 | Deleted the fifth through ninth paragraphs and replaced with new paragraphs five and six. | <p>The text of the fifth paragraph outlines the process and NRC approvals which established the ISFSI construction and operation as a radiologically non-impacted land area.</p> <p>The sixth paragraph provides an overview of the planned final disposition of the ISFSI pad.</p> |
| 1.4.2 | 1-4, 1-5 | Revised this entire section to remove the discussion on Final Status Surveys which were completed during phase one of the LTP. Added the approach for the final phase of decommissioning. | As provided in the text, the regulatory basis for the approach to the final phase is the criteria of NUREG-1757, "Consolidated Decommissioning Guidance," Section 7.4, "Group 2: Unrestricted Release Using Screening Criteria." The BRP ISFSI meets the criteria established for a Group 2 facility. |

CHAPTER 1 – GENERAL INFORMATION

| Section | Page | Revision | Basis |
|----------------|-------------|--|---|
| 1.5 | 1-5 | Revised this entire section to remove the description of "Greenfield" and added the last paragraph to provide a summary of the plan to decommission the ISFSI. | <p>The "Greenfield" condition was achieved as provided by the approval for release of the power reactor and associated land areas from the NRC license.</p> <p>The summary paragraph is a description of decommissioning the ISFSI and is based upon ISFSI operations maintaining the ability to meet the criteria of NUREG-1757, "Consolidated Decommissioning Guidance," Section 7.4, "Group 2: Unrestricted Release Using Screening Criteria."</p> |
| 1.5.1 | 1-5 | In the second sentence of the first paragraph, changed the words "license amendment" to "license termination." Removed the words "and 10 CFR 50.90." | After completion of the final phase of decommissioning activities, it is planned that license termination will be requested. |
| 1.5.2 | 1-6 | Revised the section to remove the discussion on original site characterization and added the new last paragraph to expand on the characterization of the remaining ISFSI site. | The characterization data contained within revision 2 of this LTP was used to remediate the power reactor facility and associated land areas. Subsequently, the power reactor facility and associated land areas were released from the NRC license. As such, the text is updated to reflect the remaining ISFSI site and final phase of decommissioning. |
| 1.5.3 | 1-6 | Revised the section to remove the description of site dismantlement activities that have been completed and to update the remaining activities for ISFSI dismantlement. | Remaining site dismantlement activities planned are listed based upon ISFSI operations maintaining the ability to meet the criteria of NUREG-1757, "Consolidated Decommissioning Guidance," Section 7.4, "Group 2: Unrestricted Release Using Screening Criteria." |

CHAPTER 1 – GENERAL INFORMATION

| Section | Page | Revision | Basis |
|----------------|-------------|---|--|
| 1.5.3.1 | 1-6 | Revised the section to remove completed decommissioning activities associated with the power reactor and associated land areas and revised it to reflect future planned decommissioning activities for the ISFSI. | The only decommissioning activities remaining for the final phase are those associated with the BRP ISFSI. |
| 1.5.4 | 1-6 | Revised the section to indicate that there are no anticipated remediation plans. | All remediation was completed as a prerequisite to release the power reactor facility and associated land areas from the NRC license. |
| 1.5.5 | 1-7 | Revised paragraph one of this section. Deleted paragraph two. | Final Status Surveys are not anticipated to be necessary as the ISFSI will be operated to maintain the ability to meet the criteria of NUREG-1757, "Consolidated Decommissioning Guidance," Section 7.4, "Group 2: Unrestricted Release Using Screening Criteria." |
| 1.5.6 | 1-7 | Revised the section to discuss the content of Chapter 6 of the LTP as it applied to compliance with the radiological criteria for release of phase one decommissioned land from the NRC license. | The ISFSI, prior to construction, during construction and during operation is a radiologically non-impacted area. Based upon this, the paragraph was revised to discuss compliance with the radiological criteria for license termination. |
| 1.5.7 | 1-7, 1-8 | In the third paragraph, changed "Consumers Energy" to "Entergy Palisades LLC" and "BRP Nuclear Plant" to "BRP ISFSI" and deleted the last two sentences regarding filing decommissioning cost updates with the Michigan Public Service Commission (MPSC). | The requirement to file decommissioning cost updates to the MPSC is no longer required. |

CHAPTER 1 – GENERAL INFORMATION

| Section | Page | Revision | Basis |
|----------------|-------------|---|---|
| 1.5.8 | 1-8, 1-9 | In the last paragraph, added the words “the final phase of decommissioning and.” Deleted the words “proposed” and “/partial release.” | Revised the text to indicate that Chapter 8 has been updated to reflect the final phase of decommissioning and license termination. |
| 1.6 | 1-9 | In the first paragraph, changed the words “is submitting this” to “submitted the.” Changed the words “will be” to “has been;” the word “has” to “had” and the words “will be” to “was.” | Revised the text to the correct tense based on the completion of the first phase of decommissioning. |
| 1.7 | 1-10 | Updated the contact information for the LTP. | New contact for BRP ISFSI LTP. |
| Fig. 1-1 | 1-11 | Changed the Figure title from “Big Rock Point Owner Controlled Area” to “Big Rock Point ISFSI Location In Relation To The Site Map At The Time Of LTP Submittal.” | Revised the title of the figure to reflect the completion of the first phase of decommissioning. |
| Fig. 1-2 | 1-12 | Added Big Rock Point ISFSI Non-Impacted Land Areas Map. | Added the map to provide a visual depiction of the Entergy Palisades LLC BRP ISFSI property boundary in relation to the Consumers Energy property boundary. |
| Fig. 1-3 | 1-13 | Added ISFSI Land Survey Map. | Added the survey map as a reference. |

CHAPTER 2 – SITE CHARACTERIZATION

| Section | Page | Revision | Basis |
|----------------|-------------|--|--------------|
| | | Chapter 2 and appendices remain unchanged. | |

CHAPTER 3 – IDENTIFICATION OF REMAINING SITE DISMANTLEMENT ACTIVITIES

| Section | Page | Revision | Basis |
|----------------|-------------|---|---|
| 3.1 | 3-1 | In the first and second paragraphs revised the text to reflect the transfer of the facility license. Deleted the statement that the completion of the DECON option is contingent upon continued access to a low level waste disposal site. | The revision updates the text to reflect that the NRC license for the facility was transferred from Consumers Energy to Entergy Palisades LLC. As provided in Chapter 1, it is anticipated that continued ISFSI operations will result in the facility being radiologically non-impacted when final phase dismantlement activities recommence. The ISFSI will be surveyed for release and sent for disposal or recycled locally. The need for access to a low level waste disposal site is also not anticipated. |
| 3.1 | 3-1 | In the third paragraph revised the text to reflect the transfer of the facility license. | The revision updates the text to reflect that decommissioning activities will be conducted in accordance with the Entergy's Quality Assurance Program Manual. |
| 3.1 | 3-1 | In the fourth paragraph deleted the first two sentences. | The deletion updates the text to align with the final phase of decommissioning. Programs such as the Bulk Material Control Program implemented for the first phase of decommissioning are no longer applicable. |
| 3.1 | 3-1 | Deleted the majority of the original text of the fifth and sixth paragraphs. | The deletions update the text to reflect the completion of the first phase of decommissioning. The revision also updates the text to reflect that the NRC license for the facility was transferred from Consumers Energy to Entergy Palisades LLC. |

CHAPTER 3 – IDENTIFICATION OF REMAINING SITE DISMANTLEMENT ACTIVITIES

| Section | Page | Revision | Basis |
|----------------|-------------|--|---|
| 3.2 | 3-2 | <p>Updated the section to reflect the completion of the first phase of decommissioning by deleting the statement that “Performance of decommissioning activities that have the possibility of affecting the safe storage of spent fuel or monitoring and control of radiological hazards are controlled by BRP’s administrative processes” and the original Table 3-1.</p> <p>Updated the date of NRC review of BRP license amendments</p> <p>Added reference to Amendment 127 to the BRP license.</p> | <p>The first phase decommissioning activities that could affect safe storage of spent fuel and radiological hazards have been completed.</p> <p>Deleted the original Table 3-1 as all of these activities (with exception of the ISFSI activities) were completed during the first phase of decommissioning.</p> <p>Update the date of NRC review of BRP license amendments.</p> <p>Added Amendment 127 to update the list of license amendments.</p> |
| 3.3.1 | 3-3 | <p>Deleted the entire section including Table 3-2 and replaced it with “Consumers Energy completed the first phase of decommissioning for the BRP power reactor and associated land areas with notification that the NRC approved release of this land from the BRP license on January 8, 2007 (Reference 3-20).”</p> | <p>The deletion of text of the section reflects the completion of these activities as they were stated in the original submittal of the LTP as part of the first phase of decommissioning.</p> |
| 3.3.2 | 3-3 | <p>Deleted the entire section and replaced it with “Consumers Energy completed decommissioning activities in accordance with the License Termination Plan as approved by Amendment 126 dated March 24, 2005, Approval of the License Termination Plan.”</p> | <p>The deletion of text of the section reflects the completion of these activities as they were stated in the original submittal of the LTP as part of the first phase of decommissioning.</p> |

CHAPTER 3 – IDENTIFICATION OF REMAINING SITE DISMANTLEMENT ACTIVITIES

| Section | Page | Revision | Basis |
|----------------|-------------|--|---|
| 3.4 | 3-3 | <p>Deleted text associated with the completion of the first phase of decommissioning and added text to describe further, the remaining decommissioning activities in the final phase.</p> <p>Added text which states that the remaining decommissioning schedule will be finalized upon notification by the Department of Energy (DOE) of intent to receive spent fuel and Greater Than Class C waste.</p> <p>Updated and renumbered the table within the section to include planned decommissioning activities.</p> | <p>BRP phase 1 decommissioning activities are complete and only BRP ISFSI areas remain for the final phase.</p> <p>The resumption of decommissioning activities is now dictated by the ability of the DOE to receive spent fuel.</p> <p>Planned remaining decommissioning activities.</p> |
| 3.4.1 | 3-4 | Revised this section to provide a description of decontamination and demolition of structures for the final phase of decommissioning. | It is anticipated that the ISFSI will remain a radiologically non-impacted area. However, as a contingency in the event that contaminated material is encountered, the text was revised to discuss how this would be dispositioned. |
| 3.4.1.1 | 3-4 | Deleted the text of the section and added the new paragraph, "Clean demolition debris will be disposed of at a State of Michigan licensed landfill. Any radiologically contaminated debris that may be generated will be disposed of at a facility licensed to receive radioactive waste." | The spent fuel storage casks are designed without an effluent pathway. As such, there is not a source of radioactive contamination. Therefore, it is anticipated that demolition debris will be radiologically clean and disposed of at a State of Michigan landfill. |
| 3.4.2 | 3-4 | Deleted the section. | No longer applicable as underground piping was removed during the first phase of decommissioning. |

CHAPTER 3 – IDENTIFICATION OF REMAINING SITE DISMANTLEMENT ACTIVITIES

| Section | Page | Revision | Basis |
|----------------|-------------|---|---|
| 3.4.3 | 3-4 | Deleted the section. | No longer applicable as the ISFSI is anticipated to remain radiologically non-impacted. |
| 3.5.1 | 3-4 | Updated the section to reflect the completion of the first phase of decommissioning and to provide an estimate of occupational exposure expected for the final phase of decommissioning. | <p>The total person-rem reported to the NRC for the first phase of decommissioning was less than the 700 to 1600 person-rem stated in NUREG-0586, "Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities."</p> <p>Historical occupational dose data during ISFSI only operations and radiological survey data provide the basis for the estimate of occupational exposure for the final phase of decommissioning.</p> |
| 3.5.2 | 3-4 | Updated the section to reflect the completion of the first phase of decommissioning and to provide an estimate of public exposure for the final phase of decommissioning. | <p>It is anticipated that demolition debris will be radiologically clean and disposed of at a State of Michigan landfill.</p> <p>Historical occupational dose data during ISFSI only operations and radiological survey data provide the basis for the estimate of occupational exposure for the final phase of decommissioning.</p> |
| 3.5.3 | 3-4 | Deleted text associated with phase 1 and added the new paragraph, "Entergy Palisades, LLC intends to operate the BRP ISFSI such that it will maintain its radiological non-impacted status. Therefore, the estimate of the quantity of radioactive material to be shipped is 0 cubic feet." | Phase 1 of decommissioning is complete and in the final phase it is anticipated that the ISFSI will remain a radiologically non-impacted area. Therefore, the expected volume of radioactive material shipped for disposal is 0 cubic feet. |

CHAPTER 3 – IDENTIFICATION OF REMAINING SITE DISMANTLEMENT ACTIVITIES

| Section | Page | Revision | Basis |
|---------------------|-------------|--|--|
| Renumbered 3.5.4 | 3-5 | Updated the Liquid Effluent Release Summary data. | The updated data reflect the ISFSI only operations period of the facility. This data supports the information provided in this chapter in regards to the ISFSI and ISFSI land areas as being radiologically non-impacted. |
| Renumbered 3.5.5 | 3-5 | Updated the Gaseous Effluent Release Summary data. | The updated data reflect the ISFSI only operations period of the facility. This data supports the information provided in this chapter in regards to the ISFSI and ISFSI land areas as being radiologically non-impacted. |
| 3.6 | 3-5, 3-6 | Deleted reference to the US Coast Guard and also deleted the discussion on the BRP Citizen's Advisory Board. | <p>The Entergy Palisades LLC Big Rock Point property does not adjoin Lake Michigan, therefore coordination regard the final phase of decommissioning with the US Coast Guard is not necessary.</p> <p>The BRP Citizen's Advisory Board was disbanded with the completion of the first phase of decommissioning and subsequent release of the power reactor and associated land areas from the NRC license.</p> |
| Figure 3.1 | 3-6 | Deleted figure. | Deleted figure as the BRP reactor site no longer exists. |
| Figure 3.2 | 3-6 | Deleted figure. | Deleted the figure as these activities were completed during the first phase of decommissioning. |
| Figure 3.3 | 3-6 | Deleted figure. | Deleted the figure as demolition debris disposal activities were completed during the first phase of decommissioning |

CHAPTER 3 – IDENTIFICATION OF REMAINING SITE DISMANTLEMENT ACTIVITIES

| Section | Page | Revision | Basis |
|----------------|-------------|---|--|
| 3.7 | 3-8 | Added reference letter from the USNRC to Consumers Energy, Big Rock Point, Release of Land from Part 50 License for Unrestricted Use dated January 8, 2007. | Letter from the NRC to Consumers Energy, Big Rock Point, "Release of Land from Part 50 License for Unrestricted Use," dated January 8, 2007. |

CHAPTER 4 – SITE REMEDIATION PLAN

| Section | Page | Revision | Basis |
|----------------|-------------|---|--|
| 4.1 | 4-1 | Revised section by deleting the text that discussed how remediation would meet the annual dose limit of 25 mrem/yr for the critical population group. | BRP submitted to the NRC, the necessary data in the Final Status Survey report to demonstrate compliance with the requirements of 10 CFR 20.1402, "Radiological criteria for unrestricted use." Subsequently, the power reactor facility and associated land areas were released from the NRC license. |
| 4.1.1 | 4-1 | The section has been deleted. | Deleted as part of the revision to section 4.1. |
| 4.1.2 | 4-1 | The section has been deleted. | Deleted as part of the revision to section 4.1. |
| 4.2 | 4-1 | Updated the section to discuss that remediation actions are not anticipated to be necessary for the ISFSI. | Remediation actions are not planned for the final phase of decommissioning because the ISFSI land is anticipated to remain non-impacted. |
| 4.2.1 | 4-1 | Updated the section to describe remediation plans for structures, systems and components of the ISFSI. | It is anticipated that there will not be contamination present on the interior of the storage casks. This is based upon the radiological controls in place when the spent fuel was loaded into the inner casks and the controls during the subsequent transfer to the ISFSI. Therefore, remediation will not be required. If contamination is identified, the contaminated item will be decontaminated. Then, based upon the identified contamination, an evaluation will be conducted to determine if the contaminated item has changed the radiologically non-impacted status of the ISFSI land areas. |

CHAPTER 4 – SITE REMEDIATION PLAN

| Section | Page | Revision | Basis |
|----------------|-------------|--|---|
| 4.2.2 | 4-2 | <p>Revised the section by deleting entire text then added details to state soil and water remediation was completed during the first phase of decommissioning.</p> <p>Added text to state that soil and water remediation is not necessary for the final phase of decommissioning.</p> | <p>The FuelSolutions™ W74 Canister Storage Final Safety Analysis Report, Chapter 7, “Confinement,” states that “Confinement of all radioactive material in the FuelSolutions™ Storage System is provided by a FuelSolutions™ canister.” Additionally, the design of the canister’s confinement boundary assures that there are no credible design basis events that would result in a radiological release to the environment. Therefore, it is not anticipated any remediation will be required.</p> |
| 4.2.2.1 | 4-2 | The section has been deleted. | Deleted as part of the revision to section 4.2.2. |
| 4.2.2.2 | 4-2 | The section has been deleted. | Deleted as part of the revision to section 4.2.2. |
| 4.2.2.3 | 4-2 | The section has been deleted. | Deleted as part of the revision to section 4.2.2. |
| 4.3 | 4-2 | Revised the section by deleting text which was applicable to phase 1 of decommissioning and updated text to state “With no soil or groundwater remediation anticipated for the ISFSI, there will be no impact on the Radiation Protection Program.” | <p>The design of the FuelSolutions™ W74 canister confinement boundary assures that there are no credible design basis events that would result in a radiological release to the environment. Therefore it is not anticipated any remediation will be required and subsequently there is no impact on the Radiation Protection Program.</p> |
| 4.3.1 | 4-2 | Updated the section and deleted the text discussing the Offsite Dose Calculation Manual (ODCM) and effluent controls. | <p>The design of the FuelSolutions™ W74 canister confinement boundary assures that there are no credible design basis events that would result in a radiological release to the environment.</p> |
| 4.3.1.1 | 4-2 | The section has been deleted. | Deleted as part of the revision to section 4.3.1. |

CHAPTER 4 – SITE REMEDIATION PLAN

| Section | Page | Revision | Basis |
|----------------|-------------|---|---|
| 4.4 | 4-2 | The section was revised to state that an explicit ALARA analysis is not required. | The ALARA evaluation completed for the first phase of decommissioning is no longer applicable as the first phase of decommissioning has been completed. The basis for not performing further ALARA evaluations for the final phase of decommissioning is based upon NUREG-1727, NMSS Decommissioning Standard Review Plan, Appendix D, ALARA Analyses introduction, which provides the following: “In addition, if residual radioactivity cannot be detected, it may be assumed that it has been reduced to levels that are ALARA. Therefore, the licensee does not need to conduct an explicit analysis to meet the ALARA requirement.” |
| 4.4.1 | 4-3 | The section has been deleted. | Deleted as part of the revision to section 4.4. |
| 4.4.2 | 4-3 | The section has been deleted. | Deleted as part of the revision to section 4.4. |
| 4.4.3 | 4-3 | The section has been deleted. | Deleted as part of the revision to section 4.4. |
| 4.4.4 | 4-3 | The section has been deleted. | Deleted as part of the revision to section 4.4. |
| 4.5 | 4-3 | The entire section and sub sections have been deleted. | As remediation actions are not anticipated which established that an ALARA evaluation is not necessary, there is not a need to provide ALARA cost estimates. |
| 4.6 | 4-3 | The section has been deleted. | All remediation activities were completed during the first phase of decommissioning, as such determining future collective averted dose is not necessary. |

CHAPTER 4 – SITE REMEDIATION PLAN

| Section | Page | Revision | Basis |
|----------------------|-------------|--|--|
| 4.7 | 4-3 | The entire section and sub sections have been deleted. | This section which contained the ALARA calculation results for the first phase of decommissioning is no longer applicable. |
| 4.8 | 4-4 | This section was renumbered to section 4.5 based upon the previous section deletions and the references that are no longer applicable and which have been deleted. | Updates based upon revisions to this chapter. |
| Chapter 4 Appendices | | All appendices deleted. | The appendices were applicable to the first phase of decommissioning. |

| CHAPTER 5 – FINAL STATUS SURVEY PLAN | | | |
|---|-------------|--------------------------------------|---|
| Section | Page | Revision | Basis |
| 5.0 Through 5.2 | 5-1 | The entire chapter has been revised. | <p>The FSS plan was prepared for and implemented during the initial phase of decommissioning using the applicable regulatory and industry guidance. The FSS data was submitted to the NRC in the FSS Report. This report supported the determination by the NRC to approve release of the BRP power reactor and associated land areas from the NRC license.</p> <p>The basis of approach for the final phase of decommissioning is that the ISFSI will be operated such that it would meet the criteria of NUREG-1757, "Consolidated Decommissioning Guidance," Section 7.4, "Group 2: Unrestricted Release Using Screening Criteria." Therefore, the chapter has been revised to reflect a Final Status Survey will not be required.</p> |

| CHAPTER 6 – COMPLIANCE WITH THE RADIOLOGICAL CRITERIA FOR LICENSE TERMINATION | | | |
|--|-------------|--|--------------|
| Section | Page | Revision | Basis |
| | | Chapter 6 and its appendices remain unchanged. | |

