U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

NUREG-1437
Supplement 36

Generic Environmental Impact Statement for License Renewal of Nuclear Plants

Supplement 36

Regarding Beaver Valley Power Station, Units 1 and 2

Draft Report for Comment

Office of Nuclear Reactor Regulation

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Any interested party my submit comments on this report for consideration by the NRC staff. Comments may be accompanied by additional relevant information or supporting data. Please specify the report number NUREG-1437, Supplement 36, draft, in your comments, and send them by December 3, 2008to the following address:

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ABSTRACT

The U.S. Nuclear Regulatory Commission (NRC) considered the environmental impacts of renewing nuclear power plant operating licenses (OLs) for a 20-year period in NUREG-1437 "Generic Environmental Impact Statement for License Renewal of Nuclear Plants," Volumes 1 and 2 (GEIS), and codified the results in Title 10, Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions," of the *Code of Federal Regulations* (10 CFR Part 51). In the GEIS (and its Addendum 1), the NRC staff identifies 92 environmental issues and reaches generic conclusions related to environmental impacts for 69 of these issues that apply to all plants or to plants with specific design or site characteristics. The remaining 23 issues require additional plant-specific review. These plant-specific reviews are to be included in a supplement to the GEIS.

The NRC staff has prepared this draft supplemental environmental impact statement (SEIS) in response to an application submitted to the NRC by FirstEnergy Nuclear Operating Company (FENOC) to renew the OL for Beaver Valley Power Station (BVPS) Units 1 and 2 for an additional 20 years under 10 CFR Part 54, "Requirements for Renewal of Operating Licenses for Nuclear Power Plants." This draft SEIS includes the NRC staff's analysis of the environmental impacts of the proposed action, the environmental impacts of alternatives to the proposed action, and mitigation measures available for reducing or avoiding adverse impacts. It also includes the NRC staff's preliminary recommendation regarding the proposed action.

Concerning the 69 issues for which the GEIS reached generic conclusions, the NRC staff has not identified any information that is both new and significant for any issue that applies to BVPS. In addition, the NRC staff determined that information provided during the scoping process did not call into question the conclusions in the GEIS. Therefore, the NRC staff concludes that the impacts of renewing the BVPS OL would not be greater than impacts identified for these issues in the GEIS. For each of these issues, the NRC staff's conclusion in the GEIS is that the impact is of SMALL[1] significance.

Regarding the remaining 23 issues, this draft SEIS addresses those that apply to BVPS. For each applicable issue, the NRC staff concludes that the significance of the potential environmental impacts of renewal of the OL would be SMALL. The NRC staff determined that information provided during the scoping process did not identify any new issue with a significant environmental impact.

The NRC staff's preliminary recommendation is that the Commission determine that the adverse environmental impacts of license renewal for BVPS are not so great that preserving the option of license renewal for energy planning decisionmakers would be unreasonable. This recommendation is based on (1) the analysis and findings in the GEIS, (2) the environmental report submitted by FENOC, (3) consultation with Federal, State, and local agencies, (4) the NRC staff's own independent review, and (5) the NRC staff's consideration of public comments received during the scoping process.

[1] This designation indicates that environmental effects are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource.

Abstract

The NRC staff's preliminary recommendation is that the Commission determine that the adverse environmental impacts of license renewal for BVPS are not so great that preserving the option of license renewal for energy planning decisionmakers would be unreasonable. This recommendation is based on (1) the analysis and findings in the GEIS, (2) the environmental report submitted by FENOC, (3) consultation with Federal, State, and local agencies, (4) the NRC staff's own independent review, and (5) the NRC staff's consideration of public comments received during the scoping process.

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EXECUTIVE SUMMARY

By letter dated August 27, 2007, FirstEnergy Nuclear Operating Company (FENOC) submitted an application to the U.S. Nuclear Regulatory Commission (NRC) to renew the operating licenses (OLs) for Beaver Valley Power Station (BVPS) Units 1 and 2 for an additional 20-year period. If the OLs are renewed, State regulatory agencies and FENOC will ultimately decide whether the plant will continue to operate based on factors such as the need for power or other matters within the State's jurisdiction or the purview of the owners. If the NRC does not renew the OLs, then the plant must be shut down on or before the expiration date of the current OLs, which are January 29, 2016, for Unit 1, and May 27, 2027, for Unit 2.

The NRC has implemented Section 102 of the National Environmental Policy Act (NEPA), Title 42, Section 4321, of the *United States Code* (42 U.S.C. 4321) in Title 10, Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions," of the *Code of Federal Regulations* (10 CFR Part 51). In 10 CFR 51.20(b)(2), the Commission requires preparation of an environmental impact statement (EIS) or a supplement to an EIS for renewal of a reactor OL. In addition, 10 CFR 51.95(c) states that the EIS prepared at the OL renewal stage will be a supplement to the "Generic Environmental Impact Statement for License Renewal of Nuclear Plants" (GEIS), NUREG-1437, Volumes 1 and 2.[2]

Upon acceptance of the FENOC application, the NRC began the environmental review process described in 10 CFR Part 51 by publishing a Notice of Intent to prepare an EIS and conduct scoping. The NRC staff held public scoping meetings on November 27, 2007, in Pittsburgh, Pennsylvania, and conducted a site audit at BVPS in November 2007. In the preparation of this draft supplemental environmental impact statement (SEIS) for BVPS, the NRC staff reviewed the FENOC environmental report (ER) and compared it to the GEIS, consulted with other agencies, conducted an independent review of the issues following the guidance in NUREG-1555, "Standard Review Plans for Environmental Reviews for Nuclear Power Plants," Supplement 1, "Operating License Renewal," and considered the public comments received during the scoping process. Part 1 of Appendix A to this draft SEIS provides the public comments received during the scoping process.

The NRC staff will hold two public meetings in Pittsburgh in October 2008 to describe the preliminary results of the NRC environmental review, to answer questions, and to provide members of the public with information to assist them in formulating comments on this draft SEIS. When the comment period ends, the NRC staff will consider and address all of the comments received. Part 2 of Appendix A to the final SEIS will address these comments.

This draft SEIS includes the NRC staff's preliminary analysis that considers and weighs the environmental effects of the proposed action, the environmental impacts of alternatives to the

[2] The NRC originally issued the GEIS in 1996 and Addendum 1 to the GEIS in 1999. Hereafter, all references to the GEIS include the GEIS and its Addendum 1.

proposed action, and mitigation measures for reducing or avoiding adverse effects. It also includes the NRC staff's preliminary recommendation regarding the proposed action.

The Commission has adopted the following statement of purpose and need for license renewal from the GEIS:

> The purpose and need for the proposed action (renewal of an operating license) is to provide an option that allows for power generation capability beyond the term of a current nuclear power plant operating license to meet future system generating needs, as such needs may be determined by State, utility, and, where authorized, Federal (other than NRC) decision makers.

The evaluation criterion for the NRC staff's environmental review, as defined in 10 CFR 51.95(c)(4) and the GEIS, is to determine the following:

> ...whether or not the adverse environmental impacts of license renewal are so great that preserving the option of license renewal for energy planning decision makers would be unreasonable.

Both the statement of purpose and need and the evaluation criterion implicitly acknowledge that there are factors, in addition to license renewal, that will ultimately determine whether an existing nuclear power plant continues to operate beyond the period of the current OL.

NRC regulations (10 CFR 51.95(c)(2)) contain the following statement regarding the content of an SEIS prepared at the license renewal stage:

> The supplemental environmental impact statement for license renewal is not required to include discussion of need for power or the economic costs and economic benefits of the proposed action or of alternatives to the proposed action except insofar as such benefits and costs are either essential for a determination regarding the inclusion of an alternative in the range of alternatives considered or relevant to mitigation. In addition, the supplemental environmental impact statement prepared at the license renewal stage need not discuss other issues not related to the environmental effects of the proposed action and the alternatives, or any aspect of the storage of spent fuel for the facility within the scope of the generic determination in § 51.23(a) ["Temporary storage of spent fuel after cessation of reactor operation–generic determination of no significant environmental impact"] and in accordance with § 51.23(b).

The GEIS contains the results of a systematic evaluation of the consequences of renewing an OL and operating a nuclear power plant for an additional 20 years. It evaluates 92 environmental issues using the NRC's three-level standard of significance—SMALL, MODERATE, or LARGE—developed using the Council on Environmental Quality guidelines. Footnotes to Table B-1 of 10 CFR Part 51, Subpart A, "National Environmental Policy Act—Regulations Implementing Section 102(2)," Appendix B, "Environmental Effect of Renewing the Operating License of a Nuclear Power Plant," provide the following definitions of the three significance levels:

(1) SMALL—Environmental effects are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource.

(2) MODERATE—Environmental effects are sufficient to alter noticeably, but not to destabilize, important attributes of the resource.

(3) LARGE—Environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource.

For 69 of the 92 issues considered in the GEIS, the analysis in the GEIS reached the following conclusions:

- The environmental impacts associated with the issue have been determined to apply either to all plants or, for some issues, to plants having a specific type of cooling system or other specified plant or site characteristics.
- A single significance level (i.e., SMALL, MODERATE, or LARGE) has been assigned to the impacts (except for collective offsite radiological impacts from the fuel cycle and from high-level waste and spent fuel disposal).
- Mitigation of adverse impacts associated with the issue has been considered in the analysis, and it has been determined that additional plant-specific mitigation measures are not likely to be sufficiently beneficial to warrant implementation.

The GEIS identified these 69 issues as Category 1 issues. In the absence of new and significant information, the NRC staff relied on conclusions in the GEIS for issues designated as Category 1 in Table B-1 of 10 CFR Part 51, Subpart A, Appendix B.

Of the 23 issues that do not meet the criteria given above, 21 are classified as Category 2 issues requiring analysis in a plant-specific supplement to the GEIS. The remaining two issues, environmental justice and chronic effects of electromagnetic fields, were not categorized. Environmental justice was not evaluated generically and must be addressed in a plant-specific supplement to the GEIS. Information on the chronic effects of electromagnetic fields was not conclusive at the time the GEIS was prepared.

This draft SEIS documents the NRC staff's consideration of all 92 environmental issues identified in the GEIS. The NRC staff considered the environmental impacts associated with alternatives to license renewal and compared the environmental impacts of license renewal and the alternatives. The alternatives to license renewal that the staff considered include the no-action alternative (not renewing the OL for BVPS), conservation alternative, and alternative methods of power generation. Based on projections made by the U.S. Department of Energy's Energy Information Administration, gas- and coal-fired generation appear to be the most likely power generation alternatives if the power from BVPS is replaced. The staff's evaluation of these alternatives assumed that the replacement power generation plant is located at either the BVPS site or some other unspecified alternate location.

The NRC staff has an established process for identifying and evaluating the significance of any new information on the environmental impacts of license renewal. The staff identified no new and significant information related to Category 1 issues that would call into question the conclusions in the GEIS. Similarly, the NRC staff, through its review process or the public scoping process, identified no new environmental issues applicable to BVPS. Therefore, the NRC staff relies on the conclusions of the GEIS for all Category 1 issues applicable to BVPS.

The FENOC ER presents an analysis of the Category 2 issues applicable to BVPS, in addition to the issue of environmental justice. The NRC staff has reviewed the FENOC analysis for each issue and has conducted an independent review of each issue plus environmental justice. Nine Category 2 issues are not applicable because they are related to plant design features or site characteristics not found at BVPS (See Appendix F).

In chapter 3, nine Category 2 issues specifically related to refurbishment (Terrestrial Resources, Threatened and Endangered Species, Air Quality, Housing Impacts, Public Services - Public Utilities, Public Services - Education, Offsite Land Use, Public Services – Transportation, Historic and Archaeological Resources), plus environmental justice, are addressed in this SEIS. In its environmental report, FENOC stated it does not have plans to undertake any major refurbishment or replacement actions to maintain the functionality of important systems, structures, or components for purposes of license renewal. However, FENOC has indicated possible Unit 2 steam generator (SG) repair or replacement during the license renewal term. Though the NRC staff acknowledges that Unit 2 SG replacement is not a certainty, the staff has reviewed the potential environmental impacts of this activity. The NRC staff has included a discussion of these impacts in chapter 3, using the GEIS refurbishment framework to guide their analysis. For these nine Category 2 issues and environmental justice, related to refurbishment, the NRC staff concludes that the potential environmental effects range from no impact to SMALL significance in the context of the standards in the GEIS.

In chapter 4, this draft SEIS discusses in detail eight Category 2 issues (Threatened and Endangered Species, Microbiological Organisms, Acute Effects of Electromagnetic Fields, Housing Impacts, Public Services - Public Utilities, Offsite Land Use, Public Services - Transportation, and Historic and Archeological Resources) related to operational impacts and postulated accidents during the renewal term, as well as environmental justice and chronic effects of electromagnetic fields. Five of these Category 2 issues (Threatened and Endangered Species, Housing Impacts, Public Services - Public Utilities, Public Services - Transportation, and Historic and Archeological Resources) and environmental justice apply to both refurbishment and to operation during the renewal term. For these eight Category 2 issues and environmental justice, the NRC staff concludes that the potential environmental effects are of SMALL significance in the context of the standards in the GEIS. In addition, the NRC staff determined that appropriate Federal health agencies have not reached a consensus on the existence of chronic adverse effects from electromagnetic fields. Therefore, no further evaluation of this issue is required.

In chapter 5, for severe accident mitigation alternatives (SAMAs), the NRC staff concludes that a reasonable, comprehensive effort was made to identify and evaluate SAMAs. Based on its review of the SAMAs for BVPS and the plant improvements already made, the NRC staff concludes that five Unit 1 SAMAs and three Unit 2 SAMAs are potentially cost-beneficial. Given the potential for cost-beneficial risk reduction, the staff considers that further evaluation of these SAMAs by FENOC is warranted. However, none of these SAMAs relate to adequately managing the effects of aging during the period of extended operation. Therefore, they need not be implemented as part of license renewal pursuant to 10 CFR Part 54, "Requirements for Renewal of Operating Licenses for Nuclear Power Plants."

Mitigation measures were considered for each Category 2 issue. For most issues, the staff found current measures to mitigate the environmental impacts of plant operation to be adequate. In cases where the impact of continued operation in the period of extended operation was nonexistent, no consideration or documentation of mitigation is required.

The analysis considered cumulative impacts of past, present, and reasonably foreseeable future actions, regardless of which agency (Federal or non-Federal) or person undertakes such other actions. For purposes of this analysis, where the BVPS license renewal impacts are deemed to be SMALL, the NRC staff concluded that these impacts would not result in significant cumulative impacts on potentially affected resources.

If the BVPS OLs are not renewed and the plant ceases operation on or before the expiration of its current OL, then the adverse impacts of likely power-generating alternatives would not necessarily be smaller than those associated with continued operation of BVPS. The impacts may be greater in some areas, depending on the alternatives selected.

The preliminary recommendation of the NRC staff is that the Commission determine that the adverse environmental impacts of license renewal for BVPS are not so great that preserving the option of license renewal for energy planning decision makers would be unreasonable. This recommendation is based on (1) the analysis and findings in the GEIS; (2) the ER submitted by FENOC; (3) consultation with other Federal, State, and local agencies; (4) the NRC staff's own independent review; and (5) the NRC staff's consideration of public comments received during the scoping process.

1.0 INTRODUCTION

Under Title 10, Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions," of the *Code of Federal Regulations* (10 CFR Part 51), which implements the National Environmental Policy Act (NEPA), renewal of a nuclear power plant operating license (OL) requires the preparation of an environmental impact statement (EIS). In preparing the EIS, the staff of the U.S. Nuclear Regulatory Commission (NRC) is required first to issue the statement in draft form for public comment and then to issue a final statement after considering public comments on the draft. To support the preparation of the EIS, the staff prepared NUREG-1437, "Generic Environmental Impact Statement for License Renewal of Nuclear Plants," Volumes 1 and 2 (NRC 1996; 1999b) (GEIS).[3] The GEIS is intended to (1) provide an understanding of the types and severity of environmental impacts that may occur as a result of license renewal of nuclear power plants under 10 CFR Part 54, "Requirements for Renewal of Operating Licenses for Nuclear Power Plants," (2) identify and assess the impacts that are expected to be generic to license renewal, and (3) support 10 CFR Part 51 in defining the number and scope of issues that applicants need to address in plant-by-plant renewal proceedings. Use of the GEIS guides the preparation of complete plant-specific information in support of the OL renewal process.

The FirstEnergy Nuclear Operating Company (FENOC) operates Beaver Valley Power Station (BVPS) nuclear reactor Units 1 and 2 in Shippingport, Pennsylvania, under OLs DPR-66 and NPF-73, which were issued by the NRC on July 2, 1976 and August 14, 1987, respectively. These OLs will expire January 29, 2016, for Unit 1 and May 27, 2027, for Unit 2. On August 28, 2007, FENOC submitted an application (FENOC 2007b) to the NRC to renew the BVPS Unit 1 and 2 OLs for an additional 20 years under 10 CFR Part 54. FENOC is a licensee for the purposes of its current OLs and an applicant for the renewal of the OLs. Pursuant to 10 CFR 54.23, "Contents of Application—Technical Specifications," and 10 CFR 51.53(c), FENOC submitted an environmental report (ER) (FENOC 2007a) in which it analyzed the environmental impacts associated with the proposed license renewal action, considered alternatives to the proposed action, and evaluated mitigation measures for reducing adverse environmental effects.

This report is the plant-specific supplement to the GEIS (the supplemental EIS (SEIS)) for the FENOC license renewal application. This SEIS is a supplement to the GEIS because it relies, in part, on the findings of the GEIS. The staff will also prepare a separate safety evaluation report in accordance with 10 CFR Part 54.

[3] The NRC originally issued the GEIS in 1996 and issued Addendum 1 to the GEIS in 1999. Hereafter, all references to the GEIS include the GEIS and its Addendum 1.

1.1 Report Contents

The following sections of this introduction (1) describe the background for the preparation of this SEIS, including the development of the GEIS and the process used by the staff to assess the environmental impacts associated with license renewal, (2) describe the proposed Federal action to renew the BVPS Unit 1 and 2 OLs, (3) discuss the purpose and need for the proposed action, and (4) present the status of FENOC compliance with environmental quality standards and requirements imposed by Federal, State, regional, and local agencies responsible for environmental protection.

The ensuing chapters of this SEIS closely parallel the contents and organization of the GEIS. Chapter 2 describes the site, power plant, and interactions of the plant with the environment. Chapters 3 and 4, respectively, discuss the potential environmental impacts of plant refurbishment and plant operation during the renewal term. Chapter 5 contains an evaluation of potential environmental impacts of plant accidents and includes consideration of severe accident mitigation alternatives. Chapter 6 discusses the uranium fuel cycle and solid waste management. Chapter 7 discusses decommissioning, and Chapter 8 discusses alternatives to license renewal. Finally, Chapter 9 summarizes the findings of the preceding chapters and draws conclusions about the adverse impacts that cannot be avoided, the relationship between short-term uses of man's environment and the maintenance and enhancement of long-term productivity, and the irreversible or irretrievable commitment of resources. Chapter 9 also presents the staff's preliminary recommendation with respect to the proposed license renewal action.

The appendixes include additional information. Appendix A contains public comments related to the environmental review for license renewal and staff responses to those comments. Appendixes B through G, respectively, list the following:

- the preparers of the supplement

- the chronology of the NRC staff's environmental review correspondence related to this SEIS

- the organizations contacted during the development of this SEIS

- FENOC compliance status in Table E-1 (this appendix also contains copies of consultation correspondence prepared and sent during the evaluation process)

- GEIS environmental issues that are not applicable to BVPS Units 1 and 2

- severe accident mitigation alternatives (SAMAs).

1.2 Background

Use of the GEIS, which examines the possible environmental impacts that could occur as a result of renewing individual nuclear power plant OLs under 10 CFR Part 54, and the established license renewal evaluation process support the thorough evaluation of the impacts of renewal of OLs.

1.2.1 Generic Environmental Impact Statement

The NRC initiated a generic assessment of the environmental impacts associated with the license renewal term to improve the efficiency of the license renewal process by documenting the assessment results and codifying the results in the Commission's regulations. The GEIS, which serves as the principal reference for all nuclear power plant license renewal EISs, contains this assessment.

The GEIS documents the results of the systematic approach that was taken to evaluate the environmental consequences of renewing the licenses of individual nuclear power plants and operating them for an additional 20 years. For each potential environmental issue, the GEIS (1) describes the activity that affects the environment, (2) identifies the population or resource that is affected, (3) assesses the nature and magnitude of the impact on the affected population or resource, (4) characterizes the significance of the effect for both beneficial and adverse effects, (5) determines whether the results of the analysis apply to all plants, and (6) considers whether additional mitigation measures would be warranted for impacts that would have the same significance level for all plants.

The NRC established its standard of significance for impacts by using the Council on Environmental Quality (CEQ) terminology for "significantly" (40 CFR 1508.27, which requires consideration of both "context" and "intensity"). Using the CEQ terminology, the NRC established three significance levels—SMALL, MODERATE, and LARGE. The footnotes to Table B-1 of Appendix B, "Environmental Effect of Renewing the Operating License of a Nuclear Power Plant," to Subpart A, "National Environmental Policy Act—Regulations Implementing Section 102(2),"of 10 CFR Part 51 define the three significance levels as follows:

- SMALL—Environmental effects are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource.

- MODERATE—Environmental effects are sufficient to alter noticeably, but not to destabilize, important attributes of the resource.

- LARGE—Environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource.

The GEIS assigns a significance level to each environmental issue, assuming that ongoing mitigation measures would continue.

The GEIS includes a determination of whether the analysis of the environmental issue could be applied to all plants and whether additional mitigation measures would be warranted. Issues are assigned a Category 1 or a Category 2 designation. As set forth in the GEIS, Category 1 issues are those that meet all of the following criteria:

(1) The environmental impacts associated with the issue have been determined to apply either to all plants or, for some issues, to plants having a specific type of cooling system or other specified plant or site characteristics.

(2) A single significance level (i.e., SMALL, MODERATE, or LARGE) has been assigned to the impacts (except for collective offsite radiological impacts from the fuel cycle and from high-level waste and spent fuel disposal).

(3) Mitigation of adverse impacts associated with the issue has been considered in the analysis, and it has been determined that additional plant-specific mitigation measures are likely not to be sufficiently beneficial to warrant implementation.

For issues that meet the three Category 1 criteria, no additional plant-specific analysis is required in this SEIS unless new and significant information emerges.

Category 2 issues are those that do not meet one or more of the criteria of Category 1, and therefore, require additional plant-specific review.

In the GEIS, the staff assessed 92 environmental issues and determined that 69 qualified as Category 1 issues, 21 qualified as Category 2 issues, and 2 issues (environmental justice and chronic effects of electromagnetic fields) were not categorized. Environmental justice was not evaluated on a generic basis and must be addressed in a plant-specific supplement to the GEIS. Information on the chronic effects of electromagnetic fields was not conclusive at the time the GEIS was prepared.

Of the 92 issues, 11 are related only to refurbishment, 6 are related only to decommissioning, 67 apply only to operation during the renewal term, and 8 apply to both refurbishment and operation during the renewal term. Table B-1 of Appendix B to Subpart A of 10 CFR Part 51 codifies a summary of the findings for all 92 issues in the GEIS.

1.2.2 License Renewal Evaluation Process

An applicant seeking to renew its OL is required to submit an ER as part of its application. The license renewal evaluation process involves careful review of the applicant's ER and assurance that all new and potentially significant information not already addressed in or available during the GEIS evaluation is identified, reviewed, and assessed to verify the environmental impacts of the proposed license renewal.

In accordance with 10 CFR 51.53(c)(2) and (3), the ER submitted by the applicant must contain the following:

- an analysis of the Category 2 issues in Table B-1 of Appendix B to Subpart A of 10 CFR Part 51 in accordance with 10 CFR 51.53(c)(3)(ii)

- a discussion of actions to mitigate any adverse impacts associated with the proposed action and environmental impacts of alternatives to the proposed action

In accordance with 10 CFR 51.53(c)(2), the ER does not need to do the following:

- consider the economic benefits and costs of the proposed action and alternatives to the proposed action except insofar as such benefits and costs are either (1) essential for making a determination regarding the inclusion of an alternative in the range of alternatives considered or (2) relevant to mitigation

- consider the need for power and other issues not related to the environmental effects of the proposed action and the alternatives

- discuss any aspect of the storage of spent fuel within the scope of the generic determination in 10 CFR 51.23(a) in accordance with 10 CFR 51.23(b)

- contain an analysis of any Category 1 issue, unless there is significant new information on a specific issue, in accordance with 10 CFR 51.23(c)(3)(iii) and (iv)

New and significant information is (1) information that identifies an important environmental issue not covered in the GEIS and codified in Table B-1 of Appendix B to Subpart A of 10 CFR Part 51 or (2) information that was not considered in the analyses summarized in the GEIS and that leads to an impact finding that is different from the finding presented in the GEIS and codified in 10 CFR Part 51.

In preparing to submit its application to renew the BVPS Unit 1 and 2 OLs, FENOC developed a process to ensure that information not addressed in or available during the GEIS evaluation regarding the environmental impacts of license renewal for BVPS Units 1 and 2 would be properly reviewed before submittal of the ER, and to ensure that such new and potentially significant information related to renewal of the licenses for Units 1 and 2 would be identified, reviewed, and assessed during the period of NRC review. FENOC reviewed the Category 1 issues that appear in Table B-1 of Appendix B to Subpart A of 10 CFR Part 51 to verify that the conclusions of the GEIS remained valid with respect to BVPS Units 1 and 2. Personnel from FENOC and its support organization who were familiar with NEPA issues and the scientific disciplines involved in the preparation of a license renewal ER performed this review.

The NRC staff also has a process for identifying new and significant information. "Standard Review Plans for Environmental Reviews for Nuclear Power Plants, Supplement 1: Operating License Renewal," NUREG-1555, Supplement 1 (NRC 1999a) describes that process in detail. The search for new information includes (1) review of an applicant's ER and the process for discovering and evaluating the significance of new information; (2) review of records of public comments; (3) review of environmental quality standards and regulations; (4) coordination with Federal, State, and local environmental protection and resource agencies; and (5) review of the technical literature. New information discovered by the staff is evaluated for significance using the criteria set forth in the GEIS. For Category 1 issues for which new and significant information has emerged, reconsideration of the conclusions for those issues is limited in scope to the assessment of the relevant new and significant information; the scope of the assessment does not include other facets of the issue that are unaffected by the new information.

Chapters 3 through 7 discuss the environmental issues considered in the GEIS that are applicable to BVPS Units 1 and 2. At the beginning of the discussion of each set of issues, a table identifies the issues to be addressed and lists the sections in the GEIS that discuss the issues. Category 1 and 2 issues are listed in separate tables. For Category 1 issues for which there is no new and significant information, a set of short paragraphs after the table states the GEIS conclusion codified in Table B-1 of Appendix B to Subpart A of 10 CFR Part 51, and the staff's analysis and conclusion follow. For Category 2 issues, in addition to the list of GEIS sections discussing the issue, the tables list the subparagraph of 10 CFR 51.53(c)(3)(ii) that describes the analysis required and the draft SEIS sections that present the analysis. The draft SEIS sections that discuss the Category 2 issues immediately follow the table.

The NRC prepares an independent analysis of the environmental impacts of license renewal and compares these impacts with the environmental impacts of alternatives. The evaluation of the FENOC license renewal application began with publication of a notice of acceptance for docketing and opportunity for a hearing in the *Federal Register* (FR) (72 FR 60916) (NRC 2007a) on October 26, 2007. The staff published a notice of intent to prepare an EIS and conduct scoping (72 FR 62497) (NRC 2007b) on November 5, 2007. The NRC held two public scoping meetings on November 27, 2007, in Pittsburgh, Pennsylvania. The "Environmental Impact Statement Scoping Process: Summary Report—BVPS Units 1 and 2, Pennsylvania" (NRC 2008), dated January 29, 2008, summarizes comments received during the scoping period. Part 1 of Appendix A presents comments applicable to this environmental review.

The staff followed the review guidance contained in NUREG-1555, Supplement 1 (NRC 1999a). The staff visited the BVPS site to conduct an environmental audit on November 13-16, 2007, to gather information and to become familiar with the site and its environs. The staff also reviewed the comments received during scoping and consulted with Federal, State, regional, and local agencies. Appendix D provides a list of the organizations consulted. The staff also reviewed other documents related to BVPS Units 1 and 2 and references them in this SEIS.

This SEIS presents the staff's analysis that considers and weighs the environmental effects of the proposed renewal of the OLs for BVPS Units 1 and 2, the environmental impacts of alternatives to license renewal, and mitigation measures available for avoiding adverse environmental effects. Chapter 9, "Summary and Conclusions," provides the NRC staff's preliminary recommendation to the Commission as to whether the adverse environmental impacts of license renewal are so great that preserving the option of license renewal for energy planning decisionmakers would be unreasonable.

A 75-day comment period will begin on the date of publication of the U.S. Environmental Protection Agency Notice of Filing of the draft SEIS to allow members of the public to comment on the preliminary results of the NRC staff's review. During this comment period, the NRC will hold two public meetings in Pittsburgh, Pennsylvania, in October 2008. During these meetings, the staff will describe the preliminary results of the NRC environmental review and answer related questions to provide members of the public with information to assist them in formulating their comments.

1.3 The Proposed Federal Action

The proposed Federal action is renewal of the OLs for BVPS Units 1 and 2. The BVPS plant is located in western Pennsylvania on the south bank of the Ohio River, approximately 25 miles northwest of Pittsburgh, Pennsylvania; approximately 1 mile southeast of Midland, Pennsylvania; 7 miles east of East Liverpool, Ohio; 8 miles east of Newell, West Virginia; and 8 miles southwest of Beaver, Pennsylvania. The plant has two Westinghouse-designed pressurized-water reactors, each with a design power level of 2900 megawatts thermal and a gross electrical output of 974 megawatts electric (MWe) for Unit 1 and 969 MWe for Unit 2. Two closed-cycle, hyperbolic natural draft cooling towers dissipate heat primarily to the air to provide plant cooling. Units 1 and 2 produce electricity to supply the needs of more than 13,000 homes. The current OL for Unit 1 expires on January 29, 2016, and for Unit 2 on May 27, 2027. By letter dated August 28, 2007, FENOC submitted an application to the NRC (FENOC 2007b) to renew these OLs for an additional 20 years of operation (i.e., until January 29, 2036, for Unit 1 and May 27, 2047, for Unit 2).

1.4 The Purpose and Need for the Proposed Action

Although a licensee must have a renewed license to operate a reactor beyond the term of the existing OL, the possession of that license is just one of a number of conditions that the licensee must meet to continue plant operation during the term of the renewed license. Once an OL is renewed, State regulatory agencies and the owners of the plant will ultimately decide whether the plant will continue to operate based on factors such as the need for power or other matters within the State's jurisdiction or the purview of the owners.

Thus, for license renewal reviews, the NRC has adopted the following definition of purpose and need (GEIS, Section 1.3):

The purpose and need for the proposed action (renewal of an operating license) is to provide an option that allows for power generation capability beyond the term of a current nuclear power plant operating license to meet future system generating needs, as such needs may be determined by State, utility, and where authorized, Federal (other than NRC) decision makers.

This definition of purpose and need reflects the Commission's recognition that, unless there are findings in the safety review required by the Atomic Energy Act (AEA)of 1954 or findings in the NEPA environmental analysis that would lead the NRC to reject a license renewal application, the NRC does not have a role in the energy-planning decisions of State regulators and utility officials as to whether a particular nuclear power plant should continue to operate. From the perspective of the licensee and the State regulatory authority, the purpose of renewing an OL is to maintain the availability of the nuclear plant to meet system energy requirements beyond the current term of the plant's license.

1.5 Compliance and Consultations

FENOC is required to hold certain Federal, State, and local environmental permits, as well as meet relevant Federal and State statutory requirements. In its ER, FENOC provided a list of the authorizations from Federal, State, and local authorities for current operations as well as environmental approvals and consultations associated with BVPS Unit 1 and 2 license renewal. Appendix E includes authorizations and consultations relevant to the proposed OL renewal action.

The staff has reviewed the list and consulted with the appropriate Federal, State, and local agencies to identify any compliance or permit issues or significant environmental issues of concern to the reviewing agencies. These agencies did not identify any new and significant environmental issues. The ER states that FENOC is in compliance with applicable environmental standards and requirements for BVPS Units 1 and 2. The staff has not identified any environmental issues that are both new and significant.

1.6 References

10 CFR Part 51. *Code of Federal Regulations*, Title 10, *Energy,* Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions."

10 CFR Part 54. *Code of Federal Regulations*, Title 10, *Energy,* Part 54, "Requirements for Renewal of Operating Licenses for Nuclear Power Plants."

40 CFR 1508. *Code of Federal Regulations,* Title 40, *Protection of Environment*, Part 1508, "Terminology and Index."

Atomic Energy Act of 1954 (AEA). 42 U.S.C. 2011, et seq.

FirstEnergy Nuclear Operating Company (FENOC). 2007a. "Applicant's Environmental Report—Operating License Renewal Stage. Appendix E of License Renewal Application, Beaver Valley Power Station, Units 1 and 2." Docket Numbers 50-334 and 50-412. August 2007. Agencywide Documents Access and Management System (ADAMS) Accession No. ML072470523.

FirstEnergy Nuclear Operating Company (FENOC). 2007b. "Application for Renewed Operating Licenses for Beaver Valley Power Station, Units 1 and 2." Docket Numbers 50-334 and 50-412. August 2007. ADAMS Accession Nos. ML072430914, ML072430916, ML072470493, ML072430180, and ML072550179.

National Environmental Policy Act of 1969 (NEPA). 42 U.S.C. 4321, et seq.

U.S. Nuclear Regulatory Commission (NRC). 2008. "Environmental Impact Statement Scoping Process Summary Report—BVPS Units 1 & 2, Shippingport, Pennsylvania." January 29, 2008. Washington, DC. ADAMS Accession No. ML080240411.

U.S. Nuclear Regulatory Commission (NRC). 2007a. "Notice of Acceptance for Docketing of the Application and Notice of Opportunity for a Hearing Regarding Renewal of License, Docket Nos. DPR-66 and NPF-73 for an Additional Twenty-Year Period." *Federal Register:* Vol. 72, No. 207, pp. 60916–60918. October 26, 2007. ADAMS Accession No. ML072900397.

U.S. Nuclear Regulatory Commission (NRC). 2007b. "Notice of Intent to Prepare an Environmental Impact Statement and Conduct Scoping Process." Docket Nos. DPR-66 and NPF-73, *Federal Register:* Vol. 72, No. 198, pp. 62497–62499. November 5, 2007. ADAMS Accession No. ML072900650.

U.S. Nuclear Regulatory Commission (NRC). 1999a. "Standard Review Plans for Environmental Reviews for Nuclear Power Plants, Supplement 1: Operating License Renewal." NUREG-1555, Supplement 1, Washington, DC.

U.S. Nuclear Regulatory Commission (NRC). 1999b. "Generic Environmental Impact Statement for License Renewal of Nuclear Plants," Main Report, Section 6.3, "Transportation," Table 9.1, "Summary of findings on NEPA issues for license renewal of nuclear power plants, Final Report." NUREG-1437, Volume 1, Addendum 1, Washington, DC.

U.S. Nuclear Regulatory Commission (NRC). 1996. "Generic Environmental Impact Statement for License Renewal of Nuclear Plants." NUREG-1437, Volumes 1 and 2, Washington, DC.

2.0 DESCRIPTION OF NUCLEAR POWER PLANT AND SITE AND PLANT INTERACTION WITH THE ENVIRONMENT

The Beaver Valley Power Station (BVPS) of FirstEnergy Nuclear Operating Company (FENOC) is located on the south bank of the Ohio River at approximate river mile 34.8 in Shippingport Borough, Beaver County, Pennsylvania. The station consists of two units, Units 1 and 2, which are nuclear reactors and are the subject of this action. Each nuclear reactor is a pressurized light-water reactor with three steam generators producing steam that turns turbines to generate electricity. The Ohio river is the source of cooling water for the station. The station uses two closed-cycle, natural draft cooling towers as its primary source of cooling.

2.1 Plant and Site Description and Proposed Plant Operation during the Renewal Term

As indicated in FENOC's Environmental Report (ER) (FENOC 2007a), the BVPS site region encompasses portions of Pennsylvania, Ohio, and West Virginia. The BVPS site coordinates are latitude 40.6219°N and longitude 80.4339°W, and the site is situated with the Ohio River to the north and State routes (SRs) 168 and 3016, Ferry Hill Road, to the south and east. The general features in the site vicinity have changed relatively little since the mid-1980s, when BVPS Unit 2 began operation. The BVPS site consists of approximately 453 acres of which roughly half are developed or maintained and encompassed by plant, switchyard, and related support facilities and infrastructure. The remainder of the site consists of forested lands. This section describes the plant and its environs, and Section 2.2 addresses the plant's interaction with the environment.

2.1.1 External Appearance and Setting

FENOC's ER (FENOC 2007a) further details that BVPS is situated within the Pittsburgh Low Plateau Section of the Appalachian Plateau Physiographic Province. The region is characterized by a smooth, rolling hill landscape and an upland surface traversed by several narrow, relatively shallow river valleys. Valley sides are usually moderately steep, except in the upper reaches of streams where the side slopes are fairly gentle. Elevations range from 660 to 1700 feet. Local relief on the uplands is generally less than 200 feet, with differences of as much as 600 feet between valley bottoms and upland surfaces (FENOC 2007a).

The presence of the Ohio River and the hilly topography of the area have contributed to the development of industrial river towns where the majority of industries and residences are concentrated on relatively level land adjacent to the river. Pittsburgh, the largest city within 50 miles, is the center for this industrial activity. Industries include mineral/waste recycling, chemical production, power generation, fuel distribution, ceramics, and construction materials manufacturing. The municipalities of Monaca, Rochester, and Aliquippa are mostly industrial. Steep slopes and broad, relatively flat hilltops characterize the topography beyond the river valley. Many of these rural upland areas are forested, particularly on slopes. Pastureland, cropland, and new residential development predominantly occupy the hilltops and gentler slopes. Beaver municipality is mostly residential (FENOC 2007a).

The major river systems in the region consist of the Monongahela, Allegheny, and Ohio Rivers and their tributaries. These rivers join at Pittsburgh to form the Ohio River, which then flows 981 river miles to Cairo, Illinois, where it meets the Mississippi River. A series of locks and dams operated by the U.S. Army Corps of Engineers (USACE) maintains and controls the three river connection areas, along with the river section in proximity to BVPS (USACE 2007). The U.S. Coast Guard (USCG) established a security zone on the river waters adjacent to the BVPS site, which indefinitely prohibits persons and vessels from entering the zone unless authorized by the commanding USCG Captain (FENOC 2007a).

Several public lands within or near the BVPS site vicinity are dedicated to wildlife management and recreation. These public lands include the Shippingport Community Park, a 7.5-acre public recreation facility, a portion of the Ohio River Islands National Wildlife Refuge, Raccoon Creek State Park, Pennsylvania Game Lands Number 189, Beaver Creek State Forest, Brady Run County Park, and Pennsylvania Game Lands Number 173. Most if not all of 21 Ohio River islands and 3 mainland tracts are included in the 3221-acre, 400 river-mile Ohio River islands National Wildlife Refuge established in 1990. Georgetown Island and Phillis Island are located in the vicinity of BVPS, and the latter lies partially within the BVPS exclusion area (FENOC 2007a).

Approximately half of the land on the BVPS site is developed or maintained and encompassed by plant, switchyard, and related support facilities and infrastructure. The remainder of the site consists of forested lands. The BVPS site is characterized by sloping topography with the exception of the northeast corner, where plant facilities are located. The nuclear portion of the power station, including the containment structure, auxiliary building, fuel building, and main control area, is situated on the uppermost of three terraces along the Ohio River, at an average elevation of approximately 735 feet National Geodetic Vertical Datum (NGVD). The cooling water intake and discharge facilities for the plant are located on the intermediate terrace (approximate elevation 688 feet NGVD) between the upper terrace and the present floodplain of the Ohio River. The normal water level is 664.5 feet NGVD. Peggs Run is a small stream that runs through a tunnel in the eastern portion of the BVPS site and empties into the Ohio River (FENOC 2007a).

The BVPS site is zoned industrial with a business zoning where the Training and Simulator Building is located. FENOC or its subsidiaries own all property on the site with the exception of the U.S. Government-owned eastern portion of Phillis Island, Duquesne Light jointly owned switchyard, Duquesne-Light-owned Beaver Valley Substation, microwave tower, and associated rights of way (ROWs) for the substation, tower, and pipelines for natural gas, petroleum, and scrubber slurry waste from the neighboring coal-fueled Bruce Mansfield Plant (FENOC 2007a).

Figures 2-1, 2-2, and 2-3 show site locations and land area features in a 80-km (50-mile) radius, 10-km (6-mile) radius, and a site area map, respectively.

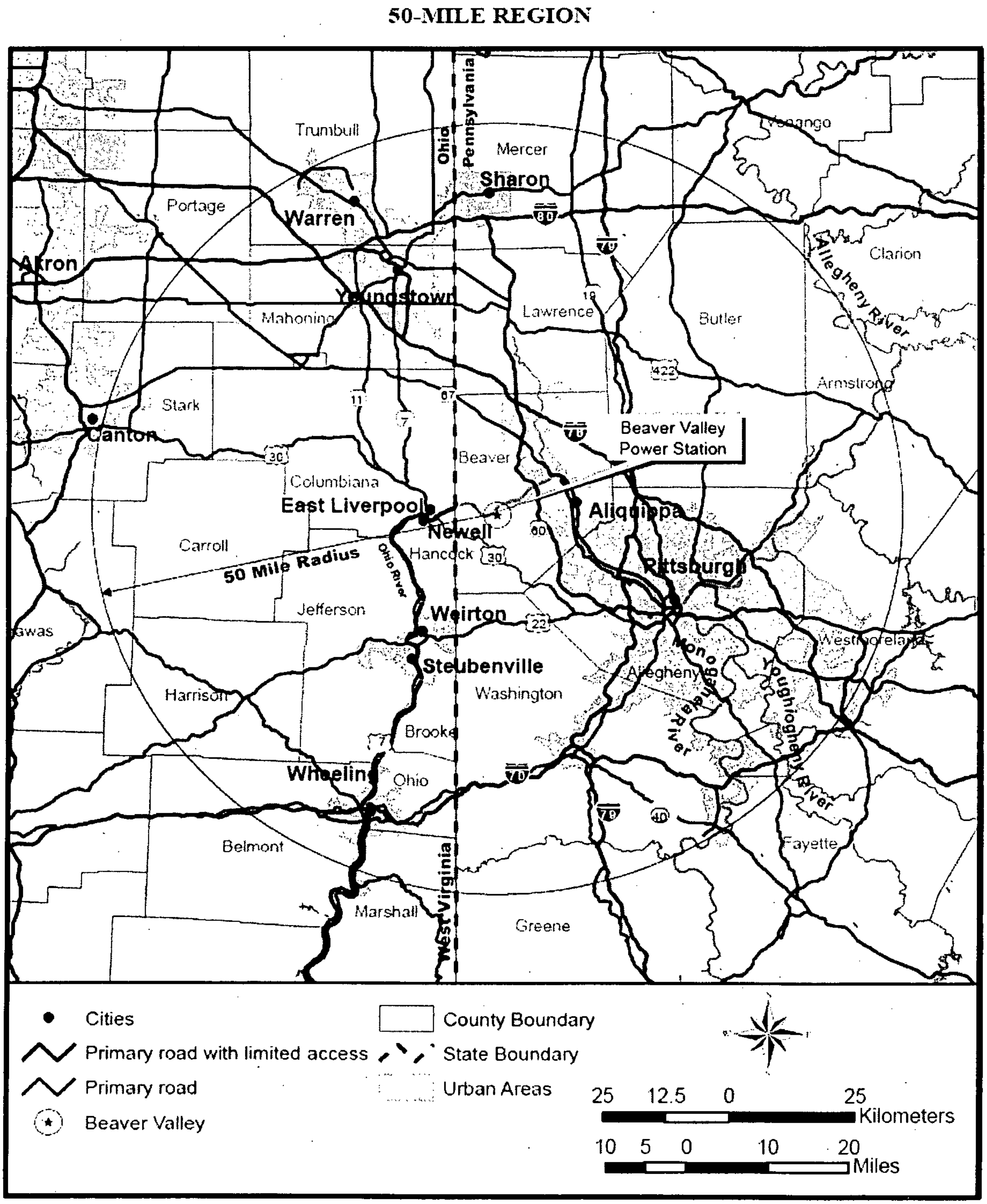

Figure 2-1. Location of BVPS Units 1 and 2, 80-km (50-mi) Region

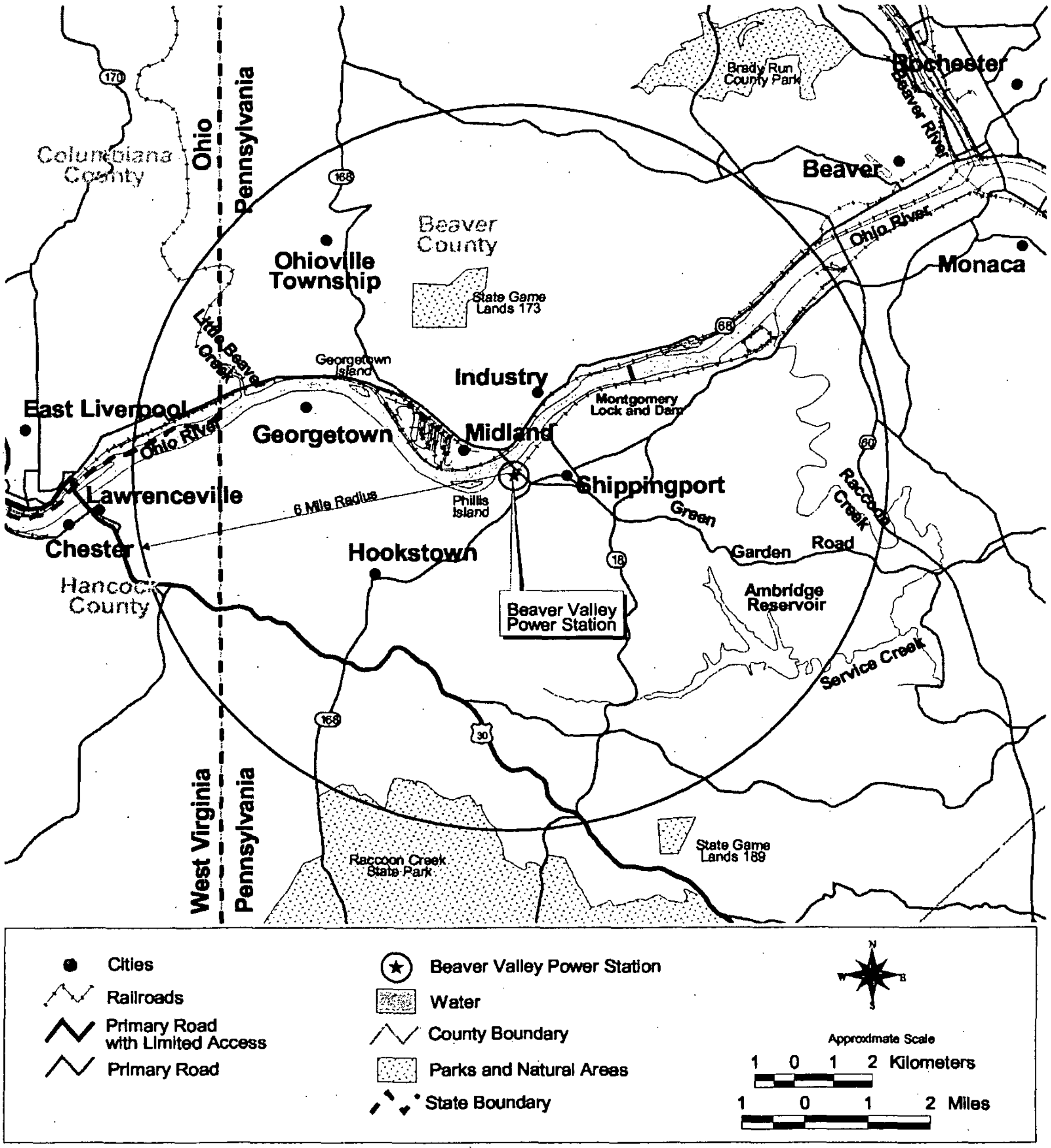

Figure 2-2. Location of BVPS Units 1 and 2, 10-km (6-mi) Region

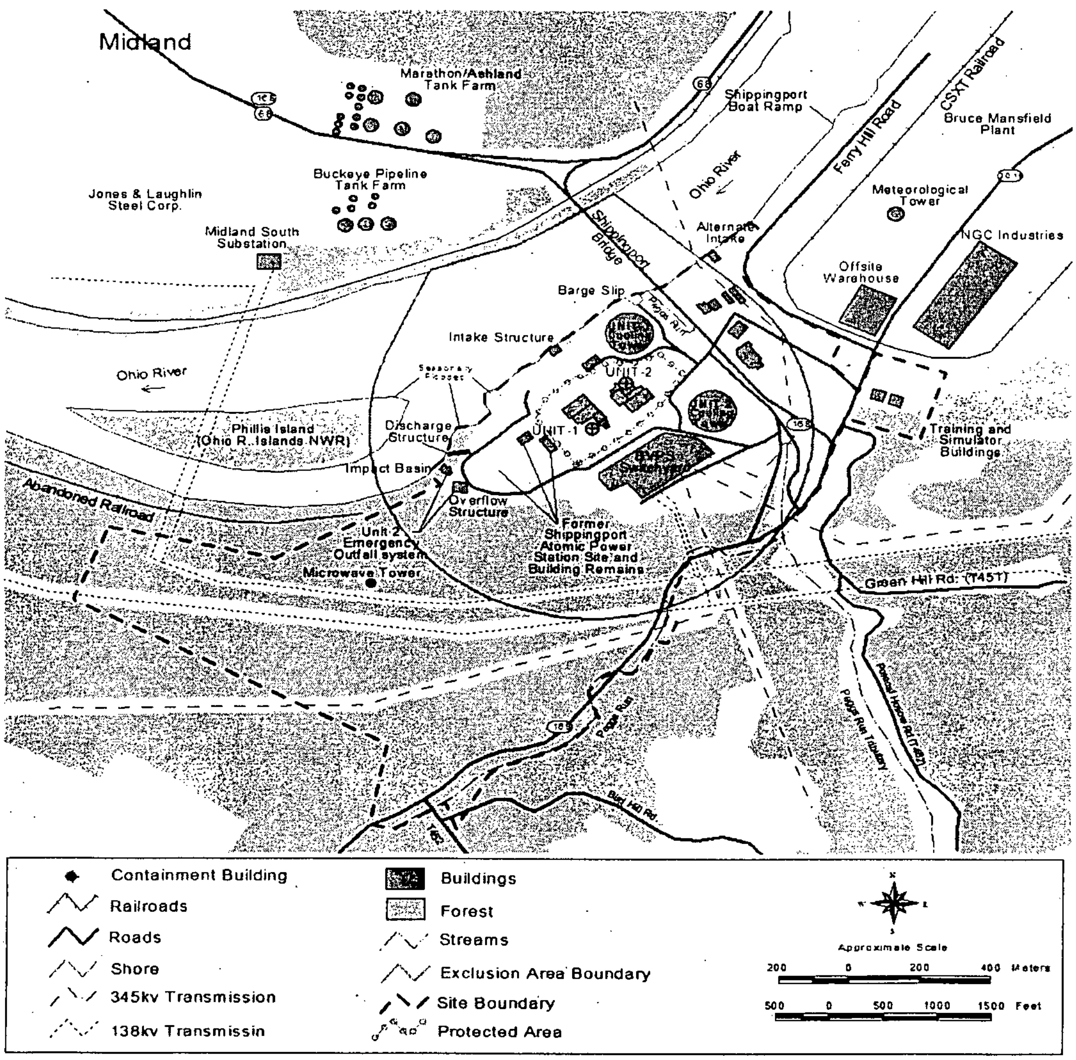

Figure 2-3. BVPS Site Map

2.1.2 Reactor Systems

BVPS is a two-unit plant with pressurized-water reactors (PWRs) and steam generators furnished by Westinghouse Electric Corporation. The original licensees designed and constructed the balance of the plant with the assistance of Stone & Webster Engineering Corporation. The nuclear steam supply systems were originally designed for a warranted power output of 2652 megawatts-thermal (MWt), the original license application rating for both units. Commercial operation was achieved in October 1976 for Unit 1 and in November 1987 for Unit 2. At their original core power level, Unit 1 generated approximately 852 megawatts-electric (MWe), and Unit 2 generated approximately 836 MWe (AEC 1973; NRC 1985).

The U.S. Nuclear Regulatory Commission (NRC) has approved two power uprate amendments for BVPS. In September 2001, the NRC approved a feedwater flow measurement uncertainty recapture, which increased the core power level of both units from 2652 MWt to 2689 MWt. The NRC approved an extended power uprate in July 2006, which allowed FENOC to operate Units 1 and 2 at 2900 MWt. The extended power uprate was completed in spring 2008, and the current gross electrical output at BVPS is 974 MWe for Unit 1 and 969 MWe for Unit 2 (FENOC 2007a).

The nuclear steam supply system of each unit consists of a PWR, reactor coolant system (RCS), and associated auxiliary systems. The purpose of the safety-related RCS is to transfer heat generated in the reactor core to the steam generators, where steam is produced to drive the turbine generator. The RCS consists of three closed heat transfer loops connected in parallel to the reactor vessel. High-pressure reactant coolant circulates through the reactor core to remove heat generated by the nuclear chain reaction; this portion of the RCS is called the primary system. The heated coolant is then passed through the coolant loop piping to the steam generators, where that heat is transferred to the feedwater to produce high-pressure saturated steam that is routed through the steam turbines. After passing through the turbines, the steam is then condensed back to water in the main condensers and pumped back to the steam generators, thus completing an isolated secondary cooling loop. A third cooling loop, the circulating water system, provides cooling of the main condensers of the secondary system as described in Section 2.1.3 (FENOC 2007a).

The BVPS reactors are licensed for uranium dioxide fuel with a maximum enrichment of 5 percent by weight uranium-235. Fuel pellets are enclosed in fuel rods that are fabricated into fuel assemblies. Each fuel assembly consists of a 17-by-17 array of fuel rods, and there are 157 fuel assemblies in the core of each reactor. The reactor also contains neutron-absorbing control rods that control core reactivity. FENOC replaces about one-third of the fuel assemblies approximately every 18 months. The maximum licensed fuel rod burnup for the Westinghouse fuel is currently 62,000 megawatt-days per metric ton of uranium (FENOC 2007a).

The reactor coolant piping and all of the pressure-containing and heat transfer surfaces in contact with primary coolant are stainless steel or stainless-steel clad, with the exception of the steam generator tubes and fuel tubes, which are Inconel and Zircaloy, respectively. Reactor core internals, including control rod drive shafts, are primarily stainless steel (FENOC 2007a).

The Unit 1 and 2 containment structures are 4.5-foot thick, steel-lined, heavily reinforced concrete cylinders, with a 2.5-foot-thick hemispherical dome and a 10-foot-thick reinforced concrete flat foundation mat. The containments are designed to withstand design-basis accidents that could produce an internal pressure of 45 pounds per square inch gauge, meeting all requirements for leak-tightness at this pressure and providing adequate radiation shielding during both normal operation and accident conditions. They are also designed to withstand external hazards such as floods, severe earthquakes, tornadoes, and associated tornado-generated missiles (FENOC 2007a).

2.1.3 Cooling and Auxiliary Water Systems

BVPS Units 1 and 2 are closed-cycle systems utilizing natural draft cooling towers. BVPS auxiliary systems and components are provided to charge makeup water to the RCS, purify reactor coolant water, provide chemicals for corrosion inhibition and reactivity control, cool system components, remove decay heat when the reactor is shut down, and provide for emergency safety injection.

The Ohio River is the source of makeup water to replace water lost through evaporation, cooling tower drift, and water discharged back to the river as blowdown. The system that supplies most of this makeup water is called the river water system. Another system, called the raw water system, also supplies part of the makeup water, as well as the cooling water needs of the plant's secondary components (AEC 1973). The service water system provides once-through cooling of primary and secondary heat exchangers, control room refrigerant condensing units, safeguards area air conditioners, main steam valve area cooling coils, motor control center cooling units, and charging pump coolers (NRC 1985).

2.1.3.1 *River Water and Service Water Systems*

Water is withdrawn from the Ohio River through the intake structure, a concrete-reinforced building located at river mile 34.8. The intake structure consists of four 15-foot-wide by 13.5-foot-high intake bays oriented parallel to the river bank, the tops of which are 5 feet below the normal Cumberland Pool elevation to prevent the entry of floating objects. In each intake bay, water passes through steeply sloped trash rack bars spaced 3.5 inches apart to sieve coarse debris, followed by vertical 0.375-inch mesh traveling screens to remove smaller debris. Debris accumulated on the trash racks is removed by rakes and transferred to a trash car; debris accumulated on the traveling screens is removed by rotating and backwashing the screens and washing to a collection basket. Intake water velocity measured at the face of the traveling screens is approximately 0.3 feet per second. Intake pumps are located below the low river elevation of 640 feet, 7 inches NGVD; the minimum river elevation for plant operation is 654 feet NGVD. An alternate intake structure is located upstream from the main intake structure and is designed to provide sufficient cooling water for safe shutdown and subsequent cool down of BVPS in the event that the main intake structure is rendered inoperable (FENOC 2007a).

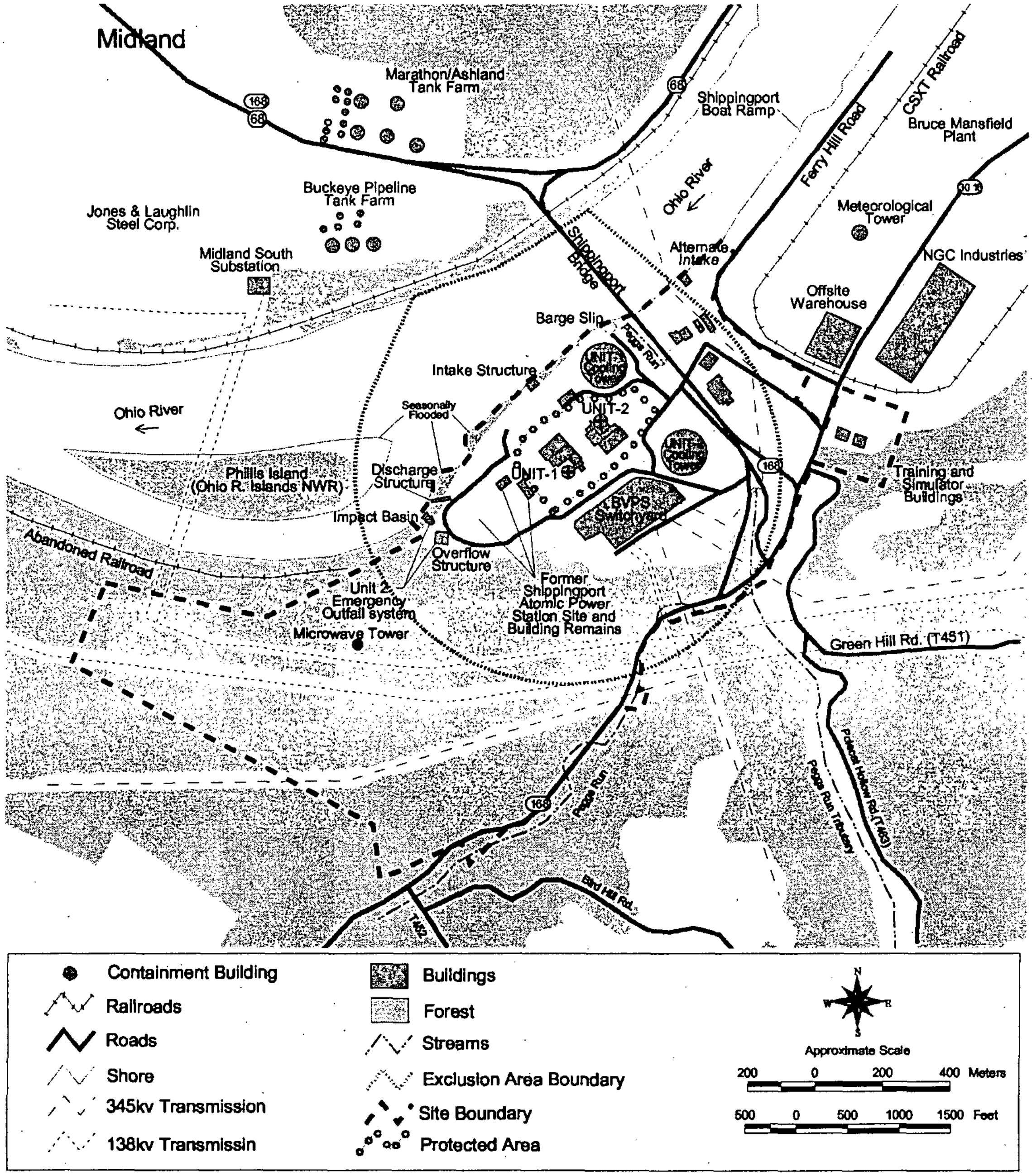

Figure 2-4. BVPS Power Block Site

Once water passes through the intake bays, it goes to four suction bays containing pumps for the BVPS Unit 1 raw water system, the BVPS Unit 1 river water system, and the BVPS Unit 2 service water system. Under normal operating conditions, one 9000-gallon-per-minute (gpm) river water pump, one 16,000-gpm raw water pump, and two 15,000-gpm service water pumps run to supply once-through cooling water to turbine plant component heat exchangers, reactor plant component heat exchangers, and other plant equipment. During periods of warmer river water temperatures, an additional 9000-gpm river water pump is put into use. (FENOC 2007a)

After cooling water has serviced the BVPS Unit 1 and 2 plant components, it is discharged to the circulating water systems downstream of the main condensers to replace operational losses. Approximately 8400 gpm of water from the BVPS Unit 2 primary heat exchangers and components are discharged directly to the Ohio River via the emergency outfall structure to reduce silt accumulation in those systems; this water is approximately 12 °F above ambient river water temperature. The emergency outfall system consists of an overflow structure and an impact basin and is designed to maintain an unrestricted discharge path for service water under normal and accident conditions. (FENOC 2007a)

2.1.3.2 *Circulating Water Systems*

The circulating water systems of BVPS Units 1 and 2 are closed-loop cooling systems utilizing natural draft, hyperbolic cooling towers that remove waste heat from the main condensers through evaporation. Water lost through evaporation and drift from the cooling towers represents consumptive use of water from the Ohio River. Operating at the power uprate level of 2900 MWt, evaporation rates increased approximately 10 percent from pre-uprate conditions; drift losses are a function of circulating water flow rates and would remain unchanged at approximately 250 and 65 gpm for Unit 1 and Unit 2, respectively. This results in a maximum consumptive water loss of approximately 18,000 gpm for Unit 1 and 20,400 gpm for Unit 2 when BVPS is operating at the full 2900 MWt power level. (FENOC 2007a)

The BVPS Unit 1 river water system and the BVPS Unit 2 service water system provide makeup water to the BVPS Unit 1 and 2 circulating water systems to replace losses resulting from evaporation and cooling tower drift. Makeup water is always greater than operational losses, and as such, overflow water from both cooling towers is directed back to the Ohio River as cooling tower blowdown. Blowdown flow keeps levels of dissolved solids in the circulating water system within design limits. The most recent power uprate resulted in decreased blowdown flows because of increased evaporation rates, which in turn increased dissolved solids in the circulating water by 7 percent. The power uprate also increased blowdown temperature by a maximum of 2.9°F. FENOC estimated that blowdown flow at the power uprate conditions are less than 42,500 gpm. (FENOC 2007a)

Temperature differences between blowdown flow and ambient river water range from 2.4 °F in August to 28.6 °F in January. With the 2.9°F maximum increase in blowdown flow temperatures resulting from the spring 2008 power uprate, the average temperature differential during warm summer months increased to approximately 5 °F to 10 °F when both units are operating at maximum power levels. During months of cooler river water temperatures, cooling tower blowdown from both units is discharged to a common outfall structure located at the Ohio River shoreline, approximately 100 feet upstream from the emergency outfall impact basin discussed

The Pennsylvania Department of Environmental Protection (PADEP) regulates discharges from the cooling water and service water systems under National Pollutant Discharge Elimination System (NPDES) Individual Wastewater Discharge Permit PA 0025615 (FENOC 2007a).

2.1.4 Radioactive Waste Management Systems and Effluent Control Systems

BVPS radioactive waste management system provides controlled handling and disposal of radioactive wastes. Operating procedures ensure that the radioactive wastes are safely processed and discharged from the plant in a manner that meets the dose limits as set forth in the Part 20, "*Radiation Protection Standards*," of Title 10 of the *Code of federal Regulations* (10 CFR Part 20), the plant's technical specifications; and BVPS' *Offsite Dose Calculation Manual* (ODCM). Unless otherwise noted, the description of the radioactive waste management systems is based on information provided in the applicant's Environmental Report (ER) (FENOC 2007a) and the Final Safety Analysis Reports for Units 1 and 2 (FSAR) (FENOC 2000, 2007f).

BVPS' radioactive waste management system is designed to collect, treat, and dispose of the radioactive wastes that are byproducts of plant operations. The byproducts are activation products resulting from the irradiation of reactor water and impurities therein (principally metallic corrosion products) and fission products that migrate through the fuel cladding or uranium contamination within the reactor coolant system. Radioactive wastes resulting from plant operations are classified as liquid, gaseous, or solid. Liquid radioactive wastes are generated from liquids received directly from portions of the reactor coolant system or were contaminated by contact with liquids from the reactor coolant system. Gaseous radioactive wastes are generated from gases or airborne particulates vented from the reactor and turbine equipment. Solid radioactive wastes are solids from the reactor coolant system or solids that came into contact with reactor coolant system liquids or gases (FENOC 2000, 2007a, 2007f).

BVPS' ODCM contains the methodology and parameters used to calculate off-site doses resulting from radioactive gaseous and liquid effluents, and the gaseous and liquid effluent monitoring alarm and trip set points used to verify that the radioactive material being discharged meets regulatory limits (FENOC 2003a).

2.1.4.1 *Liquid Waste Processing Systems and Effluent Controls*

The liquid waste disposal system receives, treats, tests, and disposes of all aerated liquid waste from building and equipment drain sumps, and from laundry and contaminated shower drains. The building and equipment sumps collect the waste from the laboratory, spent resin flush system, aerated drains from operation, decontamination and maintenance of equipment and piping, and boiler blowdown.

The system is designed so that the effluents released by the liquid waste disposal system, when mixed with the cooling tower blowdown, meet the radiation protection standards of 10 CFR Part 20. The design is based on receiving, segregating, and batch-storing three categories of solutions: high level wastes, low level waste, and laundry and contaminated showers. The system is able to handle a wide range of volumes and activities which may enter the system. The liquid radwaste treatment system (evaporator and/or demineralizer) is used to reduce the radioactive materials in each liquid waste batch prior to its discharge when the projected doses due to liquid effluent releases (when averaged over 31 days) would exceed 0.06 mrem to the total body or 0.2 mrem to any organ.

The system is designed to handle a range of plant operating conditions, from operation at zero power up to plant operation with one percent failed fuel, thus covering the various combinations of operating modes and activity contributions. The waste holding tanks can accommodate the largest single amount of drainage from equipment which may be reasonably imposed on it (FENOC 2000, 2007a, 2007f).

The NRC staff reviewed the BVPS radioactive effluent release reports for 2002 through 2006 for liquid effluents (FENOC 2003b, 2004a, 2005a, 2006b, 2007g). There were 131 liquid batch releases from Unit 1 and Unit 2, as well as continuous releases in 2006. There were no abnormal releases from either unit in 2006. The amount of radioactivity in fission and activation products discharged in liquid releases, excluding gases and tritium, totaled 0.343 Ci (1.27 E+04 MBq) from the BVPS in 2006. A total of 2030 Ci (7.51 E+07 MBq) of tritium were released from the BVPS in 2006. A total of 2.22 E-04 Ci (8.214 MBq) of dissolved and entrained gases were released from the BVPS in 2006. There were no detectable releases of gross alpha radioactivity from the BVPS site in 2006 (FENOC 2007g). The liquid discharges for 2006 are consistent with the radioactive liquid effluents discharged from 2002 through 2005. Variations on the amount of radioactive effluents released from year to year are expected based on the overall performance of the plant and the number and scope of outages and maintenance activities. The liquid radioactive wastes reported by BVPS are reasonable and no unusual trends were noted.

FENOC has indicated that it may repair or replace the Unit 2 steam generators during the period of extended operations. Such an action is not likely to result in a significant increase of liquid radioactive effluents being discharged than the amount discharged during normal plant operations. This is based on consideration that any liquids generated, processed, and released during the outage will be offset by the amount of liquid waste that would not be generated, processed, and released during normal plant operations. Based on the historical evaluation and there being no significant increase in liquid effluents from the potential repair or replacement of the Unit 2 steam generators, similar quantities of radioactive liquid effluents are expected to be generated during normal operations and outages from BVPS during the period of extended operations.

2.1.4.2 Gaseous Waste Processing Systems and Effluent Controls

The gaseous waste disposal system processes and monitors all waste gas streams before their discharge to the atmosphere. Gaseous effluents are treated to reduce the amount of radioactivity before release to the environment. The gaseous waste disposal system is designed to process effluents to meet the requirements of 10 CFR Part 20. The system provides selective holdup so that short-lived radioisotopes will have decayed before their release into the atmosphere. It also provides a 30-day holdup of these gases when the reactor is in cold shutdown during refueling. The system is designed so that all the gaseous effluent from the degasifiers is directed to the gaseous waste charcoal delay subsystem for decay of most radioactive radioisotopes before they are compressed and discharged through the process vent into the atmosphere. The discharge to the atmosphere is handled by diluting the waste gas with a large volume of air and then discharging the air through charcoal, to absorb iodine, and through high-efficiency filters, to filter out particulates. The flow rate and radioactive concentration level of the waste stream are measured continuously to determine whether the rate of activity release to the atmosphere is within the limits in the ODCM. The BVPS operating procedures specify the actions to be taken in the event of high gaseous effluent activity (FENOC 2000, 2007a, 2007f).

The NRC staff reviewed the BVPS radioactive effluent release reports for 2002 through 2006 for gaseous effluents (FENOC 2003b, 2004a, 2005a, 2006b, 2007g). In 2006, there were 58 gaseous batch releases from Units 1 and 2, as well as continuous releases. There were two unplanned releases from the BVPS site in 2006. Analysis by the applicant's staff showed that none of the unplanned releases exceeded regulatory dose limits. The amount of radioactivity discharged in fission and activation gases from the BVPS site in 2006 totaled 2.13 Ci (7.88×10^4 MBq). A total of 27.4 Ci (1.01×10^6 MBq) of tritium was released from the BVPS site in 2006. A total of 2.73×10^{-6} Ci (0.10 MBq) of radioiodines and 4.33×10^{-6} Ci (0.16 MBq) of particulates were released from the BVPS site in 2006 (FENOC 2007g). The gaseous discharges for 2006 are consistent with the radioactive gaseous effluents discharged from 2002 through 2005. Variations on the amount of radioactive effluents released from year to year are expected based on the overall performance of the plant and the number and scope of outages. The gaseous radioactive wastes reported by BVPS are reasonable and no unusual trends were noted.

FENOC has indicated that it may repair or replace the Unit 2 steam generators during the period of extended operations. Such an action is not likely to result in a significant increase of gaseous radioactive effluents being discharged than the amount discharged during normal plant operations. This is based on consideration that any gaseous effluents released during the outage will be offset by the amount of gaseous effluents that would not be generated, processed, and released during normal plant operations. Based on the historical evaluation and there being no significant increase in gaseous effluents from the potential repair or replacement of the Unit 2 steam generators, similar quantities of radioactive gaseous effluents are expected to be generated during normal operations and outages from BVPS during the period of extended operations.

2.1.4.3 *Solid Waste Processing*

The solid waste disposal system provides facilities for the collection and preparation of radioactive waste materials for shipment to processing and disposal facilities. The various solid waste streams are prepared for shipment through the use of multiple processes, as appropriate; by filtration, dewatering, solidification, segregation, compaction, packaging, and/or storage. The materials which are handled as radioactive solid waste include depleted resins from process ion exchangers, concentrated waste solutions from the evaporator bottoms hold tanks, concentrated boric acid discarded from the boron evaporator bottoms hold tank, spent filter cartridges, and miscellaneous contaminated or irradiated solid materials (other than fuel). All packages containing radioactive material and the procedures used to prepare these for offsite shipment conform with NRC and U.S. Department of Transportation (DOT) regulations. All waste material is either transferred to a licensed disposal contractor, to a licensed waste processor, or to a common carrier for delivery to a licensed disposal contractor, as appropriate. Plant procedures specify the methods of operating the solid waste system. The Process Control Program (PCP) contains the methodology and boundary conditions to assure that all activities related to waste form are controlled and processed in accordance with all regulatory requirements. (FENOC 2000, 2007a, 2007f).

In 2006, BVPS made a total of 80 shipments of solid low-level radioactive Class A waste. The non-compacted waste volume of spent resins, filter sludges, evaporator bottoms, and oil, was 35.8 m^3 (1264.26 ft^3) with an activity of 78.46 Ci (2.90 E +06 MBq). The volume of dry compressible waste and contaminated equipment was 2.38 E+03 m^3 (8.394 E+02 ft^3) with an activity of 6.51 Ci (2.41 E+05 MBq). The volume of irradiated components and control rods was 0.637 m^3 (22.5 ft^3) with an activity of 0.012 Ci (4.44 E+02 MBq) (FENOC 2007g).

The solid waste volumes and radioactivity amounts generated in 2006 are typical of previous annual waste shipments made by BVPS. Variations in the amount of solid radioactive waste generated and shipped from year to year are expected based on the overall performance of the plant and the number and scope of maintenance work and outages. The volume and activity of solid radioactive wastes reported by BVPS are reasonable and no unusual trends were noted.

FENOC has indicated that it may repair or replace the Unit 2 steam generators during the period of extended operations. Such an action is likely to result in a small increase in the amount of solid radioactive waste generated. This is based on an increase in the number of personnel working at the plant which will result in more solid waste being generated during the outage and any other associated related work. During an outage of this type, there will be an increased use of protective clothing, safety equipment, increased use of filters, and a general increase in generation of debris that will have to be disposed of as radioactive waste. However, the increased volume is expected to be within the range of solid waste that can be safely handled by BVPS during the period of extended operations.

The State of South Carolina's licensed low-level radioactive waste disposal facility, located in Barnwell, South Carolina, may limit access after June, 2008 from radioactive waste generators located in states that are not part of the Atlantic Low-Level Waste Compact. This may impact BVPS' ability to dispose of its low-level solid radioactive waste. BVPS is aware of this situation and developing a plan for the safe storage and/or disposal of its low-level radioactive wastes that will meet NRC and DOT regulations.

2.1.5 Nonradioactive Waste Systems

The Resource Conservation and Recovery Act of 1976 (RCRA) governs the disposal of solid and hazardous waste. The RCRA regulations are contained in Title 40 of the Code of Federal Regulations (CFR) Parts 239 through 299. 40 CFR Parts 239 through 259 contain regulations for solid waste, and Parts 260 through 279 contain the hazardous waste regulations. RCRA Subtitle D gives States the authority to create regulations for the management of solid and municipal waste and sets criteria for landfills and other disposal facilities, and RCRA Subtitle C regulates hazardous wastes from "cradle to grave" (EPA 2007a). BVPS generates hazardous waste, universal waste, small amounts of low-level mixed wastes, and Pennsylvania residual waste from routine plant maintenance, cleaning activities, and operational processes (FENOC 2007a).

BVPS employs documented procedures to ensure regulatory compliance during collection, accumulation, characterization, pretransport storage, monitoring, and transport preparation of wastes. Procedure number 1/2-ENV-06.01, "Regulated Waste Management," contains this guidance. Hazardous and residual waste pretransport accumulation facilities are located on the former Shippingport Atomic Power Station site. The hazardous waste accumulation facility was developed and is maintained in accordance with the requirements of 25 Pa. Code § 262a, Standards Applicable to Generators of Hazardous Waste, and plant personnel conduct weekly inspections of the areas used to store hazardous waste, mixed waste, residual waste, and universal waste. (FENOC 2008a)

2.1.5.1 *Hazardous Waste*

The U.S. Environmental Protection Agency (EPA) classifies certain nonradioactive waste as hazardous if it exhibits at least one of four characteristics (ignitability, corrosivity, reactivity, or toxicity); State-level regulators may add wastes to the EPA list of hazardous wastes (EPA 2007b). RCRA Subtitle C provides standards for the treatment, storage, and disposal of hazardous waste for hazardous waste generators (40 CFR Part 262). RCRA regulations are administered in Pennsylvania by PADEP (25 PA Code Article VII), Division of Hazardous Waste Management. According to EPA Envirofacts Warehouse, BVPS is classified as a small-quantity generator (SQG) of hazardous wastes and is an active hazardous waste biennial reporter (EPA ID No. PAR000040485). The Envirofacts Warehouse database showed no violations for BVPS (EPA 2008a).

An SQG is defined as generating more than 100 kilograms (kg), but less than 1000 kg, of hazardous waste per month (EPA 2007b). BVPS has been an SQG of hazardous waste since 1995, with the exception of September 2001 as the result of a steam generator cleaning. Hazardous wastes make up a small percentage of the BVPS total waste stream and typically consist of spent and off-specification (e.g., expired) chemicals, laboratory chemical wastes, Freon-contaminated oil, and occasional project-specific wastes, such as those produced by the 2001 steam generator cleaning. In 2005, BVPS generated and shipped for proper disposal approximately 4327 pounds of hazardous wastes, including corrosive liquids (hydrazine), oxidizing solids (potassium chromate), flammable liquids, hazardous solid waste (paint-related wastes), hazardous waste mercury, and caustic alkali liquids. (FENOC 2008a)

BVPS completed a one-time steam generator cleaning project in September 2001, which allowed the BVPS steam generators to operate safely until they were replaced in 2006. The steam generator cleaning project produced waste that was classified as hazardous because it contained chromium (RCRA Code D007). The BVPS cleaning process did not use chromium; rather, chromium-contaminated waste was removed from the steam generator. BVPS shipped the chromium-contaminated waste to Allied Technology Group's facility in Richland, Washington, for treatment and destruction disposal. (FENOC 2008a)

2.1.5.2 *Pennsylvania Residual Waste and Universal Wastes*

BVPS generates solid waste, as defined by RCRA (40 CFR Part 239, et ceq.), as part of routine plant maintenance, cleaning activities, and plant operations. In Pennsylvania, solid waste is further classified as either municipal waste or residual waste, depending on its origin (25 PA Code Article VIII; 25 PA Code Article IX). Residual waste is nonhazardous industrial waste, including solid, liquid, or gaseous waste material produced by industrial, mining, or agricultural operations (PADEP Undated A). Common residual wastes generated by BVPS include nonhazardous waste oil and oily debris resulting from maintenance of oil-filled equipment; carbon filter media; process wastewaters; asbestos; scrap from maintenance and product turnaround; and municipal-like waste (i.e., garbage) (FENOC 2007a).

BVPS is categorized as a large-quantity generator of residual wastes. From 2002 through 2006, BVPS generated approximately 9221 metric tons of residual waste, including universal wastes (FENOC 2008a). EPA classifies several hazardous wastes as universal wastes; these include batteries, certain pesticides, mercury-containing devices, and fluorescent lamps. Pennsylvania has incorporated by reference the EPA regulations (available at 40 CFR Part 273, "Standards for Universal Waste Management") regarding universal wastes (PADEP Undated B). Pennsylvania's universal waste regulations are found in 25 PA Code Article VII, Chapter 266b, "Universal Waste Management." BVPS is a small-quantity handler of universal waste (meaning the facility can accumulate more than 5000 kilograms (11,023 pounds) of universal waste at any one time), as it generates common operational wastes such as lighting ballasts containing polychlorinated biphenyls (PCBs), lamps, and batteries (FENOC 2007a).

2.1.5.3 *Low-Level Mixed Waste*

Low-level mixed wastes (LLMW) are wastes that contain both low-level radioactive waste and RCRA hazardous waste (10 CFR 266.210). EPA (or an authorized State agency) regulates the hazardous component of the mixed waste through RCRA, and the NRC regulates radioactive waste subject to the Atomic Energy Act. Pennsylvania has incorporated by reference Federal regulations exempting LLMW from RCRA storage and treatment regulations, provided that the waste meets specific conditions (25 PA Code Section 266a.20, "Recyclable Materials Used in a Manner Constituting Disposal"). Effective November 2000, Pennsylvania's hazardous waste program was authorized to implement the mixed waste program in lieu of EPA (PADEP 2001). In 2005, BVPS generated 235 pounds (106.6 kilograms) of radioactive oils and solvents from operation and maintenance; this was the only LLMW generated by the facility in the past 5 years (FENOC 2008a).

2.1.5.4 *Permitted Discharges*

Normal operating processes used to control the pH of the coolant, control scale and erosion in the cooling system, and clean and defoul (biological organisms) the condenser generate chemical and biocide wastes. Waste liquids containing chemicals from these processes are typically combined with cooling water discharges in accordance with the BVPS NPDES permit (PA0025615) (FENOC 2007a). The licensee files discharge monitoring reports with PADEP, the NRC, and EPA Region 3 on a monthly basis (FENOC 2008a). The BVPS domestic water is routed as sanitary wastewater to the Shippingport Municipal Wastewater Plant, located upstream from BVPS along the Ohio River. BVPS formerly operated two onsite sewage treatment plants, but these plants were retired in 2007 (FENOC 2007a). Section 2.1.3 discusses the BVPS permitted discharges in further detail.