CHAPTER 7 – UPDATE OF SITE SPECIFIC DECOMMISSIONING COSTS

| Section | Page | Revision | Basis |
|-----------------------|-----------------------|--------------------------------------|--|
| 7.0 through 7.4 | 7-1 through 7-7 | The entire chapter has been revised. | <p>The chapter has been revised in its entirety to acknowledge the completion of the first phase of decommissioning. With the attainment of the Greenfield condition for the former power reactor and associated land areas, the remaining systems, structures and components to be decommissioned are associated with ISFSI only operations. Therefore, the cost estimate methodology utilized is in accordance with 10 CFR 72.30, "Financial assurance and recordkeeping for decommissioning."</p> <p>The cost estimate supports the license termination approach for the ISFSI as described in the earlier chapters as maintaining a radiologically non-impacted status. As a prudent measure, the cost estimate assumes radiological remediation is required for two casks with the remainder of the facility and associated land areas being radiologically non-impacted.</p> |

CHAPTER 8 – SUPPLEMENT TO THE ENVIRONMENTAL REPORT

| Section | Page | Revision | Basis |
|----------------|-------------|--|---|
| 8.1.1 | 8-1 | Revised the first paragraph of the section to address the completion of the first phase of decommissioning. | Revised the first paragraph of the section to address the completion of the first phase of decommissioning. |
| 8.1.1 | 8-1 | Throughout the chapter revised reference numbers and figure numbers. | Reference numbers and figure numbers were revised to align with the revisions made to section 8.8. |
| 8.1.2 | 8-1, 8-2 | Revised the section by adding the last paragraph. | Added the last paragraph to add background information in regards to the January 8, 2007 release of phase one decommissioned land from the NRC license. |
| 8.1.3 | 8-2, 8-3 | Revised the section with minor text updates. | The revision updates the text to reflect the completion of the first phase of decommissioning. |
| 8.1.4 | 8-3 | Revised the section with minor text updates. | The revision updates the text to reflect the completion of the first phase of decommissioning and the remaining dismantlement of the ISFSI. |
| 8.1.5 | 8-3 | Revised the section with minor text updates. | The revision updates the text to reflect the completion of the first phase of decommissioning. |
| 8.1.6 | 8-3 | Added “the final phase of” to the first sentence. | The revision refers to the final phase of decommissioning. |
| 8.2 | 8-4 | Updated the section by deleting text to reflect the completion of the first phase of decommissioning and adding text to describe the remaining decommissioning activities of the final phase | The text of the site description has been update for the final phase of decommissioning. It describes that the ISFSI will be dismantled and demolished. ENO will determine the disposition of the support buildings at the time of decommissioning. |

CHAPTER 8 – SUPPLEMENT TO THE ENVIRONMENTAL REPORT

| Section | Page | Revision | Basis |
|----------------|-------------|--|--|
| 8.3 | 8-4 | Revised the section with minor text updates. | The revision updates the text to reflect the completion of the first phase of decommissioning and that decontamination would not be required. |
| 8.3.1 | 8-4 | Revised the section with minor text updates. Deleted the statement that stated the first phase of decommissioning was contingent on a LLW disposal site. | The revision updates the text to reflect the completion of the first phase of decommissioning. |
| 8.3.2 | 8-5 | Revised the section with minor text updates. Deleted the statement that decommissioning activities completed prior to submittal of the original LTP. | The revision updates the text to reflect the completion of the first phase of decommissioning. |
| 8.4.1.1 | 8-5, 8-6 | Revised the text to update the site description. | Revision reflects the transfer of property and NRC license to Entergy Palisades LLC from Consumers Energy. |
| 8.4.1.1 | 8-5, 8-6 | Throughout the chapter changed “plant” to “ISFSI” where appropriate. | Correct title of facility. |
| 8.4.1.2 | 8-6 | Updated the residential population data. | Updated the population to the most recent census data. |
| 8.4.1.3 | 8-7 | Updated land and water use data. | Farm data updated to the 2007 agricultural census. The Northern Michigan Hospital has been purchased and renamed McLaren-Northern Michigan Hospital. |
| 8.4.2 | 8-8 | Added the word “previous” to the first sentence. | On-site instrumentation was dismantled during the first phase of decommissioning. |
| 8.4.2.5 | 8-10 | Deleted reference to collection of wind data. | On-site instrumentation was dismantled during the first phase of decommissioning. |
| 8.4.2.6 | 8-10 | Revised the elevation data. Changed “plant” to “BRP site.” | Elevation data for the former power reactor facility was changed to elevation data for the ISFSI. Corrected location name. |

CHAPTER 8 – SUPPLEMENT TO THE ENVIRONMENTAL REPORT

| Section | Page | Revision | Basis |
|----------------|---------------|--|--|
| 8.4.3.2 | 8-11, 8-12 | Revised the elevation data. | Elevation data for the former power reactor facility was changed to elevation data for the ISFSI. |
| 8.4.4.1 | 8-12 | Deleted text describing surface water drainage of the Industrial Area. | Consumers Energy completed resurfacing and grading of the former power reactor and associated areas as described previously. The section is now applicable to the ISFSI land areas. |
| 8.4.4.2 | 8-13 | Deleted the second, third and fourth paragraph. | <p>This text pertained to the power reactor and associated land areas for the first phase of decommissioning.</p> <p>The design of the FuelSolutions™ W74 canister confinement boundary assures that there are no credible design basis events that would result in a radiological release to the environment. Therefore, it is not anticipated any remediation will be required of groundwater.</p> |
| 8.4.5 | 8-13 | Updated information on Native American treaty rights. | Updated the section to provide that in 2007, the State of Michigan, the Little River Band of Ottawa Indians, the Grand Traverse Band of Ottawa and Chippewa Indians, the Little Traverse Bay Band of Odawa Indians, the Sault Tribe of Chippewa Indians, the Bay Mills Indian Community and the United States government signed a Consent Decree which defines the extent of the Tribes' inland treaty rights. |
| 8.4.6 | 8-13 | Deleted the text that stated Consumers Energy would take the actions stipulated in the MOA prior to sale or transfer of ownership of the property. | The actions stipulated in the Memorandum of Agreement (MOA) were completed prior to release of phase one decommissioned land from the NRC license. |
| 8.4.6.1 | 8-14 | Revised the section with minor text updates. | Recordation was completed prior to release of phase one |

CHAPTER 8 – SUPPLEMENT TO THE ENVIRONMENTAL REPORT

| Section | Page | Revision | Basis |
|----------------|-------------|--|---|
| | | Added information concerning the State of Michigan Historic Marker. | decommissioned land from the NRC license. Consumers Energy in coordination with the State Historic Preservation Office installed a State of Michigan Historic Marker at a public rest area on the shore of Lake Michigan near the site. |
| 8.4.6.3 | 8-14 | Rewrote and added the word “former” in the first sentence. | Indicates that the plant no longer exists and reworded for clarity. |
| 8.4.7.2 | 8-15 | In the first paragraph deleted reference to beaches. | The BRP ISFSI property does not adjoin any beach area. |
| 8.4.7.2 | 8-15 | In the first bullet deleted reference to approximate acreage as listed in Table 8-1. | Approximate acreage is no longer provided in Table 8-1. |
| Table 8-1 | 8-16 | Updated the table. | The table has been updated to reflect only those soil types that are associated with the BRP ISFSI land areas. |
| 8.4.7.2 | 8-16 | In the second bullet revised the Flora text, deleted Table 8-2, Big Rock Point General Land Cover Types, and added footnote. | This bullet has been updated to reflect those land covers associated with the BRP ISFSI land areas. |
| 8.4.7.2 | 8-17 | In the third bullet updated the text to reflect current observations on the ISFSI site. | With the return of the power reactor and associated land areas to a Greenfield condition, those lands have been repopulated by the local fauna. Black bear have recently been identified on-site by site personnel. |
| 8.4.7.3 | 8-17 | Updated the text to reflect the BRP ISFSI land areas. | Threatened and endangered species were only identified on the shore line areas of the former facility property. The identified species have not been identified on the BRP ISFSI land areas. |

CHAPTER 8 – SUPPLEMENT TO THE ENVIRONMENTAL REPORT

| Section | Page | Revision | Basis |
|----------------|---------------|--|---|
| 8.5.1 | 8-17, 8-18 | Added the words "of the final phase." | Revised to reflect the final phase of decommissioning. |
| 8.5.1.1 | 8-18 | Revised the first paragraph with minor text updates. | The text now reflects the BRP ISFSI. The Radiation Protection Program is commensurate with license activities and is no longer reflective of an operating nuclear power plant. |
| 8.5.1.1 | 8-18 | In the first bullet updated the text and added a summary of occupational exposure. | The updated text better reflects the phased approach of decommissioning. With the completion of the first phase of decommissioning the section is updated to provide a summary of the occupational dose for the decommissioning. |
| 8.5.1.1 | 8-19 | In the third bullet deleted the section and added a new paragraph. | The text reflects the transition of the ALARA program which continues to be commensurate with licensed activities. |
| 8.5.1.1 | 8-19 | In the fourth bullet revised the bullet to reflect the final phase of decommissioning. | The design of the FuelSolutions™ W74 canister confinement boundary assures that there are no credible design basis events that would result in a radiological release to the environment. |
| 8.5.1.1 | 8-19 | In the last bullet updated the text to reflect ISFSI and added a new last paragraph. | The text provides information that supports the assessment that the ISFSI is radiologically non-impacted. The last paragraph was added to provide information regarding contamination of the coating substrate of the transfer cask. The condition report contains information that continues to support the assessment of the ISFSI being radiologically non-impacted. |
| 8.5.1.2 | 8-19, 8-20 | Updated the entire section to reflect the modifications of the Radiation Environmental Monitoring Program. | The revision reflects the modifications made to support ISFSI only operations. |
| 8.5.1.3 | 8-20 | Updated the entire section to reflect the final | The basis of the updated text is the completion of the first |

CHAPTER 8 – SUPPLEMENT TO THE ENVIRONMENTAL REPORT

| Section | Page | Revision | Basis |
|----------------|-------------|---|---|
| | | phase of decommissioning. | phase of decommissioning, and the accidents that would pertain to ISFSI only operations are bounded by these analyses in the BRP UFHSR. |
| 8.5.1.4 | 8-21 | Updated the entire section to reflect the final phase of decommissioning and deleted Table 8-3. | The basis of the updated text is the completion of the first phase of decommissioning. |
| 8.5.1.5 | 8-21 | Updated the entire section to reflect the final phase of decommissioning. | The text reflects the construction of the ISFSI and the subsequent transfer of spent fuel to the ISFSI. |
| 8.5.2 | 8-22 | Added the words "the final phase of." | Revised to reflect the final phase of decommissioning. |
| 8.5.2.1 | 8-22 | Updated the entire section to reflect the final phase of decommissioning. | As the ISFSI is a relatively small facility and it is operated as a radiologically non-impacted area decommissioning activities will be confined to the immediate area surrounding the ISFSI. Additional land areas are not anticipated to be required. |
| 8.5.2.2 | 8-22 | Updated the entire section to reflect the final phase of decommissioning. | ISFSI operations and systems do not require a water source other than a small well for the domestic water system in the administrative support building. |
| 8.5.2.3 | 8-22 | Updated the entire section to reflect the final phase of decommissioning. | The design of the FuelSolutions™ W74 canister confinement boundary assures that there are no credible design basis events that would result in a radiological release to the environment. Provided a description of groundwater flow as it exists for the ISFSI. |
| 8.5.2.4 | 8-22 | Updated the entire section to reflect the final | The section is updated to reflect dismantlement and |

CHAPTER 8 – SUPPLEMENT TO THE ENVIRONMENTAL REPORT

| Section | Page | Revision | Basis |
|----------------|-------------|---|--|
| | | phase of decommissioning. | demolition of the ISFSI pad and concrete storage casks. |
| 8.5.2.5 | 8-23 | Updated the entire section to reflect the final phase of decommissioning. | The BRP ISFSI is located inland and does not directly adjoin Lake Michigan. |
| 8.5.2.6 | 8-23 | Updated the entire section to reflect the final phase of decommissioning. | No additional land area is expected to be utilized to complete decommissioning. Therefore, no additional impacts to site flora and fauna are anticipated. |
| 8.5.2.7 | 8-23 | Updated the entire section to reflect the final phase of decommissioning. | Threatened and endangered species were only identified on the shore line areas of the former facility property. The identified species have not been identified on the BRP ISFSI land areas. |
| 8.5.2.8 | 8-23 | Updated the entire section to reflect the final phase of decommissioning. | The revision reflects the transfer of ownership and the NRC license. |
| 8.5.2.10 | 8-24 | Updated the entire section to reflect the final phase of decommissioning. | The revision reflects the socioeconomic impact of the final phase of decommissioning. |
| 8.5.2.11 | 8-24 | Deleted the text regarding the landfill in Crawford County. | This landfill is not anticipated to be required for use in accordance with an approved 10 CFR 20.2002, "Method for obtaining approval of proposed disposal procedures." |
| 8.5.2.12 | 8-24 | Revised the section with minor text updates. | The revision updates the text to reflect the completion of the first phase of decommissioning. |
| 8.5.2.13 | 8-25 | Updated the entire section to reflect the final phase of decommissioning. | As the ISFSI land area cannot be seen from traveled roadways or Lake Michigan it does not possess any aesthetic issue. |
| 8.5.2.14 | 8-25 | Updated the entire section to reflect the ISFSI | Updated the section relative to the BRP ISFSI property |

CHAPTER 8 – SUPPLEMENT TO THE ENVIRONMENTAL REPORT

| Section | Page | Revision | Basis |
|----------------|-------------|---|---|
| | | land areas. | description. |
| 8.5.2.15 | 8-25 | Added the word “completing”. | Places the text in the context of the final phase of decommissioning. |
| 8.6 | 8-25 | Added the words “the” and “ISFSI.” | Clarify it is the BRP ISFSI. |
| 8.6.1 | 8-26 | Deleted those activities that are no longer applicable. | The revision reflects those activities applicable to the BRP ISFSI. |
| 8.6.1.3 | 8-26 | Deleted those Environmental Protection Agency (EPA) regulated activities that are no longer applicable. | The revision reflects those activities applicable to the BRP ISFSI. |
| 8.6.1.4 | 8-26 | Added the new section. | This section on the FCC was inadvertently covered in section 8.6.1.3 for the EPA. |
| 8.6.2 | 8-27 | Deleted those State and Local requirements that are no longer applicable. | The revision reflects those activities applicable to the BRP ISFSI. |
| 8.7 | 8-27 | Added the words “the final phase of” and deleted “of BRP Nuclear Plant.” | This revision reflects the final phase of decommissioning. |
| Figure 8-1 | 8-29 | Revised the figure. | Removed the former power reactor facility and added the ISFSI site boundary. |
| Figure 8-2 | 8-30 | Replaced the figure. | Replaced the figure with a figure containing the property survey of the ISFSI. |
| Figure 8-3 | 8-31 | Renumbered the figure. | The figure was previously Figure 8-2. |
| Figure 8-4 | 8-32 | Added new figure | Figure 8-4 added to show location of the ISFI relative to Figure 8-3. |

CHAPTER 8 – SUPPLEMENT TO THE ENVIRONMENTAL REPORT

| Section | Page | Revision | Basis |
|----------------|------------------------|------------------------------------|---|
| Figure 8-5 | 8-33 | Revised and renumbered the figure. | The figure was previously Figure 8-3. Revised the figure to remove the Consumers Energy property boundary and add the Entergy ISFSI property boundary. Updated the key listing. |
| Figure 8-6 | 8-34 | Renumbered the figure. | The figure was previously Figure 8-4. |
| Figure 8-7 | 8-35 | Revised and renumbered the figure. | The figure was previously Figure 8-5. Updated the figure with the most recent information from the United States Geological Survey (USGS). |
| Figure 8-8 | 8-36 | Revised and renumbered the figure. | The figure was previously Figure 8-6. Revised the figure to remove the Consumers Energy property boundary and add the Entergy ISFSI property boundary. |
| 8.8 | 8-37, 8-38, 8-39 | Revised the section. | Revised the references to reflect the revisions in the chapter. |

ENCLOSURE 2

**Big Rock Point License Termination Plan Revision 3
Replacement Pages**

Chapter 1 – GENERAL INFORMATION

Replace all pages of Chapter 1 Revision 2

Sixteen Pages Follow

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1.0 GENERAL INFORMATION

1.1 PURPOSE

The objective for decommissioning the Big Rock Point (BRP) Nuclear Plant site was to reduce residual radioactivity to levels that permit release of the site for unrestricted use and for termination of the 10 CFR 50 license in a phased approach. Site areas decommissioned during phase one, associated with the former nuclear plant site, were approved by the NRC for release from the 10 CFR 50 license and release for unrestricted use on January 8, 2007. The objective for decommissioning the BRP Independent Spent Fuel Storage Installation (ISFSI) is to maintain its non-radiologically impacted status to complete the final phase of the phased approach to decommissioning to permit release of the site for unrestricted use and for termination of the 10 CFR 50 license.

The purpose of the BRP License Termination Plan (LTP) is to satisfy the requirements of 10 CFR 50.82(a)(9), *Termination of License*, using the guidance provided by Nuclear Regulatory Commission (NRC) Regulatory Guide 1.179, *Standard Format and Content of License Termination Plans for Nuclear Power Reactors*, NUREG-1575, *Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)*, NUREG-1700, *Standard Review Plan for Evaluating Nuclear Power Reactor License Termination Plans*, NUREG-1727, *NMSS Decommissioning Standard Review Plan*, and NUREG-1757, *Consolidated NMSS Decommissioning Guidance* [References 1-16, 1-17, 1-18, 1-19, and 1-20].

This LTP is incorporated by reference into the BRP Updated Final Hazards Summary Report (UFHSR). The LTP will be updated in accordance with 10 CFR 50.71(e). The LTP was approved on March 24, 2005, along with License Amendment 126 [Reference 1-11].

1.2 SCOPE

The LTP describes the remaining decommissioning activities that will be performed for the final phase of decommissioning and the method for demonstrating that the site meets the criteria for unrestricted use. The LTP contains information on:

- Historical Site Assessment and Site Characterization,
- Remaining Decommissioning Activities,
- Site Remediation Plans,
- Final Status Survey (FSS) Plan,
- Dose Modeling Scenarios,
- Update to the Site-Specific Decommissioning Cost Estimate, and
- Supplement to the Environmental Report.

The purpose and content of each chapter of the LTP is summarized in Section 1.4.

1.3 SITE DESCRIPTION AND HISTORICAL BACKGROUND

Big Rock Point ISFSI¹ is located in Charlevoix County, Michigan, approximately four miles northeast of Charlevoix, Michigan, and approximately eleven miles west of Petoskey, Michigan, on the northern shore of Michigan's Lower Peninsula. The BRP site is owned by Entergy Palisades LLC. Figure 1-1 shows the original BRP site. Figure 1-2 shows the current Big Rock Point ISFSI site. The BRP Nuclear Plant was a boiling water reactor rated at 75mW electric, designed by General Electric Company.

For the BRP Nuclear Plant, Operating License Docket No. 50-155 (License Number DPR-6) and General Independent Spent Fuel Storage Installation (ISFSI) License Docket Number 72-043, events of significance are:

- Provisional Operating License issued August 30, 1962
- Initial Criticality achieved September 27, 1962
- Initial Power Operation achieved December 8, 1962
- Commercial Operation began March 29, 1963
- Full-Term Operating License issued May 1, 1964
- Power level increased from 157 MWt to 240 MWt May 1964
- Operation permanently ceased August 29, 1997
- Fuel permanently removed from the reactor vessel September 20, 1997
- All Spent Nuclear Fuel (SNF), Special Nuclear Material (SNM), and Greater Than Class C (GTCC) waste stored on an Independent Spent Fuel Storage Installation (ISFSI) as of May 2, 2003
- Release of the power reactor and non-ISFSI related portions of the site from the NRC License on January 8, 2007
- License transfer of the BRP ISFSI to Entergy Palisades LLC on April 6, 2007

The Post Shutdown Decommissioning Activities Report (PSDAR) was submitted in accordance with 10 CFR 50.82(a)(4) on September 19, 1997, along with other documents associated with decommissioning (Offsite Dose Calculation Manual, Defueled Technical Specifications, Defueled Emergency Plan, and Emergency Plan Exemption) [Reference 1-4]. On September 23, 1997, Consumers Energy notified the NRC of the permanent cessation of operations and the permanent removal of all fuel assemblies from the reactor pressure vessel and their placement into the spent fuel pool [Reference 1-5]. Following the cessation of operations, Consumers Energy began decommissioning BRP.

¹ On April 6, 2007 the site name was changed from Big Rock Point Restoration Project to Big Rock Point Independent Spent Fuel Storage Installation (ISFSI) upon transfer of the license.

1.4 DECOMMISSIONING APPROACH

1.4.1 Overview

This chapter provides an overview of Palisades Entergy LLC's approach to the final phase of decommissioning the BRP site. References to the chapter in the LTP, where details are provided concerning the particular step or stage of the decommissioning process, are given in parentheses. Upon the decision to permanently cease power operations at BRP in 1997, Consumers Energy began characterization activities (Chapter 2, *Site Characterization*). This characterization effort, performed to the guidelines of NUREG-1575, included a historical site assessment (HSA); hydrogeological investigation; and measurements, samples and analyses to further define the present radiological conditions of the site. This effort also addressed the status of the site relative to non-radioactive contamination from hazardous and other state-regulated materials.