2.1.5.5 *Pollution Prevention and Waste Minimization*

The FENOC Chemical Control Program establishes procedures for the control of chemicals at all FENOC nuclear power plants to ensure compliance with applicable regulations and to minimize waste. The Chemical Control Program contains measures for pollution prevention and source reduction, as promulgated by the Pollution Prevention Act of 1990. In addition to providing guidance to plant personnel for emergency preparedness and response, the BVPS Environmental Emergency Response Plan also addresses pollution prevention in the event of an emergency. It outlines procedures to minimize hazards to human health and the environment from any unplanned release of hazardous materials, hazardous wastes, or oil, to the air, soils, or surface water (FENOC 2008a).

FENOC has a dedicated Corporate Waste Minimization Team that identifies waste minimization opportunities, supports the fleet-wide implementation of the FENOC waste minimization program, and evaluates the program's effectiveness. The FENOC waste minimization program, which is active at BVPS, has a number of emphases, including the following:

- purchasing and using only the amount of material needed to reduce costs and eliminate waste

- substituting less hazardous materials to eliminate the use of hazardous solvents
- reusing materials, including evaluating and repairing electrical equipment such as transformers
- recycling when reuse is not possible—FENOC has recycling programs for 50 waste streams, including various metals, batteries, cardboard, lubricating oil, paper, street lamps, and wood products (FENOC Undated)

The EPA Office of Pollution Prevention and Toxics has established a clearinghouse that provides information regarding waste management and technical and operational approaches to pollution prevention. The EPA clearinghouse can be used as a source for additional opportunities for waste minimization and pollution prevention at BVPS, as appropriate.

2.1.6 Plant Operation and Maintenance

BVPS Units 1 and 2 began commercial operation in October 1976 and November 1987. Units 1 and 2 are operated at a power level of 2900 MWt, after an increase permitted by a July 2006 NRC amendment to both units' operating licenses. Units 1 and 2 are each licensed for uranium dioxide fuel having a maximum enrichment of 5.0 percent by weight uranium-235. The fuel is in the form of fuel assemblies containing fuel pellets enclosed in fuel rods and arranged on 17 by 17 fuel assemblies meshed with neutron absorber rods. Each reactor takes 157 fuel assemblies and is on a nominal 18-month refueling cycle, with one-third of the fuel replaced per cycle (FENOC 2007a). The maximum licensed fuel rod burnup for the Westinghouse fuel is 62,000 megawatt-days per metric ton of uranium. Spent fuel is stored in spent fuel storage pools located in the containment buildings. Cooling of the primary and secondary heat exchangers and the main condenser is accomplished with raw water from the Ohio River, which is taken in once through and in a closed loop from the reactor cooling and main steam loops. A small portion of the water is used to produce demineralized water for the primary and secondary cooling loop steam supply systems. Unconsumed water is discharged back to the Ohio River in accordance with the NPDES permit.

Surveillance, online monitoring, maintenance, inspection, testing, trending, and recordkeeping activities are performed at BVPS to satisfy the current licensing requirements for the facility and to ensure compliance with environmental and safety regulations. Inspections are conducted for abrasion, abnormal wear, signs of corrosion, material degradation, bent or damaged members, loose bolts/components, loose connections, broken welds, and component performance, among other things. An increase in these activities is associated with the license renewal term, and 60 additional permanent workers will be needed to accommodate this increase in workload. Some activities can be performed while the reactor is operating, but others require that the facility be shut down before they can be performed. Activities are conducted periodically (such as annually), while others are conducted on an as-needed basis. Some of these activities can be performed only during a refueling outage. Long-term outages are required for refueling and for certain types of repairs or maintenance activities, such as the 5- and 10-year service inspection outages, or the replacement of a major reactor system or major support system component. During refueling outages, site employment increases above the permanent workforce by as many as 800 workers for temporary duty of 30 to 40 days. FENOC aging management review including the integrated plant assessment conducted under 10 CFR Part 54, "Requirements for Renewal of Operating Licenses for Nuclear Power Plants," identified a need for additional inspections at BVPS. These inspections, repair, and/or replacement activities would be scheduled during refueling or other outages and would be conducted as normal inspection, maintenance, repair, replacement, and refueling activities. The Unit 1 steam generator was replaced in this manner. Station personnel formally review modifications to improve operation of station systems, structures, or components for potential environmental impacts during the planning stage for modification (FENOC 2007a).

FENOC does not plan to undertake any major refurbishment or replacement actions to maintain the functionality of important systems, structures, or components for purposes of license renewal. However, since FENOC has indicated possible Unit 2 steam generator (SG) repair or replacement during the license renewal term, the staff has reviewed the potential environmental impacts of this activity. The NRC staff has included a discussion of these impacts in chapter 3.

2.1.7 Power Transmission System

The Beaver Valley Substation, located on the BVPS site, provides connections for six 345-kilovolt (kV) lines and seven 138-kV lines. American Transmission Systems, Inc. (ATSI) owns four of the 345-kV lines, and Duquesne Light Company (Duquesne Light) owns the remaining nine lines (FENOC 2007a). The Beaver Valley Substation entered service in 1972 to connect Duquesne Light and members of the Central Area Power Coordinating Group, before the completion of BVPS Unit 1 (AEC 1973). For this reason, the final environmental statement (FES) for BVPS Unit 1 conclude that no transmission lines were constructed specifically for BVPS Unit 1 because the Beaver Valley Substation remains an essential part of the transmission system, and all transmission lines used for BVPS Unit 1 are also used to service other major electric customers, regardless of BVPS operation (AEC 1973).

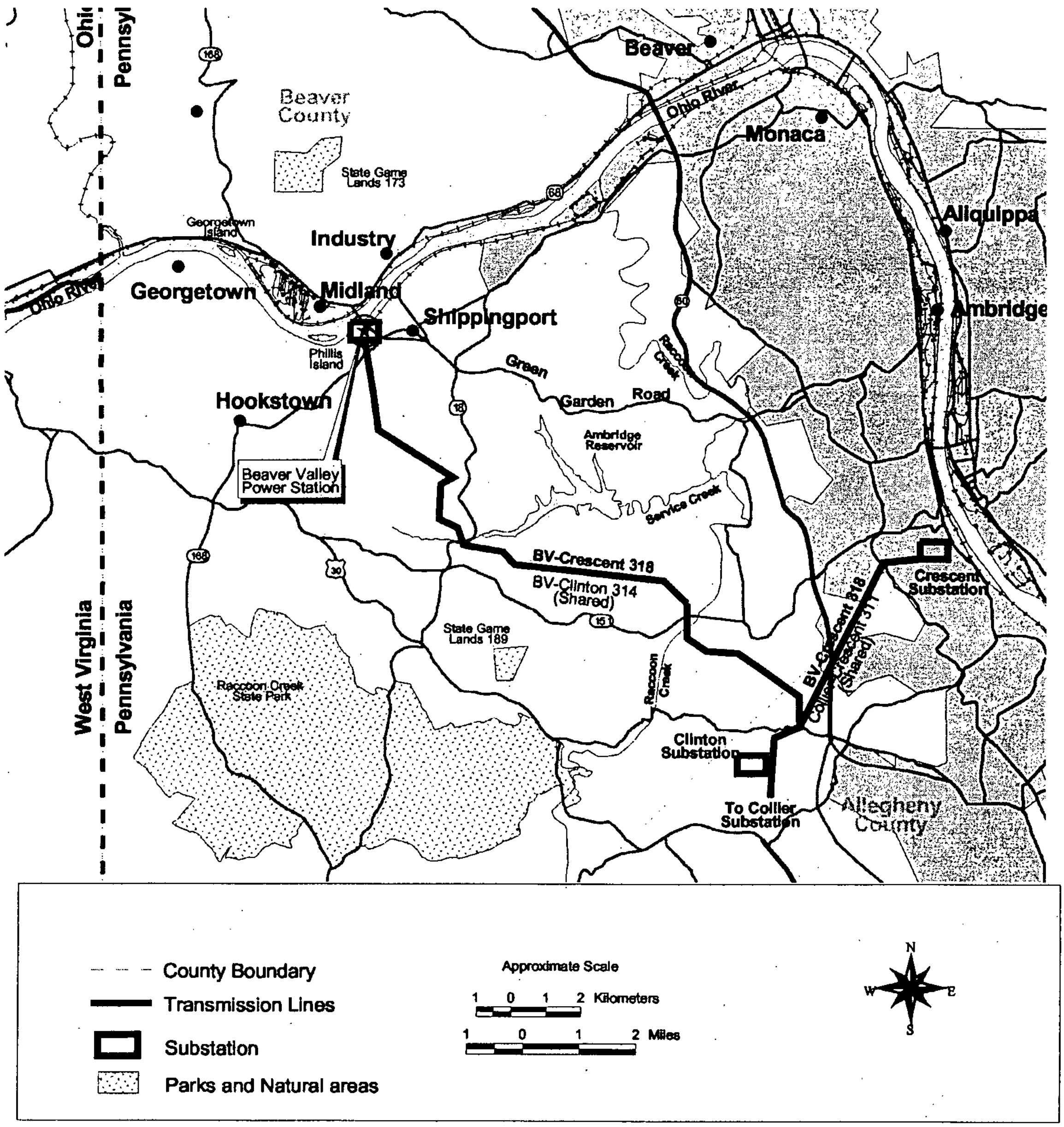

Figure 2-5. BVPS Transmission Lines

With the addition of BVPS Unit 2 in 1987, one new transmission line, the 345-kV Beaver Valley-Crescent Line 318, was constructed, and three new connections from existing transmission lines to the Beaver Valley Substation were reconfigured to increase stability and reduce potential overloads (NRC 1985). The three reconfigured connections are on the 345-kV Beaver Valley Hanna line and the 345-kV Beaver Valley Mansfield No. 1 and 2 lines. Transmission lines considered in scope for license renewal are those constructed to connect the facility to the transmission system (10 CFR 51.53(c)(3)(ii)(H)); therefore, the Beaver Valley-Crescent Line 318 and those reconfigured portions of the Beaver Valley Hanna line and the Beaver Valley Mansfield No. 1 and 2 lines are considered in scope and are discussed in detail below.

The Beaver Valley-Crescent Line 318 extends 15.8 miles from BVPS southeast to Duquesne Light's Crescent Station in Allegheny County (see Figures 2-5 and 2-6) (FENOC 2007a). The Beaver Valley-Crescent Line 318 has a 150-foot-wide ROW, which it shares with Duquesne Light's Beaver Valley-Clinton Line 314 for the first 12-mile stretch, and an 85-foot-wide ROW, which it shares with Duquesne Light's Collier-Crescent Line 314 for the remaining 3.8 miles (FENOC 2007a). The transmission line ROW comprises 257.2 acres, of which approximately 85 percent is in ROW easements and 15 percent is corporately owned (FENOC 2007a; NRC 1985).

The Beaver Valley-Hanna Line extends 59.1 miles northwest to the ATSI Hanna Substation in Portage County, Ohio; however, only the 0.18-mile reconfigured portion of the line which rerouted the connection from the Mansfield Substation to the Beaver Valley Substation (see Figure 2-5) is considered in scope for this supplemental environmental impact statement (SEIS) (FENOC 2008b). The portion of the Beaver Valley-Hanna Line constructed for the purposes of BVPS Unit 2 operation lies entirely on developed land (FENOC 2007a). The reconfigured portions of Beaver Valley-Mansfield No. 1 and Beaver Valley-Mansfield No. 2 extend northeast from BVPS 2.0 miles and 1.5 miles, respectively, to Mansfield Substation at the Bruce Mansfield Coal Plant (FENOC 2007a). The portions of these lines constructed for the purposes of BVPS Unit 2 operation are 0.34 miles and 0.33 miles, respectively, and span developed land, a forested sloping area, and maintained shrub habitat (see Figure 2-5) (FENOC 2007a, 2008b).

Both FENOC and Duquesne Light maintain the transmission line ROWs. Section 2.2.6.2 discusses transmission line ROW maintenance and vegetative management practices within the ROWs.

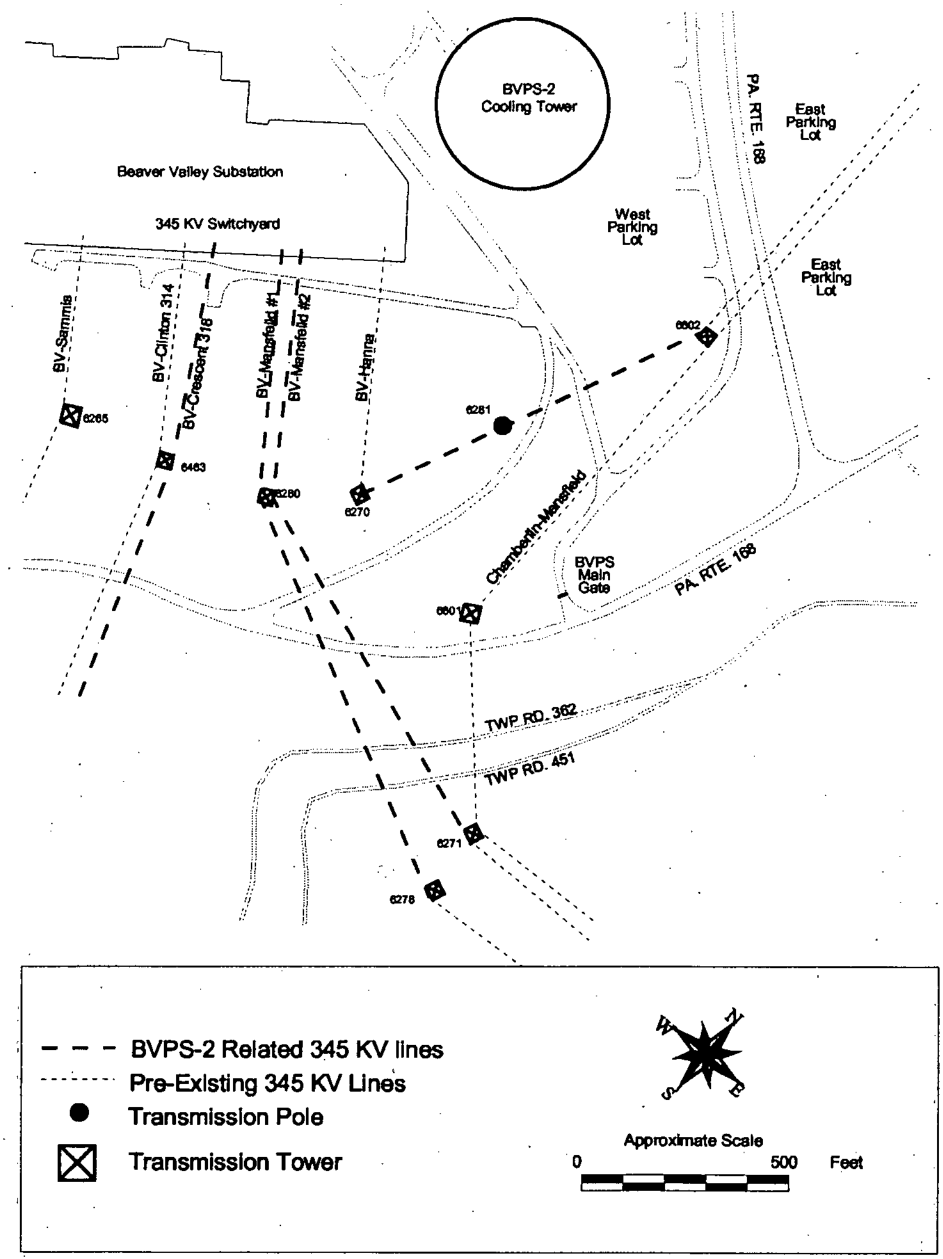

Figure 2-6. BVPS Transmission Line Site

2.2 Plant Interaction with the Environment

Sections 2.2.1 through 2.2.8 provide general descriptions of the environment near BVPS as background information. They also provide detailed descriptions where needed to support the analysis of potential environmental impacts of refurbishment and operation during the renewal term, as discussed in Chapters 3 and 4. Section 2.2.9 describes the historic and archaeological resources in the area, and Section 2.2.10 describes possible impacts associated with other Federal project activities (FENOC 2007a).

2.2.1 Land Use

FENOC or its subsidiary companies own all property within the BVPS site boundary except one residential tract located along SR 168, and two tracts owned partly or wholly by Duquesne Light (the Beaver Valley Substation, which covers approximately 24 acres and is 50-percent owned by Duquesne Light, and the microwave tower property, which covers approximately 1 acre and is 100-percent owned by Duquesne Light). Several ROWs and easements exist on the BVPS site (FENOC 2007a). These include ROWs for several pipelines for transport of natural gas and petroleum products and the pipeline from the Bruce Mansfield Plant for transport of scrubber slurry waste to the Little Blue Run disposal site. The Pennsylvania Department of Transportation (PennDOT) has an ROW for the southern approach to the Shippingport Bridge (SR 168). A small (less than 1-acre) family cemetery is situated in the eastern portion of the site near Ferry Hill Road, for which an easement has been granted for visitation and maintenance.

Shippingport Borough has zoned the entire site industrial, except the tract on which the Training and Simulator Buildings are located, which is zoned business. Some land adjacent to the BVPS site, south of SR 168, is zoned residential. However, this area is small; consists of steep, wooded slopes; and has limited potential for growth. The developed portion of BVPS is approximately 230 acres, or more than half the site (see Figure 2-3). The remaining portions of the site are unused, undeveloped, and open including fields and forest uplands (approximately 223 acres) (FENOC 2007a). Much of the 453-acre site has been disturbed at some time during the construction of the Shippingport Atomic Power Station and the construction and operation of the two BVPS units.

A 2000-foot radius around the BVPS Unit 1 containment building, with an extension to the north shore of the Ohio River, defines the combined boundaries of the BVPS Unit 1 and Unit 2 exclusion areas. FENOC or its subsidiary companies own all land within the exclusion area except the Ohio River proper, onsite property owned by Duquesne Light (i.e., switchyard tract, which is jointly owned by Duquesne Light and FENOC), and the eastern portion of Phillis Island, owned by the U.S. Government and administered by the U.S. Fish and Wildlife Service (FWS). However, appropriate controls are in place to restrict use of these lands. In case of an emergency that threatens persons or the environment, FENOC has the authority to enter the switchyard, after notifying Duquesne Light, to take action to prevent damage, injury, or loss. Limited hunting is permitted on Phillis Island, but no public assembly is allowed there (FENOC 2007a).

Effective June 12, 2002, the U.S. Coast Guard established a security zone encompassing all waters extending 200 feet from the shoreline of the southeastern shore of the Ohio River, from river mile markers 34.6 to 35.1. This rule, which was established for an indefinite period, prohibits persons or vessels from entering the security zone unless authorized by the U.S. the commanding US Coast Guard Captain of the Port of Pittsburgh or his designated representative (61 *Federal Register* 40162).

2.2.2 Water Use

2.2.2.1 *Surface Water Use*

BVPS is located at river mile 34.8 on the left bank of the Ohio River adjacent to the New Cumberland Pool. The Ohio River is formed by the confluence of the Allegheny and Monongahela Rivers at Pittsburgh, Pennsylvania, approximately 25 miles southeast of the site (NRC 1985). The Beaver River is the only major tributary of the Ohio River upstream from the site at river mile 25.2 in the Montgomery Pool, approximately 9.5 river miles upstream from the site. A series of locks, dams, and reservoirs along the Beaver, Allegheny, and Monongahela Rivers and their tributaries maintains river flow at BVPS. BVPS is 3.1 miles downstream from the Montgomery Locks and Dam and 19.6 miles upstream from the New Cumberland Locks and Dam. The New Cumberland Locks and Dam create the New Cumberland Pool and maintain a normal pool elevation of 664.5 feet NGVD, with river flows of about 20,000 cubic feet per second (cfs) (FENOC 2007a).

According to calculations by FENOC using USACE data (USACE 2007), the once-in-10-year, 7-day-duration low flow (7Q10) at the site is approximately 5290 cfs, with minimum monthly average flows ranging from 5549 cfs in October to 37,987 cfs in March (FENOC 2007a). This 7Q10 estimate does not differ significantly from the USACE 7Q10 estimate of 5200 cfs contained in the 1985 BVPS Unit 2 operating phase FES which was measured before the establishment of the nearby Stonewall Jackson Reservoir in 1990 (NRC 1985; FENOC 2007a).

USACE maintains minimum pool levels in the Upper Ohio River to sustain a navigable depth of the water channel at 9 feet. The USACE pool control strategy specifies that pool levels are not to be intentionally lowered under flows of 800 cfs. USACE is currently involved in a study to determine the investments needed to maintain the navigability of the Ohio River through 2070. Investments could include updating the three uppermost locks and dams in its jurisdiction, including Montgomery, because of their age and design. USACE does not foresee any changes in the normal pool elevation of the New Cumberland Pool as a result of any of these possible modifications. While there are currently no new planned or proposed reservoirs in the Ohio River Basin, USACE has informed FENOC that non-Federal partners have shown interest in examining reallocations at dams in the Allegheny River watershed, which could theoretically reduce releases during the summer months (FENOC 2007a).

BVPS uses both raw water from the Ohio River and treated water from the Midland Borough Water Authority for its site operations. Because BVPS uses a closed-cycle system of natural draft cooling towers, it is characterized as a consumptive water user. Cooling is the primary use for the water withdrawn from the Ohio River and is initially used as once-through, noncontact cooling water for primary and secondary heat exchangers in BVPS Units 1 and 2. To replace evaporative losses and drift from the cooling towers, as well as maintain the equilibrium of dissolved solids, most of this water is then used in the circulating water systems, which provide cooling for the main condensers. A smaller portion of water withdrawn from the river is used for other purposes, including the production of demineralized water in the nuclear steam supply system primary and secondary cooling loops.

Any water that has not been consumed by evaporation and drift losses from the cooling towers, as well as by other treated waste water streams, is discharged back to the Ohio River in a manner which complies with the National Pollutant Discharge Elimination System (NPDES) permit (PA 0025615) for the BVPS-1 and 2 site issued by the Pennsylvania Department of Environmental Protection (NRC 2006). The primary source of river water consumption at the site is from evaporation in the closed-cycle cooling system with the maximum consumptive loss being approximately 26 million gallons per day (mgd)(40 cfs). Aside from the water consumed by the closed-cycle cooling system, most of the water withdrawn from the Ohio River by the BVPS site is returned either directly or after treatment. Currently the only other facility that draws from the New Cumberland Pool and uses a closed-cycle cooling system is the Bruce Mansfield Plant whose maximum monthly consumptive loss is approximately 37 mgd (57 cfs). However, any future development in the upper Ohio River Basin of new power plants or other facilities using closed-cycle cooling could result in a decrease in the river flows at the BVPS site (Table 2-1).

Table 2-1. Ohio River Monthly Average Flow (cfs) at BVPS

	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Annual
Min	11,618	24,113	37,987	30,478	18,638	7,387	7,327	5,730	6,025	5,549	7,194	10,548	27,239
Max	91,624	98,337	116,315	104,796	101,267	81,578	55,868	48,947	42,106	56,360	95,006	96,835	59,884
Mean	50,064	57,196	69,944	59,745	42,635	30,738	21,805	16,526	17,610	21,561	35,536	51,771	39,503

Notes: Based on USGS flow data from gauging stations on the Ohio River and at Beaver Falls on the Beaver River from 1971 to 2000.

Source: FENOC 2007a.

Drift losses (water that escapes from the cooling towers as a mist), which are dependent only on circulating water flow rates, are approximately 250 gpm for Unit 1 and 65 gpm for Unit 2, collectively resulting in 0.7 cfs. It is estimated that the uprated power level of the BVPS units to 2900 MWt will increase evaporation rates from each cooling tower by approximately 10 percent but will not affect drift losses. With both units operating simultaneously at the maximum licensed power level of 2900 MWt, the annual average consumptive loss from the Ohio River would be a rate of approximately 40 cfs (18,000 gpm; 29,000 acre-feet/year), and the maximum monthly average consumptive loss would be approximately 45 cfs (20,400 gpm; 33,000 acre-feet/year) for Units 1 and 2 (FENOC 2007a).

Water from the BVPS Unit 1 and 2 river systems is discharged to the respective circulating water systems (with the exception of up to 8400 gpm (19 cfs) blowdown from BVPS Unit 2 primary heat exchangers) as makeup water to replace consumptive losses from the cooling towers. Because the makeup water discharged to the circulating water systems is always greater than the consumptive losses, the excess water is returned to the river as cooling tower blowdown. Blowdown from both units is discharged to a common concrete structure year round; however, in the summer months when the ambient river temperature is higher (July to October), an additional outfall is used. This second outfall (the BVPS Unit 1 emergency cooling tower overflow) is a submerged pipe located slightly downstream from the main blowdown discharge structure. The highest estimate of maximum monthly average blowdown flow for both units is approximately 95 cfs (42,500 gpm); this includes the 8400 gpm from BVPS Unit 2 primary heat exchangers (FENOC 2007A). The expected average temperature differences between the cooling tower blowdown and the ambient temperature of the Ohio River at the current authorized power levels range from 2.4 °F in August to 28.6 °F in January. This reflects a predicted maximum blowdown temperature increase of 2.9 °F.

Pennsylvania does not require water withdrawal permits for industrial facilities; however, users who withdraw or use more than 10,000 gallons per day (gpd) of surface water or ground water, such as BVPS, must register and periodically report water use to the Commonwealth for water planning purposes. The average water withdrawal rates for the BVPS facility (using data collected from 2004 to 2006) are approximately 68 million gpd and 47,000 gpm (Table 2-2) (FENOC 2007a).

Table 2-2. Water Withdrawal Levels for BVPS Units 1 and 2 for 2004 to 2006

				Method of Disposal			
Source Name	**Source Type**	**Collection Year**	**Total Withdrawal (gallons/year)**	**Evaporation (gallons/year)**	**Offsite Disposal (gallons/year)**	**Direct discharge to Ohio River (gallons/year)**	**Total Disposal (gallons/year)**
Main		2004	25,144,488,284	10,399,505,143	NDR	14,744,983,141	25,144,488,284
Intake	River/stream	2005	26,138,931,205	10,989,397,152	NDR	15,149,534,054	26,138,931,205
Structure	Intake	2006	23,148,312,118	NDR	NDR	NDR	23,148,312,118
Midland	Midland	2004	13,789,000	2,684,000	320,000	11,105,000	13,789,000
Municipal	Municipal	2005	16,135,000	2,795,000	340,500	13,340,000	16,135,000
Authority	Authority	2006	13,990,000	NDR	NDR	NDR	13,990,000

Source: Act 220 Water Withdrawal and Use Registration

2.2.2.2 *Ground Water Use*

In the area along the Upper Ohio River Valley, the majority of industrial centers, including the BVPS site, are built on terraces of deposited alluvial gravel and sand. These terraces of varying thicknesses have been deposited over an underlying layer of bedrock and contain large amounts of ground water. Typically, wells in this area yield between 500 and 1000 gpm (FENOC 2007a). The alluvial deposit underlying BVPS is more than 100-feet thick and is recharged by precipitation flowing downgradient (northwest) through soils above the shale and sandstone bedrock to the Ohio River (NRC 1985). The amount of annual precipitation infiltration results in approximately 12 inches of water per year of average recharge, or about 900 gpd per acre. In addition, the Ohio River supplies recharge to the alluvial aquifer because the river and the aquifer are hydraulically connected (NRC 1985). Numerous industries and municipalities draw heavily on the alluvial aquifers along the Ohio River Valley; eight well-fields for public water supply are located along the Ohio River in Beaver County (FENOC 2007a).

Although BVPS originally used water from onsite ground water wells and the Ohio River as sources of domestic water, municipal water from Midland Borough now supplies the station's domestic water distribution system. Onsite wells were used only before 1996 and are now disconnected with no plans for reactivation. Midland Borough has a water supply system with a rated capacity of 5 MGD, or 7.7 cfs. With the exception of routine ground water monitoring established by the BVPS Groundwater Protection Plan, as discussed in Section 2.2.3.2 below, no future use of ground water is anticipated at BVPS during the license renewal term (FENOC 2007a).

2.2.3 Water Quality

2.2.3.1 *Surface Water*

Water quality in the Upper Ohio River has considerably improved since the mid-20th century. Acid mine drainage discharges contributed by both the Allegheny and Monongahela Basins have historically dominated water quality issues in the Ohio River. Additional industrial wastes originated from the Pittsburgh region. The 1985 BVPS Unit 2 operating phase FES reported that a comparison of water quality data from 1968–1970 and 1976–1980 showed improvements in alkalinity, sulfates, iron, manganese, ammonia, and nitrates, indicating reductions in acid mine drainage and sewage treatment pollutants (NRC 1985).

Today, the Ohio River Valley Water Sanitation Commission (ORSANCO), created in 1948 by the Ohio River Valley Water Sanitation Compact, biennially assesses the water quality of the Ohio River. Eight states—New York, Pennsylvania, West Virginia, Virginia, Ohio, Kentucky, Indiana, and Illinois—and the Federal Government formed this Commission. ORSANCO uses a number of bimonthly sampling techniques at over 30 sites along the river to monitor bacteria, algae, nutrients, volume, and various metals, among other things. Water quality criteria are rated as "fully supporting," "partially supporting," and "not supporting." The most recent biennial assessment lists the Ohio River as "fully supporting" for aquatic life use and for public water use; however, fish consumption use is listed as "partially supporting" because of levels of mercury, PCBs, and dioxin. The New Cumberland Pool itself is listed as "not supporting" contact recreation use because it has exceeded allowable levels of coliform bacteria (ORSANCO 2006).

Ohio River water temperatures range from approximately 36.5 °F in January to 79.5 °F in both July and August. The maximum temperature is expected to be roughly 86 °F (FENOC 2007a).

BVPS NPDES Monitoring

In accordance with the Federal Water Pollution Control Act (or the Clean Water Act), the BVPS effluent discharges are regulated by NPDES permit No. PA0025615 issued by PADEP. Section 402 of the Clean Water Act states that "NPDES prohibits [discharges] of pollutants from any point source into the nation's waters except as allowed under an NPDES permit." The purpose of this permit is to regulate wastewater discharge in order to preserve the water quality of the surrounding water bodies. As of the most recent permit issued, the BVPS site has received no Notices of Violation.

The most recent renewal of this permit occurred in May 2003. Table 2-3 shows the quantitative effluent limitations regulated under the NPDES permit. In addition to these effluent limitations, the permit also stipulates that during any 1-hour period, discharge may not affect the temperature of the receiving water body by more than 2 °F.

Table 2-3. Effluent Limitations (mg/L) – NPDES Permit for BVPS

	Total Suspended Solids		Oil and Grease		Total Residual Chlorine		CBOD-5 Day		Copper		Free Available Chlorine		Betz (DT-1)		Chromium		Zinc	
Outfall No.	Avg. Mth	Max. Daily	Avg. Mth	Max. Daily	Avg. Mth	Max. Daily	Avg. Mth	Max. Day	Avg. Mth	Max. Day	Avg. Conc.	Max. Conc	Avg. Conc	Max. Conc	Avg. Conc	Max. Conc	Avg. Conc	Max. Conc
001	NLR	NLR	NLR	NLR	0.5	1.25	NLR	NLR	NLR	NLR	0.2	0.5	NLR	35.0	0.2	0.2	1.0	1.0
002	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR
003	NLR	NLR	NLR	NLR	0.5	1.25	NLR	NLR	NLR	NLR	0.2	0.5	NLR	NLR	0.2	0.2	1.0	1.0
004	NLR	NLR	NLR	NLR	0.5	1.25	NLR	NLR	NLR	NLR	0.2	0.5	NLR	NLR	0.2	0.2	1.0	1.0
005	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR
007	NLR	NLR	NLR	NLR	0.5	1.25	NLR	NLR	NLR	NLR	0.2	0.5	NLR	NLR	NLR	NLR	NLR	NLR
008	30	100	15	20	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR
010	NLR	NLR	NLR	NLR	0.5	1.25	NLR	NLR	NLR	NLR	0.2	0.5	NLR	35.0	NLR	NLR	NLR	NLR
011	30	100	15	20	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR
012	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	1.5	1.5
013	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	0.05	0.125*	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR
101	30	100	15	20	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR
102	30	100	15	20	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR
103	30	100	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR
111	30	100	15	20	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR
113	30	60	NLR	NLR	1.4	3.3*	25	50	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR
203	30	60	NLR	NLR	1.4	3.3*	25	50	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR
211	30	100	15	20	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR
213	30	100	15	20	0.5	1.25*	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR
301	30	100	15	20	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR
303	30	100	15	20	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR
313	30	100	15	20	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR
401	30	100	15	20	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR
403	30	100	15	0.5	1.25	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	35.0	NLR	NLR	NLR	NLR
413	30	100	15	20	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR
501	30	100	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR	NLR

Notes: * = Instant Max.

All outfalls have a pH limitation requiring the effluent pH to be between 6 and 9.

Source: NPDES PA 0025615

Table 2-3 illustrates the effluent limitations set by the NPDES Permit. The permit specifies 26 discharge outfalls. These outfalls include the Unit 1 and 2 cooling tower blowdown (Outfall 001), the intake screen backwash and pump (002), the uncontaminated yard stormwater runoff (003), the Unit 1 cooling tower overflow (004), the auxiliary intake screen backwash water (005), the auxiliary intake system testing water (007), the Unit 1 cooling tower pumphouse drains and stormwater runoff (008), the once-through cooling water from Unit 2 heat exchangers (010), the diesel generator building oil/water separator drain and the turbine building oil/water separator drain (011), the blowdown from the HVAC unit (012), the uncontaminated storm water runoff (013), the chemical waste treatment system (101), the intake screenhouse (102), the settling basin handling sludge from the intake clarifier (103), the diesel generator building oil/water separator drain (111), the sewage treatment plant handling sanitary wastes (113), the sewage treatment plant at the main plant (203), the turbine building oil/water separator drain (211), the Unit 2 cooling tower pumphouse floor and equipment drains (213), the Unit 2 auxiliary blowdown boiler (301), the oil/water separator handling Unit 1 turbine room floor drain (303), the turbine building oil/water separator drain (313), the chemical feed area of the Unit 2 auxiliary boilers (401), the condensate blowdown and uncontaminated river water (403), the bulk fuel storage oil/water separator drain (413), and the Unit 1 steam generator blowdown filter backwash (501). According to the BVPS NPDES permit, each of these outfalls has specific effluent discharge limitations.

Other requirements imposed by the NPDES permit include the minimization of the amount of discharged total residual chlorine and the monthly monitoring of any chemical additives used on site, including the summarization of their usage level and discharge volumes. The discharge of PCB compounds is prohibited. BVPS is permitted to use Betz Clamtrol (CT-1) to control the population of Asiatic clams, but only on a limited, as-needed basis. Monitoring of Betz Clamtrol levels is specified at several outfalls, as is the monitoring of ammonia levels, Hydrazine, biochemical oxygen demand (BOD-5 Day), and fecal coliform organisms.

Discharge of storm water must also be monitored for pollutants to ensure that the discharge consists only of uncontaminated storm water. BVPS is required to report these data using discharge monitoring reports, as well as initiating Storm Water Pollution Prevention Plans (SWPPP) for several of its outfalls.

Part C of the NPDES permit specifies that waterborne releases of radioactive material must conform to the guidelines in Appendix I, "Numerical Guides to Design Objectives and Limiting Conditions for Operation to Meet the Criterion 'As Low as Is Reasonably Achievable' for Radioactive Material in Light-Water-Cooled Nuclear Power Reactor Effluents," to 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities." The facility must provide reports that describe the quantities of unrestricted radioactive material released in effluent discharge to PADEP.

Dredging

The substrate of the Allegheny River is a unique mixture of sand and gravel glacial deposits as well as fine sand, silt, and clay. Much of the finer glacial outwash has washed from the Allegheny into the Upper Ohio River, making the bottom substrate of the river particularly important commercially, especially in upstream areas like the New Cumberland Pool. The quality and quantity of this material make it an ideal economic resource, mainly for use in highway construction. This has led to some commercial dredging in the New Cumberland Pool, with a number of other similar sites already identified as fit for more dredging in the future (USACE 2006b).

The current dredging permit allows for any necessary maintenance dredging at the BVPS site along the left bank of the Ohio River, mile 34.5. This permit, good for a period of 10 years, was issued in April 2001 and expires in 2011, but there is an option for permit renewal if the request is submitted before that date (USACE 2006b).

2.2.3.2 *Ground Water*

Ground water flow beneath both Units 1 and 2 is generally from southeast to northwest, discharging into the Ohio River. Because of the nature and permeability of the substrate, ground water flow in the alluvial gravel terrace layer is intergranular, with the water table located approximately 65 ft. below the surface of the BVPS site. Recharge to the aquifer is limited at the site because much of the surface at the BVPS site is paved, so rainfall collects in stormwater basins instead. Ground water in the less permeable shale and sandstone bedrock flows in bedding planes, joints, and fractures in the rock. The depth of the ground water in the bedrock layer is not known (FENOC 2007a).

As previously mentioned, ground water use is not anticipated at the BVPS site aside from routine ground water monitoring established by the BVPS Groundwater Protection Plan. A total of 17 monitoring wells (which can be referred to as both wells and piezometers) have been identified at the BVPS site for the purpose of monitoring temperature, conductivity, pH, dissolved oxygen, turbidity, and oxidation-reduction potential using low-flow ground water sampling techniques. Two additional sites (the cooling water blowdown lines and the Unit 2 Sanitary Water Treatment Plant) are tested by grab ground water samples as well (FENOC 2007a).

Several of the wells are selected to measure levels of tritium and gamma-emitting radionuclides because of the expectation that potential liquid releases at BVPS will transfer down to the water table below. Any permeability variations in the gravel layer would likely affect this transfer, but the liquid releases would eventually be discharged into the Ohio River. It is not expected that the underlying bedrock would be affected in this situation (FESC 2006). According to the "Annual Radiological Environmental Operating Report," samples taken from the Ohio River do not contain tritium and radionuclides released during normal plant operations (FENOC 2007h).

2.2.4 Air Quality

2.2.4.1 *Climate and Meteorology*

As documented by Pennsylvania State Climatologists, the average annual precipitation for Region 9 is 37.47 inches (95 centimeters), with February and October being the driest months (PSC 2007c). Average mean snowfall during the 30-year period (1977–2007) is 40.4 inches (103 centimeters) (NWS 2007).

BVPS is located on the south bank of the Ohio River within the Pittsburgh Low Plateau Section, which consists of a smooth undulating upland surface cut by numerous, narrow, relatively shallow river valleys. The uplands are developed on rocks containing the bulk of the significant bituminous coal in Pennsylvania. The local relief on the uplands is generally less than 200 feet (61 meters). Local relief between valley bottoms and upland surfaces may be as much as 600 feet (183 meters). Valley sides are usually moderately steep except in the upper reaches of streams where the side slopes are fairly gentle. Elevations range from 660 to 1700 feet (201 to 518 meters) (PDCNR 2007f).

The climate of western Pennsylvania is classified as Dfa[4] (Köppen[5]) (humid continental climate with hot summers and year-round precipitation). Pennsylvania is divided into 10 climate regions. Beaver County belongs to climate Region 9, along with Lawrence, Butler, Armstrong, Indiana, Allegheny, Westmoreland, Somerset, Washington, Fayette, and Greene Counties. Data collected in the region since 1899 show that the average winter temperature is 30.2 °F (-1 °C) and rarely drops below 20 °F (-6.6 °C), while the average summer temperature is 71.3 °F (21.8 °C) (PSC 2007a).

Precipitation is fairly evenly distributed throughout the year. Annual amounts generally range between 34 to 52 inches (86 to 132 centimeters), while most places receive 38 to 46 inches (97 to 117 centimeters). Greatest amounts usually occur in the spring and summer, while February is the driest month, having about 2 inches (5 centimeters) less than the wettest months. Precipitation tends to be somewhat greater in eastern sections primarily because of coastal storms (PSC 2007c).

As documented by Pennsylvania State Climatologists, the average annual precipitation for Region 9 is 37.47 inches (95 centimeters), with February and October being the driest months (PSC 2007c). Average mean snowfall during the 30-year period (1977–2007) is 40.4 inches (103 centimeters) (NWS 2007).

The dominant wind direction throughout Pennsylvania is from the west with some seasonal variation. Locally, however, wind direction is primarily influenced by changes in topography,

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4 Dfa indicates a humid continental climate with hot summers and year-round precipitation. The average temperature of the coldest month is -3 °/26.6 °F or below, the average temperature of the warmest month is greater than 10 °C/50 °F, and rainfall is equally spread throughout the year. See http://www.utexas.edu/depts/grg/kimmel/GRG301K/grg301kkoppen.html.

5 Köppen Climate Classification System is the most widely used system for classifying the world's climates. Its categories are based on the annual and monthly averages of temperature and precipitation. The Köppen system recognizes five major climatic types; each type is designated by a capital letter. See http://www.physicalgeography.net/fundamentals/7v.html.

such as valley ridges and riverbank steep slopes, which create a channeling effect. BVPS historical meteorological reports show that in spring the winds from the northwest quadrant prevail, while in summer the wind directions from south-southwest predominate, along with the secondary maximum of winds from the northwest. During the fall, there is a high frequency of winds from the west, west-northwest, and northwest, with a secondary maximum of winds from the south. The winter season delivers high-frequency and high-speed winds from the northwest quadrant. As a result of seasonal patterns, the annual wind roses exhibit a high frequency of winds from the northwest quadrant and from southern directions. The median annual windspeed for the National Weather Service Station located in Pittsburgh (approximately 25 miles southeast of BVPS) is 9 miles per hour (7.8 knots) (NCDC 2007a). While the prevailing westerly winds cause most of the air masses that affect Pennsylvania to originate in the interior of the continent, the Atlantic Ocean does have a limited influence on the State's climate. Coastal storms can affect the day-to-day weather but mostly in eastern sections of the State.

Severe weather events in Pennsylvania are uncommon. Severe snowstorms are infrequent, but when they do occur, they can approach blizzard conditions. High winds have been known to cause huge drifts that can continue to disrupt normal routines for several days. While the incidence of tornadoes is very low, the region has occasionally been hit with these storms which caused loss of life and great property damage. June is the month of highest frequency, followed closely by July and August. The National Climatic Data Center reports 15 tornadoes in Beaver County from 1950 to March 2007 (NCDC 2007b)—two at F0, nine at F1, three at F2, and one at F3 strengths.[6] The most destructive activity occurred on May 31, 1985, when 27 tornadoes raked across the northern and western counties of the Commonwealth killing more than 60 people and destroying property. In Beaver County, a tornado occurred on that date causing 3 deaths, 40 injuries, and $25 million in property damage (PSC 2007b).

The BVPS primary meteorological data monitoring system consists of three levels of instrumentation on the 500-foot (152-meters) meteorological tower, which is located 2600 feet (792 meters) northeast of BVPS Unit 1. Winds (speed and direction) are measured at three levels: 35, 150, and 500 feet (11, 46 and 152 meters). Ambient temperature and dewpoint measurements are made at the 35-foot level (11-meter). Atmospheric stability is determined by calculating temperature differences between 35 feet (11 meters) and 150 feet (46 meters) ($\Delta T1$) and 35 feet (11 meters) and 500 feet (152 meters) ($\Delta T2$). Precipitation is measured at ground level. Redundant meteorological instrumentation located on the tower provides backup data in case of primary system failure or during maintenance of the primary system. Backup windspeed, wind direction, ambient temperature, and temperature differential measurements are made at the same levels and intervals as the primary system (FENOC 2006a).

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6 The Fujita six-point scale (F0 to F5) is used to rate the intensity of a tornado based on the damage it inflicts to structures and vegetation. The lowest intensity is F0; the highest is F5. Fujita scale categories are based on estimated (not measured) sustained windspeeds compared against observed structural damage. The Enhanced Fujita Scale replaced the original Fujita Scale in February 2007. The Enhanced Fujita Scale still uses six categories of tornado intensity (EF0 to EF5) but defines those categories differently. For additional information about the Fujita Scales, see the National Oceanographic and Atmospheric Administration (NOAA) Web site and its hypertext links at http://www.spc.noaa.gov/faq/tornado/f-scale.html.

BVPS has an established real time review and data quality assurance program for meteorological data. The quality control includes weekly inspection of analog charts by site personnel and daily review of the digital data by a contractor. When a malfunction is detected, field maintenance personnel are dispatched to correct the problem. The quality-assured meteorological data are then compiled into monthly, quarterly, and annual reports (FENOC 2006a).

2.2.4.2 *Air Quality Impacts*

BVPS is located within the Mid-Atlantic Air Quality Control Region, as designated by EPA.[7] The Bureau of Air Quality of the PADEP is responsible for regulating all air emission sources within the State. Pennsylvania's ambient air monitoring program is a result of the implementation of the Federal Clean Air Act on a State level. The State is divided into six air regions, and Beaver County, where BVPS is located, belongs to Southwest Air Quality Region 5. Beaver County is a nonattainment area for fine particulate matter ($PM_{2.5}$). In October 2006, EPA issued a final rule that revises the 24-hour $PM_{2.5}$ standard and revokes the annual PM_{10} standard. The new rule does not affect nonattainment designations for PM_{10}, but additional nonattainment areas could be designated under the new $PM_{2.5}$ standard. Beaver County also is among six counties in Region 5 that are rated as nonattainment for ozone (the others are Allegheny, Armstrong, Fayette, Washington, and Westmoreland). There are 40 nonattainment and maintenance areas within a 50-mile (80 kilometers) radius of the BVPS site, see Table 2.4) (FENOC 2007a).

Pennsylvania State regulators recognize BVPS as a Synthetic Minor facility because of the quantities of emissions and restrictions on the hours of operation of its stationary sources of criteria pollutants; therefore, operation of the sources is regulated by a "State Only Operating Permit for Synthetic Minor Facility" (FENOC 2007b). BVPS has a number of stationary emission sources, such as four standby emergency power supply diesel generators, two emergency response facility generators, two auxiliary boilers and a paint shop. BVPS also has a number of sources, defined by PADEP as insignificant, such as two cooling towers, cooling water tanks, diesel fuels and fuel oil storage tanks, emergency warehouse diesel fire pump, and security emergency diesel generators for security and meteorology. The generators are tested periodically to ensure their continued ability to perform their intended function, and procedures are in place to ensure continuous monitoring, sampling, and filtering of the oil.

BVPS conducts periodic in-house industrial fire brigade training for shift operations and maintenance personnel which is permitted under approved open-burning exception for firefighting instruction that stipulates the location, time, number of fires, and types of combustibles for each exercise (FENOC 2007c).

Sections 101(b)(1), 110, 169(a)(2), and 301(a) of the Clean Air Act as amended (42 U.S.C. 7410, 7491(a)(2), 7601(a)) established Mandatory Class I Federal Areas where visibility is an important value. Because there are no Mandatory Class I Federal areas in

[7] Mid-Atlantic Air Protection Region 3 comprises Delaware, the District of Columbia, Maryland, Pennsylvania, Virginia, and West Virginia. For additional information, see the EPA Web site and its hypertext links at http://www.epa.gov/reg3artd/index.htm.

Pennsylvania or proximate to BVPS, no adverse impacts on Class I areas are anticipated from BVPS operation.[8]

Table 2-4. Nonattainment and Maintenance Areas

Area	Designation
Sulfur Dioxide	
City of Hazelwood (Allegheny County, PA)	Maintenance
Townships of Madison, Mahoning, Boggs, Washington, and Pine (Armstrong County, PA)	Nonattainment
Cities of Steubenville and Mingo Junction (Jefferson County, OH)	Maintenance
City of Weirton, including Butler and Clay Magisterial Districts (Hancock County, WV)	Maintenance
New Manchester—Grant Magisterial District (Hancock County, WV)	Maintenance
Carbon Monoxide	
City of Pittsburgh (Allegheny County, PA)	Maintenance
Ozone	
Mercer County, PA	Nonattainment
Greene County, PA	Nonattainment
Allegheny, Armstrong, Beaver, Butler, Fayette, Washington, and Westmoreland Counties, PA	Nonattainment
Portage County, OH	Maintenance
Columbiana County, OH	Maintenance
Jefferson County, OH	Maintenance
Stark County, OH	Maintenance
Trumbull County, OHc	Maintenance
Belmont County, OHc	Maintenance
Mahoning County, OH	Maintenance
Brooke County, WV	Maintenance
Hancock County, WV	Maintenance
Marshall County, WVc	Maintenance

8 A list of Mandatory Class I Federal Areas appears in 40 CFR 81.400, "Scope," et seq.

Area	Designation
Ohio County, WVc	Maintenance
Coarse Particulate Matter (PM_{10})	
City of Clairton and 4 boroughs (Allegheny County, PA)	Maintenance
Jefferson County, OH	Maintenance
City of Weirton (Brooke and Hancock Counties, WV)	Maintenance
City of Follansbee (Brooke County, WV)	Maintenance
Fine Particulate Matter ($PM_{2.5}$)	
Allegheny County, PA	Nonattainment
Beaver County, PA	Nonattainment
Butler County, PA	Nonattainment
Washington County, PA	Nonattainment
Westmoreland County, PA	Nonattainment
Township of Taylor South of New Castle City (Lawrence County, PA)	Nonattainment
Monongahela Township (Greene County, PA	Nonattainment
Elderton Borough, Township of Plumcreek, and Township of Washington (Armstrong County, PA)	Nonattainment
Belmont County, OH	Nonattainment
Jefferson County, OH	Nonattainment
Portage County, OH	Nonattainment
Stark County, OH	Nonattainment
Brooke County, WV	Nonattainment
Hancock County, WV	Nonattainment
Marshall County, WV	Nonattainment
Ohio County, WV	Nonattainment

2.2.5 Aquatic Resources

BVPS withdraws water from and discharges water to the Ohio River BVPS is located on the southern bank of the Ohio River at river mile 34.8 (FENOC 2007a). The major river systems in the region include the Ohio, Monongahela, and Allegheny Rivers and their tributaries. The Ohio River is formed by the confluence of the Monongahela and Allegheny Rivers at Pittsburgh, which is approximately 25 miles southeast of the site (USACE 2006b). The Ohio River is classified as riverine lower perennial modified by impoundments and exhibits low gradient and slow water velocity (Tolin 1988). The Ohio River Basin drains a total area of approximately 141,000 square miles and includes portions of Illinois, Indiana, Kentucky, Maryland, New York, Ohio, Pennsylvania, Tennessee, Virginia, and West Virginia. The river flows 981 miles in a southwesterly direction, joining the Mississippi River at Cairo, Illinois (FWS 1999).

USACE controls and maintains regional river waters by operating six locks and dams on the Upper Ohio River, nine locks and dams on the lower Monongahela River, and eight locks and dams on the lower Allegheny River (USACE 2006b). The series of locks and dams maintains the navigability of these rivers for commercial and pleasure boat traffic; the USACE dams do not provide flood protection, however. Because the natural river beds in this area are long, uneven downhill slopes with shallow areas and deep pools, the USACE dams create "stepped pools" along the riverbed slope that are at least 9-feet deep to allow the passage of boats and barges. Each dam has at least one lock chamber that enables boat traffic to pass safely from one pool to the next (USACE 2006b). Commercial activity on the Ohio River has increased over the years in response to the growth of heavy industry in the Pennsylvania, Ohio, and West Virginia area. As of 2006, approximately 270 million tons of cargo are shipped on the Ohio River annually (USACE 2006c).

BVPS is located on the New Cumberland Pool of the Ohio River, approximately 3.1 river miles downstream from the Montgomery Locks and Dam and 19.6 miles upstream from the New Cumberland Locks and Dam. Several creeks and river tributaries feed into the Ohio River near and within the BVPS site. In the Montgomery Pool, Beaver River joins the Ohio River approximately 9.5 miles upstream and Raccoon Creek joins approximately 4 miles upstream from BVPS; Little Beaver Creek joins the New Cumberland Pool approximately 5 miles downstream from BVPS. Ambridge Reservoir is located 5 miles southeast of the BVPS site and is an important municipal water supply impoundment of Raccoon Creek for the city of Ambridge (FENOC 2007a). Figure 2-2 shows a map of the BVPS vicinity.

Peggs Run is a small, high velocity stream that runs through a concrete culvert on the eastern portion of the BVPS site and discharges to the New Cumberland Pool, at a point just west of the Shippingport Bridge. Peggs Run drains much of the area south of the BVPS site and has historically been heavily degraded by upstream acid mining operations. Acid mining operations have decreased; however, water in upper reaches of the stream still run deep red during periods of high flow, suggesting that acid mine drainage still influences this small stream. The lower portion of Peggs Run that passes through the BVPS culvert receives some of the BVPS site stormwater and wastewater runoff, but this runoff has little or no impact on the stream. A 3-year aquatic survey of Peggs Run revealed that chironomids (midges) and other dipterans (true flies) are the dominant group of organisms present in the culvert. The likely reason for this is the lack of adequate substrate (the concrete culvert is not ideal), and this portion of the stream would not support a quality assembly of aquatic organisms regardless of any discharges from the BVPS site. However, the aquatic survey also indicated that, in general, Peggs Run water quality and substrate conditions have improved, and pollution-tolerant fish species have begun to inhabit the stream (Beak 1999).

2.2.5.1 *Physical Characteristics of the New Cumberland Pool*

The New Cumberland Pool is 23 miles long and averages approximately 1325 feet in width. At normal pool elevation, its surface area is approximately 3646 acres. Phillis Island (river mile 35), Georgetown Island (river mile 38), Babbs Island (river mile 42), and Cluster Island (river mile 52) are all sediment-capped alluvial sand and gravel islands in the New Cumberland Pool that remained following the pool's initial impoundment. Seven submerged embayments (small bays or any small, semienclosed coastal water body whose opening to a larger water body is restricted) occur in the New Cumberland Pool, totaling approximately 180 acres of aquatic backwaters. The shallow and deep habitats created by the complex of small islands in the pool make the New Cumberland Pool an important habitat area for fish and benthic organisms. (Tolin 1988)

USACE maintains a narrow navigation channel in the New Cumberland Pool that is minimally 9 feet deep; however, the actual average depth reaches 20 feet in some areas. Water depths within 100 feet of the shoreline are typically much shallower, normally less than 9 feet (USACE 2006a). The Ohio River bottom substrate mostly consists of a mixture of glacially deposited sand and gravel. Bottom substrate in the near-shore vicinity of BVPS consists of sand, silt, and detritus. Clay and sand are predominant along the north shoreline of Phillis Island, and gravel and cobble substrate occur along the middle of the Phillis Island backchannel (Tolin 1988). With the exception of buffer zones established to protect the coast, backchannels, and islands, USACE has designated much of the Ohio River as potentially suitable for future commercial dredging. USACE currently allows commercial sand and gravel dredging in the New Cumberland Pool (USACE 2007). During its site visit, the NRC staff witnessed this commercial dredging activity, occurring approximately 3 miles downstream from BVPS, near Georgetown.

The Ohio riverine aquatic bed is characterized by sparse patches of submerged, rooted aquatic plants such as the water milfoil (*Myriophyllum heterophyllum*) and pond weeds (*Polygonum* spp.). Submerged aquatic vegetation (SAV) provides important food and habitat for fish, shellfish, invertebrates, and waterfowl. In particular, SAV in the New Cumberland Pool provides nursery areas, protection, and food for fish. Migratory waterfowl including the Canada goose (*Branta canadensis*), mallard (*Anas platyrhynchos*), black duck (*Anas rubripes*), wood duck (*Aix sponsa*), northern pintail (*Anas acuta*), and blue-winged teal (*Anas discors*) also feed on SAV (FENOC 2007a). However, maintenance and commercial dredging has and will likely continue to limit SAV from proliferating in the New Cumberland Pool.

Section 2.2.3 discusses Ohio River water quality in more detail; however, in general, water quality in the river has improved since the NRC gathered data for the 1973 and 1985 FES for BVPS. Water quality improvement in the Ohio River is attributable to the rise of State and Federal pollution abatement programs and better land management practices in the river basin. Reduced acid mine drainage has resulted in an increase in alkalinity and a decrease in sulfates, iron, and manganese. Sewage treatment pollutants, such as ammonia and nitrates, have also decreased. (AEC 1973; NRC 1985; FENOC 2007a)

The 1985 FES for BVPS Unit 2 reported that average Ohio River ambient water temperatures ranged from 36.5 °F (2.5 °C) in January to 79.5 °F (26.4 °C) in August; the maximum daily temperature recorded was 86 °F (30 °C) in August (NRC 1985). More recent (1988–2002) USACE data report similar ambient river water temperatures, with maximum monthly average temperatures of 80 °F (26.7 °C) and 79 °F (26.1 °C) occurring in July and August, respectively. The maximum daily temperature recorded was again 86 °F (30 °C). (FENOC 2007a)

2.2.5.2 *Benthic Macroinvertebrates in the New Cumberland Pool*

Duquesne Light (the FENOC predecessor) and subsequently FENOC have sampled benthic macroinvertebrates in the New Cumberland Pool since the mid-1970s. Additionally, USACE conducted benthic macroinvertebrate sampling for a recent EIS (USACE 2006c). The benthic macroinvertebrate community in the New Cumberland Pool mostly consists of oligochaetes, a class or order of hermaphroditic aquatic annelid worms that lack a specialized head. From 2004 through 2006, USACE collected 57, 37, and 40 taxa, respectively; oligochaetes and midge larvae were found in the highest densities. (USACE 2006c)

In 2004–2006, FENOC also collected Asiatic clams (*Corbicula fluminea*) and zebra mussels (*Dreissena polymorpha*), nonnative species that foul power plant cooling water systems (in a process termed "macrofouling"). Asiatic clams have been observed in the Ohio River since 1974, and zebra mussels were first found at BVPS in 1995 (FENOC 2007a). Section 2.2.3 discusses biocide applications used at BVPS to control these macrofouling organisms.

Native freshwater mussels in the Unionidae family, including mucket (*Actinonaias ligamentina*), fatmucket (*Lampsilis siliquoidea*), fluted shell (*Lasmigona costata*), fragile papershell (*Leptodea fragilis*), pink heelsplitter (*Potamilus alatus*), giant floater (*Pyganodon grandis*; formerly *Anodonta grandis*), mapleleaf (*Quadrula quadrula*), fawnsfoot (*Truncilla donaciformis*), and paper pondshell (*Utterbackia imbecillis*), have all been found in low numbers in the New Cumberland Pool and, in general, represent a small portion of the macroinvertebrate community in the Upper Ohio River (FENOC 2007a). The presence of freshwater mussels is important to the ecosystem because freshwater mussels aid in the decomposition of detritus and keep bacterial and planktonic populations under control. Freshwater mussels rely on rapid currents for survival and were once predominant when the Ohio River was free flowing. However, the construction of locks and dams in the river created a pool-like ecosystem, increasing silt accumulation and slowing current velocities, a condition not ideal for Unionidae populations. Thus, the impoundment of the Ohio River system for navigation has likely limited the abundance and distribution of most freshwater mussel species. (FWS Undated; USACE 2006b) In 1999, FENOC sampled 13 percent of the New Cumberland Pool area for benthic macroinvertebrates, and of this area, only 24 percent yielded unionids (FENOC 2007a).

A minor resurgence in freshwater mussel populations has been attributed to the recent water quality improvement in the Ohio River, and very small populations can be found in areas of clean-swept substrate, such as dam tailwaters and around islands (USACE 2006b). However, the Unionidae population will likely never resemble what it was before the damming of the river. Additionally, the introduction of nonnative species has impacted the native mussel community.

Zebra mussels in particular are highly invasive and are a severe threat to native freshwater mussels in the Ohio River system. In a 1995 study conducted by FWS, zebra mussel densities ranged from 4 per square meter at upstream Ohio River sampling sites to almost 4000 per square meter at downstream sampling sites. Mortality of native mussels at these high-density sites reached 73 percent. FWS anticipated continued high mortality of native mussels if the zebra mussel densities continued at that level (FWS Undated).

2.2.5.3 *Fish in the New Cumberland Pool*

ORSANCO, the Pennsylvania Fish and Boat Commission (PFBC), the Ohio Department of Natural Resources (ODNR), Duquesne Light, and FENOC have conducted fish sampling in the New Cumberland Pool. ORSANCO conducted lock-chamber sampling in the New Cumberland Pool and in the New Cumberland and Montgomery Locks from 1992 to 2002. The most abundant fish species in the Upper Ohio River are gizzard shad (*Dorosoma cepedianum*) and freshwater drum (*Aplodinotus grunniens*), forage and rough specie fish, respectively. Other forage species commonly found in the New Cumberland Pool include various shiners (*Notropis* spp.), silver chub (*Macrhybopsis storeriana*), common carp (*Cyprinus carpio*), skipjack herring (*Alosa chrysochloris*), smallmouth buffalo (*Ictiobus bubalus*), and redhorse (*Moxostoma* spp.). Sport fishes found in the Ohio River include channel catfish (*Ictalurus punctatus*), white bass (Morone chrysops), bluegill (*Lepomis macrochirus*), flathead catfish (*Plyodictis olivaris*), smallmouth bass (*Micropterus dolomieui*), spotted bass (*Micropterus punctulatus*), sauger (*Stizostedion canadense*), walleye (*Stizostedion vitreum*), and saugeye (a sauger-walleye hybrid). (FENOC 2007a; ORSANCO Undated A)

Pelagic (open water) habitat in the New Cumberland Pool supports gizzard shad, skipjack herring, emerald shiner (*Notropis atherinoides*), freshwater drum, and white bass. The soft substrate river bottom of the New Cumberland Pool supports redhorses, catfish, and sauger. Shallow waters along the shores of the New Cumberland Pool and its islands support carp, silver chub, minnow species and shiners, smallmouth buffalo, smallmouth bass, crappie (*Pomoxis* spp.), bluegill, and other sunfish (*Lepomis* spp.). (FENOC 2007a) New Cumberland Pool low-current backwaters and embayments provide essential fish habitat in the Upper Ohio River as they serve as spawning beds and nursery areas. Additionally, dam tailwaters provide spawning habitat for sport fishes that require clean-swept substrate surfaces (Tolin 1988).

A comparison of data contained in the 1973 FES for BVPS to more recent fish population data clearly indicates that Ohio River fisheries have improved in abundance and composition since the 1960s. Many riverine species have expanded their range and increased in abundance. Fish populations have rebounded from a predominance of carp and bullheads in the 1950s and 1960s to the current diverse community of gamefish and forage species. This trend can largely be attributed to improvement in the water quality of the Ohio River. (Lorson and Miko 1994) In 1991, prompted by the improvement in water quality, PFBC began stocking the Ohio River with paddlefish fingerlings (*Polyodon spathula*), a gamefish native to the Ohio and Allegheny Rivers. Because of a combination of overfishing, poor water quality, and the construction of the lock and dam navigation system, paddlefish had not been present in the Ohio or Allegheny River systems since 1919 (PFBC 2005). Stocking efforts included the New Cumberland Pool in even-numbered years since 1994, at a rate of two fish per acre. In addition to fingerlings, PFBC also stocked the river with approximately 755,000 10-inch-long paddlefish between 1994 and 2003

(FENOC 2007a). Paddlefish were caught in the Ohio, Allegheny, and Monongahela Rivers during a 2006 survey by PFBC, suggesting that the fish are making a comeback. Stocking and monitoring efforts will likely continue until a naturally reproducing population has been established and limited sport fishery can be considered (PFBC 2005).

Other fish stocking occurs in the Ohio River to support recreational fishing. Although commercial fishing is prohibited in parts of the Ohio River, including the New Cumberland Pool, sport fishing on the Ohio River is an important economic resource for Ohio, Pennsylvania, and West Virginia. Sport fishes commonly sought in the Ohio River include smallmouth bass, largemouth bass (*Micropterus salmoides*), spotted bass, sauger, walleye, saugeye, white bass, and striped bass hybrids (a hybrid of white bass and striped bass (*Morone saxatilis*)). ODNR, West Virginia Division of Natural Resources, and PFBC work together to stock and maintain the striped bass hybrid sport fishery in the Ohio River. (FENOC 2007a)

2.2.5.4 *Threatened and Endangered Aquatic Species*

Two aquatic species that are federally listed as endangered under the Endangered Species Act may occur in the vicinity of BVPS. The clubshell (*Epioblasma torulosa rangiana*) and the northern riffleshell (*Pleurobema clava*) are freshwater mussels that have not been found recently in areas of historical occurrence, which include waterways in Beaver County and the Allegheny River and its tributaries (FWS 2007b). According to the Pennsylvania Natural Heritage Program, five aquatic species listed by the Commonwealth of Pennsylvania as threatened or endangered may occur in the vicinity of BVPS (PNHP 2008). Table 2-5 summarizes this information.

Table 2-5. Federally Listed and State-Listed Aquatic Species Potentially Occurring in the Vicinity of BVPS and Associated Transmission Lines

Scientific Name	Common Name	Federal Status[a]	State Status[a]
Fish			
Alosa chrysochloris	Skipjack herring		T
Hiodon tergisus	Mooneye		T
Ictiobus bubalus	Buffalo smallmouth		T
Macrhybopsis storeriana	Silver chub		E
Percina copelandi	Channel darter		T
Lepomis megalotis	Longear sunfish		T
Molluscs			
Epioblasma torulosa rangiana	Clubshell	E	E
Pleurobema clava	Northern riffleshell	E	E

(a) E = endangered, T = threatened, NL = not listed.
Sources: FWS 2007b; PHNP 2008

2.2.6 Terrestrial Resources

2.2.6.1 *Terrestrial Resources at the Beaver Valley Site*

BVPS is located on the South Bank of the Ohio River within the Pittsburgh Low Plateau section of the Appalachian Plateau Physiographic Province. This region ranges in elevation from 660 to 1700 feet and is characterized by uplands cut by numerous narrow, shallow valleys (PDCNR 2007d). The landscape reflects fluvial erosion, surface mining, and strip mining, which account for the major reshaping forces in this region (PDCNR 2007d). The major river systems in this region are the Monongahela, the Allegheny, and the Ohio Rivers and their tributaries.

The terrestrial habitat on and in the vicinity of the BVPS site is characteristic of western Pennsylvania and is historically classified as mesophytic forest. The predominant vegetation of mesophytic forest includes beech (*Fagus* spp.), sugar maple (*Acer saccharum*), hemlock (*Tsuga* spp.), oak (*Quercus* spp.), and hickory (*Carya* spp.) (Braun 1950 as cited in AEC 1973). FENOC conducted a reconnaissance-level survey in July 2002, which noted that the predominant overstory species are sugar maple, black cherry, and northern red oak (*Quercus rubra*); the predominant understory species are sugar maple and spicebush (*Lindera benzoin*); and the predominant herbaceous layer species are pale jewelweed (*Impatiens pallida*), May apple (*Podophyllum petatum*), and Christmas fern (*Polystichum acrostichoides*) (FENOC 2002, 2007a).

No wetlands exist on the BVPS site; however, the FWS National Wetlands Inventory database indicates that palustrine forest wetlands exist near Service Creek, which is southeast of BVPS and is crossed by the Beaver Valley-Crescent Line 318 ROW near the line's intersection with SR 18 (see Figure 2-4) (FWS 2007d; FENOC 2007a). The National Wetlands Inventory database indicates that small areas of riparian emergent wetlands exist along Raccoon Creek, near the creek's intersection with the Beaver Valley-Crescent Line 318 ROW, which lies to the east of BVPS (FWS 2007d; FENOC 2007a). However, a field reconnaissance survey conducted by FENOC in May 2003 did not indicate the presence of riparian emergent wetlands near the Raccoon Creek crossing at the time the survey was conducted (FENOC 2002; 2007). Additionally, Independence Marsh, an 18-acre mitigation wetland, constructed in 1993 by Graziani Construction Company to replace wetland loss created by the expansion of Pittsburgh International Airport, is traversed by the Beaver Valley-Crescent Line 318 near its western boundary (IMF 2007).

A variety of wildlife exists in the forest communities on and in the vicinity of the BVPS site. The FES for BVPS Unit 2 notes the white-footed mouse (*Peromyscus leucopus*), short-tailed shrew (*Blarina brevicauda*), white-tailed deer (*Odocoileus virginianus*), raccoon (*Procyon lotor*), muskrat (*Ondatra zibethicus*), American opossum (*Didelphis virginiana*), and grey fox (*Urocyon cinereoargenteus*) as species found to inhabit the BVPS site, according to a terrestrial ecology study conducted by NUS Corporation (NRC 1985). Additionally, forested areas may support red foxes (*Vulpes fulvus*), Eastern grey squirrels (*Sciurus carolinensis*), and Eastern cottontails (*Sylvilagus floridanus*) (PDCNR 2007a, 2007e).

The BVPS site is not considered an important waterfowl breeding area nor is it in a major flyway for migratory birds, though mallards (*Anas platyrhynchos*) may inhabit the Ohio River adjacent to the BVPS site (NRC 1985). Early successional and second-growth areas are likely to have nesting populations of birds, which include yellow warblers (*Dendroica petechia*), field sparrows (*Spizella pusilla*), great-crested flycatchers (*Myiarchus crinitus*), and wood thrush (*Hylocichla mustelina*) (PDCNR 2007a, 2007e). As forests mature, established populations of birds such as wild turkey (*Meleagris gallopavo)*, barred owls (*Strix varia*), and red-shouldered hawks (*Buteo lineatus*) are likely to inhabit the area (PDCNR 2007e). FENOC does not currently have any wildlife management plans in place.

Over 37 percent of vascular plant species within Pennsylvania are nonnative, and many of theses species are invasive (PABS 1998). Species documented as occurring on the BVPS site include tree-of-heaven (*Ailanthus altissima*), multiflora rose (*Rosa multiflora*), garlic mustard (*Alliaria petiolata*), Dame's rocket (*Hesperis matronalis*), crown vetch (*coronilla varia*), and Japanese knotweed (*Polygon cuspidatum* and *P. sachalinense*) (FENOC 2008b). FENOC does not manage invasive plant populations as no plant species have been found to interfere with operation of the facility.

Phillis Island and Georgetown Island, both part of the Ohio River National Wildlife Refuge, lie approximately 400 feet offshore of the BVPS site (FENOC 2007a). FWS manages the Ohio River National Wildlife Refuge, which consists of approximately 35 river islands along the Ohio River and encompasses 3300 acres from Shippingport, Pennsylvania, to Maysville, Kentucky (FWS 2008b). The refuge as a whole provides habitat for over 200 species of migratory birds, of which 80 species use the habitat for nesting (FWS 2008a).

2.2.6.2 *Transmission Line Right-of-Ways*

One transmission line, the Beaver Valley-Crescent Line 318, and reconfigured segments of three transmission lines, the Beaver Valley Hanna line and the Beaver Valley Mansfield No. 1 and 2 lines, are in scope for this SEIS (see Figure 2-5). Section 2.1.7 provides a thorough description of the transmission lines. Duquesne Light and FENOC maintain the in-scope transmission line ROWs. The Duquesne Light ROW maintenance program is applicable to the Beaver Valley-Crescent Line 318, and the FENOC ROW maintenance program is applicable to the three reconfigured transmission line segments.

Both Duquesne Light and FENOC conduct annual flyovers of selected lines to identify areas that require maintenance (Duquesne Light 2006; FENOC 2007a). Duquesne Light maintains a 6-year maintenance cycle, and FENOC maintains a 5-year maintenance cycle (Duquesne Light 2006; FENOC 2007a). Generally, portions of transmission line ROWs that are not already devoted to other uses are maintained to promote herbaceous vegetation, which includes shrubs, grasses, and other low-growing groundcover (Duquesne Light 2006; FENOC 2007d). Woody vegetation within the ROW may be pruned, chemically controlled, or removed to ensure adequate line clearance and vehicular access, where necessary; however, neither Duquesne Light nor FENOC disturbs or removes trees and shrubs unless they interfere with transmission facilities (Duquesne Light 2006; FENOC 2007d). Occasionally, hazardous trees beyond the ROW edge may require removal to ensure adequate clearance of transmission facilities (Duquesne 2006; FENOC 2007a). EPA-approved aquatic label herbicides are applied on a selective basis to prevent regrowth from tree stumps and to control incompatible woody vegetation (Duquesne Light 2006; FENOC 2007d). Duquesne Light and FENOC do not use herbicides in or adjacent to stream crossings and only occasionally apply herbicides in wetland areas on a case-specific basis (FENOC 2007d). All herbicides used in wetlands areas are EPA-approved for wetland application (FENOC 2007d). Both Duquesne Light and FENOC employ State-licensed herbicide applicators in accordance with all applicable Federal, State, and local laws and regulations.

2.2.6.3 *Threatened and Endangered Terrestrial Species*

Table 2-6 presents terrestrial species that are listed by FWS and the Commonwealth of Pennsylvania and have the potential to occur on or in the vicinity of the BVPS site or along the in-scope transmission line ROWs. Except for occasional transient species, no federally listed or proposed threatened, endangered, or candidate species are known to occur within the vicinity of the BVPS site. Of the State-listed species, tall larkspur (*Delphinium exaltatum*) has the potential to occur near Beaver Valley-Crescent Line 318, though this species does not have any recorded historical occurrence on or near the BVPS site (FENOC 2007a). The 2002 Plant Community Characterization Study conducted by Beak Consultants, Inc., for FENOC did not identify any of the plant species listed in Table 2-6 (FENOC 2002).

Table 2-6. Federally Listed and Commonwealth of Pennsylvania-Listed Terrestrial Species Potentially Occurring in Beaver or Allegheny Counties

Scientific Name	Common Name	Federal Status	State Status
Birds			
Asio flammeus	short-eared owl	–	E
Falco peregrinus	peregrine falcon	–	E
Mammals			
Myotis sodalis	Indiana bat	E	E
Plants			
Carex typhina	cattail sedge	–	E
Clematis viorna	vasevine	–	E
Cypripedium calceolus var. parviflorum	lesser yellow lady's slipper	–	E
Delphinium exaltatum	tall larkspur	–	E
Helianthemum bicknellii	hoary frostweed	–	E
Juncus torreyi	Torrey's rush	–	T
Lithospermum latifolium	American stoneseed	–	E
Matelea obliqua	climbing milkvine	–	E

Myriophyllum sibiricum	northern water-milfoil	–	E
Potamogeton tennesseensis	Tennessee pondweed	–	E
Reptiles			
Sistrurus catenatus	eastern massasauga rattlesnake	C	E

Sources: 30 PA Code 75; 17 PA Code 45; FENOC 2007a; FWS 2007c; PNHP 2007; USDA 2007

(a) C = Candidate species for listing; E = Endangered; T = Threatened; – = No listing

Peregrine Falcon

The peregrine falcon (*Falco peregrinus*) was removed from Federal listing in August 1999 but continues to be endangered at the State level. Adult birds have a bluish-black head and wings, are 14 to 19 inches tall, and have a wingspan of 39 to 43 inches (Cornell 2003). Peregrine falcons nest on high cliffs near river systems and on bridges and tall buildings (PGC 2006). The species was not observed nesting in Pennsylvania from 1959 to 1987, coinciding with the population depletion between 1950 and 1970 as a result of the species' sensitivity to dichloro-diphenyl-trichloroethane (DDT) (Cornell 2003). Reintroduction efforts in Pennsylvania and neighboring States have facilitated the growth of the population since the early 1990s (PGC 2006). Except for occasional transient individuals, the Pennsylvania Game Commission (PGC), in a letter to FENOC dated October 9, 2003, indicated that BVPS does not likely provide habitat for this species (FENOC 2007a). In a letter to the NRC dated November 20, 2007, FWS confirmed that the peregrine falcon is not known to occur in the vicinity of the BVPS site (FWS 2007b).

Short-Eared Owl

The short-eared owl (*Asio flammeus*) is listed as endangered by the Commonwealth of Pennsylvania. The species is light to dark brown with large buff-colored patches on the upper sides of its wings and dark patches around the eyes, is 13 to 17 inches tall, and has a wingspan of 38 to 44 inches (PGC 2004). Short-eared owls inhabit reclaimed strip mines, open fields and meadows, and occasionally marshland (PGC 2004). Loss of habitat to agriculture and human development has limited available nesting habitat for the species, as short-eared owls often nest on the ground in colonial groups (Audubon Society 2002; PGC 2004). In a letter to FENOC dated October 9, 2003, PGC indicated that BVPS does not likely provide habitat for this species except for occasional transient individuals (FENOC 2007a). In a letter to the NRC dated November 20, 2007, FWSconfirmed that the short-eared owl is not known to occur in the vicinity of the BVPS site (FWS 2007b).

Indiana Bat

The Indiana bat (*Myotis sodalis*) is Federally and State-listed as endangered. The species is grayish-brown and 3 to 3.5 inches tall (PDCNR 2007c). The Indiana bat is an insectivorous, migratory bat that hibernates in caves and abandoned mines with standing or flowing water or under the bark of dead trees (PDCNR 2007c; FWS 2007a; PGC 2003). Decline of this species is attributed to human disturbance of hibernating bats, deforestation, and the removal of dead trees and trees near streams (FWS 2007a). Seven Indiana bat hibernacula locations have been identified in Pennsylvania, but none is in Beaver or Allegheny Counties (PGC 2003). However, FWS recognizes forested areas across the Commonwealth of Pennsylvania as potential summer habitats for the species (FWS 2007b).

Eastern Massasauga

The Eastern massasauga rattlesnake (*Sistrurus catenatus*) is a candidate species for Federal protection and is endangered at the State level. Individuals have dark brown to black rings on the tail, pale yellow to white markings on the belly, and are 20 to 30 inches in length (PDCNR 2007b). The species inhabits wet prairie, sedge meadows, peatlands, and early successional fields and is generally found to avoid heavily wooded areas (Johnson et al. 2000). The massasauga is active in the southern areas of its range, which includes Pennsylvania, between March and November (Johnson et al. 2000). Eastern massasaugas have never been common in Pennsylvania, and the species is not known to occur in Beaver County (PDCNR 2007b). The species has historically occurred in northeastern Allegheny County but has not been observed between 1980 and 2007 (PDCNR 2007b).

2.2.7 Radiological Impacts

Radiological releases, and the resultant environmental and dose impacts, are summarized in two BVPS reports: the *Annual Radiological Environmental Operating Report* and the *Annual Radioactive Effluent Release Report*. Limits for all radiological releases are specified in the BVPS ODCM and are used to meet Federal radiation dose limits and standards. The following discussions focus on the radiological environmental impacts and the dose impacts to the public in and around the BVPS site.

2.2.7.1 *Radiological Environmental Impacts*

The BVPS radiological environmental monitoring program (REMP) consists of environmental monitoring for radioactivity in the vicinity of the site. The REMP collects and analyses samples of air, water, milk, vegetation, river sediment, fish, and ambient radiation levels in areas surrounding the BVPS site. The radioactivity contained in the sample media are assessed to determine the impacts, if any, on the environment from the operation of the BVPS. The Annual Radiological Environmental Report summarizes the radiological environmental monitoring program conducted by FENOC during the report period (FENOC 2007g).

The media samples taken in the environment are representative of the radiation exposure pathways to the public from all plant radioactive effluents. The REMP measures the direct radiation, the airborne, and the waterborne pathway activity in the vicinity of the BVPS site. Direct radiation pathways include radiation from buildings and plant structures, airborne material that may be released from the plant, cosmic radiation, fallout, and the naturally occurring radioactive materials in soil, air and water. Thermoluminescent dosimeters (TLDs) are used to measure direct radiation. The airborne pathway includes measurements of radioiodine and particulates in air samples. The waterborne pathway consists of Ohio River water, drinking water, and sediment from the shoreline near the discharge point for liquid radioactive effluents.

The NRC staff reviewed the BVPS radioactive environmental operating reports for 2002 through 2006 to look for any significant impacts to the environment or any unusual trends in the data (FENOC 2003c, 2004b, 2005b, 2006b, 2007g). In 2006, there were no plant-related activation or fission products detected in airborne particulate and radioiodine filters, milk, food crops, food (green leafy vegetables), and direct radiation. Activation or fission products attributable to plant operation were detected in surface water, precipitation, and shoreline sediment samples (FENOC 2007g). No unusual trends were noted and all reported data on the radionuclides detected in environmental samples were below applicable NRC reporting levels and showed no significant or measurable impact from the operations at BVPS.

The Pennsylvania Department of Environmental Protection (DEP), Bureau of Radiation Protection (BRP) also conducts a comprehensive environmental radiation monitoring program in Pennsylvania that routinely conducts sampling and analysis of selected environmental media in conjunction with BVPS. The BRP's environmental radiation monitoring program including thermoluminescent dosimeters (TLD) for monitoring direct radiation, air, precipitation, soil, vegetation, milk, assorted crops, surface (river) water, groundwater, fish, seafood, and river sediment. The results of the BRP's 2003-2004 environmental radiation monitoring program showed detectable levels of radioactivity attributable to the operation of the BVPS. In 2003, low levels of cobalt-58, cobalt-60, and cesium-137 were detected in sediment samples near the plant site. In 2004, only cesium-137 was detected in sediment samples near the plant site. No reactor produced radionuclides were detected in the fish or produce samples. No radioactivity attributed to reactor operation was found in air, water, or milk samples. In addition to the radioactivity detected in the environment from the BVPS, radioactivity from the remnants of atomic weapons testing and the accident at Chernobyl was detected in water and milk samples. In conclusion the report stated the following: "The results of the 2003 and 2004 environmental sampling program indicate that Pennsylvanians have not been exposed to levels of radiation above normal background. This has been determined by comparing samples collected around nuclear facilities with those from locations that would not be influenced by such facilities." (DEP 2008b).

In addition to the routine REMP, the applicant established an on-site groundwater protection program in 2006. The program is designed to monitor the on-site environment for indication of leaks from plant systems and pipes carrying liquids with radioactive material. The results were reported in the *2006 Annual Radiological Environmental Operating Report*. In 2006, BVPS collected and analyzed six offsite ground water samples for tritium and gamma producing radionuclides from three locations within four miles of the BVPS site. No detectable activity was found in the water samples. The applicant plans to implement a more extensive radiological groundwater monitoring program that may include additional monitoring wells based on site hydrology information. The results of the groundwater monitoring program will be reported each year in the *Annual Radiological Environmental Operating Report* (FENOC 2007g).

2.2.7.2 *Radiological Dose Impacts*

The NRC staff performed a review of historical data on radiological releases from BVPS during the period from 2002 through 2006 (FENOC 2003b, 2004a, 2005a, 2006b, 2007g). The Staff found that the data reported by the BVPS demonstrate that the doses to a maximally exposed member of the public in the vicinity of BVPS were within the limits and standards specified in 10 CFR Part 20, Appendix I to 10 CFR Part 50, and 40 CFR Part 190.

For 2006, dose values were calculated based on actual liquid and gaseous effluent release data and conservative models to simulate the transport mechanisms. The results are described in the *2006 Annual Radioactive Effluent Release Report* (FENOC 2007). A summary of the calculated doses to an individual located at the BVPS site boundary from radioactive liquid and gaseous effluents released during 2006 is as follows:

The 2006 calculated maximum whole-body dose to an offsite member of the general public from liquid effluents in 2006 was 5.47 E-02 mrem (5.47 E-04 mSv) from Unit 1 and 5.47 E-02 mrem (5.47 E-04 mSv) from Unit 2. These doses are well below the 3 mrem (0.03 mSv) dose design objective in Appendix I to 10 CFR Part 50.

The 2006 calculated maximum organ (adult liver) dose to an offsite member of the general public from liquid effluents in 2006 was 7.87 E-02 mrem (7.87 E-04 mSv) for Unit 1 and 7.87 E-02 mrem (7.87E-04 mSv) for Unit 2. These doses are well below the 10 mrem (0.10 mSv) dose design objective in Appendix I to 10 CFR Part 50.

The 2006 calculated maximum gamma air dose at the site boundary from noble gas discharges was 3.34 E-04 mrad (3.34 E-06 mGy) for Unit 1 and 2.69 E-06 mrad (2.69 E-08 mGy) for Unit 2. These doses are well below the 10 mrad (0.10 mGy) dose design objective in Appendix I to 10 CFR Part 50.

The 2006 calculated maximum beta air dose at the site boundary from noble gas discharges was 9.85 E-04 mrad (9.85 E-06 mGy) for Unit 1 and 1.52 E-08 mrad (1.52 E-10 mGy). These doses are well below the 20 mrad (0.20 mGy) dose design objective in Appendix I to 10 CFR Part 50.

The calculated maximum organ (child liver) dose to an offsite member of the public from gaseous iodine, tritium and particulate effluents was 3.52 E-01 mrem (3.48 E-03 mSv) for Unit 1 and 6.11 E-02 mrem (6.11 E-04 mSv) for Unit 2. These doses are well below the 15 mrem (0.15 mSv) dose design objective in Appendix I to 10 CFR Part 50.

The calculated maximum total body dose to an offsite member of the public from all radioactive emissions (radioactive gaseous and liquid effluents and direct radiation shine) from BVPS was 1.12 mrem (1.12 E-02 mSv). These doses are well below the 25 mrem (0.25 mSv) limit in EPA's 40 CFR Part 190.

The NRC staff found that the 2006 radiological data are consistent, with reasonable variation due to operating conditions and outages, with the five year historical radiological effluent releases and resultant doses. These results confirm that BVPS is operating in compliance with Federal radiation protection standards contained in Appendix I to 10 CFR Part 50, 10 CFR Part 20, and 40 CFR Part 190 (FENOC 2007g).

FENOC has indicated that it may repair or replace the Unit 2 steam generators during the period of extended operations. Such an action is not expected to change the applicant's ability to maintain radiological doses to members of the public well within regulatory limits. This is based on there not being any projected significant increases in the amount of radioactive liquid, gaseous, or solid waste.

2.2.8 Socioeconomic Factors

This section describes current socioeconomic factors that have the potential to be directly or indirectly affected by changes in BVPS operations. BVPS and the communities that support it can be described as a dynamic socioeconomic system. The communities provide the people, goods, and services required by BVPS Unit 1 and 2 operations. BVPS operations, in turn, create the demand and pay for the people, goods, and services in the form of wages, salaries, and benefits for jobs and dollar expenditures for goods and services. The communities' ability to support the demands of BVPS depends on their capacity to respond to changing environmental, social, economic, and demographic conditions.

The socioeconomic region of influence (ROI) is defined by the areas where BVPS employees and their families reside, spend their income, and use their benefits, thereby affecting the economic conditions of the region. The BVPS ROI consists of a two-county area (Allegheny and Beaver Counties) where approximately 82 percent of BVPS employees reside. The following sections describe the housing, public services, offsite land use, visual aesthetics and noise, population demography, and economy in the ROI surrounding BVPS.

FENOC employs a permanent workforce of approximately 1000 employees (FENOC 2007a). Approximately 92 percent of the workforce lives in Allegheny, Beaver, and Butler Counties in Pennsylvania, and Columbiana County in Ohio (Table 2-7). The remaining 8 percent of the workforce is divided among 9 counties in Pennsylvania, Ohio, and West Virginia, with numbers ranging from 1 to 21 employees per county. Given the residential locations of BVPS employees, the most significant impacts of plant operations are likely to occur in Allegheny and Beaver Counties. The focus of the socioeconomic impact analysis in this SEIS is therefore on the impacts of BVPS on these two counties.

Table 2-7. BVPS Units 1 and 2 Permanent Employee Residence Information by County and City

County	Number of BVPS Personnel	Percentage of Total
Allegheny, PA	243	24.5
Beaver, PA	574	57.8
Butler, PA	41	4.1
Columbiana, OH	60	6.0
Other	75	7.6
Total	993	100

Source: FENOC 2007a

Refueling outages at BVPS occur at 18-month intervals. During refueling outages, site employment increases by 800 workers for approximately 30 to 40 days (FENOC 2007a). Most of these workers are assumed to be located in the same geographic areas as the permanent BVPS workforce.

2.2.8.1 *Housing*

Table 2-8 lists the total number of occupied and vacant housing units, vacancy rates, and median value in the two-county region of influence. According to the 2000 census, there were over 661,000 housing units in the socioeconomic region, of which approximately 610,000 were occupied. The median value of owner-occupied units ranged from $84,200 in Allegheny County to $85,000 in Beaver County. The vacancy rate was lower in Beaver County (6.7 percent) than in Allegheny County (8.0 percent).

By 2006, the number of housing units in Beaver County grew to an estimated total of 79,394 units, an increase of more than 1600 units, and the number of occupied units shrunk by more than 800 units to an estimated total of 71,725 units. As a result, the number of available vacant housing units in Beaver County increased by more than 2400 units to 7669, or 9.7 percent of the available units. In addition, the estimated number of vacant housing units also increased in Allegheny County (USCB 2008).

Table 2-8. Housing in Allegheny and Beaver Counties, Pennsylvania

	Allegheny	Beaver	ROI
	2000		
Total	583,646	77,765	661,411
Occupied housing units	537,150	72,576	609,726
Vacant units	46,496	5,189	51,685
Vacancy rate (percent)	8.0	6.7	7.8
Median value (dollars)	84,200	85,000	84,600
	2006*		
Total	590,970	79,394	670,364
Occupied housing units	516,812	71,725	588,537
Vacant units	74,158	7,669	81,827
Vacancy rate (percent)	12.5	9.7	12.2
Median value (dollars)	107,700	108,700	108,200

* Estimated
Source: USCB 2008; 2006 American Community Survey

2.2.8.2 *Public Services*

This section discusses public services including water supply, education, and transportation.

Water Supply

Local municipalities and private water companies provide public potable water service to residents who do not have individual onsite wells. Thirty-seven primary community water systems reportedly produce potable water for direct sale in Beaver County. An additional eight community water systems are consecutive community water systems, purchasing water from primary systems for resale. Together, these 45 systems service residents in Beaver County. Source water for 24 of the primary systems comes from ground water, while 3 systems rely on surface water. According to PADEP, Beaver Falls Municipal Authority is the largest water purveyor in Beaver County, with over 17,000 connections (PADEP 2008a). Average daily production runs between 6 and 8 MGD, and the capacity of the system's Eastvale water plant is 10 MGD. Water is obtained from the Beaver River (Beaver Valley Municipal Authority 2005).

The Ambridge Water Authority and the Aliquippa Municipal Water Authority are the only two other major water systems in Beaver County with more than 6500 connections. The Ambridge Water Authority has approximately 7300 connections and services the Ambridge Borough and surrounding areas. The Ambridge Water Authority average daily production is 5 MGD, and the capacity of the water plant is 7 MGD. Water is obtained from the Ambridge Reservoir (FENOC 2007a, see also Figure 2-2). The Aliquippa Municipal Water Authority, which has approximately 7500 connections and services Aliquippa Borough and surrounding areas, has an average daily production of 2 MGD, and the capacity of the water plant is 4 MGD. The source of the water is ground water wells in the alluvial aquifer near the Ohio River (FENOC 2007a).

The BVPS site acquires potable water from the Midland Water Authority, and average usage is 1.3 million gallons per month (an average of approximately 44,000 gpd). The Midland Water Authority services nearly 2200 connections in Midland, Shippingport, and Ohioville. Average daily production is 2.9 MGD, and the water treatment plant has a permitted capacity of 5 MGD. The potable water used at BVPS comes from the Ohio River (FENOC 2007a).

The Pittsburgh Water & Sewer Authority (PWSA) is the largest water utility in Allegheny County with approximately 83,000 connections in the city of Pittsburgh and surrounding communities. Average daily production is 70 MGD, and the water treatment plant has a total capacity of 117 MGD (PWSA 2007). Water is obtained from the Allegheny River (FENOC 2007a).

The Wilkinsburg-Penn Water Authority serves approximately 46,000 connections in western Allegheny County. Average daily production is 23 MGD, and the water treatment plant has a total capacity of 40 MGD. Water is obtained from the Allegheny River (FENOC 2007a).

The West View Water Authority serves approximately 50,000 connections in 29 different communities. Average daily production is 25 MGD, and the water treatment plant has a total capacity of 40 MGD. Water is obtained from the Ohio River and alluvial aquifer ground water wells (FENOC 2008a).

The FENOC information-gathering efforts did not identify any reasonably foreseeable new large water users in the area.

Table 2-9. Major Public Water Supply Systems (MGD)

Water Supplier[a]	Water Source [a]	Average Daily Production	Design Capacity	Population Served
Aliquippa Municipal Water Authority	GW	2	4	15,550
Ambridge Water Authority	SW	5	7	17,832
Beaver Falls Municipal Authority	SW	6–8	10	40,642
Midland Water Authority	SW	2.9	5	3,194
Pittsburgh Water Authority	SW	70	117	250,000
West View Water Authority	SW	25	40	200,000
Wilkinsburg-Penn Water Authority	SW	23	40	120,000

GW = Ground Water; SW = Surface Water; N/A = Not Applicable or No Information Available
[a] EPA 2008b

Education

BVPS is located in the South Side Area School District (PDE 2004), Beaver County, which had an enrollment of approximately 1300 students in the 2006–2007 school year (PDE 2007a). Including the South Side Area School District, Beaver County has 15 public school districts (PDE 2007a) with over 31,000 enrolled students (PDE 2007b). Allegheny County has a total of 43 public school districts (PDE 2007a). Total enrollment in Allegheny County public schools in the 2006–2007 school year was approximately 163,000 students (PDE 2007b).

Transportation

Access to BVPS is via SR 168, a two-lane paved road, near the intersection with SR 3016 at the Shippingport Bridge. PennDOT has an ROW across the eastern end of the station site on which a portion of SR 168 is located, including the southerly approach to the Shippingport Bridge. SR 168 follows Peggs Run from the southwest before turning northward, crossing the Shippingport Bridge, and joining SR 68 (see Figure 2-3).

Employees commuting to and from work enter and leave BVPS via SR 168, which provides access from the southwest and north. Connecting routes generally used are SR 68 northward, and SR 3016, a connector to SR 18, eastward. Green Garden Road is generally used as a connecting route between SR 18 and SR 60. Each of these major commuting routes is a paved two-lane roadway, except for SR 60, a divided, four-lane, limited-access highway (see Figure 2–2).

PennDOT does not maintain level-of-service designations for roadways. Counts determining the average number of vehicles per day are available for selected routes. SR 18 and SR 68 are two of the major north-south commuting routes in Beaver County. The Beaver County Planning Department classifies SR 18 as an urban collector near BVPS, while it classifies SR 68 as a rural principal arterial roadway. Traffic volumes on SR 68 and SR 18 are much smaller on the segments near the station compared to the segments in the eastern portions of Beaver County. Green Garden Road, SR 3016, and SR 168 are classified as minor arterial roads. Table 2-10 lists commuting routes to BVPS and average annual daily traffic (AADT) volume values. The AADT values represent traffic volumes for a 24-hour period factored by both day of week and month of year.

Table 2-10. Major Commuting Routes in the Vicinity of BVPS and 2006 AADT Counts
Offsite Land Use

Roadway and Location	AADT[a]
SR 168	
From U.S. 30 to Shippingport Bridge	5000–5700
From Shippingport Bridge to SR 68 (Midland Beaver Road)	9100
SR 3016 (Shippingport Road/Green Garden Road)	
From SR 168 to SR 18 (Frankfort Road)	6600
From SR 18 to SR 3021 (Patterson Road)	4800
From SR 3021 to SR 60	4800–8900
SR 18 (Frankfort Road)	
From SR 3016 to SR 3010 (Holt Road)	6900
From SR 3010 to SR 3019 (Raccoon Creek Road)	7600
From SR 3019 to SR 60	9200
SR 68	
From SR 168 to SR 4034 (Wolf Run Road)	5600
From SR 4034 to SR 4032 (Engle Road)	8000
From SR 4032 to SR 4037 (Barclay Hill Road)	9300
From SR 4037 to SR 60	11,000

Source: PennDOT 2008
[a] All AADTs represent traffic volume during an average 24-hour period during 2006.
SR=State route; U.S.=United States

Several segments of roadway in Beaver County have been identified as being deficient because of limited traffic capacity and physical condition. These congested road segments are largely located in densely developed and populated areas in Aliquippa, Ambridge, and other river communities in Beaver County east of SR 68. By comparison, commuting routes to the BVPS site are located in more rural areas and are less congested.

2.2.8.3 *Offsite Land Use*

This section describes land use conditions in Allegheny and Beaver Counties in Pennsylvania, because the majority of the BVPS workforce lives in these counties. In addition to the property tax payments that FENOC makes to Beaver County, the surrounding counties also receive property tax payments from the 993 people employed by the site.

Comprehensive planning is in various stages in the two counties. The majority of municipalities in both counties have developed zoning, subdivision, and other land use ordinances to regulate development and growth and some have developed comprehensive plans. County-level planning documents encourage development in areas that can be served by existing infrastructure, while preserving open space and environmentally sensitive areas (BCPC 1999).

The Beaver County Planning Commission (BCPC) estimates that forest land accounts for 49.5 percent (140,840 acres) of all land in Beaver County, while agricultural land accounts for 26.2 percent (73,892 acres). Forested lands are prevalent in western Beaver County. Residential lands account for 15.5 percent (44,050 acres), while industrial, commercial, and other nonresidential urban land uses account for only 4.1 percent of the county's land area. Included in these industrial lands are brownfield sites of former steel manufacturing operations, including sites along the Ohio River. Much of the developed land in Beaver County is located within the older river communities along the Ohio and Beaver Rivers, although these areas are declining in population and economic activity (BCPC 1999).

County planning officials expect continued growth in eastern and northern Beaver County areas bordering Allegheny and Butler Counties. Allegheny County is one of the most populated counties in Pennsylvania. The area east of SR 60 has experienced significant growth in recent years, spurred in part by the location of the Pittsburgh International Airport in western Allegheny County. Significant growth is not expected in areas west of SR 60. Planning officials believe limited transportation facilities, steep topography, lack of public sewer services and infrastructure, and public sentiment will limit development in existing rural areas in western Beaver County (BCPC 1999).

Using satellite imagery, the Southwestern Pennsylvania Commission (SWPC) estimated in 1999 that forest land accounts for 49.4 percent (235,547 acres) of all land in Allegheny County, while residential land accounts for 24.8 percent (118,220 acres). Agricultural and pasture lands account for 11.5 percent (54,767 acres), while industrial, commercial, and other nonresidential urban land uses account for 3.2 percent (14,900 acres) of the county's land area (SWPC 1999).

Visual Aesthetics and Noise

BVPS is located in an industrial area on the south bank of the Ohio River. BVPS as a whole can be seen from the river and the Shippingport Bridge but is shielded on the land side for the most part by surrounding high ground and vegetation because of its position along the river in the Ohio River Valley. The presence of the Ohio River and the hilly topography of the area have contributed to the development of industrial river towns where the majority of industries and residences are concentrated on relatively level land adjacent to the river. Rocky bluffs with steep forested hillsides separate industrial areas and towns within the river valley. The cooling towers, turbine buildings, and reactor containment structures dominate the landscape of the site and are visible from the Ohio River and the bridge.

With natural draft cooling towers, the most obvious aesthetic impact is the visible plume in the sky. The plumes are most persistent under certain meteorological conditions when the capacity for the atmosphere to hold additional water vapor is lowest. This occurs when relative humidity is high and/or air temperatures are low. Observations of cooling towers in the same region suggest that, under certain meteorological conditions, the visible plume could extend 1 or 2 miles (AEC 1973).

Noise from BVPS is detectable off site. Sources of noise from station operation include the cooling towers, turbines, and large pumps and cooling water system motors. Given the industrial nature of the region and noise from vehicle traffic crossing the Shippingport Bridge, noise emissions from the station are generally nothing more than an intermittent, minor nuisance. However, noise levels may sometimes exceed the 55 decibels adjusted level that EPA uses as a threshold level to protect against excess noise during outdoor activities. However, according to EPA, this threshold does "not constitute a standard, specification, or regulation" but was intended to provide a basis for State and local governments to establish noise standards.

Demography

According to the 2000 census, approximately 482,634 people lived within 20 miles of BVPS, which equates to a population density of 384 persons per square mile (FENOC 2007a). This density translates to the least sparse Category 4 (greater than or equal to 120 persons per square mile within 20 miles). Approximately 3,274,451 people live within 50 miles of BVPS (FENOC 2007a). This equates to a population density of 417 persons per square mile. Applying the Generic Environmental Impact Statement (GEIS) (NRC 1996) proximity measures, BVPS is classified as proximity Category 4 (greater than or equal to 190 persons per square mile within 50 miles). Therefore, according to the sparseness and proximity matrix presented in the GEIS, BVPS ranks of sparseness Category 4 and proximity Category 4 result in the conclusion that BVPS is located in a high-population area.

Table 2-11 shows population changes and projections from 1970 to 2050 in Allegheny and Beaver Counties. Population changes in Beaver County showed a decline of 2.5 percent for the period of 1990 to 2000. The population is expected to continue to decline at a rate of 4.5 to

6.9 percent through 2050. In Allegheny County, the population has also declined and is projected to continue its decline through 2050.

Table 2-11. Population and Percent Growth in Allegheny and Beaver Counties, Pennsylvania, from 1970 to 2000 and Projected for 2010 and 2050

	Allegheny		Beaver	
Year	Population	Percent Growth [a]	Population	Percent Growth [a]
1970	1,605,016	—	208,418	—
1980	1,450,085	-9.7	204,441	-1.9
1990	1,336,449	-7.8	186,093	-9.0
2000	1,281,666	-4.1	181,412	-2.5
2010	1,212,917	-5.4	168,881	-6.9
2020	1,172,399	-3.3	158,653	-6.1
2030	1,135,865	-3.1	148,194	-6.6
2040	1,051,697	-7.4	141,552	-4.5
2050	1,023,685	-2.7	132,367	-6.5

— = No data available.

[a] Percent growth rate is calculated over the previous decade.

Sources: Population data for 1970 through 2000 (USCB 2008); population projections for 2010–2030 by Pennsylvania State Data Center, February 2008; population projections for 2040 and 2050 (calculated)

Table 2-12 presents the 2000 demographic profile of the two-county ROI population. Minority individuals (both race and ethnicity) comprise 15.2 percent of the total population. The minority population is composed largely of Black or African American and Asian residents.

Table 2-12. Demographic Profile of the Population in the BVPS ROI in 2000

	Allegheny	Beaver	ROI
Total Population	1,281,666	181,412	1,463,078
Race (2000) (percent of total population, Not-Hispanic or Latino)			
White	83.8	92.1	84.8
Black or African American	12.3	5.9	11.5
American Indian and Alaska Native	0.1	0.1	0.1
Asian	1.7	0.2	1.5
Native Hawaiian and Other Pacific Islander	0.0	0.0	0.0
Some other race	0.2	0.1	0.2
Two or more races	1.0	0.9	1.0
Ethnicity			
Hispanic or Latino	11,166	1,315	12,481
Percent of total population	0.9	0.7	0.9
Minority Population (including Hispanic or Latino ethnicity)			
Total minority population	207,537	14,394	221,931
Percent minority	16.2	7.9	15.2

Source: USCB 2008

Transient Population

Within 50 miles (80 kilometers) of BVPS, colleges and recreational opportunities attract daily and seasonal visitors who create demand for temporary housing and services. In 2007, approximately 119,000 students were attending colleges and universities within 50 miles (80 kilometers) of BVPS (IES 2008).

In 2000 in Beaver County, 0.4 percent of all housing units are considered temporary housing for seasonal, recreational, or occasional use. By comparison, seasonal housing accounts for 0.4 percent and 2.8 percent of total housing units in Allegheny County and Pennsylvania, respectively (USCB 2008). Table 2-13 provides information on seasonal housing within 50 miles of BVPS.

Migrant Farm Labor

Migrant farm workers are individuals whose employment requires travel to harvest agricultural crops. These workers may or may not have a permanent residence. Some migrant workers may follow the harvesting of crops, particularly fruit, throughout the rural areas of the northeastern United States. Others may be permanent residents near BVPS who travel from farm to farm harvesting crops.

Migrant workers may be members of minority or low-income populations. Because they travel and can spend a significant time in an area without being actual residents, migrant workers may be unavailable for counting by census takers. If uncounted, these workers would be underrepresented in the U.S. census minority and low-income population counts.

Table 2-13. Seasonal Housing within 50 Miles of BVPS

County [a]	Housing Units	Vacant Housing Units: for Seasonal, Recreational, or Occasional Use	Percent
Pennsylvania	5,249,750	148,230	2.8
Allegheny	583,646	2,098	0.4
Armstrong	32,387	1,422	4.4
Beaver	77,765	344	0.4
Butler	69,868	826	1.2
Clarion	19,426	2,331	12.0
Fayette	66,490	1,486	2.2
Greene	16,678	417	2.5
Lawrence	39,635	302	0.8
Mercer	49,859	482	1.0
Venango	26,904	2,586	9.6
Washington	87,267	324	0.4
Westmoreland	161,058	1,614	1.0
County Subtotal	1,230,983	14,232	3.0 (avg.)
Ohio	4,783,051	148,230	1.0
Belmont	31,236	380	1.2
Carroll	13,016	1,210	9.3
Columbiana	46,083	516	1.1
Jefferson	33,291	165	0.5
Mahoning	111,762	621	0.6
Portage	60,096	680	1.1
Stark	157,024	443	0.3
Trumbull	95,117	392	0.4
Tuscarawas	38,113	363	1.0
County Subtotal	585,738	4770	1.7 (avg.)
West Virginia	844,623	32,757	3.9
Brooke	11,150	60	0.5

Table 2-13. (contd)

County [a]	Housing Units	Vacant Housing Units: for Seasonal, Recreational, or Occasional Use	Percent
Hancock	14,728	42	0.3
Marshall	15,814	532	3.4
Ohio	22,166	82	0.4
County Subtotal	63,858	716	1.1 (avg.)
County Total	1,880,579	19,718	2.2 (avg.)

Source: USCB 2008

[a] Counties within 50 miles of BVPS with at least one block group located within the 50-mile radius

avg. = percent average for counties within the BVPS 50-mile radius and excluding State percentage

The 2002 Census of Agriculture collected information on migrant farm and temporary labor (USDA 2002). Table 2-14 provides information on migrant farm workers and temporary (less than 150 days) farm labor within 50 miles of BVPS. According to the 2002 Census of Agriculture, approximately 9100 farm workers were hired to work for less than 150 days and were employed on 3100 farms within 50 miles of BVPS. The county with the most temporary farm workers (1098 workers on 199 farms) was Columbiana County in Ohio.

Table 2-14. Migrant Farm Worker and Temporary Farm Labor within 50 Miles of BVPS

County [a]	Number of Farm Workers Working for Less Than 150 Days	Number of Farms Hiring Workers for Less Than 150 Days	Number of Farms Reporting Migrant Farm Labor	Number of Farms with Hired Farm Labor
Pennsylvania				
Allegheny	289	93	12	107
Armstrong	501	123	0	142
Beaver	144	72	13	86
Butler	609	207	9	232
Clarion	383	121	0	151
Fayette	348	139	2	193
Greene	287	176	0	180
Lawrence	212	104	8	142
Mercer	602	157	12	221
Venango	132	72	0	75
Washington	597	220	5	282
Westmoreland	511	157	4	192
Subtotal	**4615**	**1641**	**65**	**2003**
Ohio				
Belmont	272	115	0	123
Carroll	261	30	2	63
Columbiana	1098	199	5	236
Jefferson	116	50	8	65
Mahoning	365	160	3	206
Portage	377	186	2	212
Stark	741	235	19	279
Trumbull	611	209	0	231
Tuscarawas	420	160	1	199
Subtotal	**4261**	**1344**	**40**	**1614**
West Virginia				
Brooke	9	7	0	10
Hancock	44	9	0	9
Marshall	141	69	0	70
Ohio	47	21	0	26
Subtotal	**241**	**106**	**0**	**115**
Total	**9117**	**3091**	**105**	**3732**

Source: 2002 Census of Agriculture (USDA 2002), County Data; Table 7. Hired Farm Labor—Workers and Payroll: 2002

[a] Counties within 50 miles of BVPS with at least one block group located within the 50-mile radius

In the 2002 Census of Agriculture (USDA 2002), farm operators were asked for the first time whether they had hired migrant workers, defined as a farm worker whose employment required travel that prevented the migrant worker from returning to his or her permanent place of residence the same day. A total of 105 farms in the 50-mile radius reported hiring migrant workers. Stark County in Ohio reported the most farms (19) with hired migrant workers, followed by Beaver and Allegheny counties with 13 and 12 farms, respectively.

Nevertheless, Allegheny and Beaver Counties host relatively small numbers of migrant workers. According to 2002 Census of Agriculture estimates, 144 temporary farm laborers (those working fewer than 150 days per year) were employed on 72 farms in Beaver County, and 289 were employed on 93 farms in Allegheny County (USDA 2002).

2.2.8.4 *Economy*

This section contains a discussion of the economy, including employment and income, unemployment, and taxes.

Employment and Income

Between 2000 and 2006, the civilian labor force in Beaver County increased 2.8 percent to the estimated 2006 level of 89,616. The civilian labor force in Allegheny County declined 2.4 percent to the estimated 2006 level of 615,003.

In 2002, health care and social assistance represented the largest sector of employment in the two-county region followed closely by retail, manufacturing, and the accommodation and food service industry. The manufacturing sector employed the most people in Beaver County followed by health care and social assistance and retail trade sectors. Table 2-15 lists the major employers in Beaver County in 2007.

Table 2-15. Major Employers in Beaver County in 2007

Firm
Valley Medical Facilities, Inc.
Beaver County
McCarl's, Inc.
FirstEnergy Nuclear Operating Company
Wal-Mart Associates, Inc.
Chicago Title Insurance
Koppel Steel Corporation
Passavant Memorial Homes
Horsehead Corporation
McGuire Memorial

Source: Pennsylvania Department of Labor and Industry 2008

Table 2-16 presents income information for the BVPS ROI. The income levels of the two counties differ slightly. The median household and per capita income in Allegheny and Beaver Counties were both well below the Pennsylvania average. In 1999, only 9.4 percent of the population in Beaver County was living below the official poverty level, while in Allegheny County, 11.2 percent of the population was below the poverty level. The percentage of families living below the poverty level was about the same for both counties and for the State (USCB 2008).

Table 2-16. Income Information for the BVPS ROI

	Allegheny	Beaver	Pennsylvania
Median household income 1999 (dollars)	38,329	36,995	40,106
Per capita income 1999 (dollars)	22,491	18,402	20,880
Percent of families living below the poverty level (2000)	7.9	7.2	7.8
Percent of individuals living below the poverty level (2000)	11.2	9.4	11.0

Source: USCB 2008

Unemployment

In 2006, the annual unemployment averages in Beaver and Allegheny Counties were 7.0 and 5.9 percent, respectively, which were higher and lower than the annual unemployment average of 6.2 percent for Pennsylvania (USCB 2008).

Taxes

Beaver County, Shippingport Borough, and the South Side Area School District all assess FENOC annual property taxes. Revenues received by Beaver County support such programs as recreation, public safety, public works, and emergency services. Revenues received by the Shippingport Borough support such programs as waste management, public works, and public safety (FENOC 2007a) (see Table 2-17).

In the past, FENOC paid real estate taxes to the Commonwealth of Pennsylvania for power generation, transmission, and distribution facilities. Under authority of the Pennsylvania Utility Realty Tax Act (PURTA), real estate taxes collected from all utilities (water, telephone, electric, and railroads) were redistributed to the taxing jurisdictions within the Commonwealth. In Pennsylvania, these jurisdictions include counties, cities, townships, boroughs, and school districts. A formula determined the distribution of PURTA funds; the amount was not necessarily based on the individual utility's effect on a particular government entity.

In 1996, the Electricity Generation Customer Choice and Competition Act became law, which allows consumers to choose among competitive suppliers of electrical power. As a result of utility restructuring, Act 4 of 1999 revised the tax base assessment methodology for utilities from the depreciated book value to the market value of utility property. Additionally, as of January 1, 2000, PPL Susquehanna was required to begin paying real estate taxes directly to local jurisdictions, ceasing payments to the Commonwealth's PURTA fund.

In 2004, as a result of changes in State law, FENOC signed a settlement with its local taxing bodies that both acknowledged a change in the way the BVPS value would be assessed and reported a correspondingly significant reduction in assessed value. As a result, the BVPS property tax payments to Beaver County, the South Side Area School District, and Shippingport Borough were reduced significantly. The FENOC annual property tax payments to both Beaver County and Shippingport Borough for the BVPS site represent less than 1 percent of each of their operating budgets for 2004 and 2005. Property tax payments to the South Side Area School District of Beaver County for the BVPS site represent an average of approximately 7.4 percent of the school district's 2004 and 2005 annual operating budgets (see Table 2-17).

Table 2-17. BVPS Property Tax Paid and Percentage of Beaver County, South Side Area School District, and Shippingport Borough Operating Budgets, 2001 to 2005

Entity	Year	Operating Budgets (millions of dollars)	Property Tax Paid by BVPS (millions of dollars)	Percent of Operating Budget
Beaver County	2001	244.4	1.0	0.4
	2002	235.3	1.7	0.7
	2003	241.1	1.2	0.4
	2004	249.0	0.4 [a]	0.2
	2005	255.4	0.6	0.2
South Side Area School District	2001	15.1	2.4	16.2
	2002	15.6	2.1	13.7
	2003	17.7	2.3	13.2
	2004	18.7	1.4 [a]	7.5
	2005	19.0	1.4	7.3
Shippingport Borough	2001	0.9	0.071	7.6
	2002	3.1	0.508	16.3
	2003	3.9	0.069	1.8
	2004	5.0	0.028 [a]	0.6
	2005	4.5	0.028	0.6

Source: FENOC 2007e

[a] In 2004, as a result of changes in State law, FENOC signed a settlement agreement with its local taxing bodies that (1) acknowledged a change in the way the plant's value would be assessed, and (2) reported a correspondingly significant reduction in the BVPS assessed value. As a result, BVPS property tax payments to Beaver County, South Side Area School District, and Shippingport Borough were reduced significantly.

From 2001 through 2005, Beaver County collected between $440,000 and $1.7 million annually in real estate tax revenues from FENOC. Between 2001 and 2005, BVPS property taxes constituted less than 1 percent of the Beaver County total operating budgets (see Table 2-17).

From 2001 through 2005, the South Side Area School District collected between $1.4 and $2.4 million annually in real estate tax revenues from FENOC. The percentage of property tax going to the South Side Area School District's operating budget decreased from 16.2 percent in 2001 to 7.3 percent in 2005 (see Table 2-17).

From 2001 to 2005, Shippingport Borough collected between $28,000 and $508,000 in taxes. In 2002, Shippingport Borough's operating budget increased by over 200 percent from the previous year, and BVPS property tax payments increased from 7.6 percent of the budget in 2001 to 16.3 percent in 2002. The tax increase was for only 1 year and was used to pay for the construction of a sewer project. Even though the sewer project is still in progress, tax payments returned to approximate 2001 levels in 2003 (see Table 2-17).

The continued availability of BVPS and its associated tax base is an important feature in the ability of the Beaver County and Shippingport communities to continue to invest in infrastructure and to draw industry and new residents.

2.2.9 Historic and Archaeological Resources

This section discusses the cultural background and the known historic and archaeological resources at the site of BVPS Units 1 and 2 and in the surrounding area.

2.2.9.1 *Cultural Background*

The region around BVPS contains prehistoric and historic Native American and Euro-American cultural resources. A review of the Pennsylvania Sites and Structures files indicated that 13 known archaeological sites fell within a 2-mile radius of BVPS, 3 of which are located on BVPS property. The records search also identified 19 architectural properties within 3 miles of BVPS (GAI 2008). No sites listed on the National Register are located in areas affected by the operation of BVPS.

Paleoindians occupied North America from approximately 9500 to 8000 B.C., subsisting by hunted game and gathered plant material. In the Pennsylvania area, Paleoindians migrated into an environment changed by retreating glacial ice. Radiocarbon dates greater than 11,000 B.C. have been recorded at Meadowcroft Rockshelter (Lantz 1985; Adovasio et al. 1978) and at the Shawnee-Minisink site in eastern Pennsylvania (McNett 1985). In western Pennsylvania, a total of 216 Paleoindian sites have been recorded in the Upper Ohio Valley drainage and its associated tributaries (GAI 2008). Sites tend to be situated on lowland terraces of small tributaries in the glaciated portions of northern Pennsylvania (GAI 2008). In the glaciated Appalachian Plateau, sites are situated near features such as kames, lakes, streams, and rivers (Lantz 1985). These sites are identified by artifact scatters of fluted stone spear points and other tools used for cutting and scraping. Data from local and regional site distributions showing a prevalence of exotic lithic raw materials that suggest that Paleoindian populations were highly mobile and focused their travels along low-order stream and river valleys (Lantz 1985). Remains of megafauna such as mammoths, mastodons, and other extinct animals have been documented at kill sites in Crawford County, Pennsylvania (Lantz 1985). However, Paleoindian subsistence has shown that eastern Paleoindians relied less on megafauna than on generalized foraging

During the Early Archaic Period, from approximately 8000 to 6000 B.C., subsistence strategies underwent local changes to adapt to resource availability. As the glaciers retreated northward and larger animals disappeared from the region, humans adapted to exploit modern flora and smaller game animals. Like Paleoindians, Early Archaic foragers were highly mobile (Carr 1998a). As both resource quality and the cultural means to access resources improved, the population of Archaic peoples slowly increased. This is reflected in the number of Early Archaic sites found in northwestern Pennsylvania. As a result of diversification of prey species, a shift in the design of hunting weaponry occurred. Stone points changed from fluted to notched and stemmed bifaces, which represents a change in hunting technology in order to exploit smaller game (GAI 2008). Two multicomponent sites, Goddard (Mercer) and the aforementioned Meadowcroft Rockshelter (Washington), represent short-term camps which suggests that lifestyles were primarily nomadic (Carr 1998a). While these sites provided a wealth of data, research into Early Archaic use of northwestern Pennsylvania has been minimal, and more data are needed to accurately characterize forager settlement patterns and subsistence strategies (GAI 2008).

The Middle Archaic period, from approximately 6000 to 3000 B.C., like the Early Archaic, is not presently well understood or defined. Climate changes during the Middle Archaic resulted in changes to settlement patterns. There is also a shift in stone tool technology. Middle Archaic hunters exploited a wider variety of local habitats and evidence shows an increased use of local versus exotic stones (Carr 1998b). During this time, there was an increase in the use of upland environments which indicates the use of base camps on river terraces or possible single family units (Cowin 1991; Carr 1998b). The Goddard site is the closest excavated Middle Archaic site to BVPS. This site and three additional multicomponent sites in the Commonwealth Sheep Rock Rockshelter (Huntington), Meadowcroft Rockshelter (Washington), and the Shawnee-Minisink (Monroe) provide evidence of Middle Archaic occupations.

The Late Archaic period (approximately 3000 to 1000 B.C.) settlement pattern is an elaboration of the earlier site typology from the Middle Archaic period (GAI 2008). Increased diversity of lithic materials indicates that Late Archaic people traded or traveled across a wider territory. This is also reflected in the number and types of sites found in the region. As in the Early and Middle Archaic periods, the population increased, and a more logistically oriented settlement pattern emerged (Carr 1998b). Late Archaic site types include large base camps found near major water sources; smaller, short-term base camps located in upland areas; and dispersed extraction sites which indicate groups foraging local flora and faunal resources in both the upland and lowland areas (Cowin 1985). During this time, Late Archaic populations developed well-defined seasonal foraging patterns.

The Early Woodland period, from 1000 to 100 B.C., is defined by the introduction of horticulture to augment subsistence hunting and gathering. A byproduct of this reliance on agriculture was the emergence of more permanent settlements. Other characteristics of the Early Woodland culture are increasing population, emergence of social hierarchy, and use of ceramics for storage and cooking (Cowin 1985). In western Pennsylvania, there is ample evidence that Woodland people utilized the area. Data from sites in this region suggest that camps were located along terraces and upland benches above major streams.

The Middle Woodland period (approximately 150 B.C. to A.D. 850) is characterized by an elaboration in burial ceremonialism, expanded interregional trade, and an increased reliance on agriculture. A major technological advance was the introduction of the bow and arrow.

Settlement patterns during this period consisted of large, multiseasonal base camps or villages that were situated on terraces above major streams, and smaller, seasonal base camps located near resource areas in the uplands. Two Middle Woodland occupation sites near BVPS are Georgetown and Dravo No. 1. These two sites are Middle Woodland camps or villages near the confluence of the Beaver and Ohio Rivers.

During the Late Woodland period (approximately A.D. 850 to A.D. 1600), the Upper Ohio River drainage, including the Raccoon Creek Valley, was occupied by the Monongahela culture (GAI 2008). The Monongahela constructed large, seasonal, fortified villages that contained up to 150 inhabitants. Villages were circular in arrangement and were often fortified with a small circular or oval stockade (Cowin 1985). The Monongahela also constructed smaller seasonal villages in the uplands. Monongahela sites are found over much of western Pennsylvania in a variety of settings, including the floodplains of major rivers, springheads, upland benches, saddles, and hilltops (George 1974; Cowin 1985). Ceramics characteristic of the Monongahela were elongated and bag shaped (Cowin 1985).

The Protohistoric/Contact period (A.D. 1600 to A.D. 1798) in Pennsylvania represents a continuation and subsequent disruption in Late Woodland subsistence-settlement patterns. At this time, western Pennsylvania was inhabited by the Haudenosaunee (Iroquois), the Shawnee, the Delaware, and the Erie. In the late 17th century, the Haudenosaunee fought these and other Native American groups and forced them out of western Pennsylvania (GAI 2008). The French were the first Europeans to occupy the region, and they utilized the area's waterways for trade and for military purposes (Burkett and Cunningham 1997). Britain had also laid claim to the lands west of the Appalachian Mountains. In 1754, rising tensions between the French and English over control of trade culminated in the French and Indian War. During the war, the Haudenosaunee Nations controlled trade in western Pennsylvania and further gained power with the English victory in 1765. However, by 1768, the Treaty of Fort Stanwix opened western lands to settlers, thus pushing the Haudenosaunee and other Native American groups out of the area.

Attempts to settle the area that would eventually become Beaver County were few. The area was still considered Indian territory. European settlement in the area did not occur until the Treaty of Greenville was signed in 1795 (Beaver County 2008). Beaver County was formed in 1800 out of Allegheny and Washington Counties and was named after the Beaver River (Beaver County 2008). In 1875, the Pittsburgh and Lake Erie Railroad was chartered. This line was instrumental in transporting local coal and coke to the western Pennsylvania steel mills (GAI 2008). With the founding of this railroad, other railroads and industry followed.

In the early to mid-19th century, wool and wheat were the principal agricultural products (GAI 2008). Because of competition from other States farther west, the agricultural focus shifted to cattle, poultry, and corn (Bausman 1904). Early industrial activity in Beaver County consisted of glass, pottery, and boat building. Multiple boat yards were located along the Beaver River with small ports located in Industry and Shippingport (Bausman 1904). The local waterways also proved useful in providing waterpower for mills and factories (Beaver County 2008). During the 1830s, natural resources also provided a profitable industry for Beaver County. The area was distinguished for the quality and the quantity of its limestone, fire clay, sandstone, and coal. In 1859, an oil boom began in Pennsylvania, and wells within the county were some of the most productive. However, by the early 20th century, production declined.

At the turn of the 20th century, the steel industry came to Beaver County. With this new industry came a surge in population and planned towns. The local economy benefited from the steel industry. However, by the 1980s many of the steel mills in Beaver County had closed.

Half a century after the steel mills had arrived, nuclear power appeared in Beaver County. In 1957, the U.S. Atomic Energy Commission (AEC) and Westinghouse Electric Corporation constructed Shippingport Atomic Power Station, the first commercial-sized nuclear electric generating station built specifically for the production of electricity in the United States.

2.2.9.2 *Historic and Archaeological Resources at the BVPS Site*

Two archaeological sites and two historic sites are located on the BVPS property. The original review conducted for the FES for operation of BVPS Unit 1 noted only one archaeological site (Old Indian Fort—36Bv0003) on the property (AEC 1973). The FENOC license renewal review identified two additional prehistoric sites (Lower Field Site—36Bv004 and Petroglyph—36Bv0089) and two historic sites (Christler-Marker Cemetery and Shippingport Atomic Power Station). One site (36Bv0089), was reported to be on the property at the time of construction of BVPS; however, no evidence of the site remains. The NRC staff walkover survey verified information regarding these sites. The staff also reviewed files in the Pennsylvania Historical and Museum Commission's Cultural Resources Geographic Information System Database but did not locate any historic or archaeological sites within the transmission line ROWs.

The Old Indian Fort (36Bv0003) is a prehistoric village inhabited during the Middle Archaic, Late Archaic, and Late Woodland periods. This multicomponent site has yielded numerous diagnostic artifacts and ceramics. Neither the GAI reconnaissance nor the NRC's walkover survey noted any evidence of this site. However, portions of this site are undeveloped, and intact portions of the site may remain. The Lower Field Site (36Bv0004) consists of an untyped lithic scatter collected from surface contexts before construction of BVPS (GAI 2008). Limited information is available on this site, and it has not been formally evaluated. The Lower Field Site is potentially significant because of the nature of the deeply buried deposits. Site 36Bv0089 is reported to be a prehistoric petroglyph or rock carving. There is no information available regarding this site's temporal or cultural affiliation, and very little information is available describing this resource. As noted above, is the NRC staff believes that the entire landform was removed at the time of construction of BVPS.

In addition to the three prehistoric sites listed above, two historic sites are also located on the BVPS site. The Christler-Marker Cemetery was used as a family burial ground from approximately 1812 to 1957. This burial ground contains approximately 45 interments and is maintained by the Borough of Shippingport (GAI 2008).

The second historic site associated with the BVPS site is Shippingport Atomic Power Station. As part of President Dwight D. Eisenhower's "Atoms for Peace" plan in the 1950s, the U.S. government sought to use atomic energy to improve the quality of life for U.S. citizens (GAI 2008). The AEC, along with Westinghouse Electric Corporation's Bettis Atomic Laboratory, laid the plans for construction in 1953. Construction of Shippingport was completed in 1957 and it reached criticality at 4:30 am on December 2, 1957 (DOE 1983). Shippingport was the first large-scale nuclear power plant in the United States and the first plant of such size in the world operated solely to produce electric power (DOE 1983). The plant was the first to reach 25 years of commercial operation, the first to have training classes for operators and supervisors, and the first to use a water-cooled breeder core for a power plant (DOE 1983). On May 20, 1980, the American Society of Mechanical Engineers recognized Shippingport as a National Historic Mechanical Engineering Landmark (ASME 1980). In October 1982, the reactor ceased operations. Subsequently, the facility was determined eligible for listing in the National Register of Historic Places in 1983. In 1985, before its dismantlement, the facility was recorded by the Historic American Engineering Record (GAI 2008). Decommissioning activities began in 1985 and concluded in 1990. The buildings that remain are the administration building, turbine deck crane, turbine generator and turbine building, water treatment building, cooling water intake building, and two steel transmission towers.

2.2.10 Related Federal Project Activities and Consultations

The NRC staff reviewed the possibility that activities of other Federal agencies might impact the renewal of the operating license for BVPS Units 1 and 2. Any such activity could result in cumulative environmental impacts and the possible need for a Federal agency to become a cooperating agency in the preparation of the BVPS SEIS.

The NRC staff has determined that there are no Federal projects that would make it desirable for another Federal agency to become a cooperating agency in the preparation of the SEIS. No National Parks or Forests or known American Indian lands are located within 50 miles of BVPS. The only other Federal land within 50 miles of BVPS is the Ohio River Islands National Wildlife Refuge. Phillis Island (located 400 feet offshore of BVPS) and Georgetown Island (3 river miles downstream of BVPS) are the uppermost holdings in the Ohio River Islands National Wildlife Refuge.

Section 102(2)(c) of the National Environmental Policy Act of 1969 (NEPA) requires the NRC to consult with and obtain the comments of any Federal agency that has jurisdiction by law or special expertise with respect to any environmental impact involved. The NRC has consulted with the Federal agencies listed in Appendix E, which also presents Federal agency consultation correspondence and comments on the SEIS.

2.2.10.1 Coastal Zone Management Act

In the United States, coastal areas are managed through the Coastal Zone Management Act of 1972 (CZMA). The Act, administered by the NOAA Office of Ocean and Coastal Resource Management, provides for management of the Nation's coastal resources, including the Great Lakes, and balances economic development with environmental conservation. The Federal Consistency Regulations implemented by NOAA are contained in 15 CFR Part 930.

This law authorizes individual States to develop plans that incorporate the strategies and policies they will employ to manage development and use of coastal land and water areas. NOAA must approve each plan. One of the components of an approved plan is "enforceable policies," by which a State exerts control over coastal uses and resources.

NOAA approved the Pennsylvania Coastal Management Program in 1980. The lead agency is the Coastal Zone Management Program within PADEP which implements and supervises all the various Coastal Zone Management programs in the State. Pennsylvania's coastal zone comprises two widely separated coastal areas, the 63-mile Lake Erie shoreline and the 57-mile stretch of coastline along the Delaware Estuary (NOAA 2008).

Federal Consistency Regulations require "federal actions, occurring inside a state's coastal zone, that have a reasonable potential to affect the coastal resources or uses of that state's coastal zone, to be consistent with that state's enforceable coastal policies, to the maximum extent practicable."

BVPS is located in Beaver County, which is not included in the list of Pennsylvania coastal counties which are subject to the rules and policies of the Coastal Zone Management Program, which administers the CZMA. License renewal of BVPS does not require a State coastal consistency certification.

2.3 References

10 CFR Part 20. *Code of Federal Regulations*, Title 10, *Energy*, Part 20, "Standards for Protection Against Radiation."

10 CFR Part 50. *Code of Federal Regulations*, Title 10, *Energy*, Part 50, "Domestic Licensing of Production and Utilization Facilities."

10 CFR Part 54. *Code of Federal Regulations*, Title 10, *Energy*, Part 54, "Requirements for Renewal of Operating Licenses for Nuclear Power Plants."

40 CFR Part 190. *Code of Federal Regulations*, Title 40, *Protection of Environment*, Part 190, "Environmental Radiation Protection Standards for Nuclear Power Operations."

40 CFR 262. *Code of Federal Regulations*. Title 40, *Protection of the Environment*, Part 262, "Standards Applicable to Generators of Hazardous Waste."

40 CFR Part 266. *Code of Federal Regulations*, Title 40, *Protection of the Environment*, Part 266, "Standards for the Management of Specific Hazardous Wastes and Specific Types of Hazardous Waste Management Facilities," Section 210, "What Definitions Apply to the Subpart?"

40 CFR Part 273. *Code of Federal Regulations*, Title 40, *Protection of the Environment*, Part 273, "Standards For Universal Waste Management."

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No. 50-412. Office of Nuclear Reactor Regulation. Washington, DC. ADAMS Accession No. ML0725501770.

3.0 ENVIRONMENTAL IMPACTS OF REFURBISHMENT

Environmental issues associated with refurbishment activities are discussed in NUREG-1437, "Generic Environmental Impact Statement for License Renewal of Nuclear Plants" (GEIS), Volumes 1 and 2 (NRC 1996; 1999).[9] The GEIS includes a determination of whether the analysis of the environmental issues can be applied to all plants and whether additional mitigation measures would be warranted. Issues are then assigned a Category 1 or a Category 2 designation. As set forth in the GEIS, Category 1 issues are those that meet all of the following criteria:

(1) The environmental impacts associated with the issue have been determined to apply either to all plants or, for some issues, to plants having a specific type of cooling system or other specified plant or site characteristics.

(2) A single significance level (i.e., SMALL, MODERATE, or LARGE) has been assigned to the impacts (except for collective offsite radiological impacts from the fuel cycle and from high-level waste and spent fuel disposal).

(3) Mitigation of adverse impacts associated with the issue has been considered in the analysis, and it has been determined that additional plant-specific mitigation measures are likely not to be sufficiently beneficial to warrant implementation.

For issues that meet the three Category 1 criteria, no additional plant-specific analysis is required in this draft supplemental environmental impact statement (draft SEIS) unless new and significant information is identified.

Category 2 issues are those that do not meet one or more of the criteria for Category 1, and therefore, additional plant-specific review of these issues is required.

License renewal actions include associated refurbishment actions to provide for safe and economic operation during the period of extended operation. These actions may have an impact on the environment that requires evaluation, depending on the type of action and the plant-specific design.

In its environmental report (ER), FirstEnergy Nuclear Operating Company (FENOC) stated that it does not plan to undertake any major refurbishment or replacement actions to maintain the functionality of important systems, structures, or components for purposes of license renewal (FENOC 2007). However, FENOC has indicated the possibility of Unit 2 steam generator (SG) repair or replacement during the license renewal term. Although the staff of the U.S. Nuclear Regulatory Commission (NRC) acknowledges that Unit 2 SG replacement is not a certainty, the staff has reviewed the potential environmental impacts of this activity. Using the GEIS refurbishment framework to guide its analysis, the NRC staff has included a discussion of these impacts in this chapter.

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[9] The NRC originally issued the GEIS in 1996 and issued Addendum 1 in 1999. Hereafter, all references to the "GEIS" include the GEIS and its Addendum 1.

3.1 Potential Refurbishment Activities

FENOC indicated that it has performed an evaluation of systems, structures, and components pursuant to of Title 10, Section 54.21, "Contents of Application—Technical Information," of the Code of Federal Regulations (10 CFR 54.21) to identify the need to undertake any major refurbishment activities that are necessary to support continued operation of the Beaver Valley Power Station (BVPS) during the requested 20-year period of extended operation. Table B.2 of the GEIS lists items that are subject to aging and might require refurbishment to support continued operation during the renewal period.

The FENOC ER (FENOC 2007) indicates a need for additional inspections at BVPS, including possible Unit 2 SG repair or replacement during the license renewal term. The ER also states that the SG replacement activities will occur during scheduled outages and, therefore, are bounded by the environmental impacts analyzed in the final environmental statement (FES).

The GEIS provides the frame of reference for license renewal ERs and specifically includes the replacement of an SG as an example of major refurbishment activities. When major refurbishment activities are associated with license renewal, the environmental impacts associated with the activity must be analyzed in accordance with 10 CFR 51.53(c)(2). Therefore the NRC staff issued a request for additional information (RAI ENV 3.0-1), by letter dated March 13, 2008 (NRC 2008b), to obtain clarification from FENOC regarding whether the SG replacement activity for Beaver Valley Unit 2 is associated with license renewal, and if it is associated with license renewal, to obtain the FENOC analysis of impacts from the activity.

In response to RAI ENV 3.0-1, by letter dated April 25, 2008 (FENOC 2008a), FENOC indicated that replacing the BVPS Unit 2 SG was, at this point, a postulation and that it will make decisions regarding its implementation based on the assessments of SG performance and condition required by the BVPS SG Management Program. FENOC asserted that the BVPS Unit 2 SG replacement activities are not major refurbishment activities associated with license renewal. FENOC reasoned that the activities do not amount to a major refurbishment as described by the GEIS framework assumptions associated with a modeled set of SG replacement activities.

Citing its directly related experience with an identical set of SG replacement activities at BVPS Unit 1 in 2006, FENOC indicated that a Unit 2 SG replacement would be more streamlined than the GEIS indicated and could be accomplished within one slightly extended refueling outage lasting about 70 days, as opposed to the GEIS model calling for up to 9 months. FENOC reasserted its conclusion in the ER that the activities associated with a BVPS Unit 2 SG replacement are effectively bounded by the environmental impacts associated with normal refueling outages and are therefore contained in the FES.

Although the NRC staff acknowledges that FENOC does not consider the Unit 2 SG replacement as a major refurbishment activity, and that its replacement is not a certainty, the staff decided to review the potential environmental impacts of this activity in the interest of addressing possible environmental impacts associated with license renewal.

Description of the Steam Generator Replacement Project

In response to RAI ENV 3.0-1, by letter dated April 25, 2008 (FENOC 2008a), FENOC described the potential Unit 2 SG replacement project. BVPS Units 1 and 2 are similarly designed, in particular with respect to the containment structures and SGs. Therefore, the Unit 2 SG project is based largely on experiences and lessons learned from the Unit 1 SG replacement performed during a slightly extended refueling outage in 2006. FENOC expects similar impacts to the site and local environment.

The new SGs will be shipped from the manufacturer (Unit 1 SGs were constructed in Europe) to the United States and transported by barge via the Ohio River to the existing BVPS onsite barge slip. Before their arrival, FENOC will arrange for necessary barge slip maintenance dredging, permitted by the U.S. Army Corps of Engineers (USACE). Upon arrival at the site, the new SGs will be loaded onto a heavy-duty transporter and moved to temporary storage facilities northeast of the Unit 2 cooling tower for preinstallation preparation. A temporary construction opening of approximately 20 feet by 18 feet, through the reinforced concrete walls and interior steel liner, will be created in the containment building near the existing equipment hatch. A hydrodemolition process will be used for concrete removal. Water from this hydrodemolition will be cleaned up via a portable water treatment clarification system and then discharged into the Ohio River, in an operation approved through the National Pollutant Discharge Elimination System (NPDES) permit system process by the Pennsylvania Department of Environmental Protection (PADEP). Concrete debris will be disposed of in accordance with Pennsylvania residual waste regulations. Steel reinforcement and liners will be cleaned, reconditioned, and reused in place.

During the replacement project, approximately 900 additional workers will be on site to support the project activities. Several temporary facilities will be erected on previously disturbed areas to house SG replacement project activities. All other temporary facilities will use portions of existing structures and facilities or consist of trailers located within the developed industrial area of the site.

After SG replacement, the reactor building containment opening will be sealed and returned to its original configuration and integrity. SGs removed from the Unit 2 containment building will be drained and detached from existing piping and supports and sealed. A permanent storage building will be constructed adjacent to the Waste Handling Building (where the old Unit 1 SGs are stored) on the far side of the switchyard for onsite storage of the old Unit 2 SGs. Any excavated materials will be handled in accordance with the waste and clean-fill rules in effect.

3.2 Environmental Impacts of Refurbishment

As requested by the NRC staff, FENOC provided an analysis of Category 1 and 2 issues associated with the Unit 2 SG replacement project in the response to RAI ENV 3.0-1, by letter dated April 25, 2008 (FENOC 2008a), and by letter dated May 30, 2008 (FENOC 2008b). The following sections present a discussion of this review.

Appendix F lists Category 1 and 2 issues related to refurbishment that are not applicable to BVPS Units 1 and 2, because they are related to plant design features or site characteristics not found at the BVPS site.

Table 3-1 lists the Category 1 issues associated with refurbishment.

Table 3-1. Category 1 Issues for Refurbishment Evaluation

ISSUE—10 CFR Part 51, Subpart A, Appendix B, Table B-1	GEIS Sections
SURFACE WATER QUALITY, HYDROLOGY, AND USE (FOR ALL PLANTS)	
Impacts of refurbishment on surface water quality	3.4.1
Impacts of refurbishment on surface water use	3.4.1
AQUATIC ECOLOGY (FOR ALL PLANTS)	
Refurbishment	3.5
GROUND WATER USE AND QUALITY	
Impacts of refurbishment on ground water use and quality	3.4.2
LAND USE	
Onsite land use	3.2
HUMAN HEALTH	
Radiation exposures to the public during refurbishment	3.8.1
Occupational radiation exposures during refurbishment	3.8.2
SOCIOECONOMICS	
Public services: public safety, social services, and tourism and recreation	3.7.4; 3.7.4.3; 3.7.4.4; 3.7.4.6
Aesthetic impacts (refurbishment)	3.7.8

The following provides the results of the review and brief statement of GEIS conclusions, as codified in Table B-1 of Appendix B, "Environmental Effect of Renewing the Operating License of a Nuclear Power Plant," to Subpart A, "National Environmental Policy Act—Regulations Implementing Section 102(2)," of 10 CFR Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions," for each Category 1 refurbishment issue listed in Table 3-1.

- <u>Impacts of refurbishment on surface water quality</u>. Based on information in the GEIS, the Commission found the following:

  > Impacts are expected to be negligible during refurbishment because best management practices are expected to be employed to control soil erosion and spills.

- <u>Impacts of refurbishment on surface water use</u>. Based on information in the GEIS, the Commission found the following:

  > Water use during refurbishment will not increase appreciably or will be reduced during plant outage.

- <u>Impacts of refurbishment on aquatic biota</u>. Based on information in the GEIS, the Commission found the following:

> During plant shutdown and refurbishment there will be negligible effects on aquatic biota because of a reduction of entrainment and impingement of organisms or a reduced release of chemicals.

- Impacts of refurbishment on ground water use and quality. Based on information in the GEIS, the Commission found the following:

> Extensive dewatering during the original construction on some sites will not be repeated during refurbishment on any sites. Any plant wastes produced during refurbishment will be handled in the same manner as in current operating practices and are not expected to be a problem during the license renewal term.

- Impacts of refurbishment on onsite land use. Based on information in the GEIS, the Commission found the following:

> Projected onsite land use changes required during refurbishment and the renewal period would be a small fraction of any nuclear power plant site and would involve land that is controlled by the applicant.

- Radiation exposures to the public during refurbishment. Based on information in the GEIS, the Commission found the following:

> During refurbishment, the gaseous effluents would result in doses that are similar to those from current operation. Applicable regulatory dose limits to the public are not expected to be exceeded.

- Occupational radiation exposures during refurbishment. Based on information in the GEIS, the Commission found the following:

> Occupational doses from refurbishment are expected to be within the range of annual average collective doses experienced for pressurized-water reactors and boiling-water reactors. Occupational mortality risks from all causes including radiation is in the mid-range for industrial settings.

- Public services: public safety, social services, and tourism and recreation. Based on information in the GEIS, the Commission found the following:

> Impacts to public safety, social services, and tourism and recreation are expected to be of small significance at all sites.

- Aesthetic impacts (refurbishment). Based on information in the GEIS, the Commission found the following:

> No significant impacts are expected during refurbishment.

The NRC staff has not identified any new and significant information during its review of the BVPS ER, the staff's site audit, the scoping process, or the evaluation of available information, including the FENOC RAI ENV 3.0-1 responses by letters dated April 25, 2008 (FENOC 2008a); May 30, 2008 (FENOC 2008b); June 2, 2008 (FENOC 2008c); and June 27, 2008 (FENOC 2008d). Therefore, the NRC staff concludes that there would be no impacts for Category 1 issues during the renewal term beyond those discussed in the GEIS. The NRC staff thus adopts the GEIS conclusions for these issues.

Environmental issues related to refurbishment considered in the GEIS for which NRC staff could not satisfy Category 1 criteria (see Section 3.0) for all plants, or for specific classes of plants, are Category 2 issues. Table 3-2 lists these issues.

Table 3-2. Category 2 Issues for Refurbishment Evaluation

ISSUE—10 CFR Part 51, Subpart A, Appendix B, Table B-1	GEIS Sections	10 CFR 51.53 (c)(3)(ii) Subparagraph
TERRESTRIAL RESOURCES		
Refurbishment impacts	3.6	E
THREATENED OR ENDANGERED SPECIES (FOR ALL PLANTS)		
Threatened or endangered species	3.9	E
AIR QUALITY		
Air quality during refurbishment (nonattainment and maintenance areas)	3.3	F
SOCIOECONOMICS		
Housing impacts	3.7.2	I
Public services: public utilities	3.7.4.5	I
Public services: education (refurbishment)	3.7.4.1	I
Offsite land use (refurbishment)	3.7.5	I
Public services, transportation	3.7.4.2	J
Historic and archaeological resources	3.7.7	K
ENVIRONMENTAL JUSTICE		
Environmental justice	Not addressed[a]	Not addressed[a]

[a]Guidance related to environmental justice was not in place at the time the NRC prepared the GEIS and the associated revision to 10 CFR Part 51. If an applicant plans to undertake refurbishment activities for license renewal, the applicant's ER and the NRC staff's environmental impact statement must address environmental justice.

The following sections present the results of the review for each Category 2 refurbishment issue.

3.2.1 Terrestrial Ecology—Refurbishment Impacts

Refurbishment impacts on terrestrial ecology are a Category 2 issue (10 CFR Part 51, Subpart A, Appendix B, Table B-1). Table B-1 notes the following:

> Refurbishment impacts are insignificant if no loss of important plant and animal habitat occurs. However, it cannot be known whether important plant and animal communities may be affected until the specific proposal is presented with the license renewal application.

Section 2.2.6 of this draft SEIS describes the terrestrial resources on and in the vicinity of the BVPS site. Section 2.1.7 describes transmission line rights-of-way. For the purposes of this analysis, the geographic area considered is described in Sections 2.2.6 and 2.1.7.

The Unit 2 SG replacement project would likely require laydown areas and the construction of a permanent storage facility for the replaced Unit 2 SGs. The new facility would be constructed adjacent to the radwaste building (southwest of the BVPS switchyard) on previously disturbed land that is currently covered by low-growing grasses. FENOC plans to use a paved parking area, east of the Unit 2 cooling tower, for laydown of materials during construction. No natural habitat would be lost or altered from either construction of a storage facility or laydown of materials. Any ground-disturbing activities that take place would require appropriate permits from local, State, and Federal agencies, and FENOC procedures and policies specify that approval be obtained before breaking ground on any new structures. Some noise and construction activities may affect wildlife for the period of onsite activity, but these effects will likely be minimal and short term (FENOC 2008a).

Based on information from the NRC staff's review of the FENOC ER for the BVPS proposed license renewal, the NRC staff's environmental site audit, the scoping process, and evaluation of other reports and information, impacts to terrestrial resources during the proposed Unit 2 SG replacement would be SMALL. A few mitigation measures that could reduce impacts to the terrestrial environment during construction of the permanent storage building include silt fences to minimize sediment transport, the use of best management practices (BMPs), and revegetation of cleared land after completion of construction. These mitigation measures could decrease impacts by reducing erosion and minimizing the movement of sediment, nutrients, and pollutants to surface and ground water resources. The staff did not identify any cost-benefit studies applicable to these mitigation measures.

3.2.2 Threatened or Endangered Species—Refurbishment Impacts

Refurbishment impacts on threatened or endangered species are a Category 2 issue. Table B-1 of Appendix B to Subpart A of 10 CFR Part 51 notes the following:

> Generally, plant refurbishment and continued operation are not expected to adversely affect threatened and endangered species. However, consultation with appropriate agencies would be needed at the time of license renewal to determine whether threatened or endangered species are present and whether they would be adversely affected.

Potential refurbishment activities at BVPS could affect threatened and endangered aquatic species occurring in the New Cumberland Pool of the Ohio River; no impacts are expected on threatened or endangered terrestrial species.

In 2006, FENOC replaced the Unit 1 reactor vessel head and three SGs. If FENOC undertakes refurbishment of BVPS Unit 2, replacement of the Unit 2 SGs will likely involve a similar transportation scenario. To facilitate the 2006 refurbishment activities, the large replacement components were fabricated in Spain and shipped overseas to New Orleans, Louisiana. From New Orleans, they traveled by barge via the Mississippi and Ohio Rivers to BVPS. A single barge was used to transport these components, and the barge was grounded at the BVPS barge slip, located at river mile 34.7 on the southern shore of the New Cumberland Pool, just north of the Unit 1 cooling tower. (FENOC 2008c)

To accommodate grounding of the barge, FENOC performed maintenance dredging of the barge slip approximately 15.2 meters (50 feet) beyond the FENOC current dredging permit boundary, as detailed in USACE dredging permit number 200100242, valid through 2011. FENOC obtained a modification of the existing permit to allow this one-time maintenance dredging extension.

Dredging activities can directly damage benthic communities, as well as benthic habitat that may be essential to spawning and nursery areas. Prior to the Unit 1 SG and vessel head replacement, FENOC consulted PADEP and the Pennsylvania Fish & Boat Commission (FBC) regarding the effects on threatened or endangered aquatic species in the New Cumberland Pool of dredging an additional 15.2 meters (50 feet) beyond their current permitted dredging boundary. In spring 2005, FENOC submitted an application package to PADEP and FBC, which contained a description of the project with details of the activity that required the permit modification, photos, and a revised drawing of the proposed dredging area. (FENOC 2008c)

In a letter to FENOC dated June 21, 2005, FBC identified six threatened, endangered, or candidate fish species potentially occurring in the New Cumberland Pool. FBC was concerned about the potential impact of dredging on fish eggs, fry, and juveniles, and requested that "...all instream activity be avoided from April 1 to July 1 in order to avoid adverse impacts during the spawning season for these species." FBC also requested that FENOC implement strict erosion and sedimentation measures, as well as BMPs, to minimize the amount of erosion or sedimentation entering the river. Furthermore, in a letter to FENOC dated July 25, 2005, PADEP approved the one-time dredging project and reiterated that no dredging could take place in the Ohio River from April 1 to July 1. (FENOC 2008c)

The NRC consulted informally with the Pennsylvania Field Office of the U.S. Fish and Wildlife Service (FWS) regarding the impact of the potential FENOC refurbishment activities on endangered mussels (the Northern riffleshell (Epioblasma torulosa rangiana) and clubshell (Pleurobema clava). The NRC determined that the one-time maintenance dredging would not affect endangered mussels, as these mussels are likely not present in the New Cumberland Pool. Furthermore, the location of the potential dredging is in an area of the pool where the substrate is not suitable for mussel colonization. FWS agreed with the NRC assessment that federally listed mussels are likely not present in the portion of the Ohio River where BVPS is located, and thus, there would be no impact on threatened and endangered aquatic species. However, FWS recommended implementing BMPs similar to those recommended by FBC and

PADEP prior to the Unit 1 replacement activities, which consisted of constructing silt fences around spoil piles and conducting dredging during low-flow periods to minimize sediment runoff into the river. (NRC 2008a)

As stated earlier, if FENOC were to undertake replacement of the Unit 2 SGs, it is expected that the replacement components would be shipped to the BVPS site in the same manner as in the 2006 replacement project. FENOC would again be required to apply for a modification of its existing USACE dredging permit, which would include consultation with PADEP and FBC regarding the potential environmental impacts of the project on threatened and endangered species. As such, impacts of the potential refurbishment project on threatened and endangered species would be expected to be SMALL. The NRC staff did not identify any additional cost-beneficial mitigation measures beyond those required by FBC and PADEP.

3.2.3 Air Quality during Refurbishment (Nonattainment and Maintenance Areas)

Air quality during refurbishment (nonattainment and maintenance areas) is a Category 2 issue. Table B-1 in Appendix B to Subpart A of 10 CFR Part 51 notes the following:

> Air quality impacts from plant refurbishment associated with license renewal are expected to be small. However, vehicle exhaust emissions could be cause for concern at locations in or near nonattainment or maintenance areas. The significance of the potential impact cannot be determined without considering the compliance status of each site and the numbers of workers expected to be employed during the outage.

Specifically, 10 CFR 51.53(c)(3)(ii)(F) requires the following:

> If the applicant's plant is located in or near a non-attainment or maintenance area, an assessment of vehicle exhaust emissions anticipated at the time of peak refurbishment work force must be provided in accordance with the Clean Air Act as amended.

The GEIS states the following:

> The 1990 Clean Air Act amendments include a provision that no federal agency shall support any activity that does not conform to a state implementation plan designed to achieve the National Ambient Air Quality Standards for criteria pollutants (sulfur dioxide, nitrogen dioxide, carbon monoxide, ozone, lead, and particulate matter less than 10 μm in diameter). On November 30, 1993, the U.S. Environmental Protection Agency (EPA) issued a final rule (58 FR 63214) implementing the new statutory requirements, effective January 31, 1994. The final rule requires that federal agencies prepare a written conformity analysis and determination for each pollutant where the total of direct and indirect emissions

caused by proposed federal action[10] would exceed established threshold emission levels in a nonattainment[11] or maintenance area[12].

Some minor and short-duration air quality impacts would be expected to occur during Unit 2 SG replacement activities at the BVPS site. The main sources of these air quality impacts would be from fugitive dust from construction activities and exhaust emissions from the motorized equipment and vehicles of workers associated with the project. Most of the BVPS Unit 2 SG replacement activities would be performed inside existing buildings and would not cause additional atmospheric emissions. A containment storage building to house the removed Unit 2 SGs would be built, and some land would be used for temporary laydown areas. FENOC estimated that the area disturbed for building construction and laydown areas would be less than 10 acres. To mitigate the expected minor air quality impacts as a result of equipment emissions and fugitive dust from operation of earth-moving and material-handling equipment, FENOC indicated they would use BMPs. These include watering, installing silt fences, covering soil piles, and minimizing disturbed areas.

Construction activities that require earth disturbance greater than 1 acre, as well as soil disturbances of less than 1 acre as part of a larger common plan of development, would be conducted in accordance with NPDES erosion and sedimentation permits. These permits incorporate a PADEP requirement to develop and implement an Erosion and Sediment Control Plan.

Of the BVPS permanent workers, 82 percent reside in Beaver and Allegheny Counties as discussed in Section 3.4 of the FENOC ER (FENOC 2007). FENOC stated that an additional 900 temporary employees would be needed for the duration of the project, which was estimated to last 70 days. The additional temporary workforce would migrate to the area for the duration of the project, thus adding to the percentage of the workers residing in those two counties (FENOC 2008a). A major consideration of environmental impacts of refurbishment is the increased emissions from transportation of the additional temporary work force.

Federal agencies are prohibited from issuing a license for any activity that does not conform to an applicable implementation plan (40 CFR 51.850, "Prohibition"). The Southwestern Pennsylvania Commission (SPC) is the designated Metropolitan Planning Organization (MPO) for the 10-county region within southwestern Pennsylvania. MPOs are responsible for making transportation conformity determinations for long-range transportation plans and short-range transportation improvement programs.

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10 Federal action means any activity engaged in by a department, agency or instrumentality of the Federal Government, or any activity that a department, agency or instrumentality of the Federal Government supports in any way, provides financial assistance for, licenses, permits, or approves, other than activities related to transportation plans, programs, and projects developed, funded, or approved under title 23 U.S.C or the Federal Transit Act (49 U.S.C 1601 *et seq.*). (40 CFR 51.852)

11 An area is designated "nonattainment" for a criteria pollutant if it does not meet NAAQS for the pollutant.

12 A maintenance area has been redesignated by a State from nonattainment to attainment; the State must submit to EPA a plan for maintaining NAAQS as a revision to its SIP.

Beaver County, where BVPS is located, is part of the SPC. BVPS is required to show conformity with applicable Commonwealth of Pennsylvania state implementation plans (SIPs) by analyzing vehicle exhaust emissions that would occur during the SG replacement project.

The EPA designates geographical areas as "attainment areas" if the areas meet designated air quality standards and "nonattainment areas" if they do not meet the standards. A "maintenance area" is the EPA designation for a geographical area that was once a nonattainment area but has subsequently met particular air quality standards. For these areas, air quality maintenance plans are implemented to maintain air quality attainability.

Allegheny County is within a designated maintenance area for sulphur dioxide (SO_2). The Hazelwood geographical area, which is within a 2-mile radius of the Hazelwood air quality State monitor in Allegheny County, is classified as a maintenance area for SO_2 (EPA 2008a). The maintenance plan for the Allegheny County SO_2 attainment area states that motor vehicles are not a significant contributor to the nonattainment designation. Therefore, for the BVPS Unit 2 SG replacement project, a conformity analysis and emissions determination for SO_2 are not required (EPA 2004a).

EPA has approved the redesignation of Allegheny County (high traffic density areas within a central business district and certain other traffic density areas) as a CO maintenance area (EPA 2004b). As a result, a limited maintenance plan was implemented in Allegheny County. The EPA policy under such a plan does not require emission budget testing for conformity determination. In relation to the BVPS Unit 2 SG replacement project, conformity for the CO maintenance plan was demonstrated for Allegheny County, and no additional analysis is required.

Beaver County is designated a maintenance area for particulate matter that is 10 micrometers or smaller in size (PM_{10}). Allegheny County is within a designated maintenance area for PM_{10} and carbon monoxide (CO). According to the "Maintenance Plan for the Allegheny County PM_{10} Maintenance Area," the PM_{10} emissions from public roads were less than 3 percent of all emissions and are not a significant contributor to the emissions in the area (EPA 2003). The BVPS Unit 2 SG replacement project total direct and indirect emissions of PM_{10} would not exceed established threshold emission levels for its maintenance area because of the project's short duration and FENOC's use of mitigation measures. Therefore, conformity analysis and determination for PM_{10} are not required (FENOC 2008d).

For other air pollutants where analysis is required, FENOC performed impacts analysis using EPA-approved 8-hour ozone and $PM_{2.5}$ models. The analysis was based on the assumption that 2300 vehicles would be traveling to and from BVPS (each worker would commute 50 miles each way, daily) for a period of 70 days (FENOC 2008d). The total vehicle miles traveled (VMT) during the SG replacement and refuelling outage would be 16,100,000 miles which is approximately 0.08 percent of the total VMT for the Pittsburgh-Beaver Valley $PM_{2.5}$ nonattainment area in the year 2011, and 0.07 percent in the year 2020 (Table 13 in SPC 2007).

Beaver County is one of the seven counties that are located within the Pittsburgh-Beaver Valley 8-hour ozone nonattainment area (consisting of Allegheny, Armstrong, Beaver, Butler, Fayette, Washington, and Westmoreland Counties). The daily VMT would be 230,000 miles, which would be approximately 0.36 percent of the projected daily VMT in the Pittsburgh-Beaver Valley ozone area in the year 2011, and 0.32 percent in the year 2020 (Tables E-4 and E-5 in

SPC 2007). Beaver and Allegheny Counties are both designated as nonattainment areas for 8-hour (ground-level) ozone, and they are part of the Pittsburgh-Beaver Valley 8-hour ozone nonattainment area (SPC 2007). NO_x and volatile organic compounds (VOC) are the precursors of ozone.[13] FENOC anticipates 230.23 kilograms per day (kg/day) emissions of NO_x and 130.61 kg/day of VOC emissions. This represents 0.33 percent of the NO_x emission budget and 0.032 percent of the VOC emission budget (FENOC 2008c).

Beaver and Allegheny Counties are designated as particulate matter 2.5 micrometers or smaller in size ($PM_{2.5}$) nonattainment area, and they are part of the Pittsburgh-Beaver Valley $PM_{2.5}$ nonattainment area. Conformity assessment[14] annual emissions for the area for direct $PM_{2.5}$ emissions are 442.656 tons per year (tpy), and those for indirect $PM_{2.5}$ emissions are 21,946.915 tpy (SPC 2007). Estimated direct and indirect $PM_{2.5}$ emissions during the SG replacement project would be 0.36 tpy for $PM_{2.5}$ and 18.28 tpy for NO_x. As discussed in FENOC's RAI ENV 3.0-1 supplemental response on June 27, 2008 (FENOC 2008d) these would constitute 0.08 percent of annual emissions for $PM_{2.5}$ and NO_x.

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[13] Ozone is formed when NO_x and VOC combine in the presence of heat and sunlight.

[14] $PM_{2.5}$ emission budgets are not available. EPA does not require submittal of $PM_{2.5}$ SIPs until April 2008. Before approval of $PM_{2.5}$ SIPs, the Transportation Conformity Rule allows conformity determinations to be based on either a demonstration that future emissions will be below 2002 levels, or that emissions in each analysis year under the "build" condition will not be greater than emissions under the "no-build" condition. The emission reduction must be a net reduction of emissions that accounts for emissions attributable to transportation-related sources. Reductions in emissions resulting from several Federal programs (e.g., tail pipe standards, evaporative controls, and fuel volatility) cannot be credited toward the reduction. Through the interagency consultation process, the "below 2002 levels" test was selected for demonstrating conformity for the three $PM_{2.5}$ nonattainment areas. $PM_{2.5}$ emissions (fine particulates) are emitted directly by motor vehicles as a result of the fuel combustion process (tailpipe emissions) and as a result of brake and tire wear; are the result of re-entrained road dust and transportation construction dust; and are formed through reactions in the atmosphere among the precursor emissions volatile organic compounds (VOC), NO_x, ammonia (NH_3), and sulfates (SO_x). The following apply under EPA conformity regulations:

- Direct $PM_{2.5}$ tailpipe, brake wear, and tire wear emissions must be analyzed.
- Re-entrained road dust is included only if EPA or PADEP determines that it is a significant contributor to $PM_{2.5}$ in the nonattainment area, or it is named in a $PM_{2.5}$ SIP and a motor vehicle emissions budget is established for this item.
- Transportation construction dust is encompassed in regional transportation conformity if it is named in a $PM_{2.5}$ SIP and a motor vehicle emissions budget is established for this item.
- NO_x must be analyzed in the period preceding SIP submission and budget adequacy determination or approval, unless EPA and PADEP determine that it is not a significant contributor.
- VOC, NH_3, and SO_x analysis is not required in the period preceding SIP submission unless EPA or PADEP determines one or more of these precursors to be a significant contributor. As a result of the interagency consultation process required by the Transportation Conformity Rule, and in the absence of a SIP and attendant emission budgets, and in the absence of EPA and PADEP significance determinations, the SPC $PM_{2.5}$ conformity analysis encompasses direct $PM_{2.5}$ emissions (tailpipe, brake wear, tire wear) and NO_x precursor emissions.

The results of the model calculations indicate that the emissions associated with the proposed action are in conformance with the implementation plans for the nonattainment areas. The total direct and indirect emissions resulting from the postulated BVPS Unit 2 SG replacement projects are not expected to exceed emission budgets, specified in the Pennsylvania SIPs, and rates, established by EPA for nonattainment and maintenance areas in 40 CFR Part 51, "Requirements for Preparation, Adoption, and Submittal of Implementation Plans." On this basis, the NRC staff concludes that the impact of vehicle exhaust emissions during the SG replacement project would be SMALL. The NRC staff identified a variety of measures that could mitigate potential air quality impacts resulting from the BVPS Unit 2 SG replacement project. These include the use of multiperson vans and the implementation of shift changes for the workforce to reduce the number of vehicles on the road at any given time. The NRC staff did not identify any cost-benefit studies applicable to these mitigation measures.

3.2.4 Housing Impacts—Refurbishment

Housing impacts during refurbishment are a Category 2 issue. Table B-1 of Appendix B to Subpart A of 10 CFR Part 51 notes the following:

> Housing impacts are expected to be of small significance at plants located in a medium or high population area and not in an area where growth control measures that limit housing development are in effect. Moderate or large housing impacts of the workforce associated with refurbishment may be associated with plants located in sparsely populated areas or in areas with growth control measures that limit housing development.

FENOC estimates that SG replacement would require a one-time increase in the number of refueling outage workers for up to 70 days at BVPS. Approximately 900 workers would be needed to perform Unit 2 SG replacement project activities in addition to the normal number of refueling outage workers (FENOC 2008a).