The final phase of decommissioning activities at BRP shall be conducted in accordance with the BRP Updated Final Hazards Summary Report (UFHSR), Defueled Technical Specifications, Entergy's Quality Assurance Program Manual, the existing 10 CFR Part 50 license, and the requirements of 10 CFR 50.82(a)(6) and (a)(7). If a decommissioning activity requires prior NRC approval under 10 CFR 50.59(c)(2) or a change to the BRP Defueled Technical Specifications or license, a submittal shall be made to the NRC for review and approval before implementation of the activity in question. Decommissioning activities are conducted in accordance with the BRP Defueled Technical Specifications, PSDAR, Radiation Protection Program, Off-Site Dose Calculation Manual (ODCM), and EN-IS-101, Industrial Safety and Health Program. These programs are established and available for inspection by the NRC.

Activities that will be conducted during the final phase of decommissioning will not pose any greater radiological or safety risk than those conducted during the initial phase of decommissioning. Radiological assessments of the Radiation Protection Program are performed annually pursuant to 10 CFR 20.1101(c). Radiological data compiled during the initial phase of decommissioning validated that Big Rock's PSDAR conclusion that projected dose for decommissioning fell well within NUREG-0586, *Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities* estimates [References 1-2 and 1-14] was accurate.

The initial site characterization, together with HSA and hydrogeological investigations, provided the basis for selection of the dose modeling scenarios and critical groups used to address possible future uses of the site. The computer code used for dose modeling calculated the Derived Concentration Guideline Levels (DCGLs) as approved in the LTP. Derived Concentration Guideline Levels correspond to a dose to the average member of the selected critical group that is as low as reasonably achievable (ALARA) and does not exceed the total effective dose equivalent (TEDE) 25 mrem/year criteria for unrestricted use (Chapter 4, *Site Remediation Plan*, and Chapter 6, *Compliance with the Radiological Criteria for License Termination*).

The letter from the U.S. Nuclear Regulatory Commission to Consumers Energy, Big Rock Point Plant, dated March 24, 2005, *Issuance of Amendment 126 to Approve the License Termination Plan* demonstrated that the NRC acknowledged the land area upon which the ISFSI was constructed was radiologically non-impacted. To validate the radiological status of the ISFSI land areas prior to construction of the ISFSI, radiological surveys were performed which confirmed the non-impacted radiological status of the land area. The ISFSI was then constructed and made operational. The spent fuel and Greater Than Class C waste was then transferred from the reactor containment building to the ISFSI in accordance with the requirements of the Radiation Protection Program maintaining the radiologically non-impacted status of the ISFSI. Due to the design of the spent fuel storage system with no designed effluent pathways, it is not anticipated that the ISFSI will become radiologically impacted during ISFSI operations, and therefore, no remediation will be required to terminate the license.

Entergy Palisades LLC intends to demolish the ISFSI pad structure and release the demolition debris to a State of Michigan licensed landfill.

1.4.2 Phased Release Approach to License Termination

At the time of the LTP submittal, Consumers Energy chose a phased release approach for release of land from the operating license as follows:

- First Phase – Release of the majority of the site land, including non-impacted and areas impacted by power generation activities (approximately 2.281 km² or 563.6 acres). The majority of the site land was released from the license on January 8, 2007 and,
- Final Phase – Release the portion of the site associated with ISFSI operations (approximately 0.1 km² or 20 acres).

The basis of approach for the final phase of decommissioning is that the ISFSI will be operated such that it would meet the criteria of NUREG-1757, "Consolidated Decommissioning Guidance Section 7.4 Group 2: Unrestricted Release Using Screening Criteria; No Decommissioning Plan Required."

NUREG-1757 provides the following:

"Group 2 facilities may have residual radiological contamination present in building surfaces and soils. However, licensees are able to demonstrate that their facilities meet the provisions of 10 CFR 20.1402 ("Radiological Criteria for Unrestricted Use") by applying the screening approach dose analysis described in Chapter 6.

Additionally, licensees in Group 2 typically possess historical records of material receipt, use, and disposal, such that quantifying past radiological material possession and use may be developed with a high degree of confidence. Furthermore, these licensees have radiological survey records that characterize the residual radiological contamination levels present within the facilities and at their sites. That is, they are able to demonstrate residual radiological contamination levels

without more sophisticated survey procedures (greater than those used for operational surveys) or dose modeling. These licensees do not need to use site-specific parameters or establish site-specific DCGLs in order to demonstrate acceptability for release of their sites.

For Group 2 facilities, a DP is not required, but licensees will have to demonstrate that the site meets the screening criteria assumptions described in Chapter 6. A DP is not required because worker cleanup activities and procedures are consistent with those approved for routine operations, and no dose analysis is required.”

Specific to the BRP ISFSI:

1. BRP has established site-specific DCGLs as approved with this LTP;
2. BRP maintains concise historical records from the time of construction of the ISFSI to the time of license termination that provide a high degree of confidence in the radiological status of the ISFSI and;
3. If contamination were to be identified, the cleanup activities will be consistent with the approaches previously approved in the LTP.

Upon completion of the decommissioning, a report will be prepared and submitted to the NRC summarizing surveys supporting the release of site land from the 10 CFR 50 license.

1.5 PLAN SUMMARY

Termination of the NRC license and environmental closure of the BRP site are closely related activities, completion of which will allow the site to be released for future unrestricted use. The initial phase of decommissioning restored the former plant areas to a “Greenfield” condition and the associated land areas were released from the license. The LTP describes the processes to be used for the final phase in meeting the requirements to terminate the NRC license.

Upon transfer of the spent fuel and Greater Than Class C waste material from the ISFSI, the ISFSI structure will be surveyed for unrestricted release and demolished. Buildings and structures not within the ISFSI protected area may remain on site.

1.5.1 General Information

This LTP has been prepared for BRP in accordance with 10 CFR 50.82(a)(9). The LTP is being maintained as a supplement to the BRP UFHSR to support the application for a license termination to meet 10 CFR 50.82(a)(9). Each of the chapters required by 10 CFR 50.82(a)(9) are outlined in the subsections below. Note all figures and references (listed in alphabetical order) are located at the end of the corresponding chapter.

1.5.2 Site Characterization

Chapter 2 of the LTP discusses the original site characterization as it applied to potential radiological and non-radiological material contamination onsite at the time of the LTP submittal.

Based upon the original site characterization and routine radiological surveys of the ISFSI from the beginning of ISFSI operations, the land upon which the ISFSI is located continues to be classified as non-impacted (Figure 1-2). If a condition arises that changes the radiological status of the ISFSI, the land area will be appropriately characterized in accordance with the methodology previously outlined in this LTP. Confirmation of the non-impacted status of the ISFSI area will be conducted when the spent fuel and Greater Than Class C waste is removed from the site.

1.5.3 Identification of Remaining Site Dismantlement Activities

Chapter 3 of the LTP discusses identification of remaining site dismantlement activities. Entergy Palisades LLC's primary goals are to maintain the safe storage of spent fuel until transfer to the Department of Energy (DOE), to decommission the BRP ISFSI safely, to monitor and control radiological hazards should they exist to maintain the radiological non-impacted status of the ISFSI land areas. The ISFSI will be surveyed for release and sent for disposal or recycled locally. Should there be contaminated material that cannot be decontaminated, it will be sent to an offsite radioactive waste processor or directly to a licensed low-level radioactive waste disposal site. Currently, Palisades Entergy LLC has access to low-level waste disposal facilities in Barnwell, South Carolina and Clive, Utah.

1.5.3.1 Future Decommissioning Activities and Tasks

The remaining decommissioning activities include transfer of the spent fuel and Greater Than Class C waste to the DOE, the survey and release of the concrete storage overpacks, ISFSI storage pad and cask transfer equipment; and the assessment of ISFSI operations history and radiological surveys to confirm the non-impacted status of the ISFSI land areas.

Entergy Palisades LLC continues to operate the ISFSI under a general license pursuant to 10 CFR Parts 50 and 72. Entergy Palisades LLC will amend this LTP if necessary to complete decommissioning of the ISFSI once the fuel is transferred to a permanent DOE storage facility.

1.5.4 Site Remediation Plans

Chapter 4 of the LTP describes the various methods to be used during the BRP ISFSI decommissioning to reduce the levels of radioactivity to those which meet the NRC radiological release criteria in 10 CFR 20.1402, *Radiological Criteria for Unrestricted Use*. BRP intends to release the site for unrestricted use upon license termination. No post-operations remediation activities are anticipated. As the ISFSI will be operated to maintain a radiological non-impacted status, remediation of ISFSI land areas will not be required.

1.5.5 Final Status Survey Plan

Chapter 5 of the LTP describes that the ISFSI is anticipated to remain non-radiologically impacted and that the final phase of decommissioning will not require a final status survey. If necessary, the methods previously established to be used in planning, designing, conducting, and evaluating final status surveys at BRP will be evaluated for use, as appropriate, to demonstrate the site meets the NRC's radiological criteria for unrestricted use as specified in 10 CFR 20.1402 (i.e., 25 mrem plus ALARA for all dose pathways). If a Final Status Survey Plan is necessary, it will follow the guidelines developed in NUREG-1575 as they apply to the BRP ISFSI site.

1.5.6 Compliance with the Radiological Criteria for License Termination

Chapter 6, together with Chapters 4 and 5, described the process to demonstrate compliance with the radiological criteria of 10 CFR 20.1402 for unrestricted future use of the BRP site. The goal of the BRP ISFSI is to release the site for unrestricted use in compliance with the NRC's dose limit of 25 mrem/year plus ALARA. The NRC dose limit applies to residual radioactivity that is distinguishable from background. Chapter 6 of the LTP provided the methods for calculating the annual dose from residual radioactivity that would remain when the power reactor and associated land areas were released for unrestricted use and the methods used to demonstrate compliance with the unrestricted use criteria.

Consumers Energy utilized accepted industry technical and computer codes to model dose from soils and groundwater and to develop associated DCGLs for submittal of the LTP. Derived Concentration Guideline Levels are the concentration radioactivity limits that were the basis for evaluating the results of the FSS used to release the power reactor and associated land areas from the license. The computer dose model utilized was a modified resident farmer scenario for site soils and groundwater using RESRAD version 6.21.

Chapters 4 and 5 have been revised to accomplish the final phase of decommissioning. Chapter 6 remains as approved by the NRC on March 24, 2005.

1.5.7 Update of Site-Specific Decommissioning Costs

In accordance with 10 CFR 50.82(9)(ii)(f), Chapter 7, *Update of Site-Specific Decommissioning Costs*, provides an updated, site-specific estimate of the remaining decommissioning costs. Regulatory Guide 1.179 provides guidance with respect to the information to be presented. The LTP must provide an estimate of the remaining decommissioning costs and compare the estimated costs with the present funds set aside for decommissioning. The financial assurance instrument required per 10 CFR 50.75 must be funded to the amount of the cost estimate [References 1-20 and 1-11]. If there is a deficit in present funding, the LTP must indicate the means for ensuring adequate funds to complete the decommissioning.

The cost estimate focuses on the remaining work, detailed by each activity associated with the decommissioning, including the costs of labor, materials, equipment, energy, and services. The decommissioning estimate includes a comparison of estimated costs with the present funds set aside for decommissioning and a description of the means to ensure there will be sufficient funds for completing decommissioning.

Entergy Palisades LLC owns a 100% undivided interest in the BRP ISFSI and provides financial assurance for decommissioning through the use of an external sinking fund, funded by rates that are established by cost of service ratemaking regulation. Following 35 years of electric power generation, BRP was voluntarily shut down by Consumers Energy on August 29, 1997, and immediately entered into decommissioning. In accordance with 10 CFR 50.82(a)(8)(iii), a detailed, site-specific cost estimate was prepared for Consumers Energy and docketed with the NRC in its submittal of the BRP PSDAR.

1.5.8 Supplement to the Environmental Report

Chapter 8, *Supplement to the Environmental Report*, satisfies the requirements stated in:

- 10 CFR 50.82(a)(9)(ii)(G)
A supplement to the Environmental Report pursuant to 10 CFR 51.53 shall be submitted describing any new information or significant environmental change associated with the licensee's proposed termination activities.
- 10 CFR 51.53(d)
Post operating license stage "... each applicant for a license amendment approving a license termination plan or decommissioning plan under paragraph 50.82 of this chapter either for unrestricted use or based on continuing use restrictions applicable to the site ... shall submit with its application the number of copies specified in paragraph 51.55, of a separate document, entitled "Supplement to Applicant's Environmental Report – Post Operating License Stage," which will update "Applicants Environmental Report – Operating License Stage," as appropriate, to reflect any new information or significant environmental change associated with the ... proposed activities with respect to the planned storage of spent fuel...."

Decommissioning activities will be accomplished with no significant adverse environmental impacts as described in Chapter 8. Decommissioning and license termination activities remain bounded by decommissioning activities described in:

- The PSDAR,
- NUREG-0586, *Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities (FGEIS)*, and
- NUREG-1496, *Generic Environmental Impact Statement in Support of Rulemaking on Radiological Criteria for License Termination on NRC Licensed Facilities* [Reference 1-15].

The BRP PSDAR was submitted to the NRC in accordance with 10 CFR 50.82 (a)(4)(i). In the PSDAR, Consumers Energy performed an environmental review to evaluate actual or potential environmental impacts associated with proposed decommissioning activities. This site-specific evaluation used NUREG-0586 guidance and concluded environmental impacts were bounded by NUREG-0586 criterion.

Consumers Energy did not prepare an Environmental Report during original construction permitting. (An Environmental Report was not required under the Atomic Energy Commission regulations at the time of original BRP licensing.) In 1994, Consumers Energy prepared an Environmental Report for Decommissioning in conjunction with the Decommissioning Plan. This report was updated to reflect current plant conditions and parameters and was incorporated by reference into the UFHSR and submitted to the NRC on September 18, 2002.

The purpose of Chapter 8 of the LTP is to revise the BRP Environmental Report with new information or significant environmental change associated with the final phase of decommissioning and license termination activities.

1.6 LICENSE TERMINATION PLAN CHANGE PROCESS

Consumers Energy submitted the LTP as a supplement to the UFHSR. Accordingly, the LTP has been updated in accordance with 10 CFR 50.71(e). Once the LTP had been approved, the following change criteria was used in addition to those criteria specified in 10 CFR 50.59, 10 CFR 72.48, 10 CFR 50.82(a)(6), and 10 CFR 50.82(a)(7). Changes to the LTP that require NRC approval prior to implementation include:

- Increasing the radionuclide-specific DCGLs or area factors (as discussed in Chapters 5 and 6);
- Increasing the probability of making a Type I decision error above the level stated in the LTP (discussed in Chapter 5);
- Increasing the investigation level thresholds for a given survey unit classification (as given in Chapter 5);
- Changing the classification of a survey unit from a more restrictive classification to a less restrictive classification (e.g., Class 1 to Class 2);
- Reducing the coverage requirements for scan measurements (as discussed in Chapter 5); or
- Using statistical tests other than the Sign Test for data evaluation (as discussed in Chapter 5).

License Amendment 126 to Facility Operation License DPR-6 for Big Rock Point to include conditions for the License Termination Plan was issued by the U.S. NRC on March 24, 2005 [Reference 1-11].

1.7 LICENSE TERMINATION PLAN INFORMATION CONTACT

For information or comments regarding the BRP LTP, please contact the following party:

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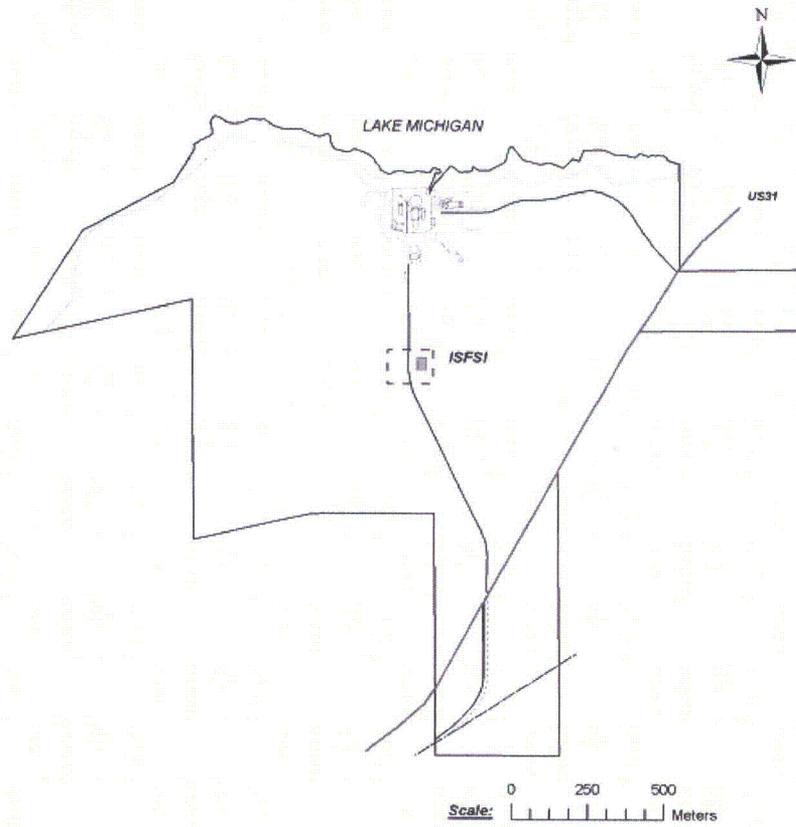


Figure 1-1. Big Rock Point ISFSI Location In Relation
To The Site Map At The Time Of LTP Submittal

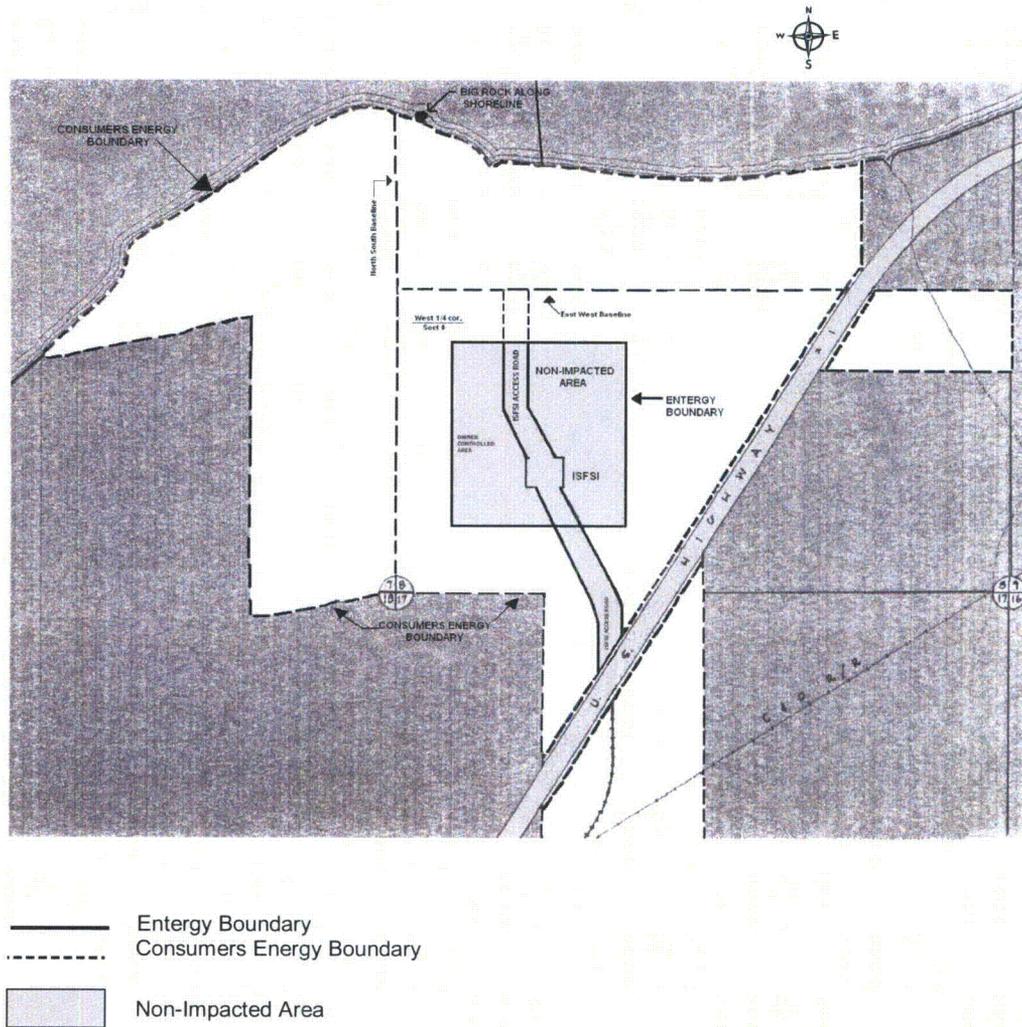


Figure 1-2. Big Rock Point ISFSI Non-Impacted Land Areas

1.8 REFERENCES

- 1-1 Big Rock Point Plant Facility Operating License (DPR-6) issued May 31, 1960 as amended January 13, 2000
- 1-2 Big Rock Point Plant Inter-Office Memorandum KEP 02-02, *Radiation Protection 2000 Program Review 10 CFR 20.1101*, from KEPallagi, RP&ES Manager to Self-Assessment File, February 19, 2002
- 1-3 Letter from Consumers Energy, Big Rock Point Plant to the U.S. Nuclear Regulatory Commission, *Decommissioning Plan and Environmental Report for the Decommissioning Plan for Big Rock Point Nuclear Plant*, February 27, 1995
- 1-4 Letter from Consumers Energy, Big Rock Point Plant to the U.S. Nuclear Regulatory Commission, *Documents Associated with Decommissioning (PSDAR, Rev. 1, ODCM, Defueled Technical Specifications, Defueled Emergency Plan, Emergency Plan Exemption)*, September 19, 1997
- 1-5 Letter from Consumers Energy, Big Rock Point Plant to the U.S. Nuclear Regulatory Commission, *Certification of Permanent Fuel Removal – Removed on September 20, 1997*, September 23, 1997
- 1-6 Letter from Consumers Energy, Big Rock Point Plant to the U.S. Nuclear Regulatory Commission, *Request for Approval of Proposed Disposal Procedures in Accordance with 10 CFR 20.2002*, May 18, 2001
- 1-7 Letter from Consumers Energy, Big Rock Point Plant to the U.S. Nuclear Regulatory Commission, *Request for Approval of Proposed Disposal Procedures in Accordance with 10 CFR 20.2002*, June 20, 2001
- 1-8 Letter from Consumers Energy, Big Rock Point Plant to the U.S. Nuclear Regulatory Commission, *Request for Approval of Proposed Disposal Procedures in Accordance with 10 CFR 20.2002*, September 15, 2004
- 1-9 Letter from Consumers Energy, Big Rock Point Plant to the U.S. Nuclear Regulatory Commission, *Documents Associated with Decommissioning (PSDAR, Rev. 1, ODCM, Defueled Technical Specifications, Defueled Emergency Plan, Emergency Plan Exemption)*, September 19, 1997
- 1-10 Letter from the U.S. Nuclear Regulatory Commission to Consumers Energy, Big Rock Point Plant, *Proposed Disposal Procedures in Accordance With 10 CFR 20.2002*, February 5, 2002
- 1-11 Letter from the U.S. Nuclear Regulatory Commission to Consumers Energy, Big Rock Point Plant, dated March 24, 2005, *Issuance of Amendment 126 to Approve the License Termination Plan*