The number of additional workers would cause a short-term increase in the demand for temporary (rental) housing units in the region beyond what is normally experienced during a refueling outage at BVPS. Since BVPS is located in a high-population area, and Allegheny and Beaver Counties are not subject to growth control measures that would limit housing development, any changes in BVPS employment would have little noticeable effect on housing availability in these counties. In addition, the number of available housing units has kept pace with or exceeded the decrease in the county populations. However, the rental housing market in the region is very large, and based on this information, employment-related housing impacts would be very SMALL. Due to this housing situation and the short duration of the refurbishment project, the NRC staff has not identified any impact reducing mitigation measures or associated cost-benefit studies.

3.2.5 Public Services: Public Utilities—Refurbishment

Public services: public utilities are a Category 2 refurbishment issue. Table B-1 of Appendix B to Subpart A of 10 CFR Part 51 notes that "an increased problem with water shortages at some sites may lead to impacts of moderate significance on public water supply availability."

Since there is no water shortage in the BVPS region and the public water systems located in Allegheny and Beaver Counties have excess capacity, any changes in BVPS and employee public water usage would have little noticeable effect on public water supply availability in these counties. As discussed in Section 2.2.8.2, BVPS acquires potable water from the Midland Water Authority. Current average daily usage represents 1.5 percent of the Midland Water Authority's average daily demand and 0.9 percent of its permitted capacity. FENOC projects no increase in plant demand (FENOC 2007).

As discussed in Section 3.2.4, FENOC estimates that Unit 2 SG replacement would require a one-time increase in the number of refueling outage workers for up to 70 days at BVPS (FENOC 2008a). The additional number of refueling outage workers needed to replace the SGs would cause a short-term increase in the amount of public water and sewer services used in the immediate vicinity of BVPS. Since the region has excess capacity, water supply impacts would be very SMALL, and the NRC staff has not identified any impact reducing mitigation measures or associated cost-benefit studies.

3.2.6 Public Services: Education—Refurbishment

Public services: education (refurbishment) is a Category 2 issue. Table B-1 of Appendix B to Subpart A of 10 CFR Part 51 notes that "most sites would experience impacts of small significance but larger impacts are possible depending on site- and project-specific factors."

As discussed in Section 3.2.4, FENOC estimates that Unit 2 SG replacement would require a one-time increase in the number of refueling outage workers for up to 70 days at BVPS (FENOC 2008a). Because of the brief time needed to replace the SGs, workers would not be expected to bring families and school-age children with them, and therefore, there would be no impact on educational services during this extended refueling outage.

3.2.7 Offsite Land Use—Refurbishment

Offsite land use (refurbishment) is a Category 2 issue. Table B-1 of Appendix B to Subpart A of 10 CFR Part 51 notes that "impacts may be of moderate significance at plants in low population areas."

Since BVPS is in a high-population area, any changes in BVPS employment would have little noticeable effect on land use in the region. Because of the brief time needed to replace the SGs, the additional number of refueling outage workers would not cause any permanent land use changes related to population and tax revenue in the immediate vicinity of BVPS.

3.2.8 Public Services: Transportation—Refurbishment

Public services: transportation is a Category 2 refurbishment issue. Table B-1 of Appendix B to Subpart A of 10 CFR Part 51 notes the following:

> Transportation impacts (level of service) of highway traffic generated during plant refurbishment and during the term of the renewed license are generally expected to be of small significance. However, the increase in traffic associated with additional workers and the local road and traffic control conditions may lead to impacts of moderate or large significance at some sites.

The additional number of refueling outage workers and truck material deliveries needed to support the replacement of the SGs would cause a short-term level of service impact on access roads in the immediate vicinity of BVPS. As previously discussed in Section 2.2.8.2, major commuting routes to BVPS, including State Route (SR) 168, are mostly rural and uncongested. According to FENOC, increased traffic volumes entering and leaving BVPS during refueling outages, which occur at intervals of approximately 18 months, has not degraded the level of service capacity on local roads, and the higher number of refueling outage workers during the Unit 1 SG replacement did not require any road improvements. During routine periods of high traffic volume (i.e., morning and afternoon shift changes), FENOC employs personnel to direct traffic entering and leaving BVPS to minimize level of service impacts on SR 168 (FENOC 2008a).

In addition, the Council for the Borough of Shippingport stated in a letter to FENOC that there would be no need for road improvements to accommodate traffic for the Unit 2 SG replacement project (FENOC 2008a), and the Beaver County Planning Department has not identified any limited capacity or physical condition deficiencies on the major commuting routes to BVPS. BVPS is also located in an area of declining population so traffic volumes are not expected to increase. Based on this information and because of the brief duration (up to 70 days) for the SG replacement project, transportation (level of service) impacts would be very SMALL. The NRC staff has not identified any impact reducing mitigation measures or associated cost-benefit studies

3.2.9 Historic and Archeological Resources—Refurbishment

Historic and archeological resources are a Category 2 refurbishment issue. Table B-1 of Appendix B to Subpart A of 10 CFR Part 51 notes the following:

> Generally, plant refurbishment and continued operation are expected to have no more than small adverse impacts on historic and archaeological resources. However, the National Historic Preservation Act requires the Federal agency to consult with the State Historic Preservation Officer to determine whether there are properties present that require protection.

The area of potential effect from the SG replacement activity is in a location that was previously disturbed by the construction of BVPS Units 1 and 2. Ground-disturbing activities associated with this project would involve the construction of a storage building to house the replaced components (FENOC 2008a). The new storage building would be located next to the existing Waste Storage Building and the building that houses the replaced Unit 1 SGs and reactor vessel head (FENOC 2008a). Additional temporary facilities would be erected to support project activities; none of these structures would be located in undisturbed areas. Should FENOC proceed with this project, all activities associated with this project, including construction and excavation, as well as transportation of the SGs on site, would occur in areas previously disturbed by construction of BVPS Units 1 and 2. Additionally, all activities would be reviewed in accordance with the FENOC Integrated Cultural Resource Management Plan and associated site procedures which are designed to ensure that investigations and consultations are conducted as needed and that existing or potentially existing cultural resources are adequately protected. These procedures have been reviewed by the Pennsylvania Historical and Museum Commission (PHMC; Pennsylvania's State Historic Preservation Office).

The impacts associated with this activity are not expected to adversely affect historic or archeological sites in the area of BVPS Units 1 and 2. Therefore, the potential impacts from this activity on historic or archeological resources would be SMALL. However, should archeological resources be encountered during construction, work would cease until FENOC environmental personnel perform an evaluation and consider possible mitigation measures through consultation with PHMC.

3.2.10 Environmental Justice—Refurbishment

Environmental justice is a Category 2 refurbishment issue. Table B-1 of Appendix B to Subpart A of 10 CFR Part 51 notes that "The need for and the content of an analysis of environmental justice will be addressed in plant specific reviews."

Since BVPS is located in a high-population area, any changes in BVPS employment would have little noticeable effect on minority and/or low-income populations in the region. Because of the short time (up to 70 days) needed to replace the Unit 2 SGs and based on the analysis of impacts for the other resource areas discussed in Section 3.2, there would be no disproportionately high and adverse impacts to minority and low-income populations in the immediate vicinity of BVPS.

3.3 Evaluation of New and Potentially Significant Information on Impacts of Refurbishment

For all Category 1 issues related to refurbishment, the NRC staff has not identified any new and significant information during its review of the BVPS ER, the staff's environmental site audit, the scoping process, or the evaluation of other available information, including the FENOC RAI ENV 3.0-1 responses by letters dated April 25, 2008 (FENOC 2008a); May 30, 2008 (FENOC 2008b); June 2, 2008 (FENOC 2008c); and June 27, 2008 (FENOC 2008d). Therefore, the NRC staff adopts the findings in the GEIS for Category 1 issues associated with refurbishment, and concludes that there would be no environmental impacts during the renewal term beyond those discussed in the GEIS for these issues.

3.4 Summary of Impacts of Refurbishment

For the nine Category 2 issues and environmental justice, the impacts of refurbishments for range from no impact to SMALL. For the refurbishment issues Public Services: Education, Offsite Land Use, and Environmental Justice, the NRC staff concludes that there would be no noticeable impact. For the refurbishment issues Terrestrial Ecology, Threatened or Endangered Species, Air Quality (Nonattainment and Maintenance Areas), Housing Impacts, Public Services: Public Utilities, Public Services: Transportation, and Historic and Archeological Resources, the NRC staff concludes that the potential environmental effects are of SMALL significance.

3.5 References

10 CFR Part 51. Code of Federal Regulations, Title 10, Energy, Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions."

10 CFR Part 54. Code of Federal Regulations, Title 10, Energy, Part 54, "Requirements for Renewal of Operating Licenses for Nuclear Power Plants."

40 CFR Part 51. Code of Federal Regulations, Title 40, Protection of Environment, Part 51, "Requirements for Preparation, Adoption, and Submittal of Implementation Plans."

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4.0 ENVIRONMENTAL IMPACTS OF OPERATION

Environmental issues associated with operation of a nuclear power plant during the renewal term are discussed in NUREG-1437, "Generic Environmental Impact Statement for License Renewal of Nuclear Plants," Volumes 1 and 2 (NRC 1996; 1999) (GEIS).[15] The GEIS includes a determination of whether the analysis of the environmental issues can be applied to all plants and whether additional mitigation measures are warranted. Issues are then assigned a Category 1 or a Category 2 designation. As set forth in the GEIS, Category 1 issues are those that meet all of the following criteria:

The environmental impacts associated with the issue have been determined to apply either to all plants or, for some issues, to plants having a specific type of cooling system or other specified plant or site characteristics.

A single significance level (i.e., SMALL, MODERATE, or LARGE) has been assigned to the impacts (except for collective offsite radiological impacts from the fuel cycle and from high-level waste and spent fuel disposal).

Mitigation of adverse impacts associated with the issue has been considered in the analysis, and it has been determined that additional plant-specific mitigation measures are likely not to be sufficiently beneficial to warrant implementation.

For issues that meet the three Category 1 criteria, no additional plant-specific analysis is required unless new and significant information emerges.

Category 2 issues are those that do not meet one or more of the criteria for Category 1, and therefore, these issues require additional plant-specific review.

This chapter addresses the issues related to operation during the renewal term that are listed in Table B-1 of Appendix B, "Environmental Effect of Renewing the Operating License of a Nuclear Power Plant," to Subpart A, "National Environmental Policy Act—Regulations Implementing Section 102(2)," of Title 10, Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions," of the *Code of Federal Regulations* (10 CFR Part 51), and that are applicable to the Beaver Valley Power Station (BVPS). Section 4.1 addresses issues applicable to the BVPS cooling system. Section 4.2 addresses issues related to transmission lines and onsite land use. Section 4.3 addresses the radiological impacts of normal operation, and Section 4.4 addresses issues related to the socioeconomic impacts of normal operation during the renewal term. Section 4.5 addresses issues related to ground water use and quality, while Section 4.6 discusses the impacts of renewal term operations on threatened and endangered species. Section 4.7 addresses potentially new information raised during the scoping period, and Section 4.8 discusses cumulative impacts. Section 4.9 summarizes the results of the evaluation of environmental issues related to operation during the renewal term. Finally, Section 4.10 lists the references for Chapter 4. Appendix F lists Category 1 and Category 2 issues that are not applicable to BVPS because they are related to plant-design features or site characteristics not found at the station.

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15 The U.S. Nuclear Regulatory Commission (NRC) originally issued the GEIS in 1996 and issued Addendum 1 to the GEIS in 1999. Hereafter, all references to the GEIS include the GEIS and its Addendum 1.

4.1 Cooling System

Table 4-1 lists Category 1 issues in Table B-1 of Appendix B to Subpart A of 10 CFR Part 51 that are applicable to the BVPS cooling system operation during the renewal term. FirstEnergy Nuclear Operating Company (FENOC) stated in its environmental report (ER) (FENOC 2007a) that it is not aware of any new and significant information associated with the license renewal of BVPS. Nor has the NRC staff identified any new and significant information during its independent review of the BVPS ER, the staff's site audit, the scoping process, or evaluation of other available information. Therefore, the NRC staff concludes that there would be no impacts related to these issues beyond those discussed in the GEIS. For all of the issues, the NRC staff concluded in the GEIS that the impacts would be classified as SMALL, and additional plant-specific mitigation measures are not likely to be sufficiently beneficial to be warranted.

Table 4-1. Category 1 Issues Applicable to the Operation of the BVPS Cooling System during the Renewal Term

ISSUE—10 CFR Part 51, Subpart A, Appendix B, Table B-1	GEIS Sections
SURFACE WATER QUALITY, HYDROLOGY, AND USE	
Altered current patterns at intake and discharge structures	4.2.1.2.1
Altered thermal stratification of lakes	4.2.1.2.3
Temperature effects on sediment transport capacity	4.2.1.2.3
Scouring caused by discharged cooling water	4.2.1.2.3
Eutrophication	4.2.1.2.3
Discharge of chlorine or other biocides	4.2.1.2.4
Discharge of sanitary wastes and minor chemical spills	4.2.1.2.4
Discharge of other metals in wastewater	4.2.1.2.4

Table 4-1. (contd)

AQUATIC ECOLOGY	
Accumulation of contaminants in sediments or biota	4.2.1.2.4
Entrainment of phytoplankton and zooplankton	4.2.2.1.1
Cold shock	4.2.2.1.5
Thermal plume barrier to migrating fish	4.2.2.1.6
Distribution of aquatic organisms	4.2.2.1.6
Premature emergence of aquatic insects	4.2.2.1.7
Gas supersaturation (gas bubble disease)	4.2.2.1.8
Low dissolved oxygen in the discharge	4.2.2.1.9
Losses from predation, parasitism, and disease among organisms exposed to sublethal stresses	4.2.2.1.10
Stimulation of nuisance organisms	4.2.2.1.11
AQUATIC ECOLOGY (PLANTS WITH COOLING-TOWER-BASED HEAT DISSIPATION SYSTEMS)	
Entrainment of fish and shellfish in early life stages	4.3.3
Impingement of fish and shellfish	4.3.3
Heat shock	4.3.3
TERRESTRIAL RESOURCES	
Cooling tower impacts on crops and ornamental vegetation	4.3.4
Cooling tower impacts on native plants	4.3.5.1
Bird collisions with cooling towers	4.3.5.2
HUMAN HEALTH	
Microbiological organisms (occupational health)	4.3.6
Noise	4.3.7

The following briefly describes the GEIS conclusions, as codified in Table B-1, and NRC staff's review for each of these issues:

- Altered current patterns at intake and discharge structures. Based on information in the GEIS, the Commission found the following:

  Altered current patterns have not been found to be a problem at operating nuclear power plants and are not expected to be a problem during the license renewal term.

- Altered thermal stratification of lakes. Based on information in the GEIS, the Commission found the following:

Generally, lake stratification has not been found to be a problem at operating nuclear power plants and is not expected to be a problem during the license renewal term.

- Temperature effects on sediment transport capacity. Based on information in the GEIS, the Commission found the following:

  These effects have not been found to be a problem at operating nuclear power plants and are not expected to be a problem during the license renewal term.

- Scouring caused by discharged cooling water. Based on information in the GEIS, the Commission found the following:

  Scouring has not been found to be a problem at most operating nuclear power plants and has caused only localized effects at a few plants. It is not expected to be a problem during the license renewal term.

- Eutrophication. Based on information in the GEIS, the Commission found the following:

  Eutrophication has not been found to be a problem at operating nuclear power plants and is not expected to be a problem during the license renewal term.

- Discharge of chlorine or other biocides. Based on information in the GEIS, the Commission found the following:

  Effects are not a concern among regulatory and resource agencies, and are not expected to be a problem during the license renewal term.

- Discharge of sanitary wastes and minor chemical spills. Based on information in the GEIS, the Commission found the following:

  Effects are readily controlled through [National Pollutant Discharge Elimination System] NPDES permit and periodic modifications, if needed, and are not expected to be a problem during the license renewal term.

- Discharge of other metals in wastewater. Based on information in the GEIS, the Commission found the following:

  These discharges have not been found to be a problem at operating nuclear power plants with cooling-tower-based heat dissipation systems and have been satisfactorily mitigated at other plants. They are not expected to be a problem during the license renewal term.

- Accumulation of contaminants in sediments or biota. Based on information in the GEIS, the Commission found the following:

Accumulation of contaminants has been a concern at a few nuclear power plants but has been satisfactorily mitigated by replacing copper alloy condenser tubes with those of another metal. It is not expected to be a problem during the license renewal term.

- Entrainment of phytoplankton and zooplankton. Based on information in the GEIS, the Commission found the following:

  Entrainment of phytoplankton and zooplankton has not been found to be a problem at operating nuclear power plants and is not expected to be a problem during the license renewal term.

- Cold shock. Based on information in the GEIS, the Commission found the following:

  Cold shock has been satisfactorily mitigated at operating nuclear plants with once-through cooling systems, has not endangered fish populations or been found to be a problem at operating nuclear power plants with cooling towers or cooling ponds, and is not expected to be a problem during the license renewal term.

- Thermal plume barrier to migrating fish. Based on information in the GEIS, the Commission found the following:

  Thermal plumes have not been found to be a problem at operating nuclear power plants and are not expected to be a problem during the license renewal term.

- Distribution of aquatic organisms. Based on information in the GEIS, the Commission found the following:

  Thermal discharge may have localized effects but is not expected to affect the larger geographical distribution of aquatic organisms.

- Premature emergence of aquatic insects. Based on information in the GEIS, the Commission found the following:

  Premature emergence has been found to be a localized effect at some operating nuclear power plants but has not been a problem and is not expected to be a problem during the license renewal term.

- Gas supersaturation (gas bubble disease). Based on information in the GEIS, the Commission found the following:

  Gas supersaturation was a concern at a small number of operating nuclear power plants with once-through cooling systems but has been satisfactorily mitigated. It has not been found to be a problem at operating nuclear power plants with cooling towers or cooling ponds and is not expected to be a problem during the license renewal term.

- Low dissolved oxygen in the discharge. Based on information in the GEIS, the Commission found the following:

  Low dissolved oxygen has been a concern at one nuclear power plant with a once-through cooling system but has been effectively mitigated. It has not been found to be a problem at operating nuclear power plants with cooling towers or cooling ponds and is not expected to be a problem during the license renewal term.

- Losses from predation, parasitism, and disease among organisms exposed to sublethal stresses. Based on information in the GEIS, the Commission found the following:

  These types of losses have not been found to be a problem at operating nuclear power plants and are not expected to be a problem during the license renewal term.

- Stimulation of nuisance organisms. Based on information in the GEIS, the Commission found the following:

  Stimulation of nuisance organisms has been satisfactorily mitigated at the single nuclear power plant with a once-through cooling system where previously it was a problem. It has not been found to be a problem at operating nuclear power plants with cooling towers or cooling ponds and is not expected to be a problem during the license renewal term.

- Entrainment of fish and shellfish in early life stages (cooling-tower-based heat dissipation). Based on information in the GEIS, the Commission found the following:

  Entrainment of fish has not been found to be a problem at operating nuclear power plants with this type of cooling system and is not expected to be a problem during the license renewal term.

- Impingement of fish and shellfish (cooling-tower-based heat dissipation). Based on information in the GEIS, the Commission found the following:

  The impingement has not been found to be a problem at operating nuclear power plants with this type of cooling system and is not expected to be a problem during the license renewal term.

- Heat shock (cooling-tower-based heat dissipation). Based on information in the GEIS, the Commission found the following:

> Heat shock has not been found to be a problem at operating nuclear power plants with this type of cooling system and is not expected to be a problem during the license renewal term.

- Cooling tower impacts on crops and ornamental vegetation. Based on information in the GEIS, the Commission found the following:

  > Impacts from salt drift, icing, fogging, or increased humidity associated with cooling-tower operation have not been found to be a problem at operating nuclear power plants and are not expected to be a problem during the renewal term.

- Cooling tower impacts on native vegetation. Based on information in the GEIS, the Commission found the following:

  > Impacts from salt drift, icing, fogging, or increased humidity associated with cooling-tower operation have not been found to be a problem at operating nuclear power plants and are not expected to be a problem during the renewal term.

- Bird collisions with cooling towers. Based on information in the GEIS, the Commission found the following:

  > These collisions have not been found to be a problem at operating nuclear power plants and are not expected to be a problem during the license renewal term.

- Microbiological organisms (occupational health). Based on information in the GEIS, the Commission found the following:

  > Occupational health impacts are expected to be controlled by continued application of accepted industrial hygiene practices to minimize worker exposures.

- Noise. Based on information in the GEIS, the Commission found the following:

  > Noise has not been found to be a problem at operating plants and is not expected to be a problem at any plant during the license renewal term.

For all of these Category 1 Issues, as codified in Table B-1, the NRC staff has not identified any new and significant information during its review of the BVPS ER, the staff's site audit, the scoping process, or the evaluation of other available information. Therefore, the NRC staff made no further conclusions beyond those discussed in the GEIS.

The following sections discuss the Category 2 issues related to cooling system operation during the renewal term that are applicable to BVPS. Table 4-2 lists these issues.

Table 4-2. Category 2 Issues Applicable to the Operation of the BVPS Cooling System during the Renewal Term

ISSUE—10 CFR Part 51, Subpart A, Appendix B, Table B-1	GEIS Sections	10 CFR 51.53(c)(3)(ii) Subparagraph	SEIS Section
SURFACE WATER QUALITY, HYDROLOGY, AND USE (FOR ALL PLANTS)			
Water use conflicts (plants with cooling towers and cooling ponds using makeup water from a small river with low flow)	4.3.2.1; 4.4.2.1	A	4.1.1
HUMAN HEALTH			
Microbiological organisms (public health) (plants using a lake, canal, or cooling pond or that discharge to a small river)	4.3.6	G	4.1.2

4.1.1 Water Use Conflicts

The NRC specifies the following in 10 CFR 51.53(c)(3)(ii)(A):

> ...if the applicant's plant uses cooling towers or cooling ponds and withdraws makeup water from a river whose annual flow rate is less than $3.15x10^{12}$ cubic feet per year (ft^3/year) [99,885 cubic feet per second (cfs)], an assessment of the impact of the proposed action on the flow of the river and related impacts on instream and riparian ecological communities must be provided.

For water use conflicts, the NRC further states as issue 13 in 10 CFR Part 51, Subpart A, Appendix B, Table B-1, "the issue has been a concern at nuclear power plants with cooling ponds and at plants with cooling towers. Impacts on instream and riparian communities near these plants could be of moderate significance in some situations." This issue is applicable to BVPS because the plant uses cooling towers and withdraws makeup water for its cooling systems from the New Cumberland Pool on the Ohio River, which has an annual mean flow of approximately $1.25x10^{12}$ ft^3/yr (39,503 cfs) (FENOC 2007a) at the location of the site, thus meeting the NRC's definition of a small river.

4.1.1.1 *Surface Water Use Conflicts*

The GEIS considered surface water use conflicts to be a Category 2 issue for two separate reasons:

Consumptive water use can adversely affect riparian vegetation and instream aquatic communities in the stream. Reducing the amount of water available to either the riparian zones or instream communities could result in impacts to threatened and endangered species, wildlife, and recreational uses of the water body. In addition, riparian vegetation performs several important ecological functions, included stabilizing channels and floodplains, influencing water temperature and quality, and providing habitat for aquatic and terrestrial wildlife (NRC 1996).

Continuing operation of these facilities depends on the availability of water within the river from which they are withdrawing water. For facilities that are located on small bodies of water, the volume of water available is expected to be susceptible to droughts and to competing water uses within the basin. In cases of extreme drought, these facilities may be required to curtail operations if the volume of water available is not sufficient (NRC 1996).

An additional potential effect of the withdrawal of water from a small river is that the withdrawal may have an impact on ground water levels and thus result in ground water use conflicts (NRC 1996). This is considered a separate Category 2 issue and is evaluated in Section 4.1.1.2 of this SEIS.

The 10-year, 7-day-duration low flow (7Q10) of the Ohio River at the BVPS site is approximately 5290 cfs (149.8 cubic meters per second (cms)). The U.S. Army Corps of Engineers (USACE) reported the lowest minimum flow expected under conditions corresponding to the lowest flow of record, which occurred in 1930, would be approximately 4000 cfs (113.3 cms). The maximum consumptive use of surface water at BVPS is 40 cfs (1.1 cms) or 0.8 percent and 1.0 percent of the 7Q10 and the minimum expected flow of the Ohio River, respectively (FENOC 2007a). These consumptive losses are insignificant relative to the flow of the Ohio River and would not be expected to impact the river's aquatic and riparian ecological communities or other facilities relying on the river as a source of water.

Additionally, as detailed in Section 2.2.2.1, a series of locks and dams operated by USACE maintains and controls water elevations of the Ohio River and lower portions of the Allegheny and Monongahela Rivers. USACE indicated that even under postulated river flows as low as 800 cfs (22.7 cms), the minimum pool elevation of the New Cumberland Pool would remain at 664.5 feet (202.5 m) National Geodetic Vertical Datum (NGVD) to maintain the navigability of the water channel. USACE is currently undertaking a study to determine measures necessary to maintain the Ohio River's navigation channels through 2070. The maximum consumptive water loss at BVPS of 40 cfs (1.1 cms) represents approximately 5 percent of the USACE postulated low flow. Therefore, consumptive losses through the license renewal period would not likely result in any change in the elevation of the New Cumberland Pool (FENOC 2007a).

The staff has reviewed the available information, including that provided by the applicant, additional USACE data, information gathered during the staff's site visit and the scoping process, and other available sources. Considering that the BVPS consumptive water use is small relative to the flow of the Ohio River, and that USACE does not anticipate changing its river control policy, the NRC staff concludes the impact of water use on the Ohio River at BVPS would be classified as SMALL.

Mitigation measures that could further reduce the consumptive use of Ohio River water by BVPS include additional recycling of plant service water, increased efficiency of the cooling tower heat dissipation system, and the use of alternate sources of water for minor plant use. Implementation of any of these mitigation measures would have a negligible effect on the availability of surface water because the flow of the river far exceeds the amount of water used by BVPS. The staff did not identify any cost benefit studies applicable to these mitigation measures.

4.1.1.2 *Ground Water Use Conflicts (Plants Using Cooling Towers or Cooling Ponds and Withdrawing Makeup Water from a Small River)*

The NRC specifies in 10 CFR 51.53(c)(3)(ii)(A) that "if the applicant's plant utilizes cooling towers or cooling ponds and withdraws makeup water from a river whose annual flow rate is less than 3.15×10^{12} cubic feet per year (ft^3/year) [99,885 cubic feet per second (cfs)]...[t]he applicant shall also provide an assessment of the impacts of the withdrawal of water from the river on alluvial aquifers during low flow." For water use conflicts, the NRC further states as issue 34 in 10 CFR Part 51, Subpart A, Appendix B, Table B-1, "...Water use conflicts may result from surface water withdrawals from small water bodies during low flow conditions which may affect aquifer recharge, especially if other groundwater or upstream surface water users come online before the time of license renewal...." This issue is applicable to BVPS because the plant uses cooling towers and withdraws makeup water for its cooling systems from the New Cumberland Pool on the Ohio River, which has an annual mean flow of approximately 1.25×10^{12} ft^3/year (39,503 cfs (1119 cms)) (FENOC 2007a) at the location of the site, thus meeting the NRC's definition of a small river.

Consumptive water losses at BVPS constitute a small fraction of the Ohio River flow at the New Cumberland Pool, where BVPS is situated. The 7Q10 flow is approximately 5290 cfs and the minimum flow expected is approximately 4000 cfs. Maximum consumptive water use for BVPS Units 1 and 2 is approximately 40 cfs, resulting in 0.8 percent and 1.0 percent of the 7Q10 and minimum expected flow of the Ohio River, respectively (FENOC 2007a). The alluvial aquifers lining the Upper Ohio River Valley are hydraulically connected to the Ohio River; thus, alluvial ground water recharge and depth along the New Cumberland Pool fluctuates with the changes in pool depth. As stated in Section 4.1.1, for navigation purposes, USACE employs a flow control strategy that maintains a minimum pool level in the New Cumberland Pool of 664.5 feet (202.5 m) NGVD, even under river flow conditions as low as 800 cfs (22.7 cms) (FENOC 2007a). Therefore, any fluctuations in pool depth as a result of consumptive water use at BVPS would be expected to be minimal and would not significantly affect ground water in the area of BVPS.

Furthermore, the Commonwealth of Pennsylvania requires facilities that withdraw or use more than 10,000 gallons per day of surface water or ground water, such as BVPS, to register and periodically report their water usage for Commonwealth water planning purposes (FENOC 2007a). For this reason, combined with the USACE river control policy, the NRC staff concludes that the impacts from consumptive water use on ground water would be classified as SMALL.

Mitigation measures that could reduce the effects on ground water include the reduction in the consumptive use of surface water from the New Cumberland Pool by BVPS as described in the mitigation measures discussed in the previous section. Implementation of any of these mitigation measures would have negligible effect on the availability of surface water and, thereby, on ground water levels because the flow of the river far exceeds the amount of water used by BVPS. The staff did not identify any cost benefit studies applicable to these mitigation measures.

4.1.2 Microbiological Organisms (Public Health)

For power plants that use a cooling pond, lake, or canal or that discharge to a small river, the effects of microbiological organisms on human health are listed as a Category 2 issue and require plant-specific evaluation for license renewal review. This issue is applicable to BVPS because the facility discharges to the Ohio River, which meets the NRC definition of a small river (less than 3.15×10^{12} ft^3/yr) in 10 CFR 51.53(c)(3)(ii)(G); the Ohio River has an average annual flow rate of approximately 1.25×10^{12} ft^3/yr in the vicinity of BVPS.

The Category 2 designation is based on the magnitude of the potential public health impacts associated with thermal enhancement of enteric pathogens that could not be determined generically in the GEIS. Enteric pathogens include *Salmonella* spp. and *Shigella* spp., the *Pseudomonas aeruginosa* bacterium, the thermophilic *Actinomyces* fungi, a number of species from genus *Legionella*, and the pathogenic strain of the free-living amoebae *Naegleria* spp. (*N. fowleri*). The NRC noted that impacts of nuclear plant thermal discharges are considered to be of small significance if they do not enhance the presence of microorganisms that are detrimental to water quality and public health (NRC 1996).

Thermophilic microorganisms thrive and propagate in high temperatures, generally from 77 to 176 °F (25 to 80 °C), with optimal growth occurring between 122 and 150 °F (50 and 66 °C) and minimum tolerance of 68 °F (20 °C) (Joklik and Willett 1976). However, thermal preference and tolerances vary across bacterial families. Pathogenic microorganisms that are of concern in the operation of nuclear power reactors typically have optimal growing temperatures of approximately 99 °F (37 °C) (Joklik and Smith 1972).

N. fowleri is of particular concern because it can cause significant adverse human health effects when populations are increased. *N. fowleri* enters the human body through the nasal passage and penetrates the nasal mucosa, potentially resulting in a rapidly fatal form of encephalitis, termed primary amebic meningoencephalitis (PAM). It is estimated that individual annual risks to swimmers from PAM caused by the free-living *N. fowleri* are very low (approximately 4×10^{-6}); however, there have been reported cases of fatal *Naegleria* infections associated with power plant cooling towers (NRC 1996). *N. fowleri* can be found in a variety of habitats including soil, freshwater lakes, ponds, thermal springs, air, and humidifier systems. Studies report that *N. fowleri* can tolerate temperatures from 80 °F to 111 °F (26.7 to 44 °C), but populations may be enhanced in thermally altered water bodies where temperatures range from 95 to 106 °F (35 to 41 °C) or higher (Marciano-Cabral 2007). *N. fowleri* is rarely found at temperatures below 95 °F (35 °C), and infection rarely occurs at this water temperature or lower (Tyndall et al. 1989).

The "Final Environmental Statement Related to the Operation of Beaver Valley Power Station, Unit 2" (NRC 1985) reported that average temperatures in the Ohio River in the vicinity of BVPS range from 36.5 °F (2.5 °C) in January to 79.5 °F (26.4 °C) in August. More recent data from USACE reports similar river water temperatures, with the highest maximum monthly average temperature of 80 °F (26.7 °C) occurring in July. The maximum daily average temperature of 86 °F (30 °C) occurred in both July and August (FENOC 2007a). These data indicate that during warmer months, water temperatures in the Ohio River could support survival of thermophilic microorganisms; however, temperatures are generally below the range most conducive to their growth and reproduction.

Following implementation of the spring 2008 power uprate, FENOC calculated that BVPS cooling water discharges consisted of approximately 19 cfs at a maximum temperature of 13 °F above ambient river water temperature from the emergency outfall structure and approximately 95 cfs at 5 to 10 °F above ambient river water temperature from the outfall structure. FENOC conservatively calculates that this would result in relatively small thermal plumes that would extend 500 to 1000 feet downriver from the outfall structures, even during the warmest summer months. The maximum average monthly and maximum average daily temperatures in the thermal plumes would reach 85 °F (29.4 °C) and 91 °F (32.8 °C), respectively (FENOC 2007a). Because the growth rate for microbiological organisms is measured in hours to days (Hendricks 1972), it is not expected that this short period of plume passage would notably affect growth rates of microbiological organisms compared to ambient river temperatures. In addition, because of the design of the BVPS common outfall structure and the nature of thermal mixing, the maximum plume water temperatures would remain towards the surface waters, not near the river bottom where *N. fowleri* may occur in the sediment (FENOC 2007a).

Additionally, the BVPS river water/service water and circulating water systems are routinely treated with biocides approved by the Pennsylvania Department of Environmental Protection (PADEP) to control microbiological organisms and macrofouling. FENOC currently uses hypochlorite, bromide, and a quaternary amine formulation for biofouling control. Thus, cooling tower blowdown discharged to the Ohio River contains trace levels of biocides and associated residuals that are in compliance with the limits prescribed by the facility's current National Pollutant Discharge Elimination System (NPDES) permit. The chemicals contained in the blowdown may actually inhibit the growth of thermophilic microorganisms in the area of the discharge outfalls (FENOC 2007a).

The shores of the Ohio River in the area of BVPS are off-access to members of the public, which prevents public exposure to potentially contagious populations of thermophilic microorganisms. Shore-based access to the site and recreational activities such as swimming and fishing are not permitted, and in June 2002, the U.S. Coast Guard established a no-access security zone that includes waters extending 200 feet from the shoreline of the southeastern shore of the Ohio River, from river mile markers 34.6 to 35.1. This security zone is effective indefinitely, and vessels or people may not enter the security zone unless they are authorized by the Coast Guard (FENOC 2007a).

FENOC consulted the Pennsylvania Department of Health (PADOH) and PADEP with regard to thermophilic pathogens potentially associated with the continued operation of the BVPS cooling water system for the license renewal period. PADOH indicated it was not aware of any significant health issues that would affect the license renewal project at BVPS; PADEP raised no issues or questions regarding the FENOC thermophilic pathogens analysis as contained in the ER (FENOC 2007a).

The NRC staff independently reviewed the BVPS ER, visited the BVPS site, and reviewed the applicant's Commonwealth of Pennsylvania NPDES permit. Based on the evaluation presented above, the staff concludes that thermophilic microbiological organisms are not likely to present a public health hazard as a result of BVPS discharges to the Ohio River, and the staff classifies the expected impacts on public health from thermophilic microbiological organisms from continued operation of BVPS in the license renewal period as SMALL. In addition to maintaining the current security zone to restrict access to the Ohio River shores in the vicinity of BVPS, the staff identified one additional measure that could mitigate potential thermophilic microbiological organism impacts resulting from continued operation of BVPS. Periodic monitoring for thermophilic microbiological organisms in the water and sediments near the discharge outfalls could reduce human health impacts by minimizing public exposures to thermophilic microbiological organisms. The staff did not identify any cost-benefit studies applicable to this mitigation measure.

4.2 Transmission Lines

4.2.1 Transmission Lines

Section 2.1.7 of this SEIS describes the in-scope transmission lines and right-of-way (ROW) maintenance practices.

Table 4-3 lists Category 1 issues in 10 CFR Part 51, Subpart A, Appendix B, Table B-1, that are applicable to transmission lines at BVPS. FENOC stated in the BVPS ER (FENOC 2007a) that it is not aware of any new and significant information associated with the renewal of the BVPS operating licenses (OLs). Nor did the NRC staff identify any new and significant information during its independent review of the BVPS ER, the staff's site audit, the scoping process, or the evaluation of other available information. Therefore, the NRC staff concludes that there would be no impacts related to these issues beyond those discussed in the GEIS (NRC 1996). For all of those issues, the NRC staff concluded in the GEIS that the impacts would be SMALL, and additional plant-specific mitigation measures are not likely to be sufficiently beneficial to warrant implementation.

Table 4-3. Category 1 Issues Applicable to the BVPS Transmission Lines during the Renewal Term

ISSUE—10 CFR Part 51, Subpart A, Appendix B, Table B-1	GEIS Sections
TERRESTRIAL RESOURCES	
Power line ROW management (cutting and herbicide application)	4.5.6.1
Bird collisions with power lines	4.5.6.2
Impacts of electromagnetic fields on flora and fauna (plants, agricultural crops, honeybees, wildlife, livestock)	4.5.6.3
Floodplains and wetlands within power line ROWs	4.5.7
AIR QUALITY	
Air quality effects of transmission lines	4.5.2
LAND USE	
Onsite land use	4.5.3
Power line ROWs	4.5.3

A brief description of the NRC staff's review and GEIS conclusions, as codified in Table B-1, for each of these issues follows:

- Power line ROW management (cutting and herbicide application). Based on information in the GEIS, the Commission found the following:

  The impacts of right-of-way maintenance on wildlife are expected to be of small significance at all sites.
- Bird collisions with power lines. Based on information in the GEIS, the Commission found the following:

  Impacts are expected to be of small significance at all sites.
- Impacts of electromagnetic fields on flora and fauna (plants, agricultural crops, honeybees, wildlife, livestock). Based on information in the GEIS, the Commission found the following:

  > No significant impacts of electromagnetic fields on terrestrial flora and fauna have been identified. Such effects are not expected to be a problem during the license renewal term.

- Floodplains and wetlands within power line ROWs. Based on information in the GEIS, the Commission found the following:

  > Periodic vegetation control is necessary in forested wetlands underneath power lines and can be achieved with minimal damage to the wetlands. No significant impact is expected at any nuclear power plant during the license renewal term.

- Air quality effects of transmission lines. Based on the information in the GEIS, the Commission found the following:

  Production of ozone and oxides of nitrogen is insignificant and does not contribute measurably to ambient levels of these gases.

- Onsite land use. Based on the information in the GEIS, the Commission found the following:

  > Projected onsite land use changes required during the renewal period would be a small fraction of any nuclear power plant site and would involve land that is controlled by the applicant.

- Power line ROWs. Based on information in the GEIS, the Commission found the following:

  > Ongoing use of power line rights-of-way would continue with no change in restrictions. The effects of these restrictions are of small significance.

For all of these Category 1 Issues applicable to the BVPS transmission lines during the renewal term, as codified in Table B-1, the NRC staff has not identified any new and significant information during its review of the BVPS ER, the staff's site audit, the scoping process, or the evaluation of other available information. Therefore, the NRC staff made no further conclusions beyond those discussed in the GEIS.

There is one Category 2 issue related to transmission lines and another issue related to transmission lines that is being treated as a Category 2 issue. Table 4-4 lists these issues, which are discussed in Sections 4.2.2 and 4.2.3.

Table 4-4. Category 2 and Uncategorized Issues Applicable to the BVPS Transmission Lines during the Renewal Term

ISSUE—10 CFR Part 51, Subpart A, Appendix B, Table B-1	**GEIS Section**	**10 CFR 51.53(c)(3)(ii) Subparagraph**	**SEIS Section**
	HUMAN HEALTH		
Electromagnetic fields—acute effects (electric shock)	4.5.4.1	H	4.2.1
Electromagnetic fields—chronic effects	4.5.4.2	NA	4.2.2

4.2.2 Electromagnetic Fields—Acute Effects

Based on the GEIS, the Commission found that electric shock resulting from direct access to energized conductors or from induced charges in metallic structures has not been found to be a problem at most operating plants and generally is not expected to be a problem during the license renewal term. However, site-specific review is required to determine the significance of the electric shock potential along the portions of the transmission lines that are within the scope of this SEIS.

In the GEIS (NRC 1996), the NRC staff found that without a review of the conformance of each nuclear plant transmission line with National Electrical Safety Code (NESC) criteria, it was not possible to determine the significance of the electric shock potential (IEEE 2002). Evaluation of individual plant transmission lines is necessary because the issue of electric shock safety was not addressed in the licensing process for some plants. For other plants, land use in the vicinity of transmission lines may have changed, or power distribution companies may have chosen to upgrade line voltage. To comply with 10 CFR 51.53(c)(3)(ii)(H), the applicant must provide an assessment of the impact of the proposed action on the potential shock hazard from the transmission lines if the transmission lines that were constructed for the specific purpose of connecting the plant to the transmission system do not meet the recommendations of the NESC for preventing electric shock from induced currents.

All transmission lines associated with BVPS were constructed in accordance with NESC and industry guidance in effect at that time. The transmission facilities are maintained to ensure continued compliance with current standards. Since the lines were constructed, a new criterion has been added to the NESC for power lines with voltages exceeding 98 kV. This criterion states that the minimum clearance for a line must limit induced currents due to static effects to 5 mA.

FENOC has reviewed the transmission lines for compliance with this criterion. FENOC indicated that all transmission lines within the scope of this review have been restudied and the results show there are no locations under the transmission lines that have the capacity to induce more than 5 mA in a vehicle parked beneath the line. No induced shock hazard to the public should occur, since the lines are operating within original design specifications and meet current NESC clearance standards (FENOC 2007).

The NRC staff has reviewed the available information, including the applicant's evaluation and computational results. Based on this information, the NRC staff evaluated the potential impacts for electric shock resulting from operation of BVPS and its associated transmission lines. It is the NRC staff's conclusion that the potential impacts from electric shock during the renewal period would be SMALL.

The NRC staff identified a variety of measures that could mitigate potential EMF impacts resulting from continued operation of the BVPS transmission lines. These mitigation measures would include limiting public access to transmission line structures, installing caution signs at locations where transmission lines cross public roads, and increasing the clearance height of the transmission lines.

These mitigation measures could further reduce human health impacts, already assessed as small, by minimizing public exposures to electric shock hazards. The staff verified that the applicant meets the NESC criteria that are necessary for the protection of employees and the public from acute EMF hazards associated with transmission lines, including during the license renewal term. The Staff did not identify any cost benefit studies applicable to the mitigation measures discussed above.

4.2.3 Electromagnetic Fields—Chronic Effects

In the GEIS, the chronic effects of 60-Hz electromagnetic fields from power lines were not designated as Category 1 or 2, and will not be until a scientific consensus is reached on the health implications of these fields.

The potential for chronic effects from these fields continues to be studied and is not known at this time. The National Institute of Environmental Health Sciences (NIEHS) directs related research through the U.S. Department of Energy (DOE).

The report by NIEHS (NIEHS 1999) contains the following conclusion:

> The NIEHS concludes that ELF-EMF (extremely low frequency-electromagnetic field) exposure cannot be recognized as entirely safe because of weak scientific evidence that exposure may pose a leukemia hazard. In our opinion, this finding is insufficient to warrant aggressive regulatory concern. However, because virtually everyone in the United States uses electricity and therefore is routinely exposed to ELF-EMF, passive regulatory action is warranted such as continued emphasis on educating both the public and the regulated community on means aimed at reducing exposures. The NIEHS does not believe that other cancers or non-cancer health outcomes provide sufficient evidence of a risk to currently warrant concern.

This statement is not sufficient to cause the NRC staff to change its position with respect to the chronic effects of electromagnetic fields. The NRC staff considers the GEIS finding of "not applicable" still appropriate and will continue to follow developments on this issue.

4.3 Radiological Impacts of Normal Operations

Category 1 issues in 10 CFR Part 51, Subpart A, Appendix B, Table B-1 that are applicable to BVPS in regard to radiological impacts are listed in Table 4-5. FENOC stated in its ER (FENOC 2007a) that it is not aware of any new and significant information associated with the renewal of the BVPS OL. The NRC staff has not identified any new and significant information during its independent review of the FENOC ER, the NRC staff's site visit, the scoping process, or its evaluation of other available information. Therefore, the NRC staff concludes that there are no impacts related to these issues beyond those discussed in the GEIS. For these issues, the NRC staff concluded in the GEIS that the impacts are SMALL, and additional plant-specific mitigation measures are not likely to be sufficiently beneficial to be warranted.

Table 4-5. Category 1 Issues Applicable to Radiological Impacts of Normal Operations during the Renewal Term

ISSUE—10 CFR Part 51, Subpart A, Appendix B, Table B-1	GEIS Sections
HUMAN HEALTH	
Radiation exposures to public (license renewal term)	4.6.2
Occupational radiation exposures (license renewal term)	4.6.3

A brief description of the NRC staff's review and the GEIS conclusions, as codified in Table B-1, for each of these issues follows:

- Radiation exposures to public (license renewal term). Based on information in the GEIS, the Commission found the following:

  Radiation doses to the public will continue at current levels associated with normal operations.

- Occupational radiation exposures (license renewal term). Based on information in the GEIS, the Commission found the following:

  Projected maximum occupational doses during the license renewal term are within the range of doses experienced during normal operations and normal maintenance outages, and would be well below regulatory limits.

For all of these Category 1 Issues applicable to radiological impacts of normal operations during the renewal term, as codified in Table B-1, the NRC staff has not identified any new and significant information during its independent review of the BVPS ER and information on a postulated repair or replacement of the Unit 2 steam generators, the NRC staff's site visit, the scoping process, or its evaluation of other available information. Therefore, the NRC staff made no further conclusions beyond those discussed in the GEIS.

There are no Category 2 issues related to radiological impacts of routine operations.

4.4 Socioeconomic Impacts of Plant Operations during the License Renewal Term

Table 4-6 lists Category 1 issues in 10 CFR Part 51, Subpart A, Appendix B, Table B–1, that are applicable to socioeconomic impacts during the renewal term. As stated in the GEIS, the impacts associated with these Category 1 issues were determined to be SMALL, and plant-specific mitigation measures would not be sufficiently beneficial to be warranted.

Table 4-6. Category 1 Issues Applicable to Socioeconomics during the Renewal Term

ISSUE—10 CFR Part 51, Subpart A, Appendix B, Table B-1	GEIS Section
SOCIOECONOMICS	
Public services: public safety, social services, and tourism and recreation	4.7.3; 4.7.3.3; 4.7.3.4; 4.7.3.6
Public services: education (license renewal term)	4.7.3.1
Aesthetic impacts (license renewal term)	4.7.6
Aesthetic impacts of transmission lines (license renewal term)	4.5.8

The NRC staff reviewed and evaluated the BVPS ER, scoping comments, other available information, and visited BVPS in search of new and significant information that would change the conclusions presented in the GEIS. No new and significant information during this review and evaluation. Therefore, the staff expects that there would be no impacts related to these Category 1 issues during the renewal term beyond those discussed in the GEIS.

The results of the review and brief statement of GEIS conclusions, as codified in Table B-1 of Appendix B to Subpart A of 10 CFR Part 51, for each of the socioeconomic Category 1 issues are the following:

- Public services: public safety, social services, and tourism and recreation. Based on information in the GEIS, the Commission found the following:

  Impacts to public safety, social services, and tourism and recreation are expected to be of small significance at all sites.

- Public services: education (license renewal term). Based on information in the GEIS, the Commission found the following:

Only impacts of small significance are expected.

- Aesthetic impacts (license renewal term). Based on information in the GEIS, the Commission found the following:

  No significant impacts are expected during the license renewal term.

- Aesthetic impacts of transmission lines (license renewal term). Based on information in the GEIS, the Commission found the following:

  No significant impacts are expected during the license renewal term.

No new and significant information was identified for these issues during the review. Therefore, it is expected that there would be no impacts during the renewal term beyond those discussed in the GEIS.

Table 4-7 lists the Category 2 socioeconomic issues, which require plant-specific analysis, and an environmental justice impact analysis, which the GEIS did not address.

Table 4-7 Category 2 Issues Applicable to Socioeconomics and Environmental Justice during the Renewal Term

ISSUE—10 CFR Part 51, Subpart A, Appendix B, Table B-1	**GEIS Section**	**10 CFR 51.53(c)(3)(ii) Subparagraph**	**SEIS Section**
	SOCIOECONOMICS		
Housing impacts	4.7.1	I	4.4.1
Public services: public utilities	4.7.3.5	I	4.4.2
Offsite land use (license renewal term)	4.7.4	I	4.4.3
Public services: transportation	4.7.3.2	J	4.4.4
Historic and archaeological resources	4.7.7	K	4.4.5
Environmental justice	Not addressed[a]	Not addressed[a]	4.4.6

[a]Guidance related to environmental justice was not in place at the time the GEIS and the associated revision to 10 CFR Part 51 were prepared. Therefore, plant-specific reviews must address environmental justice.

4.4.1 Housing Impacts During Operation

Section C.1.4 of Appendix C to the GEIS presents a population characterization method based on two factors, sparseness and proximity. Sparseness measures population density within 20 miles of the site, and proximity measures population density and city size within 50 miles. Each factor has categories of density and size (GEIS, Table C.1). A matrix is used to rank the population category as low, medium, or high (GEIS, Figure C.1).

According to the 2000 census, 482,634 people lived within 20 miles of BVPS, which equates to a population density of 384 persons per square mile (FENOC 2007a). This density translates to the least sparse Category 4 (greater than or equal to 120 persons per square mile within 20 miles). Approximately 3,274,451 people live within 50 miles of BVPS (FENOC 2007a). This equates to a population density of 417 persons per square mile. Applying the GEIS proximity measures, BVPS is classified as proximity Category 4 (greater than or equal to 190 persons per square mile within 50 miles). Therefore, according to the sparseness and proximity matrix presented in the GEIS, BVPS ranks of sparseness Category 4 and proximity Category 4 result in the conclusion that BVPS is located in a high-population area.

Table B-1 of Appendix B to Subpart A of 10 CFR Part 51 states that impacts on housing availability are expected to be of small significance in high-density population areas where growth control measures are not in effect. Since BVPS is located in a high population area, and Allegheny and Beaver Counties are not subject to growth control measures that would limit housing development, any changes in BVPS employment would have little noticeable effect on housing availability in these counties. Since FENOC has indicated that it plans no major plant refurbishment, non-outage employment levels at BVPS would remain relatively constant with no additional demand for permanent housing during the license renewal term. In addition, the number of available housing units has kept pace with or exceeded the decrease in area population. Based on this information, there would be no impact on permanent housing during the license renewal term beyond what is currently being experienced.

However, FENOC indicated in their environmental report that the Unit 2 steam generators (SGs) at BVPS might be replaced during the license renewal term (FENOC 2007a). FENOC estimates that SG replacement would require a one-time increase in the number of refueling outage workers for up to 70 days at BVPS (FENOC 2008b). These additional workers would create an additional demand for temporary (rental) housing in the immediate vicinity of BVPS. Even though the replacement of Unit 2 SGs is not certain, the NRC staff has reviewed the potential environmental impacts of this activity. These impacts are discussed in section 3.2 of this DSEIS.

4.4.2 Public Services: Public Utilities

Impacts on public utility services are considered SMALL if there is little or no change in the ability of the system to respond to demand and thus there is no need to add capital facilities. Impacts are considered MODERATE if service capabilities are overtaxed during periods of peak demand. Impacts are considered LARGE if services (e.g., water, sewer) are substantially degraded and additional capacity is needed to meet ongoing demand. In the absence of new and significant information to the contrary, the only impacts on public utilities that could be significant are impacts on public water supplies.

Analysis of impacts on the public water and sewer systems considered both plant demand and plant-related population growth. Section 2.1.3 of this SEIS describes the permitted withdrawal rate and actual use of water at BVPS.

As discussed in Section 2.2.8.2, BVPS acquires potable water from the Midland Water Authority. Current average daily usage represents 1.5 percent of the Midland Water Authority's average daily demand and 0.9 percent of its permitted capacity. No increase in plant demand is projected.

Since FENOC has indicated that there would be no major plant refurbishment or additional workers hired during the license renewal period, overall employment levels at BVPS would remain relatively unchanged with no additional demand for public water and sewer services. Public water systems in the region would be adequate to meet the demands of residential and industrial customers in the area. Therefore, there would be no additional impact to public water and sewer services during the license renewal term beyond what is currently being experienced.

As discussed in Section 4.4.1, FENOC might replace the Unit 2 steam generators (SGs) at BVPS during the license renewal term (FENOC 2007a). The additional number of refueling outage workers needed to replace the SGs would cause a short-term increase in the amount of public water and sewer services used in the immediate vicinity of BVPS. These impacts are discussed in section 3.2 of this DSEIS.

4.4.3 Offsite Land Use—License Renewal Term

Offsite land use during the license renewal term is a Category 2 issue (10 CFR Part 51, Subpart A, Appendix B, Table B-1). Table B-1 notes that "significant changes in land use may be associated with population and tax revenue changes resulting from license renewal."

Section 4.7.4 of the GEIS defines the magnitude of land use changes as a result of plant operation during the license renewal term as follows:

- SMALL—little new development and minimal changes to an area's land use pattern
- MODERATE—considerable new development and some changes to the land use pattern
- LARGE—large-scale new development and major changes in the land use pattern

Tax revenue can affect land use because it enables local jurisdictions to provide the public services (e.g., transportation and utilities) necessary to support development. Section 4.7.4.1 of the GEIS states that the assessment of tax-driven land use impacts during the license renewal term should consider (1) the size of the plant's payments relative to the community's total revenues, (2) the nature of the community's existing land use pattern, and (3) the extent to which the community already has public services in place to support and guide development. If the plant's tax payments are projected to be small relative to the community's total revenue, tax-driven land use changes during the plant's license renewal term would be SMALL, especially where the community has preestablished patterns of development and has provided adequate public services to support and guide development. Section 4.7.2.1 of the GEIS states that if tax payments by the plant owner are less than 10 percent of the taxing jurisdiction's revenue, the significance level would be SMALL. If the plant's tax payments are projected to be medium to large relative to the community's total revenue, new tax-driven land use changes would be MODERATE. If the plant's tax payments are projected to be a dominant source of the community's total revenue, new tax-driven land use changes would be LARGE. This would be especially true if the community has no preestablished pattern of development or has not provided adequate public services to support and guide development.

4.4.3.1 *Population-Related Impacts*

Since FENOC has indicated that they have no plans to add non-outage employees during the license renewal period, there would be no noticeable change in land use conditions in the vicinity of BVPS. Therefore, there would be no population-related land use impacts during the license renewal term beyond those already being experienced.

As discussed in Section 4.4.1, FENOC might replace the Unit 2 steam generators (SGs) at BVPS during the license renewal term (FENOC 2007a). Due to the short amount of time needed to replace the SGs, the additional number of refueling outage workers would not cause any permanent population-related land use changes in the immediate vicinity of BVPS. These impacts are discussed in section 3.3 of this DSEIS.

4.4.3.2 *Tax-Revenue-Related Impacts*

As discussed in Chapter 2, FENOC pays annual real estate taxes to Beaver County, South Side Area School District, and Shippingport Borough. For the 5-year period from 2001 through 2005, tax payments to Beaver County represented between 0.2 and 0.7 percent of the county's total operating budgets. In comparison, the FENOC property tax payments to South Side Area School District make up a larger percentage of the school district's operating budget. For the period 2001 through 2005, tax payments to the South Side Area School District represented 7.3 to 16.2 percent of the district's operating budget, and payments to Shippingport Borough represented between 0.3 to 16.3 percent of the borough's operating budget.

Since FENOC started making payments to local jurisdictions, population levels and land use conditions in Shippingport Borough and Beaver County have not changed significantly, which might indicate that these tax revenues have had little or no effect on land use activities within the county. However, discontinuing the current level of tax revenues could have a significant negative economic impact on the South Side Area School District.

FENOC has indicated that it plans no major plant refurbishment or license-renewal-related construction activities to support the continued operation of BVPS during the license renewal period. Accordingly, there would be no increase in the assessed value of BVPS, and annual property tax payments to Beaver County, the South Side Area School District, and the Borough of Shippingport would be expected to remain relatively unchanged throughout the license renewal period. Based on this information, there would be no land use impacts related to tax revenue during the license renewal term beyond those already being experienced.

As discussed in Section 4.4.1, FENOC might replace the Unit 2 steam generators (SGs) at BVPS during the license renewal term (FENOC 2007a). Due to the short amount of time needed to replace the SGs, the additional number of refueling outage workers would not cause any permanent population-related land use changes in the immediate vicinity of BVPS. These impacts are discussed in Chapter 3 of this DSEIS.

4.4.4 Public Services: Transportation Impacts

Table B-1 in 10 CFR Part 51 states the following:

> Transportation impacts (level of service) of highway traffic generated...during the term of the renewed license are generally expected to be of small significance. However, the increase in traffic associated with additional workers and the local road and traffic control conditions may lead to impacts of moderate or large significance at some sites.

The regulation in 10 CFR 51.53(c)(3)(ii)(J) requires all applicants to assess the impacts of highway traffic generated by the proposed project on the level of service of local highways during the term of the renewed license.

Since FENOC has no plans to add non-outage employees during the license renewal period; traffic volume and levels of service on roadways in the vicinity of BVPS would not change. Therefore, there would be no transportation impacts during the license renewal term beyond those already being experienced.

As discussed in Section 4.4.1, FENOC might replace the Unit 2 steam generators (SGs) at BVPS during the license renewal term (FENOC 2007a). The additional number of refueling outage workers and truck material deliveries needed to support the replacement of the SGs would cause a one-time short-term transportation impact on access roads in the immediate vicinity of BVPS. These impacts are discussed in section 3.2 of this DSEIS.

4.4.5 Historic and Archaeological Resources

The National Historic Preservation Act (NHPA), as amended, requires Federal agencies to consider the effects of their undertakings on historic properties. Historic properties are defined as resources that are eligible for listing on the National Register of Historic Places. The criteria for eligibility include (1) association with significant events in history; (2) association with the lives of persons significant in the past; (3) embodiment of distinctive characteristics of type, period, or construction, and (4) association with or potential to yield important information (ACHP 2008). The historic preservation review process mandated by Section 106 of the NHPA is outlined in regulations issued by the Advisory Council on Historic Preservation in Title 36, "Parks, Forests, and Public Property," Part 800, "Protection of Historic Properties," of the *Code of Federal Regulations* (36 CFR Part 800). The issuance of a renewed operating license for a nuclear power plant is a federal action that could possibly affect either known or currently undiscovered historic properties located on or near the plant site and its associated transmission lines. In accordance with the provisions of the NHPA, the NRC is required to make a reasonable effort to identify historic properties in the areas of potential effect. If no historic properties are present or affected, the NRC is required to notify the State Historic Preservation Office before proceeding. If it is determined that historic properties are present, the NRC is required to assess and resolve possible adverse effects of the undertaking.

As discussed in Chapter 2, FENOC contacted the Pennsylvania Historical and Museum Commission (PHMC; Pennsylvania's State Historic Preservation Office, or SHPO) on September 8, 2003, regarding preparation of its application for license renewal (FENOC 2007a). By letter dated November 19, 2003, PHMC responded by requesting additional information to proceed with a historic properties review. PHMC also stated that the proposed project should have no adverse effect on prehistoric and historic archaeological resources in the project area. PHMC stated that, should project plans change, Phase 1 (reconnaissance surveys) archaeological surveys may be required. In accordance with 36 CFR 800.8(c), the NRC contacted PHMC (NRC 2007d), the Advisory Council on Historic Preservation (NRC 2007e), and the appropriate federally recognized native American tribes with current and historic ties to the region in November 2007. The staff has received comment letters from both the Delaware and Onondaga Nations. Appendix C lists these letters.

The final environmental statement (FES), prepared for continuation of the construction permit and issuance of the facility's operating license, stated that the site had been substantially disturbed before the construction of BVPS. Prior land disturbance was associated primarily with construction of Shippingport Atomic Power Station (AEC 1973). The FES also identified one

Indian village site near the abandoned Shippingport ferry docks on the south bank of the Ohio River (AEC 1973). The Atomic Energy Commission (AEC) concluded that no archaeological sites of significance would be affected by the operation of BVPS. This conclusion was based on the prior site disturbance associated with the construction of Shippingport Atomic Power Station. No archaeological surveys were conducted before the construction of BVPS. The PHMC reviewed the project data and concurred that there was no adverse effect on historical sites, structures, or archaeological sites (AEC 1973).

In preparation for license renewal, FENOC contracted with GAI Consultants, Inc. (GAI) to prepare an integrated cultural resources management plan (ICRMP) for BVPS. The ICRMP serves as a management tool that integrates cultural resource considerations with ongoing BVPS activities. FENOC has incorporated the ICRMP and its recommendations into its site procedures. For its survey, GAI conducted a historic records review and reconnaissance fieldwork to identify and evaluate all previously surveyed cultural resources, inventory additional architectural and historical resources, and conduct an archaeological survey within the BVPS facility subject to possible construction activities associated with extended operations. No subsurface cultural resource surveys were conducted on the BVPS site as a result of GAI's fieldwork. The ICRMP was developed in consultation with FENOC and the PHMC. FENOC submitted the ICRMP to the PHMC for review and concurrence. On March 28, 2008, the PHMC agreed with the recommendations of the ICRMP for archaeological resources. However, the PHMC was unable to complete its review of Shippingport Atomic Power Station until additional information is submitted. FENOC is currently collecting this additional information and will submit it to the PHMC.

As stated earlier, GAI conducted historical research and reconnaissance fieldwork to identify and evaluate all previously surveyed cultural resources within the area of potential effect. Additionally, GAI inventoried architectural and historical resources. The resulting document features recommendations for planning activities with respect to the inventoried resources for use by BVPS management. The ICRMP provides FENOC with a programmatic basis for compliance with both Federal and Commonwealth of Pennsylvania historic preservation directives and guidelines. The ICRMP was developed in consultation with PHMC.

As stated in Section 2.2.9.2, two archaeological sites and two historic sites are located on the BVPS property. The FES for BVPS Unit 1 identified one archaeological site (Old Indian Fort—36Bv0003) on site. Two additional prehistoric sites (Lower Field Site—36Bv004 and Petroglyph—36Bv0089) and two historic sites (Christler-Marker Cemetery and Shippingport Atomic Power Station) were identified through the FENOC license renewal review. No evidence of site 36Bv0089 (a petroglyph recorded onsite at the time of BVPS construction) was reported to be on the property.

The Old Indian Fort (36Bv0003) is a prehistoric village that contains evidence of Middle Archaic, Late Archaic, and Late Woodland occupations. Neither the GAI reconnaissance nor the NRC's walkover survey found evidence of this site. However, portions of this site are undeveloped, and intact portions of the site may remain. The ICRMP notes that, pending formal evaluation, the Old Indian Fort site is considered potentially eligible for listing on the National Register of Historic Places.

The Lower Field Site (36Bv0004) was noted as an untyped lithic scatter collected from surface contexts before the construction of BVPS (GAI 2008). Limited information is available about this site, and it has not been formally evaluated. The ICRMP notes that this site is potentially significant due to the nature of the deeply buried deposits. Since the site has potential significance, the ICRMP notes that Phase 1 surveys would be required to determine the eligibility of this site to determine whether future activities would affect this site.

In addition to the three prehistoric sites listed above, two historic sites are also located on the BVPS site. The Christler-Marker Cemetery was used as a family burial ground from approximately 1812 to 1957. This cemetery is intact and has the potential to be a significant resource; therefore, it is recommended that FENOC avoid future ground-disturbing activities near the site. The second historic site associated with the BVPS site is the Shippingport Atomic Power Station (Shippingport).

FENOC has not proposed any new facilities, service roads, or transmission lines associated with continued operations or refurbishment, therefore, no impacts are expected to historic and archaeological resources on or in the vicinity of BVPS (FENOC 2007a). However, FENOC indicated that it might replace BVPS Unit 2 steam generators during the renewal term. Even though the replacement of these steam generators is uncertain, the NRC staff has reviewed the potential environmental impacts of this activity in Chapter 3 of this DSEIS.

Based on the NRC staff's review of the ICRMP, the FENOC improved environmental review procedures, the PHMC files, archaeological reviews, surveys, assessments, and other information, the NRC staff concludes that the potential impacts on historic and archaeological resources at BVPS would be SMALL. However, as noted in the ICRMP and the NRC staff's walkover survey, there is the potential for prehistoric and historic archaeological resources to be present on BVPS property. Since FENOC has developed and implemented an ICRMP, and has improved environmental review procedures, FENOC would likely protect any known or unknown archaeological sites within the site boundary. Should project plans change, then further mitigation and consultation would be initiated by FENOC with the PHMC.

4.4.6 Environmental Justice

Under the 1994 Executive Order 12898 (59 FR 7629), Federal agencies are responsible for identifying and addressing potential disproportionately high and adverse human health and environmental impacts on minority and low-income populations. In 2004, the Commission issued its "Policy Statement on the Treatment of Environmental Justice Matters in NRC Regulatory and Licensing Actions" (69 FR 52040) (NRC 2004c), which states, "The Commission is committed to the general goals set forth in E.O. 12898, and strives to meet those goals as part of its NEPA review process."

The Council on Environmental Quality (CEQ) provides the following information in "Environmental Justice: Guidance Under the National Environmental Policy Act" (CEQ 1997):

> **Disproportionately High and Adverse Human Health Effects.** Adverse health effects are measured in risks and rates that could result in latent cancer fatalities, as well as other fatal or nonfatal adverse impacts on human health. Adverse health effects may include bodily impairment, infirmity, illness, or death. Disproportionately high and adverse human health effects occur when the risk or rate of exposure to an environmental hazard for a minority or low-income population is significant (as defined by NEPA [National Environmental Policy Act]) and appreciably exceeds the risk or exposure rate for the general population or for another appropriate comparison group.

Disproportionately High and Adverse Environmental Effects. A disproportionately high environmental impact that is significant (as defined by NEPA) refers to an impact or risk of an impact on the natural or physical environment in a low-income or minority community that appreciably exceeds the environmental impact on the larger community. Such effects may include ecological, cultural, human health, economic, or social impacts. An adverse environmental impact is an impact that is determined to be both harmful and significant (as defined by NEPA). In assessing cultural and aesthetic environmental impacts, impacts that uniquely affect geographically dislocated or dispersed minority or low-income populations or American Indian tribes are considered.

The environmental justice analysis assesses the potential for disproportionately high and adverse human health or environmental effects on minority and low-income populations that could result from the operation of BVPS during the renewal term. In assessing the impacts, the staff used the following CEQ (1997) definitions of minority individuals and populations and low-income population:

- Minority individuals. Individuals who identify themselves as members of the following population groups: Hispanic or Latino, American Indian or Alaska Native, Asian, Black or African American, Native Hawaiian or Other Pacific Islander, or two or more races meaning individuals who identified themselves on a Census form as being a member of two or more races, for example, Hispanic and Asian.

- Minority populations. Minority populations are identified when (1) the minority population of an affected area exceeds 50 percent or (2) the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis.

- Low-income population. Low-income populations in an affected area are identified with the annual statistical poverty thresholds from the Census Bureau's Current Population Reports, Series PB60, on Income and Poverty.

4.4.6.1 *Minority Population in 2000*

According to 2000 census data, 11.4 percent of the population (approximately 3,260,000 individuals) residing within a 50-mile radius of BVPS identified themselves as minority individuals. The largest minority group was Black or African American (292,000 persons or 9 percent), followed by Asian (35,000 or about 1.1 percent). About 8 percent of the Beaver County population was minorities, with Black or African American the largest minority group (6.5 percent), followed by Hispanic (0.7 percent) (USCB 2003).

The 50-mile radius around BVPS includes parts of Pennsylvania, Ohio, and West Virginia. The geographic area consists of each county with at least one census block group located within the 50-mile radius. The population demographic data from these counties were added together to derive average regional percentages. Of the 2,796 census block groups located wholly or partly within the 50-mile radius of BVPS, 325 block groups were determined to have high density minority population percentages that exceeded the regional percentages by 20 percentage points or more. The largest number of high density minority block groups was Black or African American, with 303 block groups that exceed the regional percentage of 20 percent or more. These block groups are concentrated in urban areas with high population densities. The greatest number of high density block groups with minority populations are located in three counties (Mahoning County and Trumbull County in Ohio; and Allegheny County, Pennsylvania), in the cities of Youngstown and Warren in Ohio and Pittsburgh, Pennsylvania. The closest high density minority population to BVPS is located in the city of Aliquippa, Pennsylvania.

Based on 2000 census data, Figure 4-1 shows the location of high density minority block groups within a 50-mi radius of BVPS.

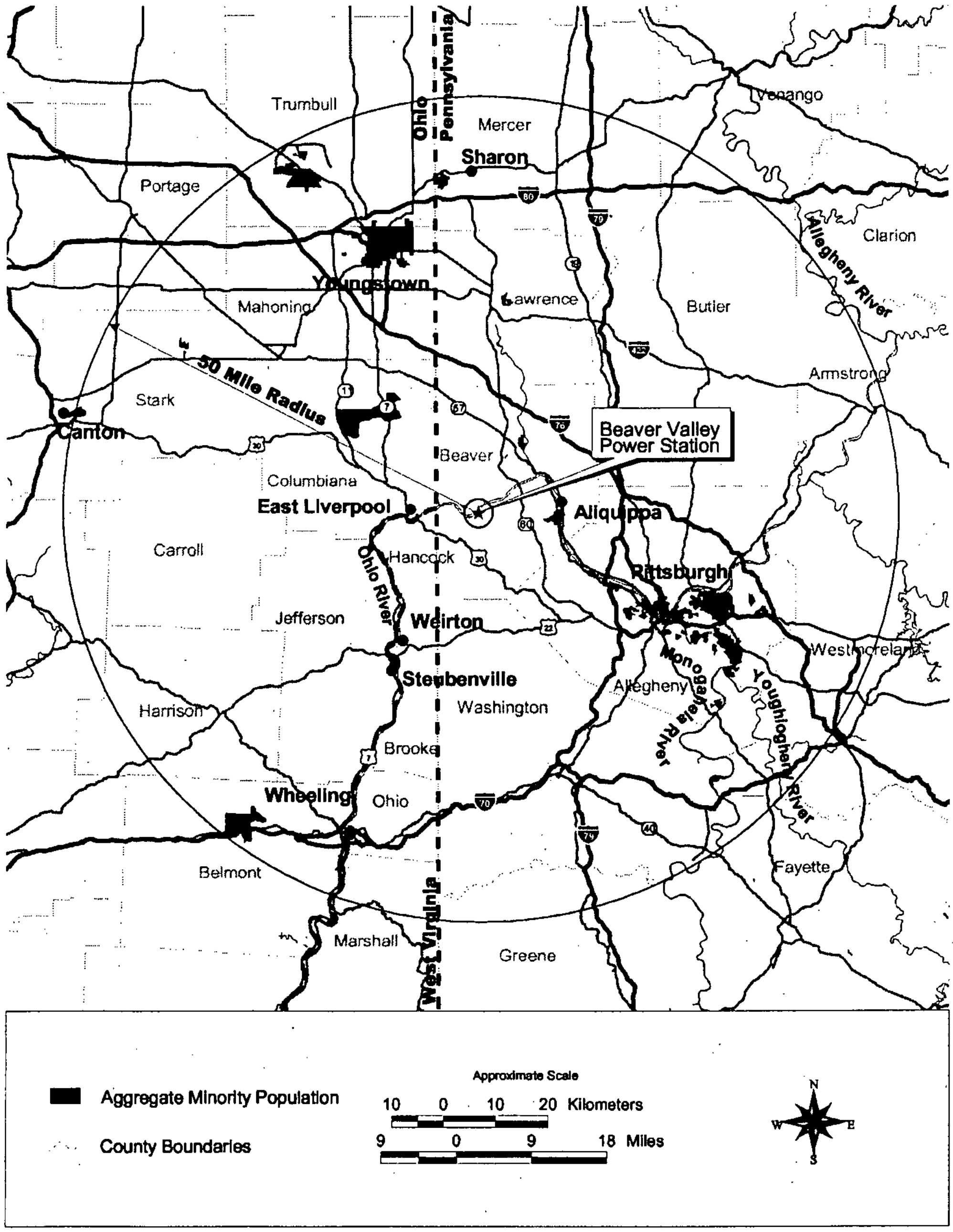

Figure 4-1. Minority Block Groups in 2000 within a 50-Mile Radius of BVPS (USCB 2008)

4.4.6.2 *Low-Income Population in 2000*

According to 2000 census data, approximately 351,000 families (approximately 8.1 percent) residing within a 50-mile radius of BVPS were identified as living below the Federal poverty threshold. The 1999 Federal poverty threshold was $17,029 for a family of four.

According to census data, the median household income for Pennsylvania in 2004 was $43,714, while 11.2 percent of the State population was determined to be living below the Federal poverty threshold. Beaver County had the lowest median household income ($39,688) and a similar percentage (11.4 percent) of individuals living below the poverty level when compared to the State. Allegheny County also had a lower median household income ($42,182) and an equal percentage (11.4 percent) of individuals living below the poverty level when compared to Beaver County and the State (USCB 2008).

Census block groups were considered high density low-income block groups if the percentage of households below the Federal poverty threshold exceeded the state average by 20 percent or more. Based on 2000 Census data, there were 171 block groups within the 50-mile radius of BVPS that exceeded the state average for low income households by 20 percent or more. The majority of census block groups with low-income populations were located in two counties, Allegheny County, Pennsylvania (75 block groups) and Mahoning County, Ohio (34 block groups). The nearest high density low-income population to BVPS is located in East Liverpool, Ohio. Figure 4-2 shows the location of high density low-income census block groups within a 50-mile radius of BVPS.

4.4.6.3 *Analysis of Impacts*

Consistent with the impact analysis for the public and occupational health and safety, the affected populations are defined as minority and low-income populations who reside within a 50-mile radius of BVPS. Based on the analysis of impacts for other resource areas, there would be no disproportionately high and adverse impacts from the operation of BVPS during the license renewal period.

As discussed in Section 4.4.1, FENOC might replace the Unit 2 steam generators (SGs) at BVPS during the license renewal term (FENOC 2007a). FENOC estimates that SG replacement would require a one-time increase in the number of refueling outage workers for up to 70 days at BVPS (FENOC 2008b). The replacement of the existing SGs would have little noticeable effect on minority and/or low-income populations in the region. These impacts are discussed in Chapter 3 of this DSEIS.

The NRC also analyzed the risk of radiological exposure through the consumption patterns of special pathway receptors, including subsistence consumption of fish, native vegetation, surface waters, sediments, and local produce; absorption of contaminants in sediments through the skin; and inhalation of plant materials. The special pathway receptors analysis is important to the environmental justice analysis because consumption patterns may reflect the traditional or cultural practices of minority and low-income populations in the area.

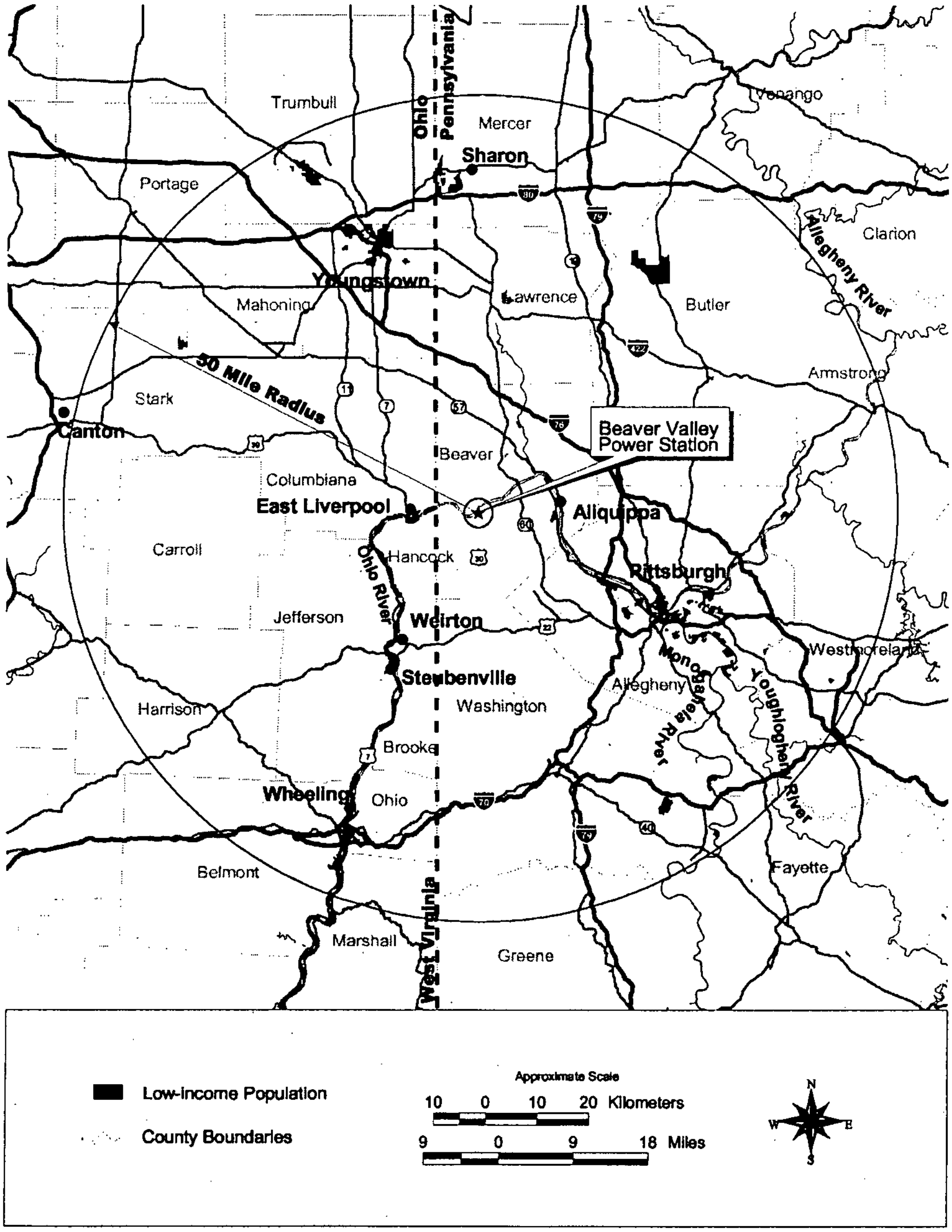

Figure 4-2. Low-Income Block Groups within a 50-Mile Radius of BVPS (USCB 2008)

Subsistence Consumption of Fish and Wildlife

Section 4-4 of Executive Order 12898 directs Federal agencies, whenever practical and appropriate, to collect and analyze information on the consumption patterns of populations who rely principally on fish and/or wildlife for subsistence and to communicate the risks of these consumption patterns to the public. In this draft SEIS, the NRC examined impacts to American Indian, Hispanic, and other traditional lifestyle special pathway receptors to determine whether there were any means for minority or low-income populations to be disproportionately affected. The NRC considered special pathways that took into account the levels of contaminants in native vegetation, crops, soils and sediments, surface water, fish, and game animals on or near the BVPS site.

FENOC has a comprehensive Radiological Environmental Monitoring Program (REMP) at BVPS to assess the impact of site operations on the environment. Samples are collected from the aquatic and terrestrial pathways in the vicinity of BVPS. The aquatic pathways include fish, surface waters, and sediment. The terrestrial pathways include airborne particulates and radioiodine, milk, food crops, feed crops, vegetation, and direct radiation. During 2006, 1392 analyses were performed on collected samples of environmental media as part of the required REMP and showed no significant or measurable radiological impact from BVPS operations.

Strontium-90 was detected in milk samples taken in 2006 at levels similar to the past 5 years. The gamma spectrometry analyses indicated positive results only for naturally occurring potassium-40 at average environmental levels. No other radionuclides were identified in the milk samples.

Tritium was identified in some of the water samples, but the values were consistent with tritium detected at control locations. Gamma spectrometry analysis of water samples indicated no radionuclides above detection capabilities. The iodine-131 analysis showed several positive analyses, but the values were consistent with iodine-131 found at the upstream control locations.

Sediment samples were collected upstream and downstream from the discharge point of BVPS liquid effluent releases. Analysis of samples indicated the presence of naturally occurring radionuclides potassium-40, thallium-208, bismuth-214, lead-212, lead-214, radium-226, and actinium-228 in all samples. The analyses also detected cesium-137, but the values were consistent with cesium-137 detected at the control location. The cesium-137 is most likely the result of past nuclear weapons tests and Chernobyl. Cobalt-58 and cobalt-60 were also identified in samples obtained at the shoreline of the BVPS main outfall facility. This is not unusual, because BVPS discharges cobalt-58 and cobalt-60 in liquid waste effluents in amounts consistent with authorized liquid effluent releases. All liquid effluent releases from BVPS during the report period did not exceed the release concentration limits in the Offsite Dose Calculation Manual. The 2006 results for all samples are consistent with the previous 5-year historical results and exhibit no adverse trends (FENOC 2007c).

The results of the 2006 REMP demonstrate that the routine operation at the BVPS site had no significant or measurable radiological impact on the environment. No elevated radiation levels were detected in the offsite environment as a result of plant operations and the storage of radioactive waste. The findings of the REMP continue to demonstrate that the operation of BVPS does not result in a significant measurable dose to a member of the general population or adversely impact the environment as a result of radiological effluents (FENOC 2007c). REMP continues to demonstrate that the dose to a member of the public from the operation of BVPS remains significantly below the federally required dose limits specified in 10 CFR Part 20, "Standards for Protection against Radiation," and Title 40, "Protection of Environment," Part 190, "Environmental Radiation Protection Requirements for Normal Operations of Activities in the Uranium Fuel Cycle" (40 CFR Part 190).

The Bureau of Radiation Protection (BRP) of PADEP maintains a comprehensive environmental radiation monitoring program in Pennsylvania, as required by the Radiation Protection Act (No. 1984-147). The purpose of the program is to evaluate long-term trends in environmental radiation levels; assess the environmental impact of particular sites, such as BVPS; and provide this information to the public. The BRP currently maintains offsite environmental radiation monitoring programs around five nuclear power plants in Pennsylvania including BVPS. Monitoring stations indicate any effects from plant operation at control locations, which are beyond the measurable influence of the facility. These stations also provide verification of utility effluent monitoring programs during routine operations.

Each year, BRP collects dosimetry, air, water, milk, fish, produce, and sediment samples in the vicinity of BVPS. BRP collected fish samples in the vicinity of the BVPS discharge and produce samples of cabbage from two gardens located 1 mile northeast and 3.8 miles west-northwest of BVPS in 2001 and 2002. BRP found traces of cesium-137 in milk samples taken at different locations and different times of the year. Manganese-54, cobalt-58, cobalt-60, cesium-134, and cesium-137 were also found in sediment samples. BRP attributed the presence of these isotopes to station discharges. However, BRP detected no reactor-related radionuclides in water samples. The presence of cesium-137 is attributed to fallout from past weapons testing and the accident at Chernobyl in April 1986. In addition, BRP found no reactor-related radioisotopes in fish or produce samples in 2001 and 2002 (PADEP BRP 2005).

Based on recent monitoring results, concentrations of contaminants in native vegetation, crops, soils and sediments, surface water, fish, and game animals in areas surrounding BVPS have been quite low (at or near the threshold of detection) and seldom above background levels (FENOC 2007c). Consequently, no disproportionately high and adverse human health impacts would be expected in special pathway receptor populations in the region as a result of subsistence consumption of fish and wildlife.

4.5 Ground Water Use and Quality

According to 10 CFR Part 51, Subpart A, Appendix B, Table B-1, plants using less than 100 gallons per minute "are not expected to cause any groundwater use conflicts." This Category 1 issue is applicable to BVPS ground water use and quality during the renewal term. During the review of the BVPS ER, the staff's site visit, the scoping process, and the evaluation of all available information, the NRC staff did not identify any new and significant information. BVPS does not use ground water in any of its operations, and there is no evidence of ground water contamination in the area resulting from the plant's operation. BVPS is developing a Groundwater Protection Plan that calls for the use of onsite wells that were formally operated in order to monitor ground water quality, but the site has no plans to utilize any ground water in its future operations. Therefore, the staff concludes that there are no impacts related to these issues beyond those discussed in the GEIS, which concluded that the impacts are SMALL.

4.6 Threatened or Endangered Species

Threatened or endangered species appear as a Category 2 issue in 10 CFR Part 51, Subpart A, Appendix B, Table B-1. Table 4-8 lists this issue.

Table 4-8 Category 2 Issue Applicable to Threatened or Endangered Species during the Renewal Term

ISSUE—10 CFR Part 51, Subpart A, Appendix B, Table B-1	GEIS Section	10 CFR 51.53(c)(3)(ii) Subparagraph	SEIS Section
THREATENED OR ENDANGERED SPECIES (FOR ALL PLANTS)			
Threatened or endangered species	4.1	E	4.6

This Category 2 issue requires consultation with appropriate agencies to determine whether threatened or endangered species are present and whether they would be adversely affected by continued operation of BVPS during the license renewal term. Sections 2.2.5 and 2.2.6 of this SEIS discuss the characteristics and habitat of threatened or endangered species in the vicinity of the BVPS.

FENOC contacted the U.S. Fish and Wildlife Service (FWS) on September 8, 2003, regarding threatened and endangered species at the BVPS site (FENOC 2007a). This letter described the site and the in-scope transmission lines and gave a preliminary assessment of the Federally listed threatened, endangered, and candidate species potentially occurring on or near the BVPS site. In its response letter to FENOC, dated October 2, 2003, FWS did not identify any known federally listed or proposed threatened or endangered species within the project impact area (FENOC 2007a).

On November 2, 2007, the NRC contacted FWS, the National Marine Fisheries Service (NMFS), and the Pennsylvania Environmental Council to request information on Federally and State-listed threatened and endangered species and critical habitats in the vicinity of BVPS. The NRC staff also requested information that could assist in its assessment of the environmental impacts associated with license renewal (NRC 2007a; 2007b; 2007c). In response, on November 20, 2007, FWS indicated that, "except for occasional transient species, no Federally listed or proposed threatened or endangered species under [its] jurisdiction are known to occur within the project impact area" (FWS 2007). In a letter dated November 15, 2007, NMFS indicated that "no threatened or endangered species under [its] jurisdiction are known to exist in the vicinity of BVPS" (NMFS 2007). The Pennsylvania Environmental Council did not provide any comments in response to the November 2, 2007, NRC letter.

4.6.1 Aquatic Species

The NRC staff has reviewed information provided by the applicant and information publicly available and has contacted the Pennsylvania Field Office of FWS (FWS 2007). No federally listed threatened or endangered aquatic species or critical habitat occurs in the Ohio River, in the vicinity of the BVPS site, or in the streams crossed by the transmission line ROWs. Two federally listed endangered mussels, the clubshell (*Epioblasma torulosa rangiana*) and the northern riffleshell (*Pleurobema clava*), were historically found in waterways in Beaver County and the Allegheny River and its tributaries. However, these mussels have not recently been found in these areas of historical occurrence. Therefore, license renewal of BVPS would have no effect on any federally listed aquatic species, and mitigation measures need not be considered.

4.6.2 Terrestrial Species

Currently, no threatened or endangered species are known to occur on or in the vicinity of the BVPS site or within the Beaver Valley-Crescent Line 318 ROW or in-scope portions of the Beaver Valley-Hanna and Beaver Valley Mansfield No. 1 and 2 line ROWs.

The NRC staff encourages FENOC and Duquesne Light to report the existence of any Federally or State-listed endangered or threatened species within or near the transmission line ROWs to PADEP and/or FWS if any such species are identified during the renewal term. In particular, if any evidence of injury or mortality of migratory birds or threatened or endangered species is observed within the corridor during the renewal period, the staff encourages FENOC and/or Duquesne Light to promptly report this to the appropriate wildlife management agencies.

Operation of BVPS and its associated transmission lines are not expected to adversely affect any threatened or endangered terrestrial species during the license renewal term. Therefore, license renewal of BVPS would have no effect on any Federally listed terrestrial species, and mitigation measures need not be considered.

4.7 Evaluation of New and Potentially Significant Information on Impacts of Operations during the Renewal Term

BVPS has two routine processes for identifying potentially new and significant information. First, administrative procedures for environmental planning, preparedness, and response require an annual determination of offsite chemical hazards. The environmental review process has been integrated with the FENOC safety evaluation process to ensure that potential hazards are evaluated for environmental and safety concerns. Second, FENOC completed a thorough review of internal and external documents, as well as interviews with internal experts on relevant subjects. During the review process, BVPS staff identified a potentially new and significant environmental issue—a new propane pipeline terminal and wholesale distribution facility was sited across the Ohio River from BVPS. The BVPS staff conducted an engineering evaluation to identify potential hazardous risks to BVPS and to determine if the new facility posed a change to previously analyzed design-basis accidents at BVPS. In addition, the BVPS environmental and chemistry staff evaluated whether operation of the propane terminal facility could significantly change the previously analyzed environmental impacts of the BVPS site.

After reviewing the BVPS engineering assessment, FENOC determined that the propane terminal and wholesale distribution facility did not pose an undue risk to members of the public because no significant change occurred in the previously considered design-basis accidents at BVPS. The BVPS staff concluded that no changes were needed in the BVPS design-basis accidents previously considered. The BVPS environmental and chemistry staff determined that routine operations at the propane facility would not have a significant impact on the previous conclusions regarding environmental impacts attributed to routine operations at BVPS. Based on these assessments, BVPS concluded that the environmental impacts of the propane pipeline and wholesale distribution facility on BVPS were small and would not invalidate the NRC's conclusions in the FES for BVPS and the GEIS. Therefore, the identification of the propane facility is new but not significant information (FENOC 2007a).

The NRC staff evaluated this information during its independent review of the FENOC ER, the scoping process, the site audit, and interviews with knowledgeable BVPS personnel. After evaluating all available information, the NRC staff concurred that the identification of a propane terminal and wholesale distribution facility in the vicinity of BVPS is new but not significant information. Therefore, the NRC staff concluded that there is no additional impact related to these issues beyond those discussed in the GEIS.

4.8 Cumulative Impacts

The NRC staff considered potential cumulative impacts on the environment resulting from the incremental impact of license renewal when added to other past, present, and reasonably foreseeable future actions. For the purposes of this analysis, past actions are related to the resources when BVPS was licensed and constructed, present actions are related to the resources during current operations, and future actions are those that are reasonably foreseeable through the end of station operations including the license renewal term. The geographic area over which past, present, and future actions are assessed depends on the affected resource.

The impacts of the proposed action, license renewal, as described in this chapter of the draft SEIS, are combined with other past, present, and reasonably foreseeable future actions regardless of which agency (Federal or non-Federal) or entity is undertaking the actions. The combined impacts are defined as "cumulative" in 40 CFR 1508.7, "Cumulative Impact," and include individually minor but collectively significant actions taking place over a period of time. It is possible that an impact that may be SMALL by itself could result in a MODERATE or LARGE impact when combined with the impacts of other actions on the affected resource. Likewise, if a resource is regionally declining or imperiled, even a SMALL individual impact could be important if it contributes to or accelerates the overall resource decline.

The NRC staff has identified reasonably foreseeable actions occurring in the future that are considered in this review for their cumulative impacts on the environment.

The following sections describe the cumulative impacts in the vicinity of BVPS. While the description may be limited by the unavailability of specific information, the NRC staff based its assessment on scientific principles and professional judgment.

4.8.1 Cumulative Impacts on Aquatic Ecology

This section assesses the impacts on the aquatic ecology of the Ohio River of the proposed action that relate to the operation of the BVPS closed-cycle cooling system, combined with other past, present, and reasonably foreseeable future actions within the defined geographic area of the Ohio River. The Ohio River is formed by the confluence of the Monongahela and Allegheny Rivers at Pittsburgh, Pennsylvania, and flows in a southwesterly direction 981 miles to Cairo, Illinois, where it joins the Mississippi River. USACE has constructed a series of locks and dams along the entire length of the Ohio River to make the river navigable for commercial and recreational boat traffic. The 20 locks and dams in the Ohio River have transformed the river from a rapid and free-flowing system to a network of 20 slow-flowing navigational pools (USACE 2006a). BVPS is located at river mile 34.8, on the New Cumberland Pool of the Upper Ohio River, approximately 3.1 river miles downstream from the Montgomery Locks and Dam and 19.6 miles upstream from the New Cumberland Locks and Dam (FENOC 2007a). For the purposes of this analysis, the geographic area considered for cumulative impacts on aquatic resources in the vicinity of BVPS is the New Cumberland Pool in the Upper Ohio River.

The region of the Ohio River Valley where BVPS is located is very industrialized. The reason for this is twofold. The region is rich in natural resources such as coal, clay, gas, oil, sand, and gravel, and the navigable river systems in the area allow for easy transportation to other parts of the country. Industrial facilities upstream from BVPS include a zinc recycling plant, two chemical plants, a cogeneration facility, a gypsum wallboard manufacturer, and the FENOC Bruce Mansfield Plant, a 2505-megawatt (MW) power plant fueled by three coal-fired units, adjacent to BVPS. Industrial facilities downstream of BVPS include gasoline, fuel oil, and propane bulk storage facilities, a steel mill, and ceramics and pottery manufacturers. The FENOC W.H. Sammis Power Plant, located just upstream of the New Cumberland Locks and Dams, is fueled by seven coal-fired units and five oil-fired peaking units, totaling 2316 MW (FENOC 2007a). Point-source discharges from these facilities directly affect the water quality in the New Cumberland Pool. The cooling water intake systems at the Bruce Mansfield and W.H. Sammis power plants may impact fish and shellfish populations.

Historically, the Three Rivers Region (where the Allegheny and Monongahela Rivers meet to form the Ohio) was a leading industrial area for coal mining, resource extraction, boat building, and metals manufacturing. Thus, water quality in the three rivers was impacted proportionally. The legacy of coal mining still affects the Ohio River; long after their abandonment, coal mines still leach acidic waters to ground water and streams that discharge to the Ohio River. Acid mine drainage contributes to the degradation of water quality and aquatic biota, as it is very acidic and typically contains high levels of iron, sulfur, and aluminum (EPA undated). Evidence of acid mine drainage can be found just up the hill from the BVPS site. Although mining operations near Peggs Run have long since ceased, the small stream still runs deep red during times of heavy water flow, indicating that abandoned mines in the area are still leaching contaminants (Beak 1999).

Current municipal and industrial effluents to the Ohio River in the vicinity of BVPS are, and will continue to be, regulated through NPDES permits issued by the PADEP Bureau of Water Supply and Wastewater Management. For facilities using the Ohio River as a source of cooling water, the NPDES permit will also contain regulations pertaining to the impingement and entrainment of fish and shellfish and temperature limits on heated effluents to the river. The PADEP periodically reviews and renews NPDES permits, thus regulating the flow of industrial effluents to the river in a manner that preserves water quality and protecting aquatic resources from impingement and entrainment through implementation of best technology available (BTA) and other mitigative measures.

BVPS uses a closed-cycle cooling system, which, because of its relatively small water withdrawal rates, is considered BTA for reducing the impact of power plant cooling systems on aquatic resources. From 1970 until the present, ichthyoplankton, adult fish, and impingement surveys have been conducted at the BVPS site. In 1980, the NRC determined that these studies were no longer required; however, FENOC continued the monitoring through 1995. The NRC reviewed impingement monitoring and ichthyoplankton survey results contained in BVPS annual nonradiological environmental reports from 1980 through 1995 (excluding 1986, as the report was unavailable) and determined that losses from impingement and entrainment at BVPS have a negligible impact on fish populations in the New Cumberland Pool (FENOC 2008a).

With regard to water quality, the Ohio River Valley Water Sanitation Commission (ORSANCO) works with States in the Ohio River Valley and Federal Government to control and abate pollution in the Ohio River. As discussed in Chapter 2, since the 1960s, pollution prevention regulations, the reduction in acid mining drainage, and better land management in the Ohio River Basin have cumulatively resulted in improved water quality in the Ohio River; this can be attributed to the work done by ORSANCO and State environmental agencies in the Ohio River Valley. With the continued efforts of ORSANCO, along with regulatory enforcement by PADEP, the improving trends in Upper Ohio River water quality will likely continue throughout the BVPS license renewal period.

The canalization of the Ohio River system allows the river and its navigable tributaries to support barge shipment of 270 million tons of commodities annually (USACE 2006b). While this shipping activity is vital to the economy of the Ohio River Valley, barge traffic has impacts on aquatic biota in the river, including but not limited to propeller entrainment and disruption of ichthyoplankton; siltation of mussels and other benthic organisms from the resuspension of sediments; impacts to submerged aquatic vegetation because of increased turbidity; and fuel spills from barges (ORF 2004).

The construction of locks and dams along the Ohio River transformed the Three Rivers Region into an industrial epicenter for the country, but it also irrevocably transformed the river's ecosystem from a shallow and free-flowing river to a series of deep, slow-moving pools. Impoundment of the river raised water levels and turned stream mouths into submerged embayments, and pools and embayments now require regular dredging to remove silt accumulation (ORF 2004). This transformation of the river has changed the aquatic community, with the greatest impact on freshwater mussel populations. Native freshwater mussels, many of which are now classified as federally endangered, experienced a significant decline resulting from the canalization of the river and the consequent loss of habitat. Freshwater mussels prefer silt-free substrates and silt-free, rapidly flowing water; hence, the pool-like ecosystem of the Ohio River is not ideal habitat (FWS undated). The construction of dams also affected fish movement along the river. Although the locks and high flows allow for some movement of fish, the locks and dams are not operated in such a way that allows for free movement of fish, especially during critical life cycle periods when migration may be necessary for survival or propagation (ORF 2004).

Working to counter the impact of dams in the Ohio River, FWS, the Pennsylvania Fish and Boat Commission, the West Virginia Division of Natural Resources, and the Ohio Department of Natural Resources all are participating in various fish stocking programs. The stocking programs aim to support recreational fishing on the Ohio River and to recolonize the river with native fish that were extirpated from the river because of the construction of dams, overfishing, and poor water quality. These ongoing stocking programs are showing signs of success.

The invasion of the nonnative zebra mussel (*Dreissena polymorpha*) has seriously impacted the remaining native freshwater mussel populations in the Ohio River. Zebra mussels were likely introduced into North America through the ballast water of oceangoing cargo ships, rapidly spreading through the Great Lakes and into the Mississippi River drainage system. The preferred substrate of zebra mussels is other mussels, so they rapidly encrust existing mussel populations and essentially suffocate them (SeaGrant Pennsylvania 2007). USACE employs an aggressive zebra mussel control program in the Upper Ohio River, using chemical and physical treatments to protect lock and dam structures, navigation vessels, and water monitoring equipment (USACE undated). However, because once zebra mussels are established in a water body, they are very difficult to control, native freshwater mussels may never make a strong return to the Ohio River system. In response to an NRC industry-wide notice, BVPS instituted a zebra mussel monitoring program in 1990. The first zebra mussels were detected at BVPS in 1995. BVPS employs a macrofouling program consisting of the application of a quaternary amine-based nonoxidizing molluscicide, GEBetz Powerline 3627, to prevent the proliferation of zebra mussels and Asiatic clams (*Corbicula fluminea*) in the plant's cooling system (FENOC 2008a).

USACE routinely dredges the New Cumberland Pool to maintain the minimum 9-foot depth for navigation channels in the river. Additionally, USACE has approved commercial dredging activities for sand and gravel in the Ohio River from river mile 0 to river mile 40, which includes the New Cumberland Pool. An active sand and gravel dredging operation occurs in the New Cumberland Pool approximately 3 miles downstream from the BVPS site (FENOC 2007a). Dredging does direct damage to benthic habitat and communities in the river, as it disrupts or removes bottom habitat. Dredging creates hypoxic areas that cannot support aquatic life and suspends sediment, nutrients, and persistent chemicals in the water column where they can degrade water quality and potentially contribute to eutrophication (ORF 2004).

Section 404(b)(1) of the Clean Water Act requires USACE to issue dredging permits based on the least environmentally damaging practicable alternative to aquatic resources. Thus, USACE has incorporated numerous measures into its dredging permits to eliminate or minimize adverse impacts to the aquatic ecosystem. USACE will revise existing permits on a site-specific basis, permits will incorporate adaptive management measures, and USACE will coordinate with FWS to determine if dredging activities could impact threatened or endangered species. Furthermore, no dredging is allowed within 150 feet of the 6-foot river depth contours, in water depths less than 9 feet, on the back-channel side of any island, or within 1000 feet upstream and 300 feet downstream of any island. Dredging is prohibited within 1500 feet upstream and 1000 feet downstream of Georgetown and Phillis Islands, which are Ohio River Island National Wildlife Refuges. Additionally, no dredging is permitted between Georgetown and Phillis Islands and the navigation channel (USACE 2007).

The NRC staff has determined that the cumulative impacts on aquatic resources resulting from all past, present, and reasonably foreseeable future actions, including non-BVPS actions, would be MODERATE. This designation is largely the result of past actions including the construction of locks and dams along the Ohio River and the introduction of nonnative zebra mussels and future actions including continued commercial and navigational dredging activities. The NRC staff concludes, however, that the SMALL impacts of the BVPS cooling system operations, including entrainment and impingement of fish and shellfish, heat shock, or any of the cooling-system-related Category 1 issues, would not contribute to an overall decline in water quality or status of aquatic resources in the New Cumberland Pool. Therefore, the NRC staff concludes that the potential contribution of BVPS operations during the license renewal term on cumulative impacts to aquatic resources would be SMALL.

4.8.2 Cumulative Impacts on Terrestrial Resources

This section addresses past, present, and future actions that could result in adverse cumulative impacts to terrestrial resources, including wildlife populations, upland habitats, wetlands, riparian zones, invasive species, protected species, and land use. For purposes of this analysis, the geographic area considered in the evaluation includes the BVPS site and the in-scope transmission line ROWs.

Approximately 230 of the 453 acres of land on the BVPS site are developed and maintained for operation of BVPS (FENOC 2007a). The site is situated on an ancient floodplain and is underlain by fine loam, silt loam, and silty clay loam; however, much of the site was filled during construction of Unit 1 and the Shippingport station, which previously operated adjacent to BVPS (NRC 1985).

Though no transmission line construction occurred as a result of BVPS Unit 1 operation, and minimal transmission line construction occurred as a result of BVPS Unit 2 operation, previous construction of the 13 transmission lines that connect to the Beaver Valley Substation, owned by American Transmission Systems, Inc., and Duquesne Light, resulted in subsequent changes to the wildlife and plant species in the vicinity of BVPS. Because of the fragmentation of previously contiguous forested areas, edge effects, such as changes in light, wind, and temperature and changes in the abundance and distribution of interior species, reduced habitat ranges for certain species, and an increased susceptibility to invasive species may have occurred in these areas. Maintenance of ROWs has likely had past impacts and is likely to have present and future impacts on the terrestrial habitat. These impacts may include bioaccumulation of chemicals, prevention of the natural successional stages of the surrounding vegetative community because of ROW maintenance, an increase in abundance of edge species, a decrease in abundance of interior species, and an increase in invasive species populations.

As no protected species are known to occur on or in the vicinity of the BVPS site, protected species, discussed in Section 2.2.6, are not expected to be adversely affected by future actions during the renewal term. The Ohio River Islands National Wildlife Refuge encompasses up to 35 river islands along the Ohio River ranging from Shippingport, Pennsylvania, to Maysville, Kentucky (FENOC 2007a). Of these river islands, Phillis Island and Georgetown Island lie approximately 400 feet offshore of the BVPS site (FENOC 2007a). In 2004 FWS completed the "Ohio River Islands National Wildlife Refuge Comprehensive Conservation Plan" to set forth management goals and objectives for the refuge for the next 15 years (FWS 2004). Continued management of this land would ensure the future existence of habitat for wildlife during the renewal term. Independence Marsh is an 18-acre mitigation wetland that is traversed by the Beaver Valley-Crescent Line 318 near its western boundary (IMF 2007). The continued management of this resource by the Independence Conservancy, Inc., will ensure the future existence of wetland habitat near the BVPS site during the renewal term.

The Bruce Mansfield Coal Plant is located along the Ohio River adjacent to BVPS. The plant, which began operation in 1976, has three coal-fired units and burns more than 6.5 million tons of coal annually (FENOC 2007b). The site for the Bruce Mansfield Plant covers approximately 473 acres (FENOC 2007b). Coal-fired plants are a major source of air pollution in the United States, as they release sulfur dioxide, nitrogen oxides, mercury, carbon dioxide, and particulates. Nitrous oxides and sulfur dioxides can combine with water to form acid rain, which can lead to erosion and changes in soil pH levels. Mercury can deposit on soils and surface water, which may then be taken up by both terrestrial and aquatic plant or animal species, and poses the risk of bioaccumulation. For these reasons, the Bruce Mansfield Plant is likely to have current and future impacts to the environment in the vicinity of the BVPS site and surrounding area.

The city of Pittsburgh lies 25 miles east of BVPS, and the Pittsburgh metropolitan statistical area (MSA) is the 22nd most populous MSA in the United States (FENOC 2007a). Continued commercial and residential development of this area in the future may result in additional runoff from roads and impervious surfaces, development adjacent to wetlands and riparian zones, and an increase in waste releases, all of which could have future impacts on the terrestrial habitat.

The NRC staff examined the cumulative effects of forest fragmentation, the spread of invasive species, impacts to protected species, emissions from a neighboring coal plant, and continued land development in the Pittsburgh area. The NRC staff concludes that the minimal terrestrial impacts of the continued BVPS operations would not contribute to the overall decline in the condition of terrestrial resources. The NRC staff believes that the cumulative impacts of other and future actions during the term of license renewal on terrestrial habitat and associated species, when added to past, present, and reasonably foreseeable future actions, would be SMALL.

4.8.3 Cumulative Radiological Impacts

The radiological dose limits for protection of the public and workers have been developed by the EPA and NRC to address the cumulative impact of acute and long-term exposure to radiation and radioactive material. These dose limits are codified in 40 CFR Part 190 and 10 CFR Part 20. For the purpose of this analysis, the area within a 50-mi (80-km) radius of the BVPS site was included. The REMP conducted by FENOC in the vicinity of the Beaver Valley site measures radiation and radioactive materials from all sources, including BVPS; therefore, the monitoring program measures cumulative radiological impacts. There are no other nuclear power plants or uranium fuel cycle facilities within a 50-mi (80-km) radius of BVPS that would contribute to the cumulative radiological impacts.

Monitoring results for the 5-year period from 2002 to 2006 were reviewed by the NRC staff as part of the cumulative impacts assessment. Additionally, in Sections 2.2.7 and 4.3, the NRC staff concluded that impacts of radiation exposure to the public and workers (occupational) from operation of BVPS during the renewal term are SMALL. The NRC and the Commonwealth of Pennsylvania would regulate any future actions in the vicinity of the Beaver Valley site that could contribute to cumulative radiological impacts. Therefore, the NRC staff concludes that cumulative radiological impacts of continued operations of BVPS are SMALL.

The NRC staff determined that the electric-field-induced currents from the BVPS transmission lines are well below the National Electrical Safety Code (NESC) recommendations for preventing electric shock from induced currents. Therefore, the BVPS transmission lines do not appreciably affect the overall potential for electric shock from induced currents within the analysis area. With respect to chronic effects of electromagnetic fields, although the NRC staff considers the GEIS finding of "not applicable" to be appropriate in regard to BVPS, the BVPS transmission lines are not likely to contribute to the regional exposure to extremely low frequency-electromagnetic fields (ELF-EMFs). The BVPS transmission lines pass through a sparsely populated, rural area with very few residences or businesses close enough to the lines to have detectable ELF-EMFs. Therefore, the NRC staff has determined that the cumulative impacts of the continued operation of the BVPS transmission lines would be SMALL.

4.8.4 Cumulative Socioeconomic and Land Use Impacts

As discussed in Section 4.4 of this draft SEIS, continued operation of BVPS during the license renewal term would have no impact on socioeconomic conditions in the region beyond those already being experienced. Since FENOC has indicated that it plans no major plant refurbishment nor hiring additional non-outage workers during the license renewal term, overall expenditures and employment levels at BVPS would be expected to remain relatively constant with no additional demand for permanent housing, public utilities, and public services. In addition, since employment levels and the value of BVPS would not change, there would be no population and tax revenue-related land use impacts. There would also be no disproportionately high and adverse health and environmental impacts on minority and low-income populations in the region. Based on this and other information presented in the SEIS, there would be no cumulative socioeconomic impacts from the continued operation of BVPS during the license renewal term beyond those already being experienced.

However, FENOC indicated in their environmental report that the Unit 2 SGs at BVPS might be replaced during the license renewal term (FENOC 2007a). FENOC estimates that SG replacement would require a one-time increase in the number of refueling outage workers for up to 70 days at BVPS (FENOC 2008b). These additional workers would create a one-time short-term increase in the demand for temporary (rental) housing, increase use of public water and sewer services, and transportation impacts on access roads in the immediate vicinity of BVPS. Since the replacement of Unit 2 SGs is not certain and the short amount of time needed to replace the SGs, the additional number of refueling outage workers and truck material deliveries needed to support this one-time replacement of the Unit 2 SGs (Unit 1 SGs having already been replaced) could have a temporary cumulative affect on socioeconomic conditions in the vicinity of the BVPS. However, there would be no long-term cumulative socioeconomic impacts from Unit 2 SG replacement in the region.

4.8.5 Cumulative Impacts on Air Resources

This section analyzes past, present, and future actions that could result in adverse cumulative impacts on air quality. For the purposes of this analysis, the geographic area considered is within a 50-mile radius of the plant. As discussed in Section 2.2.4, BVPS is located within the Mid-Atlantic Air Quality Control Region (AQCR), designated by EPA. Because of its limited potential to release criteria pollutants and hazardous air pollutants, BVPS has had minimal adverse impact on the attainment status of ambient air quality in the AQCR in which it is located.

The plant is expected to continue to have negligible adverse impacts on near-field ambient air quality. Therefore, the NRC staff has determined that the cumulative impacts of the BVPS continued operation during license renewal are SMALL.

4.8.6 Cumulative Impacts on Groundwater Resources

BVPS no longer uses groundwater in its operations and is not proposing to change this during the re-licensing period, so the facility has no direct impact on the availability of local groundwater. A percentage of the potable water for local residents and towns of the area is taken from groundwater sources, but the continued operation of the BVPS site should not increase the demand for groundwater because it has no plans to significantly increase employment in the local area.

The ER submitted by the FENOC states that there are no plans to undertake any major refurbishment or replacement actions and those actions that have been proposed fall within the parameters of routine inspection and maintenance (FENOC 2007a). However, FENOC has also indicated that during the period of license renewal there is a possibility for Unit 2 steam generator (SG) replacement or repair. The NRC staff has recognized that SG replacement is not certain, but has reviewed the potential environmental impacts as well. The staff's discussion of these potential impacts can be found in Chapter 3 of this dSEIS, which analyzes the impacts based on the GEIS refurbishment framework.

At the BVPS site, potential liquid releases could affect groundwater quality by migrating to the water table below. Because the groundwater underneath the BVPS site flows in the direction of the Ohio River there is the potential for the discharge of contaminants into the river. A BVPS Groundwater Protection Plan has already been implemented which will monitor groundwater quality at the site using previously established monitoring wells.

On the basis of the provided information, independent review by the NRC staff concludes that the cumulative impact to groundwater resources during the license renewal period would be SMALL.

4.8.7 Cumulative Impacts on Surface Water Resources

BVPS draws its surface water from the New Cumberland Pool on the Ohio River and discharges any water not consumed by evaporation and drift losses back into the river within the parameters of the National Pollutant Discharge Elimination System (NPDES) permit (PA 0025615) for the BVPS-1 and 2 site issued by the Pennsylvania Department of Environmental Protection. The water quality of the Ohio River is assessed biennially by the Ohio River Valley Water Sanitation Commission (ORSANCO) and temperature is monitored at the BVPS site.

Because FENOC stated that there are no proposed refurbishment activities or changes to the current hydrologic regime at the site, operation of BVPS should not affect water levels in the New Cumberland Pool which are managed by the USACE through a series of locks and dams (FENOC 2007a). However, FENOC has also indicated that during the period of license renewal there is a possibility for Unit 2 steam generator (SG) replacement or repair. The NRC staff has recognized that SG replacement is not certain, but has reviewed the potential environmental impacts as well. The staff's discussion of these potential impacts can be found in Chapter 3 of this dSEIS, which analyzes the impacts based on the GEIS refurbishment framework.

The uprated power level of the BVPS units to 2900 MWt is expected to increase evaporation losses by about ten percent, but should have no affect on drift losses. Consumptive losses at the BVPS site do not have a significant affect on flow in the Ohio River and are not expected to impact either ecological communities or facilities which rely on the same water supply.

On the basis of the provided information, independent review by the NRC staff concludes that the cumulative impact to surface water resources during the license renewal period would be SMALL.

4.9 Summary of Impacts of Operations During the Renewal Term

The NRC staff has not identified any information that is both new and significant related to any of the applicable Category 1 issues associated with the BVPS operation during the renewal term. Consequently, the NRC staff concludes that environmental impacts associated with these issues are bounded by the impacts described in the GEIS. For each of these issues, the GEIS concluded that the impacts would be SMALL and that additional plant-specific mitigation measures are not likely to be sufficiently beneficial to warrant implementation.

The NRC staff conducted plant-specific environmental evaluations for eight Category 2 issues applicable to BVPS operation during the renewal term and for environmental justice and chronic effects of electromagnetic fields. For four issues (housing, public utilities, offsite land use, and transportation), the NRC staff concludes that there are no environmental impacts during the license renewal term. For the remaining four issues (acute effects of electromagnetic fields, historic and archaeological resources, threatened or endangered species, severe accidents), the NRC staff concluded that the potential environmental impacts of renewal term operations of BVPS would be of SMALL significance in the context of the standards set forth in the GEIS.

For the issue of environmental justice, the NRC staff determined that no disproportionately high and adverse impacts would be expected on minority and low-income populations. In addition, the NRC staff determined that appropriate Federal health agencies have not reached a consensus regarding chronic adverse effects from electromagnetic fields. Therefore, the NRC staff did not evaluate this issue.

4.10 References

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10 CFR Part 51. *Code of Federal Regulations*, Title 10, *Energy*, Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions."

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5.0 ENVIRONMENTAL IMPACTS OF POSTULATED ACCIDENTS

Environmental issues associated with postulated accidents are discussed in NUREG-1437, "Generic Environmental Impact Statement for License Renewal of Nuclear Plants" (GEIS), Volumes 1 and 2 (NRC 1996, 1999).[16] The GEIS includes a determination of whether the analysis of the environmental issue can be applied to all plants and whether additional mitigation measures would be warranted. Issues are then assigned a Category 1 or a Category 2 designation. As set forth in the GEIS, Category 1 issues are those that meet all of the following criteria:

(1) The environmental impacts associated with the issue have been determined to apply either to all plants or, for some issues, to plants having a specific type of cooling system or other specified plant or site characteristics.

(2) A single significance level (i.e., SMALL, MODERATE, or LARGE) has been assigned to the impacts (except for collective offsite radiological impacts from the fuel cycle and from high-level waste and spent fuel disposal).

(3) Mitigation of adverse impacts associated with the issue has been considered in the analysis, and it has been determined that additional plant-specific mitigation measures are likely not to be sufficiently beneficial to warrant implementation.

For issues that meet the three Category 1 criteria, no additional plant-specific analysis is required unless new and significant information is identified.

Category 2 issues are those that do not meet one or more of the criteria for Category 1, and therefore, additional plant-specific review of these issues is required.

This chapter summarizes the environmental impacts from postulated accidents that might occur during the license renewal term. An in depth analysis of environmental impacts from postulated accidents is included in Appendix G.

5.1 Postulated Plant Accidents

The GEIS evaluates two classes of accidents. These are design-basis accidents (DBAs) and severe accidents, as discussed below.

5.1.1 Design-Basis Accidents

To receive U.S. Nuclear Regulatory Commission (NRC) approval to operate a nuclear power facility, an applicant for an initial operating license (OL) must submit a safety analysis report (SAR) as part of its application. The SAR presents the design criteria and design information for

[16] The NRC originally issued the GEIS in 1996 and issued Addendum 1 to the GEIS in 1999. Hereafter, all references to the "GEIS" include the GEIS and Addendum 1.

the proposed reactor and comprehensive data on the proposed site. The SAR also discusses various hypothetical accident situations and the safety features provided to prevent and mitigate accidents. The NRC staff reviews the application to determine whether the plant design meets the Commission's regulations and requirements and includes, in part, the nuclear plant design and its anticipated response to an accident.

DBAs are those accidents that both the licensee and the NRC staff evaluate to ensure that the plant can withstand normal and abnormal transients and a broad spectrum of postulated accidents, without undue hazard to the health and safety of the public. A number of these postulated accidents are not expected to occur during the life of the plant but are evaluated to establish the design basis for the preventive and mitigative safety systems of the facility. The acceptance criteria for DBAs are described in Title 10, Part 50, "Domestic Licensing of Production and Utilization Facilities," and Part 100, "Reactor Site Criteria," of the *Code of Federal Regulations* (10 CFR Part 50 and 10 CFR Part 100).

The environmental impacts of DBAs are evaluated during the initial licensing process, and the ability of the plant to withstand these accidents is demonstrated to be acceptable before issuance of the OL. The results of these evaluations are found in license documentation such as the applicant's final safety analysis report, the NRC staff's safety evaluation report, the final environmental statement, and Section 5.1 of this supplemental environmental impact statement (SEIS). A licensee is required to maintain the acceptable design and performance criteria throughout the life of the plant, including any extended-life operation. The consequences for these events are evaluated for the hypothetical maximally exposed individual; thus, changes in the plant environment will not affect these evaluations. Because of the requirements that continuous acceptability of the consequences and aging management programs be in effect for license renewal, the environmental impacts as calculated for DBAs should not differ significantly from initial licensing assessments over the life of the plant, including the license renewal period. Accordingly, the design of the plant relative to DBAs during the extended period is considered to remain acceptable, and the environmental impacts of those accidents were not examined further in the GEIS.

The Commission has determined that the environmental impacts of DBAs are of SMALL significance for all plants because the plants were designed to successfully withstand these accidents. Therefore, for the purposes of license renewal, DBAs are designated as a Category 1 issue in Table B-1 of Appendix B, "Environmental Effect of Renewing the Operating License of a Nuclear Power Plant," to Subpart A, National Environmental Policy Act—Regulations Implementing Section 102(2)," of 10 CFR Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions." The early resolution of the DBAs makes them a part of the current licensing basis of the plant; the current licensing basis of the plant is to be maintained by the licensee under its current license and, therefore, under the provisions of 10 CFR 54.30, "Matters Not Subject to a Renewal Review," it is not subject to review under license renewal. Table 5-1 lists this issue, which is applicable to Beaver Valley Power Station (BVPS) Units 1 and 2.

Table 5-1. Category 1 Issues Applicable to Postulated Accidents during the Renewal Term

ISSUE—10 CFR PART 51, SUBPART A, APPENDIX B, TABLE B-1	GEIS SECTION
POSTULATED ACCIDENTS	
Design-basis accidents	5.3.2; 5.5.1

Based on information in the GEIS, the Commission found the following:

> The NRC staff has concluded that the environmental impacts of design-basis accidents are of small significance for all plants.

First Energy Nuclear Operating Company (FENOC), stated in its environmental report (ER) (FENOC 2007) that it is not aware of any new and significant information associated with the renewal of the BVPS OL. The NRC staff has not identified any new and significant information during its independent review of the FENOC ER, the site visit, the scoping process, or the evaluation of other available information. Therefore, the NRC staff concludes that there are no impacts related to DBAs beyond those discussed in the GEIS.

5.1.2 Severe Accidents

Severe nuclear accidents are those that are more severe than DBAs because they could result in substantial damage to the reactor core, regardless of offsite consequences. In the GEIS, the NRC staff assessed the impacts of severe accidents using the results of existing analyses and site-specific information to conservatively predict the environmental impacts of severe accidents for each plant during the renewal period.

Severe accidents initiated by external phenomena, such as tornadoes, floods, earthquakes, fires, and sabotage, traditionally have not been discussed in quantitative terms in final environmental statements and were not specifically considered for the BVPS site in the GEIS (NRC 1996). However, in the GEIS, the NRC staff did evaluate existing impact assessments performed by the NRC and by the industry at 44 nuclear plants in the United States and concluded that the risk from beyond-design-basis earthquakes at existing nuclear power plants is SMALL. Additionally, compliance with the NRC regulatory requirements under 10 CFR Part 73, "Physical Protection of Plants and Materials," provides reasonable assurance that the risk from sabotage is SMALL. Even if such events were to occur, the Commission would expect that resultant core damage and radiological releases would be no worse than those expected from internally initiated events. Based on the above, the Commission concludes that the risk from sabotage and beyond-design-basis earthquakes at existing nuclear power plants is small and, additionally, that a generic consideration of internally initiated severe accidents adequately addresses the risks from other external events.

Based on information in the GEIS, the Commission found the following:

> The probability weighted consequences of atmospheric releases, fallout onto open bodies of water, releases to groundwater, and societal and economic

impacts from severe accidents are small for all plants. However, alternatives to mitigate severe accidents must be considered for all plants that have not considered such alternatives.

Therefore, the Commission has designated mitigation of severe accidents as a Category 2 issue in 10 CFR Part 51, Subpart A, Appendix B, Table B-1. Table 5-2 lists this issue, as applicable to BVPS.

Table 5-2. Category 1 Issues Applicable to Postulated Accidents during the Renewal Term

ISSUE—10 CFR PART 51, SUBPART A, APPENDIX B, TABLE B-1	GEIS SECTION	10 CFR 51.53(C)(3)(II) SUBPARAGRAPH	SEIS SECTION
	POSTULATED ACCIDENTS		
Severe Accidents	5.3.3; 5.3.3.2; 5.3.3.3; 5.3.3.4; 5.3.3.5; 5.4; 5.5.2	L	5.2

5.2 Severe Accident Mitigation Alternatives

According to 10 CFR 51.53(c)(3)(ii)(L), license renewal applicants must consider alternatives to mitigate severe accidents if the NRC staff has not previously evaluated severe accident mitigation alternatives (SAMAs) for the applicant's plant in an environmental impact statement or related supplement or in an environmental assessment. The purpose of this consideration is to ensure the identification and evaluation of plant changes (i.e., hardware, procedures, and training) with the potential for improving severe accident safety performance. SAMAs have not been previously considered for BVPS; therefore, the remainder of Chapter 5 addresses those alternatives.

5.2.1 Introduction

This section summarizes the SAMA evaluation for BVPS conducted by FENOC and the NRC staff's review of that evaluation. The NRC staff performed its review with contract assistance from Information Systems Laboratories, Inc. The NRC staff's complete review is available in Appendix G; the SAMA evaluation is available in full in the FENOC ER (FENOC 2007).

FENOC conducted the SAMA evaluation for BVPS with a four-step approach. In the first step, FENOC quantified the level of risk associated with potential reactor accidents using the plant-specific probabilistic safety assessment (PSA) and other risk models.

In the second step, FENOC examined the major risk contributors and identified possible ways (SAMAs) of reducing that risk. Common ways of reducing risk are changes to components, systems, procedures, and training. FENOC initially identified 189 and 190 potential SAMAs for BVPS Units 1 and 2, respectively. For each unit, FENOC performed an initial screening in which it eliminated SAMAs that are not applicable to BVPS because of design differences, that have already been implemented at BVPS, that are addressed by a similar SAMA candidate, or that have estimated costs that would exceed the dollar value associated with completely eliminating all severe accident risk at BVPS. This screening reduced the list of potential SAMAs to 63 for Unit 1 and 56 for Unit 2.

In the third step, FENOC estimated the benefits and the costs associated with each of the remaining SAMAs. Estimates were made of the extent to which each SAMA could reduce risk. FENOC developed those estimates in terms of dollars in accordance with NRC guidance for performing regulatory analyses (NRC 1997). It also estimated the cost of implementing the proposed SAMAs.

Finally, in the fourth step, the costs and benefits of each of the remaining SAMAs were compared to determine whether the SAMA was cost beneficial, meaning the benefits of the SAMA were greater than the cost (a positive cost-benefit). FENOC concluded in its ER that five of the SAMAs evaluated for Unit 1 and three of the SAMAs evaluated for Unit 2 would be potentially cost beneficial (FENOC 2007).

The potentially cost-beneficial SAMAs do not relate to adequately managing the effects of aging during the period of extended operation; therefore, they need not be implemented as part of license renewal pursuant to 10 CFR Part 54, "Requirements for Renewal of Operating Licenses for Nuclear Power Plants." The following sections discuss the FENOC SAMA analyses and the NRC's review in more detail.

5.2.2 Estimate of Risk

FENOC submitted an assessment of SAMAs for BVPS as part of the ER (FENOC 2007). The basis of this assessment was the most recent BVPS PSA available at that time, a plant-specific offsite consequence analysis performed using the MELCOR Accident Consequence Code System 2 (MACCS2) computer program and insights from the BVPS individual plant examination (IPE) (DLC 1992a and 1992b) and individual plant examination of external events (IPEEE) (DLC 1995 and 1997).

The baseline core damage frequency (CDF) for the purpose of the SAMA evaluation is approximately 1.95x10-5 per year for Unit 1 and 2.40x10-5 per year for Unit 2. The CDF values are based on the risk assessment for both internally and externally initiated events. Table 5-3 provides the breakdown of CDF by initiating event for Units 1 and 2.

Table 5-3. BVPS Core Damage Frequency

Initiating Event	Unit 1		Unit 2	
	CDF (per year)	% of Total CDF*	CDF (per year)	% of Total CDF*
Internal Events—At Power				
Loss of Emergency 4160-V ac	1.3×10^{-6}	7	3.8×10^{-6}	16
Partial Loss of Main Feedwater	3.1×10^{-7}	2	1.7×10^{-7}	<1
Loss of Emergency 125-V dc	3.1×10^{-7}	2	5.2×10^{-7}	2
Loss of River Water/Service Water	2.7×10^{-7}	1	8.1×10^{-7}	3
Excessive Loss-of-Coolant Accident (LOCA)	2.7×10^{-7}	1	2.7×10^{-7}	1
Reactor Trip	2.2×10^{-7}	1	1.3×10^{-7}	<1
Turbine Trip	2.0×10^{-7}	1	2.3×10^{-7}	<1
Loss of Offsite Power	1.9×10^{-7}	<1	8.2×10^{-7}	3
Small, Medium, or Large LOCA	1.5×10^{-7}	<1	1.2×10^{-7}	<1
Closure of One Main Steam Isolation Valve	1.4×10^{-7}	<1	4.9×10^{-8}	<1
Internal Floods	1.2×10^{-7}	<1	1.2×10^{-6}	5
Excessive Feedwater Flow	1.0×10^{-7}	<1	6.6×10^{-8}	<1
Inadvertent Safety Injection Initiation	5.7×10^{-8}	<1	4.4×10^{-8}	<1
Steam Generator Tube Rupture (SGTR)	5.6×10^{-8}	<1	3.7×10^{-7}	2
Total Loss of Main Feedwater	5.0×10^{-8}	<1	4.0×10^{-8}	<1
V-Sequence Initiating Event	2.0×10^{-8}	<1	2.8×10^{-7}	1
Loss of Containment Instrument Air	6.2×10^{-9}	<1	2.9×10^{-7}	1
All Other Internal Initiating Events	1.9×10^{-7}	1	3.2×10^{-7}	1
CDF from Internal Events	$\mathbf{3.98 \times 10^{-6}}$	**21**	$\mathbf{9.53 \times 10^{-6}}$	**40**
External Events—At Power				
Seismic	1.19×10^{-5}	61	9.70×10^{-6}	40
Fire	3.67×10^{-6}	18	4.80×10^{-6}	20
CDF from External Events	$\mathbf{1.55 \times 10^{-5}}$	**79**	$\mathbf{1.45 \times 10^{-5}}$	**60**
Total CDF	$\mathbf{1.95 \times 10^{-5}}$	**100**	$\mathbf{2.40 \times 10^{-5}}$	**100%**

* Percentages are rounded off to whole numbers.

As shown in Table 5-3, support system initiators such as events initiated by loss of one emergency alternating current (ac) bus, one emergency direct current (dc) bus or loss of service water are major contributors to the internal event CDF for each unit. Internal flooding events are a minor contributor to CDF for Unit 1, but a larger contributor to CDF for Unit 2. The differences in the CDF contributions are largely the result of several significant differences between the two BVPS units.

FENOC estimated the dose to the population within 80 kilometers (50 miles) of the BVPS site to be approximately 0.579 person-sieverts (person-Sv) (57.9 person-rem) per year for Unit 1 and 0.558 person-Sv (55.8 person-rem) per year for Unit 2. Table 5-4 summarizes the breakdown of the total population dose by containment release mode. Containment bypass because of interfacing system loss-of-coolant accidents (ISLOCAs) and late containment failures dominate the population dose risk at BVPS.

Table 5-4. Breakdown of Population Dose by Containment Release Mode

Containment Release Mode	Unit 1		Unit 2	
	Population Dose (Person-Rem* Per Year)	**% Contribution**	**Population Dose (Person-Rem* Per Year)**	**% Contribution**
Intact Containment	<0.1	<0.1	<0.1	<0.1
Containment Bypass—ISLOCA	37.8	65	18.9	34
Containment Bypass—SGTR	0.2	<1	0.5	1
Containment Isolation Failure	0.4	<1	0.4	<1
Early Containment Failure	<0.1	<0.1	0.1	<1
Late Containment Failure	19.0	33	35.8	64
Basemat Melt-through	0.4	<1	0.1	<1
Total	**57.9**	**100**	**55.8**	**100**

* One person-rem = 0.01 person-Sv.

The NRC staff has reviewed the FENOC data and evaluation methods and concludes that the quality of the risk analyses is adequate to support an assessment of the risk reduction potential for candidate SAMAs. Accordingly, the NRC staff based its assessment of offsite risk on the CDFs and offsite doses reported by FENOC.

5.2.3 Potential Plant improvements

Once it had identified the dominant contributors to plant risk, FENOC searched for ways to reduce that risk. In identifying and evaluating potential SAMAs, FENOC considered insights from the plant-specific PSA and SAMA analyses performed for other operating plants that have submitted license renewal applications. FENOC identified 189 and 190 potential risk-reducing improvements (SAMAs) to plant components, systems, procedures, and training for BVPS Units 1 and 2, respectively.

For Unit 1, FENOC removed all but 63 of the SAMAs from further consideration because they are not applicable to BVPS for reasons of design differences, or because they have already been implemented at BVPS, are addressed by a similar SAMA candidate, or have estimated costs exceeding the dollar value associated with completely eliminating all severe accident risk at BVPS. For Unit 2, FENOC removed all but 56 of the SAMAs from further consideration based on the same criteria and performed a detailed cost-benefit analysis for each of the remaining SAMAs.

The NRC staff concludes that FENOC used a systematic and comprehensive process for identifying potential plant improvements for BVPS and that the set of potential plant improvements identified by FENOC is reasonably comprehensive and, therefore, acceptable.

5.2.4 Evaluation of Risk Reduction and Costs of Improvements

FENOC evaluated the risk reduction potential of the remaining candidate SAMAs applicable to each unit (63 SAMAs for Unit 1 and 56 for Unit 2). The SAMA evaluations used realistic assumptions with some conservatism.

FENOC estimated the costs of implementing the candidate SAMAs through the use of screening values and an expert panel. The cost estimates conservatively did not include the cost of replacement power during extended outages required to implement the modifications, nor did they include contingency costs associated with unforeseen implementation obstacles. The NRC staff reviewed the FENOC bases for calculating the risk reduction for the various plant improvements and concludes that the rationale and assumptions for estimating risk reduction are reasonable and generally conservative (i.e., the estimated risk reduction is similar to or somewhat higher than what would actually be realized). Accordingly, the NRC staff based its estimates of averted risk for the various SAMAs on the FENOC risk reduction estimates. The NRC staff reviewed the bases for the applicant's cost estimates. For certain improvements, the NRC staff also compared the cost estimates to estimates developed elsewhere for similar improvements, including estimates developed as part of other licensees' analyses of SAMAs for operating reactors and advanced light-water reactors. The NRC staff found the cost estimates to be reasonable and generally consistent with estimates provided in support of other plants' analyses.

The NRC Staff concludes that the risk reduction and the cost estimates provided by FENOC are sufficient and appropriate for use in the SAMA evaluation.

5.2.5 Cost-Benefit Comparison

FENOC based its cost-benefit analysis primarily on NUREG/BR-0184, "Regulatory Analysis Technical Evaluation Handbook" (NRC 1997). The NRC has recently revised NUREG/BR-0058, "Regulatory Analysis Guidelines of the U.S. Nuclear Regulatory Commission," to reflect the agency's revised policy on discount rates. Revision 4 of NUREG/BR-0058 states that two sets of estimates should be developed—one at 3 percent and one at 7 percent (NRC 2004). FENOC provided both sets of estimates (FENOC 2007).

FENOC identified five Unit 1 SAMAs and three Unit 2 SAMAs to be potentially cost beneficial in the baseline analysis contained in the ER. FENOC performed additional analyses to evaluate the impact of parameter choices and uncertainties on the results of the SAMA assessment (FENOC 2007). If the benefits are increased by a factor of approximately 2 to account for uncertainties, one additional SAMA candidate was determined to be potentially cost beneficial for Unit 2. The potentially cost-beneficial SAMAs for Unit 1 are the following:

(1) SAMA 164—Modify the emergency procedures to direct the operators to close the reactor coolant system (RCS) loop stop valves to isolate a steam generator that has had a tube failure, and obtain a gagging device that could be used to close a stuck open

steam generator safety valve on the ruptured steam generator before core damage occurs.

(2) SAMA 167—Increase the seismic ruggedness of the 125-volt (V) dc battery room masonry block walls to reduce the failure of these walls following seismic events and prevent damage to the four emergency batteries located in the room.

(3) SAMA 168—Install a fire barrier or fire curtain between the four emergency switchgear fans located in the cable spreading room. This would reduce propagation of a fire from one fan to another.

(4) SAMA 187—Increase the seismic ruggedness of the emergency response facility (ERF) substation batteries to increase reliability of the ERF substation diesel following seismic events. This applies to the battery rack only and not to the entire structure.

(5) SAMA 189—Provide diesel-backed power for the fuel pool purification pumps and valves used for makeup to the refueling water storage tank (RWST) to increase availability of the RWST during loss of offsite power and station blackout events.

For Unit 2, the following are the potentially cost-beneficial SAMAs:

(1) SAMA 3—Add a portable generator to supply power to the steam generator level instrumentation. This would improve the capability of the Unit 2 turbine-driven auxiliary feedwater (AFW) pump in station blackout sequences and make its performance more comparable to that of the dedicated AFW pump present in Unit 1.

(2) SAMA 78—Modify the startup feedwater pump so that it can be used as a backup to the emergency feedwater system, including during a station blackout scenario, to increase the reliability of decay heat removal. This would provide a system similar to the dedicated AFW pump present in Unit 1, which is powered from the ERF diesel generator.

(3) SAMA 164—Modify the emergency procedures to direct the operators to close the RCS loop stop valves to isolate a steam generator that has had a tube failure and obtain a gagging device that could be used to close a stuck-open steam generator safety valve on the ruptured steam generator before core damage occurs.

The NRC staff concludes that, with the exception of the potentially cost-beneficial SAMAs discussed above, the costs of the SAMAs evaluated would be higher than the associated benefits.

5.2.6 Conclusions

The NRC staff reviewed the FENOC analysis and concluded that the methods used and the implementation of those methods were sound. The treatment of SAMA benefits and costs support the general conclusion that the SAMA evaluations performed by FENOC are reasonable and sufficient for the license renewal submittal.

Based on its review of the SAMA analysis, the NRC staff concurs with the FENOC identification of areas in which risk can be further reduced in a cost-beneficial manner through the implementation of all or a subset of potentially cost-beneficial SAMAs. Given the potential for cost-beneficial risk reduction, the NRC staff considers that FENOC should further evaluate these SAMAs. However, none of the potentially cost-beneficial SAMAs relate to adequately managing the effects of aging during the period of extended operation. Therefore, they need not be implemented as part of the license renewal pursuant to 10 CFR Part 54.

5.3 References

10 CFR Part 50. *Code of Federal Regulations*, Title 10, *Energy*, Part 50, "Domestic Licensing of Production and Utilization Facilities."

10 CFR Part 51. *Code of Federal Regulations*, Title 10, *Energy*, Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions."

10 CFR Part 54. *Code of Federal Regulations*, Title 10, *Energy*, Part 54, "Requirements for Renewal of Operating Licenses for Nuclear Power Plants."

10 CFR Part 73. *Code of Federal Regulations*, Title 10, *Energy*, Part 73. "Physical Protection of Plants and Materials."

10 CFR Part 100 Code of Federal Regulations, Title 10, Energy, Part 100, "Reactor Site Criteria."

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Duquesne Light Company (DLC). 1995. "Beaver Valley Unit 1 Probabilistic Risk Assessment, Individual Plant Examination of External Events," June 1995.

Duquesne Light Company (DLC). 1997. "Beaver Valley Unit 2 Probabilistic Risk Assessment, Individual Plant Examination of External Events," September 1997.

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U.S. Nuclear Regulatory Commission (NRC). 1999. "Generic Environmental Impact Statement for License Renewal of Nuclear Plants." NUREG-1437, Volume 1, Addendum 1, Washington, DC.

U.S. Nuclear Regulatory Commission (NRC). 1997. "Regulatory Analysis Technical Evaluation Handbook." NUREG/BR-0184, Washington, DC.

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6.0 ENVIRONMENTAL IMPACTS OF THE URANIUM FUEL CYCLE AND SOLID WASTE MANAGEMENT

Environmental issues associated with the uranium fuel cycle and solid waste management are discussed in NUREG-1437, "Generic Environmental Impact Statement for License Renewal of Nuclear Plants," Volumes 1 and 2 (NRC 1996; 1999) (GEIS).[1] The GEIS includes a determination of whether the analysis of the environmental issues can be applied to all plants and whether additional mitigation measures would be warranted. Issues are then assigned a Category 1 or a Category 2 designation. As set forth in the GEIS, Category 1 issues are those that meet all of the following criteria:

(1) The environmental impacts associated with the issue have been determined to apply either to all plants or, for some issues, to plants having a specific type of cooling system or other specified plant or site characteristics.

(2) A single significance level (i.e., SMALL, MODERATE, or LARGE) has been assigned to the impacts (except for collective offsite radiological impacts from the fuel cycle and from high-level waste (HLW) and spent fuel disposal).

(3) Mitigation of adverse impacts associated with the issue has been considered in the analysis, and it has been determined that additional plant-specific mitigation measures are likely not to be sufficiently beneficial to warrant implementation.

For issues that meet the three Category 1 criteria, no additional plant-specific analysis is required unless new and significant information emerges.

Category 2 issues are those that do not meet one or more of the criteria for Category 1, and therefore, these issues require additional plant-specific review. There are no Category 2 issues for the uranium fuel cycle and solid waste management.

This chapter addresses the issues related to the uranium fuel cycle and solid waste management during the license renewal term that are listed in Table B-1 of Appendix B, "Environmental Effect of Renewing the Operating License of a Nuclear Power Plant," to Subpart A, "National Environmental Policy Act—Regulations Implementing Section 102(2)," of Title 10, Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions," of the *Code of Federal Regulations* (10 CFR Part 51) and are applicable to the Beaver Valley Power Station (BVPS). The GEIS describes in detail the generic potential impacts of the radiological and nonradiological environmental impacts of the uranium fuel cycle and transportation of nuclear fuel and wastes. The description is based, in part, on the generic impacts provided in 10 CFR 51.51(b), Table S-3, "Table of Uranium Fuel Cycle Environmental Data," and in 10 CFR 51.52(c), Table S-4, "Environmental Impact of Transportation of Fuel and Waste to and from One Light-Water-Cooled Nuclear Power Reactor." The NRC staff of the U.S. Nuclear Regulatory Commission (NRC) also addresses the impacts from radon-222 and technetium-99 in the GEIS.

6.1 The Uranium Fuel Cycle

Table 6-1 lists the Category 1 issues in Table B-1 of Appendix B to Subpart A of 10 CFR Part 51 that are applicable to the uranium fuel cycle and solid waste management during the BVPS renewal term.

Table 6-1. Category 1 Issues Applicable to the Uranium Fuel Cycle and Solid Waste Management during the Renewal Term

ISSUE—10 CFR Part 51, Subpart A, Appendix B, Table B-1	**GEIS Sections**
URANIUM FUEL CYCLE AND WASTE MANAGEMENT	
Offsite radiological impacts (individual effects from other than the disposal of spent fuel and HLW)	6.1; 6.2.1; 6.2.2.1; 6.2.2.3; 6.2.3; 6.2.4; 6.6
Offsite radiological impacts (collective effects)	6.1; 6.2.2.1; 6.2.3; 6.2.4; 6.6
Offsite radiological impacts (spent fuel and HLW disposal)	6.1; 6.2.2.1; 6.2.2.2; 6.2.3; 6.2.4; 6.6
Nonradiological impacts of the uranium fuel cycle	6.1; 6.2.2.6; 6.2.2.7; 6.2.2.8; 6.2.2.9; 6.2.3; 6.2.4; 6.6
Low-level waste (LLW) storage and disposal	6.1; 6.2.2.2; 6.4.2; 6.4.3; 6.4.3.1; 6.4.3.2; 6.4.3.3; 6.4.4; 6.4.4.1; 6.4.4.2; 6.4.4.3; 6.4.4.4; 6.4.4.5; 6.4.4.5.1; 6.4.4.5.2; 6.4.4.5.3; 6.4.4.5.4; 6.4.4.6; 6.6
Mixed waste storage and disposal	6.4.5.1; 6.4.5.2; 6.4.5.3; 6.4.5.4; 6.4.5.5; 6.4.5.6; 6.4.5.6.1; 6.4.5.6.2; 6.4.5.6.3; 6.4.5.6.4; 6.6
Onsite spent fuel	6.1; 6.4.6; 6.4.6.1; 6.4.6.2; 6.4.6.3; 6.4.6.4; 6.4.6.5; 6.4.6.6; 6.4.6.7; 6.6
Nonradiological waste	6.1; 6.5; 6.5.1; 6.5.2; 6.5.3; 6.6
Transportation	6.1; 6.3.1; 6.3.2.3; 6.3.3; 6.3.4; 6.6, Addendum 1

FirstEnergy Nuclear Operating Company (FENOC) stated in its environmental report (ER) (FENOC 2007) that it is not aware of any new and significant information associated with the renewal of the BVPS operating license. The NRC staff has not identified any new and significant information during its independent review of the BVPS ER, the staff's site audit, the scoping process, or its evaluation of other available information. Therefore, the staff concludes that there would be no impacts related to these issues beyond those discussed in the GEIS. For these issues, the NRC staff concluded in the GEIS that the impacts are classified as SMALL, except for the collective offsite radiological impacts from the fuel cycle and from HLW and spent fuel disposal, as discussed below, and that additional plant-specific mitigation measures are not likely to be sufficiently beneficial to be warranted.

A brief description of the staff review and the GEIS conclusions, as codified in Table B-1, 10 CFR Part 51, for each of these issues follows:

- <u>Offsite radiological impacts (individual effects from other than disposal of spent fuel and HLW)</u>. Based on information in the GEIS, the Commission found the following:

  > Off-site impacts of the uranium fuel cycle have been considered by the Commission in Table S-3 of [10 CFR 51.51(b)]. Based on information in the GEIS, impacts on individuals from radioactive gaseous and liquid releases including radon-222 and technetium-99 are small.

  The NRC staff has not identified any new and significant information on this issue during its independent review of the BVPS ER, the staff's site audit, the scoping process, or its evaluation of other available information. Therefore, the staff concludes that there would be no offsite radiological impacts (individual effects) of the uranium fuel cycle during the renewal term beyond those discussed in the GEIS.

- <u>Offsite radiological impacts (collective effects)</u>. Based on information in the GEIS, the Commission found the following:

  > The 100-year environmental dose commitment to the U.S. population from the fuel cycle, high level waste and spent fuel disposal excepted, is calculated to be about 14,800 person-rem [Roentgen Equivalent Man], or 12 cancer fatalities, for each additional 20-year power reactor operating term. Much of this, especially the contribution of radon releases from mines and tailing piles, consists of tiny doses summed over large populations. This same dose calculation can theoretically be extended to include many tiny doses over additional thousands of years as well as doses outside the U.S. The result of such a calculation would be thousands of cancer fatalities from the fuel cycle, but this result assumes that even tiny doses have some statistical adverse health effect which will not ever be mitigated (for example no cancer cure in the next thousand years), and that these doses projected over thousands of years are meaningful. However, these assumptions are questionable. In particular, science cannot rule out the possibility that there will be no cancer fatalities from these tiny doses. For perspective, the doses are very small fractions of regulatory limits, and even smaller fractions of natural background exposure to the same populations. Nevertheless, despite all the uncertainty, some judgment as to the regulatory NEPA (National Environmental Policy Act of 1969) implications of these matters should be made and it makes no sense to repeat the same judgment in every case. Even taking the uncertainties into account, the Commission concludes that

> these impacts are acceptable in that these impacts would not be sufficiently large to require the NEPA conclusion, for any plant, that the option of extended operation under 10 CFR Part 54 should be eliminated. Accordingly, while the Commission has not assigned a single level of significance for the collective effects of the fuel cycle, this issue is considered Category 1.

The NRC staff has not identified any new and significant information during its independent review of the BVPS ER, the staff's site audit, the scoping process, or its evaluation of other available information. Therefore, the NRC staff concludes that there would be no offsite radiological impacts (collective effects) from the uranium fuel cycle during the renewal term beyond those discussed in the GEIS.

- Offsite radiological impacts (spent fuel and HLW disposal). Based on information in the GEIS, the Commission found the following:

> For the HLW and spent fuel disposal component of the fuel cycle, there are no current regulatory limits for offsite releases of radionuclides for the current candidate repository site. However, if we assume that limits are developed along the lines of the 1995 National Academy of Sciences (NAS) report, "Technical Bases for Yucca Mountain Standards," and that in accordance with the Commission's Waste Confidence Decision, 10 CFR 51.23, a repository can and likely will be developed at some site which will comply with such limits, peak doses to virtually all individuals will be 100 mrem per year or less. However, while the Commission has reasonable confidence that these assumptions will prove correct, there is considerable uncertainty since the limits are yet to be developed, no repository application has been completed or reviewed, and uncertainty is inherent in the models used to evaluate possible pathways to the human environment. The NAS report indicated that 100 mrem (1 mSv) per year should be considered as a starting point for limits for individual doses, but notes that some measure of consensus exists among national and international bodies that the limits should be a fraction of the 100 mrem (1 mSv) per year. The lifetime individual risk from 100 mrem (1 mSv) annual dose limit is about $3x10^{-3}$.
>
> Estimating cumulative doses to populations over thousands of years is more problematic. The likelihood and consequences of events that could seriously compromise the integrity of a deep geologic repository were evaluated by the U.S. Department of Energy in the "Final Environmental Impact Statement: Management of Commercially Generated Radioactive Waste," October 1980 (DOE 1980). The evaluation estimated the 70-year whole-body dose commitment to the maximum individual and to

the regional population resulting from several modes of breaching a reference repository in the year of closure, after 1,000 years, after 100,000 years, and after 100,000,000 years. Subsequently, the NRC and other Federal agencies have expended considerable effort to develop models for the design and for the licensing of a HLW repository, especially for the candidate repository at Yucca Mountain.

More meaningful estimates of doses to population may be possible in the future as more is understood about the performance of the proposed Yucca Mountain repository. Such estimates would involve very great uncertainty, especially with respect to cumulative population doses over thousands of years. The standard proposed by the NAS is a limit on maximum individual dose. The relationship of potential new regulatory requirements, based on the NAS report, and cumulative population impacts has not been determined, although the report articulates the view that protection of individuals will adequately protect the population for a repository at Yucca Mountain. However, EPA's (Environmental Protection Agency's) generic repository standards in 40 CFR Part 191 generally provide an indication of the order of magnitude of cumulative risk to population that could result from the licensing of a Yucca Mountain repository, assuming the ultimate standards will be within the range of standards now under consideration. The standards in 40 CFR Part 191 protect the population by imposing "containment requirements" that limit the cumulative amount of radioactive material released over 10,000 years. Reporting performance standards that will be required by EPA are expected to result in releases and associated health consequences in the range between 10 and 100 premature cancer deaths with an upper limit of 1000 premature cancer deaths worldwide for a 100,000 metric ton of heavy metal (MTHM) repository.

Nevertheless, despite all the uncertainty, some judgment as to the regulatory NEPA implications of these matters should be made and it makes no sense to repeat the same judgment in every case. Even taking the uncertainties into account, the Commission concludes that these impacts are acceptable in that these impacts would not be sufficiently large to require the NEPA conclusion, for any plant, that the option of extended operation under 10 CFR Part 54 should be eliminated. Accordingly, while the Commission has not assigned a single level of significance for the impacts of spent fuel and high level waste disposal, this issue is considered Category 1.

On February 15, 2002, based on a recommendation by the Secretary of the Department of Energy, the President recommended the Yucca Mountain site for the development of a repository for the geologic disposal of spent nuclear fuel and high-level nuclear waste.

The U.S. Congress approved this recommendation on July 9, 2002, in House Joint Resolution 87, which designated Yucca Mountain as the repository for spent nuclear waste.

On July 23, 2002, the President signed House Joint Resolution 87 into law; Public Law 107-200, 116 Stat. 735 (2002) designates Yucca Mountain as the repository for spent nuclear waste. On June 3, 2008, the NRC *received an application from the DOE for a license to construct and* operate a high-level nuclear waste geologic repository at Yucca Mountain. The NRC will determine whether to authorize construction of the Yucca Mountain repository based on the results of its technical review of the application and the corresponding adjudicatory hearings. This development do not represent new and significant information with respect to the offsite radiological impacts from license renewal related to disposal of spent nuclear fuel and high-level nuclear waste.

The U.S. Environmental Protection Agency (EPA) developed repository standards specific to Yucca Mountain, which the NRC subsequently adopted in 10 CFR Part 63, "Disposal of High-Level Radioactive Wastes in a Geologic Repository at Yucca Mountain, Nevada." In an opinion, issued July 9, 2004, the U.S. Court of Appeals for the District of Columbia Circuit (the Court) vacated the EPA radiation protection standards for the candidate repository, which required compliance with certain dose limits over a 10,000-year period. The Court's decision also vacated the compliance period in the NRC's licensing criteria for the candidate repository in 10 CFR Part 63. In response to the Court's decision, EPA issued its proposed revised standards to 40 CFR Part 197, "Public Health and Environmental Radiation Standards for Management and Disposal for Yucca Mountain, Nevada," on August 22, 2005. To be consistent with the revised EPA standards, the NRC proposed revisions to 10 CFR Part 63 on September 8, 2005 (NRC 2005).

Therefore, for the HLW and spent fuel disposal component of the fuel cycle, there is some uncertainty with respect to regulatory limits for offsite releases of radioactive nuclides for the current candidate repository site. However, before promulgation of the affected provisions of the Commission's regulations, the NRC staff assumed that limits would be developed along the lines of the National Academy of Sciences report, "Technical Bases for Yucca Mountain Standards" (NAS 1995) and that in accordance with the Commission's Waste Confidence Decision, 10 CFR 51.23, "Temporary Storage of Spent Fuel after Cessation of Reactor Operation—Generic Determination of No Significant Environmental Impact," a repository that would comply with such limits could and likely would be developed at some site. Peak doses to virtually all individuals would be 100 millirem (1 millisievert) per year or less.

Despite the current uncertainty with respect to these rules, some judgment as to the regulatory 1969 NEPA implications of offsite radiological impacts of spent fuel and high-level waste disposal should be made. The NRC staff concludes that these impacts are acceptable and would not be sufficiently large to require the NEPA conclusion that the option of extended operation under 10 CFR Part 54, "Requirements for Renewal of Operating Licenses for Nuclear Power Plants," should be eliminated.

The NRC staff has not identified any new and significant information during its independent review of the BVPS ER, the staff's site audit, the scoping process, or its evaluation of other available information. Therefore, the NRC staff concludes that there would be no offsite radiological impacts related to spent fuel and HLW disposal during the renewal term beyond those discussed in the GEIS.

- Nonradiological impacts of the uranium fuel cycle. Based on information in the GEIS, the Commission found the following:

  > The nonradiological impacts of the uranium fuel cycle resulting from the renewal of an operating license for any plant are found to be SMALL.

  The NRC staff has not identified any new and significant information during its independent review of the BVPS ER, the staff's site audit, the scoping process, or its evaluation of other available information. Therefore, the staff concludes that there would be no nonradiological impacts of the uranium fuel cycle during the renewal term beyond those discussed in the GEIS.

- Low-level waste storage and disposal. Based on information in the GEIS, the Commission found the following:

  > The comprehensive regulatory controls that are in place and the low public doses being achieved at reactors ensure that the radiological impacts to the environment will remain small during the term of a renewed license. The maximum additional on-site land that may be required for LLW storage during the term of a renewed license and associated impacts will be SMALL. Nonradiological impacts on air and water will be negligible. The radiological and non-radiological environmental impacts of long-term disposal of low-level waste from any individual plant at licensed sites are small. In addition, the Commission concludes that there is reasonable assurance that sufficient low-level waste disposal capacity will be made available when needed for facilities to be decommissioned consistent with NRC decommissioning requirements.

  The staff has not identified any new and significant information during its independent review of the BVPS ER, the staff's site audit, the scoping process, or its evaluation of other available information. Therefore, the NRC staff concludes that there would be no impacts of low-level waste storage and disposal associated with the renewal term beyond those discussed in the GEIS.

- Mixed waste storage and disposal. Based on information in the GEIS, the Commission found the following:

> The comprehensive regulatory controls and the facilities and procedures that are in place ensure proper handling and storage, as well as negligible doses and exposure to toxic materials for the public and the environment at all plants. License renewal will not increase the small, continuing risk to human health and the environment posed by mixed waste at all plants. The radiological and non-radiological environmental impacts of long-term disposal of mixed waste from any individual plant at licensed sites are small. In addition, the Commission concludes that there is reasonable assurance that sufficient mixed waste disposal capacity will be made available when needed for facilities to be decommissioned consistent with NRC decommissioning requirements.

The NRC staff has not identified any new and significant information during its independent review of the BVPS ER, the staff's site audit, the scoping process, or its evaluation of other available information. Therefore, the staff concludes that there would be no impacts of mixed waste storage and disposal associated with the renewal term beyond those discussed in the GEIS.

- <u>Onsite spent fuel</u>. Based on information in the GEIS, the Commission found the following:

> The expected increase in the volume of spent fuel from an additional 20 years of operation can be safely accommodated on site with small environmental effects through dry or pool storage at all plants if a permanent repository or monitored retrievable storage is not available.

The NRC staff has not identified any new and significant information during its independent review of the BVPS ER, the staff's site audit, the scoping process, or its evaluation of other available information. Therefore, the staff concludes that there would be no impacts of onsite spent fuel associated with license renewal beyond those discussed in the GEIS.

- <u>Nonradiological waste</u>. Based on information in the GEIS, the Commission found the following:

> No changes to generating systems are anticipated for license renewal. Facilities and procedures are in place to ensure continued proper handling and disposal at all plants.

The NRC staff has not identified any new and significant information during its independent review of the BVPS ER, the staff's site visit, the scoping process, or its evaluation of other available information. Therefore, the staff concludes that there would be no nonradiological waste impacts during the renewal term beyond those discussed in the GEIS.

- Transportation. Based on information in the GEIS, the Commission found the following:

> The impacts of transporting spent fuel enriched up to 5 percent uranium-235 with average burnup for the peak rod to current levels approved by NRC up to 62,000 MWd/MTU (megawatt-days per metric ton of uranium) and the cumulative impacts of transporting high-level waste to a single repository, such as Yucca Mountain, Nevada, are found to be consistent with the impact values contained in 10 CFR 51.52(c), Summary Table S-4 "Environmental Impact of Transportation of Fuel and Waste to and from One Light-Water-Cooled Nuclear Power Reactor." If fuel enrichment or burnup conditions are not met, the applicant must submit an assessment of the implications for the environmental impact values reported in § 51.52.

BVPS meets the fuel enrichment and burnup conditions set forth in Addendum 1 to the GEIS. The NRC staff has not identified any new and significant information during its independent review of the BVPS ER, the staff's site audit, the scoping process, or its evaluation of other available information. Therefore, the staff concludes that there would be no impacts of transportation associated with license renewal beyond those discussed in the GEIS.

6.2 References

10 CFR Part 51. *Code of Federal Regulations*, Title 10, *Energy,* Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions."

10 CFR Part 54. *Code of Federal Regulations*, Title 10, *Energy,* Part 54, "Requirements for Renewal of Operating Licenses for Nuclear Power Plants."

10 CFR Part 63. *Code of Federal Regulations*, Title 10, *Energy,* Part 63, "Disposal of High-Level Radioactive Wastes in a Geologic Repository at Yucca Mountain, Nevada."

40 CFR Part 191. *Code of Federal Regulations*, Title 40, *Protection of Environment*, Part 191, "Environmental Radiation Protection Standards for Management and Disposal of Spent Nuclear Fuel, High-Level and Transuranic Radioactive Waste."

40 CFR Part 197. *Code of Federal Regulations*, Title 40, *Protection of Environment*, Part 197, "Public Health and Environmental Radiation Protection Standards for Management and Disposal for Yucca Mountain, Nevada."

FirstEnergy Nuclear Operating Company (FENOC). 2007. "Applicant's Environmental Report—Operating License Renewal Stage. Appendix E of License Renewal Application, Beaver Valley

Power Station, Units 1 and 2." Docket Numbers 50-334 and 50-412. August 2007. Agencywide Documents Access and Management System (ADAMS) Accession No. ML072470523.

Joint Resolution 87 Approving the Site at Yucca Mountain, Nevada, for the Development of a Repository for the Disposal of High-Level Radioactive Waste and Spent Nuclear Fuel, pursuant to the Nuclear Waste Policy Act of 1982. 2002. Public Law 107-200. 116 Stat. 735.

National Academy of Sciences (NAS). 1995. *Technical Bases for Yucca Mountain Standards.* Washington, DC.

National Environmental Policy Act (NEPA) of 1969, 42 U.S.C. 4321, et seq.

U.S. Department of Energy (DOE). 1980. "Final Environmental Impact Statement: Management of Commercially Generated Radioactive Waste." DOE/EIS-0046F, Washington, DC.

U.S. Nuclear Regulatory Commission (NRC). 2005. Proposed Rule "Implementation of the Dose Standard After 10,000 Years." 70 FR 53313. Washington, DC.

U.S. Nuclear Regulatory Commission (NRC). 1999. "Generic Environmental Impact Statement for License Renewal of Nuclear Plants," Section 6.3, "Transportation," Table 9.1, "Summary of findings on NEPA issues for license renewal of nuclear power plants." NUREG-1437, Volume 1, Addendum 1. Washington, DC.

U.S. Nuclear Regulatory Commission (NRC). 1996. "Generic Environmental Impact Statement for License Renewal of Nuclear Power Plants." NUREG-1437, Volumes 1 and 2. Washington, DC.

7.0 ENVIRONMENTAL IMPACTS OF DECOMMISSIONING

NUREG-0586, "Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities," Supplement 1, "Regarding the Decommissioning of Nuclear Power Reactors" (NRC 2002), evaluates the environmental impacts of the activities associated with the decommissioning of any reactor before or at the end of an initial or renewed licensing term. The U.S. Nuclear Regulatory Commission (NRC) staff's evaluation of the environmental impacts of decommissioning presented in NUREG-0586, Supplement 1, identifies a range of impacts for each environmental issue.

Discussion of the incremental environmental impacts associated with decommissioning activities resulting from continued plant operation during the renewal term appears in NUREG-1437, "Generic Environmental Impact Statement for License Renewal of Nuclear Plants," Volumes 1 and 2 (NRC 1996; 1999) (GEIS).[17] The GEIS includes a determination of whether the analysis of the environmental issue could be applied to all plants and whether additional mitigation measures would be warranted. Issues were then assigned a Category 1 or a Category 2 designation. As set forth in the GEIS, Category 1 issues are those that meet all of the following criteria:

(1) The environmental impacts associated with the issue have been determined to apply either to all plants or, for some issues, to plants having a specific type of cooling system or other specified plant or site characteristics.

(2) A single significance level (i.e., SMALL, MODERATE, or LARGE) has been assigned to the impacts (except for collective offsite radiological impacts from the fuel cycle and from high-level waste and spent fuel disposal).

(3) Mitigation of adverse impacts associated with the issue has been considered in the analysis, and it has been determined that additional plant-specific mitigation measures are likely not to be sufficiently beneficial to warrant implementation.

For issues that meet the three Category 1 criteria, no additional plant-specific analysis is required unless new and significant information emerges.

Category 2 issues are those that do not meet one or more of the criteria for Category 1 and, therefore, require additional plant-specific review. There are no Category 2 issues related to decommissioning.

7.1 <u>Decommissioning</u>

Table 7-1 lists the Category 1 issues in Table B-1 of Appendix B, "Environmental Effect of Renewing the Operating License of a Nuclear Power Plant," to Subpart A, "National Environmental Policy Act—Regulations Implementing Section 102(2)," of Title 10, Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory

[17] The NRC originally issued the GEIS in 1996 and issued Addendum 1 to the GEIS in 1999. Hereafter, all references to the GEIS include the GEIS and its Addendum 1.

Functions," of the *Code of Federal Regulations* (10 CFR Part 51), that are applicable to Beaver Valley Power Station (BVPS) decommissioning following the renewal term. FirstEnergy Nuclear Company (FENOC) stated in its environmental report (ER) (FENOC 2007) that it is aware of no new and significant information regarding the environmental impacts of BVPS license renewal. The staff has not identified any new and significant information during its independent review of the FENOC ER, the staff's site visit, the scoping process, or its evaluation of other available information. Therefore, the staff concludes that there are no impacts related to these issues beyond those discussed in the GEIS. For all of these issues, the staff concluded in the GEIS that the impacts are classified as SMALL, and additional plant-specific mitigation measures are not likely to be sufficiently beneficial to be warranted.

Table 7-1. Category 1 Issues Applicable to the Decommissioning of BVPS Following the Renewal Term

ISSUE—10 CFR Part 51, Subpart A, Appendix B, Table B-1	GEIS Section
DECOMMISSIONING	
Radiation doses	7.3.1; 7.4
Waste management	7.3.2; 7.4
Air quality	7.3.3; 7.4
Water quality	7.3.4; 7.4
Ecological resources	7.3.5; 7.4
Socioeconomic impacts	7.3.7; 7.4

The following briefly describes the staff's review and the GEIS conclusions, as codified in Table B-1, for each of these issues.

- Radiation doses. Based on information in the GEIS, the Commission found the following:

  Doses to the public will be well below regulatory standards regardless of which decommissioning method is used. Occupational doses would increase no more than 1 person-rem [0.01 person-Sievert] caused by buildup of long-lived radionuclides during the license renewal term.

  The staff has not identified any new and significant information during its independent review of the FENOC ER, the staff's site visit, the scoping process, and its evaluation of other available information. Therefore, the staff concludes that there are no radiation dose impacts associated with decommissioning following the license renewal term beyond those discussed in the GEIS.