- 1-12 Letter from the U.S. Nuclear Regulatory Commission to Consumers Energy, Big Rock Point Plant, dated January 19, 2005, *Approval of Proposed Revision to Disposal Procedures in Accordance with 10 CFR 20.2002*
- 1-13 U.S. Federal Register, Volume 66, Number 236, Friday, December 7, 2001, page 63567 (66 FR 63567) Consumers Energy Company; Big Rock Point Plant; Environmental Assessment and Finding of No Significant Impact
- 1-14 U.S. Nuclear Regulatory Commission NUREG-0586, *Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities*, August 1988
- 1-15 U.S. Nuclear Regulatory Commission NUREG-1496, *Generic Environmental Impact Statement in Support of Rulemaking on Radiological Criteria for License Termination on NRC Licensed Facilities*, July 1997
- 1-16 U.S. Nuclear Regulatory Commission NUREG-1575, *Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)*, December 1997
- 1-17 U.S. Nuclear Regulatory Commission NUREG-1700, *Standard Review Plan for Evaluating Nuclear Power Reactor License Termination Plans*, April 2000
- 1-18 U.S. Nuclear Regulatory Commission NUREG-1727, *NMSS Decommissioning Standard Review Plan*, September 2000
- 1-19 U.S. Nuclear Regulatory Commission NUREG-1757, *Consolidate NMSS Decommissioning Guidance*, September 2002
- 1-20 U.S. Nuclear Regulatory Commission Regulatory Guide 1.179, *Standard Format and Content of License Termination Plans for Nuclear Power Reactors*, January 1999

ENCLOSURE 2
(Continued)

**Big Rock Point License Termination Plan Revision 3
Replacement Pages**

Chapter 2 – SITE CHARACTERIZATION

No changes were made to this chapter as a result of Revision 3 to the LTP

Replace one page of Chapter 2 Revision 2

One Page Follows

This chapter was compiled in April 2003 and revised in July 2004 prior to LTP approval by the NRC. It remains a historical summary of plant operational and early decommissioning characterization data.

No changes were made to this chapter as a result of Revision 3 to the LTP

ENCLOSURE 2
(Continued)

**Big Rock Point License Termination Plan Revision 3
Replacement Pages**

Chapter 3 – IDENTIFICATION OF REMAINING SITE DISMANTLEMENT ACTIVITIES

Replace all pages of Chapter 3 Revision 2

Nine Pages Follow

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3.0 IDENTIFICATION OF REMAINING SITE DISMANTLEMENT ACTIVITIES

3.1 INTRODUCTION

In accordance with 10 CFR 50.82 (a)(9)(ii)(B), the License Termination Plan (LTP) must identify the major dismantlement and decontamination activities. This chapter was written following the guidance of NUREG-1700, *Standard Review Plan for Evaluating Nuclear Power Reactor License Termination Plans*, and Regulatory Guide 1.179, *Standard Format and Content of License Termination Plans for Nuclear Power Reactors*, and will discuss those remaining dismantlement activities as of April 6, 2007 [References 3-15 and 3-17]. Information is presented to demonstrate that these activities will be performed in accordance with 10 CFR Part 50 and will not be inimical to the common defense and security or to the health and safety of the public pursuant to 10 CFR 50.82(a)(10). Information that demonstrates that these activities will not have a significant effect on the quality of the environment is provided in LTP Chapter 8, *Supplement to the Environmental Report*.

Entergy Palisades LLC's primary goals are to maintain the continued safe storage of spent fuel at the Big Rock Point (BRP) Independent Spent Fuel Storage Installation (ISFSI) and to decommission the ISFSI safely after transfer of the spent fuel and Greater Than Class C (GTCC) waste. As of May 2, 2003, all spent nuclear fuel, special nuclear material, and Greater Than Class C waste material was relocated to the ISFSI from the spent fuel pool. Entergy Palisades LLC will decontaminate and dismantle the ISFSI facility in accordance with the DECON alternative, as described in NUREG-0586, *Final Generic Environmental Impact Statement (FGEIS)* [Reference 3-12].

Decommissioning activities at BRP shall be conducted as discussed in this LTP and in accordance with the Defueled Technical Specifications, Entergy Palisades LLC's Quality Assurance Program Manual (QAPM), the BRP 10 CFR Part 50 license, and the requirements of 10 CFR 50.82(a)(6) and (a)(7). If an activity requires prior NRC approval under 10 CFR 50.59(c)(2) or a change to the BRP Defueled Technical Specifications or license, a submittal shall be made to the NRC for review and approval before implementation of the activity in question.

Activities conducted during decommissioning will not pose any greater radiological or safety risk than those conducted during former plant operations. Decommissioning activity radiological risk is bounded by previously analyzed radiological risk for former operating activities that occurred during major maintenance and outage evolutions.

The activities described in Section 3.4 include future decommissioning activities of the ISFSI site. Table 3-1 contains a list of future decommissioning activities to be performed by Entergy Palisades LLC or its contractors.

3.2 DECOMMISSIONING OVERVIEW

Decommissioning activities for the former power reactor and associated land areas were initiated following the decision to permanently cease BRP power operations on August 29, 1997. At that time, BRP performed evaluations of major plant structures, systems, and components (SSCs) to determine what function, if any, these SSCs would be expected to perform during decommissioning. Each major plant SSC was evaluated to determine if the SSC, in its entirety or any portion thereof, was important for the safe storage of the spent fuel (ISSSF), was important for the monitoring and control of radiological hazards (IMCRH), or was needed to perform a function during the decommissioning and decontamination (D&D) of the plant.

Big Rock Point administrative procedures specify the standard methods of accomplishing plant activities and processes. They are the documents used to implement the requirements of the QAPM. This QAPM ensures that BRP complies with the requirements of 10 CFR 50, Appendix B for quality assurance. Examples of administrative processes controlled by procedures include: ALARA (as low as reasonably achievable) reviews, radiation protection (including airborne and contamination control), effluent and environmental monitoring, radioactive waste processing (including transportation and release requirements), safety programs, control of design basis (modification and work package procedures), and final status surveys.

A work control process is applied for decommissioning to document work performed and apply plant processes and controls to the activities. If a decommissioning activity requires NRC review pursuant to 10 CFR 50.59, an amendment to the BRP Defueled Technical Specifications (DTS) or license will be submitted. As of June 12, 2013, NRC review for BRP license amendments associated with decommissioning activities included the following:

- Amendment 120, December 24, 1998. Approval of the Defueled Technical Specifications (DTS).
- Amendment 121, January 13, 2000. Deletion of the definition of site boundary and removal of site map.
- Amendment 122, September 28, 2001. DTS reflected control of heavy loads, spent fuel handling considerations, and installation of a single-failure proof crane.
- Amendment 123, July 18, 2002. License was revised to include the approved ISFSI Security Plan reference.
- Amendment 124, September 11, 2002. Addition of Spent Fuel Pool applicability statements.
- Amendment 125, March 19, 2004. Issuance of Amendment Related to the Transfer of all Spent Fuel Storage from the Spent Fuel Pool into Dry Cask Storage.
- Amendment 126, March 24, 2005. Approval of the License Termination Plan.
- Amendment 127, April 11, 2007. Approval of Transfer of Facility Operating License No. DPR-06.

3.3 COMPLETED DECOMMISSIONING ACTIVITIES AND TASKS

3.3.1 Summary

Consumers Energy completed the first phase of decommissioning for the BRP power reactor and associated land areas with notification that the NRC approved release of this land from the BRP license on January 8, 2007 (Reference 3-20).

3.3.2 Description of Completed Activities

Consumers Energy completed decommissioning activities in accordance with the License Termination Plan as approved by Amendment 126 dated March 24, 2005, *Approval of the License Termination Plan*.

3.4 REMAINING DECOMMISSIONING ACTIVITIES

The focus of this section is on the demolition of the BRP ISFSI structures. Table 3-1 is a list of future decommissioning activities planned at the BRP ISFSI. The activities listed are intended to provide an overview of the remaining decommissioning activities and an estimated time schedule for those activities. There is no intent to revise this LTP when schedule changes occur. Schedules provided in this section are for general guidance and illustrative purposes only. Current schedules will be finalized upon notification by the Department of Energy of intent to receive the spent fuel and Greater Than Class C waste. The assumptions and philosophy of Entergy Palisades LLC for the remaining BRP demolition activities are as follows:

- General demolition activities are consistent with clean-to-dirty approach.
- Demolition activities in open areas involving structures with known or suspected contamination require radiological control and isolation to prevent cross- or re-contamination by air or water pathways.
- Excavated locations may remain open to support ongoing work.
- Groundwater and surface water control measures are required for all excavations where the potential exists for migration of radioactive or hazardous materials.
- Final Status Survey (FSS) will not be required for license termination.

Table 3-1. Remaining Decommissioning Activities

| Activity | Projected Date |
|--|-------------------------|
| Transport Fuel to DOE Repository | 1 st Quarter |
| Verify Radiological Non-Impacted Status of Facility | 1 st Quarter |
| NRC/ORISE Verification of Radiological Non-Impacted Status | 1 st Quarter |
| Demolish ISFSI Structures | 2 nd Quarter |
| Dispose of Demolition Debris | 2 nd Quarter |
| Terminate License | 3 rd Quarter |

3.4.1 Decontamination and Demolition of Structures

Entergy Palisades LLC intends to operate the BRP ISFSI such that it will maintain its radiological non-impacted status. Therefore, decontamination activities are not expected. Should minor diffuse contamination be identified, the standard industry decontamination methods including wiping, washing, vacuuming, scabbling, spalling, and abrasive blasting will be employed. Selection of the preferred method is based on the specific situation and appropriate radiological controls necessary to protect the workforce and environment, and to maintain the radiological non-impacted status of the ISFSI land areas. Structures or portions of structures that cannot be sufficiently decontaminated will be disposed of as radioactive waste. Approved administrative procedures and processes control decontamination activities. These controls ensure that wastewater is collected and airborne contamination controls are used, as necessary, and all releases are monitored.

3.4.1.1 Demolition Debris Disposal

Clean demolition debris will be disposed of at a State of Michigan licensed landfill. Any radiologically contaminated debris that may be generated will be disposed of at a facility licensed to receive radioactive waste.

3.5 CURRENT RADIOLOGICAL STATUS AND EXPOSURE ESTIMATES

3.5.1 Occupational Exposure

The cumulative occupational exposure for the first phase of decommissioning was less than the 700 to 1600 person-rem estimate of NUREG-0586, Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities [Reference 3-12]. The occupational exposure operating history for the BRP ISFSI since release from the license of the former power reactor and associated land areas is an average of 0 person-rem per year. The estimated total nuclear worker exposure for the remaining decommissioning activities is estimated to be less than 1 person-rem.

3.5.2 Public Exposure

Continued application of BRP's Radiation Safety Program, Radiological Effluent Technical Specification Program, and Radiological Environmental Monitoring Program assures public protection in accordance with 10 CFR Part 20 and 10 CFR Part 50, Appendix I. Environmental monitoring data provides that there has been no public exposure due to ISFSI operations. There is no expected public exposure expected due to the remaining decommissioning activities.

3.5.3 Estimate of Quantity of Radioactive Material to be Shipped for Disposal or Processing

Entergy Palisades, LLC intends to operate the BRP ISFSI such that it will maintain its radiological non-impacted status. Therefore, the estimate of the quantity of radioactive material to be shipped is 0 cubic feet.

3.5.4 Liquid Effluents Activity and Volume

The Annual Radioactive Effluent Release Report includes data on liquid effluents. A summary of the liquid waste effluent release report for 2007 through 2012 is provided in Table 3-2, below.

Table 3-2. Liquid Effluent Release Summary

| Year | Tritium Release Ci | Dissolved and Entrained Gas Release Ci | Alpha Release Ci | Other Fission and Activation Product Release Ci | Waste Volume Liters | Volume of Dilution Water Liters | Max. Dose Commitment Whole Body mrem | Max Dose Commitment Organ mrem |
|------|--------------------|--|------------------|---|---------------------|---------------------------------|--------------------------------------|--------------------------------|
| 2007 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2008 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2009 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2010 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2011 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2012 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

3.5.5 Gaseous Effluents Activity and Volume

Radioactive Effluent Release Reports includes data on gaseous effluents. A summary of the liquid waste effluent release report for 2007 through 2012 is provided in Table 3-3 below.

Table 3-3. Gaseous Effluent Release Summary

| Year | Fission and Activation Gas Release Ci | Iodines Ci | Particulates Ci | Tritium Ci | Whole Body Dose, β mrad | Whole Body Dose, γ mrad | Organ Dose mrem |
|------|---------------------------------------|------------|-----------------|------------|-------------------------------|--------------------------------|-----------------|
| 2007 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2008 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2009 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2010 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2011 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2012 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

3.6 COORDINATION WITH OUTSIDE ENTITIES

The decommissioning and termination of the BRP 10 CFR Part 50 license involves coordination with various Federal, State, and local agencies, including the:

- U.S. NRC,
- State of Michigan Occupational Safety and Health Administration,
- U.S. Environmental Protection Agency,
- Michigan Department of Environmental Quality,

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- State Historic Preservation Office,
- State Fire Marshall,
- U.S. Department of Energy, and
- Local law enforcement agencies.

Chapter 8 of this LTP provides a detailed discussion of Federal, State, and local requirements.

3.7 REFERENCES

- 3-1 Big Rock Point Decommissioning Administrative Procedure, Volume 1, D3.1, Decommissioning Work Packages
- 3-2 Big Rock Point Decommissioning Administrative Procedure, Volume 1, D3.1.3, Milestone Work Packages
- 3-3 Big Rock Point Defueled Technical Specifications, Volume 2
- 3-4 Big Rock Point Post Shutdown Decommissioning Activities Report (PSDAR), Revision 2, March 26, 1998
- 3-5 Big Rock Point Updated Final Hazards Summary Report (UFHSR), Revision 10, September 18, 2002
- 3-6 Consumers Energy Quality Program Description for Nuclear Power Plants, (CPC-2A) (Part 1) – Big Rock Point
- 3-7 Letter from Consumers Energy, Big Rock Point to U.S. Nuclear Regulatory Commission, *Request for Approval of Proposed Disposal Procedures in Accordance with 10 CFR 20.2002*, May 18, 2001
- 3-8 Letter from Consumers Energy, Big Rock Point to U.S. Nuclear Regulatory Commission, *Request for Approval of Proposed Disposal Procedures in Accordance with 10 CFR 20.2002*, June 20, 2001
- 3-9 Letter from U.S. Nuclear Regulatory Commission to Consumers Energy, Big Rock Point, *Environmental Assessment and Finding of No Significant Impact Related to Request for Approval of Proposed Disposal Procedures in Accordance with 10 CFR 20.2002*, December 3, 2001
- 3-10 Letter from U.S. Nuclear Regulatory Commission to Consumers Energy, Big Rock Point, *Proposed Disposal Procedures in Accordance with 10 CFR 20.2002 (TAC NO. MB1463)*, February 5, 2002
- 3-11 U.S. Nuclear Regulatory Commission NUREG-0554, *Single-Failure-Proof Cranes for Nuclear Power Plants*, January 1979
- 3-12 U.S. Nuclear Regulatory Commission NUREG-0586, *Final Generic Environmental Impact Statement (FGEIS) on Decommissioning of Nuclear Facilities*, August 1998
- 3-13 U.S. Nuclear Regulatory Commission NUREG-0586, Supplement 1, *Generic Environmental Impact Statement (GEIS) on Decommissioning of Nuclear Facilities*, October 2002
- 3-14 U.S. Nuclear Regulatory Commission NUREG-0612, *Control of Heavy Loads at Nuclear Plants*, July 1980

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- 3-15 U.S. Nuclear Regulatory Commission NUREG-1700, *Standard Review Plan for Evaluating Nuclear Power Reactor License Termination Plans*, April 2000
- 3-16 U.S. Nuclear Regulatory Commission Regulatory Guide 1.16, *Reporting of Operating Information – Appendix A, Technical Specifications*, August 1975
- 3-17 U.S. Nuclear Regulatory Commission Regulatory Guide 1.179, *Standard Format and Content of License Termination Plans for Power Reactors*, January 1999
- 3-18 Letter from Consumers Energy, Big Rock Point to U.S. Nuclear Regulatory Commission, *Request for Approval of Proposed Disposal Procedures in Accordance with 10 CFR 20.2002*, September 15, 2004
- 3-19 Letter from U.S. Nuclear Regulatory Commission to Consumers Energy, Big Rock Point, *Approval of Proposed Revision to Disposal Procedures in Accordance with 10 CFR 20.2002 (TAC No. L52096)*, January 19, 2005
- 3-20 Letter from U.S. Nuclear Regulatory Commission to Consumers Energy, *Big Rock Point - Release of Land from Part 50 License for Unrestricted Use*, January 8, 2007

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4.0 SITE REMEDIATION PLAN

4.1 INTRODUCTION

This section of the License Termination Plan (LTP) previously described the remediation actions used in the decommissioning of the Big Rock Point (BRP) power reactor and associated land areas. Remediation was performed under the Radiation Protection Program in a manner that assured both worker and environmental doses were ALARA. Subsequently, the power reactor facility and associated land areas were released from the NRC license on January 8, 2007.

4.2 REMEDIATION ACTIONS

NUREG-1700, *Standard Review Plan for Evaluating Nuclear Power Reactor License Termination Plans*, guidance for the content of LTP Chapter 4 calls for discussion of activities involving remediation of all structures with residual radioactivity levels in excess of unrestricted use limits [Reference 4-4].

Prior to construction of the ISFSI, radiological surveys were performed to confirm the non-impacted status of the ISFSI land area. The ISFSI was then constructed and made operational. The spent fuel and Greater Than Class C (GTCC) waste was then transferred from the reactor containment building to the ISFSI in accordance with the requirements of the Radiation Protection Program maintaining the radiologically non-impacted status of the ISFSI. Due to the design of the spent fuel storage system with no designed effluent pathways, it is not anticipated that the ISFSI will become radiologically impacted during ISFSI operations, thus it is anticipated that remediation will not be necessary to release the site from the NRC license.

Quarterly radiological surveys are performed to confirm the non-impacted status of the ISFSI. The radiological surveys are available for routine inspection by the NRC.

4.2.1 Structures, Systems and Components

All equipment, components and structures associated with the ISFSI will be surveyed for radiological unrestricted release.

Due in part to the radiological controls in place at the time the spent fuel casks were loaded and transferred and the design of the storage system which minimizes exposure to the environment, it is not anticipated that contamination exists on the interior surfaces of the concrete storage casks. The radiological surveys performed on a routine frequency continue to confirm the non-impacted status of the ISFSI. If contamination is identified on the interior surface of the concrete storage casks they will be decontaminated and surveyed for radiological unrestricted release. Radiological surveys and an evaluation will be completed to determine if the contamination on the interior of the concrete storage casks have changed the non-impacted status of the ISFSI land areas.