- Waste management. Based on information in the GEIS, the Commission found the following:

  Decommissioning at the end of a 20-year license renewal period would generate no more solid wastes than at the end of the current license term. No increase in the quantities of Class C or greater than Class C wastes would be expected.

  The staff has not identified any new and significant information during its independent review of the FENOC ER, the staff's site visit, the scoping process, and its evaluation of other available information. Therefore, the staff concludes that there are no impacts from solid waste associated with decommissioning following the license renewal term beyond those discussed in the GEIS.

- Air quality. Based on information found in the GEIS, the Commission found the following:

  Air quality impacts of decommissioning are expected to be negligible either at the end of the current operating term or at the end of the license renewal term.

  The staff has not identified any new and significant information during its independent review of the FENOC ER, the staff's site visit, the scoping process, and its evaluation of other available information. Therefore, the staff concludes that there are no impacts on air quality associated with decommissioning following the license renewal term beyond those discussed in the GEIS.

- Water quality. Based on information found in the GEIS, the Commission found the following:

  The potential for significant water quality impacts from erosion or spills is no greater whether decommissioning occurs after a 20-year license renewal period or after the original 40-year operation period, and measures are readily available to avoid such impacts.

  The staff has not identified any new and significant information during its independent review of the FENOC ER, the staff's site visit, the scoping process, or its evaluation of other available information. Therefore, the staff concludes that there are no impacts on water quality associated with decommissioning following the license renewal term beyond those discussed in the GEIS.

- Ecological resources. Based on information found in the GEIS, the Commission found the following:

  Decommissioning either after the initial operating period or after a 20-year license renewal period is not likely to have any direct ecological impacts.

The staff has not identified any new and significant information during its independent review of the FENOC ER, the staff's site visit, the scoping process, or its evaluation of other available information. Therefore, the staff concludes that there are no impacts on ecological resources associated with decommissioning following the license renewal term beyond those discussed in the GEIS.

- Socioeconomic impacts. Based on information found in the GEIS, the Commission found the following:

  Decommissioning would have some short-term socioeconomic impacts. The impacts would not be increased by delaying decommissioning until the end of a 20-year re-license period, but they might be decreased by population and economic growth.

  The staff has not identified any new and significant information during its independent review of the FENOC ER, the staff's site visit, the scoping process, or its evaluation of other available information. Therefore, the staff concludes that there are no socioeconomic impacts associated with decommissioning following the license renewal term beyond those discussed in the GEIS.

7.2 References

10 CFR Part 51. *Code of Federal Regulations*, Title 10, *Energy*, Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions."

FirstEnergy Nuclear Operating Company (FENOC). 2007. "Applicant's Environmental Report—Operating License Renewal Stage." Appendix E of License Renewal Application, Beaver Valley Power Station, Units 1 and 2. Docket Numbers 50-334 and 50-412. August 2007. Agencywide Documents Access and Management System (ADAMS) Accession No. ML072470523.

U.S. Nuclear Regulatory Commission (NRC). 2002. "Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities," Supplement 1, "Regarding the Decommissioning of Nuclear Power Reactors." NUREG-0586, Vols. 1 and 2. Washington, DC.

U.S. Nuclear Regulatory Commission (NRC). 1999. "Generic Environmental Impact Statement for License Renewal of Nuclear Plants," Main Report, Section 6.3, "Transportation," Table 9.1, "Summary of findings on NEPA issues for license renewal of nuclear power plants," Final Report. NUREG-1437, Volume 1, Addendum 1. Washington, DC.

U.S. Nuclear Regulatory Commission (NRC). 1996. "Generic Environmental Impact Statement for License Renewal of Nuclear Plants." NUREG-1437, Volumes 1 and 2. Washington, DC.

8.0 ENVIRONMENTAL IMPACTS OF ALTERNATIVES

This chapter examines the potential environmental impacts associated with alternatives to issuing renewed operating licenses (OLs) for Beaver Valley Power Station (BVPS), Units 1 and 2. The U.S. Nuclear Regulatory Commission (NRC) staff considered the following alternatives:

- denying the issuance of renewed OLs (i.e., the no-action alternative)
- implementing electric generating sources other than BVPS
- purchasing electric power from other sources to replace power generated by BVPS
- implementing a combination of generation and conservation measures

The NRC staff evaluated environmental impacts across 12 categories—land use, ecology, surface water use and quality, ground water use and quality, air quality, waste, human health, socioeconomics, transportation, aesthetics, historic and archeological resources, and environmental justice—using the NRC's three-level standard of significance, which is SMALL, MODERATE, or LARGE. The NRC developed these standards based on the Council on Environmental Quality guidelines. The NRC staff outlined these standards in the footnotes to Table B-1 of Appendix B, "Environmental Effect of Renewing the Operating License of a Nuclear Power Plant," to Subpart A, "National Environmental Policy Act—Regulations Implementing Section 102(2)," of Title 10, Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions," of the *Code of Federal Regulations* (10 CFR Part 51):

- SMALL—Environmental effects are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource.

- MODERATE—Environmental effects are sufficient to alter noticeably, but not to destabilize important attributes of the resource.

- LARGE—Environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource.

The impact categories evaluated in this chapter are the same categories used in NUREG-1437, "Generic Environmental Impact Statement for License Renewal of Nuclear Plants," Volumes 1 and 2 (NRC 1996, 1999) (GEIS),[18] with the additional impact categories of environmental justice and transportation.

[18] The NRC originally issued the GEIS in 1996 and issued Addendum 1 to the GEIS in 1999. Hereafter, all references to the GEIS include both the GEIS and its Addendum 1.

8.1 No-Action Alternative

The NRC regulations implementing the National Environmental Policy Act of 1969 (NEPA), found in Appendix A(4) to Subpart A of 10 CFR Part 51, direct the agency to discuss the no-action alternative in an environmental impact statement (EIS). For license renewal, the no-action alternative refers to a scenario in which the NRC does not issue the renewed BVPS OLs, and FirstEnergy Nuclear Operating Company (FENOC) ceases plant operations in accordance with 10 CFR 50.82, "Termination of License." If, after performing safety and environmental reviews of the BVPS license renewal application, the NRC were to issue renewed BVPS OLs, then FENOC could choose to continue operating BVPS throughout the renewal term. If this were to occur, then shutdown of the unit and decommissioning activities would be postponed for up to an additional 20 years. The NRC staff expects that the impacts of decommissioning after 60 years of operation will not differ significantly from those that will occur after 40 years of operation.

The NRC staff addressed the environmental impacts of decommissioning in several documents, including NUREG-0586, Supplement 1, "Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities" (NRC 2002); Chapter 7 of the GEIS; and Chapter 7 of this draft supplemental environmental impact statement (SEIS). Chapter 7 of this draft SEIS addresses environmental impacts of decommissioning associated with spent fuel storage pools. These analyses either directly address or bound the environmental impacts of decommissioning whenever FENOC ceases to operate BVPS. These documents do not, however, address environmental impacts that may occur after plant shutdown and before the actual decommissioning process begins. The following sections discuss the environmental impacts from plant shutdown for each evaluation category:

- Land Use

  Plant shutdown will not affect onsite land use. Plant structures and other facilities will likely remain in place until decommissioning. Most transmission lines at BVPS will remain in service after the plant stops operating, especially because the nearby Bruce Mansfield plant will continue to operate even if BVPS were shut down. Maintenance of most existing transmission lines will continue as before. The NRC staff expects the impacts on land use from plant shutdown to be SMALL.

- Ecology

  Plant shutdown will minimally affect ecology. In Chapter 4 of this draft SEIS, the NRC staff concluded that the terrestrial and aquatic ecological impacts of continued plant operation will be SMALL. As indicated in the above section on land use, maintenance of the right-of-ways (ROWs) will continue as before. If the plant were to cease operating, impacts to aquatic ecology would decrease because the plant would withdraw and discharge less water than during operations. Shutdown will reduce the already SMALL impacts to aquatic and terrestrial ecology. As such, the NRC staff concludes that ecological impacts from shutdown of the plant will be SMALL.

- Water Use and Quality—Surface Water

  Surface water use and quality impacts will decrease following reactor shutdown because the plant will withdraw less water from the Ohio River for cooling purposes (ceasing to use cooling towers shortly after shutting down) and will discharge less water to the Ohio River from domestic and service water usage. In Chapter 4 of this draft SEIS, the NRC staff concluded that impacts of continued plant operation on surface water use and quality will be SMALL. Since operational impacts are already SMALL, the NRC staff concludes that a decrease in impact levels from plant shutdown means that impacts will remain SMALL.

- Water Use and Quality—Ground Water

  BVPS currently uses no ground water. Onsite wells exist solely for the purposes of ground water monitoring. Plant shutdown will have no effect on BVPS usage of ground water. Further, plant shutdown will likely have at most a SMALL impact on ground water quality because shutdown results in lower overall levels of industrial activity on site.

- Air Quality

  Air quality impacts will decrease following plant shutdown. When plant operations stop, emissions from activities related to plant operation, such as the use of diesel generators and worker transportation, will be reduced. In Chapter 4 of this draft SEIS, the NRC staff concluded that the impact of continued plant operation on air quality will be SMALL. Therefore, the NRC staff concludes that the impact on air quality from shutdown of the plant will be SMALL.

- Waste

  After an initial increase immediately following shutdown, BVPS will stop generating high-level radioactive waste, while generation of low-level and mixed waste associated with plant operation and maintenance will decrease. In general, both radioactive and nonradioactive waste generation will decrease following an initial post-shutdown increase. In Chapter 6 of this draft SEIS, the NRC staff characterized the impacts of high-level radioactive waste generated by continued plant operation as SMALL. The staff also characterized the impacts of low-level and mixed waste from plant operation as SMALL. Since waste volumes will decline following shutdown, these impacts will also be SMALL.

- Human Health

  Human health impacts will decrease following plant shutdown. The plant, which is currently operating within regulatory limits, will emit less gaseous and liquid radioactive material to the environment. In addition, following shutdown, the variety of potential accidents at the plant (radiological or industrial) will be reduced to a limited set associated with shutdown events, fuel handling, or fuel storage. In Chapter 4 of this draft SEIS, the NRC staff concluded that the impacts of continued plant operation on human health will be SMALL. In Chapter 5 of this draft SEIS, the NRC staff concluded that the impacts of accidents during operation will be SMALL. Therefore, as radioactive emissions to the environment decrease, and as the likelihood and variety of accidents decrease following shutdown, the NRC staff concludes that the impacts to human health following plant shutdown will be SMALL.

- Socioeconomics

  Plant shutdown will have a minimal impact on socioeconomic conditions in the region around BVPS, primarily because of the plant's proximity to the Pittsburgh metropolitan region and its relatively small contribution to local services. Plant shutdown will eliminate up to 993 jobs and will reduce tax revenue in the region, though the BVPS contributions to local taxing jurisdictions are a small percentage of total revenue for each of the jurisdictions, as discussed in Chapter 4 of this draft SEIS. The loss of these contributions, which may not entirely cease until after decommissioning, will have a SMALL impact, although job losses could increase the impact level slightly. Overall, the staff expects the impacts of plant shutdown to be SMALL to MODERATE. See Appendix J to NUREG-0586, Supplement 1 (NRC 2002), for additional discussion of the potential socioeconomic impacts of plant decommissioning.

- Transportation

  Traffic volumes on the roads in the vicinity of BVPS will be reduced after plant shutdown. Most of the reduction in traffic volume will be associated with the loss of jobs. The shipment of material to and from the plant will be reduced before decommissioning. Transportation impacts will be SMALL as a result of plant shutdown. Transportation impacts would increase if a new reactor or alternative energy facility were constructed on the BVPS site or in the immediate vicinity. Such impacts may be SMALL to MODERATE but of short duration.

- Aesthetics

  Plant structures and other facilities will likely remain in place until decommissioning, although plumes from the plant's cooling towers are likely to disappear entirely. Noise caused by plant operation will cease. The NRC staff concludes that the aesthetic impacts of plant closure will be SMALL.

- Historic and Archeological Resources

  Plant shutdown will likely have no noticeable impacts on historic and archeological resources. Before decommissioning, it is unlikely that plant staff will begin deconstruction or remediation. Because existing transmission lines will remain energized, plant staff will continue to maintain the transmission line ROWs. In Chapter 4, the NRC staff concluded that the impacts of continued plant operation on historic and archeological resources will be SMALL, in part because of existing, effective procedures to limit such impacts. The NRC staff concludes that the impacts on historic and archeological resources from plant shutdown will also be SMALL.

- Environmental Justice

  Plant shutdown is unlikely to disproportionately affect minority and low-income populations. Impacts to all other resource areas will be either SMALL or SMALL to MODERATE. The communities near BVPS do not contain disproportionately high populations of minorities or low-income residents. Thus, impacts from plant shutdown are likely to be SMALL. See Appendix J of NUREG-0586, Supplement 1 (NRC 2002), for additional discussion of these impacts.

Table 8-1 summarizes the environmental impacts from plant shutdown for each category.

Since the NRC presumes that a need exists for power from a plant seeking license renewal, the staff assumes that other forms of power supply or demand reduction (i.e., conservation) could meet this need if the agency were to select the no-action alternative. In addition, if the NRC decides to issue renewed licenses for BVPS Units 1 and 2, utility and State planners may nevertheless elect to pursue other forms of electrical generation or load reduction. Thus, Section 8.2 of this draft SEIS discusses the impacts of alternatives that could be pursued to meet system needs. The alternatives considered in Section 8.2 are distinct alternatives to license renewal, although their environmental impacts may also be considered potential consequences of the no-action alternative.

8.2 Alternative Energy Sources

This section discusses the environmental impacts associated with alternative sources of electric power to replace the power generated by BVPS. The NRC staff also considered the potential of purchased power and conservation to offset the power produced by BVPS, even though they are not generating alternatives per se.

The order in which the NRC staff presents alternatives to license renewal does not imply which alternative energy source would most likely replace the power generated by BVPS or which would have the lowest environmental impacts.

Given the limited space available on the BVPS site, the NRC staff considered that all single-source alternatives (i.e., excluding the combination alternative) will be located at an alternate site. FENOC indicated in its environmental report (ER) (FENOC 2007) that alternatives could be located in areas of Pennsylvania, West Virginia, or Ohio that have necessary access to cooling water and transportation infrastructure, including gas pipelines. The NRC staff reasoned that some infrastructure, such as transmission lines, would not yet exist at the hypothetical site. Given the range of potential locations, the staff evaluated alternatives at hypothetical sites, and the following section addresses the degree to which site characteristics may affect impact levels.

In most cases, NRC staff observes that an alternative that could create LARGE site-specific impacts (i.e., impacts that destabilize a particular resource) would not likely be permitted by local, state and/or Federal environmental, land use, or public-good regulations (e.g., Clean Water Act, Clean Air Act, Endangered Species Act, state-level implementing regulations for any delegated powers, state-level environmental quality regulations, and even local zoning ordinances, to name several). As such, the alternatives proposed in this section typically employ one or more mitigation measures to reduce impact levels in one or more areas. These may include closed-cycle cooling to reduce effects on aquatic life, scrubbers to control air emissions, commercially-proven recycling strategies to reduce combustion waste streams, and siting near existing infrastructure to reduce effects on land use and ecology. The NRC staff's analyses in the following chapters do not, however, indicate that particular alternatives would be permitted or constructed in certain areas; authority to approve proposals to construct and/or operate these alternatives falls to other decision-makers, usually on a state or utility level.

Table 8-1. Summary of Environmental Impacts of the No-Action Alternative

Impact Category	Impact	Comment
Land use	SMALL	Impact is expected to be SMALL because onsite land use will not change before decommissioning, and most transmission lines will remain in operation.
Ecology	SMALL	Impact is expected to be SMALL for aquatic and terrestrial ecology; SMALL operational impact becomes less significant after shutdown.
Water use and quality—surface water	SMALL	Impact is expected to be SMALL because the already-small effects of surface water intake and discharge will decrease.
Water use and quality—ground water	SMALL	Impact is expected to be SMALL because BVPS does not use ground water, and any already-small effects on ground water quality will shrink as onsite industrial activities cease.
Air quality	SMALL	Impact is expected to be SMALL because emissions related to plant operation and worker transportation will decrease from already-small levels.
Waste	SMALL	Impact is expected to be SMALL because generation of high-level waste (HLW) will stop, and generation of low-level and mixed waste will decrease. Impacts of operation are already SMALL.
Human health	SMALL	Impact is expected to be SMALL because radiological doses to workers and members of the public, which are within regulatory limits, will decrease. The likelihood of accidents also will decrease.
Socioeconomics	SMALL to MODERATE	Impact is expected to be SMALL to MODERATE because BVPS supplies a small proportion of local taxing authorities' revenue. Job loss impacts are mitigated by proximity to the Pittsburgh area.
Transportation	SMALL	Impact is expected to be SMALL because the loss of employment will reduce traffic.
Aesthetics	SMALL	Impact is expected to be SMALL because plant structures will remain in place.
Historic and archeological resources	SMALL	Impact is expected to be SMALL because plant shutdown will decrease the likelihood of land disturbance, the impact of which is already SMALL.
Environmental justice	SMALL	Impact is expected to be SMALL because such impacts are not likely to disproportionately affect minority or low-income populations.

The NRC staff considered the following single-source generation alternatives in detail:

- coal-fired generation (Section 8.2.1)
- natural-gas-fired generation (Section 8.2.2)
- new nuclear power generation (Section 8.2.3)

Section 8.2.4 discusses the alternative of purchasing power from other sources to replace power generated at BVPS. Section 8.2.5 discusses power-generation and conservation alternatives that the NRC staff considered but found not to be reasonable as single-source replacements for BVPS, as well as the reasons for their dismissal. Section 8.2.6 discusses the environmental impacts of a combination of generation and conservation alternatives, including several power sources the NRC staff found incapable of individually replacing BVPS.

Each year the Energy Information Administration (EIA), a branch of the U.S. Department of Energy (DOE), issues its updated Annual Energy Outlook, which is a forecasting document that analyzes trends and issues in energy production, supply, and consumption in order to project future energy developments. The comprehensiveness and policy neutrality of the Annual Energy Outlook is unique among forecasting documents. In its "Annual Energy Outlook 2007 with Projections to 2030," EIA projects a continued nationwide increase in energy consumption and generating capacity (EIA 2007a).

Early in this period (i.e., through 2010), EIA projects that natural-gas-fired, combined-cycle or combustion turbine technology will account for most generating capacity additions. As natural gas prices increase, coal-fired generation will begin to account for the largest share of capacity additions (EIA 2007a). EIA projects that coal will account for the majority (54 percent) of new capacity through 2030 and that advanced coal technologies, such as coal-fueled integrated gasification combined-cycle (IGCC) generation, will continue to decline in cost relative to improved natural-gas-fired, combined-cycle technologies (EIA 2007a).

EIA also projects that U.S. generators will increase total nuclear and renewable generation capacity throughout the forecast term, partly because of tax credits and other incentives. As a proportion of installed capacity, however, nuclear generation will decrease slightly through 2030, while renewable generation remains relatively constant (EIA 2007a). EIA suggests that changes in electricity generation costs, which are highly dependent on emission control costs, will drive utilities' choices in generating technologies (EIA 2007a).

EIA asserts that oil-fired plants will account for virtually no new generation capacity in the United States through 2030, projecting a 0.6-percent annual decrease in electric sector oil consumption because of higher fuel costs and lower efficiencies (EIA 2007a). Given the EIA analysis, the NRC staff did not consider an oil-fired alternative to BVPS.

BVPS Units 1 and 2 currently have a combined net rating of approximately 1842 megawatts-electric (MWe). For the purposes of this draft SEIS, 1842 MWe is the amount of capacity an alternative will need to provide. FENOC staff indicated that alternatives providing 1800 MWe will adequately approximate the amount of capacity provided by BVPS. The NRC staff believes this approximation will provide a reasonable analysis, though it may slightly understate some impacts. In its analysis, the NRC staff identified alternatives providing capacity amounts as close to the BVPS capacity as possible.

8.2.1 Coal-Fired Generation

This section discusses the NRC staff's evaluation of a coal-fired alternative located at an alternate site, which may or may not have been previously developed. Given the FENOC service territory, this plant is likely to be located in Ohio or Pennsylvania but could also be located in West Virginia or New Jersey. In its ER, FENOC indicated that PJM Interconnection (PJM), the system into which BVPS currently sells electricity, is facing capacity constraints and additional capacity needs in the near future. Pennsylvania, West Virginia, and Ohio are all States with restructured electric regulatory systems that could hypothetically host a coal-fired alternative.

FENOC assumed a heat rate[19] of 9800 Btu per kilowatt-hour (Btu/kWh) for a coal-fired alternative that would consist of three units having a net capacity of 1800 MWe (i.e., 1980 MWe gross output assuming a 9.1-percent rate of internal consumption (FENOC 2007)). The FENOC heat rate is based on FirstEnergy's experience with existing coal-fired power plants. For purposes of its independent analysis, the NRC staff used data developed by EIA (EIA 2007a). The coal-fired alternative presented here has a heat rate of 8844 Btu/kWh and better reflects the efficiency gains that can be expected from operating at supercritical conditions.[20] The NRC staff accepted the FENOC estimate for internal consumption, but notes that this estimate is higher than estimates in most recent ERs. Since internal consumption levels can often be driven by emission control technologies, and since extensive auxiliary facilities, such as those associated with sulfur scrubbing at FirstEnergy's nearby Bruce Mansfield plant, can increase internal consumption, the NRC staff accepts the FENOC level of internal consumption. As a result, the gross output of the coal-fired alternative will be 2026 MWe, with a net output of 1842 MWe.

In addition, the NRC staff believes that the FENOC assertion that a coal-fired alternative of this size could rely on three, equally sized units is acceptable, although combinations using larger, smaller, or variably sized units could also produce an appropriate replacement capacity. Regardless of the number of units, the NRC staff assumed that a coal-fired alternative will use a closed-cycle cooling system to meet existing regulations to protect aquatic life.

Although the period of extended operation is only 20 years, the NRC staff considers the impact of operating the coal-fired alternative for 40 years to be a reasonable conservative projection of the alternative's operating life due to economic return on investments, and the lifespan of systems and components.

The coal-fired alternative, with a gross electric output of 2026 MWe, will consume approximately 5.20 million metric tons (MT) (5.73 million tons) per year (yr) of pulverized bituminous coal, with an ash content of approximately 12.83 percent and a heating value of 11,650 Btu per pound (Btu/lb), which are average values for coal consumed across Pennsylvania, Ohio, and West

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[19] Heat rate is a measure of generating station thermal efficiency. In English units, it is generally expressed in British thermal units (Btu) per net kilowatt-hour (kWh). It is computed by dividing the total Btu content of the fuel burned for electric generation by the resulting kWh generation.

[20] Supercritical coal-fired plants have steam cycles that operate at higher pressures (greater than 3207 pounds per square inch) than those of subcritical plants. They can be significantly more efficient. Even higher efficiencies are possible with ultrasupercritical coal plants or by using IGCC technologies. Currently, the United States has no ultrasupercritical plants and one, relatively small operating IGCC facility.

Virginia (EIA 2006b). While FENOC assumed an 80-percent capacity factor for the coal-fired alternative (likely to be a reasonable approximation), the NRC staff assumed that the coal-fired alternative will have an 85-percent capacity factor.[21] This higher capacity factor better represents the loading necessary to replace a nuclear power plant and is also a reasonable estimate of the capacity factor for a large coal-fired power plant.

The coal-fired alternative will produce approximately 667,000 MT (735,000 tons) of ash in a single year. After combustion, FENOC indicated that the ash could be recycled, but assumed that none would be. The NRC staff notes that fly ash can often be used as a component of concrete manufacture or may have other uses aside from landfilling. Furthermore, recycling fly ash is often highly dependent on the availability of a recycling market, the quantity of material demanded, and the distance to market or cost of transportation.

Since the operators of the coal-fired alternative will likely control sulfur dioxide (SO_2) emissions using lime-based scrubbers (as does FirstEnergy's Bruce Mansfield plant), the coal-fired alternative will generate approximately 214,000 MT (236,000 tons) of scrubber sludge, based on an annual limestone usage of approximately 73,600 MT (81,100 tons). Some or all of the sludge byproduct produced by a coal-fired alternative could be recycled for use in gypsum wallboard manufacture. FirstEnergy's Bruce Mansfield plant currently recycles much of its scrubber sludge, though it previously disposed of the sludge in a nearby reservoir. As of 2006, American Coal Ash Association surveys indicate that 79 percent of flue-gas desulfurization gypsum was reused or recycled (ACAA 2007). Consequently, the NRC staff assumed that the amount of desulfurization byproduct generated from this alternative will also be recycled or reused, though reuse or recycling proportions and options may vary widely depending on the location of the alternative.

Coal and limestone will likely be delivered by rail, although a site near a major, navigable waterway could receive coal and limestone by barge (as does the Bruce Mansfield plant). The coal-fired alternative will likely require more than approximately 570 unit trains per year (11 unit trains per week) of coal, given that a 1 unit train contains 100 cars carrying 91 MT (100 tons) each, resulting in 9,070 MT (10,000 tons) of coal total per train. On any given day, up to four train trips may occur on the rail spur as trains come and go. Crews will need to construct a rail spur to receive these deliveries. Following combustion, ash will leave the site either on trains or trucks for eventual disposal or recycling. In 2006, an average of 45 percent of the coal ash was recycled (ACAA 2007). The NRC staff assumed that this amount of ash from the coal-fired alternative will be recycled or reused, although, as with gypsum scrubber waste, ash recycling proportions may vary widely for plants in different locations. The following sections discuss the environmental impacts of the coal-fired alternative. Impacts will vary somewhat with the characteristics of the site selected.

- Land Use

  Many locations suitable for siting the coal-fired alternative (especially flat, terrace areas along rivers, which is a common siting practice for coal-fired plants in this part of the

[21] The capacity factor is the ratio of electricity generated, for the period of time considered, to the energy that could have been generated at continuous, full-power operation during the same period.

United States, as noted in FENOC 2007) may have been disturbed in part or entirely by previous development. In some locations, "brownfields," or sites that were previously industrial and still contain some level of degradation from the earlier industrial activity, may be the most likely sites. Sites along rivers in this area are likely to have easier access to coal and limestone transportation, both by barge (directly on the river) and by train (as some railways run the length of major river valleys). Sites that have previously been used for industrial activities may have existing rail spurs or dock/pier infrastructure and may be closer to transmission lines.

FENOC indicated that approximately 260 acres (a) (105 hectares (ha)) will be necessary to support a coal-fired alternative capable of replacing BVPS. The GEIS, however, estimates a need for up to 1700 a (688 ha) for a 1000-MWe generating station. This amount of land use will include plant structures and associated infrastructure. By scaling GEIS estimates, a 2026-MWe plant could require up to approximately 3440 a (1390 ha) of land. This amount of land will encompass the plant site, transmission line ROWs, and a rail spur.

Based on land use for other nearby power plants, including FirstEnergy's W.H. Sammis and Bruce Mansfield plants (both of which are larger in capacity than the alternative discussed here), the NRC staff believes the FENOC estimate to be reasonable, although additional land may be used for buffer around plant structures or to support transmission lines and a rail spur. Even assuming additional land use for these purposes, total land required by the coal-fired alternative is unlikely to exceed 1000 a (405 ha) for all uses, excluding coal mining.

The coal-fired alternative will require approximately 294 a (119 ha) of this land area for waste disposal over the 40-year plant life,[22] a marked reduction from the land FENOC indicated will be necessary in the ER (FENOC 2007), because NRC staff assumes higher ash and gypsum recycling rates than FENOC indicated in their ER.

Coal mining introduces offsite land use impacts in addition to direct land use impacts from the construction and operation of new power plants. Land disturbance will likely occur in Pennsylvania, Ohio, or West Virginia because a significant amount of the coal used originates in these three States, although important amounts also come from Kentucky and western states like Wyoming (EIA 2006b).[23]

The GEIS indicates that approximately 22,000 a (8,903 ha) could be affected for mining coal and waste disposal to support a 1000-MWe coal plant during its operational life (NRC 1996). A total of approximately 44,600 a (18,000 ha) of land will be required to

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22 Only half of the land area needed for waste disposal is directly attributable to the alternative of renewing the BVPS Units 1 and 2 operating licenses for 20 years.

23 Western coal tends to be markedly lower in sulfur content and somewhat lower in heating content than eastern coal. Many power stations use this subbituminous coal to reduce sulfur oxide emissions without having to install scrubber equipment. A power plant equipped with highly effective scrubbers, such as the alternative considered by the NRC staff, is likely to make greater use of local, higher sulfur coals rather than importing low-sulfur coal from western States.

support a new coal-fired power plant; however, most of this land is in existing coal-mining areas and has likely already experienced some level of disturbance. The elimination of the need for uranium mining to supply fuel for BVPS Units 1 and 2 will also partially offset this offsite land use. The GEIS estimates that approximately 1000 a (405 ha) will be used for mining and processing uranium for a 1000-MWe nuclear plant. For BVPS, roughly 1840 a (745 ha) of uranium mining area will no longer be needed.

Land use impacts could range from MODERATE to LARGE, depending on the location of the plant. Some portion of this impact can be mitigated by constructing new transmission lines in existing ROWs to as great an extent as possible.

- Ecology

As indicated in the Land Use section, constructing the coal-fired alternative will require roughly 1000 a (405 ha) of land. Coal-mining operations will also affect terrestrial ecology in offsite coal mining areas, although, as noted above, some of this land is likely already disturbed by mining operations. Onsite and offsite land disturbances form the basis for impacts to terrestrial ecology.

Impacts will vary based on the degree to which the proposed plant site is already disturbed. On a previous industrial site, impacts to terrestrial ecology will be minor, unless substantial transmission line ROWs, a lengthy rail spur, or additional roads need to be constructed through undisturbed or less-disturbed areas. Constructing ROWs, rails, and roads may all have the effect of fragmenting or destroying habitats. In addition, construction onsite, especially of plant structures, may eliminate onsite habitats and alter the site for a long period of time. Some areas onsite, such as any buffer areas, may remain undeveloped and could harbor habitat for terrestrial species, though site lighting, noise, and activities may degrade the value of any remaining ecosystems. Any onsite or offsite waste disposal by landfilling will also affect terrestrial ecology at least through the time period when the disposal area is reclaimed. Deposition of acid rain or other emissions can also affect terrestrial ecology. Given the emission controls discussed in the Air Quality section, air deposition impacts may be noticeable, but are not likely to be destabilizing.

Impacts to aquatic ecology are likely during construction. Regardless of where the plant is constructed, site disturbance will likely increase erosion and sedimentation runoff into nearby waterways, increasing turbidity. While site procedures and management practices may limit this effect, the impact will likely be noticeable. This is particularly true when intake and outfall structures are constructed alongside or in the body of water, as well as when any ROWs, roads, or rail lines require in-stream structures to support stream crossings. Noise and disturbance from construction, in addition to increased turbidity, may have a noticeable effect.

Following construction, the greater thermal efficiency of the coal-fired alternative versus the existing BVPS (even allowing for internal consumption) will result in slightly less consumptive water use for cooling and blowdown.

During operations, disposal of waste materials will have to comply with local and State regulations, some of which are intended to prevent runoff into surface water. Management of runoff from coal piles will also be necessary. Spills occurring during onsite activities will need to be appropriately handled, and runoff from new, impervious surfaces (e.g., roads and rooftops) may affect aquatic ecology, as could deposition of acids or chemicals emitted through the plant's stacks. Given current regulations, as well as the emission controls discussed in the Air Quality section, these impacts may be noticeable, but are not likely to be destabilizing. The visibility of these impacts will vary based on how sensitive existing aquatic ecosystems and species are to disturbance and the characteristics of the water body near which the plant is constructed.

Overall impacts on ecology from a coal-fired alternative will likely be MODERATE.

- Water Use and Quality—Surface Water

A coal-fired power plant will likely rely on surface water for cooling and use a closed-cycle cooling system with cooling towers. The impact on the surface water will depend on the volume of water needed for makeup water, the plant's discharge volume, and the characteristics of the receiving body of water. Withdrawal of water may be under the control of a commission, depending on the water body in question, while a State's National Pollutant Discharge Elimination System (NPDES) program will regulate discharges to any surface body of water. As discussed in the Ecology section, the coal-fired alternative uses slightly less surface water than the existing plant, though runoff from coal or waste piles, as well as from impervious site surfaces, spills, or deposition of air emissions, could have a noticeable effect. Surface water impacts can vary significantly depending on the nature of the water bodies affected. These impacts will likely be SMALL to MODERATE.

- Water Use and Quality—Ground Water

Impacts will depend on whether the plant will use ground water for any purposes, as well as the characteristics of local aquifers. Effects to ground water quality can also depend on waste-management and coal-storage practices, although proper disposal and material handling should reduce the likelihood of an effect, as would recycling a greater percentage of waste products. Regardless of location, the NRC staff finds it highly unlikely that a coal-fired power plant will rely on ground water for plant cooling and believes that ground water and waste-management regulations will limit impacts to SMALL.

- Air Quality

The air quality impacts of a coal-fired power plant are considerably greater than those of the current BVPS. Air emissions are generally the most noticeable effect of coal-fired power plants and typically lead to the greatest degree of public concern. This section focuses on the air quality impacts associated with power plant operation. The NRC staff acknowledges that commuting workers will also generate air pollutants from personal vehicles, but given the size of plant staff—from the 300 that FENOC estimated to the

507 extrapolated from the workforce numbers in the GEIS—this pollution source is likely to have a much smaller effect than the plant itself. Additionally, transportation of fuel to the plant and wastes away from the plant will also generate pollutants. During construction, however, the workforce may have a noticeable impact, when as many as 2500 (according to FENOC estimates) workers will be on site. (For construction-stage workforce, extrapolating from GEIS estimates provides an unreasonably large peak workforce of 5070.)

The GEIS indicated that, for refurbishment of existing nuclear plants, the presence on site of 2300 additional workers' vehicles could create noticeable impacts in a nonattainment or maintenance area (NRC 1996). FENOC estimates and GEIS extrapolations indicate the presence of more than 2300 workers, though, as noted in the GEIS, some may carpool while others may have traveled to worksites other than the new power plant site, thus reducing somewhat the total impact of worker transportation directly attributable to the new site.

Also, heavy construction vehicles and motorized equipment will create exhaust emissions, while earth-moving and site-clearing activities will generate fugitive dust. When possible, construction crews will use applicable dust-control measures to reduce these effects. All construction-stage impacts, however, will be intermittent and short lived, perhaps up to 4 years.

Coal-fired power plants emit many pollutants as a result of fuel-bound elements (sulfur oxides, typically expressed as SO_2; hazardous air pollutants (HAPs), such as mercury; naturally occurring radioactive materials; and some nitrogen oxides (NO_x)) and combustion conditions (NO_x, carbon monoxide (CO), and particulates). Many of these emissions are either directly harmful or are precursors to harmful compounds. Regulations in place to reduce potential health effects from air emissions, especially those promulgated in response to the Clean Air Act (CAA), drive the types of emission controls this coal-fired alternative will use to limit its effects on air quality. CAA mechanisms like New Source Performance Standards, nonattainment areas, State implementation plans (SIPs), and specialized programs, including one that limits overall NO_x emissions throughout the Eastern United States, all drive the emission control technologies used by this coal-fired alternative.

Since requirements for pollutant control in nonattainment areas are stronger than those in attainment areas, and since nonattainment areas for $PM_{2.5}$ (i.e., particulate matter (PM) 2.5 microns (μm) or less in diameter) and 8-hour ozone standards occur throughout Pennsylvania and Ohio, while several $PM_{2.5}$ nonattainment areas occur in West Virginia, with the two easternmost counties in West Virginia also ozone nonattainment areas, the NRC staff considered the more stringent requirements associated with nonattainment areas (EPA 2008b). In addition, all three States, even if not subject to nonattainment rules for ozone, are subject to restrictions on NO_x emissions during "ozone season."

A new coal-fired power plant located in any CAA nonattainment area will need a nonattainment area permit and a Title V operating permit under the CAA. The plant will need to comply with the New Source Performance Standards for such plants set forth in Subpart DA, "Standards of Performance for Electric Utility Steam Generating Units for which Construction is Commenced after September 18, 1978," of 40 CFR Part 60, "Standards for Performance for New Stationary Sources." The standards establish limits for PM and opacity (40 CFR 60.42da), SO_2 (40 CFR 60.43da), NO_x (40 CFR 60.44da), and mercury (40 CFR 60.45da). The coal-fired alternative will also require operating permits from the State in which it is located and may have to purchase offsets for its emissions of various criteria pollutants, as discussed below.

Impacts for particular pollutants are expected to be as follows:

<u>Sulfur oxides emissions</u>. The FENOC ER (FENOC 2007) proposes that the coal-fired alternative will use wet limestone-based scrubbers to remove sulfur oxides. Its total SO_2 emissions will be approximately 9150 MT/yr (10,100 tons/yr), based on U.S. Environmental Protection Agency (EPA) emissions factors (EPA 1998a).

A new coal-fired power plant will be subject to the requirements in Title IV of the CAA, which was enacted to reduce emissions of SO_2 and NO_x, the two principal precursors of acid rain, by restricting emissions of these pollutants from power plants. Title IV caps aggregate annual power plant SO_2 emissions and impose controls on SO_2 emissions through a system of marketable allowances. The EPA issues one allowance for each ton of SO_2 that a unit is allowed to emit. New units do not automatically receive allowances but are required to have allowances to cover their SO_2 emissions. Owners of new units must therefore acquire allowances, purchase from owners of other power plants, or reduce SO_2 emissions at other power plants they own. Allowances can be banked for use in future years. Thus, the coal-fired alternative will not add to net regional SO_2 emissions, although it may increase local SO_2 emissions.

<u>Nitrogen oxides emissions</u>. Title IV of the CAA establishes technology-based emission limitations for NO_x emissions. A new coal-fired power plant will be subject to the New Source Performance Standards for such plants found at 40 CFR 60.44a(d)(1). This regulation, issued on September 16, 1998 (EPA 1998a), limits the discharge of any gases that contain NO_x (expressed as nitrogen dioxide (NO_2)) in excess of 300 nanograms per joule (ng/J) of gross energy output (0.70 lb/million Btu), based on a 30-day rolling average.

FENOC projects that the coal-fired alternative will use low-NO_x burners with overfire air and selective catalytic reduction (SCR). Given these control technologies, the NRC staff estimated the total annual NO_x emissions for the coal-fired alternative to be approximately 1300 MT/yr (1430 tons/yr), or less than 3.1 percent of the New Source Performance Standard emission rate. As NO_x is a primary ozone precursor, the operators of the coal-fired alternative located in an ozone nonattainment area will need to purchase emission allowances to offset this amount of emissions.

In addition, 40 CFR 51.121(e) sets the total amount of NO_x that could be emitted by Pennsylvania, Ohio, and West Virginia during the ozone season (May 1 to September 30). The total permitted amount in Pennsylvania in 2007 was 234,152 MT

(257,928 tons); in Ohio, the total permitted amount was 226,538 MT (249,541 tons); and in West Virginia, the total permitted amount was 75,755 MT (83,921 tons). The coal-fired alternative will need to offset its emissions through credit purchases or from a set-aside pool to avoid violating future Statewide allowable limits.

Particulate emissions. Based on EPA emissions factors (1998b), the NRC staff estimates that the total annual stack emissions in the absence of emission controls will include approximately 333,000 MT (367,000 tons) of filterable total suspended particulates (TSP) and approximately 76,700 MT (84,500 tons) of particulate matter (PM) having an aerodynamic diameter less than or equal to 10 μm (PM_{10}) (see 40 CFR 50.6a).[24] The NRC staff believes that fabric filters will be the most likely control technology, resulting in a total emission rate of 333 MT/yr (367 tons/yr) and 76.7 MT/yr (84.5 tons/yr), respectively, of TSP and PM_{10}. Coal-handling equipment will also introduce fugitive particulate emissions, though these emissions are difficult to quantify.

Carbon monoxide emissions. The NRC staff estimates the total CO emissions from the coal-fired alternative to be approximately 1300 MT/yr (1430 tons/yr) based on EPA emissions factors (EPA 1998b). This level of emissions is greater than that of the *operating license renewal alternative.*

Hazardous air pollutants including mercury. Following the D.C. Circuit Court's February 8, 2008, ruling that vacated its Clean Air Mercury Rule (CAMR), EPA is working to evaluate how it will regulate mercury emissions (EPA 2008a). Before CAMR, EPA determined that coal- and oil-fired electric utility steam-generating units are significant emitters of HAPs (EPA 2000a). EPA determined that coal plants emit arsenic, beryllium, cadmium, chromium, dioxins, hydrogen chloride, hydrogen fluoride, lead, manganese, and mercury (EPA 2000a). EPA concluded that mercury is the HAP of greatest concern and that (1) a link exists between coal combustion and mercury emissions, (2) electric utility steam-generating units are the largest domestic source of mercury emissions, and (3) certain segments of the U.S. population (e.g., the developing fetus and subsistence fish-eating populations) are believed to be at potential risk of adverse health effects resulting from mercury exposures caused by the consumption of contaminated fish (EPA 2000a). In light of the recent court decision, EPA will revisit mercury regulation, although it is possible that the agency will continue to regulate mercury as a HAP, thus requiring the use of best available control technology to prevent its release to the environment.

Uranium and thorium. Coal contains uranium and thorium, among other naturally occurring radioactive elements. One researcher indicated that uranium concentrations are generally in the range of 1 to 10 parts per million (ppm) and thorium concentrations are generally about 2.5 times this level (Gabbard 1993). The U.S. Geological Survey (USGS) indicates that Western and Illinois Basin coals contain uranium and thorium at roughly equal concentrations, mostly between 1 and 4 ppm, but notes that some coals

[24] See also 40 CFR 50.7a for $PM_{2.5}$ standards.

may contain concentrations as high as 20 ppm of both elements (USGS 1997). Gabbard (1993) indicates that a 1000-MWe coal-fired plant could release roughly 4.7 MT (5.2 tons) of uranium and 11.6 MT (12.8 tons) of thorium to the atmosphere. USGS and Gabbard indicate that almost all of the uranium, thorium, and most decay products remain in solid coal wastes, especially in the fine glass spheres that constitute much of coal's fly ash. Modern emission controls, such as those included for this coal-fired alternative, allow for recovery of greater than 99 percent of these solid wastes (EPA 1998b), thus retaining most of the coal's radioactive elements in solid form rather than releasing them to the atmosphere. Even after concentration in coal waste, the level of radioactive elements remains relatively low—typically 10 to 100 ppm—and consistent with levels found in naturally occurring granitic rocks, shales, and phosphate rocks (USGS 1997).

Carbon dioxide. The coal-fired alternative will release unregulated carbon dioxide (CO_2) emissions that could contribute to climate change. Based on EIA emission factors for bituminous coal combustion, this coal-fired alternative will result in 12.4 million MT (13.7 million tons) of CO_2 emissions (EIA 2007b).

Visibility protection. In addition to regulations that address particular pollutants, EPA has various regulatory requirements for visibility protection found in Subpart P, "Protection of Visibility," of 40 CFR Part 51, "Requirements for Preparation, Adoption, and Submittal of Implementation Plans," including a specific requirement for review of any new major stationary source in an area designated as attainment or unclassified under the CAA.

Section 169A of the CAA establishes a national goal of preventing future impairment and remedying existing impairment of visibility in mandatory Class I Federal areas (identified in 40 CFR 81.400, "Scope," et seq.) when impairment results from manmade air pollution. The EPA haze rule specifies that, for each mandatory Class I Federal area located within a State, the State must establish goals that provide for reasonable progress towards achieving natural visibility conditions. The reasonable progress goals must provide for an improvement in visibility for the most-impaired days over the period of the implementation plan and ensure no degradation in visibility for the least-impaired days over the same period (40 CFR 51.308(d)(1)). If the coal-fired alternative were located close to a mandatory Class I area, additional air pollution control requirements could be imposed. Pennsylvania and Ohio contain no Class I areas; West Virginia contains two, one in the Dolly Sods Wilderness Area and the other in the Otter Creek Wilderness Area. Power plants that may affect the air quality in these areas could be subject to additional restrictions on emissions.

Summary. The NRC staff analysis indicated that emissions from a coal-fired alternative could be substantial; however, extensive existing regulations attempt to limit the effects of coal-fired generation on air quality. Even with these controls, the effects will be clearly noticeable. The appropriate characterization of air impacts from the coal-fired alternative is MODERATE.

- Waste

Coal combustion generates waste in the form of ash, and equipment for controlling air pollution generates additional ash and scrubber sludge.[25] A coal-fired power plant having a gross capacity of 2026 MWe will generate approximately 1.14 million MT (1.26 million tons) of this waste annually for 40 years. Based on industry-average recycling rates, approximately 675,000 MT (744,000 tons), or 45 percent of the ash content and 79 percent of gypsum scrubber waste, could be recycled for beneficial reuse, leaving a total of approximately 466,000 MT (514,000 tons) for landfill on site or nearby, accounting for approximately 294 a (119 ha) of land area over the 40-year plant life. Waste impacts to ground water and surface water could extend beyond the operating life of the plant if leachate and runoff from the waste storage area occur. Disposal of the waste could noticeably affect land use and ground water quality, but with appropriate management and monitoring, it will not destabilize any resources. After closure of the waste site and revegetation, the land could be made available for other uses.

In May 2000, EPA issued a "Notice of Regulatory Determination on Wastes from the Combustion of Fossil Fuels" (EPA 2000b). In it, EPA indicated that it would issue regulations for disposal of coal combustion waste under Subtitle D of the Resource Conservation and Recovery Act. As of this document's publication, EPA has not yet issued these regulations.

In addition to combustion wastes, crews will generate debris during construction activities. These wastes will likely be disposed of on site, when possible. Overall, this amount of waste is small compared to the operational waste generated, and many construction wastes can be recycled.

In summary, the appropriate characterization of impacts from waste generated from burning coal is MODERATE; the impacts will be clearly noticeable but will not destabilize any important resource.

- Human Health

Coal-fired power plants introduce worker risks from coal and limestone mining, from coal and limestone transportation, and from disposal of coal combustion and scrubber wastes. In addition, there are public risks from inhalation of stack emissions and the secondary effects of eating foods grown in areas subject to deposition from plant stacks. In the GEIS, the NRC staff stated that human health impacts (cancer and emphysema) could result from inhalation of toxins and particulates, but it did not identify the significance of these impacts. Regulations restricting emissions—enforced by EPA or State agencies—have acted to significantly reduce potential health effects but do not entirely eliminate them. These agencies also impose site-specific emission limits as needed to protect human health. Even if the coal-fired alternative were located in a

25 Radionuclides (e.g., uranium and thorium) present in coal fly ash exist at levels equivalent to those in naturally occurring granitic, phosphate, and shale rocks (USGS 1997).

nonattainment area, emission contents and trading or offset mechanisms could prevent further regional degradation; however, local effects could be visible. Many of the byproducts of coal combustion responsible for health effects are largely controlled, captured, or converted in modern power plants, although some level of health effects may remain.

Aside from emission impacts, the coal-fired alternative also introduces the risk of coal-pile fires and attendant inhalation risks, though these types of events are relatively rare.

Overall, given extensive health-based regulation, the NRC staff expects human health impacts to be SMALL.

- Socioeconomics

FENOC projected a maximum construction workforce of 2500 (FENOC 2007), with an average workforce of 1750. The GEIS projects a peak workforce of 1200 to 2500 for a 1000-MWe plant (when extrapolated, this yields a peak of 2430 to 5070 workers). The NRC staff believes that the FENOC estimate is reasonable and is within the range provided by the GEIS. Furthermore, the upper-end estimate of the GEIS is probably unreasonably large.

During the 5-year construction period, the communities surrounding the plant site will experience increased demand for rental housing and public services, although these effects could be moderated if the plant site is near an urban area with many skilled workers. The relative economic contributions of these relocating workers to local business and tax revenues will also vary with the size and variety of the area's existing economic base.

After construction, local communities may be affected by the loss of construction jobs and associated loss of business, while rental housing markets could experience increased availability and decreased prices. As noted in the GEIS, the socioeconomic impacts at a rural site will be larger than at an urban site because more of the construction workforce will need to move closer to the construction site, as well as having a proportionally larger effect. Construction impacts, then, could range from SMALL to LARGE, depending on site characteristics.

FENOC estimated an operational workforce of 300 (FENOC 2007), while extrapolated GEIS estimates call for approximately 500 workers. The FENOC estimate appears reasonable and is consistent with trends calling for decreased workforces at power facilities. Even at a more rural site, impacts are unlikely to be large. Operations impacts will likely be SMALL to MODERATE, depending on the characteristics of communities near the site.

- Transportation

During 5 years of construction, up to 2500 workers will be commuting to the site. The addition of these workers will increase traffic volumes on existing roads. These impacts will vary significantly depending on the characteristics of nearby roadways. In addition to commuting workers, trucks will transport some construction materials to the worksite. These vehicles will increase potential effects. Further, trains or barges will be used to deliver large components to the plant site. Transportation impacts are likely to be largest during construction.

The maximum number of plant operating personnel will be approximately 300 workers. More significant, though, will be frequent deliveries of coal and limestone, likely by rail. Approximately 570 unit trains (trains with 100 cars carrying 100 tons of coal per car for 9070 MT (10,000 tons) per train) per year will be necessary. Onsite coal storage will make it possible to receive several trains per day. Limestone will also likely be delivered by rail, which could add additional traffic (though considerably less traffic than that generated by coal deliveries). If coal and limestone were delivered by barge, the NRC staff expects transportation-related impacts to be less significant than if delivered by rail.

Overall, the coal-fired alternative will likely create SMALL to MODERATE impacts on transportation, although impacts will vary based on existing transportation infrastructure capacity and demand, as well as whether coal and limestone are delivered by rail or barge.

- Aesthetics

The coal-fired alternative's three power plant units will be up to 200 feet (ft) (61 meters (m)) tall and may be visible off site in daylight hours. The three exhaust stacks will be up to 600 ft (183 m) high (at least 500 ft (152 m) for good engineering practice). If the coal-fired alternative makes use of natural-draft cooling towers, as does the current BVPS, then additional impacts will occur from the towers, which may be several hundred feet tall and topped with condensate plumes. Mechanical draft towers will also generate condensate plumes but will be markedly shorter than natural-draft towers. Other buildings on site may also affect aesthetics, as could construction of new transmission lines. Noise and light from plant operations, as well as lighting on plant structures, may be detectable off site.

If the coal-fired alternative is located along a river valley terrace, as FENOC suggests it could be, then impacts may be moderated because the higher elevation ridges along the river valley may make it difficult to see or hear the plant outside of the river valley. Aesthetic impacts could be further mitigated if the plant were located in an industrial area adjacent to other power plants. Overall, the aesthetic impacts associated with the coal-fired alternative will likely be SMALL to MODERATE, although a plant located in an area with less geographic relief or near areas where visual resources are particularly valued could have larger effects.

* Historic and Archeological Resources

  It is difficult to determine the effects on historic and archeological resources when a specific site has not been selected. Sites vary greatly in terms of their potential for historic or archeological resources and in terms of any previous characterization of existing resources. To protect resources on site, any proposed areas will need to be surveyed to identify and record existing historic and archeological resources, to identify cultural resources, and to develop possible mitigation measures to address any adverse effects from ground-disturbing actions. Studies will be needed for all areas of potential disturbance at the proposed plant site and along associated corridors where new construction will occur (e.g., roads, transmission corridors, rail lines, or other ROWs). In most cases, project proponents should avoid areas with the greatest sensitivity.

  Depending on the resource richness of the site ultimately chosen for the coal-fired alternative, impacts will range from SMALL to MODERATE.

* Environmental Justice

  Environmental justice effects occur when the effects identified under previous resource areas in this section adversely and disproportionately affect minority or low-income populations. In the case of a potential future power plant constructed at an unknown site, the NRC staff finds it difficult to assign a specific impact level for environmental justice effects. Without knowing which populations a new plant may affect, the staff notes that effects to nearby populations will vary from construction stage to operations stage.

  Increased rental housing demand during construction in some locations could disproportionately affect low-income populations. Housing demands will be somewhat mitigated if the plant site is constructed near a metropolitan area, since many construction workers will commute. Also, increased coal consumption may affect employment and environmental conditions in otherwise relatively low-income regions in Pennsylvania, Ohio, or West Virginia. In the absence of specific data, environmental justice impacts for a coal-fired alternative will likely be SMALL to MODERATE and will depend heavily on characteristics of the site and nearby populations.

Table 8-2 summarizes the environmental impacts of the coal-fired alternative.

Table 8-2. Summary of Environmental Impacts of Coal-Fired Generation

Impact Category	Alternate Site	
	Impact	**Comments**
Land use	MODERATE to LARGE	Requires approximately 1000 a (405 ha) for power plant, support buildings, parking, transmission lines, possible rail spur, waste disposal; additional offsite land use impacts for coal and limestone mining.
Ecology	MODERATE	Impacts during construction include habitat fragmentation and runoff into bodies of water; during operation, impacts include cooling water withdrawal and blowdown, as well as deposition of air pollutants.
Water use and quality—surface water	SMALL to MODERATE	Closed-cycle cooling reduces impacts, although potential exists for surface runoff during construction and operation, as well as from waste and coal piles. Surface deposition could increase effects.
Water use and quality—ground water	SMALL	Ground water will likely not be used for cooling; leachate from coal or plant wastes may affect ground water, but this will be regulated and monitored with water usage and discharge permits.
Air quality	MODERATE	Many counties throughout Ohio, Pennsylvania, and West Virginia are nonattainment areas for ozone and $PM_{2.5}$. The coal-fired alternative will emit the following pollutants: Sulfur oxides: 10,100 tons (9150 MT)/yr Nitrogen oxides: 1430 tons (1300 MT)/yr Particulates: 367 tons (333 MT)/yr of TSP 84.5 tons (76.7 MT)/yr of PM_{10} Carbon monoxide: 1430 tons (1300 MT)/yr It will also emit small amounts of mercury, other HAPs, some naturally occurring radioactive materials, and unregulated CO_2.
Waste	MODERATE	Total waste mass will be approximately 514,000 tons/yr of ash and scrubber sludge (after recycling 45 and 79 percent, respectively) requiring approximately 294 a for disposal during the 40-year life of the plant. Construction impacts will be small, with land-clearing waste disposed on site.
Human health	SMALL	Impacts are uncertain, but the plant must comply with health-based emission standards and offset its emissions of ozone-producing NO_x and control PM.
Socioeconomics	SMALL to LARGE	Construction impacts will depend on location, but could be LARGE if plant is located in a rural area where many workers need to temporarily relocate for construction and then leave. Impacts are largest during construction.
Transportation	SMALL to MODERATE	Transportation impacts will be most significant during construction, but will decline during operations. Impacts depend on characteristics of local transportation infrastructure.
Aesthetics	SMALL to MODERATE	Overall, impacts will depend on site characteristics, including local topography. Some plant structures, such as stacks and transmission lines, may be particularly noticeable. Noise impacts could be noticeable.

Table 8-2. (contd)

Impact Category	Alternate Site	
	Impact	**Comments**
Historic and archeological resources	SMALL to MODERATE	Impacts will vary depending on the sensitivity of the site, though site surveys and efforts to avoid particularly sensitive areas will be necessary to prevent greater impacts.
Environmental justice	SMALL to MODERATE	Impacts are heavily dependent on population distribution and makeup at the site.

8.2.2 Natural-Gas-Fired Generation

This section presents an analysis of the environmental impacts of a natural-gas-fired alternative. The NRC staff assumed that a replacement natural-gas-fired plant will use combined-cycle technology because of its significant efficiency advantages over simple-cycle combustion turbines or gas-fired boilers. While combined-cycle plants most commonly supply intermediate-duty cycles, they are also capable of supporting baseload needs.

The NRC staff assumed that a gas-fired alternative will use a closed cycle cooling system because new power plant facilities are required to use measures that reduce impingement and entrainment of fish and shellfish.

In a variety of ways, combined-cycle, gas-fired generation differs significantly from the existing BVPS plant and from the coal-fired alternative. First, in a combined-cycle plant, a combustion turbine generates most of the electricity produced. Unlike the other single-source generation alternatives considered in this section, a combustion turbine is an internal combustion engine that uses combustion gases to directly turn turbine blades (a process called a Brayton cycle). After turning the turbine blades, exhaust with some remaining heat is ducted to a heat recovery steam generator, where it boils water into steam to power a second steam-cycle turbine (a so-called Rankine cycle).

In contrast, the coal and new nuclear options will all rely solely on a steam-turbine cycle (a Rankine cycle) to power the electric generator. In any steam-cycle power plant, some heat sink is necessary to condense the steam back into water so it can be boiled again. In a combined-cycle power plant, only the steam-cycle portion requires a condenser, with the remainder of its waste heat vented to the atmosphere in exhaust gas, while greater thermal efficiencies (nearly 60 percent versus 30–40 percent for nuclear and coal-fired options) will result in less total heat wasted.

Hence, combined-cycle power plants need substantially less cooling water than coal or nuclear plants. In addition, natural-gas-fired, combined-cycle facilities tend to be compact and require little support infrastructure aside from transmission lines and a gas pipeline. They also tend to employ substantially smaller workforces.

For comparison purposes, the NRC staff evaluated a new gas-fired, combined-cycle alternative producing a net capacity of 2000 MWe. This gas-fired alternative consists of five GE S107H units, each producing a net output of 400 MWe (GE 2007). While this alternative produces 8 percent more electricity than the gas-fired alternative suggested by FENOC (and more than the current BVPS), this alternative's thermal efficiency is 12 percent greater than the alternative proposed in the FENOC ER. Thus, emissions levels are lower than the FENOC estimate though power output is higher. Based on available vendor date, the NRC staff considers this configuration to be a realistic alternative to license renewal.

Assuming that 3 percent of the energy produced at the gas-fired alternative will meet onsite loads, the gross output for this alternative is roughly 1940 MWe.

The NRC staff believes that the gas-fired alternative will have a lifespan similar to the 20-year renewal period, although, with refurbishment, the gas-fired alternative may be capable of operating for a longer period of time.

The following sections discuss the overall environmental impacts of the natural-gas-fired generating system. Impacts will be strongly influenced by site characteristics and will tend to be greater if the site has not been previously disturbed.

- Land Use

  Many locations suitable for siting the gas-fired alternative are similar to those considered for the coal-fired alternative, though less overall space is necessary. In the area near BVPS, this means riverside terrace areas are likely locations. FENOC noted in its ER, however, that many of these areas lack gas pipeline access and that constructing pipelines in the relatively rugged surrounding terrain will be difficult and expensive (FENOC 2007). FENOC considered, instead, that a gas-fired option could be constructed in northwest Ohio or southeast Michigan, allowing access to a major pipeline, transmission capacity, suitable land, adequate water supply, and a skilled workforce. It may even be possible to colocate the gas-fired alternative with an existing FirstEnergy-owned gas-fired unit. FENOC indicated that transmission capacity within the region will be adequate to allow a gas-fired alternative to BVPS to be sited near the opposite side of Ohio from the current BVPS plant (FENOC 2007).

  FENOC indicated that approximately 120 a (89 ha) will be necessary to support a gas-fired alternative capable of replacing BVPS. The GEIS, however, estimates 110 a (45 ha) for a 1000-MWe generating station. This amount of land use will include plant structures and associated infrastructure. By scaling GEIS estimates, a 2000-MWe plant will require up to approximately 220 a (89 ha) of land. This amount of land will encompass the plant site, transmission line ROWs, and a rail spur. The NRC staff believes that the FENOC estimate is reasonable. However, if additional land is necessary for a buffer around plant structures or to support transmission lines and gas pipelines, the NRC staff believes the GEIS estimate for land use provides a more useful approximation.

  Land use impacts from construction are likely to be SMALL, although they may be more noticeable at a previously undeveloped site than if collocated with another generating station or on a previously industrial site. Impacts can be further mitigated by constructing new transmission lines in existing ROWs to as great an extent possible.

  In addition to onsite land requirements, land will be required off site for natural gas wells and collection stations. The GEIS estimates that 3600 a (1457 ha) will be required for wells, collection stations, and pipelines to bring the gas to a 1000-MWe generating facility. If this land requirement were scaled directly with generating capacity, an alternative to BVPS could require 7200 a (2910 ha) (though actual requirements will vary significantly). Most of this land requirement will occur in areas where gas extraction already occurs. In addition, some of this natural gas may arrive in the United States as liquefied natural gas and may not be adequately reflected in the GEIS estimates. Furthermore, much of this land is likely already in use for gas extraction and processing. Effects from gas extraction are generally smaller than those for coal mining, as most land around a gas extraction site remains undisturbed, except for that used for roads or a collection pipe network, and site reclamation tends to be less involved.

The elimination of the need for uranium fuel for BVPS Units 1 and 2 will partially offset these offsite land requirements. In the GEIS, the NRC staff estimated that approximately 1000 a (405 ha) will not be needed for mining and processing uranium during the operating life of a 1000-MWe nuclear power plant. For BVPS, roughly 1840 a (745 ha) of uranium mining area will no longer be needed.

Overall land use impacts from a natural-gas-fired power plant will be SMALL to MODERATE, depending on local land use and availability near the proposed site.

- Ecology

As indicated in the Land Use section, constructing the gas-fired alternative will require roughly 220 a (89 ha) of land. These land disturbances form the basis for impacts to terrestrial ecology. (Gas extraction and collection will also affect terrestrial ecology in offsite gas fields, although, as noted in the Land Use section, much of this land is likely already disturbed by gas extraction, and the incremental effects of this alternative on gas field terrestrial ecology are difficult to gauge.)

Impacts will vary based on the degree to which the proposed plant site is already disturbed. On a previously industrial site, impacts to terrestrial ecology will be minor, unless substantial transmission line ROWs, a lengthy pipeline, or additional roads need to be constructed through undisturbed or less-disturbed areas. Constructing ROWs, pipelines, and roads may all have the effect of fragmenting or destroying habitats, though a pipelined fuel source and a small workforce will help to minimize the need for additional transportation infrastructure.

In addition, construction on site may eliminate onsite habitats and alter the site for a long period of time. Some areas on site, such as any buffer areas, may remain undeveloped and could still harbor habitat for terrestrial species, though site lighting, noise, and activities may degrade the value of any remaining ecosystems. Deposition of air pollutants from this alternative may affect terrestrial ecology, but it is unlikely to be noticeable.

Impacts to aquatic ecology are likely during construction. Regardless of where the plant is constructed, site disturbance will likely increase runoff into, and hence turbidity in, nearby waterways. While site procedures and management practices may limit this effect, the impact could be noticeable. Construction effects on water quality are likely to be less significant for the gas-fired alternative than for the coal-fired or nuclear alternatives because the amount of site disturbance is less and many of the major plant components are smaller and require less onsite fabrication. Effects may be noticeable if the gas-fired alternative were constructed alongside or in a body of water, as well as if any new ROWs, roads, or pipeline were to require in-stream structures to support stream crossings. Noise and disturbance from construction, in addition to increased turbidity, may have a noticeable effect.

During operations, the gas-fired alternative will require cooling water, although markedly less than required by the coal-fired alternative, new nuclear alternative, or the existing BVPS. As discussed in the introduction to this alternative, a combination of significantly higher thermal efficiency and reduced need for steam condensing means that the gas-fired alternative will use less than one-third the amount of water necessary for the coal-fired alternative (and less still than BVPS or the new nuclear alternative) and will discharge a smaller amount of effluent.

During operations, disposal of waste materials will have to comply with local and State regulations. Spills occurring during onsite activities will also need to be appropriately handled, and runoff from new impervious surfaces (e.g., roads, rooftops) may affect aquatic ecology. Some deposition of airborne pollutants could occur, and this may affect water quality. Potential effects are substantially smaller than for the coal-fired alternative. Given current regulations, as well as emission controls discussed in the Air Quality section, these impacts may be noticeable but are not likely to be destabilizing. The visibility of these impacts will vary based on how sensitive existing aquatic ecosystems and species are to disturbance and the characteristics of the water body near which the plant is constructed.

Overall impacts on ecology from a gas-fired alternative will likely be SMALL to MODERATE, depending largely on the amount of land disturbed while constructing pipelines or ROWs.

- Water Use and Quality—Surface Water

A gas-fired power plant will likely rely on surface water for cooling and use a closed-cycle cooling system with cooling towers. The heat load managed by the plant's cooling towers will be markedly less than for the other single-source alternatives or BVPS. The impact on surface water will depend on the volume of water needed for makeup water, the plant's discharge volume, and the characteristics of the receiving body of water.[26]

Withdrawal of water may be under the control of a commission, depending on the water body in question, while a State's NPDES program will regulate discharges to any surface body of water. As discussed in the section introduction, this alternative uses significantly

[26] Some gas-fired plants make use of sewage treatment effluent for cooling water supply. This may be an option depending on where the plant is located.

less surface water and discharges less effluent than the existing plant. Site runoff from impervious site surfaces, spills, or deposition of air emissions may have an effect, but it is unlikely to be noticeable. Surface water effects will vary depending on the nature of the water bodies affected. These impacts will likely be SMALL.

- Water Use and Quality—Ground Water

Impacts will depend on whether the plant will use ground water for any purpose, as well as the characteristics of local aquifers. Regardless of location, the NRC staff finds it unlikely that a gas-fired power plant will rely on ground water for plant cooling. Hence, ground water impacts will be SMALL.

- Air Quality

A gas-fired alternative will release a variety of air emissions. Like the coal-fired alternative, a gas-fired plant will emit criteria air pollutants, but in smaller quantities (except NO_x, which requires additional controls to reduce emissions).

The NRC staff's assessment of air quality impacts focused on the effects of power plant operation. The staff acknowledges that commuting workers will also generate air pollutants from personal vehicles, but given the size of plant staff (ranging from the FENOC estimate of 80 employees to the estimate of 300 arrived at by extrapolating workforce numbers in the GEIS), this pollutant source will have a much smaller effect than the plant itself.

During construction, however, the workforce may have an impact when as many as 900 workers (for each construction period, according to FENOC estimates) to 2400 workers (according to estimates extrapolated from the GEIS) will be on site. The GEIS indicates that, for refurbishment of existing nuclear plants, the presence of 2300 additional vehicles could create noticeable impacts in a nonattainment or maintenance area.

As noted in the GEIS, some workers may carpool while others may have traveled to worksites other than the new power plant site, thus reducing the total impact of worker transportation directly attributable to the new site. Also, heavy construction vehicles and motorized equipment will create exhaust emissions, while earth-moving and site-clearing activities will generate fugitive dust. When possible, construction crews will use applicable dust-control measures to reduce these effects. All construction-stage impacts, however, will be intermittent and short lived. (FENOC estimated that several units could be built in two separate building phases, each one lasting 2 to 2.5 years, reflecting the disparate license expiration dates of BVPS Units 1 and 2.)

Gas-fired power plants primarily emit pollutants as a result of combustion conditions. These pollutants include NO_x, CO, and particulates. Regulations in place to reduce potential health effects from air emissions, especially those promulgated in response to the CAA, drive the types of emission controls this gas-fired alternative will use to limit the effect on air quality. CAA mechanisms like New Source Performance Standards, nonattainment areas, SIPs, and specialized programs, including one that limits overall

NO_x emissions throughout the Eastern United States, all drive emission control technologies used in this gas-fired alternative.

NO_x is typically the pollutant of greatest concern for a gas-fired power plant. Given the proper atmospheric conditions, NO_x helps to form ozone as well as smog. Since nonattainment areas for 8-hour ozone standards occur throughout Pennsylvania and Ohio, as well as the two easternmost counties in West Virginia (EPA 2008b), and since requirements for pollutant control in nonattainment areas are stronger than those in attainment areas, the NRC staff considered the more-stringent requirements associated with nonattainment areas in its analysis. In addition, all three States, even if not subject to nonattainment rules for ozone, are subject to restrictions on NO_x during "ozone season."

A new gas-fired generating plant located in a nonattainment area will need a nonattainment area permit and a Title IV operating permit under the CAA. The plant will need to comply with the New Source Performance Standards for such plants as set forth in Subpart DA of 40 CFR Part 60. The standards establish limits for PM and opacity (40 CFR 60.42(a)), SO_2 (40 CFR 60.43(a)), and NO_x (40 CFR 60.44(a)).

Impacts for particular pollutants are as follows:

Sulfur oxides. Based on EPA emissions factors (EPA 2000c), the gas-fired alternative will produce approximately 131 MT/yr (144 tons/yr) of sulfur oxides, expressed as SO_2. A new gas-fired power plant will be subject to the requirements in Title IV of the CAA. Title IV was enacted to reduce emissions of SO_2 and NO_x, the two principal precursors of acid rain, by restricting emissions of these pollutants from power plants. Title IV caps aggregate annual power plant SO_2 emissions and imposes controls on SO_2 emissions through a system of marketable allowances. EPA issues one allowance for each ton of SO_2 that a unit is allowed to emit. New units do not automatically receive allowances, but are required to have allowances to cover their SO_2 emissions. Owners of new units must therefore acquire allowances from owners of other power plants by purchase or reduce SO_2 emissions at other power plants they own. Allowances can be banked for use in future years. Thus, a new gas-fired power plant will not add to net regional SO_2 emissions, although it might do so locally.

Nitrogen oxides. Based on EPA emissions factors (EPA 2000c), the gas-fired alternative will produce approximately 419 MT/yr (462 tons/yr) of NO_x. This level of NO_x emissions relies on dry low NO_x burners and SCR to reduce initial NO_x emissions by more than 90 percent. If located in a nonattainment area, the plant operator will need to purchase emissions allowances to offset this amount of emissions.

In addition, 40 CFR 51.121(e) set the total amount of NO_x that could be emitted by Pennsylvania, Ohio, and West Virginia in the ozone season (May 1 to September 30). The total permitted amount permitted in Pennsylvania in 2007 was 234,152 MT (257,928 tons); in Ohio, the total permitted amount was 226,538 MT (249,541 tons); and in West Virginia, the total permitted amount was 75,755 MT (83,921 tons). The gas-fired alternative will need to offset its emissions through credit purchases or from a set-aside pool to avoid violating future Statewide allowable limits.

Title IV of the CAA establishes technology-based emission limitations for NO_x emissions. A new gas-fired power plant will be subject to standards published in 40 CFR 60.44a(1). This regulation, issued on September 16, 1998 (EPA 1998a), limits the discharge of any gases that contain NO_x (expressed as NO_2) in excess of 86 ng/J of gross energy input (0.20 lb per million Btu), based on a 30-day rolling average. A gas-fired generator is legally permitted to discharge approximately 7690 MT (8470 tons) per year of NO_x. These limitations are sufficiently permissive that a new gas-fired plant in a nonattainment area will not be restricted by them; rather, the requirements associated with nonattainment would drive emissions controls.

Carbon monoxide. Based on EPA emissions factors (EPA 2000c), the gas-fired alternative will emit approximately 87 MT/yr (96 tons/yr) of CO.

PM_{10} particulates. Based on EPA emissions factors (EPA 2000c), the gas-fired alternative will produce approximately 73 MT/yr (81 tons/yr) of PM. All PM emissions generated by the gas-fired alternative will be PM_{10} emissions. Some of these may also be classified as $PM_{2.5}$ emissions, which consist of particulates having an aerodynamic diameter less than or equal to 2.5 μm. PM emissions from the gas-fired alternative are lower than those from the coal-fired alternative, but more than those emitted by the license renewal alternative.

Carbon dioxide. A natural-gas-fired plant will also have unregulated CO_2 emissions of 4.43 million MT/yr (4.88 million tons/yr) that could contribute to climate change (based on EIA emission factors (EPA 2007b)). These impacts, however, are smaller than the effects of the coal-fired alternative, and significantly greater than the effects of license renewal or a new nuclear power plant.

Hazardous air pollutants. In December 2000, EPA issued regulatory findings on HAP emissions from electric utility steam-generating units (EPA 2000b). EPA found that natural-gas-fired power plants emit arsenic, formaldehyde, and nickel (EPA 2000b). Unlike for coal and oil-fired plants, EPA did not determine that emissions of HAPs from natural-gas-fired power plants should be regulated under Section 112 of the CAA.

Visibility protection. In addition to regulations that address particular pollutants, EPA has various regulatory requirements for visibility protection in Subpart P of 40 CFR Part 51, including a specific requirement for review of any new major stationary source in an area designated as attainment or unclassified under the CAA.

Section 169A of the CAA establishes a national goal of preventing future and remedying existing impairment of visibility in mandatory Class I Federal areas (identified in 40 CFR 81.400, et seq.) when impairment results from manmade air pollution. The EPA haze rule specifies that, for each mandatory Class I Federal area located within a State, the State must establish goals that provide for reasonable progress towards achieving natural visibility conditions. The reasonable progress goals must provide for an improvement in visibility for the most-impaired days over the period of the implementation plan and ensure no degradation in visibility for the least-impaired days over the same period (40 CFR 51.308(d)(1)). If the gas-fired alternative were located close to a mandatory Class I area, additional air pollution control requirements could be imposed. Pennsylvania and Ohio contain no Class I areas; West Virginia contains two—the Dolly Sods Wilderness Area and the Otter Creek Wilderness Area. Power plants that could affect the air quality in these areas may be subject to additional restrictions on emissions.

Summary. The NRC staff considers that the overall air quality impact for a new natural-gas-fired plant will be SMALL to MODERATE, depending on the control technology employed during the operating stage and the degree to which a gas-fired alternative affects ozone levels in nearby nonattainment areas.

- Waste

The primary waste component from the gas-fired alternative will be spent catalysts from SCR NO_x removal. Any ash generated from burning natural gas will be emitted by the gas-fired alternative as PM. In the GEIS, the NRC staff concluded that waste generation from gas-fired technology will be minimal. Waste generation will be minor compared to the other alternatives considered and will consist primarily of industrial and municipal waste.

During construction of the gas-fired alternative, crews will generate waste from land clearing and grading, as well as other construction activities. Most waste from land clearing can be disposed of on site, and total disturbed area will be small. Building on a previously developed site, such as a site formerly used for industrial purposes or one that already contains a power plant, could minimize land-clearing waste, although some previous industrial sites may have onsite pollution issues that complicate development. Many wastes generated by the construction project, including metal scrap, have significant recycling value and there are likely to be markets for beneficial reuse.

Overall, the waste impacts will be SMALL for a natural-gas-fired plant site.

- Human Health

Human health effects of gas-fired generation are generally low, although in Table 8-2 of the GEIS, the NRC staff identified cancer and emphysema as potential health risks from gas-fired plants. These risks are likely attributable to NO_x emissions that contribute to ozone formation, which in turn contributes to health risks. Emission controls on this gas-fired alternative maintain NO_x emissions well below air quality standards established for the purposes of protecting human health, and emissions trading or offset requirements mean that overall NO_x in the region will not increase. Health risks to workers may also result from handling spent catalysts that may contain heavy metals. Overall, the impacts on human health of the natural-gas-fired alternative are likely to be SMALL.

- Socioeconomics

The NRC staff concluded in the GEIS that the socioeconomic impacts from constructing and operating a natural-gas-fired plant will not be very noticeable and that the small operational workforce will result in the lowest socioeconomic impacts of any nonrenewable technology. Compared to the coal-fired and nuclear alternatives, the smaller size of the construction workforce, the shorter construction timeframe, and the smaller size of the operations workforce will mitigate socioeconomic impacts.

FENOC indicated that 500–900 workers will be necessary to construct this alternative (FENOC 2007), working two, 2- to 2.5-year construction periods. Sites in rural areas may experience greater socioeconomic impacts during construction, including rental housing and public or social service demands, if 900 workers need to relocate to the area and then leave after 2 to 2.5 years.

These impacts could be moderated if the plant site is near an urban area with many skilled workers. The relative economic contributions of relocating workers to local business and tax revenues will also vary with the size and variety of the area's existing economic base.

After construction, local communities may be affected by the loss of the construction jobs and associated loss of business, while rental housing markets could experience increased availability and decreased prices. As noted in the GEIS, the socioeconomic impacts at a rural site will be larger than at an urban site because more of the construction workforce will need to move closer to the construction site, as well as having a proportionally larger effect. Construction impacts, then, could range from SMALL to MODERATE, depending on site characteristics.

Following construction, a gas-fired alternative will provide up to 80 jobs, based on FENOC estimates, or up to 300 jobs based on extrapolated estimates in the GEIS. These additional workers will be unlikely to have a major socioeconomic effect.

Socioeconomic impacts associated with construction and operation of a natural-gas-fired power plant would likely be SMALL to MODERATE.

- Transportation

Transportation impacts associated with construction and operations will depend on the population density and transportation infrastructure in the vicinity of the site. Transportation impacts vary significantly depending on characteristics of nearby roadways. In addition to commuting workers, trucks will transport some construction materials to the worksite. These vehicles will increase potential effects. Furthermore, pipeline construction or modification to existing pipeline systems may have an additional, short-lived impact.

Transportation impacts will almost disappear during operations. The maximum number of plant operating personnel will be approximately 80 workers, although the GEIS indicates that as many as 300 could be required. Even so, since fuel is transported by pipeline, most transportation infrastructure will experience little increased use from plant operations.

Overall, the gas-fired alternative will likely create SMALL impacts on transportation, with impacts varying based on existing transportation infrastructure capacity and demand, as well as on how the local infrastructure handles the effects during construction.

- Aesthetics

The five gas-fired units will be approximately 100 ft (30 m) tall, while each of the five exhaust stacks will be at least 175 ft (53 m) tall and perhaps taller to account for local topography. Some structures may require aircraft warning lights. If the plant is located near the existing BVPS, impacts may be moderated as higher elevation ridges along the river valley make it difficult to see or hear the plant outside of the river valley. In northwest Ohio, however, topography is less likely to screen the plant. Associated infrastructure will generally be smaller and less noticeable than that of the existing BVPS plant. The gas-fired plant's mechanical draft cooling towers will be markedly shorter than natural-draft towers, but they will likely generate condensate plumes and operational noise.

In addition to the plant buildings, the plant site may require new transmission lines and a new gas pipeline. Transmission lines may create lasting effects, but pipeline construction will create only short-term impacts.

On both sites, plant operating noise will be limited to industrial processes and communications. Unlike the other alternatives the staff considered, pipelines deliver the necessary fuel, thus eliminating the need for handling or other transportation equipment. Noise from pipelines may be audible off site near compressors.

In general, plant effects on aesthetics are unlikely to be noticeable outside of the plant's immediate vicinity. Impacts are likely to be SMALL to MODERATE, depending mostly on the amount of new transmission line required.

- Historic and Archeological Resources

It is difficult to determine the effects on historic and archeological resources when a specific site has not been selected. Sites vary greatly in terms of their potential for historic or archeological resources and any previous characterization of existing resources. To protect resources on site, any proposed areas will need to be surveyed to identify and record existing historic and archeological resources, to identify cultural resources, and to develop possible mitigation measures to address any adverse effects from ground-disturbing actions. Studies will be needed for all areas of potential disturbance at the proposed plant site and along associated corridors where new construction will occur (e.g., roads, transmission corridors, pipelines, or other ROWs). In most cases, project proponents should avoid areas with the greatest sensitivity.

Depending on the resource richness of the site ultimately chosen for the gas-fired alternative, impacts could range from SMALL to MODERATE.

- Environmental Justice

  Environmental justice effects occur when the effects identified under previous resource areas in this section adversely and disproportionately affect minority or low-income populations. In the case of a potential future power plant constructed at an unknown site, the NRC staff finds it difficult to assign a specific impact level for environmental justice effects. Without knowing which populations a new plant may affect, the staff notes that the effects to nearby populations will vary from construction stage to operations stage. Increased rental housing demand during construction in some locations could disproportionately affect low-income populations. Housing demands could be somewhat mitigated if the plant site is constructed near a metropolitan area, since many construction workers will commute. In the absence of specific data, environmental justice impacts for a gas-fired alternative will likely be SMALL to MODERATE and will heavily depend on the characteristics of the site and nearby populations.

Table 8-3 summarizes the environmental impacts of the natural-gas-fired generating system.

8.2.3 New Nuclear Power Generation

Since 1997, the NRC has certified four new standard designs for nuclear power plants under Subpart B, "Standard Design Certifications," of 10 CFR Part 52, "Early Site Permits; Standard Design Certifications; and Combined Licenses for Nuclear Power Plants." These designs are the 1300-MWe U.S. Advanced Boiling Water Reactor (US-ABWR) (Appendix A, "Design Certification Rule for the U.S. Advanced Boiling Water Reactor," to 10 CFR Part 52), the 1300-MWe System 80+ design (Appendix B, "Design Certification Rule for the System 80+ Design," to 10 CFR Part 52), the 600-MWe AP600 design (Appendix C, "Design Certification Rule for the AP600 Design," to 10 CFR Part 52), and the 1100-MWe AP1000 design (Appendix D, "Design Certification Rule for the AP1000 Design," to 10 CFR Part 52). Four additional designs are undergoing certification review, and four others are undergoing preapplication reviews. All of the plants currently certified or awaiting certification are light-water reactors; several of the designs in precertification review are not, including the pebble bed modular reactor and the advanced CANDU reactor (ACR)-700 (NRC 2007a). The NRC received several combined operating license (COL) applications in 2007 and 2008 and has approved several early site permits (ESPs) The NRC expects additional COL applications throughout the remainder of 2008 and more in subsequent years. Several of these COL applications have referenced designs not yet certified.