4.2.2 Soil and Water

Remediation of soil and water was performed under the Radiation Protection Program for the power reactor facility and associated land areas and those areas were released from the NRC License on January 8, 2007.

The FuelSolutions™ W74 Canister Storage Final Safety Analysis Report, Chapter 7, Confinement, provides that confinement of all radioactive materials in the FuelSolutions™ Storage System is provided by a FuelSolutions™ canister. The design of the FuelSolutions™ W74 canister confinement boundary assures that there are no credible design basis events that would result in a radiological release to the environment. Therefore, it is not anticipated that the ISFSI land and groundwater will become radiologically impacted during ISFSI operations, thus it is anticipated that remediation will not be necessary to release the site from the NRC License.

4.3 REMEDIATION ACTIVITY IMPACT ON THE RADIATION PROTECTION PROGRAM

With no soil or groundwater remediation anticipated for the ISFSI, there will be no impact on the Radiation Protection Program

4.3.1 Commitment to Radiation Protection Procedures

Big Rock Point intends to continue under its Part 50 license throughout the final phase of the decommissioning process. Radiation Protection procedures are required under the Defueled Technical Specifications for implementation of the requirements of 10 CFR 20.

The Radiation Protection Program and procedures developed and utilized during plant operation were revised to be utilized for the protection of ISFSI and contract personnel, and for protection of the environment during ISFSI operations. Changes and additions to these procedures, to improve applicability to specific circumstances during the decommissioning process, are made under ISFSI administrative controls that include appropriate reviews and approvals. Training and instructions provided to ISFSI and contract workers follow the requirements of 10 CFR 19.12, and reports of personnel exposure are provided pursuant to the applicable sections of 10 CFR Parts 19 and 20. The requirements of these regulations were implemented by means of plant procedures.

4.4 ALARA EVALUATION

NUREG-1727, NMSS Decommissioning Standard Review Plan, Appendix D, ALARA Analyses introduction provides the following:

"In addition, if residual radioactivity cannot be detected, it may be assumed that it has been reduced to levels that are ALARA. Therefore, the licensee does not need to conduct an explicit analysis to meet the ALARA requirement."

As previously described, the ISFSI was constructed on a non-impacted area of the site and it is anticipated that the ISFSI will not become radiologically impacted from

ISFSI operations. It is anticipated there will not be residual radioactivity; therefore, none will be detected. As such, an explicit analysis to meet ALARA requirements for the ISFSI need not be conducted.

4.5 REFERENCES

- 4-1 Big Rock Point Offsite Dose Calculation Manual, Volume 25A, Section I, *Procedural and Surveillance Requirements*, (Relocated Technical Specifications)
- 4-2 U.S. Nuclear Regulatory Commission NUREG-1575, *Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)*, August 2000
- 4-3 U.S. Nuclear Regulatory Commission NUREG-1727, *Decommissioning Standard Review Plan*
- 4-4 U.S. Nuclear Regulatory Commission NUREG-1700, *Standard Review Plan for Evaluating Nuclear Power Reactor License Termination Plans*, April 2000
- 4-5 Letter from U.S. Nuclear Regulatory Commission to Consumers Energy, *Big Rock Point - Release of Land from Part 50 License for Unrestricted Use*, January 8, 2007

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5.0 FINAL STATUS SURVEY PLAN

5.1 INTRODUCTION

The Big Rock Point (BRP) Final Status Survey (FSS) Plan was prepared for the initial phase of decommissioning using the applicable regulatory and industry guidance. The plan was used to develop the site procedures and work instruction used to perform the FSS of the BRP site.

5.1.1 Purpose

The initial phase of the decommissioning FSS Plan described the final survey process used to demonstrate that the BRP site complied with radiological criteria for unrestricted use specified in 10 CFR 20.1402, i.e., annual dose limit of 25 mrem plus ALARA for all dose pathways. Nuclear Regulatory Commission (NRC) regulations applicable to radiation surveys are found in 10 CFR 50.82(a)(9)(ii)(D) and 10 CFR 20.1501(a) and (b).

5.1.2 Scope

Big Rock Point has been approved to release the site land using a phased approach. The first phase included the majority of the site land which was released from the NRC License. The second and final phase of site release includes the independent Spent Fuel Storage Installation (ISFSI) following spent fuel removal and facility dismantlement. Once both these phases are complete the BRP site license under 10 CFR Part 50 will be terminated. It is possible that release of non-impacted portions of the site could occur prior to completing demolition activities, should Entergy Palisades LLC management decide accordingly.

The FuelSolutions™ W74 Canister Storage Final Safety Analysis Report, Chapter 7, Confinement, provides that confinement of all radioactive materials in the FuelSolutions™ Storage System is provided by a FuelSolutions™ canister. The design of the FuelSolutions™ W74 canister confinement boundary assures that there are no credible design basis events that would result in a radiological release to the environment.

Due to the design of the spent fuel storage system with no designed effluent pathways it is not anticipated that the ISFSI will become radiologically impacted during ISFSI operations, thus it is anticipated that remediation and FSS will not be necessary to release the site from the NRC License.

Therefore, the basis approach for the final phase of decommissioning is that the ISFSI will be operated such that it would meet the criteria of NUREG-1757, "Consolidated Decommissioning Guidance, Section 7.4, Group 2: Unrestricted Release Using Screening Criteria; No Decommissioning Plan Required."

5.2 REFERENCES

- 5-1 Letter from U.S. Nuclear Regulatory Commission to Consumers Energy, *Big Rock Point - Release of Land from Part 50 License for Unrestricted Use*, January 8, 2007

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**Chapter 6 – COMPLIANCE WITH THE RADIOLOGICAL CRITERIA FOR LICENSE
TERMINATION**

No changes were made to this chapter as a result of Revision 3 to the LTP

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This chapter provides the basis for the dose models used to develop site-specific DCGLs as approved by the NRC on Mach 24, 2005.

No changes were made to this chapter as a result of Revision 3 to the LTP.

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7.0 UPDATE OF SITE-SPECIFIC DECOMMISSIONING COSTS

7.1 INTRODUCTION

In accordance with 10 CFR 50.82(a)(9)(ii)(F), Regulatory Guide 1.179, *Standard Format and Content of License Termination Plans for Nuclear Power Plants*, and 10 CFR 72.30, *Financial Assurance and Recordkeeping for Decommissioning*, the site-specific cost estimate and funding plans are provided in this chapter.

The License Termination Plan (LTP) must:

Provide an estimate of the remaining decommissioning costs and compare the estimated costs with the present funds set aside for decommissioning. The financial assurance instrument required per 10 CFR 72.30(e)(2) must be funded to the amount of the cost estimate. If there is a deficit in present funding, the LTP must indicate the means for ensuring adequate funds to complete the decommissioning.

The decommissioning cost estimate should include an evaluation of the proposed practices and procedures for the decontamination of the site and facilities, and for disposal of residual radioactive materials after all spent fuel, high-level radioactive waste, and reactor-related Greater Than Class C (GTCC) waste have been removed in order to provide reasonable assurance that the decontamination and decommissioning of the ISFSI at the end of its useful life will provide adequate protection to the health and safety of the public.

Entergy Nuclear Palisades, LLC owns a 100% undivided interest in the Big Rock Point (BRP) Independent Spent Fuel Storage Installation (ISFSI) and provides financial assurance for decommissioning through the use of a Parent Company Guarantee.

Following 35 years of electric power generation, BRP was voluntarily shut down by Consumers Energy on August 29, 1997, and immediately entered into decommissioning. In accordance with 10 CFR 50.82(a)(8)(iii), a detailed site-specific cost estimate was prepared by TLG Services for Consumers Energy and docketed with the NRC in its submittal of the BRP Post Shutdown Decommissioning Activities Report (PSDAR) [References 7-2 and 7-1]. Pursuant to State of Michigan requirements to prepare and file decommissioning cost estimate updates with the Michigan Public Service Commission (MPSC) at three-year intervals, an estimate update was prepared by TLG Services in 2000 and filed in March 2001 as a follow-up to a site-specific decommissioning cost estimate filed with the MPSC in March 1998 [References 7-2 and 7-3]. Since the submittal of the LTP, Consumers Energy, in compliance with State of Michigan requirements, contracted TLG Services to prepare an estimate update in 2003. This update was filed with the MPSC in March 2004, and served as the cost basis for Revision 2 of the LTP [Reference 7-4].

Consumers Energy completed the first phase of decommissioning and subsequently received NRC approval to release from the license the power reactor and associated land areas. The NRC license for the BRP ISFSI and associated land areas was subsequently transferred to Entergy Nuclear Palisades, LLC. This revision to the LTP contains the updated decommissioning cost estimate for the final phase of

decommissioning as provided in the letter (ENOC-12-00039) from Entergy Nuclear Operations, Inc. to the U.S. Nuclear Regulatory Commission – *ISFSI Decommissioning Funding Plans (10 CFR 72.30)*, December 13, 2012.

7.2 DECOMMISSIONING COST ESTIMATE

7.2.1 Cost Estimate Description and Methodology

The methodology used to develop the cost estimate is as described in 10 CFR 72.30(c). The estimate considers (1) Spills of radioactive material producing additional residual radioactivity in on site subsurface material; (2) Facility modifications; (3) Changes in authorized possession limits; and (4) Actual remediation costs that exceed the previous cost estimate.

Table 7-1, Significant Quantities and Physical Dimensions provides the estimates of the total radioactive waste and clean debris based upon the following key assumptions:

- Decommissioning estimate is based on the current configuration of the ISFSI.
- Due to the design of the storage system, no radioactive surface contamination is expected.
- Two of the seven spent fuel overpacks contain low levels of neutron-induced residual radioactivity that would necessitate remediation.
- A small portion of the ISFSI pad (directly underneath the two overpacks) will be activated to a level that would require remediation.
- Prior to ISFSI pad construction, the existing soils and imported fill soils were verified to be radiologically non-impacted.
- Low-level radioactive waste disposal costs are based upon Entergy's negotiated rates.
- Decommissioning will be performed by an independent contractor.
- Contingency has been added at an overall rate of 25% consistent with the contingency evaluation criteria referenced in NUREG-1757.

Table 7-1. Significant Quantities and Physical Dimensions

ISFSI PAD

| Item | Length (ft) | Width (ft) | Residual Radioactivity |
|-----------|-------------|------------|------------------------|
| ISFSI Pad | 99 | 75 | No |

ISFSI STORAGE OVERPACK

| Item | Value | Notes |
|--|-------|--|
| Overall Height (inches) | 220 | Dimensions are nominal |
| Outside Diameter (inches) | 138 | Dimensions are nominal |
| Inside Diameter (inches) | 73 | Dimensions are nominal |
| Inner Liner Thickness (inches) | 2.0 | Dimensions are nominal |
| Quantity (total) | 8 | 7 Spent Fuel + 1 GTCC |
| Quantity (with residual radioactivity) | 2 | Equivalent to the number of overpacks used to store last complete core offload |
| Total Surface Area of Overpack Liner with Residual Radioactivity (square feet) | 648 | |
| Low-Level Radioactive Waste (cubic feet) | 1,282 | |
| Low-Level Radioactive Waste (packaged density) | 84 | Average weight density |

OTHER POTENTIALLY IMPACTED ITEMS

| Item | Value | Notes |
|---|-------|---------------------------|
| Number of Overpacks Used for GTCC Storage | 1 | No residual radioactivity |

7.2.2 Summary of the Site-Specific Decommissioning Cost Estimate

Table 7-2, ISFSI Decommissioning Costs and Waste Volumes provides the site-specific cost estimate with the 25% contingency.

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Table 7-2. ISFSI Decommissioning Costs and Waste Volumes

| | Costs (thousands, 2012 dollars) | | | | | | Waste Volume (ft3) | Person-Hours | | |
|---|------------------------------------|-----------|-----------|----------|-------|-------|--------------------------|--------------|----------|-------------------------|
| | Removal | Packaging | Transport | Disposal | Other | Total | | Contractor | Licensee | NRC / NRC Contractor |
| Decommissioning Contractor | | | | | | | | | | |
| Planning (characterization, specs and procedures) | - | - | - | - | 146 | 146 | - | 928 | - | - |
| Decontamination/Demolition (activated liner removal) | 13 | 4 | 27 | 72 | 53 | 170 | 1,282 | 116 | - | - |
| License Termination (radiological surveys) | - | - | - | - | 446 | 446 | - | 3,574 | - | - |
| Subtotal | 13 | 4 | 27 | 72 | 645 | 762 | 1,282 | 4,618 | - | - |
| Supporting Costs | | | | | | | | | | |
| NRC and NRC Contractor Fees and Costs | - | - | - | - | 209 | 209 | - | - | - | 776 |
| Insurance | - | - | - | - | 34 | 34 | - | - | - | - |
| Security (industrial) | - | - | - | - | 94 | 94 | - | 2,479 | - | - |
| Entergy Oversight Staff | - | - | - | - | 141 | 141 | - | - | 1,881 | - |
| Subtotal | - | - | - | - | 478 | 478 | - | 2,479 | 1,881 | 776 |
| Total (w/o contingency) | 13 | 4 | 27 | 72 | 1,123 | 1,240 | 1,282 | 7,097 | 1,881 | 776 |
| Total (w/25% contingency) | 16 | 6 | 34 | 91 | 1,404 | 1,550 | - | - | - | - |

7.2.3 Spent Fuel Management

Completion of the BRP final phase of decommissioning is dependent upon the DOE's ability to remove spent fuel from the site. Until that time, Entergy Nuclear Palisades, LLC will continue to operate the ISFSI, which was constructed for interim storage of the spent fuel, in accordance with license requirements.

Similar to non-radiological site restoration costs, Entergy Nuclear Palisades, LLC recognizes that the costs to operate an ISFSI and other spent fuel related costs fall outside the NRC definition of decommissioning. Therefore, those costs are not included within the estimates provided herein.

7.3 DECOMMISSIONING FUNDING PLAN

Entergy Nuclear Operations, Inc., in compliance with 10 CFR 72.30(e)(2) [Reference 7-5], provides financial assurance for the decommissioning of the BRP ISFSI through the use of a Parent Company Guarantee.

As demonstrated in their recent submittal of the Financial Test for Decommissioning Funding Parent Guarantee, Entergy Nuclear Operations, Inc. [Reference 7-6] provides decommissioning assurance in the amount of \$5 million for the NRC radiological decommissioning costs.

7.4 REFERENCES

- 7-1 Big Rock Point Post Shutdown Decommissioning Activities Report (PSDAR), Revision 2, March 26, 1998
- 7-2 TLG Services, Inc., Decommissioning Cost Study for the Big Rock Point Nuclear Plant, March 26, 1998
- 7-3 TLG Services, Inc., Decommissioning Cost Study for the Big Rock Point Nuclear Plant, March 22, 2001
- 7-4 TLG Services, Inc., Decommissioning Cost Update for the Big Rock Point Nuclear Plant, March 22, 2004
- 7-5 Letter (ENOC-12-00039) from Entergy Nuclear Operations, Inc. to the U.S. Nuclear Regulatory Commission – *ISFSI Decommissioning Funding Plans (10 CFR 72.30)*, December 13, 2012
- 7-6 Letter (ENOC-13-00009) from Entergy Nuclear Operations, Inc. to the U.S. Nuclear Regulatory Commission – *Financial Test for Decommissioning Funding Parent Guarantee for the year ending December 31, 2012*, March 29, 2013

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8.0 SUPPLEMENT TO THE ENVIRONMENTAL REPORT

8.1 INTRODUCTION AND PURPOSE

8.1.1 Purpose

The purpose of this section of the License Termination Plan (LTP) is to retain pertinent information for the final phase of decommissioning from this NRC approved LTP [Reference 8-39] and the updated Environmental Report (ER) which covered the first phase of decommissioning for Big Rock Point (BRP) with the information and significant environmental change associated with the site's decommissioning and license termination activities. This section of the LTP is pursuant to 10 CFR 51.53(d) and 10 CFR 50.82(a)(9)(ii)(G).

The information contained in this chapter generally follows the Nuclear Regulatory Commission (NRC) guidance of Regulatory Guide 1.179, *Standard Format and Content of License Termination Plans for Nuclear Power Reactors*, dated January 1999 and NUREG-1700, *Standard Review Plan for Evaluation Nuclear Power Reactor License Termination Plans*, dated April 2000. The contents of this section have also been reviewed against the appropriate sections of NUREG-1727, *NMSS Decommissioning Standard Review Plan*, dated September 2000. Much of the information in this document has also been provided to the NRC in other forms, e.g., Updated Final Hazards Summary Report (UFHSR). Guidance contained in Supplement 1 to NUREG-0586, *Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities* (GEIS), was also utilized during preparation of this chapter [Reference 8-33].

8.1.2 Background

At the time the BRP Nuclear Plant was licensed for construction in 1960, the Atomic Energy Commission (AEC; NRC predecessor) regulations did not require submittal of an environmental report. Since this time-frame was prior to promulgation of the National Environmental Policy Act of 1969, the AEC was not required to issue an Environmental Impact Statement (EIS) for BRP. However, much of the information typically contained in an environmental report was available for the AEC's review within BRP's original Final Hazards Summary Report (FHSR) at the time of licensing [Reference 8-9].

In 1993, BRP initiated a decommissioning study to prepare a Decommissioning Plan in accordance with 10 CFR 50.82(a) for submittal to the NRC. During this decommissioning study, it was recognized BRP had never submitted an environmental report as part of the site's original licensing basis documents. In February 1995, BRP submitted to the NRC a Decommissioning Plan and also a companion environmental report for decommissioning the BRP site [Reference 8-21]. This ER for decommissioning concluded the SAFSTOR option selected by the decommissioning study was bounded by NUREG-0586, *Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities* (FGEIS) [References 8-6 and 8-32]. The SAFSTOR option was chosen at this time due to the

unavailability of a low-level radioactive waste disposal site to licensees in the State of Michigan.

In July 1995, the NRC proposed to amend its regulations related to decommissioning nuclear power reactors. In February 1996, BRP requested the NRC delay completion of its review of the BRP Decommissioning Plan to allow Consumers Power Company¹ to assess the effect of the proposed regulations on the decommissioning of BRP [Reference 8-22]. The revised decommissioning regulations were finalized in August 1996 and included a provision that a previously submitted Decommissioning Plan be considered to be equivalent to a Post Shutdown Decommissioning Activities Report (PSDAR) required under 10 CFR 50.82(a)(4). In September 1996, Consumers Power Co. reached an agreement with the NRC that the BRP Decommissioning Plan was to be considered as the site's PSDAR and that this Decommissioning Plan be appended to the BRP UFHSR [Reference 8-23].

Following permanent cessation of plant operations in August 1997, BRP submitted a revision to its PSDAR stating that immediate dismantlement (DECON option) would begin since a low-level radioactive waste burial site was now available [References 8-24 and 8-11]. This revision to the PSDAR was structured in accordance with the new decommissioning rule and superseded the previously submitted Decommissioning Plan (Rev 0 of the PSDAR). Due to the revision to decommissioning regulations and subsequent revision to the PSDAR to utilize the DECON option, the BRP Decommissioning Plan and corresponding ER for Decommissioning were never formally reviewed by the NRC and a Safety Evaluation Report (SER) was never generated for these documents. Big Rock Point did not rescind its original ER for decommissioning because it was determined by site personnel that this document was still required by 10 CFR 50.82(a)(4)(i).

During review of revisions to the 10 CFR 50.59 and 50.82 processes, BRP personnel determined that an ER was required to perform both 10 CFR 50.59 and 50.82 evaluations. Subsequently, the site's ER for decommissioning was revised and incorporated by reference into the BRP UFHSR [Reference 8-17]. This revised ER for decommissioning concluded the DECON option and immediate dismantlement currently supported by the site's PSDAR is within the bounds of NUREG-0586.

The BRP power reactor and facilities were subsequently dismantled and the power reactor site and associated land areas were returned to the "Greenfield" condition described in Section 8.2. The BRP power reactor and associated land areas were released from the NRC license on January 8, 2007.

8.1.3 Site Description After Unrestricted Release

A summary description of the site following license termination and unrestricted release is provided in Section 8.2. All above-grade and below-grade structures, equipment and foundations were demolished and the resulting demolition debris was disposed of offsite at either a low-level radioactive waste facility or a State of Michigan licensed industrial waste landfill. The building foundation excavations were

¹ Prior to 1998 Consumers Energy Company's legal name was Consumers Power Company.

backfilled with local soil fill material following remediation and final status survey activities.

8.1.4 PSDAR Update for Remaining Dismantlement and Decontamination Activities

Big Rock Point LTP, Chapter 3, *Identification of Remaining Site Dismantlement Activities*, identifies the remaining dismantlement activities of the Independent Spent Fuel Storage Installation (ISFSI), which are scheduled to be completed prior to license termination and unrestricted release. These activities are compared to the descriptions provided in the PSDAR and any changes identified. The impacts of changes to these activities are described in Section 8.3.

8.1.5 Summary and Update of Big Rock Point Environmental Report

The BRP ER, originally developed for decommissioning (see Section 8.1.2), was used as the basis to prepare the supplement to the ER. At the time of the LTP submittal, a review of the BRP ER was performed to identify any relevant new information or significant environmental changes to the report. Guidance contained in Supplement 1 to NUREG-0586 was reviewed to determine the nature of any new information to be included in this section. A summary of information in the BRP ER is contained in Section 8.4.

8.1.6 Environmental Effects of Decommissioning

A description of both the radiological and non-radiological environmental effects of the final phase of decommissioning is provided in Section 8.5. Radiological impacts reviewed include evaluations of occupational and public doses, decommissioning accidents, low-level waste (LLW) generation, transportation and disposal, and adherence to radiological criteria for license termination. The non-radiological effects include potential impacts governed by federal (other than the NRC), state and local regulations. NUREG-0586 GEIS, Supplement 1, was utilized as guidance in evaluating the non-radiological effects of decommissioning. New information is provided concerning the decommissioning impacts on socio-economic, cultural, historical, archeological, and environmental justice considerations.

8.1.7 Overview of Regulations Governing Decommissioning and Final Site Release

Section 8.6 provides a summary of federal, state and local regulations governing decommissioning of BRP and final site release of the property.

8.1.8 Summary and Conclusions

The development of information contained in the various sections of this LTP has resulted in defining additional detail regarding the evolution of planned decommissioning activities. New or relevant information and significant environmental changes were reviewed against the existing BRP PSDAR, the BRP ER, and against NUREG-0586 (GEIS) criteria to determine if the conclusions reached in these documents are still valid for decommissioning and license

termination activities planned at BRP. This additional information forms the basis for the conclusions provided in Section 8.7.

8.2 SITE DESCRIPTION AFTER UNRESTRICTED RELEASE

This section presents a summary of the final condition of the site at the conclusion of the final phase of decommissioning and license termination activities.

At the time of license termination, the site will meet the radiological criteria for unrestricted release as defined in 10 CFR 20.1402, in addition to applicable State of Michigan criteria for release of the site.

The only site buildings now in existence were constructed to support Dry Fuel Storage. These buildings have associated utilities (electric, phone, sanitary) which were installed to support the ISFSI. The BRP ISFSI will be demolished and Entergy Nuclear Palisades, LLC will determine the disposition of the support buildings and utilities at the time of final phase dismantlement. Entergy Nuclear Palisades, LLC will determine the use of the ISFSI and associated land areas after license termination.

Consumers Energy retains ownership of the former power reactor and associated land areas and will determine the future use of that site.

8.3 PSDAR UPDATE FOR REMAINING DISMANTLEMENT AND DECONTAMINATION ACTIVITIES

The License Termination Plan, Chapter 3 identifies and details the remaining final phase dismantlement activities that are scheduled to be completed in support of license termination and unrestricted release. These activities have been compared to the descriptions provided in the PSDAR with no changes identified.

8.3.1 Post-Shutdown Decommissioning Activities Report Description

The BRP PSDAR was submitted to the NRC under the provisions of 10 CFR 50.82(a)(7). The PSDAR described planned decommissioning activities, a schedule for their accomplishment, estimate of expected decommissioning costs, and provided the basis for concluding the environmental impacts associated with site-specific decommissioning activities will be in compliance with 10 CFR 50.82(a)(6)(ii) [Reference 8-12]. Consumers Energy Co. dismantled the BRP power reactor and associated land areas in accordance with the DECON option found acceptable to the NRC in its FGEIS.

8.3.2 Impacts of Decommissioning Activities

The final phase decommissioning requirements are incorporated into the LTP, as approved by the NRC, and into site procedures and programs, as necessary [Reference 8-39]. Subsequent sections in this chapter of the LTP provide additional information regarding environmental effects of the final phase of decommissioning.

8.4 BIG ROCK POINT SITE ENVIRONMENTAL DESCRIPTION

The information contained in this section is a summary based on the BRP ER developed for decommissioning [Reference 8-7]. The purpose of this section is to provide an overview of the site and regional environmental information. In general, the information contained in this section is derived directly from the ER, where new or different information is provided; the appropriate reference is also included.

8.4.1 Geography and Demography

8.4.1.1 Site Location Description

The BRP ISFSI site is located near the northeast shore of Lake Michigan in Charlevoix County in the northern part of Michigan's Lower Peninsula. The site is approximately 60 miles northeast of Traverse City, Michigan, and 225 miles north-northwest of Detroit. The closest population centers are the cities of Charlevoix, 3.5 miles southwest, and Petoskey, 11 miles east of the ISFSI site. The site is owned by Entergy Nuclear Palisades, LLC and occupies approximately 107 acres (0.433 km²). Figure 8-1 depicts the property boundaries and Owner-Controlled Area at the time the LTP was submitted and Figure 8-2 shows the current site boundaries and the ISFSI area. Figure 8-3 shows an aerial view of the BRP site and surrounding land prior to the first phase of decommissioning and Figure 8-4 shows an aerial view of the BRP ISFSI site and surrounding land. The Owner-Controlled Area is identical to plant property boundaries.

The area immediately surrounding the ISFSI is wooded and gently sloping; a significant portion of the site property has been classified as wetlands. Approximately three miles to the south are Lake Charlevoix and Round Lake, inland extensions of Lake Michigan. Lake Charlevoix occupies approximately 27 square miles while Round Lake is a small natural harbor connecting Lakes Michigan and Charlevoix. A small stream, Susan Creek, exists to the east of US Route 31 and drains into Lake Michigan, east of the site.

Scattered rural and resort residences and a few commercial facilities are found within three miles of the site. Significant commercial and residential areas exist in the cities of Charlevoix and Petoskey. Industrial activity in the vicinity of BRP consists primarily of small manufacturing facilities. A small plastics manufacturer, employing approximately 150 people, is located to the east, adjacent to plant property. An operating cement plant with a quarry is located about six miles to the southwest. A large housing and recreational complex is located about nine miles to the east of the BRP site.

8.4.1.2 Population

The areas near BRP are generally rural to suburban. The northern part of Michigan is a well-documented tourist destination, resulting in significant seasonal population fluctuations. Peak seasonal visitation occurs in the summer months (June through August) with corresponding population increases in Charlevoix and Emmet counties of up to 75 percent.

The permanent residential population within the five-mile radius is approximately 3,800 and includes a portion of the city of Charlevoix; Charlevoix County residential population is 25,949. The permanent residential population within 50 miles is approximately 195,000. The closest city with a residential population in excess of 25,000 is Sault Ste. Marie, Ontario, Canada, located approximately 100 miles from the plant. Traverse City, Michigan, approximately 50 miles to the south, does not have a population of greater than 25,000 within its incorporated boundaries, but the greater metropolitan area does exceed 25,000. There are no significant minority populations in the areas surrounding the BRP site [Reference 8-30].

Based on Census data over the last five decades, average population increases for area municipalities is approximately 12 percent over 50 years or approximately 0.3 percent per year. The average annual population increase for the three surrounding counties (Charlevoix, Antrim and Emmet) is approximately 2.6 percent. The increase in rural residential populations is consistent with an overall trend recognized across the country of movement from urban to suburban or rural areas. Projected population growth rate for the regional area is expected to remain relatively constant.

8.4.1.3 Land and Water Use Within a Five-Mile Radius

The general land use surrounding BRP is shown in Figure 8-5. Vegetation in this area consists largely of wooded areas and open fields. There are relatively few farms in the area immediately surrounding the plant site. Commercial land use consists primarily of small businesses in or near the city of Charlevoix. There are several small industrial sites within the five-mile radius. Several medium-density residential developments are located to the east of the plant. The remainder of residential and vacation homes are scattered throughout the area. There are also a variety of public recreation areas and several large bodies of water located within five miles of the plant.

- **Farms**

Land use for farming is limited in the vicinity of BRP primarily due to nutrient-poor soils. According to 2007 agricultural census, approximately 15.5 percent of Charlevoix County is used for farming versus 12 percent in 1997 [Reference 8-1]. In general there has been a decrease in the number of both large and small farms in Charlevoix County over the last several decades. Currently, no lakefront farms are located along Lake Michigan within 35 miles of BRP due to poor soil quality and high economic value of Lake Michigan shoreline property.

- **Commercial / Industrial Areas**

The majority of commercial land use occurs in the city of Charlevoix, located approximately 3.5 miles southwest of the plant. A small industrial park of less than ten small businesses and a 58-room hotel are located approximately 2.5 miles southwest of the BRP site boundary. Refer to Figure 8-5 for approximate locations of commercial/industrial facilities.

- **Residential Areas**

Several residential areas are located in the vicinity of BRP, including subdivisions to the east, west and south and also within the city limits of Charlevoix. The closest residence to BRP is located approximately ½ mile to the west.

- **Schools / Hospitals**

There are four schools within five miles of the plant. The size of these schools ranges from approximately 100-700 students. Charlevoix Area Hospital and McLaren - Northern Michigan Hospital, both small regional facilities, are located five miles to the southwest and twelve miles to the east, respectively.

- **Recreational Areas**

Waterfront recreational areas include the Mt. McSauba Recreation Area, Lake Michigan Beach, Depot Beach, and Ferry Avenue Beach located on Lake Charlevoix, in addition to several public and private marinas also located on Lake Charlevoix. In the vicinity of the plant, both Lake Charlevoix and Lake Michigan are used extensively for recreational fishing. There are two golf courses within five miles of the plant; both of these courses are located along US Route 31, between BRP and the city of Charlevoix. Approximately 1.5 acres just west of the site and 140 acres just across US Route 31 are owned by the Little Traverse Conservancy. South of US Route 31 approximately 100 acres are owned by the Charlevoix Rod and Gun Club. A non-motorized recreational trail was completed in 2002 along US Route 31.

- **Transportation Routes**

US Route 31 connects the cities of Charlevoix and Petoskey and provides access to the ISFSI. A small airport serving the area is located south of Charlevoix along US Route 31.

- **Major Bodies of Water**

The primary body of water in the vicinity of the ISFSI is Lake Michigan. Lake Michigan has a surface area of approximately 22,300 square miles and a maximum recorded depth of 923 feet. To the south, at a distance of about three miles, is Lake Charlevoix, an inland extension of Lake Michigan. To the east of the plant is Susan Creek, which flows from Susan Lake north into Lake Michigan. Lake Charlevoix has a surface area of about 17,000 acres, while Susan Lake has a surface area of about 130 acres.

8.4.2 Climate

The following assessment of the climatology of the ISFSI is based on data from previous on-site instrumentation and from the three National Weather Service (NWS) cooperative stations in the vicinity of BRP (Charlevoix, 5.2 miles west-southwest; Petoskey, 10.3 miles east; and East Jordan, 14.8 miles south of BRP).

Due to the proximity of the site to Lake Michigan, the influence of the lake on the climatology at the ISFSI is significant throughout most of the year. In general, the lake has a moderating effect on the weather. Prevailing westerly winds bring cooler spring and early summer temperatures while fall and early winter temperatures are milder than those experienced further inland. Since the day-to-day weather is controlled mostly by the high and low pressure fronts, the area near BRP usually does not experience prolonged periods of hot, humid weather in summer, or extreme cold in the winter.

8.4.2.1 Temperature

A moderating effect on ambient temperatures caused by Lake Michigan water temperatures is commonly experienced at the site. On the average, the warmest normal maximum and normal minimum temperatures both occur in July (76.6 °F and 57.0 °F). The coldest normal maximum temperatures usually occur in January (26.7 °F). However, the coldest normal minimum temperatures (12.8 °F) occur in February. By February, northern Lake Michigan is usually frozen over. Thus, its moderating effects on cold temperature and cloud coverage are minimized. For all months, the diurnal range for the shoreline stations is consistently less than that of the inland site. During the spring months, the high temperatures are typically two to five degrees Fahrenheit cooler near the cold lake. Conversely, low temperatures during the autumn months are two to four degrees Fahrenheit warmer at the shoreline.

8.4.2.2 Precipitation

Precipitation at the BRP site is very evenly distributed, averaging between two and three inches eight months of the year. Annually, the BRP site receives an average of 31.7 inches of precipitation. During a typical year, 149 days receive measurable precipitation. Heavier daily amounts of precipitation, those at and above 0.10", occur mainly during the spring, late summer, and fall. These amounts are partially the result of the thunderstorm season, which lasts from March to November.

8.4.2.3 Evaporation

Local evaporation measurements are recorded at Lake City, Michigan, approximately 70 miles south of BRP. July, the warmest month, has the highest evaporation rate. Total evaporation for the May through October seasonal averages about 28.0 inches. However, the normal precipitation during this period is only 18.5 inches. Thus, moisture replenishment during the fall and winter months is important in maintaining overall area hydrology.

8.4.2.4 Snowfall

Annually, the BRP site averages over 106 inches of snow; however, this has varied greatly over the years, ranging from as little as 43.3 inches in 1954 to as much as 231.0 inches in 1985. January receives the most, with an average of 33.4 inches. The daily snowfalls at the BRP site are generally the result of light, but frequent, lake-effect squalls. Major snowstorms do occasionally occur at BRP. The maximum daily snowfall recorded in the vicinity of the plant was 20.5 inches in November 1950. BRP's winter combination of below freezing temperatures and frequent snowfalls is ideal for snow accumulation. February has the deepest average snow cover, approximately 17 inches.

8.4.2.5 Wind

Historical wind data was previously collected by instrumentation located on the plant stack, 71.3 meters (233.9 feet) above-grade. The highest annual average wind speeds are associated with the north-northwest and north sectors, at 7.6 m/s (17.0 mph) and 7.4 m/s (16.6 mph), respectively. The lowest speeds, 5.6 m/s (12.5 mph), are associated with northeast winds. Calm winds, defined as less than 0.4 m/s, are observed only 0.26% of the time.

8.4.2.6 Severe Weather

The highest monthly frequencies for thunderstorms at BRP occur in June and July, with an incidence of seven days each. The normal annual thunderstorm total is 36 days. Most of the storms that arrive at the BRP site originate over Lake Michigan where moisture is plentiful. Thus, a significant portion of the daily precipitation amounts are caused by convective activity. Flooding, resulting from either probable maximum precipitation or lake flooding event, would not exceed an elevation of 594.0 feet mean sea level (msl). The approximate elevation of the ISFSI is 618.5 feet [Reference 8-17].

Tornadic activity in the vicinity of BRP is rare. The northern part of Michigan is at the extreme fringe of the Midwest tornado belt. During the period from 1930-1985, inclusive, only two tornado sightings have been recorded in Charlevoix County.

8.4.3 Geology and Seismology

The following sections provide a general discussion of site geology and seismology.

8.4.3.1 Regional Geology

The BRP site lies within the Great Lakes Section of the Central Lowlands Physiographic Province. The dominant features of this section were caused by glaciation and include lakes, prominent end moraines, outwash plains, closed basins forming swamps or lakes, eskers and drumlins, and vast areas of rolling ground moraine between the end moraines. Because of the direction of advance and retreat of the last glaciation, lower peninsula Michigan has a strong surficial northwest-southeast grain. This is also the principal structural trend in Paleozoic rock. Bedrock consists of limestone and shale of the Traverse Group of Middle Devonian age (395 million years before present (mybp) to 375 mybp). Three formations of the Traverse Group are exposed in the region: the Petoskey, Charlevoix, and Gravel Point formations. The bedrock immediately beneath the plant is the Gravel Point formation as the Petoskey and Charlevoix formations have been eroded away. Much of the southern shoreline of Little Traverse Bay from Charlevoix to Petoskey is formed by outcrops of the Gravel Point formation. Interbedded with the limestone strata are beds of shale and shaley limestone.

BRP is located in the Central Stable Region Tectonic Province. This province is characterized by major domes, basins, and arches which formed during the Paleozoic Era (570 mybp to 240 mybp). The site lies above the northern flank of the Michigan Basin, which is one of the large tectonic structures in the Central Stable Region. Bedrock in the region dips at a low angle to the southeast toward the center of the Michigan Basin. Superimposed on this regional dip in the site region are gentle undulations caused by the presence of minor synclines and anticlines. These folds strike generally northwest-southeast and plunge to the southeast. The axes of major folds within Paleozoic rocks of the Michigan Basin also have northwest-southeast trends.

Regional jointing in the northern Michigan Basin have four major vertical joint sets: N52 E, N46 W, N89 W, and N1 E. These trends are present in the site region with the northwest set being the most prominent. The joints are usually tight and widely spaced, but locally they have been widened by solutioning. Sinkholes exposed in local quarries appear to be aligned along major joint trends.

The Michigan Basin has been relatively stable for several hundred million years and is, therefore, relatively undeformed. Faults have been identified in Paleozoic rocks in the basin, however, no major faults are known in the site area. The faults in the basin are believed to be pre-Pennsylvanian (more than 330 mybp). They do not offset Pleistocene (10,000 years to 2 mybp) glacial deposits. Minor faults related to ancient solution collapse features have been observed in local quarries. Faults have been postulated, based on seismic reflection profiling in Lake Michigan. These faults have been evaluated and interpreted to be not capable of displacement.

8.4.3.2 Site Geology

Elevations at the former plant property on the south shore of Little Traverse Bay range from about 580 feet msl at the lakeshore to 700 feet msl, about one mile inland. Elevation at the ISFSI is approximately 618.5 feet msl. From the lakeshore to about one mile inland, the terrain is a lowland that was once submerged beneath ancestral Lake Michigan.

Site topography is characterized by low beach ridges separated by swampy areas. Approximately one to five miles inland from the lake, elevations range from 700 to 900 feet above lake levels. This area is a till plain with drumlins that rise 40 to 60 feet above it. A drainage divide causes surface water and shallow groundwater to flow north to Little Traverse Bay and south to Lake Charlevoix. It is also the probable recharge area for minor artesian zones in the soil beneath the plant site. A topographic map of the area surrounding BRP is provided in Figure 8-6.

The geology of the site was investigated in several phases. Two exploratory borings were drilled into the top of bedrock in May 1959, and seven more borings were drilled into rock in February 1960. In 1979, three borings were drilled to determine the dynamic characteristics of the soil and rock beneath the site. In 1999, 26 borings were drilled to better define geologic and hydrogeologic conditions at the site. In 2001 and 2002, 15 groundwater wells and borings were drilled to further identify site hydrogeologic conditions in the vicinity of the Industrial Area [Reference 8-27]. Section 2.4.3 contains additional information regarding groundwater and geology investigation wells as they relate to site characterization.

8.4.3.3 Seismology

The probability of earthquakes of significant intensity near BRP appears to be very low. Recorded earthquake history for Michigan and the surrounding region has classified all earthquakes in the region as minor or intermediate. The nearest recorded earthquake, occurring in 1909, was centered near Menominee, Michigan, approximately 110 miles from the plant. Since 1909, no earthquakes centered within a 150-mile radius of BRP have been documented. Figure 8-7 is a United States Geologic Survey (USGS) seismic history for Michigan [Reference 8-18].

8.4.4 Hydrology

The information presented in this section describes general characteristics of the surface and groundwater within the area immediately surrounding BRP.

8.4.4.1 Surface Waters

The water level of Lake Michigan has varied between approximately 576 and 583 feet msl since 1905. Lake Michigan water level experiences long-term, seasonal, and short-term variations. Long-term variations are caused by periods of higher or lower than usual precipitation or evaporation lasting several years and extending over a large part of the Great Lakes watershed. The highest recorded (1905-present) mean monthly water level on northern Lake Michigan near BRP was 582.0 feet msl (1986). The minimum monthly level of Lake Michigan was elevation 576.6 feet msl (1964) [Reference 8-29].

Big Rock Point is located in an area where surface runoff generally flows into Lake Michigan. Drainage from the ISFSI and buildings generally flows away from the ISFSI area toward Lake Michigan.

In general, the northern portion of Lake Michigan is characterized as an oligotrophic lake with excellent water quality. Periodic analyses have been performed on Lake Michigan waters in the vicinity of the plant. Water quality data reflect analyses performed on Lake Michigan waters near the plant Discharge Canal, in Little Traverse Bay, and outside the Pine River Channel leading from Round Lake to Lake Michigan (also known as the Charlevoix Harbor area). Water quality information obtained from these locations is fairly consistent and is a reasonable representation of Lake Michigan water quality in this region.

8.4.4.2 Groundwater

Groundwater at the site moves north into Lake Michigan from the groundwater divide between Lakes Charlevoix and Michigan.

8.4.5 Natural Resources

In addition to the aquatic resources described in Section 8.4.1.3, several public lands and conservation areas are located near BRP, offering a variety of recreational opportunities including fishing, hunting, boating, swimming, hiking and picnicking. Waterfront recreational areas include the Mt. McSauba Recreation Area, Lake Michigan Beach, Depot Beach and Ferry Avenue Beach located on Lake Charlevoix. In the vicinity of the plant, both Lake Charlevoix and Lake Michigan are used extensively for recreational fishing. Approximately 1.5 acres just west of the plant is owned by the Little Traverse Conservancy. This land includes 500 feet of Lake Michigan shoreline, reserved as a natural habitat and receives minimal public use. Figure 8-3 shows the locations of public lands listed above as well as the locations of recreational facilities within five miles of BRP. There are no known mineral resources as defined by USGS on the BRP site [Reference 8-31].