FENOC noted in its ER that it did not believe that adequate time existed before the 2016 expiration of the BVPS Unit 1 OL for licensing and construction of a new reactor. Consequently, FENOC did not consider a new reactor to be a reasonable alternative. Some in the industry have indicated that a minimum of 7 to 8 years is necessary to license and construct a new unit (*Nucleonics Week* 2008). As of the date of publication, BVPS Unit 1 can operate 8 more years under the current OL; thus, the NRC staff did consider a new nuclear plant as an alternative to BVPS.

Table 8-3. Summary of Environmental Impacts of Natural-Gas-Fired Generation

Impact Category	Alternate Site	
	Impact	**Comments**
Land use	SMALL to MODERATE	Requires approximately 220 a (89 ha) for power plant, support buildings, parking, transmission lines; additional offsite land use impacts for natural gas extraction.
Ecology	SMALL to MODERATE	Impacts during construction include habitat fragmentation and runoff into bodies of water; impacts during operation include cooling water withdrawal and blowdown, as well as deposition of air pollutants.
Water use and quality—surface water	SMALL	This alternative requires relatively little cooling water, and closed-cycle cooling reduces impacts. Potential exists for surface runoff during construction and operation. Deposition of air pollutants may increase effects.
Water use and quality—ground water	SMALL to MODERATE	Ground water will likely not be used for cooling.
Air quality	SMALL to MODERATE	Many counties throughout Ohio, Pennsylvania, and West Virginia are nonattainment areas for ozone and $PM_{2.5}$. The gas-fired alternative will emit the following pollutants: Sulfur oxides: 140 tons (308000 lbs.)/yr Nitrogen oxides: 462 tons (1016400 lbs.)/yr Particulates: 81 tons (178200 lbs.)/yr of TSP, all PM_{10} Carbon monoxide: 96 tons/yr It would also emit small amounts other HAPs, as well as unregulated CO_2.
Waste	SMALL	Waste will consist primarily of industrial and municipal waste. Construction impacts will be small, with land-clearing waste disposed on site.
Human health	SMALL	Impacts are uncertain, but the plant must comply with health-based emission standards and offset its emissions of ozone-producing NO_x.
Socioeconomics	SMALL to MODERATE	Construction impacts will depend on location, but will be larger if the plant is located in a rural area where many workers will need to temporarily relocate for construction and then leave. Impacts are largest during construction.
Transportation	SMALL	Transportation impacts will be most noticeable during construction and will decline during operations; pipelined fuel reduces impacts.
Aesthetics	SMALL to MODERATE	Overall impacts will depend on site characteristics, including local topography. Transmission lines may be particularly noticeable. Noise impacts could be noticeable.
Historic and archeological resources	SMALL to MODERATE	Impacts will vary depending on the sensitivity of the site, though site surveys and efforts to avoid particularly sensitive areas will be necessary to prevent greater impacts.
Environmental justice	SMALL to MODERATE	Impacts are heavily dependent on population distribution and makeup at the site.

The NRC staff assumed that the new nuclear plant will have a 40-year lifetime, although license renewal could allow operation beyond the initial license. To replace the power generation capacity currently at BVPS, a new reactor will need to generate approximately 1900 MWe, allowing for a 3-percent internal consumption rate. None of the reactor models currently certified or under precertification review will allow for an exact replacement of BVPS capacity. The closest fit, three AP600 units, is not a possibility since Westinghouse no longer offers the AP600. Two AP1000 units (totaling roughly 2200 MWe) or one European Pressurized Reactor or US- Advanced Pressurized Water Reactor (both undergoing certification review), with a projected output of 1600 MWe per unit, provide the closest approximations. Impact analyses in this section will not reference a particular design, and impacts will be generally applicable to all designs. These qualitative analyses are not intended to take the place of—or prejudice—the indepth environmental analysis that will accompany an actual application review of an ESP or COL.

The NRC staff has already addressed many of the likely environmental effects of a new nuclear plant in its regulations applicable to currently operating reactors. New reactors are likely to be similar, although not necessarily identical, to existing reactors in terms of their effects on the environment.

Table S-3 of 10 CFR 51.51, "Uranium Fuel Cycle Environmental Data—Table S-3," summarizes environmental data associated with the uranium fuel cycle. The impacts in Table S-3 address a 1000-MWe unit and must be adjusted to reflect the impacts of a 1900-MWe plant (allowing for approximately 3 percent internal consumption). Table S-4 of 10 CFR 51.52, "Environmental Effects of Transportation of Fuel and Waste—Table S-4," summarizes the environmental impacts associated with transporting fuel and waste to and from a power reactor. The summary of the NRC's findings on NEPA issues for license renewal of nuclear power plants in Table B-1 of Appendix B to Subpart A of 10 CFR Part 51 is also relevant to the operation of a replacement nuclear power plant, although it is not relevant to the evaluation of the environmental impacts.

The following sections discuss the overall impacts of the new nuclear power generation alternative, excepting those issues already addressed. The extent of the impacts depends on the site's location and characteristics.

- Land Use

  Many locations suitable for siting the new nuclear alternative (especially flat terrace areas along rivers, which is a common siting practice for power plants in this part of the United States) may have been disturbed in part or entirely by previous development. In some locations, brownfields, or sites that were previously industrial and still contain some level of degradation from the earlier industrial activity, may be the most likely sites. Sites along rivers in this area are likely to have easier access to transportation for fuel and major components, both by barge (directly on the river) and by train (some railways run the length of major river valleys). Sites that have previously been used for industrial activities may have existing rail spurs and dock/pier infrastructure and may be closer to transmission lines.

  The GEIS indicates that new light-water reactors can require 500 to 1000 a (202 to 405 ha) per reference 1000-MWe unit. If the impact is scaled directly with plant size, a 1900-MWe new nuclear plant would require approximately 950 to 1900 a (384 to

769 ha). This amount of land will encompass the plant site, transmission line ROWs, and a rail spur, as well as additional buffer space. Based on land use for other nuclear power plants, including the existing BVPS, the NRC staff believes this estimate is reasonable, though it could overstate the land requirement in some cases.

A new plant will trigger no net change in land needed for uranium mining because uranium mined for the new nuclear plant will offset fuel mined for the existing BVPS. Land use may be affected for a longer period of time following shutdown if plant ownership elects to leave the plant in a SAFSTOR status. Once decommissioning and decontamination is complete, however, land should be available for unrestricted use.

The overall impacts from the new nuclear alternative will likely be MODERATE, depending on the location of the plant. Some portion of this impact could be mitigated by constructing new transmission lines in existing ROWs to as great an extent as possible.

- Ecology

As indicated in the Land Use section, constructing the new nuclear alternative will require 950 to 1900 a (384 to 769 ha) of land for plant structures and associated infrastructure. (Since land used for uranium mining will likely not change, no additional offsite land use is expected.) These land disturbances form the basis for impacts to terrestrial ecology.

Impacts will vary based on the degree to which the proposed plant site is already disturbed. On a previously industrial site, impacts to terrestrial ecology will be minor, unless substantial transmission line ROWs, a lengthy rail spur, or additional roads need to be constructed through undisturbed or less-disturbed areas. Constructing ROWs, rails, and roads may all have the effect of fragmenting or destroying habitats. In addition, construction on site, especially of plant structures, may eliminate onsite habitats and alter the site for a long period of time. Some areas on site, such as any buffer areas, may remain undeveloped and could still harbor habitat for terrestrial species; however, site lighting, noise, and activities may degrade the value of any remaining ecosystems. All waste generated by the plant, with the exception of spent fuel, is likely to be transported off site for disposal in areas already designated for use as waste disposal sites. Eventually, spent fuel will also leave the site after an interim onsite period.

Impacts to aquatic ecology are likely during construction. Regardless of where the plant is constructed, site disturbance will likely increase runoff into nearby waterways. While site procedures and best management practices may limit this effect, the impact will likely be noticeable. This is particularly the case when intake and outfall structures are constructed alongside or in the body of water, as well as if any ROWs, roads, or rail lines require in-stream structures to support stream crossings. Noise and disturbance from construction, in addition to increased turbidity, may have a noticeable effect.

Following construction, the greater thermal efficiency of the new nuclear alternative versus the existing BVPS (even after allowing for internal consumption) will allow for slightly less water consumption for cooling and blowdown. During operations, disposal of nonradioactive waste materials must comply with local and State regulations, some of which are intended to prevent runoff into surface water. Spills occurring during onsite activities will need to be appropriately handled, and runoff from new impervious surfaces (e.g., roads, rooftops) may affect aquatic ecology. Given current regulations, these impacts are not likely to be noticeable, although they could be in some situations. The visibility of these impacts will vary based on how sensitive existing aquatic ecosystems and species are to disturbance and the characteristics of the water body near which the plant is constructed.

Overall impacts on ecology from a new nuclear alternative will likely be SMALL to MODERATE.

- Water Use and Quality—Surface Water

A new nuclear plant will likely rely on surface water for cooling and use a closed-cycle cooling system with cooling towers. The impact on the surface water will depend on the volume of water needed for makeup water, the plant's discharge volume, and the characteristics of the receiving body of water. Withdrawal of water may be under the control of a commission, depending on the water body in question, while a State's NPDES program will regulate discharges to any surface body of water. As discussed in the Ecology section, this alternative will use slightly less surface water than the existing plant, though runoff from impervious site surfaces, spills, or deposition of air emissions could have a noticeable effect. Surface water impacts will vary significantly depending on the nature of the water bodies affected. These impacts will likely be SMALL to MODERATE.

- Water Use and Quality—Ground Water

Impacts will depend on whether the plant will use ground water for any purposes, as well as the characteristics of local aquifers. Effects to ground water quality will also depend somewhat on waste-management practices. Regardless of location, the NRC staff finds it highly unlikely that a new nuclear power plant will rely on ground water for plant cooling and believes that ground water and waste management regulations will result in SMALL impacts.

- Air Quality

Whereas air quality impacts analysis for the gas-fired and coal-fired alternatives focused on the direct effects of power plant operation, the new nuclear alternative will have very limited operational effects on air quality and will emit far less air pollution than either the coal- or gas-fired alternatives. During operation, a nuclear alternative will emit essentially no air pollution except that associated with the testing and use of diesel generators. These generators run for several hours to several days per year. Operating emission impacts will be similar to those of the existing BVPS, which the NRC staff found to be SMALL in the GEIS.

During construction, however, commuting workers will generate air pollutants from personal vehicles, assuming that 3800 to 5500 workers will be on site. (This assumption is based on GEIS estimates—the first number is an extrapolation of the GEIS minimum estimate for the peak workforce at a 1000-MWe advanced light-water reactor, and the second is the maximum GEIS estimate. However, the NRC staff believes that extrapolating this larger number for a 1900-MWe plant yields an unreasonably large estimate.) The GEIS indicates that, for refurbishment of existing nuclear plants, the presence on site of 2300 additional workers' vehicles could create noticeable impacts in a nonattainment or maintenance area. As also noted in the GEIS, some workers may carpool while others may be traveling to the plant site instead of other worksites, thus reducing somewhat the comparative impact of worker transportation.

Heavy construction vehicles and motorized equipment will create exhaust emissions, while earth-moving and site-clearing activities will generate fugitive dust. When possible, construction crews will use applicable dust-control measures to reduce these effects. All construction-stage impacts, however, will be intermittent and short lived, perhaps up to 5 or 6 years.

Table S-3 in 10 CFR 51.51[27] provides additional information on emissions from the nuclear fuel cycle.

Following the framework developed in the GEIS for refurbishment impacts, air quality impacts will be SMALL to MODERATE if the facility is constructed in a nonattainment or maintenance area.

- Waste

Table B-1 of Appendix B to Subpart A of 10 CFR Part 51 sets out the waste impacts associated with operation of a nuclear power plant. Wastes include radioactive, mixed, industrial (such as hazardous), and municipal wastes. Most wastes will be industrial or municipal in nature. Construction-related debris will be generated during construction activities and either disposed of on site or removed to another site for disposal. In addition, many construction wastes can be recycled. Overall, waste impacts will be SMALL and similar to those of the currently operating BVPS plant.

[27] Table S-3 quantifies emissions of gases released during the fuel cycle, with the exception of unregulated CO_2. Using Table S-3 and EIA conversion factors, this new nuclear alternative's fuel cycle will emit roughly 797,000 tons (723,000 MT) of CO_2 (EIA 2007b). EIA indicates that nuclear power plants emit no CO_2 from operations, although diesel generators add small amounts.

- Human Health

In Table B-1 of Appendix B to Subpart A of 10 CFR Part 51, the NRC established human health impacts for operating nuclear power reactors. Overall, the Commission determined that human health impacts will be SMALL, except for those associated with microbiological organisms and acute electromagnetic shock. The NRC staff expects the new nuclear alternative to comply with electrical codes and use cooling towers for heat dissipation, making it likely that all human health impacts will be SMALL.

- Socioeconomics

The construction period and the peak workforce associated with construction of a new nuclear power plant are currently unquantified, but licensing and construction could take 7 to 8 years (*Nucleonics Week* 2008). Given that some activities addressed by the staff as construction have been allowed under limited work authorizations, the construction phase for purposes of this analysis could last 5 to 6 years, during which up to 5500 workers may be on site (according to the GEIS).

During the 5- to 6-year construction period, the communities surrounding the plant site will experience increased demand for rental housing and public services, although these effects may be moderated if the plant site is near an urban area with many skilled workers. The relative economic contributions of these relocating workers to local business and tax revenues will also vary with the size and variety of the area's existing economic base.

After construction, local communities may be affected by the loss of the construction jobs and associated loss of business, while rental housing markets could experience increased availability and decreased prices. As noted in the GEIS, the socioeconomic impacts at a rural site will be larger than at an urban site, because more of the construction workforce will need to move closer to the construction site, as well as having a proportionally larger effect. Construction impacts, then, could range from SMALL to LARGE, depending on site characteristics.

The new plant's operational workforce will likely be similar to the 993 currently employed by BVPS, though it could be smaller. Operations impacts will likely be SMALL to MODERATE, depending on the characteristics of the communities near the site.

Overall, socioeconomic impacts of a new nuclear power plant will be SMALL to LARGE.

- Transportation

Transportation impacts are likely to be largest during construction. During the construction period, up to 5500 workers may be commuting to the site. Transportation effects will vary significantly depending on the characteristics of nearby roadways. In addition to commuting workers, trucks will transport construction materials to the worksite. These vehicles will increase potential effects. Further, trains or barges will be used to deliver large components to the plant site.

The new nuclear alternative may employ a workforce similar in size to the 993 currently at BVPS. In addition to commuting workers, deliveries will arrive by truck, rail, or barge, including fresh fuel, replacement parts, and maintenance supplies.

Overall, the new nuclear alternative will likely have SMALL to MODERATE impacts on transportation, although impacts will vary based on existing transportation infrastructure capacity and demand. Impacts will occur primarily during construction.

- Aesthetics

At an alternate site, the NRC staff expects aesthetic impact from buildings, cooling towers, the plumes associated with the cooling towers, and transmission lines. Natural-draft cooling towers, like the current BVPS towers, may be several hundred feet tall and topped with condensate plumes. Mechanical draft towers will also generate condensate plumes, but will be markedly shorter than natural-draft towers. Other buildings on site may also affect aesthetics, as could construction of new transmission lines. Noise and light from plant operations, as well as lighting on plant structures, may be detectable off site.

If the new nuclear alternative is located along a river valley terrace, then its impacts may be moderated by higher elevation ridges along the river valley which would make it difficult to see or hear the plant outside of the river valley. Aesthetic impacts could be further mitigated if the plant were located in an industrial area adjacent to other power plants. Overall, the aesthetic impacts associated with the new nuclear alternative will likely be SMALL to MODERATE, depending on local site characteristics, such as geographic relief or proximity to areas where visual resources are particularly valued.

- Historic and Archeological Resources

It is difficult to determine the effects on historic and archeological resources when a specific site has not been selected. Sites vary greatly in terms of their potential for historic or archeological resources and any previous characterization of existing resources. To protect resources on site, any proposed areas will need to be surveyed to identify and record existing historic and archeological resources, to identify cultural resources, and to develop possible mitigation measures to address any adverse effects from ground-disturbing actions. Studies will be needed for all areas of potential disturbance at the proposed plant site and along associated corridors where new construction will occur (e.g., roads, transmission corridors, rail lines, or other ROWs). In most cases, project proponents should avoid areas with the greatest sensitivity.

Depending on the resource richness of the site ultimately chosen for the new nuclear alternative, impacts could range from SMALL to MODERATE.

- Environmental Justice

Environmental justice effects occur when the effects identified under previous resource areas in this section adversely and disproportionately affect minority or low-income populations. In the case of a potential future power plant constructed at an unknown site, the NRC staff finds it difficult to assign a specific impact level for environmental justice effects.

Without knowing which populations a new plant may affect, the staff notes that effects to nearby populations will vary from construction stage to operations stage. Increased rental housing demand during construction in some locations could disproportionately affect low-income populations. Housing demands could be somewhat mitigated if the plant site is constructed near a metropolitan area, since many construction workers will commute.

In the absence of specific data, the staff expects the environmental justice impacts for a new nuclear alternative to be SMALL to MODERATE and heavily dependent on the characteristics of the site and nearby populations. Table 8-4 summarizes the environmental impacts of new nuclear power generation.

8.2.4 Purchased Electrical Power

BVPS exists in the footprint of the PJM, a large, competitive wholesale electrical market, although most of FirstEnergy's generating assets exist in areas administered by the Midwest Independent System Operator (MISO). Both systems allow for distribution and sale of electricity from generating assets throughout the regions in which they operate. PJM and MISO both allow the sale of energy across State borders. Reliability First Corporation (RFC) enforces reliability standards in all PJM and MISO areas in which FirstEnergy operates. In the ER, FENOC asserted that an insufficient amount of purchase power capacity will exist in the future to allow replacement of BVPS with purchased power (FENOC 2007), based on current demand growth projections for the RFC region included in the North American Electric Reliability Corporation (NERC) report entitled, "2006 Long Term Reliability Assessment" (NERC 2006). According to the NERC 2007 report entitled, "2007 Long Term Reliability Assessment" (NERC 2007), capacity constraints remain beyond 2012. The NRC staff believes it is likely that additional resources will emerge by the time the BVPS Unit 1 OL expires in 2016 and Unit 2 OL expires in 2027, but the staff is less certain about whether resources will be sufficient to support a purchased power alternative. Regardless, the staff evaluated the possible impacts of this alternative as summarized in the following paragraphs.

Since much of the capacity available throughout PJM and MISO consists of coal, natural gas, or nuclear power, impacts will likely be similar to those of the previously described options. If the FENOC power purchases cause currently existing capacity to operate at higher capacity factors rather than triggering new construction, then construction-stage impacts would be eliminated. However, in that case, it is likely that purchased power will come from older, less efficient plants; plants with once-through cooling; or plants without modern emission controls. As such, impacts are difficult to quantify, although they are likely to be similar to those of other alternatives considered in Sections 8.2.1 through 8.2.3 of this draft SEIS, as well as in the GEIS.

Table 8-4. Summary of Environmental Impacts of New Nuclear Power Generation

Impact Category	Alternate Site	
	Impact	Comments
Land use	MODERATE	Requires up to 1900 a (769 ha) for power plant, support buildings, parking, transmission lines, and possible rail spur; no net change in uranium mining area.
Ecology	SMALL to MODERATE	Impacts during construction include habitat fragmentation and runoff into bodies of water; during operation, impacts include cooling water withdrawal and blowdown, as well as deposition of air pollutants.
Water use and quality—surface water	SMALL to MODERATE	Closed-cycle cooling reduces impacts, although potential exists for surface runoff during construction and operation.
Water use and quality—ground water	SMALL	Ground water would likely not be used for cooling, although it could be used for domestic or service water.
Air quality	SMALL to MODERATE	Many counties throughout Ohio, Pennsylvania, and West Virginia are nonattainment areas for ozone and $PM_{2.5}$. The GEIS indicates that more than 2300 workers on site could affect air quality in nonattainment areas.
Waste	SMALL	Wastes will consist primarily of industrial and municipal wastes, with some radioactive or mixed waste. Construction impacts will be small, with land-clearing waste disposed on site.
Human health	SMALL	The plant will need to operate within regulatory limits.
Socioeconomics	SMALL to LARGE	Construction impacts will depend on location, but could be LARGE if plant is located in a rural area where many workers will temporarily relocate for construction and then leave. Impacts are largest during construction.
Transportation	SMALL to MODERATE	Transportation impacts will be most significant during construction and decline during operations. Impacts will depend on characteristics of local transportation infrastructure.
Aesthetics	SMALL to MODERATE	Overall impacts will depend on site characteristics, including local topography. Some plant structures, such as cooling towers and transmission lines, may be particularly noticeable. Noise impacts could be noticeable.
Historic and archeological resources	SMALL to MODERATE	Impacts will vary depending on the sensitivity of the site, and site surveys and efforts to avoid particularly sensitive areas will be necessary to prevent greater impacts.
Environmental justice	SMALL to MODERATE	Impacts are heavily dependent on population distribution and makeup at the site.

Given the location of BVPS, it is unlikely that FENOC will be able to purchase power from Canada or Mexico to replace the plant's capacity, regardless of whether either country has sufficient existing export capacity.

Since purchased power may come from a variety of generating resources, including coal, natural gas, nuclear, hydroelectric, and perhaps oil-fired installations (where previous NRC documents, including past SEISs and the GEIS, determined the impacts to be similar to or larger than those of natural-gas-fired generation), the NRC staff evaluation indicates that impacts from the purchased power alternative will be greater than the impacts of license renewal.

8.2.5 Other Alternatives

This section discusses energy alternatives that the staff has determined are not individually sufficient to serve as alternatives to issuing the renewed BVPS OL.

8.2.5.1 *Oil-Fired Generation*

EIA projects that oil-fired plants will account for very little of the new generation capacity in the United States during the 2007 to 2030 time period. Further, overall oil consumption for electricity generation will decrease because of higher fuel costs and lower efficiencies (EIA 2007a).

The variable costs of oil-fired generation tend to be greater than those of the nuclear or coal-fired options, and oil-fired generation tends to have greater environmental impacts than natural-gas-fired generation. In addition, future increases in oil prices are expected to make oil-fired generation increasingly more expensive. The high cost of oil has prompted a steady decline in its use for electricity generation. As such, the NRC staff did not consider oil-fired generation as an alternative to BVPS license renewal.

8.2.5.2 *Windpower*

Windpower, by itself, is not suitable for large baseload capacity. As discussed in Section 8.3.1 of the GEIS, wind has a high degree of intermittency and low average annual capacity factors (up to 30 to 40 percent). Windpower, in conjunction with energy storage mechanisms or another readily dispatchable power source, like hydropower, could serve as a means of providing baseload power. Current energy storage technologies are too expensive for windpower to serve as a large baseload generator. While Pennsylvania, Ohio, and West Virginia combined may contain hydropower resources to pair with wind capacity sufficient to replace BVPS (INEEL 1997a, 1997b, 1998), this capacity occurs primarily in small installations. As noted in Section 8.2.5.4 of this SEIS, the large number of installations and attendant environmental effects of many new hydropower installations prevented the NRC staff from evaluating hydropower as a stand-alone alternative. These effects also make it unlikely that a suitable amount of hydropower capacity could back up the wind capacity necessary to replace BVPS.

The Commonwealth of Pennsylvania is mostly a windpower Class 1 region, although some areas, particularly along ridgelines, may provide wind classes ranging from 4 to 6 (DOE 2003a).

Ohio is mostly a windpower Class 1 State as well, although significant portions of northwestern Ohio are Class 2 (DOE 2004). Ohio's best wind resources exist off shore in Lake Erie, where windpower Classes 4 and 5 exist near the northeastern Ohio shoreline. Some Class 6 resources exist mid-lake. (To date, no wind projects have been constructed offshore in the United States.) West Virginia is also mostly a windpower Class 1 State, with Class 2 and higher resources along highlands and ridges in the east-central part of the State. Some resources may reach Class 6 and 7 (DOE 2003b).

Wind turbines are economical in windpower Classes 4 through 7, which have average windspeeds of 12.5 to 21.1 miles per hour (20 to 34 kilometers per hour) (DOE 2007).

Through the end of 2007, operators had installed 367 MWe of windpower capacity throughout Pennsylvania, Ohio, and West Virginia. All of this capacity has been installed since 1999. Most of this capacity (294 MWe) occurs in Pennsylvania (DOE 2008). While installed levels of windpower in Pennsylvania, Ohio, and West Virginia are relatively low, windpower installation in Pennsylvania has accelerated.

As noted by the NRC staff in the draft SEIS for the Susquehanna Steam Electric Station, PJM (encompassing nearly all of Pennsylvania and West Virginia and most of Ohio) has a maximum potential of 6658 MWe of wind capacity with an achievable potential of 665 MWe to 1995 MWe. Given that this capacity will function at a 30–40-percent capacity factor, it is unlikely that there will be sufficient windpower potential to replace BVPS. Even allowing for substantial capacity in the areas of Ohio under MISO control, more than 4500 MWe of wind capacity (assuming a higher-than-average 40-percent capacity factor) will be needed to replace the energy produced by BVPS. However, even this capacity will not ensure availability of electricity at most times, making it unsuitable for stand-alone baseload generation purposes. Therefore, the NRC staff does not consider windpower to be a stand-alone alternative to BVPS license renewal.

8.2.5.3 *Solar Power*

Solar technologies use the sun's energy to produce electricity. Currently, the BVPS site receives approximately 4 to 4.5 kWh per square meter per day (approximately 0.4 kWh of solar radiation per square foot per day), as does much of Pennsylvania, Ohio, and West Virginia (NREL 2008), assuming collectors oriented at an angle equal to the installation's latitude. Since flat-plate photovoltaics tend to be roughly 25 percent efficient, a solar-powered alternative will require at least 8250 to 9290 a (3340 to 3760 ha) of collectors to provide an amount of electricity equivalent to that generated by BVPS. Space between parcels and associated infrastructure increase this land requirement. This amount of land, while large, is consistent with the land required for coal and natural gas fuel cycles. In the GEIS, the NRC staff noted that, by its nature, solar power is intermittent (i.e., it does not work at night and cannot serve baseload when the sun is not shining), and the efficiency of collectors varies greatly with weather conditions. A solar-powered alternative will require energy storage or a backup power supply to provide electric power at night. Given the challenges in meeting baseload requirements, the NRC did not evaluate solar power as an alternative to license renewal of BVPS.

8.2.5.4 *Hydropower*

According to researchers at Idaho National Energy and Environmental Laboratory, Pennsylvania, Ohio, and West Virginia have a combined capacity of 4383.7 MWe of technically available, undeveloped hydroelectric resources at 104 sites throughout the states (INEEL 1997, 1997a, 1998). This amount occurs primarily in small installations generating 10 MWe or less; however, three sites in West Virginia and one in Pennsylvania are capable of providing at least 100 MWe. These sites are scattered widely across the three-state region. The NRC staff notes that the total available hydropower potential is greater than the capacity considered for the other alternatives to license renewal, although many sites may not be available for development. In addition, the staff did not screen these sites for environmental acceptability. Given the large numbers of individual installations needed to replace the BVPS capacity and the potential detrimental environmental effects of fully exploiting this capacity, the NRC staff did not evaluate hydropower as an alternative to license renewal.

8.2.5.5 *Geothermal Energy*

Geothermal energy has an average capacity factor of 90 percent and can be used for baseload power where available. However, geothermal electric generation is limited by the geographical availability of geothermal resources (NRC 1996). As illustrated by Figure 8.4 in the GEIS, no feasible eastern location for geothermal capacity exists to serve as an alternative to BVPS. The NRC staff concluded that geothermal energy is not a reasonable alternative to renewal of the BVPS OLs.

8.2.5.6 *Wood Waste*

In 1999, DOE researchers estimated that Pennsylvania, Ohio, and West Virginia have existing biomass fuel resources consisting of urban, mill, agricultural, and forest residues, as well as speculative potential for energy crops. Excluding potential energy crops, DOE researchers projected that the three States collectively had 15.4 million MT (16.9 million tons) of plant-based biomass available at $50 per ton (in 1995 dollars) delivered (Walsh et al. 2000). The Bioenergy Feedstock Development Program at Oak Ridge National Laboratory estimated that each air-dry pound of wood residue produces approximately 6400 Btu of heat (ORNL 2007). Assuming a 33-percent conversion efficiency, using all biomass available in Pennsylvania, Ohio, and West Virginia at $50 per ton—the maximum price the researchers considered—will generate roughly 21 terawatt hours of electricity. This is about 53 percent more than the electrical output of BVPS at an 85-percent capacity factor.

Walsh et al. (2000) note that these estimates of biomass capacity contain substantial uncertainty and that potential availability does not mean that biomass will actually be available at the prices indicated or that potential resources will be free of contamination. Some of these plant wastes already have reuse value and would likely be more costly to deliver. Others, such as forest residues, may prove unsafe and unsustainable to harvest on a regular basis.

Furthermore, Walsh et al. (2000) assumed costs for transporting materials up to 50 miles. Additional distances will increase costs and thus reduce the amount of biomass available at each price point. To mitigate the collection cost issue, one could construct many small plants throughout the three States, although from an infrastructure and planning perspective, this approach may become complex and expensive. Further complicating this approach is that a regionally integrated network of biomass-fired power plants has not been created or executed elsewhere in the United States.

Given the technical challenges associated with successfully developing and deploying a biomass-fired alternative, in addition to the uncertainties associated with fuel supply and availability, the NRC staff did not consider biomass-fired generation as an alternative to license renewal.

8.2.5.7 *Municipal Solid Waste*

Municipal solid waste combustors incinerate waste to produce steam, hot water, or electricity. Combustors use three types of technologies—mass burn, modular, and refuse-derived fuel. Mass burning is currently the method used most frequently in the United States and involves no (or little) sorting, shredding, or separation. Consequently, toxic or hazardous components present in the waste stream are combusted, and toxic constituents are exhausted to the air or become part of the resulting solid wastes. Currently, approximately 89 waste-to-energy plants operate in the United States. These plants generate approximately 2700 MWe, or an average of approximately 30 MWe per plant (Integrated Waste Services Association 2007). Approximately 80 average-sized plants will be necessary to provide the same level of output as the other alternatives to BVPS license renewal.

Estimates in the GEIS suggest that the overall level of construction impact from a waste-fired plant will be approximately the same as that for a coal-fired power plant. Additionally, waste-fired plants have the same or greater operational impacts than coal-fired technologies (including impacts on the aquatic environment, air, and waste disposal). The initial capital costs for municipal solid-waste plants are greater than for comparable steam-turbine technology at coal-fired facilities or at wood-waste facilities because of the need for specialized waste separation and handling equipment (NRC 1996).

The decision to burn municipal waste to generate energy is usually driven by the need for an alternative to landfills rather than energy considerations. The use of landfills as a waste disposal option is likely to increase in the near term as energy prices increase; however, it is possible that municipal waste combustion facilities may become attractive again.

Regulatory structures that once supported municipal solid waste incineration no longer exist. For example, the Tax Reform Act of 1986 made capital-intensive projects such as municipal waste combustion facilities more expensive relative to less capital-intensive waste disposal alternatives such as landfills. Also, the 1994 Supreme Court decision *C&A Carbone, Inc. v. Town of Clarkstown, New York,* struck down local flow control ordinances that required waste to be delivered to specific municipal waste combustion facilities rather than landfills that may have had lower fees. In addition, increasingly stringent environmental regulations have increased the capital cost necessary to construct and maintain municipal waste combustion facilities (EIA 2001).

Given the small average installed size of municipal solid waste plants and the unfavorable regulatory environment, the NRC staff does not consider municipal solid waste combustion to be a feasible alternative to BVPS license renewal.

8.2.5.8 *Other Biomass-Derived Fuels*

In addition to wood and municipal solid-waste fuels, there are other concepts for biomass-fired electric generators, including direct burning of energy crops, conversion to liquid biofuels, and biomass gasification. In the GEIS, the NRC staff indicated that none of these technologies had progressed to the point of being competitive on a large scale or of being reliable enough to replace a baseload plant such as BVPS Units 1 and 2. After reevaluating current technologies, the NRC staff believes other biomass-fired alternatives are still unable to reliably replace the BVPS capacity. For this reason, the NRC staff does not consider other biomass-derived fuels to be feasible alternatives to renewal of the BVPS Units 1 and 2 OLs.

8.2.5.9 *Fuel Cells*

Fuel cells oxidize fuels without combustion and its environmental side effects. Power is produced electrochemically by passing a hydrogen-rich fuel over an anode and air (or oxygen) over a cathode and separating the two by an electrolyte. The only byproducts (depending on fuel characteristics) are heat, water, and CO_2. Hydrogen fuel can come from a variety of hydrocarbon resources by subjecting them to steam under pressure. Natural gas is typically used as the source of hydrogen.

At the present time, fuel cells are not economically or technologically competitive with other alternatives for baseload electricity generation. EIA projects that by 2008 fuel cells may cost $4374 per installed kW (EIA 2006a), roughly 3.5 times the construction cost of new coal-fired capacity and more than 7 times the cost of new, advanced gas-fired, combined-cycle capacity. In addition, fuel cell units are likely to be small in size (the EIA reference plant is 10 MWe). While it may be possible to use a distributed array of fuel cells to provide an alternative to BVPS, it would be extremely costly to do so. As such, the NRC staff does not consider fuel cells to be an alternative to BVPS license renewal.

8.2.5.10 *Delayed Retirement*

In its ER, FENOC did not indicate any plans to retire existing capacity at BVPS. FENOC also noted that FirstEnergy would require new capacity even if no additional units retire. Finally, FENOC indicated that it had no knowledge of FirstEnergy plants that may retire by the time the BPVS OLs expire in 2016 and 2027 (FENOC 2007). Thus, the NRC staff did not evaluate delayed retirement as an alternative to license renewal.

8.2.5.11 *Utility-Sponsored Conservation*

Before implementation of Pennsylvania's Alternative Energy Portfolio Standard (AEPS), the Commonwealth of Pennsylvania commissioned studies to establish the potential amounts of energy and efficiency resources throughout the State. This study identified over 16,000 gigawatt hours (GWh) of energy efficiency potential available within 20 years of the study (Pletka 2004), or by 2024. BVPS Units 1 and 2, however, produce approximately 13.7 GWh when operating at 85 percent over the same 1-year period. This means the majority of the State's energy efficiency potential as identified in 2004 would be necessary to replace the capacity at BVPS.

Additionally, some of the savings potential identified in the AEPS study may not be available in areas currently served by BVPS, making it difficult to functionally offset the BVPS capacity. Further, some of this capacity may actually be used by the PJM demand response program (see PJM Annual Report) or could now be claimed for credit under the AEPS.

The NRC staff had difficulty finding energy efficiency studies for Ohio and West Virginia. One 2001 study indicated that Ohio could save 72,417 GWh of electricity by 2020, based on an extrapolation of 1997 data and a conservation program start date of 2000 (Environmental Law & Policy Center, et al. 2001). To date, it does not appear that Ohio has implemented the recommendations in the report, and achievable conservation potential by 2020 will be considerably lower than the study projected using a 2008 start date rather than the original start date of 2000 recommended in the report. West Virginia appears to have no available statewide energy efficiency assessment.

Given the lack of available information on conservation potential, the NRC staff did not evaluate conservation as a stand-alone alternative to license renewal. The staff did, however, consider it as part of a combination alternative since the potential may be large.

8.2.6 Combination of Alternatives

The NRC staff considered a wide variety of alternatives to issuing renewed OLs for BVPS, several of which the staff determined to be individually capable of replacing the BVPS capacity, and many of which the staff determined to be incapable of replacing the BVPS capacity or too expensive to be considered reasonable options. Since the decision of whether to operate the plant is up to energy planners outside the NRC, relevant decisionmakers could choose any of a wide range of combination alternatives to replace capacity currently at BVPS.

This section considers a combination of options that could serve as an alternative to issuing renewed OLs for BVPS.

In performing this analysis, the NRC staff attempted to develop an alternative that minimized potential environmental impacts. The above analysis clearly suggests that minimizing construction and disturbance will reduce overall environmental impact levels.

As such, this combination alternative consists of retaining one of the existing BVPS units while the other is replaced by conservation. Since the OLs for Units 1 and 2 expire 11 years apart, technology options and policy backdrops may change significantly during this 11-year period. For predictability purposes, the NRC analyzed a scenario in which Unit 1 ceases to operate in 2016, and Unit 2 continues to operate under license renewal. This analysis in no way prejudices the NRC's ultimate decision with regard to license renewal for either unit, nor does it indicate the staff's analysis of other safety or environmental factors with regard to BVPS license renewal. Instead, it is an attempt by the staff to develop an alternative with the lowest environmental impact.

Several feasible options exist for replacing the capacity from BVPS Unit 1, possibly including conservation, wind, and small amounts of wood-fired generation or increased capacity at existing hydroelectric installations. Another option is to site some replacement gas-fired, combined-cycle capacity at the existing site to take advantage of the little land available on site.

From an environmental perspective, the NRC staff believes that relying on conservation to replace the retired unit's capacity will result in the smallest impact to the environment; the GEIS notes that most conservation impacts are SMALL or negligible. The NRC staff recognizes that significant uncertainty exists surrounding the actual conservation potential, although the staff also recognizes that Pennsylvania used the estimates for conservation potential reported in Pletka (2004) in developing the AEPS. Replacing the BVPS Unit 1 output with conservation will require 43 percent of Pennsylvania's conservation potential. Additionally, estimates for Ohio's potential may be unrealistically high; however, less than 10 percent of the reported potential will be necessary to replace one BVPS unit.

The overall impacts of this alternative are likely to be SMALL.

Effects to land use will be SMALL, as existing site and ROW maintenance will continue unchanged and no new construction will occur to replace the retired unit's capacity.

Ecological impacts will also be SMALL. The single-unit plant will need about half as much water as two units, ROW maintenance will continue, domestic water consumption and discharge will decline, and no major new construction will occur. No additional transmission lines will be necessary. The ecological impacts of this combination alternative will thus be smaller than renewing both licenses and smaller than the coal-fired, gas-fired, and new nuclear alternatives.

Water use and air quality impacts will be SMALL. Surface water intake and discharge will be less than the existing two units and likely smaller than the coal-fired or new nuclear alternatives. Ground water use will be unaffected. Air quality impacts will be SMALL.

Renewing one license will result in less radioactive and mixed-waste generation, as well as less nonradioactive waste, than the proposed action. Conservation activities may increase municipal waste generation, although this effect could be minimized by replacing items as they reach the end of their lives. In total, waste impacts will be SMALL.

The human health effects of this combination alternative will be substantially similar to the health impacts of renewing both licenses, although the GEIS notes that conservation approaches can affect indoor air quality. The GEIS indicates, however, that these effects can likely be effectively mitigated. Thus, health impacts will also be SMALL.

Impacts to aesthetics will not be noticeable and will thus be SMALL, as all current site structures will likely remain in place until both units cease operation. In addition, impacts to historic and archeological resources will likely be similar to those of continued operation of both units. This alternative will have SMALL impacts on cultural resources.

The combination alternative also results in SMALL impacts to socioeconomics, transportation, and environmental justice. The area has significant population. At most, only one-half of the plant workforce will leave, while the property will retain at least one-half of its tax valuation and revenue contribution. Thus, the socioeconomic impact will be SMALL. With approximately one-half (or slightly more) of the existing workforce remaining on site, transportation impacts, which are already SMALL, will remain so. The loss of relatively little tax revenue and employment, as well as SMALL impacts in other resource areas, means that impacts will also be SMALL for environmental justice

8.3 Summary of Alternatives Considered

The environmental impacts of the proposed action (issuing renewed BVPS Unit 1 and 2 OLs) will be SMALL for all impact categories, except for the Category I issues of collective offsite radiological impacts from the fuel cycle and from HLW and spent fuel disposal. The NRC staff did not assign a single significance level to collective offsite radiological impacts from the fuel cycle and from HLW and spent fuel disposal, but the Commission determined them to be Category 1 issues nonetheless.

In addition to the proposed action, the NRC staff considered several alternative actions in depth, including the no-action alternative (Section 8.1), coal-fired generation (Section 8.2.1), natural-gas-fired combined-cycle generation (Section 8.2.2), new nuclear power generation (Section 8.2.3), purchased electrical power (Section 8.2.4), and a combination of alternatives (Section 8.2.6). The NRC staff selected these alternatives after reviewing a broad array of technologies, many of which the staff determined to be unable to meet the needs currently served by BVPS. Section 8.2.5 briefly discusses these alternatives.

The NRC staff notes that the combination alternative, which includes one BVPS unit with a renewed license and one unit replaced by conservation, has SMALL impacts in all categories evaluated. All other alternatives capable of meeting the needs currently served by BVPS Units 1 and 2 entail potentially greater impacts than the proposed action of license renewal for the BVPS Units 1 and 2. Since the no-action alternative necessitates the implementation of one or a combination of alternatives, all of which have greater impacts than the proposed action, the NRC staff concludes that the no-action alternative will have environmental impacts greater than or equal to the proposed license renewal action.

8.4 References

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10 CFR Part 52. *Code of Federal Regulations*, Title 10, *Energy,* Part 52, "Early Site Permits; Standard Design Certifications; and Combined Licenses for Nuclear Power Plants."

40 CFR Part 50. *Code of Federal Regulations*, Title 40, *Protection of Environment*, Part 50, "National Primary and Secondary Ambient Air Quality Standards."

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9.0 SUMMARY AND CONCLUSIONS

By letter dated August 27, 2007, FirstEnergy Nuclear Operating Company (FENOC) submitted an application to the U.S. Nuclear Regulatory Commission (NRC) to renew the operating licenses (OLs) for the Beaver Valley Power Station (BVPS) Units 1 and 2 for an additional 20-year period. If the OLs are renewed, State regulatory agencies and BVPS will ultimately decide whether the plant will continue to operate based on factors such as the need for power or other matters within the State's jurisdiction or the purview of the owners. If the OLs are not renewed, then the plant must be shut down on or before the expiration dates of the current OLs, which are January 29, 2016, and May 27, 2027, for Units 1 and 2, respectively.

Section 102 of the National Environmental Policy Act (NEPA) (42 U.S.C. 4321) directs that an environmental impact statement (EIS) is required for major Federal actions that significantly affect the quality of the human environment. The NRC has implemented Section 102 of NEPA in Title 10, Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions," of the *Code of Federal Regulations* (10 CFR Part 51). This regulation identifies licensing and regulatory actions that require an EIS. In 10 CFR 51.20(b)(2), the Commission requires preparation of an EIS or a supplement to an EIS for renewal of a reactor OL; 10 CFR 51.95(c) states that the EIS prepared at the OL renewal stage will be a supplement to NUREG-1437, "Generic Environmental Impact Statement for License Renewal of Nuclear Plants," Volumes 1 and 2, issued May 1996 (NRC 1996, 1999) (GEIS).[28]

Upon acceptance of the BVPS application, the NRC began the environmental review process described in 10 CFR Part 51 by publishing on November 5, 2007, a Notice of Intent to prepare an EIS and conduct scoping (NRC 2008b). The NRC staff held public scoping meetings on November 27, 2007, in Pittsburgh, Pennsylvania (NRC 2008c), and conducted a site audit at BVPS in November 2007 (NRC 2008d). In the preparation of this draft supplemental environmental impact statement (SEIS) for BVPS, the NRC staff reviewed the BVPS environmental report (ER) and compared it to the GEIS, consulted with other agencies, conducted an independent review of the issues following the guidance set forth in NUREG 1555, "Standard Review Plans for Environmental Reviews for Nuclear Power Plants," Supplement 1, "Operating License Renewal" (NRC 2000), and considered the public comments received during the scoping process. The NRC staff also considered the public comments received during the scoping process for preparation of this draft SEIS for BVPS (NRC 2008a). Part 1 of Appendix A to this draft SEIS provides the public comments received during the scoping process that were considered to be within the scope of the environmental review.

The NRC staff will hold two public meetings in Pittsburgh, Pennsylvania, in October 2008, to describe the preliminary results of the NRC environmental review, to answer questions, and to provide members of the public with information to assist them in formulating comments on this draft SEIS. When the comment period ends, the NRC staff will consider and address all of the comments received. Part 2 of Appendix A to the final SEIS will address these comments.

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[28] The NRC originally issued the GEIS in 1996 and issued Addendum 1 to the GEIS in 1999. Hereafter, all references to the GEIS include Addendum 1.

This draft SEIS includes the NRC staff's preliminary analysis which considers and weighs the environmental effects of the proposed action, including cumulative impacts, the environmental impacts of alternatives to the proposed action, and mitigation measures available for reducing or avoiding adverse effects. This draft SEIS also includes the NRC staff's preliminary recommendation regarding the proposed action.

The NRC has adopted the following statement of purpose and need for license renewal from the GEIS:

> The purpose and need for the proposed action (renewal of an operating license) is to provide an option that allows for power generation capability beyond the term of a current nuclear power plant operating license to meet future system generating needs, as such needs may be determined by State, utility, and, where authorized, Federal (other than NRC) decision makers.

The evaluation criterion for the NRC staff's environmental review, as defined in 10 CFR 51.95(c)(4) and the GEIS, is to determine the following:

> ...whether or not the adverse environmental impacts of license renewal are so great that preserving the option of license renewal for energy planning decision makers would be unreasonable.

Both the statement of purpose and need and the evaluation criterion implicitly acknowledge that that factors in addition to license renewal will ultimately determine whether an existing nuclear power plant continues to operate beyond the period of the current OL.

NRC regulations (10 CFR 51.95(c)(2)) contain the following statement regarding the content of an SEIS prepared at the license renewal stage:

> The supplemental environmental impact statement for license renewal is not required to include discussion of need for power or the economic costs and economic benefits of the proposed action or of alternatives to the proposed action except insofar as such benefits and costs are either essential for a determination regarding the inclusion of an alternative in the range of alternatives considered or relevant to mitigation. In addition, the supplemental environmental impact statement prepared at the license renewal stage need not discuss other issues not related to the environmental effects of the proposed action and the alternatives, or any aspect of the storage of spent fuel for the facility within the scope of the generic determination in § 51.23(a) and in accordance with § 51.23(b).

The GEIS contains the results of a systematic evaluation of the consequences of renewing an OL and operating a nuclear power plant for an additional 20 years. It evaluates 92 environmental issues using the NRC's three-level standard of significance—SMALL, MODERATE, or LARGE—developed using the Council on Environmental Quality guidelines. The footnotes to Table B-1 of Appendix B, "Environmental Effect of Renewing the Operating License of a Nuclear Power Plant," to Subpart A, "National Environmental Policy Act—

Regulations Implementing Section 102(2)," of 10 CFR Part 51 establish the following definitions for the three significance levels:

(1) SMALL—Environmental effects are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource.

(2) MODERATE—Environmental effects are sufficient to alter noticeably, but not to destabilize, important attributes of the resource.

(3) LARGE—Environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource.

For 69 of the 92 issues considered, the NRC staff analysis in the GEIS shows the following:

- The environmental impacts associated with the issue have been determined to apply either to all plants or, for some issues, to plants having a specific type of cooling system or other specified plant or site characteristics.

- A single significance level (i.e., SMALL, MODERATE, or LARGE) has been assigned to the impacts (except for collective offsite radiological impacts from the fuel cycle and from high-level waste and spent fuel disposal).

- Mitigation of adverse impacts associated with the issue has been considered in the analysis, and it has been determined that additional plant-specific mitigation measures are likely not to be sufficiently beneficial to warrant implementation.

The NRC staff identified these 69 issues as Category 1 issues in the GEIS. In the absence of new and significant information, the NRC staff relied on conclusions in the GEIS for issues designated Category 1 in Table B-1 of Appendix B to Subpart A of 10 CFR Part 51. The NRC staff also determined that information provided during the public comment period did not identify any new issue that requires site-specific assessment.

Of the 23 issues that do not meet the criteria presented above, 21 are classified as Category 2 issues requiring analysis in a plant-specific supplement to the GEIS. The remaining two issues, environmental justice and chronic effects of electromagnetic fields, were not categorized. This is because environmental justice was not evaluated generically in the GEIS, thus requiring review in the draft SEIS herein, and information on the chronic effects of electromagnetic fields was not conclusive at the time the GEIS was prepared.

This draft SEIS documents the NRC staff's consideration of all 92 environmental issues identified in the GEIS. The NRC staff considered the environmental impacts associated with alternatives to license renewal and compared the environmental impacts of license renewal and the alternatives. The alternatives to license renewal that the staff considered include the no-action alternative (not renewing the OL for BVPS) and alternative methods of power generation. The staff evaluated these alternatives with the assumption that the replacement power generation plant is located at either the BVPS site or some other unspecified location.

9.1 Environmental Impacts of the Proposed Action—License Renewal

The NRC staff has an established process for identifying and evaluating the significance of any new information on the environmental impacts of license renewal. No information has been identified as being new and significant related to Category 1 issues that would call into question the conclusions in the GEIS. Similarly, the NRC staff identified no new environmental issues applicable to BVPS through its review process or the public scoping process. Therefore, the NRC staff relies on the conclusions of the GEIS for all Category 1 issues that are applicable to BVPS.

The FENOC ER presents an analysis of the Category 2 issues applicable to BVPS, in addition to environmental justice. The NRC staff has reviewed the FENOC analysis for each issue and has conducted an independent review of each issue plus environmental justice. Nine Category 2 issues are not applicable because they are related to plant design features or site characteristics not found at BVPS (see Appendix F).

Nine Category 2 issues specifically related to refurbishment (Terrestrial Resources, Threatened and Endangered Species, Air Quality, Housing Impacts, Public Services - Public Utilities, Public Services - Education, Offsite Land Use, Public Services – Transportation, Historic and Archaeological Resources), plus Environmental Justice, are addressed in this SEIS. FENOC, in its environmental report, stated it does not have plans to undertake any major refurbishment or replacement actions to maintain the functionality of important systems, structures, or components for purposes of license renewal (FENOC 2007). However, FENOC has indicated possible Unit 2 steam generator (SG) repair or replacement during the license renewal term. Though the NRC staff acknowledges that Unit 2 SG replacement is not a certainty, the staff has reviewed the potential environmental impacts of this activity. The NRC staff has included a discussion of these impacts, using the GEIS refurbishment framework to guide their analysis. For these nine Category 2 issues and environmental justice, related to refurbishment, the NRC staff concludes that the potential environmental effects range from no impact to SMALL significance in the context of the standards in the GEIS.

This draft SEIS discusses in detail eight Category 2 issues (Threatened and Endangered Species, Microbiological Organisms, Acute Effects of Electromagnetic Fields, Housing Impacts, Public Services - Public Utilities, Offsite Land Use, Public Services - Transportation, and Historic and Archeological Resources) related to operational impacts and postulated accidents during the renewal term, as well as environmental justice and chronic effects of electromagnetic fields.

Five of the Category 2 issues (Threatened and Endangered Species, Housing Impacts, Public Services - Public Utilities, Public Services - Transportation, and Historic and Archeological Resources) and environmental justice apply to both refurbishment and to operation during the renewal term. As such, in this supplement to the GEIS, these five Category 2 issues have been reviewed for both refurbishment and to operation during the renewal term.

For all eight Category 2 issues related to operational impacts and environmental justice, the NRC staff concludes that the potential environmental effects are of SMALL significance in the context of the standards established in the GEIS. In addition, the NRC staff determined that appropriate Federal health agencies have not reached a consensus on the existence of chronic adverse effects from electromagnetic fields. Therefore, this issue does not require further evaluation.

For severe accident mitigation alternatives (SAMAs), the NRC staff concludes that a reasonable, comprehensive effort was made to identify and evaluate SAMAs. Based on its review of the SAMAs for BVPS, provided by FENOC's analysis, and the plant improvements already made, the NRC staff concludes that five Unit 1 SAMAs and three Unit 2 SAMAs are potentially cost-beneficial. Given the potential for cost-beneficial risk reduction, the staff considers that further evaluation of these SAMAs by FENOC is warranted. However, none of these SAMAs relate to adequately managing the effects of aging during the period of extended operation. Therefore, they need not be implemented as part of license renewal pursuant to 10 CFR Part 54, "Requirements for Renewal of Operating Licenses for Nuclear Power Plants."

The NRC staff considered mitigation measures for each Category 2 issue. For most issues, the staff found that current measures to mitigate the environmental impacts of plant operation were adequate. In several cases where continued operation had a SMALL impact in the extended license renewal term, the NRC staff identified potential mitigation measures, where measures were identifiable. In cases where the impact of continued operation in the extended license renewal term was nonexistent, no consideration or documentation of mitigation is required.

The NRC staff considered cumulative impacts of past, present, and reasonably foreseeable future actions, regardless of which agency (Federal or non-Federal) or person undertakes such other actions. For purposes of this analysis, where BVPS license renewal impacts are deemed to be SMALL, the NRC staff concluded that these impacts would not result in significant cumulative impacts on potentially affected resources.

The following sections discuss unavoidable adverse impacts, irreversible or irretrievable commitments of resources, and the relationship between local short-term use of the environment and long-term productivity.

9.1.1 Unavoidable Adverse Impacts

An environmental review conducted at the license renewal stage differs from the review conducted in support of a construction permit because the plant is in existence at the license renewal stage and has operated for a number of years. As a result, adverse impacts associated with the initial construction have been avoided, have been mitigated, or have already occurred. The environmental impacts to be evaluated for license renewal are those associated with refurbishment and continued operation during the renewal term.

The adverse impacts of continued operation identified are considered to be of SMALL significance. The adverse impacts of likely power generation alternatives if BVPS ceases operation at or before the expiration of the current OL will not be smaller than those associated with continued operation of this unit, and they may be greater for some impact categories in some locations.

9.1.2 Irreversible or Irretrievable Resource Commitments

The commitment of resources related to construction and operation of the BVPS during the current license period was made when the plant was built. The resource commitments considered in this draft SEIS are associated with continued operation of the plant for an additional 20 years. These resources include materials and equipment required for plant maintenance and operation, the nuclear fuel used by the reactors, and ultimately, permanent offsite storage space for the spent fuel assemblies.

The likely power generation alternatives if BVPS ceases operation on or before the expiration of the current OL will require a commitment of resources for construction of the replacement plants, as well as for fuel to run the plants.

9.1.3 Short-Term Use Versus Long-Term Productivity

An initial balance between short-term use and long-term productivity of the environment at the BVPS site was set when the plant was approved and construction began. That balance is now well established. Renewal of the OL for BVPS and continued operation of the plant will not alter the existing balance but may postpone the availability of the site for other uses. Denial of the application to renew the OL will lead to shutdown of the plant and will alter the balance in a manner that depends on subsequent uses of the site. For example, the environmental consequences of turning the BVPS site into a park or an industrial facility are quite different.

9.2 Relative Significance of the Environmental Impacts of License Renewal and Alternatives

The proposed action is renewal of the OL for BVPS. Chapter 2 describes the site, power plant, and interactions of the plant with the environment. As noted in Chapter 3, FENOC, in its environmental report, stated it does not have plans to undertake any major refurbishment or replacement actions to maintain the functionality of important systems, structures, or components for purposes of license renewal (FENOC 2007). However, FENOC has indicated possible Unit 2 steam generator (SG) repair or replacement during the license renewal term. Though the NRC staff acknowledges that Unit 2 SG replacement is not a certainty, the staff has reviewed the potential environmental impacts of this activity. Chapters 4 through 7 discuss environmental issues associated with renewal of the OL. Chapter 8 addresses environmental issues associated with the no-action alternative and alternatives involving power generation and conservation.

Table 9-1 compares the significance of the environmental impacts of the proposed action (approval of the application for renewal of the OL), the no-action alternative (denial of the application), alternatives involving nuclear, gas-fired, or coal-fired generation of power at the BVPS site and an unspecified "alternate site," and a combination of alternatives. Continued use of a closed-cycle cooling system at the BVPS site is assumed for Table 9-1.

Table 9-1 shows that the significance of the environmental effects of the proposed action is SMALL for all impact categories. Similarly, the environmental effects of the no-action (with the exception of socioeconomic impacts) and combination alternatives are SMALL for all impact categories. Other power-generating alternative actions considered may have environmental effects in at least some impact categories that reach the level of MODERATE or LARGE significance.

Table 9-1 Summary of Environmental Significance of License Renewal, the No Action Alternative, and Other Alternatives

Impact Category	Proposed Action—License Renewal	No-Action Alternative—Denial of Renewal (alternative site)	Coal-Fired Generation (alternative site)
Land Use	SMALL	SMALL	SMALL to MODERATE
Ecology	SMALL	SMALL	MODERATE to LARGE
Water Use and Quality—Surface Water	SMALL	SMALL	SMALL to MODERATE
Water Use and Quality—Ground Water	SMALL	SMALL	SMALL to MODERATE
Air Quality	SMALL	SMALL	SMALL to MODERATE
Waste	SMALL	SMALL	MODERATE
Human Health	SMALL	SMALL	MODERATE
Socioeconomics	SMALL	SMALL to MODERATE	MODERATE
Transportation	SMALL	SMALL	SMALL to MODERATE
Aesthetics	SMALL	SMALL	SMALL to MODERATE
Historic and Archeological Resources	SMALL	SMALL	MODERATE to LARGE
Environmental Justice	SMALL	SMALL	MODERATE to LARGE

Table 9-1 (contd)

Impact Category	Natural Gas-Fired Generation (alternative site)	New Nuclear Generation (alternative site)	Combination of Alternatives
Land Use	SMALL to MODERATE	MODERATE	SMALL
Ecology	SMALL to MODERATE	MODERATE	SMALL
Water Use and Quality—Surface Water	SMALL	SMALL to MODERATE	SMALL
Water Use and Quality—Ground Water	SMALL to MODERATE	SMALL to MODERATE	SMALL
Air Quality	SMALL to MODERATE	SMALL to MODERATE	SMALL
Waste	SMALL	SMALL	SMALL
Human Health	SMALL	SMALL	SMALL
Socioeconomics	SMALL to MODERATE	SMALL to LARGE	SMALL
Transportation	SMALL to MODERATE	SMALL to MODERATE	SMALL
Aesthetics	SMALL to MODERATE	SMALL to MODERATE	SMALL
Historic and Archeological Resources	SMALL to MODERATE	SMALL to MODERATE	SMALL
Environmental Justice	SMALL to MODERATE	SMALL to MODERATE	SMALL

9.3 NRC Staff Conclusions and Recommendations

Based on (1) the analysis and findings in the GEIS, (2) the ER submitted by FENOC, (3) consultation with Federal, State, and local agencies, (4) the NRC staff's own independent review, and (5) the NRC staff's consideration of public comments received, the preliminary recommendation of the NRC staff is that the Commission determine that the adverse environmental impacts of license renewal for BVPS are not so great that preserving the option of license renewal for energy planning decisionmakers would be unreasonable.

9.4 References

10 CFR Part 51. *Code of Federal Regulations*, Title 10, *Energy*, Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions."

10 CFR Part 54. *Code of Federal Regulations*, Title 10, *Energy*, Part 54, "Requirements for Renewal of Operating Licenses for Nuclear Power Plants."

FirstEnergy Nuclear Operating Company (FENOC). 2007. "Beaver Valley Power Station Unit 1 and 2, Applicant's Environmental Report, Operating License Renewal Stage." Shippingport, PA. Agencywide Documents Access and Management System (ADAMS) Accession No. ML072470523.

National Environmental Policy Act of 1969 (NEPA). 42 U.S.C. 4321, et seq.

U.S. Atomic Energy Commission (AEC). 1973. "Final Environmental Statement Related to the Operation of the Beaver Valley Power Station Unit 1." Duquesne Light Company, Ohio Edison Company, Pennsylvania Power Company. Docket No. 50-334, Washington, DC. ADAMS Accession No. ML072550197.

U.S. Nuclear Regulatory Commission (NRC). 2008a. "Environmental Scoping Summary Report Associated with the Staff's Review of the Beaver Valley Power Station License Renewal Application". ADAMS Accession No. ML080240411.

U.S. Nuclear Regulatory Commission (NRC). 2008b. "Notice of Opportunity for Hearing and Notice of Intent to Prepare an Environmental Impact Statement and Conduct Scoping Process of Facility Operating License Nos. DPR-66 and NPF-73 for an Additional 20-year Period, FirstEnergy Nuclear Operating Company, Beaver Valley Power Station." *Federal Register* 72 FR 62497. Washington, DC. ADAMS Accession No. ML072900650.

U.S. Nuclear Regulatory Commission (NRC). 2008c. "Summary of Public Meetings Related to the Review of the Beaver Valley Power Station License Renewal Application." ADAMS Accession No. ML073530551.

U.S. Nuclear Regulatory Commission (NRC). 2008d. "Summary of Site Audit Related to the Review of the License Renewal Application for Beaver Valley Power Station, Units 1 and 2." ADAMS Accession No. ML080290257.

U.S. Nuclear Regulatory Commission (NRC). 2000. "Standard Review Plans for Environmental Reviews for Nuclear Power Plants," Supplement 1, "Operating License Renewal." NUREG-1555. Washington, DC.

U.S. Nuclear Regulatory Commission (NRC). 1999. "Generic Environmental Impact Statement for License Renewal of Nuclear Plants," Main Report, "Section 6.3—Transportation, Table 9.1, Summary of findings on NEPA issues for license renewal of nuclear power plants, Final Report." NUREG-1437, Volume 1, Addendum 1. Office of Nuclear Regulatory Research. Washington, DC.

U.S. Nuclear Regulatory Commission (NRC). 1996. "Generic Environmental Impact Statement for License Renewal of Nuclear Plants." NUREG-1437, Volumes 1 and 2. Washington, DC.

U.S. Nuclear Regulatory Commission (NRC). 1985. "Final Environmental Statement Related to the Beaver Valley Power Station," Unit 2. Duquesne Light Company, et al. Docket No. 50-412. Office of Nuclear Reactor Regulation. Washington, DC. September 1985. ADAMS Accession No. ML0725501770.

Appendix A

Comments Received on the Beaver Valley Power Station, Units 1 and 2, Environmental Review

A. Appendix A

Comments Received on the Beaver Valley Power Station,

Units 1 and 2, Environmental Review

On November 5, 2007, the U.S. Nuclear Regulatory Commission (NRC) published a Notice of Intent in the *Federal Register* (72 FR 62497) to notify the public of the NRC staff's intent both to prepare a plant-specific supplement to NUREG-1437, "Generic Environmental Impact Statement for License Renewal of Nuclear Plants" (known as the GEIS[29]), Volumes 1 and 2, related to the renewal application for the Beaver Valley Power Station (BVPS) operating licenses, and to conduct scoping. The NRC prepared this plant-specific supplement to the GEIS in accordance with the National Environmental Policy Act (NEPA), Council on Environmental Quality guidance, and Title 10, Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions," of the *Code of Federal Regulations* (10 CFR Part 51). As outlined by NEPA, the NRC initiated the scoping process with the issuance of the *Federal Register* notice. The NRC invited the applicant; Federal, State, and local government agencies; Native American tribal organizations; local organizations; and individuals to participate in the scoping process by providing oral comments at the scheduled public meetings and/or submitting comments by January 7, 2008.

The scoping process included two public scoping meetings, which were held at the Embassy Suites, 550 Cherrington Parkway, Pittsburgh, Pennsylvania, on November 27, 2007. The NRC issued press releases and announced the meetings in local newspapers. Approximately 120 members of the public attended the meetings. Both sessions began with NRC staff members providing a brief overview of the license renewal process. Following their prepared statements, the NRC staff members opened the meetings for public comments. Eleven attendees provided either oral comments or written statements that were recorded and transcribed by a certified court reporter. The meeting transcripts can be found as an attachment to the meeting summary, which was issued on January 8, 2008 (meeting transcripts, Agencywide Documents Access and Management System (ADAMS) Accession Nos. ML073390032 and ML073400843; meeting summary, ADAMS Accession No. ML073530551). (ADAMS is accessible at http://adamswebsearch.nrc.gov/dologin.html or through the NRC's Electronic Reading Room link at http://www.nrc.gov. Persons who do not have access to ADAMS or who encounter problems in accessing the documents located in ADAMS should contact the NRC's Public Document Room staff at 1-800-397-4209 or 301-415-4737, or by email at pdr@nrc.gov.

At the conclusion of the scoping period, the NRC staff reviewed the transcripts and all written material and identified individual comments. The staff gave each set of comments from a given commenter a unique alpha identifier (Commenter ID), allowing each set of comments from a

[29] The NRC originally issued the GEIS in 1996 and Addendum 1 in 1999. Hereafter, all references to the "GEIS" include the GEIS and its Addendum 1.

commenter to be traced back to the transcript, letter, or email in which the comments were submitted. Specific comments were numbered sequentially within each comment set. The BVPS Scoping Summary Report, dated January 29, 2008 (ADAMS Accession No. ML080240411), includes all of the comments and the NRC staff responses.

The NRC staff consolidated and categorized the comments according to the topic within the proposed supplement to the GEIS or according to the general topic if outside the scope of the GEIS. The NRC staff first combined comments with similar specific objectives to capture the common essential issues that had been raised and then determined the appropriate action for each comment.

Table A-1 identifies the individuals who provided comments applicable to the environmental review and the Commenter ID associated with each person's set(s) of comments. Table A-1 lists the individuals in the order in which they spoke at the public meeting, and the comments received by letter are in alphabetical order. To maintain consistency with the BVPS Scoping Summary Report, this appendix retains the unique identifier used in that report for each set of comments. The Commenter ID is preceded by BVPS. Accession numbers indicate the location of the written comments in ADAMS. The NRC is providing this information, which was extracted from the BVPS Scoping Summary Report, for the convenience of those interested in the scoping comments applicable to this environmental review.

Comments fall into one of the following four general groups:

(1) The first group includes specific comments that address environmental issues within the purview of the NRC environmental regulations related to license renewal. These comments address Category 1 or Category 2 issues or issues that were not addressed in the GEIS. They also address alternatives and related Federal actions.

(2) The second group includes general comments (1) in support of or opposed to nuclear power or license renewal or (2) that relate to the renewal process, the NRC's regulations, and the regulatory process. These comments may or may not specifically relate to the BVPS license renewal application.

(3) The third group includes questions that do not provide new information.

(4) The fourth group includes specific comments that address issues that do not fall within, or are specifically excluded from, the purview of NRC environmental regulations related to license renewal. These comments typically address issues such as the need for power, emergency preparedness, security, current operational safety issues, and safety issues related to operation during the renewal period.

Comments in this section fell under general groups 1 and 2 with the following sub-categories:

Group 1
A.1 Human Health Issues
A.2 Uranium Fuel Cycle and Waste Management Issue

Group 2
A.3 Support for Nuclear Power
A.4 Support for License Renewal at Beaver Valley Power Station, Units 1 and 2

Table A-1 Individuals Providing Comments during the Scoping Comment Period

Commenter ID	Commenter	Affiliation (If Stated)	Comment Source and ADAMS Accession Number[1]
BVPS-A	Joe Spanik	Beaver County Commissioner	Afternoon Scoping Meeting
BVPS-B	Larry Foulke	University of Pittsburgh	Afternoon Scoping Meeting
BVPS-C	Jeff Jones	Local Citizen	Afternoon Scoping Meeting
BVPS-D	Pete Sena III	Site Vice President, Beaver Valley Power Station	Afternoon Scoping Meeting
BVPS-E	Bruce McDowell	Boy Scouts of America, Pittsburgh Council	Afternoon Scoping Meeting
BVPS-F	Rich Luczko	International Brotherhood of Electrical Workers	Afternoon Scoping Meeting
BVPS-G	Mike Clancy	Mayor of Shippingport, Pennsylvania	Evening Scoping Meeting
BVPS-H	Wesley Hill	Beaver County Emergency Services Department	Evening Scoping Meeting
BVPS-I	John Grosskopf	Beaver Valley Volunteer Fire Department	Evening Scoping Meeting
BVPS-J	Dr. Ernest Sternglass	University of Pittsburgh	Evening Scoping Meeting
BVPS-K	Ken Will	AVI Food Systems	Evening Scoping Meeting
BVPS-L	Dave Hughes	Citizen Power	Evening Scoping Meeting
BVPS-M	Kevin Ostrowski	FirstEnergy Nuclear Operating Company	Evening Scoping Meeting
BVPS-N	Celia Rajkovich	Local Citizen	Evening Scoping Meeting Feedback Form (ML080240239)
BVPS-O	Bruce Simmeth	United Way, Beaver County	Letter (ML080160451)
BVPS-P	Russell D. Morgan	Greene Township Board of Supervisors	Letter (ML080160457)
BVPS-Q	George Dudash III	Local Citizen	Letter (ML080220343)

(1) The afternoon and evening transcripts can be found under ADAMS Accession Nos. ML073390032 and ML073400843, respectively.

A.1 Human Health Issues

Comment: Dr. E. Sternglass provided the NRC staff with the following book, *The Enemy Within: The High Cost of Living Near Nuclear Reactors: Breast Cancer, AIDS, Low Birthweights, and Other Radiation-Induced Immune Deficiency Effects*, by Jay M. Gould with members of the Radiation and Public Health Project, Ernest J. Sternglass, Joseph J. Mangano, William McDonnel, 1996, and photocopies of articles: "A short latency between radiation exposure from nuclear plants and cancer in young children," by Joseph J. Mangano, MPH, MBA, International Journal of Health Services, Volume 36, Number 1, pages 113–135, 2006; "Public health risks of extending licences of the Indian Point 2 and 3 nuclear reactors," Joseph J. Mangano, MPH, MBA, Executive Director, Radiation and Public Health Project, November 12, 2007; "Geographic variance in Pennsylvania thyroid cancer incidence and the link with nuclear power reactors," Joseph J. Mangano, MPH, MBA, Radiation and Public Health Project, February 14, 2007; "The health effects of low level radiation: Proceedings of a symposium held at the House of Commons, London, April 24th, 1996," edited by Richard Bramhall, Green Audit Books, Green Audit Wales Ltd, Aberystwyth, 1997, all of which deal with the effects of radiation, for the staff's consideration during its review of Beaver Valley Power Station's License Renewal Application. (BVPS-J)

Comment: Well, first of all I want to thank you for the opportunity to speak today. It is very important to be able to have a chance to present alternative options and views, and concerns, that have arisen in my research, and that of many other people around the world, for the last 40, 50 years, since the first nuclear reactors were built. And this is an historic site. I used to work for the Westinghouse Electric Company for 15 years. And I was very proud and happy when a clean nuclear plant would replace the terrible dirt that my wife told me, she was born in Pittsburgh. She said when she went to elementary school she left the house, and the snow was white. By the time she got to school, the snow was black. So after the war it was cleaned up. And since I reported to the man who designed the core of this plant, at the Westinghouse Research Lab, at the end of my 15 years there, I was very happy that we were going to have clean and healthy children for the rest, and possibly even grandchildren and great grandchildren. So what I'm about to talk about is really based on a terrible mistake that I made, and all scientists, who first worked with x-rays. Because my job at Westinghouse, it is very important for you to understand, was to work on imaging tools that would cut the dose in diagnostic radiology. And for 15 more years I could continue this work, and developing ways to cut x-ray doses by a hundred-fold, especially during pregnancy, which had been giving a lot of problems, for another hundred-fold doing fluoroscopy. So the technology of reducing radiation was my life's work. And, therefore, I was very upset when I first heard about how seriously we underestimated the effect of bomb fallout. And the first many years that I have spent, since 1961, '62, on this subject, the more I became aware of how little we understood, because we had no experience with nuclear fission products, which are different from the external radiation that we get from the cosmic rays, and from the ground, from the gamma rays, because they don't concentrate in any particular organ. But, as we found out, and many other people around the world have, of course, since then discovered it, unfortunately too late, that we grossly underestimated the doses to critical organs in the human body, when we took food and drink into consideration, and inhaled the air that was filled with radioactive gases from the bomb testing. And that was a first thing that I wanted to bring out, that it was not me who first became concerned about nuclear reactors. The first persons who became concerned about nuclear reactors were Dr. Arthur Tamplin and John Gofman, who wrote a book, '*Population Control' Through Nuclear Pollution*. And they were the pioneers in pointing out that nuclear reactors, back in 1969, '70, when they were publishing this book, if they were to continue to operate, they would cause anywhere from 32,000 to 64,000 extra deaths per year in this country. Their explanation was very good. They worked for the Atomic Energy Commission at the time, in California, at the Livermore Laboratory, and they were the first to warn the world about this particular terrible problem, that we had not understood, for many years, even though we should have understood, but nobody had any experience with fission products. And a few years later I wrote a book, a copy of which I have with me, and an excerpt from which I'm going to donate, and give to the NRC. The book, unfortunately, is called *Secret Fallout: Low-Level Radiation from Hiroshima to Three Mile Island*. That is the book that I wrote shortly I found out about this and investigated the health statistics from various countries and States at the time. And, unfortunately, it was not until much later that the true magnitude of these findings became apparent. And we published a series of more books. And the organization that developed, an independent research group called the Radiation and Public Health Project. And in it we showed that, indeed, we had had a major, major misunderstanding of the seriousness of radiation that we had all hoped would allow us to build clean nuclear plants which Eisenhower [word missing] were too cheap to meter. So what happened since then is really important, and I needed to, and I brought documents with me to illustrate it. And I want to give you the basic—*Break*—I see, okay. So, the basic problem has been that we simply did not understand the nature of the radiation that was being given out by the nuclear plants and fallout. In fact, all over the world we found that many people investigated the findings. And so let me give you a brief summary of our findings, and those around the world. The paper that describes what happened at Shippingport is here. And we began that both infant mortality and cancer rates were much higher, and had changed from the time before the bomb testing, and before the bomb, to a much higher level than in Pennsylvania as a whole and in other cities like Pittsburgh, a little bit further away. But the geographic pattern that evolved was for breast cancers, and other cancers, which is described in this book called *The Enemy Within*, which we ourselves are, it was called *The High Cost of Living Near Nuclear Reactors*, and published by Gould, and many members of the Radiation and Public Health Project. The effect of low-level radiation was the testimony that I gave to the House of Commons in 1997, in London, in which I illustrate the terrible problems that we found. For instance, among the things we had all assumed is that the safest things to assume is that there is no safe threshold, and that there is a straight line relationship between dose and health effects. But we were wrong. It turned out that in 1972, a paper was published by a staff member of the Canadian Atomic Energy Commission, Dr. Petkau. Dr. Petkau was a physician and scientist who discovered, quite by accident, that when radiation was spread out, instead of being given in a short burst like an x-ray, it turned out that it was more damaging to cell walls, and killing cells, than when the burst was short. And that was totally in opposition to what we had believed for years, because our repair processes, which go on in the human body, or else we would have died from a long-time lifetime exposure to natural radiation, we would have accumulated many defects that were actually being repaired. And he discovered that the free radical process, not the DNA damage, turned out to be more efficient, and that is interesting, than a short burst. If this room were filled with 500 people, and I yelled fire, how many of you think would get to the door? That is what he found. When you produce too many they deactivate each other, and they couldn't get to the wall to damage it. But if you have a few people here in the room, and I yell fire, they have no problem getting out, they don't bump into each other. And that was totally unknown to many of us until 1972, when the first bomb was detonated in 1945. So you can see how little we really understood about the nature of radiation. And, as a result, other people investigated this, and among the things they found is that there are other reasons why the dose relationship is not a straight line, it is worse. It goes up much faster at low doses, and flattens out at high doses. So even the terrible experience from Chernobyl, for the people in Europe, they were lucky it was flattening out with higher doses. But we, who received a small amount of radiation from Chernobyl, have a large increase in cancers, which is all documented in scientific papers. In fact, on the Web site of the group that I'm now president of, it is called the Radiation and Public Health Project, it is simply called radiation.org. And any of you can look at it, radiation.org is a very simple thing to remember, and see all the articles that we have published, over 22 articles in the scientific literature that are peer reviewed by independent people chosen by the editors, not by us. And all of these papers have not been discredited. In fact, a huge effort has come about, in Europe, as a result of our findings, and many other similar papers have now been found. And one of the things that I'm going to give the NRC is a recent paper just published at Johns Hopkins University, in the International Journal of Health Services, giving 67 references, I think it is something like that, over 60 references to similar discoveries in Germany, Russia, France, England, and so on. That we simply did not understand the seriousness of the low-level radiation. And the reason why originally the Atomic Energy Commission didn't want to admit this, is that we needed nuclear bombs as a deterrent against Russia taking over Europe, and the communists overrunning Korea, and all of Asia, as far as we could tell. And that is why the tragedy has arisen. Because the national security interests were primary. But now, in the recent months, only a few months ago, I think it was in January that there was an article in the Wall Street Journal, by a chief person in this whole battle, during the Cold War, George Schultz, who was Secretary of State, and Henry Kissinger, wrote an article that we must get rid of all nuclear weapons, and all stored material that can be turned into nuclear weapons. And every day that all our reactors operate, we produce more plutonium. And it is not easy to get hold of all the plutonium that has been produced in research, and power reactors all over the world. And so terrorists can now get hold of a lot of material that has been produced in the production of the peaceful atom. And that we never anticipated. And, certainly, we never anticipated anything like the terrible effect of bomb testing. And so what we now have in this paper by my colleague called "A Short Latency Period between Radiation Exposure from Nuclear Plants and Cancer in Young Children," by Joseph J. Mangano, published in January of last year in the International Journal of Health Services, a very respected peer reviewed journal, that has carried many of our articles. And in it he talks about what happened at Beaver County. And he found, in one of his tables, where he compared the nuclear reactor at Shippingport with many other reactors, and the country as a whole, and he found that the Government's own NIH study, that initially claimed that there weren't any increases in cancer around nuclear reactors, if you read the fine print in detail, you will find that for children, if they are separated, and one looks at children who are 0 to 5, and 5 to 10, one finds a big increase in childhood cancer between age 5 and 10, which had been discovered by Dr. Alice Stewart by studying the statistics on people who had been exposed to x-rays. And so since 1956, we have learned that the fetus that is developing in the mother's womb is 10 to 100 times more sensitive than the adult. And all our radiation standards were set on the characteristics of a grown-up person, not on the developing fetus. And later studies, until 1970, many papers that she studied, that she produced with her colleagues at Oxford, they show that the earlier the pregnancy that the radiation is given, which is very rarely done in medical uses, but it happens from the environment, and from nuclear reactors, it takes 10 times less radiation to double the risk of cancer between age 5 and 10. And so this is an important material that should be considered by the Nuclear Regulatory

Commission in the question of whether reactors should be relicensed all over the country. And, in fact, my colleague, Joe Mangano, just presented this paper at Indian Point Hearings that were just held a few weeks ago, in which our group presented, had a press conference, at which we invited people, and we showed what damage could be done by the continued operation of two nuclear plants at Indian Point, just 30 miles north of the city. And the important thing is that he handed them a paper which, by the way, is available for downloading on the radiation.org Web site, it said, the geographic variance in Pennsylvania thyroid cancer incidents and the link with nuclear power reactors. And the important thing is that it showed a map which is part of this paper, a map in which he shows that they investigated the thyroid cancer which is known, and admitted to be caused by iodine-131 routinely released into the air from nuclear bombs, obviously, and then from nuclear reactor stacks. He showed that both of the eastern part, and the western part, but not in central Pennsylvania, except for one county, that is high up in the mountains, all the other reactors, within 50 miles of a nuclear reactor, are among the top 8 or 10 whose thyroid cancer incidents are now publicly available. And that it only occurs near the reactors, and not in between, except for the county called Clinton, Clinton of all places. Clinton turns out to be on a mountain ridge, and that is where I used to go skiing when I was young. The point is that that is where the fallout comes down, that is where the rain and the snow is heaviest, in the mountains of central Pennsylvania. And that is the only county that is not within 50 miles of a nuclear reactor, that is among the top 13 of the country for thyroid cancer, which has been well identified, and which has risen enormously, and which Pennsylvania has the highest rate of cancer. But we are lucky, relatively, in this country, in this particular part of the country, because our cancer rates are less than half of what they are around Philadelphia. Philadelphia has a whole string of reactors. Something like 15 were built, I think, about or so are still in operation. You know, Three Mile Island was shut down, one of the reactors and some others. And the terrible tragedy is, as he points out in another publication, that Philadelphia, among 60 similar-sized cities, metropolitan areas, has the highest cancer rate of any city in the country. And that is the tragedy of the error we made at Westinghouse, and everywhere in the world, way back in the 1940s, '50s, and early '60s, that we misunderstood the real danger of operating these reactors. And that is why he could cite, Joe Mangano, Joseph Mangano over, let's see, what is the number, 67 references, all supporting this. And not one reference that has, in any way, discredited our findings that not only cancer rates, but measure the amount of strontium-90 in the soil, in the milk, and in baby teeth, tend to be higher in the counties downwind, or generally to the east of nuclear plants, than the upwind counties, with the same medical care, the same preparation distribution between black and white, the same difference in wealth. And all this is now clear, we have the documents, but an agency that was originally created because the AEC could not be trusted, now we know that we all are subject to mistakes. And the great mistake is that we can correct it. We can have wind power, we can have wind power with the cheaper per kilowatt installed today, in this State, than new nuclear reactors, or keeping old ones running, at the risk of the enormous health care costs, that we have been wondering why they are rising in this Nation. Nobody talks about the rising incidence of disease, the enormous rise that only took place since the bomb testing, and since the reactors. And we have now added, and the papers are all there for you to see in the Web site, that some 23 million people, in this country alone, have died suddenly, and an increase in excess over the normal expectations. And other scientists, also in Pennsylvania, one of them wrote an article recently in which she said that hundreds of millions of people around the world have died, numbers far greater than all the wars that we have fought in modern times. And that is what we now need to reexamine in light of all these findings around the world, not just by our group. And we can do it because fortunately wind power, and solar power, and thermal heat, geothermal energy, all these things can replace it, and the additional thing is we can greatly improve the energy efficiency of our buildings. The energy efficiency has been shown, by recent architectural scientist studies, to show that we wouldn't need to build any more nuclear or power plants of any kind if we had all the ways of insulating homes, and improving the use of energy, and the production of materials. It can be done, and it has to be done, if we want to end the damage to the children who are born, often, with cognitive development that makes them perform poorly in school, and many, many schools in our area have terrible, terrible records, compared to other schools in more distant areas, that have not had the exposure of children in utero. We never considered, it wasn't even fully documented until 1960, or '70, that really we have made gross mistakes in medicine, by irradiating women during pregnancy, when we never should have been able to do that. So we are not the only ones, in the engineering and nuclear reactor business, that have suffered from this lack of knowledge. Medicine has done the same thing. In fact, the misuse of x-rays was so important that in my early life as a child, my parents who were both physicians, discussed over the dinner table, all the cases when they had to deal with people who had been overexposed to medical x-rays. And that is what we now have to face as hard evidence. And as difficult as it is to admit, that one has made a mistake. But, fortunately, whenever nuclear plants have closed, and that is all cited in many articles in our website, and so on, we have done studies that showed that within a matter of months to years, infant mortality goes down. And within a matter of 5 to 10 years, childhood cancers go down. And a few years later, most cancers begin to diminish. So it can be done. And I thank you for listening to me. Thank you very much. (BVPS-J)

Comment: This is a tired microphone, I tell you. It just doesn't want to, it needs some Viagra. I just want to make two major points. I am the head of an organization based in Pittsburgh called Citizen Power, which is an energy advocacy organization. And we have a lot of concerns about nuclear power and, really, are concerned about extending the license of a nuclear plant for 20 more years. I think the research that Dr. Sternglass just referred to should be enough to have the American Government not continue the licenses of these plants, any of these plants around the country. That should be enough, I think, right there. But we are concerned about a couple of aspects that don't get addressed, other than all the safety issues that are generally talked about, like the storage of the nuclear waste, and those kinds of things. And there is a lot of myths about nuclear power, one of them was just mentioned by the previous speaker, about the fact that it helps us reduce our dependence on foreign sources of energy. The fact is that most of the commercial-grade uranium used at these plants, in this country, is imported. So it doesn't get us anywhere in terms of away from dependence on foreign sources of energy. This is an example of one of the myths about this source of energy. Another myth is that, and you can see it right on FirstEnergy's literature here, this fact sheet from FENOC, where it says nuclear power is recognized as a "clean air energy source," cooling tower emissions consist of harmless water vapor. The issue is not what comes out of the cooling towers. The issue is what comes out of the stacks of the gas building. And someone may argue that these are safe levels, but there are plenty of studies, which just were referred to, that these levels are not safe, in fact. That, over time, low dose levels of radiation are deadly. And a 20-year study by the National Academy of Sciences showed that. But what I want the NRC to do, because in your slide presentation, you said that, on your environmental review, you consider and analyze and look at the environmental impacts of continued plant operation. And you take a look at whether or not the environmental impacts of license renewal were so great that license renewal would be unreasonable. And I suspect that when you look at plant operation, from an environmental impact perspective, you probably don't look at the fuel cycle in its entirety. And I think it is important to consider the impact of mining, you know, smelting, the whole process of getting this uranium into commercial-grade fuel. Because we haven't seen a definitive study yet, although we suspect that this process, we know that this process contributes to global warming. We know that this process creates greenhouse gases. And we think the NRC should be looking at, if you are really taking a look at the environmental impact in determining whether or not it makes sense to renew the license, environmentally or not, or what the alternatives are, you should be looking at the impact of this fuel, the development of this fuel, and whether or not it is too risky in terms of climate change. And, finally, I would just say, I hope you would give a review of the extension of the license at Beaver Valley extra analysis and study, because even though there are people in the community who appreciate FirstEnergy's generosity, let's say, and even though I'm sure that those who work at that plant are dedicated, and committed, and good professional people, we have big concerns about the management, especially at higher levels, in that company. And this is a company that had covered up, as some of you may know, a near serious catastrophe at its Davis-Besse plant in Port Clinton, Ohio, when a hole developed in the reactor pressure vessel head. And this gets to the whole concern that you are looking at relicensing, or extending a license in a very different era than when these plants were originally licensed. You are talking about extending a license in the era of deregulation. And the era of deregulation means that companies have got to run these plants to compete, and be competitive. And this is exactly what happened at Davis-Besse in Port Clinton, where the company ran the plant even though they should have closed it down, and taken care of changing that reactor pressure vessel head before a meltdown occurred. Which was only prevented by an eighth-inch stainless steel cladding that was left after that major hole ate through that reactor ahead of the concrete. And the company admitted, when it got discovered, that it put production ahead of safety, because of deregulation, essentially. This is a company that put production ahead of safety. And that decision wasn't made by the workers, that was made by the higher-ups at FirstEnergy. So this is a company you really have to keep your eye on in this license extension process. So I appreciate the opportunity to be able to speak to you today about that. Thank you. (BVPS-L)

Response: *The NRC's primary mission is to protect public health and safety and the environment from the effects of radiation from nuclear reactors, materials, and waste facilities. The NRC's regulatory limits for radiological protection are set to protect workers and the public from the harmful health effects of radiation on humans. The limits are based on the recommendations of standards-setting organizations consisting of the International Commission on Radiological Protection, the National Council on Radiation Protection and Measurements, and the National Academy of Sciences. Radiation standards reflect extensive scientific study by these national and international organizations and are conservative to ensure that the public and workers at nuclear power plants are protected.*

Health effects from exposure to radiation are dose dependent, ranging from no effect at all to death. Above certain doses, radiation can be responsible for inducing diseases such as *leukemia, breast cancer, and lung cancer. Very high (hundreds of times higher than a rem), short-term doses of radiation have been known to cause prompt (or early, also called "acute") effects, such as vomiting and diarrhea, skin burns, cataracts, and even death.*

Although radiation may cause cancers at high doses and high dose rates, currently there are no reputable scientifically conclusive data that unequivocally establish the occurrence of cancer following exposure to low doses and dose rates, below about 0.1 sievert (10 rem). However, radiation protection experts conservatively assume that any amount of radiation may pose some risk of causing cancer or a severe hereditary effect and that the risk is higher for higher radiation exposures. Therefore, they use a linear, no-threshold dose response relationship to describe the relationship between radiation dose and detriments such as cancer induction. Simply stated, any increase in dose, no matter how small, results in an incremental increase in health risk. The NRC accepts this theory as a conservative model for estimating health risks from radiation exposure, recognizing that the model probably overestimates those risks. Based on this theory, the NRC conservatively establishes limits for radioactive effluents and radiation exposures for workers and members of the public, as found in 40 CFR Part 190, "Environmental Radiation Protection Standards for Nuclear Power Operations," 10 CFR Part 20, "Standards for Protection Against Radiation," and Appendix I, "Numerical Guides for Design Objectives and Limiting Conditions for Operation to Meet the Criterion 'As Low as is Reasonably Achievable' for Radioactive Material in Light-Water-Cooled Nuclear Power Reactor Effluents," to 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities." Regulatory limits are placed on the radiation dose that members of the public might receive from all of the radioactive material released by the nuclear plant combined. The NRC requires licensees to report liquid, gaseous, and solid effluent releases as well as the results of their radiological environmental monitoring programs annually. The annual effluent release and radiological environmental monitoring reports submitted to the NRC are available to the public in ADAMS via the Electronic Reading Room, accessible at the NRC Web site (http://www.nrc.gov).