Commercial fishing in Lake Michigan near BRP is regulated under the terms of the 1985 negotiated settlement involving Native American tribes, the State of Michigan and the U.S. Department of Interior. In 2007, the State of Michigan, the Little River Band of Ottawa Indians, the Grand Traverse Band of Ottawa and Chippewa Indians, the Little Traverse Bay Band of Odawa Indians, the Sault Tribe of Chippewa Indians, the Bay Mills Indian Community and the United States government signed a Consent Decree which defines the extent of the Tribes' inland treaty rights.

8.4.6 Cultural, Historical and Archeological Resources

The Michigan Historic Preservation Office reviewed the BRP LTP under the authority of Section 106 of the National Historic Preservation Act and determined that three areas within the BRP site were eligible for listing in the National Register of Historic Places. These areas, discussed in the following sections, are:

- 1) The former nuclear power facility (buildings and equipment),
- 2) Prehistoric archeological site identified during Phase II archeological study, and
- 3) The "Big Rock" located in Lake Michigan adjacent to the shoreline west of the plant.

Consumers Energy was a concurring party to a Memorandum of Agreement (MOA) between the NRC and the Michigan State Historic Preservation Office (SHPO) to preserve the historic, archeological and cultural resources located within the BRP site. The actions specified in the stipulations of this MOA were completed prior to release from the license of the power reactor and associated land areas.

8.4.6.1 Nuclear Plant Facility

The nuclear plant facility is considered eligible for listing in the National Register of Historic Places. This eligibility is based on BRP's status as one of the first commercial high-density boiling water power reactors, its use as a research site for both the early nuclear power industry and medical radiation treatments, and also its 1991 designation by the American Nuclear Society as a "Nuclear Historic Landmark." In order to ensure that the history of the plant was preserved, Consumers Energy performed recordation to the National Park Services Historic American Engineering Record standard documenting the facility's design and operational history. Consumers Energy also developed exhibit(s) in conjunction with the local historical society commemorating the history of BRP, coordinated the installation of a State of Michigan Historic Marker providing history of the nuclear power plant and the historical and cultural significance of the "Big Rock", and installed a historical monument at the entrance to the former site.

8.4.6.2 Archeological Studies

A Phase I archaeological survey of plant property was conducted in 2000 assessing the historic significance of previously undisturbed land [Reference 8-28]. This Phase I survey identified seven prehistoric archeological sites that warranted additional study to complete their evaluation. A Phase II survey of these seven prehistoric archeological sites was completed in 2002 [Reference 8-35]. The Phase II survey found one area (two of the seven identified locations) possesses significant artifacts from Native American prehistoric activity.

8.4.6.3 Traditional Cultural Property

Along the Lake Michigan shoreline, approximately ½ mile west of the former plant Industrial Area, a large rock (approximately 4m by 4m in size) exists that is visible both from the water and shoreline. The "Big Rock" has historical and cultural significance to the local Native American tribe, Little Traverse Bay Band of Odawa² Indians, and has been documented as a navigational marker used by native people as they canoed across Little Traverse Bay each year. A Traditional Cultural Properties study completed in 2003 determined that the "Big Rock" is a significant cultural resource to local Native American groups [Reference 8-36].

8.4.7 Ecological Resources

The following sections provide an overview of the aquatic flora and fauna, terrestrial flora and fauna, and Threatened and Endangered Species information for the biological communities in the vicinity of BRP.

² Odawa is the Native-American equivalent of the English word Ottawa.

8.4.7.1 Aquatic Ecology

- Aquatic Flora

While no current data is available on aquatic flora near the BRP site, results of several Lake Michigan near-shore water studies indicate that the year-to-year distribution of phytoplankton throughout Lake Michigan is relatively constant with expected seasonal variations.

- Aquatic Fauna

Characterization of aquatic biological communities provided in this subsection focuses on Lake Michigan and Lake Charlevoix. The littoral mainland area of Lake Michigan has potential spring and summer spawning grounds for several species of fish. However, the immediate vicinity of BRP has not been identified by the U.S. Fish and Wildlife Service as a critical spawning ground. The site does not represent a unique or specialized niche for colonization or ecological activities and the habitat is typical of the northern part of Lake Michigan's lower peninsula shoreline.

Popular sport fish found in Lake Charlevoix and the Charlevoix County area of Lake Michigan include: lake trout, coho salmon, chinook salmon, rainbow trout, pink salmon, brown trout, walleye, channel catfish, burbot, yellow perch, lake whitefish, smallmouth bass, largemouth bass, northern pike, and sunfish. Forage fish stocks in Lake Michigan include such species as alewife, smelt, bloater chubs, and sculpins.

8.4.7.2 Terrestrial Ecology

Terrestrial biological communities onsite are located on level to gently sloping lake plain soils that are cobbly and gravelly. Most of the site property is composed of woodlands, with limited open-land acreage that is converting to forest. Soils on the property are in the Detour-Kiva association. These soils are very poorly suited to both farming and silvicultural practices. The following sections describe soil, terrestrial plant and wildlife in the vicinity of BRP.

- Soils

The soil survey of Charlevoix County, Michigan, includes all site soils in the Detour-Kiva association. Soil types onsite are provided in Table 8-1; Figure 8-8 provides information on approximate locations of these onsite soil types. In general, the site is poorly suited to agriculture use due to nutrient-poor soils and the high economic value of Lake Michigan shoreline. This high capital cost makes farming not economically feasible, although small residential gardens are possible.

Table 8-1. Big Rock Point Soil Types

| Soil Type | Description | Comments |
|-----------|---|--|
| AgB | Alpena gravelly-sandy loam, 0-6% slopes | This is a soil of beach ridges and terraces. Onsite, this soil is found predominantly in a band about a quarter-mile wide along the beach ridges and terrace adjacent to Lake Michigan. Permeability is rapid, natural fertility is low, organic content is moderately low. The Industrial Area is comprised of this type. |
| DeB | Detour cobbly loam, 0-6% slopes | This soil is a poorly drained soil with slow permeability and surface runoff. Detour soils are poorly suited to farming because of wetness. Onsite, Detour soils are generally forested. |
| EdB | Eastport sand, 0-6% slope | This is a soil of beach ridges and low dunes on the plant site. This soil is found about a quarter-mile inland in a narrow band associated with the steeply sloped Emmet-Onaway soils. |
| Hs | Hessel cobbly loam | Hessel soils are thin, poorly drained soils formed on lake plains and lake terraces. Water availability is high, organic matter and natural fertility is high. Depth is seldom more than two feet. |

- Flora

Since 1978, dramatic successional changes have occurred at the BRP site. Open areas have succeeded to young stands of cedar and birch. Growth that was formerly dominated by saw timber-sized aspen and birch is now dominated by pole-sized white cedar and balsam fir due to death of the senescent aspen and birch and release of the coniferous understory. In general, the BRP site forest vegetation is now typically characterized as lowland conifer, pole-sized and well-stocked (cover Type 423)³ with minor stands of aspen and birch (cover Type 413)³.

³ Nomenclature follows the Michigan Land Cover Use Classification System. The numerical system describes forest type for forested areas.

- Fauna

Birds and mammals in the vicinity of BRP are generally representative of species found along shoreline and inland habitats in northern, lower Michigan. Species diversity, particularly of "non-game" species, may be higher onsite in the more mature habitats than they are regionally. However, species favoring younger successional stages, including uneven-aged aspen stands, such as whitetail deer, snowshoe hare or ruffed grouse have not been as abundant near the former plant as they are regionally. Since returning the former power reactor site to "Greenfield", there appears to be an increase in the number of these species.

Employee observations indicate deer, grouse, wild turkey and black bear are present onsite, and rarer animals such as bobcat may be present from time to time. Coyotes appear to be common, as are two of their common prey, snowshoe hare and cottontail rabbit. Both beaver and muskrat are common along Susan Creek. Several bald eagle sightings have also occurred on and near the BRP site since plant shutdown. Recreational hunting of deer, turkey, and bird occurs on private land near the BRP site.

8.4.7.3 Threatened and Endangered Species

The BRP site is located in relatively undisturbed natural habitats near the shore of Lake Michigan. Great Lake beaches, both sandy beaches and rock beaches, have the potential for harboring Federally-listed threatened species such as Dwarf lake iris (*Iris lacustris*), Houghton's goldenrod (*Solidago houghtonii*), and Pitcher's thistle (*Cirsium pitcheri*). These species are well-represented in shoreline habitats in Charlevoix County and adjacent counties, as evidenced by Michigan Natural Features Inventory (MNFI) records. Several surveys by Consumers Energy documented the presence of Pitcher's Thistle and a State-listed threatened species, the Lake Huron tansy (*Tanacetum huronense*), on beach areas west of the former plant Industrial Area. Dwarf Lake Iris and Houghton's Goldenrod were not found on the BRP site despite thorough searches, the most recent in August 2002 [Reference 8-19]. No threatened or endangered species have been identified on the BRP ISFSI land.

Inland, conifer swamp and upland habitats could possibly harbor plant or animal species that are State-listed as threatened or of special concern. However, no such species have been specifically identified at this time.

8.5 ENVIRONMENTAL EFFECTS OF DECOMMISSIONING

The following sections address the environmental impact for the process of decommissioning and site restoration of the BRP Nuclear Plant.

8.5.1 Radiological Impacts of Decommissioning

Radiological impacts of the final phase of decommissioning discussed below include:

- Onsite occupational radiation doses,
- Offsite radiation exposures and monitoring, from liquid and gaseous effluent releases,
- Effects of decommissioning accidents,
- Radiation exposures resulting from LLW disposal and transportation,
- Spent fuel storage, and
- Radiological criteria for unrestricted use of the site.

8.5.1.1 Occupational Radiation Exposures

Occupational radiation exposure at the BRP ISFSI is controlled in accordance with 10 CFR 20. The requirements of 10 CFR 20 are implemented through a Radiation Protection (RP) Program that is commensurate with licensed activities. The BRP RP Program is applied to all activities involving radiological hazards. The program is based on the premise that all exposures should be reduced to levels, which are as low as reasonably achievable (ALARA), to both the individual worker and to the workforce as a whole.

- Occupational Radiation Exposure Comparison to GEIS

The total dose for all phases of decommissioning BRP RP activities was estimated to be 700 person-rem. The estimate was derived from the original five-year SAFSTOR dose estimate and was adjusted by the factor of radioactive decay that would have occurred if the five-year SAFSTOR option had been utilized and other radiological considerations. The immediate dismantlement (DECON option) dose estimate was significantly lower than the value of 1874 person-rem for a boiling water reactor facility identified in the GEIS. A chemical decontamination of the primary Nuclear Steam Supply System was completed in 1998, resulting in removal of approximately 435 curies of radioactivity. The performance of the chemical decontamination negates the disadvantage of the DECON option as discussed in the GEIS.

The actual occupational dose for the first phase of decommissioning was approximately 550 person-rem. The estimated occupational dose for the final phase of decommissioning is estimated to be significantly below 1 person-rem. Current data from ISFSI only operations indicate that the annual occupational dose has been 0 person-rem.

- Radiation Protection Program

The requirements of 10 CFR 19 and 20 are implemented by administrative and working level procedures. The elements of the BRP RP Program are described below.

- ALARA Program

The philosophy of the Radiation Protection Program for the BRP ISFSI is to maintain the occupational dose to all personnel as low as reasonably achievable. Each person is responsible for protecting themselves from unnecessary radiation exposure. Every reasonable effort will be made to maintain radiation dose as far below these values as is reasonably achievable.

- Radiation Respiratory Protection Program

The BRP Radiation Protection Program meets all requirements of 10 CFR 20, Subpart H, (20.1701 through 20.1704) in regards to respiratory protection.

The FuelSolutions™ W74 Canister Storage Final Safety Analysis Report, Chapter 7, Confinement, provides that confinement of all radioactive materials in the FuelSolutions™ Storage System is provided by a FuelSolutions™ canister. The design of the FuelSolutions™ W74 canister confinement boundary assures that there are no credible design basis events that would result in a radiological release to the environment. Therefore, the need for respiratory protection is not expected during the final phase of decommissioning.

- Radioactive Materials and Contamination Control

Control of radioactive materials for BRP's final phase of decommissioning will be incorporated into decommissioning activities through radiation work permits, procedures, and radiation protection guides.

The spent fuel and Greater Than Class C waste was transferred to the ISFSI in accordance with the former plant's Radiation Protection Program contamination control procedures. Historical radiological survey data indicates that the identification of contamination on the ISFSI has not occurred.

On June 19, 2008, minor contamination was identified on the transfer cask emanating from the coating substrate by the leaching process. Condition report CR-PLP-2008-02741 documented the identification and level of contamination, as well as the corrective action. The contamination was confined to the transfer cask and did not interface with the ISFSI pad.

8.5.1.2 Offsite Radiation Exposure and Monitoring

The Radiological Environmental Monitoring Program (REMP) has been modified to monitor specifically for ISFSI operations as described in the Offsite Dose Calculation Manual (ODCM). This program currently provides the basis for the monitoring of liquid and gaseous effluents as not being required due to the design of the FuelSolutions™ W74 canister. The program monitors gamma radioactivity near the site boundary and at the ISFSI. Reports as prescribed in the ODCM are submitted annually to the NRC in accordance with BRP Defueled Technical Specifications, 10 CFR 50.36(a), and 10 CFR 50, Appendix I, Section III.B.1 [Reference 8-10].

Annual doses to the public during BRP's operating period and the initial phase of decommissioning did not exceed 0.5 millirem for liquid effluents and 0.1 millirem from gaseous effluents. With no existing effluent pathways, dose to the public is expected to be 0 millirem per year during ISFSI operations.

In the instance of off-normal/emergency events, both liquid and gaseous effluent doses will be calculated using industry-standard models, applying site-specific parameters of meteorology, and dilution factors to the nearest public water supply, nearby recreational activity and critical receptor [Reference 8-34].

8.5.1.3 Environmental Effects of Accidents and Decommissioning Events

Analysis of potential accidents during the decommissioning phase involved an assessment of planned BRP decommissioning activities to identify accidents with significant radiological release capabilities. These decommissioning accidents are categorized in two areas, events involving spent fuel and external events. Events analyzed included spent fuel handling accidents, loss of spent fuel pool cooling, spent fuel pool freezing and dry fuel storage-related accidents. External events are initiating events that have the potential to result in radiological consequences; those included loss of offsite power, aircraft hazards, fire and natural phenomena (flooding, tornadoes, etc.). Accidents that pertain to ISFSI only operations are bounded by these analyses. The BRP UFHSR contains a detailed discussion of decommissioning accident scenarios and conclusions [Reference 8-17]. The Fuel Solutions Storage System Final Safety Analysis Report addresses accidents and natural phenomena specifically applicable to the dry fuel storage system located at the ISFSI [Reference 8-2].

A review of these scenarios to determine which accident would produce the maximum off-site radiological consequences has been performed in accordance with the guidelines of the Environmental Protection Agency (EPA) Manual of Protective Action Guides (PAGs) and Protective Actions for Nuclear Accidents, EPA-400 [References 8-5 and 8-20].

It is concluded all postulated decommissioning accidents for BRP are bounded by the results described in the GEIS. Thus, as concluded by the GEIS, decommissioning will have a minimal impact on public safety and health.

8.5.1.4 Evaluation of Decommissioning Low-Level Radioactive Waste (LLRW) Volume & Transportation Considerations

Big Rock Point's final phase of decommissioning will require disposal of a small volume of radioactive material and a moderate amount of non-radioactive materials to restore the site and allow release of the site for unrestricted use and license termination. Materials that cannot be decontaminated to the level below the radioactive release criteria are processed as radioactive waste. Big Rock Point ensures appropriate processing, packaging, and control of solid, liquid, and gaseous radioactive wastes through procedures implementing requirements of the Process Control Program, and the ODCM [References 8-10 and 8-13]. Clean demolition debris will be disposed of at a State of Michigan licensed landfill. Any radiologically contaminated debris that may be generated will be disposed of at a facility licensed to receive radioactive waste.

The much smaller size of the BRP ISFSI as compared to the former power plant which was originally compared to the reference BWR in the GEIS results in volumes and total quantities of radioactivity required for shipment, which are on the order of a fraction of 1% of the quantities assumed in Appendix N of the GEIS.

For the final phase of decommissioning, doses due to transportation of radioactive waste are bounded by the GEIS. Overall, both occupational and public doses remain bounded by the GEIS calculations.

8.5.1.5 Spent Fuel Storage

The onsite ISFSI accommodates all of the remaining spent fuel from plant operations in seven storage casks. An additional cask is designated for storage of Greater Than Class C radioactive wastes. The environmental impacts associated with dry fuel storage at BRP include land use to accommodate the ISFSI (approximately 20 acres, most of which was previously undisturbed land that is radiologically non-impacted) and minimal occupational doses for workers assigned to monitor the installation. Offsite/public doses associated with the ISFSI are considered not to be significant. Historical REMP data indicates no dose consequence to the public since completion of phase one decommissioning and release of the power reactor and associated land areas from the license. Figure 8-1 shows the location of the ISFSI within the former BRP site boundary.

8.5.1.6 Radiological Criteria for License Termination

Following decommissioning, residual radioactivity will be limited to allow release of the property for unrestricted use such that an individual of a critical population group living on the site would not be expected to receive a dose greater than 25 mrem/year from all applicable combined environmental exposure pathways. License Termination Plan Chapters 2, *Site Characterization*, Chapter 5, *Final Status Survey Plan*, and Chapter 6, *Compliance with the Radiological Criteria for License Termination*, provide the required information regarding achieving unrestricted site release.

8.5.2 Non-Radiological Environmental Impacts

The following subsections provide an assessment of the non-radiological impacts of the final phase of decommissioning and site release. Generic Environmental Impact Statement Supplement 1 was utilized as the basis for identifying potential environmental impacts and determining the significance of these impacts.

8.5.2.1 Onsite / Offsite Land Use

Additional land areas are not anticipated to be required for use during the final phase of decommissioning with the exception of the designated landfill for disposal of non-radioactive ISFSI demolition debris (see Section 3.4.1.1). Since the ISFSI site is expected to be restored to a Greenfield condition, the long-term effects of onsite land-use are not significant.

8.5.2.2 Water Use

The only water usage is groundwater from the site well water system. The principal use of groundwater is for the domestic water system. Water usage is not expected to be necessary during the final phase of decommissioning.

8.5.2.3 Water Quality

No impacts on Lake Michigan are expected from the final phase of decommissioning activities.

An unspecified amount of storm water runoff is discharged to Lake Michigan via a drainage ditch which runs north onto the Consumers Energy property and then to Lake Michigan. A Storm Water Pollution Prevention Plan will define specific requirements for ensuring proper management of storm water discharges from the site [Reference 8-16].

No adverse impacts on groundwater are anticipated from final phase decommissioning activities. In addition, the groundwater system under the ISFSI area is effectively separated from any potential contact with local private wells and the down-gradient direction of groundwater flow is to the north into Lake Michigan.

8.5.2.4 Air Quality

Fugitive dust will be generated from the various demolitions and dismantling operations. Fugitive dust may originate from concrete during removal of the ISFSI pad or concrete shield casks, and from soil excavation to remove the ISFSI pad and underground utilities.

Reasonable control measures will be utilized to minimize the quantities of fugitive dust. Excavation of soils and concrete demolition may include the use of wet suppression to minimize the generation of fugitive dust.

The controlled dismantlement and packaging of the ISFSI pad and concrete storage casks will preclude fugitive dust from becoming an ambient air quality concern during the final phase of decommissioning. The closest national ambient air quality Category 1 area is the Seney National Wildlife Refuge located approximately 70 miles northwest of the BRP site. The location of the Seney National Wildlife Preserve is generally considered upwind of the prevailing wind direction. There are no Category 1 areas within 100 miles downwind of the BRP site.

8.5.2.5 Aquatic Ecology

No adverse impacts to the aquatic flora or fauna are anticipated from the final phase of decommissioning activities as the activities will not adjoin Lake Michigan and the beachfront.

8.5.2.6 Terrestrial Ecology

No additional land area is expected to be utilized to complete decommissioning. Therefore, no additional impacts to site flora and fauna are anticipated.

8.5.2.7 Threatened and Endangered Species

No adverse impact to any identified species is anticipated since they are not present in locations expected to be impacted by decommissioning activities. Prior to initiation of any decommissioning activities that could potentially affect endangered shoreline species, additional surveys will be conducted using up-to-date listings to identify the existence of threatened or endangered species near areas that may be impacted.

8.5.2.8 Occupational Safety

Entergy Nuclear Palisades, LLC is committed to the safe decommissioning of BRP. The Safety Program provides the basis for controlling safety during decommissioning activities. The primary objective of the Safety Program is to protect workers and visitors from industrial hazards that have the potential of developing during decommissioning activities and to achieve an injury and incident-free workplace. The Safety Program establishes and maintains a safe workplace for workers, contractors, and visitors through procedures and guidelines to be used to reduce industrial hazards and risks. Entergy's Industrial Safety and Health Program defines specific programs and requirements to ensure worker protection [Reference 8-3].

While it is recognized final phase decommissioning activities are significantly different from the initial phase of decommissioning, qualified staff, facilities, and equipment are available to perform decommissioning in a safe and effective manner. Compliance with all applicable federal Occupational Safety & Health Act (OSHA) and state (Michigan Occupational Safety & Health Act, MIOSHA) regulations and to the guidance provided through industry standards and good work practices is a top priority of all site management and employees.

8.5.2.9 Cost

Chapter 7, *Update of Site-Specific Decommissioning Costs*, of this LTP provides a summary and update of decommissioning costs.

8.5.2.10 Socioeconomics

During the initial phase of decommissioning, the socioeconomic considerations related to decommissioning resulted from losses of wages and tax revenues after plant shutdown. At that time, the impact of those considerations as they applied to BRP and the surrounding communities was considered to be significant based on guidance contained in Supplement 1 to the GEIS. The effect on socioeconomics is considered to be large if a 5% or greater decrease in the area workforce occurs and/or a greater than 20% loss of local tax revenues occurs. The effect of the tax revenue loss after the plant's shut down was offset by the tourism economy and nearby land development for resort, residential and recreational use.

Since the completion of the initial phase of decommissioning, a relatively small staff has been required to operate the ISFSI. The reduction of the workforce post license termination will not exceed 5% of the area workforce and the loss of tax revenues to Charlevoix County and Hayes Township will not be significant.

8.5.2.11 Environmental Justice

Environmental justice is characterized by high and adverse health, economic or environmental effects by local low-income and minority populations. Due to a tourism-based local economy, area demographic data indicate very low incidence of low-income or minority populations in the communities affected by BRP decommissioning. Further, local Native American populations are not considered to be significantly affected by the decommissioning of BRP. Based upon area demographics and the fact that the site is expected to be restored to a Greenfield condition acceptable for unrestricted use, environmental justice considerations are not considered significant for BRP site restoration.

8.5.2.12 Cultural, Historical & Archeological Resources

The Michigan Historic Preservation Office has determined that several locations within the former BRP site are eligible for listing on the National Register of Historic Places. Section 8.4.6 provides a discussion regarding preservation and the management of those resources.

8.5.2.13 Aesthetic Issues

Aesthetic issues apply primarily to scenic preservation of public lands. The BRP ISFSI site is not public land and cannot be seen on traveled roads or waterway; however, its proximity to public lands (parks and conservation areas along the Lake Michigan shoreline) warrants an assessment of aesthetics. As expected, the ISFSI will be returned to a "Greenfield" condition and precludes any aesthetic issues.

8.5.2.14 Noise

Big Rock Point is located in an area that is surrounded on four sides by dense coniferous and deciduous forests. The nearest residence is approximately one-half mile from the property boundary and the nearest recreational area is approximately one-half mile from the property boundary. Decommissioning activities will add minimally to ambient sound levels beyond the site boundary. Activities such as the operation of construction equipment may be audible along US Route 31 and over Lake Michigan. However, the operation of construction equipment will be intermittent and temporary, occurring primarily during the daylight hours. It is anticipated any noise beyond the site boundary will be well below 50 dBA, the level above which noise levels may initiate community complaints.

8.5.2.15 Irretrievable Resources

Irretrievable resources refer to materials utilized to construct, operate, and decommission a commercial nuclear reactor; these include, but are not limited to, uranium for the nuclear fuel cycle, building construction materials, fuel oil, disposal site (landfill) space usage, etc. The utilization of space in radioactive and industrial landfills for system components and demolition debris is less than the space gained by unrestricted release of the site property. Therefore, completing decommissioning, dismantlement, and restoration of the site to a Greenfield condition are determined not to have any additional adverse effect on resources beyond the materials required to construct and operate the facility.

8.6 OVERVIEW OF REGULATIONS GOVERNING DECOMMISSIONING ACTIVITIES AND SITE RELEASE

Decommissioning and restoration of the BRP ISFSI requires adherence to many federal, state, and local regulations. Applicable federal, state, and local requirements are identified and reviewed below. The information provided below is intended as a broad overview of applicable regulations; this discussion is not intended to be all-inclusive since specific decommissioning activities may invoke regulations not discussed within this section.

8.6.1 Federal Requirements

Decommissioning activities that are subject to federal regulations, permits, licenses, notification, approvals or acknowledgments include:

- Handling, packaging, and shipment of radioactive waste,
- Hazardous waste generation/disposition,
- License termination and final site release,
- Radio communications,
- Storage of spent fuel,
- Worker radiation protection, and
- Worker health and safety.

8.6.1.1 Nuclear Regulatory Commission

The majority of radiological activities fall under Title 10 of the Code of Federal Regulation (CFR) and are administered by the NRC. Applicable Title 10 regulations include:

- Part 50 - decommissioning activities,
- Part 20 - radiation protection,
- Part 51 - environmental protection,
- Part 61 - disposal of radioactive waste, and
- Part 71 - packaging and transportation of radioactive waste (regulations in 49 CFR 171 to 174 also apply).

8.6.1.2 Occupational Safety and Health Administration

Worker health and safety protection during decommissioning is subject to OSHA regulations. The regulations applicable to construction are 29 CFR 1910 and 1926. These regulations include requirements for respiratory protection (non-radiological), hearing protection, illumination, scaffold safety, crane and rigging safety, chemical usage and release response, and cleanup operations.

8.6.1.3 Environmental Protection Agency

The EPA regulations outlined in Title 40 of the Code of Federal Regulations apply as follows:

- Part 141 - Safe Drinking Water Standards,
- Part 190 - Radiation Protection Standards for Nuclear Power Operations,
- Part 129-132 - Clean Water Act.

8.6.1.4 Federal Communications Commission

Federal Communications Commission (FCC) licenses are required for radio communication equipment used at BRP.

8.6.2 State and Local Requirements

Permits and approvals from or notifications to several state and local agencies are required for safety and environmental protection purposes. Some of these are for specific decommissioning activities, and others are for existing BRP site facilities and ongoing activities that may also be required to support decommissioning. Many of the state and local requirements apply to activities that are also subject to federal regulations discussed previously. Decommissioning activities and related site operations that fall under state and local jurisdiction include:

- Building permits and codes,
- Facility demolition,
- Plant domestic water wells,
- Radioactive waste disposal,
- Site unrestricted release,
- Solid waste shipment,
- Solid waste disposal,
- Soil erosion and sedimentation,
- Wetlands protection,
- Water use and effluent quality.

Soil erosion and sedimentation control and wetlands protection are governed by Act 451, Parts 91 and 303, respectively.

Michigan waste management regulations are found in Parts 111, 115, 117, and 121 of Act 451. These regulations apply to generation, disposition, and disposal of hazardous waste, solid waste management, non-hazardous liquid industrial wastes, and used oil recycling. All non-hazardous, non-radioactive wastes, including demolition debris, will be disposed of as either a Type II or Type III waste. Additionally, lead paint handling and disposal falls under MIOSHA regulations.

Drinking water supplies are regulated under the Safe Drinking Water Act (PA 399, 1976) by the Drinking Water and Radiological Protection Division of the MDEQ.

8.7 SUMMARY AND CONCLUSIONS

The assessment establishes the environmental effects for the final phase of decommissioning are minimal, and there are no adverse effects outside the bounds of NUREG-0586 (GEIS) or the associated Supplement 1.

Additionally, the conclusions contained in the BRP PSDAR utilized as the original basis for the decommissioning environmental assessment of radiological and non-radiological affects of decommissioning are still valid. These conclusions are summarized as follows:

- Annual occupational radiation exposures per individual will be maintained ALARA and below historical levels for the operating phase of the plant.
- All effluents, both radiological and non-radiological, will remain within regulatory limits as specified in applicable control documents and approvals throughout the decommissioning process.
- Exposure to onsite workers and the offsite public as a result of waste transportation are expected to be maintained well below the levels projected by NUREG-0586 (GEIS).
- Following decommissioning, residual radioactivity will be limited to allow release of the property for unrestricted use such that an individual of a critical population group living on the site would not be expected to receive a dose greater than 25 mrem/year from all combined environmental exposure pathways.

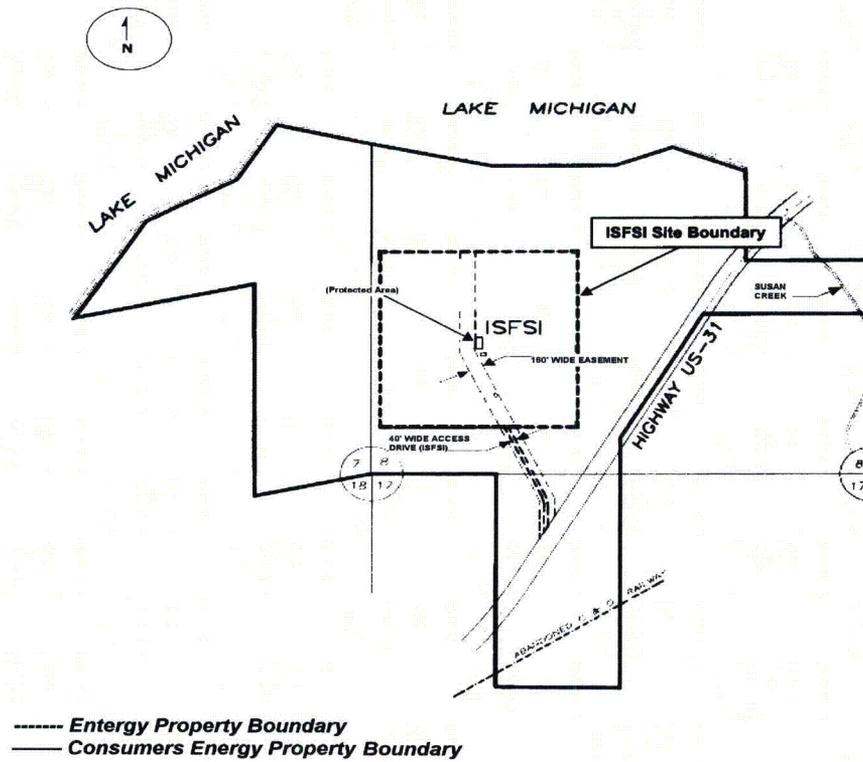


Figure 8-1. Big Rock Point Site Boundary Map

Big Rock Point Owner Controlled Area

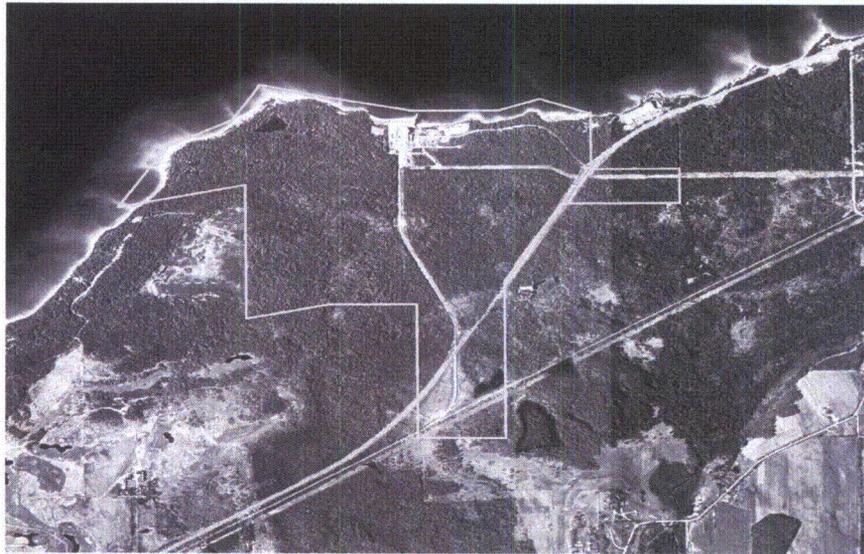


Figure 8-3. Aerial Image of BRP Prior to First Phase of Decommissioning



**Figure 8-4. Aerial Image of Energy Big Rock Point ISFSI
(As of 2007)**

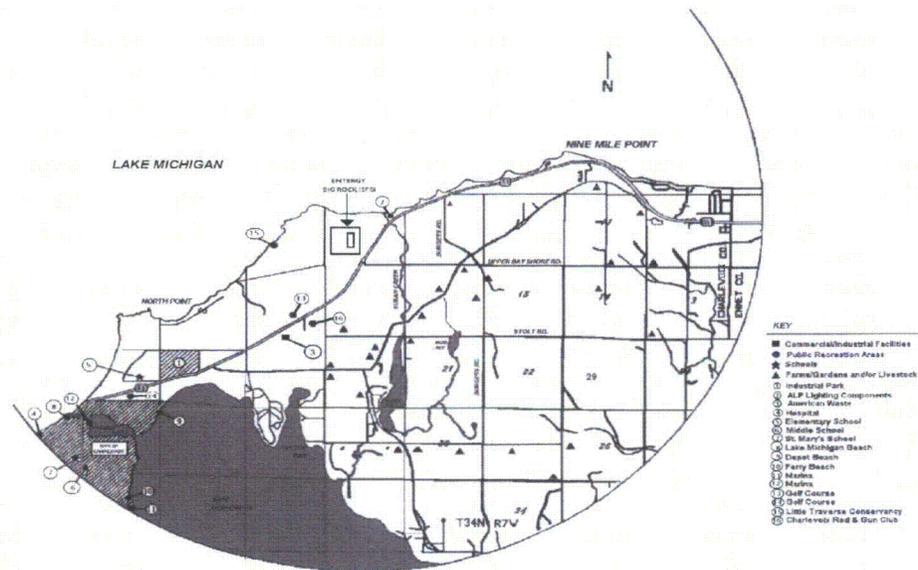


Figure 8-5. Land Use Within Five Miles of Big Rock Point

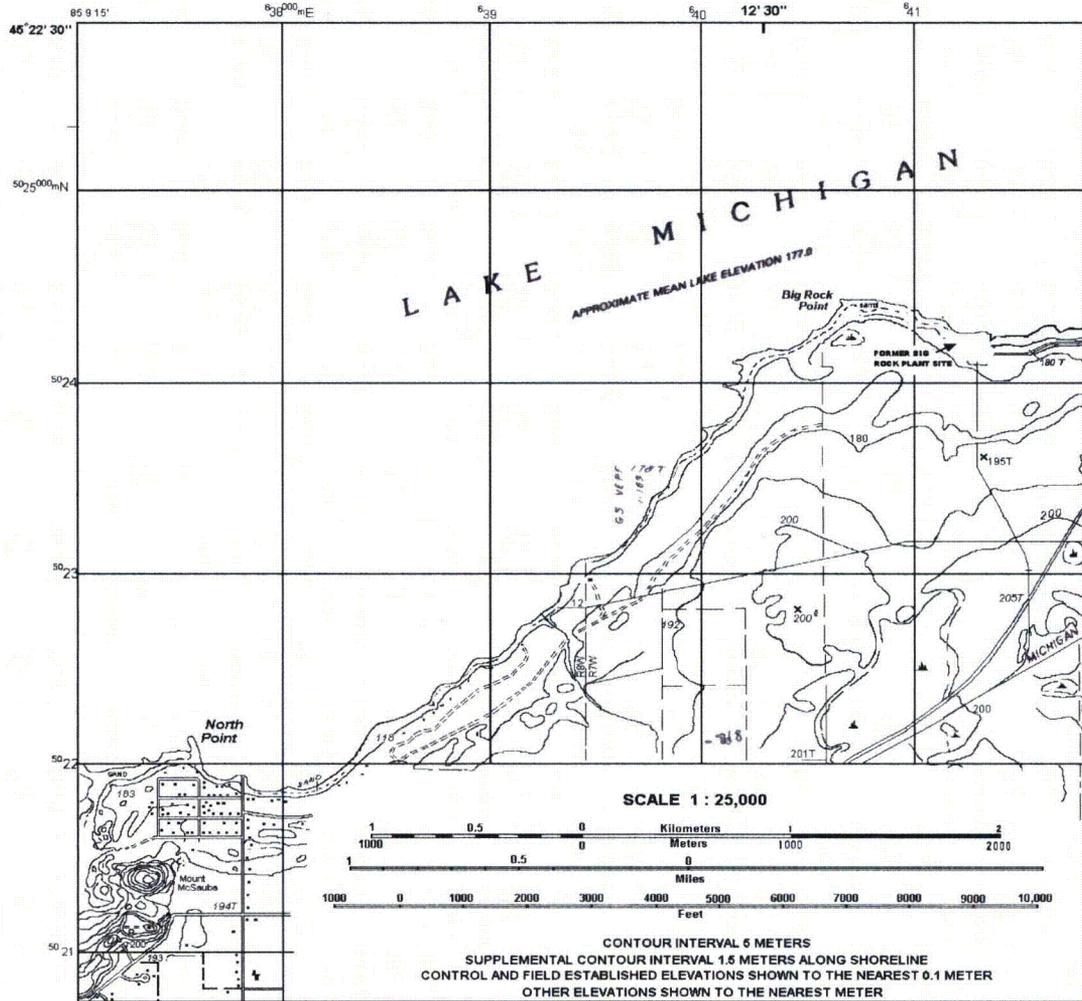
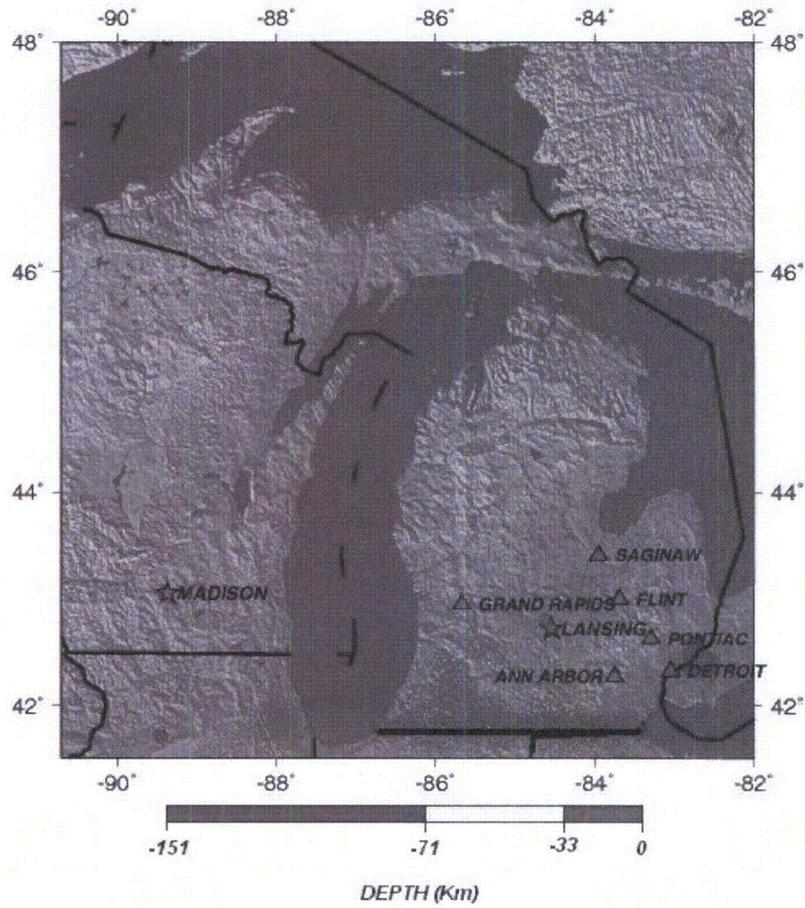


Figure 8-6. Topographic Map of Area Surrounding Big Rock Point



Depth is in kilometers.
Purple Triangles: Cities
Purple Star: Capital City
Circles: Earthquakes (color represents depth range)

Earthquake locations are from the USGS/NEIC PDE catalog.

Figure 8-7. USGS Seismic History for Michigan (1990 – 2006)

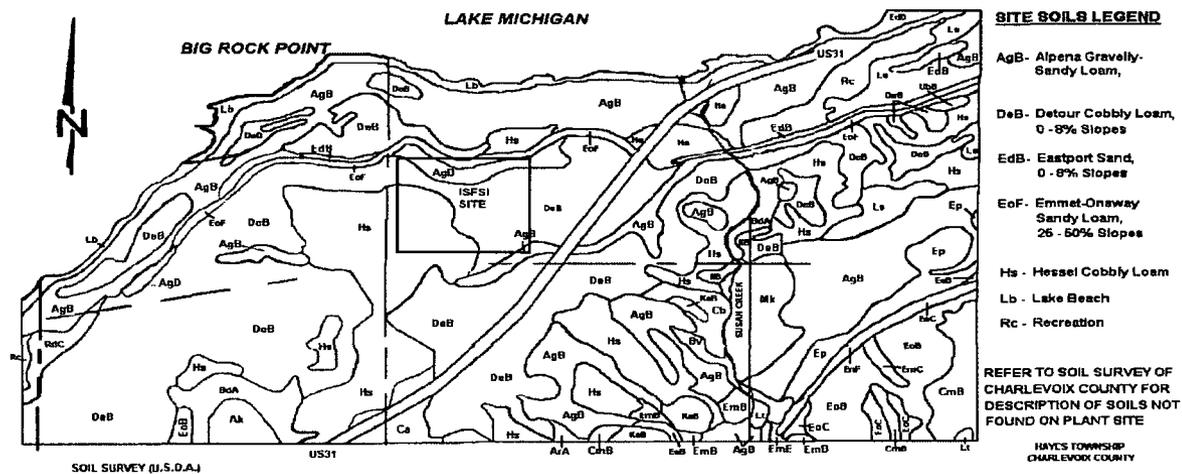


Figure 8-8. Big Rock Point Soil Types

8.8 REFERENCES

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