The amount of radioactive material released from nuclear power facilities is well measured, well monitored, and known to be very small. The doses of radiation that are received by members of the public as a result of exposure to nuclear power facilities are so low that resulting cancers have not been observed and would not be expected. Although a number of studies of cancer incidence in the vicinity of nuclear power facilities have been conducted, there are no studies to date that are accepted by the scientific community that show a correlation between radiation dose from nuclear power facilities and cancer incidence in the general public. NUREG-1850, "Frequently Asked Questions on License Renewal of Nuclear Power Reactors," published by the NRC on March 2006, discusses the following specific studies that have been conducted:

- *In 1990, at the request of Congress, the National Cancer Institute conducted a study of cancer mortality rates around 52 nuclear power plants and 10 other nuclear facilities. The study covered the period from 1950 to 1984 and evaluated the change in mortality rates before and during facility operations. The study concluded that there was no evidence that nuclear facilities may be linked causally with excess deaths from leukemia or from other cancers in populations living nearby.*

- *In June 2000, investigators from the University of Pittsburgh found no link between radiation released during the 1979 accident at the Three Mile Island power plant and* *cancer deaths among nearby residents. Their study followed 32,000 people who lived within 5 miles of the plant at the time of the accident.*

- *In January 2001, the Connecticut Academy of Sciences and Engineering issued a report on a study around the Haddam Neck nuclear power plant in Connecticut and concluded that radiation emissions were so low as to be negligible.*

- *In 2001, the American Cancer Society concluded that, although reports about cancer clusters in some communities have raised public concern, studies show that clusters do not occur more often near nuclear plants than they do by chance elsewhere in the population. Likewise, there is no evidence that links strontium-90 with increases in breast cancer, prostate cancer, or childhood cancer rates. Radiation emissions from nuclear power plants are closely controlled and involve negligible levels of exposure for nearby communities.*

- *Also in 2001, the Florida Bureau of Environmental Epidemiology reviewed claims that there are striking increases in cancer rates in southeastern Florida counties caused by increased radiation exposures from nuclear power plants. However, using the same data to reconstruct the calculations on which the claims were based, Florida officials were not able to identify unusually high rates of cancers in these counties compared with the rest of the State of Florida and the Nation.*

- *In 2000, the Illinois Public Health Department compared childhood cancer statistics for counties with nuclear power plants to similar counties without nuclear plants and found no statistically significant difference.*

To ensure that the plants are operated safely within the requirements, the NRC licenses the plants to operate, licenses the plant operators, and establishes technical specifications for the operation of each plant. The NRC provides continuous oversight of plants through its Reactor Oversight Process to verify that they are being operated in accordance with NRC rules and regulations. The NRC has full authority to take whatever action is necessary to protect public health and safety and may demand immediate licensee actions, up to and including a plant shutdown.

The NRC has issued regulations establishing clear requirements for license renewal to ensure safe plant operation for extended plant life (codified in 10 CFR Part 51 and 10 CFR Part 54, "Requirements for Renewal of Operating Licenses for Nuclear Power Plants"). An applicant must provide the NRC with an evaluation that addresses the technical aspects of plant aging and describes the ways those effects will be managed. The applicant must also prepare an evaluation of the potential impact on the environment if the plant operates for up to an additional 20 years. During the review of the application for license renewal, the NRC staff verifies the safety evaluations through inspections and reviews environmental issues associated with license renewal.

The NRC staff has not identified any new and significant information during its independent review of the Beaver Valley environmental report, annual radioactive effluent release reports, annual radiological environmental operating reports, technical specifications, the Offsite Dose Calculation Manual (which specifies limits for all radiological releases), inspection reports, and the environmental site audit.

These comments provided no additional information. The NRC's primary mission to protect public health and safety and the environment continues to be met. No change to the BVPS EIS was made as a result of these comments.

A.2 Uranium Fuel Cycle and Waste Management Issues

Comment: I live within the 10–15-mile radius of BVPS. My concern is spent fuel storage since YM is not scheduled to open till 2017. (BVPS-N)

Response: *The NRC is committed to ensuring that both spent fuel and low-level wastes are managed to prevent detrimental health impacts to the public. In the* Federal Register *on December 6, 1999, the NRC published a notice that the Commission is of the view that experience and developments since 1990 confirm the Commission's 1990 Waste Confidence findings. Thus, the Commission decided that a comprehensive evaluation of the Waste Confidence Decision at this time was not necessary. The Commission would consider undertaking a comprehensive evaluation when the impending repository development and regulatory activities have run their course or if significant and pertinent unexpected events occur, raising substantial doubt about the continuing validity of the 1990 Waste Confidence findings. The NRC has stated in its regulations at 10 CFR 51.23(a), "The Commission has made a generic determination that, if necessary, spent fuel generated in any reactor can be stored safely and without significant environmental impact of at least 30 years beyond the licensed life for operation (which may include the term of renewed license) of that reactor at its spent fuel storage basin or at either onsite or offsite independent fuel storage installations." The NRC has a certification process for casks, regulated by 10 CFR Part 72, "Licensing Requirements for the Independent Storage of Spent Nuclear Fuel, High-Level Radioactive Waste, and Reactor Related Greater Than Class C Waste." Such wastes are under continual licensing control. Furthermore, the Commission believes that there is reasonable assurance that at least one mined geological repository will be available in the first quarter of the 21st century, and sufficient repository capacity will be available within 30 years beyond the licensed life for operation of any reactor to dispose of the commercial high-level waste and spent fuel originating in such reactors and generated up to that time. The regulation at 10 CFR 51.23(b) specifically states that no discussion of any environmental impact of spent fuel storage for the 30-year period following the term of the reactor operating license is required in any environmental report, EIS, or environmental assessment. Management of wastes during the operation of the reactor is part of the licensing basis of the facility. In the interim, onsite spent fuel storage in pools and in dry cask storage facilities continues in accordance with NRC regulations. Consequently, the comment does not provide new and significant information and will not result in modification of the BVPS EIS.*

A.3 Support for Nuclear Power

Comment:
To Whom It May Concern,

This letter was written in response to an editorial by Ernest Sternglass, PhD published in the Pittsburgh Post-Gazette on Sunday 16 December 2007. The letter sums up my thoughts concerning the Beaver Valley EIS, so I am forwarding it to you to be entered in the docket. Thank you for your consideration.

In his editorial "Trade Nukes for Gas" (PG, Sunday 16 December 2007), Ernest Sternglass, PhD argues that nuclear power is dangerous and that the Beaver Valley reactors operated by First Energy Corp. in Shippingport PA should be shut down and converted to natural gas.

Dr. Sternglass is a dedicated professional in the field of health physics, and has been studying the effects of radiation for over 60 years. While I have the utmost respect for Dr. Sternglass, I must disagree with his position, and I am certainly not alone. I worked as a health physics technician at the Shippingport and Beaver Valley power stations between 1980 and 1985. During that time I joined the Health Physics Society, a group (of which Dr. Sternglass is a member) consisting of professionals from industry, government, and academia world wide representing all disciplines associated in some way with radiation. For 14 years I perused the papers presented in the monthly journals, and it led me to a number of conclusions. The first is that radiation is more thoroughly studied than any other potentially hazardous agent of interest to man. Second, the <u>vast</u> majority of Dr. Sternglass' peers disagree with his views. The overwhelming majority of papers indicated no discernable link between low levels of radiation and cancer or other ill effects. A few actually concluded that low levels of radiation are beneficial or even essential to life. Only substantial exposures i.e., Chernobyl, Hiroshima, or industrial accidents have created an observable, measurable risk to humans.

The fact of matter is that studies can be influenced, deliberately or inadvertently, to give the results the investigator wishes to see. That is the basis of the peer review process. While I would never suggest that Dr. Sternglass would deliberately influence a study, I am certain that at some point over the last 60 years there would be at least <u>some</u> reasonable level of concurrence with Dr. Sternglass' conclusions. In case after case, independent studies have failed to verify or repeat many of his conclusions.

As far as releases of radioactive materials from commercial nuclear plants are concerned, the quantities and type of material released are very carefully documented and the material is either allowed to decay prior to release or heavily diluted during release. The isotopes released generally are low level emitters and of short half life. Contrast this careful monitoring and documentation to hospitals and other medical users of radioactive materials. In a hospital, a patient will receive a dose of a radioactive isotope and subsequently "release" it into a commode where it enters the waste stream without any accounting or monitoring. The amount of radioactive material used for medical purposes is considerable, and once again, its disposition after administration is not considered or controlled in any way. Dr. Sternglass specifically mentions Strontium 90 in his editorial, an isotope generally not released by an operating power plant. As far as the alleged increased cancer rates found within 50 miles of Beaver County, I would argue that the materials released from 100 years of unregulated industrial pollution from chemical, steel, and heavy metal smelting plants (to name just a few) would be far more likely to cause cancer and other illnesses than radiation.

Concerning the construction and operation of the actual plants, I can speak of my experiences as an operator at the Beaver Valley plant(s) between 1985 and 1991. The original Shippingport power station was jointly operated by the Navy and Duquesne Light Co. As such, its operation fell under the control of the legendary Admiral Rickover, who demanded nothing less than excellence. The conduct of operations instilled in those early days carried over to the Beaver Valley plant, and professionalism and rigid adherence to procedure and protocol was reflected on a daily basis. Believe me, you would never find someone sleeping in the control room at Beaver Valley. The training program was very thorough as well, and there was always a sufficient complement of personnel on site to deal with any situation that might present itself.

As I was present during the construction, start up, and operation of Unit 2, I saw first hand the quality being built in to that plant from the early stages. The reactor containment building, for example, consists of a welded steel pressure vessel encased in 4+ feet of concrete. The reinforcing rods within the concrete were as thick as a linebacker's arm, welded together, and packed in so tightly that you could hardly see through them to the other side. That building was supposedly designed to withstand the impact of a Boeing 707, and as someone who has witnessed first hand the aftermath of a major aircraft accident, I have no doubt that it could. As far as terrorist attacks are concerned, I have been told by commercial pilots that it would take a very experienced pilot indeed to even hit the containment building at high speed, as the dome is only about 110 feet high and the same diameter.

As far as the possibility of a catastrophic accident is concerned, you can forget about the "China Syndrome." We already had a meltdown in a US reactor...Three Mile Island Unit 2. The molten fuel never breached the reactor vessel, let alone the containment building itself. Furthermore, that accident produced a sea change in nuclear power plant design, construction, and operation. Apart from the fact that the TMI Unit 2 reactor was rendered permanently inoperable by the accident, the benefits that resulted from that incident have made the industry safer by many orders of magnitude.

One of the most important challenges we face as a nation is the need for minimally polluting, renewable, efficient energy sources. In this case, we have fallen sadly behind other nations. In the 1970's, the French recognized this challenge and decided to commit to nuclear power in a big way. After evaluating the various vendors, they contracted Westinghouse to build their first plant. This plant was identical to our Beaver Valley 1 plant and is referred to as the "Beaver Valley Prototype." They built a number of these plants under license, and then went on to design and build similar plants of higher output on their own. The French now produce almost 80% of their electricity from nuclear. They also used our technology to build a large scale fuel reprocessing plant, so that they are able to extract usable fuel from the spent fuel rods for reuse. The small amount of high level waste remaining is mixed with molten glass, in a process known as vitrification, so that it is rendered insoluble, and disposed of in extremely deep wells drilled into the ground. In France, there is no controversy over how or where to bury potentially hazardous spent fuel rods. As a result of their foresight, France has an efficient, cost effective electric economy that fuels everything from industry to mass transit with little pollution. That is why France had no problem signing on to the Kyoto Protocol.

Dr. Sternglass wants to convert the Beaver Valley plants to natural gas. Back in the 80's and 90's, many utilities were building natural gas fired plants because they were cheap, had short construction times, and met all pollution regulations. Back then, I observed that this trend would inevitably lead to higher natural gas prices. Have you checked your gas bill lately? The nuclear to gas conversion described in the article involved a rather small, oddball nuclear plant that proved incapable of reliable operation. Converting high output plants such as Beaver Valley is generally not considered to be a cost effective enterprise.

The inescapable fact is that gas fired turbine generators, and to an even larger extent renewable energy sources, simply do not have much output. It would take over 470 large wind turbines to produce the same electrical output as the 2 unit Beaver Valley nuclear plant, and that output is at the mercy of the wind.

In conclusion, I certainly feel that nuclear plants must be designed, built, and operated with safety, quality, and security as the primary goals. Risk to the public must be minimized, and the release of radioactive materials must be kept as low as humanly possible. I am confident that the Beaver Valley plants meet and exceed these criteria. Paranoia about minimal or nonexistent risks is counterproductive to the needs of our nation, and some perspective needs to be introduced. I received a higher radiation dose during a cardiac stress test a few years back than I did from working in nuclear plants for 11 years. My hope for the future is that the public gets to "know nukes," instead of blindly accepting the "no nukes" rhetoric of fear and ignorance. This concludes my comments. Sincerely, George Dudash III (BVPS-Q)

Response: *The comment is supportive of nuclear power. The comment is general in nature, provides no new information, and, therefore, will not be evaluated further. No change to the scope of the BVPS Environmental Impact Statement (EIS) will be made as a result of these comments.*

A.4 Support for License Renewal at Beaver Valley Power Station, Units 1 and 2

Comment: Good afternoon. Thank you for giving me the opportunity to talk about FirstEnergy and renewing their license. And I think it is important for Beaver County, and what happens at the nuclear power plant. So on behalf of the Board of County Commissioners, and the 180,000 residents of Beaver County, I just want to say that in August of 2007, the Beaver Valley power station submitted an application to the Nuclear Regulatory Commission, the NRC, to renew the operating license for Units 1 and 2 for an additional 20 years. And I know that there are some other folks here that are going to talk about the current employees there, and I don't want to go into that, I know he wants to say a few words about the full-time employees. But what this means to Beaver County, during the refueling and maintenance work period, referred to as outages, the Beaver Valley creates more than over 1000 jobs, temporary jobs, at the Shippingport Power Plant. Outages take place every 18 months for each unit and provide important economic benefits to the area businesses, but also to their families, and to the benefits they have to pay for maintaining their household, and their house insurance. So this is important to the Beaver County building trades, and not only just to Beaver County, the surrounding counties, and other States that are around, that work at the power plant during these outages. The U.S. Department of Energy projects that power demand is expected to increase 40 percent in the United States by 2030. The Beaver Valley Power Station needs to continue to produce safe and reliable electricity to meet those increased power demands. Since 2002, FirstEnergy has spent more than 550 million to upgrade the Beaver Valley Power Station, so it may continue to operate safely and reliably well into the future. Without the license renewal, Beaver County would suffer economically with the loss of more than 1000 good jobs. Small businesses which surround the station and rely on the patronage of station employees would be financially devastated with the loss of this Beaver Valley Power Station. Just let me give you a review of what Beaver County was all about. Back in the early '80s, we were a steel mill community. Now, as you all know, the steel mills have collapsed since the early '80s. And basically, we have lost almost 30,000 jobs, and just recently USAir, we have a lot of employees, almost 8000 employees who work at USAir, that had good paying jobs that are no longer there. Less than 1000 jobs are available at USAir. So this plant, who has over 1000 full-time workers, and over 1000 construction workers working there, this plant means a lot to us. But, once again, there is also another very valid point of why we believe that the NRC should renew the license. As you are aware, we have an emergency management service department, or EMS, that is highly involved in nuclear disaster drills that are mandated by the NRC, to ensure the public safety at all times. And I just might add that FirstEnergy Corporation, FENOC, has been a great corporate partner to Beaver County in many, many ways, in Beaver County. So without renewing this license we are going to see a great devastation, the economic impact, and the loss of jobs, if we are not able to renew this license for another 20 years. Thank you very much. (BVPS-A)

Comment: My name is Larry Foulke, I'm a resident of Allegheny County, and I have had a career of almost 40 years as a nuclear engineer, at the Bechtel Bettis Laboratory and Westinghouse Electric Company. In this career I have contributed to, and managed, groups of engineers in nuclear reactor research, safety analysis, reactor performance analysis, environmental engineering training, and security. After my retirement from Bettis, in 2006, I was asked, by the University of Pittsburgh, to develop and deliver courses in nuclear engineering to students. And there I currently serve as director of nuclear programs. I am here to speak in favor of granting the Beaver Valley Nuclear Station an extension of their operating license so they may continue to generate inexpensive, reliable, secure, safe, and environmentally friendly electricity. The world's, and western Pennsylvania's, energy needs will be growing, much more steeply, from now than at any time since the beginning of the industrial revolution.

There is no doubt that we will need much more energy in the future than now. Where is this energy going to come from? Will it be from renewable energy? There is an abundance of it, no one doubts that. In looking towards the future, however, renewables will clearly not be able to entirely fill the gap created by depleting fossil fuels. Will it be from fossil fuels, oil, coal, and gas? It cannot be all from coal and oil. Looking towards the future, oil will become less available. The use of coal cannot increase dramatically without doing interminable damage to the environment. And renewables will not be able to entirely fill the vacuum created by depleting fossil fuels. Today oil is about the only way we have of making transportation fuel. All our cars, planes, and ships use oil. We simply cannot replace that energy need for transportation with coal, or corn from Iowa. So the oil resource problem is of immediate and pressing concern. I'm a great proponent of the plug-in hybrid vehicle. I believe that the use of nuclear-generated electricity to charge the battery of a plug-in hybrid, while I sleep, is the way to go in the future.

President Eisenhower's Atoms for Peace speech, in 1954, was a key event for the peaceful uses of atomic energy. It led to the development and construction of the Shippingport reactor a few miles from where we are today. It achieved its initial criticality on December the 2nd, 1957. The 50th anniversary of that event is only a few days away. I have worked on this reactor during my career. Since that time, as of the day I prepared these remarks, we have accumulated almost 13,000 reactor years of experience in producing civilian nuclear power in the world. How many fatalities have occurred from that experience? Very few, and none have occurred in the United States. A presentation of fatality data, from the independent Paul Scherrer Institute, in Switzerland, shows that nuclear power has the best safety record, and fewest fatalities, of any major process for generating large amounts of electricity. And that includes Chernobyl. Today it is safer to work in a nuclear power plant than in the manufacturing sector, and even in real estate and finance industries, according to the statistics from the United States Bureau of Labor statistics. The industrial accident rate, in the nuclear industry, continues to decline for a record low of .24 industrial accidents per 200,000 work hours. The cost of fuel, and operations, is a minor cost factor for nuclear power. Increasing the price of uranium would have little effect on the overall cost of nuclear power. A doubling in the cost of natural uranium would increase the total cost of nuclear generated electricity by about 5 percent. On the other hand, if the price of natural gas were doubled, the cost of gas-fired electricity would increase by about 60 percent. While the long-term radioactive waste storage problems of nuclear power may have been solved, technically, they have not been fully solved politically. The fact is that nuclear energy is one of the cleanest ways we know to produce huge amounts of electricity. However, like all the ways of generating electricity, it does generate waste. But those nuclear wastes provide one of the greatest benefits of nuclear power that the public does not fully appreciate yet. Nuclear wastes are sequestered and segregated from the outset. Their volume is extremely small, relative to the amount of energy produced. And we have sensitive instruments to monitor and ensure we have control of the wastes. If you believe we have a problem now with carbon dioxide emissions, think about the middle of this century, and consider the amount of energy that the world will need. The energy answer is going to be natural gas, or if the energy answer is going to be natural gas or coal, you have to do something with the carbon wastes. Sequestration of nuclear waste is a much easier problem than sequestration of fossil-powered plant waste. A big disadvantage of nuclear is the cost of new plant construction. The cost to build a nuclear power plant, today, is much greater than the cost to build a natural gas powered plant. But here at Beaver Valley, we have plants that are already built. It would be foolish to shut these plants down early when the world and the region need energy. Once the plant is built, and, the construction loan is paid off, there are few ways of producing electricity that have a lower operating cost. On the average, for nuclear power plants in the United States, in the year 2006, nuclear electricity was produced for 1.72 cents per kilowatt hour. Nuclear power is a mature and established method of energy production. According to a recent survey by MIT's Center for Advanced Energy Systems, Americans are increasingly looking to alternative energy sources, like wind and solar, but they are warming up to nuclear. Americans, now, strongly wish to reduce the use of oil, and they view this energy source less favorably than any other source of power. Coal, seen as moderately priced, but very harmful to the environment, also remains unpopular. James Lovelock, a leading environmentalist, agrees. He writes "Nuclear energy is the only logical solution. Opposition to nuclear energy is based on irrational fear fed by a Hollywood style fiction, the green lobbyists, and the media. Nuclear energy has proved to be the safest of all energy sources." For the total generating capacity of over 1600 megawatts of electricity, Beaver Valley is a major producer of electricity for western Pennsylvania, generating enough electricity to power more than a million homes. The Beaver Valley Nuclear Stations have operated safely since the plant was commissioned. I know many employees at Beaver Valley, and I know they are committed to producing energy safely and responsibly. The design, construction, and operation of the plant are based on a multilevel safety philosophy used in all U.S. commercial nuclear power plants. This philosophy, combined with excellence in management, training, and operations, helps to ensure a safe plant. The Beaver Valley Nuclear Station is, clearly, a regional asset that provides electricity safely and economically. It is in the best interests of all citizens, and businesses, to extend the operating life of the two units for another 20 years. Thank you. (BVPS -B)

Comment: In 2006, I became involved with a south-side area baseball and softball program. And, as part of that program, our Board has made a commitment to build a good program. And in doing so, we have started working with our local businesses and forming partnerships. In early 2007, we approached FirstEnergy, and Beaver Valley Power Station, about becoming more of a partner with our organization. Since the first conversation, we worked on a few projects together. In July, the Beaver Valley Power Station ran a FirstEnergy softball tournament to benefit the United Way that was played at our field in Greene Township. Our fields were in bad shape due to a rainstorm a couple of nights before, and we had several people work to repair those fields and, as a result, it was a success for FirstEnergy. We also worked with the Beaver Valley Power Station on a successful fundraising hoagie sale, where at their outage we were allowed to come down and actually set up and sell hoagies to raise funds for our organization. We raised over $600. And I have a feeling that our biggest partnership has yet to be determined. I'm excited about the partnership that is being created with FirstEnergy and the Beaver Valley Power Station, and hope it continues to improve. I found that the Beaver Valley Power Station is willing to be a partner with organizations in the community. Not only has the Beaver Valley Power Station provided financial stability for many of the citizens and communities, they are also working to foster a stronger relationship to our organization. And I support their efforts to extend their operating license. Thank you. (BVPS -C)

Comment: Good afternoon. I'm Pete Sena, I'm the site vice president of the Beaver Valley Power Station. I would like to thank the NRC, and members of the local community, and the public, for the opportunity to speak on behalf of Beaver Valley. We recognize that the licenses for Beaver Valley Units 1 and 2 expire in 2016 and 2027. However, we have begun the process early to allow a thorough review of the license renewal application. Beaver Valley has been a member of the local community since the early 1970s, when the construction of Beaver Valley Unit 1 began. Since that time, Beaver Valley has been operating in a safe, secure, and environmentally sound manner. In 1999, FirstEnergy Nuclear Operating Company took control of the Beaver Valley facility from Duquesne Light. And, since that time, has continued to fund the operation of Beaver Valley in a safe and secure manner. License extension for Beaver Valley will continue to mean high paying jobs for the local community, as well as property taxes, personnel taxes, and utility taxes, to fund the local government. Continued plant operation will provide a stable supply and low-cost electricity to support the region's economic growth. An additional 20 years of operation will also support our regional contribution to energy independence; resources of foreign energy will not adversely impact the local or global environment. To sum it up, extending the operation of the Beaver Valley facility in years 2036 and 2047 is a safe, secure, environmentally friendly option that will provide economic stability to the region. On behalf of the nearly 1000 men and women of the Beaver Valley team, again I would like to thank the NRC and the members of the public, to speak on Beaver Valley's behalf. (BVPS-D)

Comment: I always like to face the audience. I'm Bruce McDowell, I'm a professional scouter with the Boy Scout Council, the Greater Pittsburgh Council; in our region. I'm real pleased to be able to speak on behalf of the Boy Scouts, and our partnership with FirstEnergy, which has been many, many years now, since FirstEnergy became a community partner, after following Duquesne Light, and we worked with Duquesne Light as well. My role, working with the Boy Scouts, is to work in partnership with organizations, and citizens, and companies. So FirstEnergy is considered a very strong partner of what our Boy Scout Council tries to do in involving people. FirstEnergy members get involved as leaders, they get involved in many of the projects that we conduct in the community, things like Scouting for Food, where we are empowered to help get food for the needy; things like our National Jamboree, where FirstEnergy donated pots to our Scouts to be able to use on a permanent basis; things like our annual Eagle Scout recognition dinner, where we work with the staff to get adults as role models, to work with our Eagle Scouts, and their career ambitions. Many of them are interested in becoming nuclear engineers, electrical engineers, civil engineers, and such. In fact, out of the Eagle Scout class this year of 306 Eagle Scouts, over 50 want to go into engineering, which was the highest career field interest, out of the many fields that were there. That indicates the need to support things like nuclear energy. We had dinner last week, and we had five of the FirstEnergy staff there, with our Eagle Scouts. And there are many other projects, locally, in the community with the Scout troops that go on behind the scenes, that we don't often see, but the FirstEnergy people are there to support them. So where is this important in the future for the next license agreement? The responsibility of good citizenship from people and companies is a partnership. We are sure that they will help us do our best, as well as FirstEnergy, in doing its best. I'm convinced that members of the staff have been doing due diligence to meet the regulatory needs. They are sensitive to the needs of the community, and they are sensitive to the needs of the environment. So I would, on behalf of the Council, would support this license agreement. Thank you. (BVPS-E)

Comment: Good afternoon. My name is Rich Luczko, I'm a member of the IBEW, and have been a member for 37 years with Duquesne Light, and FirstEnergy. And I'm here, today, in support of the license renewal for Beaver Valley Units 1 and 2. We have talked about how many employees, we have 1000 employees in the Beaver Valley Power Station is one of the largest employers and taxpayers. They contribute 4 million, annually, in payroll, property, and real property. You know, as everybody has talked about, power demand is increasing, people want a reasonable amount of power, reasonably priced power, and nuclear is the way. I just want to give you an example of some safety issues. As a member of FEN team, I'm an electrical engineer, and we just went over, we were 7.5, seven-and-a-half million man hours, without a lost-time accident. You talk about safety. I'm proud to be part of that team. And believe it or not, we lost that record on a slip. We changed three steam generators, put a new reactor head, tore the containment apart, and had over 1000 workers there, and we only had an accident on a slip. So that says it, itself, what kind of work record we have. As far as the reliability, and we do more now than ever before, as far as working with the radiological issues. Since the '70s, things have changed since Three Mile Island. I'm so proud that I can work there, I'm involved as a legislative coordinator for Local 29, and dealing with some of the legislators from Harrisburg, and Washington, DC. I invited them, personally, to come and see our plant, and they were nice enough to have them come down, and they were impressed. And I'm impressed. We talk about where the industry is at. I grew up on the south side of Pittsburgh, when the steel industry was going strong, in the '60s and '70s. And to see all those jobs go, it just hurts me, still hurts me. And right now the energy industry is all we have left. We can keep these jobs, maintain them, keep the plants running safely, and have decent paying, family sustaining jobs. And I'm here, and my local, and the officers of Local 29 support the renewal of these plants and will actively work to make sure the process goes forward. Thank you. (BVPS-F)

Comment: Good evening. My name is Mike Clancy. I'm the current Mayor of Shippingport, and also a former employee at the Beaver Valley Power Station. And I want to say that I know the operating staff, and the maintenance staff, personally. And you won't find a more qualified or better trained group of people that will run this power plant safely and efficiently. And they have my utmost support. And I think this license renewal is a very good thing for the borough of Shippingport, Beaver County, and also the tri-State area. Thank you very much. (BVPS-G)

Comment: Good evening. First I would like to thank you all for the opportunity to come speak tonight on behalf of the Beaver Valley Power Station and FENOC. Over the past number of years I've had the privilege and honor of working with both the environmental people and the public safety people, employees, and management staff at the Beaver Valley Power Station. I must tell you that in those years, Beaver County has stepped up far beyond a lot of other areas, States and other counties in this nation, as far as preparing and working with the employees and residents of Beaver County in case of an emergency at the power station. During the last year, the last exercise in Beaver County, the four support counties, and our three, two other support States, in our exercise we ended up with no workers, no mistakes in the nuclear exercise, that was second to none in the Nation. With that all going on, and in the southwest corner of Pennsylvania, Beaver County is a part of the regional taskforce, region 13, otherwise known as, which was formed since September 11th. And that southwest corner of PA includes 13 counties and the city of Pittsburgh, which Beaver County is a very strong part of, and has used in the past, since its beginning, a lot of things learned, lessons learned, and things that we continue to plan on, and respond for, and those issues and things have been put into effect from things learned from the power plant. I take great pride in supporting the continued and the renewal of the license for the Beaver Valley Power Station, and the staff and employees at FENOC. Thank you very much. (BVPS-H)

Comment: Good evening. I would like to talk about the community support that we receive from FirstEnergy. FirstEnergy, through the last 5 years, has helped with our fund raising programs, which is our 5K race, and our Safety Festival. They have always had somebody there to set up an information booth for the public to get all kinds of information about what happens down at FirstEnergy. They also let us use their fire grounds down at the plant, where we can send our fire fighters down there to actually take part in the fire grounds for live fire training, which is essential to some of the members because a lot of the regulations today, it is almost impossible to get a house to train in, and burn it down. So FirstEnergy, through Dave

Hoffman, has let us come down and use the training ground. Also FirstEnergy helped us acquire a cascade system, which is essential for us to fill our self-contained breathing apparatus. Four of our members of the department are employees down at FirstEnergy. They are well-trained and certified individuals, which brings a lot to our department. And just for instance, Alex, who is actually assistant chief of the department, is a mechanic. He does a lot of the maintenance on our vehicles, which saves us, is a cost savings towards not only the taxpayers at Beaver, but the department. Just from his maintenance background we don't have to send our vehicles out to be repaired. If he can do it then he will take care of it. A lot of the electrical work that needs to be done he knows people that work at FirstEnergy, and they are more than glad to come in and help with the electrical aspect on some of the equipment. Tammy, she leads our fund raising committee, and also writes grants for the department. She is very helpful. Over the last couple of years she has written grants, which our fire department has received a total of $200,000 to purchase new turnout gear, self-contained breathing apparatus, and numerous other equipment for our vehicles. Another one of our members, Dave, he teaches the Future Fire Fighters Program, which is based out of the Beaver high school, it is for kids in 8th grade to 12th grade, it teaches them the fundamentals of fire fighting, team building, and also community involvement. And then also John Kowolski, which John is here with me tonight, he is the president of the fire department, he does all our public relations work. He is also our safety officer. So on the fire ground, he is the one that makes sure that, at the end of the day, after a fire scene, that we all get home. Being a volunteer organization, we really appreciate the support of the Beaver Valley Power Station. Thank you. (BVPS-I)

Comment: Good evening. Nearly 20 percent of our country's electricity is generated from nuclear power. The plants that make that number possible provide a carbon-free source of electricity. So an unquestioned commitment to safety, and reduce our dependence on foreign oil. The Beaver Valley Nuclear Power Plant contributes to our local economy as an efficient source of electricity. But its true impact on the community must also be measured by its financial influence. The plant is invaluable to the community as an employer and a customer of many of our local businesses. Thank you. (BVPS-K)

Comment: Good evening. My name is Kevin Ostrowski, a native of Beaver County, a long-term resident of Beaver County, and currently the director of site operations at the Beaver Valley Power Station. Our message tonight is simple. And that is that the people of Beaver Valley, as well as the management at FirstEnergy, is committed to operating the Beaver Valley Power Station with every aspect, and respect, and high regard for the safety of the nuclear reactor, the personnel, industrial safety, every aspect of radiological safety, and is the focus of this particular review. As stewards of the environment, on all facets of environmental safety, we look forward today, and into the future, of operating and serving the public, operating the plant and serving the public in the future, and into license renewal. Thank you very much. (BVPS-M)

Comment: Dear Mr. Howard: I am pleased to submit this letter of support on behalf of the First Energy Corporation. Our Beaver Valley nuclear power plant, which is operated by the First Energy Corporation, has been a strong community supporter in Beaver County. It has been our largest contributor to the Scouting For Food Drive which operates in partnership with the Greater Pittsburgh Council, Boy Scouts of America. This annual community wide effort collects donated canned goods and household products to support the Salvation Army's food bank system which fed more than 2,700 needy families in Beaver County last year. In addition, our

Beaver Valley plant has also been a leading corporate and employee contributor to the United Way's annual campaign. As we have seen funding reductions in several social service programs at both the federal and state levels in recent years, the local support from our Beaver Valley plant has become even more important to our 21 member agencies and the important services which they provide to the people of Beaver County. We thank the FirstEnergy Corporation, through their Beaver Valley plant, for their continuing corporate and employee support of the United Way of Beaver County. It has been my pleasure to write this letter of support on behalf of the First Energy Corporation and our Beaver Valley nuclear power plant. If I can answer any questions or provide additional information, please contact me at

724-774-3210. Thank you. Sincerely, Bruce F. Simmeth, Executive Director (BVPS-O)

Comment: Dear Scott: Thank you for the invitation to attend the November 27 public meeting to engage in a discussion concerning the renewal of the NRC license for the Beaver Valley nuclear power plant. Unfortunately, we are unable to attend as we are in the middle of budget adoption and several hearings under the Zoning Ordinance. We do, however, wish to comment on the application for the record. Greene Township has been blessed by the presence of the Nuclear Power Plants in Shippingport over the past 40 years. Many of our residents have had very gainful employment there, giving them the ability to construct beautiful homes in our Township, which increases our Real Estate Tax revenue, along with the revenue of Earned Income taxes. We have had a good relationship with Duquense Light and then with FirstEnergy as they operated the plants. We have had invaluable assistance with our Emergency Response Plans, and we have held a number of Community Days with substantial financial support and personnel involvement by both companies. We hope that, with such a positive impact on our Township, the plants will receive a renewal of their license to keep them around for another 20 years. Sincerely, Russell D. Morgan, Chairman (BVPS-P)

Response: *The comments are supportive of license renewal. The comments are general in nature, provide no new information, and, therefore, will not be evaluated further. No change to the scope of the BVPS EIS will be made as a result of these comments.*

Appendix B

Contributors to the Draft NUREG-1437 Supplement 36

B. Appendix B

Contributors to the Draft NUREG-1437 Supplement 36

The Office of Nuclear Reactor Regulation, U.S. Nuclear Regulatory Commission, prepared this supplement to the Beaver Valley Power Station (BVPS) Environmental Impact Statement (EIS). The following table lists those who contributed to its preparation.

Table B-1 Contributors to the BVPS Supplement to the Generic EIS

Name	Affiliation	Function or Expertise
	U.S. NUCLEAR REGULATORY COMMISSION	
Rani L. Franovich	Nuclear Reactor Regulation	Branch Chief
Eric Benner	Nuclear Reactor Regulation	Branch Chief
Kent Howard	Nuclear Reactor Regulation	Project Manager
Emmanuel Sayoc	Nuclear Reactor Regulation	Project Manager
Jeffrey Rikhoff	Nuclear Reactor Regulation	Socioeconomics, Environmental Justice, Land Use
Dennis Beissel	Nuclear Reactor Regulation	Hydrology, Water Use and Quality
Allison Travers	Nuclear Reactor Regulation	Hydrology, Water Use and Quality
Stephen Klementowicz	Nuclear Reactor Regulation	Radiation Protection
Jennifer A. Davis	Nuclear Reactor Regulation	Cultural Resources
Ekaterina Lenning	Nuclear Reactor Regulation	Meteorology, Air Quality
Andrew Stuyvenberg	Nuclear Reactor Regulation	Alternatives
Briana Balsam	Nuclear Reactor Regulation	Aquatic and Terrestrial Ecology
Sarah Lopas	Nuclear Reactor Regulation	Aquatic Ecology, Nonradiological Waste
Briana Balsam	Nuclear Reactor Regulation	Terrestrial Ecology, Threatened and Endangered Species
Robert Palla	Nuclear Reactor Regulation	Severe Accident Mitigation Alternatives
	INFORMATION SYSTEMS LABORATORY	
Bruce Mrowca		Severe Accident Mitigation Alternatives
Ali Azarm		Severe Accident Mitigation Alternatives

Appendix C

Chronology of NRC Staff Environmental Review Correspondence Related to FirstEnergy Nuclear Operating Company Application for the License Renewal of Beaver Valley Power Station, Units 1 and 2

C. Appendix C

Chronology of NRC Staff Environmental Review Correspondence Related to FirstEnergy Nuclear Operating Company Application for the License Renewal of Beaver Valley Power Station, Units 1 and 2

This appendix contains a chronological listing of correspondence between the U.S. Nuclear Regulatory Commission (NRC) and FirstEnergy Nuclear Operating Company (FENOC), and other correspondence related to the NRC staff's environmental review, under Title 10, Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions," of the *Code of Federal Regulations* (10 CFR Part 51), of the FENOC application for renewal of the operating license for Beaver Valley Power Station (BVPS), Units 1 and 2. All documents, with the exception of those containing proprietary information, are publicly available at the NRC Public Document Room (PDR), located at One White Flint North, 11555 Rockville Pike, Rockville, Maryland, 20852, or from the NRC's Agencywide Documents Access and Management System (ADAMS). The ADAMS Public Electronic Reading Room is accessible at http://adamswebsearch.nrc.gov/dologin.htm. The ADAMS accession numbers for each document are included below. Persons who do not have access to ADAMS, or who encounter problems in accessing the documents located in ADAMS, should contact the NRC's PDR reference staff by telephone at 1-800-397-4209 or 301-415-4737, or by email at pdr@nrc.gov.

August 27, 2007	Letter from Peter P. Sena III, FENOC, submitting the application for renewal of the operating license for BVPS, Units 1 and 2. L-07-113, (Accession Nos. ML072430914, ML072430916, ML072470493, ML072430180, ML072550179)
August 27, 2007	Beaver Valley Power Station, Units 1 and 2, License Renewal Application—Appendix E, Environmental Report. (Accession No. ML072470523)
September 07, 2007	Letter to Diane Wakefield, Beaver Area Memorial Library, regarding the maintenance of reference material at the Beaver Area Memorial Library, related to the license renewal application for BVPS, Units 1 and 2. (Accession No. ML072410381)
September 17, 2007	Letter to Diane Ambrose, Beaver County Library System, regarding the maintenance of reference material at the Beaver County Library System, related to the license renewal application for BVPS, Units 1 and 2. (Accession No. ML072540597)
September 18, 2007	Letter to Peter P. Sena III, regarding receipt and availability of the license renewal application for BVPS, Units 1 and 2. (Accession No. ML072340332)

September 18, 2007	*Federal Register* Notice of Receipt and Availability of Application for Renewal of BVPS, Units 1 and 2, Facility Operating License Nos. DPR-66 and NPF-73 for an Additional 20-Year Period, Docket Nos. 50-334 and 50-412 (72 FR 54301). (Accession No. ML072340374)
October 22, 2007	Letter to Peter P. Sena III, Determination of Acceptability and Sufficiency for Docketing, Proposed Review Schedule, Opportunity for a Hearing Regarding the Application from FirstEnergy, for Renewal of the Operating Licenses for the Beaver Valley Power Station, Units 1 and 2. (Accession No. ML072900312)
October 22, 2007	*Federal Register* Notice of Acceptance for Docketing of the Application and Notice of Opportunity for Hearing Regarding Renewal of Facility Operating License Nos. DPR-66 and NPF-73 for an Additional 20-Year Period, Docket Nos. 50-334 and 50-412; FENOC, BVPS, Units 1 and 2 (72 FR 60916). (Accession No. ML072900397)
October 29, 2007	*Federal Register* Notice of Intent to Prepare an Environmental Impact Statement and Conduct Scoping Process, Docket Nos. 50-334 and 50-412 (72 FR 62497). (Accession No. ML072900650)
October 29, 2007	Letter to Peter P. Sena III, Notice of Intent to Prepare an Environmental Impact Statement and Conduct Scoping Process for License Renewal for Beaver Valley Power Station, Units 1 and 2 (TAC Nos. MD6595 and MD6596). (Accession No. ML072900639)
November 02, 2007	Letter to Scott Hans, U.S. Army Corps of Engineers, regarding the BVPS, Unit 1 and 2, license renewal application review, invitation to the public meetings on process and scoping, and request for comments. (Accession No. ML072920402)
November 02, 2007	Letter to Don L. Klima, Advisory Council on Historic Preservation, concerning the BVPS, Unit 1 and 2, License Renewal Application Review. (Accession No. ML072910607)
November 02, 2007	Letter to Rich Janati, Pennsylvania Department of Environmental Protection, Division of Radiological Protection, regarding the review of the license renewal application for BVPS, Units 1 and 2, invitation to the public meetings on process and scoping, and request for comments. (Accession No. ML072920398)
November 02, 2007	Letter to David Densmore, U.S. Fish and Wildlife Service, Pennsylvania Field Office, Request for List of Protected Species within the Area under Evaluation for the Beaver Valley Power Station, Units 1 and 2, License Renewal Application Review. (Accession No. ML072910105)

November 02, 2007	Letter to Patricia Kurkul, National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service, Request for List of Protected Species and Essential Fish Habitat within the Area under Evaluation for the Beaver Valley Power Station, Units 1 and 2, License Renewal Application Review. (Accession No. ML072910221)
November 02, 2007	Letter to Mark Epstein, Ohio Historic Preservation Office, request for comments concerning the BVPS, Unit 1 and 2, license renewal application review. (Accession No. ML073020229)
November 02, 2007	Letter to Samuel W. Speek, Ohio Department of Natural Resources, request for comments concerning the BVPS, Unit 1 and 2, license renewal application review. (Accession No. ML072950321)
November 02, 2007	Letter to Davitt Woodwell, Pennsylvania Environmental Council, request for comments concerning the BVPS, Unit 1 and 2, license renewal application review. (Accession No. ML072920376)
November 02, 2007	Letter to Matt Hough, Pennsylvania Game Commission, request for comments concerning the BVPS, Unit 1 and 2, license renewal application review. (Accession No. ML072920415)
November 02, 2007	Letter to Michael DiBerardinis, Pennsylvania Department of Conservation and Natural Resources, request for comments concerning the BVPS, Unit 1 and 2, license renewal application review. (Accession No. ML072920260)
November 02, 2007	Letter to Thomas C. Shetterly, Pennsylvania Fish and Boat Commission, request for comments concerning the BVPS, Unit 1 and 2, license renewal application review. (Accession No. ML072920276)
November 02, 2007	Letter to Michael Clancy, Shippingport Borough, request for comments concerning the BVPS, Unit 1 and 2, license renewal application review. (Accession No. ML072920359)
November 02, 2007	Letter to Pat Lampe, Shippingport Borough, request for comments concerning the BVPS, Unit 1 and 2, license renewal application review. (Accession No. ML072920385)
November 02, 2007	Letter to Barbara Franco, State Historic Preservation Officer, Pennsylvania Historical and Museum Commission, request for comments concerning the BVPS, Unit 1 and 2, license renewal application review. (Accession No. ML072910734)
November 02, 2007	Letter to Susan M. Pierce, Deputy State Historic Preservation Officer, West Virginia Division of Culture and History, request for comments concerning the BVPS, Unit 1 and 2, license renewal application review. (Accession No. ML073020219)

November 02, 2007	Letter to Curtis Taylor, West Virginia Division of Natural Resources, request for comments concerning the BVPS, Unit 1 and 2, license renewal application review. (Accession No. ML072950219)
November 08, 2007	Memorandum from Kent Howard, NRC, Forthcoming Meeting To Discuss the Safety Review Process Overview and Environmental Scoping Process for Beaver Valley Power Station, Units 1 and 2, License Renewal Application Review. (Accession No. ML073100576)
November 09, 2007	Letter to Chairman Robert Chicks, Stockbridge-Munsee Band of the Mohican Nation, Wisconsin, Indian Tribe, Request for Comments Concerning the Beaver Valley Power Station, Units 1 and 2, License Renewal Application Review. (Accession No. ML073040557)
November 09, 2007	Letter to Mr. Irving Powles, Jr., Onondaga Nation, Indian Tribe, Request for Comments Concerning the Beaver Valley Power Station, Units 1 and 2, License Renewal Application Review. (Accession No. ML073040557)
November 09, 2007	Letter to Gerald Danforth, Oneida Nation of Wisconsin, Indian Tribe, Request for Comments Concerning the Beaver Valley Power Station, Units 1 and 2, License Renewal Application Review. (Accession No. ML073040557)
November 09, 2007	Letter to Chairman Raymond Cline, Delaware Trust Board, Indian Tribe, Request for Comments Concerning the Beaver Valley Power Station, Units 1 and 2, License Renewal Application Review. (Accession No. ML073040557)
November 09, 2007	Letter to Chairman Ron Sparkman, Shawnee Tribe, Indian Tribe, Request for Comments Concerning the Beaver Valley Power Station, Units 1 and 2, License Renewal Application Review. (Accession No. ML073040557)
November 09, 2007	Letter to Governor Larry Nuckolls, Absentee-Shawnee Tribe of Oklahoma, Indian Tribe, Request for Comments Concerning the Beaver Valley Power Station, Units 1 and 2, License Renewal Application Review. (Accession No. ML073040557)
November 09, 2007	Letter to Chief James Ransom, St. Regis Mohawk Tribe, Indian Tribe, Request for Comments Concerning the Beaver Valley Power Station, Units 1 and 2, License Renewal Application Review. (Accession No. ML073040557)
November 09, 2007	Letter to Mr. Raymond Halbritter, Oneida Indian Nation, Indian Tribe, Request for Comments Concerning the Beaver Valley Power Station,

	Units 1 and 2, License Renewal Application Review. (Accession No. ML073040557)
November 09, 2007	Letter to Chief Leo Henry, Tuscarora Nation, Indian Tribe, Request for Comments Concerning the Beaver Valley Power Station, Units 1 and 2, License Renewal Application Review. (Accession No. ML073040557)
November 09, 2007	Letter to Chief Paul Spicer, Seneca-Cayuga Tribe of Oklahoma, Indian Tribe, Request for Comments Concerning the Beaver Valley Power Station, Units 1 and 2, License Renewal Application Review. (Accession No. ML073040557)
November 09, 2007	Letter to President Maurice John, Seneca Nation of Indians, Indian Tribe, Request for Comments Concerning the Beaver Valley Power Station, Units 1 and 2, License Renewal Application Review. (Accession No. ML073040557)
November 09, 2007	Letter to Chief Glenna Wallace, Eastern Shawnee Tribe of Oklahoma, Indian Tribe, Request for Comments Concerning the Beaver Valley Power Station, Units 1 and 2, License Renewal Application Review. (Accession No. ML073040557)
November 09, 2007	Letter to President Kerry Holton, Delaware Nation, Indian Tribe, Request for Comments Concerning the Beaver Valley Power Station Units 1 and 2, License Renewal Application Review. (Accession No. ML073040557)
November 09, 2007	Letter to Chief Roger Hill, Tonawanda Seneca Nation, Indian Tribe, Request for Comments Concerning the Beaver Valley Power Station, Units 1 and 2, License Renewal Application Review. (Accession No. ML073040557)
November 15, 2007	Letter from Mary A. Colligan, NOAA National Marine Fisheries Service, Northeast Region, response to request for listing of endangered species concerning the BVPS, Unit 1 and 2, license renewal application review. (Accession No. ML080160443)
November 19, 2007	Letter from Russell D. Morgan, Greene Township Board of Supervisors, regarding comments in support of the BVPS, Unit 1 and 2, license renewal. (Accession No. ML080160457)
November 19, 2007	Letter from Tony Gonyea, Onondaga Nation, response to request for comments concerning the BVPS, Unit 1 and 2, plant license renewal application review. (Accession No. ML080160450)
November 20, 2007	Letter from David Densmore, U.S. Fish and Wildlife Service, Pennsylvania Field Office, response to request for listing of

endangered species concerning the BVPS, Unit 1 and 2, license renewal application review. (Accession No. ML080160437)

November 26, 2007 — Letter from Bruce F. Simmeth, United Way of Beaver County, regarding comments in support of the BVPS, Unit 1 and 2, license renewal. (Accession No. ML080160451)

November 27, 2007 — Letter from Larry Foulke, regarding comments in support of the BVPS Units 1 and 2 license renewal, received at the November 27, 2007 Public Meeting (Accession No. ML080160433)

November 27, 2007 — Letter from Jeff Jones, regarding comments in support of the BVPS, Unit 1 and 2, license renewal, received at the November 27, 2007, public meeting. (Accession No. ML080160440)

December 21, 2007 — Letter from Peter P. Sena III, regarding the submittal of editorial corrections to the BVPS Units 1 and 2 license renewal application. L-07-500, (Accession No. ML073601009)

January 09, 2008 — Summary of Public Environmental Scoping Meetings Related to the Review of the Beaver Valley Power Station, License Renewal Application (TAC Nos. MD6595 and MD6596). (Accession No. ML073530539)

January 18, 2008 — Letter from Peter P. Sena III, regarding the submittal of supplemental documents to the BVPS, Unit 1 and 2, license renewal application, requested during the environmental audit. L-07-502, (Accession No. ML080170508)

January 28, 2008 — Letter from Peter P. Sena III, Disposition of Exceptions to Supplemental License Renewal Environmental Information Requested by Nuclear Regulatory Commission Related to the Review of the BVPS Units 1 and 2, License Renewal Application (TAC Nos. MD6595 and MD6596). (Security-related information, unavailable to public)

January 28, 2008 — Letter to Peter P. Sena III, Request for Additional Information Regarding Severe Accident Mitigation Alternatives Request for Beaver Valley Power Station Units 1 and 2 License Renewal (TAC Nos. MD6595 and MD6596). (Accession No. ML080230728)

January 30, 2008 — Letter to Peter P. Sena III, summary of the environmental scoping process related to the review of the BVPS, Unit 1 and 2, license renewal application (TAC Nos. MD6595 and MD6596). (Accession No. ML080240411)

March 07, 2008 — Letter from Peter P. Sena III, Response to Severe Accident Mitigation Alternatives Request for Additional Information Related to the Review

	of the BVPS, Units 1 and 2, License Renewal Application (TAC Nos. MD6595 and MD6596), L-08-81, (Accession No. ML080710545)
March 13, 2008	Letter to Peter P. Sena III, Request for Additional Information Regarding Refurbishment Impacts for Beaver Valley Power Station Units 1 and 2 License Renewal (TAC Nos. MD6595 and MD6596). (Accession No. ML080560588)
March 17, 2008	Memorandum, Summary of Site Audit Related to the Review of the License Renewal Application for Beaver Valley Power Station, Units 1 and 2 (TAC Nos. MD6595 and MD6596). (Accession No. ML080290257)
March 21, 2008	Summary of the March 3, 2008, telephone conference on the request for additional information regarding severe accident mitigation alternatives related to the review of the BVPS, Unit 1 and 2, license renewal application (TAC Nos. MD6595 and MD6596). (Accession No. ML080730116)
March 26, 2008	Summary of the January 16, 2008, telephone conference on the request for additional information regarding severe accident mitigation alternatives related to the review of the BVPS, Unit 1 and 2, license renewal application (TAC Nos. MD6595 and MD6596). (Accession No. ML080740392)
April 07, 2008	Summary of the March 05, 2008, telephone conference on the request for additional information regarding refurbishment activities related to the review of the BVPS, Unit 1 and 2, license renewal application (TAC Nos. MD6595 and MD6596). (Accession No. ML080740123)
April 10, 2008	Letter from Peter P. Sena III, regarding the submittal of a supplemental document, Integrated Cultural Resources Management Plan, to the BVPS, Unit 1 and 2, license renewal application, requested during the environmental audit of the BVPS, Unit 1 and 2, license renewal application (TAC Nos. MD6595 and MD6596). (Security-related information, unavailable to public)
April 25, 2008	Letter from Peter P. Sena III, Response to Refurbishment Activities Request for Additional Information Followup Questions Related to the Review of the BVPS Units 1 and 2, License Renewal Application (TAC NOS. MD6595 and MD6596), L-08-125, (Accession No. ML081200598)
May 08, 2008	Summary of the April 10, 2008, telephone conference on the request for additional information followup questions regarding severe accident mitigation alternatives related to the review of the BVPS, Unit 1 and 2, license renewal application (TAC Nos. MD6595 and MD6596). (Accession No. ML081160150)

May 02, 2008	Letter from Peter P. Sena III, Response to Severe Accidents Mitigation Alternatives Request for Additional Information Follow-Up Questions Related to the Review of the BVPS Units 1 and 2, License Renewal Application (TAC NOS. MD6595 and MD6596), L-08-148, (Accession No. ML081270237)
May 30, 2008	Letter from Peter P. Sena III, Response to Refurbishment Activities Request for Additional Information Followup Questions Related to the Review of the BVPS Units 1 and 2, License Renewal Application (TAC NOS. MD6595 and MD6596), L-08-179, (Accession No. ML081550420)
June 02, 2008	Letter from Peter P. Sena III, Response to Refurbishment Activities Request for Additional Information Followup Questions Related to the Review of the BVPS Units 1 and 2, License Renewal Application (TAC NOS. MD6595 and MD6596), L-08-200, (Accession No. ML081690429)
June 08, 2008	Summary of the April 30, 2008 telephone conference on the request for additional information followup questions regarding refurbishment activities related to the review of the BVPS Units 1 and 2, license renewal application (TAC NOS. MD6595 and MD6596) (Accession No. ML081230499)
June 27, 2008	Letter from Peter P. Sena III, Response to Refurbishment Activities Request for Additional Information Followup Questions Related to the Review of the BVPS Units 1 and 2, License Renewal Application (TAC NOS. MD6595 and MD6596), L-08-210, (Accession No. ML081790702)
July 02, 2008	Summary of the May 20, 2008 telephone conference on the request for additional information followup questions regarding refurbishment activities related to the review of the BVPS Units 1 and 2, license renewal application (TAC NOS. MD6595 and MD6596) (Accession No. ML081550314)
August 18, 2008	Summary of the June 02, 2008 telephone conference on the request for additional information followup questions regarding refurbishment activities related to the review of the BVPS Units 1 and 2, license renewal application (TAC NOS. MD6595 and MD6596) (Accession No. ML081910624)

Appendix D

Organizations Contacted Related to FirstEnergy Nuclear Operating Company Application for the License Renewal of Beaver Valley Power Station, Units 1 and 2

D. Appendix D

Organizations Contacted Related to FirstEnergy Nuclear Operating Company Application for the License Renewal of Beaver Valley Power Station, Units 1 and 2

Units 1 and 2The U.S. Nuclear Regulatory Commission contacted the following Federal, State, and local agencies, and Native American Tribes, during the course of its independent review of the environmental impacts related to the application for license renewal for the Beaver Valley Power Station:

Advisory Council on Historic Preservation, Washington, DC

National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Gloucester, MA

Ohio Department of Natural Resources, Division of Natural Areas and Preserves, Columbus, OH

Ohio Historical Society, Ohio Historic Preservation Office, Columbus, OH

Pennsylvania Environmental Council, Western Regional Office, Pittsburgh, PA

Pennsylvania Game Commission, Bolivar, PA

Pennsylvania Department of Conservation and Natural Resources, Harrisburg, PA

Pennsylvania Department of Environmental Protection, Division of Radiological Protection, Harrisburg, PA

Pennsylvania Fish and Boat Commission, Somerset, PA

Pennsylvania Historical and Museum Commission, Harrisburg, PA

Shippingport Borough, Shippingport, PA

United States Army Corps of Engineers, Pittsburg, PA

U.S. Fish and Wildlife Service, Pennsylvania Field Office, State College, PA

West Virginia Division of Natural Resources, Division of Wildlife, Charleston, WV

West Virginia Division of Culture and History, Charleston, WV

Absentee-Shawnee Tribe of Oklahoma, Shawnee, OK

Cayuga Nation, Versailles, NY

Delaware Nation, Anadarko, OK

Delaware Trust Board, Bartlesville, OK

Eastern Shawnee Tribe of Oklahoma, Seneca, MO

Oneida Indian Nation, Verona, NY

Oneida Nation of Wisconsin, Oneida, WI
Onondaga Nation, Nedrow, NY
Seneca Nation of Indians, Salamanca, NY
Seneca-Cayuga Tribe of Oklahoma, Miami, OK
Shawnee Tribe, Miami, OK
St. Regis Mohawk Tribe, Akwesasne, NY
Stockbridge-Munsee Band of the Mohican Nation, Bowler, WI
Tonawanda Seneca Nation, Verona, NY
Tuscarora Nation, Via Lewiston, NY

Appendix E

Beaver Valley Power Station Units 1 and 2, Compliance Status and Consultation Correspondence

E. Appendix E

Beaver Valley Power Station Units 1 and 2, Compliance Status and Consultation Correspondence

E.1 Consultation Correspondence

Table E-1 identifies the consultation correspondence related to the evaluation of the application for renewal of the operating license for the Beaver Valley Power Station (BVPS), Units 1 and 2. Copies of the consultation correspondence appear at the end of this appendix.

Table E-2 lists the BVPS licenses, permits, and other approvals obtained from Federal, State, regional, and local authorities.

Table E-1 Consultation Correspondence

Source	Recipient	Date of Letter
U.S. Nuclear Regulatory Commission (R. Franovich)	Advisory Council on Historic Preservation (D.L. Klima) ML072910607	November 02, 2007
U.S. Nuclear Regulatory Commission (R. Franovich)	State Historic Preservation Office, Pennsylvania Historical and Museum Commission (Barbara Franco) ML072910734	November 02, 2007
U.S. Nuclear Regulatory Commission (R. Franovich)	Ohio Historic Preservation Office (Mark Epstein) ML073020229	November 02, 2007
U.S. Nuclear Regulatory Commission (R. Franovich)	Deputy State Historic Preservation Office, West Virginia Division of Culture and History (Susan M. Pierce) ML073020219	November 02, 2007
U.S. Nuclear Regulatory Commission (R. Franovich)	U.S. Army Corps of Engineers (Scott Hans) ML072920402	November 02, 2007
U.S. Nuclear Regulatory Commission (R. Franovich)	Pennsylvania Department of Environmental Protection, Division of Radiological Protection (Rich Janati) ML072920398)	November 02, 2007
U.S. Nuclear Regulatory Commission (R. Franovich)	U.S. Fish and Wildlife Service, Pennsylvania Field Office (David Densmore) ML072910105	November 02, 2007
U.S. Nuclear Regulatory Commission (R. Franovich)	National Oceanic and Atmospheric Administration, National Marine Fisheries Service (Patricia Kurkul) ML072910221	November 02, 2007
U.S. Nuclear Regulatory Commission (R. Franovich)	Ohio Department of Natural Resources (Samuel W. Speek) ML072950321	November 02, 2007
U.S. Nuclear Regulatory Commission (R. Franovich)	Pennsylvania Environmental Council (Davitt Woodwell) ML072920376	November 02, 2007

Table E-1. (coontd)

Source	Recipient	Date of Letter
U.S. Nuclear Regulatory Commission (R. Franovich)	Pennsylvania Game Commission (Matt Hough) ML072920415	November 02, 2007
U.S. Nuclear Regulatory Commission (R. Franovich)	Pennsylvania Department of Conservation and Natural Resources (Michael DiBerardinis) ML072920260	November 02, 2007
U.S. Nuclear Regulatory Commission (R. Franovich)	Pennsylvania Fish and Boat Commission (Thomas C. Shetterly) ML072920276	November 02, 2007
U.S. Nuclear Regulatory Commission (R. Franovich)	Shippingport Borough (Michael Clancy) ML072920359	November 02, 2007
U.S. Nuclear Regulatory Commission (R. Franovich)	Shippingport Borough (Pat Lampe) ML072920385	November 02, 2007
U.S. Nuclear Regulatory Commission (R. Franovich)	West Virginia Division of Natural Resources (Curtis Taylor) ML072950219	November 02, 2007
U.S. Nuclear Regulatory Commission (R. Franovich)	Stockbridge-Munsee Band of the Mohican Nation, Wisconsin, Indian Tribe (Chairman Robert Chick) ML073040557	November 14, 2007(a)
National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Northeast Region (Mary A. Colligan) ML080160443	U.S. Nuclear Regulatory Commission (R. Franovich)	November 15, 2007
Onondaga Nation (Tony Gonyea) ML080160450	U.S. Nuclear Regulatory Commission (R. Franovich)	November 19, 2007
U.S. Fish and Wildlife Service (David Densmore) ML080160437	U.S. Nuclear Regulatory Commission (R. Franovich)	November 20, 2007
U.S. Nuclear Regulatory Commission (S. Lopas)	U.S. Fish and Wildlife Service (Pamela Shellenberger) ML081910224, ML801910279	June 24, 2008

(a) Similar letters were sent to listed Indian Nations, See Appendix D.

E.2 Licenses Permits and Other Approvals

Table E-2. Federal, State, Local, and Regional Licenses, Permits, and Other Approvals for BVPS

Agency	Authority	Requirement	Number	Expiration Date	Authorized Activity
U.S. Nuclear Regulatory Commission	Atomic Energy Act, 10 CFR Part 50	License to operate	DPR-66	January 29, 2016	Authorization to operate BVPS, Unit 1.
U.S. Nuclear Regulatory Commission	Atomic Energy Act, 10 CFR Part 50	License to operate	NPF-73	May 27, 2027	Authorization to operate BVPS, Unit 2.
U.S. Department of Transportation	49 CFR 5108	Hazardous Materials Shipment Certificate of Registration	060707 551 070P	June 30, 2008, issued annually	Authorization to ship hazardous materials.
U.S. Environmental Protection Agency	CERCLA [42 U.S.C. s/s 9601 et seq (1980)]	Used for SARA Tier II reporting and emergency planning	04-02474 BVPS facility identification number	Indefinite	Used for SARA Tier II reporting and emergency planning.
U.S. Environmental Protection Agency	EPCRA [42 U.S.C. 11011 et seq (1986)] SARA [42 U.S.C. 9601 et seq (1986)]	Used for SARA Tier II reporting and emergency planning	04-02475 FE Long-Term Distribution Center/Warehouse (22)	Indefinite	Used for SARA Tier II reporting and emergency planning.
U.S. Environmental Protection Agency	RCRA [42 U.S.C. s/s 321 et seq (1976)]	Monitor regulated waste activity under the PA Solid Waste Management Act	PAR000040485	Indefinite	Monitor regulated waste activity under the PA Solid Waste Management Act.

Table E-2. (contd)

Agency	Authority	Requirement	Number	Expiration Date	Authorized Activity
U.S. Army Corps of Engineers	Section 10 of the *Rivers and Harbors Act* of 1899	U.S. Department of the Army Maintenance Dredging Permit	200100242	December 31, 2011	Maintenance dredging of the Ohio River along the BVPS auxiliary intake structure, main intake structure, barge slip area, discharge structure, and emergency outfall structure.
Pennsylvania Department of Environmental Protection	*Federal Clean Water Act*, Section 402 (33 U.S.C. Section 1251 et seq.), Pennsylvania Clean Streams Law, Act of June 22, 1937 (P.L. 1987, No. 394), as amended (35 P.S. §691.1 et seq.)	National Pollutant Discharge Elimination System Permit, Individual Wastewater Discharge Permit	PA 0025615	December 27, 2006 *Continued pending approval of renewal application*	Wastewater treatment and effluent discharge to receiving waters (Ohio River and Peggs Run).
Pennsylvania Department of Environmental Protection	*Federal Clean Water Act*, Section 402 (33 U.S.C. Section 1251 et seq.), Pennsylvania Clean Streams Law, Act of June 22, 1937 (P.L. 1987, No. 394), as amended (35 P.S. §691.1 et seq.)	NPDES Construction Stormwater Permits	PAG-2-0004-03-025	December 4, 2008	Stormwater discharge related to the construction of temporary offices at offsite warehouse, and security perimeter expansion.

Table E-2. (contd)

Agency	Authority	Requirement	Number	Expiration Date	Authorized Activity
Pennsylvania Department of Environmental Protection	General permit for sewage conveyance project to Shippingport borough municipal wastewater treatment facility.	NPDES Construction Stormwater Permits	GP05046203	Upon project completion	General permit for sewage conveyance project to Shippingport Borough Municipal Wastewater Treatment Facility.
Pennsylvania Department of Environmental Protection	Pennsylvania Code, Title 25, Chapter 245	Storage Tank Registrations and Permits	Unit 1 Facility ID 04-13281	Issued annually on October 4, indefinite	Registration of aboveground and underground storage tanks (as defined in Pennsylvania Code, Title 25, Chapter 245.1) containing regulated substances.
Pennsylvania Department of Environmental Protection	Pennsylvania Code, Title 25, Chapter 245	Storage Tank Registrations and Permits	Unit 2 Facility ID 04-13361	Issued annually on October 4, indefinite	Registration of aboveground and underground storage tanks (as defined in Pennsylvania Code, Title 25, Chapter 245.1) containing regulated substances.

Table E-2. (contd)

Agency	Authority	Requirement	Number	Expiration Date	Authorized Activity
Pennsylvania Department of Environmental Protection	Pennsylvania Code, Title 25, Chapter 245	Storage Tank Registrations and Permits	Unit 2 Facility ID 04-13361	Issued annually on October 4, indefinite	Registration of aboveground and underground storage tanks (as defined in Pennsylvania Code, Title 25, Chapter 245.1) containing regulated substances.
Pennsylvania Department of Environmental Protection*	*Pennsylvania Dam Safety and Encroachment Act* of Nov. 26, 1978 (P.L. 1375, No. 325) as amended (32 P.S. §693.1 et seq.)	Water Obstruction and Encroachment Permits	200100242 (0477705 allows maintenance dredging)	December 31, 2011	Allows for operation, maintenance, and normal repair of structures or obstructions built upon waters of the State and the 100-year floodplain.
Pennsylvania Department of Environmental Protection*	*Pennsylvania Dam Safety and Encroachment Act* of Nov. 26, 1978 (P.L. 1375, No. 325) as amended (32 P.S. §693.1 et seq.)	Water Obstruction and Encroachment Permits	0477705 (200100242 allows maintenance dredging)	Indefinite	Allows for operation, maintenance, and normal repair of structures or obstructions built upon waters of the State and the 100-year floodplain.

Table E-2. (contd)

Agency	Authority	Requirement	Number	Expiration Date	Authorized Activity
Pennsylvania Department of Environmental Protection*	*Pennsylvania Dam Safety and Encroachment Act* of Nov. 26, 1978 (P.L. 1375, No. 325) as amended (32 P.S. §693.1 et seq.)	Water Obstruction and Encroachment Permits	06786A (transmission line over Ohio River at Mile 34.5)	Indefinite	Allows for operation, maintenance, and normal repair of structures or obstructions built upon waters of the State and the 100-year floodplain.
Pennsylvania Department of Environmental Protection*	*Pennsylvania Dam Safety and Encroachment Act* of Nov. 26, 1978 (P.L. 1375, No. 325) as amended (32 P.S. §693.1 et seq.)	Water Obstruction and Encroachment Permits	18737 (intake and discharge structures)	Indefinite	Allows for operation, maintenance, and normal repair of structures or obstructions built upon waters of the State and the 100-year floodplain.
Pennsylvania Department of Environmental Protection*	*Pennsylvania Dam Safety and Encroachment Act* of Nov. 26, 1978 (P.L. 1375, No. 325) as amended (32 P.S. §693.1 et seq.)	Water Obstruction and Encroachment Permits	0475711 (BVPS-2 auxiliary intake structure)	Indefinite	Allows for operation, maintenance, and normal repair of structures or obstructions built upon waters of the State and the 100-year floodplain.

Table E-2. (contd)

Agency	Authority	Requirement	Number	Expiration Date	Authorized Activity
Pennsylvania Department of Environmental Protection*	*Clean Air Act*, 40 U.S.C. 1857 et seq., *Pennsylvania Air Pollution Control Act* of Jan. 8, 1960, (P.L. 2119)	*Air Quality* Operating Permit (State Only) (Synthetic Minor)	*Beaver Valley Power* Station Application for Air Quality Operating Permit #04-086 (State Only) (Synthetic Minor)	*Indefinite* (pending issuance of permit by PADEP)	*Establishes emission limits* for BVPS emergency diesel generators and the BVPS- 2 auxiliary boiler. Pending final approval by PADEP, the application replaces the following separate Air Quality Operating Permits, which are now inactive: 04-302-055 (BVPS-2 auxiliary boilers) 04-399-004 (auxiliary diesel generators) 04-399-005A (Emergency Response Facility diesel generator) 04-399-006 (South Office Shops Building diesel generator).
Pennsylvania Department of Environmental Protection*	*Pennsylvania Clean Streams Law*, Act of June 22, 1937 (P.L. 1987, No. 394), as amended (35 P.S. §691.1 et seq.)	Water Management Permit (Part 2 Industrial Wastewater)	048204 [BVPS-2 RBC system (sewage)]	Indefinite	One-time permits allowing for the construction and operation of BVPS site industrial wastewater treatment facilities. Discharges are now regulated under NPDES permit.

Table E-2. (contd)

Agency	Authority	Requirement	Number	Expiration Date	Authorized Activity
Pennsylvania Department of Environmental Protection*	*Pennsylvania Clean Streams Law*, Act of June 22, 1937 (P.L. 1987, No. 394), as amended (35 P.S. §691.1 et seq.)	Water Management Permit (Part 2 Industrial Wastewater)	0479403 [BVPS-1 & BVPS-2 RBC system (sewage)] 0478201 [BVPS-1 oil separator effluent] 0473211 [all BVPS- and BVPS-2 discharges] 0472411 [BVPS-1 package plant (sewage)] 0470208 [BVPS-1 radiation and water treating waste] 0470203 [BVPS-1 condenser cooling water]	Indefinite	One-time permits allowing for the construction and operation of BVPS site industrial wastewater treatment facilities. Discharges are now regulated under NPDES permit.
Pennsylvania Department of Environmental Protection	O25 PA Code 129.14. Open Burning Operations	Open Burning Permit for Firefighting Instruction	N/A	Issued annually on December 31	Periodic open burning of wooden pallets and diesel fuel for purposes of fire brigade training. Operation of the BVPS Fire School.
Pennsylvania Department of Environmental Protection	Pennsylvania Code, Title 25, Chapter 287.7	Approval for the disposition of intake and cooling tower silt	N/A (Letter Concurrence)	Indefinite	Application of dredged and dewatered intake and cooling tower silt at approved areas on site.
Pennsylvania Department of Environmental Protection	*Pennsylvania Water Resources Planning Act* (Act 220-2002)	Act 220 Water Withdrawal and Use Registration	221113 Main Intake Structure, Alternate Intake, and Midland Municipal Authority	Indefinite	Water withdrawal and use/disposition.

Table E-2. (contd)

Agency	Authority	Requirement	Number	Expiration Date	Authorized Activity
Pennsylvania Fish and Boat Commission	Pennsylvania Fish and Boat Code (Act 1980-1975)	Scientific Collector's Permit	036, Type III (R)	Issued annually on December 31	Collection of fish and other aquatic life for environmental monitoring programs.
Tennessee Department of Environment and Conservation	Tennessee Code Annotated 68- 202-206	Radioactive Waste License for Delivery	T-PA008-L-99	Issued annually on December 31	Shipment of radioactive material to a licensed disposal/processing facility within the State of Tennessee.
South Carolina Department of Environmental Quality	*South Carolina Radioactive Waste Transportation and Disposal Act* (Act No. 429 of 1980)	Radioactive Waste License for Delivery	0009-37-99-X	Issued annually on December 31	Shipment of radioactive material to a licensed disposal/processing facility within the State of South Carolina.

Permit originally issued by the Pennsylvania Department of Natural Resources.
BVPS = Beaver Valley Power Station
CERCLA = *Comprehensive Environmental Response, Compensation, and Liability Act*
CFR = *Code of Federal Regulations*
EPCRA = *Emergency Planning and Community Right to Know Act*
ID = Identification Number
N/A = Not Applicable
NPDES = National Pollutant Discharge Elimination System
PADEP = Pennsylvania Department of Environmental Protection
P.L. = Public Law
P.S. = Public Statute
RBC = Rotating Biological Contactor
RCRA = Resources Conservation and Recovery Act
SARA = *Superfund Amendments and Reauthorization Act*
U.S.C. = *United States Code*

E.3 Correspondence

November 2, 2007

Mr. Don L. Klima, Director
Advisory Council on Historic Preservation
Office of Federal Agency Programs
1100 Pennsylvania Ave, NW, Suite 803
Washington, DC 20004

SUBJECT: BEAVER VALLEY POWER STATION, UNITS 1 & 2, LICENSE RENEWAL APPLICATION REVIEW

Dear Mr. Klima:

The U.S. Nuclear Regulatory Commission (NRC) staff is reviewing an application, to renew the operating licenses for Beaver Valley Power Station (BVPS), Units 1 & 2, which is located near the town of Shippingport, Beaver County, Pennsylvania. BVPS is operated by FirstEnergy Nuclear Operating Company (FENOC). The application for renewal was submitted by FENOC in a letter dated August 27, 2007, pursuant to Title 10 of the *Code of Federal Regulations* Part 51 & 54 (10 CFR Part 51 & 54).

The NRC has established that, as part of the staff's review of any nuclear power plant license renewal action, a site-specific Supplemental Environmental Impact Statement (SEIS) to its "Generic Environmental Impact Statement for License Renewal of Nuclear Plants," NUREG-1437, will be prepared under the provisions of 10 CFR Part 51, the NRC's regulation that implements the National Environmental Policy Act of 1969 (NEPA). In accordance with 36 CFR 800.8(c), the SEIS will include analyses of potential impacts to historic and cultural resources.

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If you have any questions or require additional information, please contact the Safety/Environmental Project Manager, Mr. Kent Howard, at 301-415-2989 or by e-mail at KLH1@nrc.gov.

Sincerely,

/RA by Bo Pham for/
Rani Franovich, Branch Chief
Project Branch 2
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket Nos. 50-334 and 50-412

cc: See next page

Mr. Klima -2-

If you have any questions or require additional information, please contact the Safety/Environmental Project Manager, Mr. Kent Howard, at 301-415-2989 or by e-mail at KLH1@nrc.gov.

Sincerely,

/RA by Bo Pham for/
Rani Franovich, Branch Chief
Project Branch 2
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket Nos. 50-334 and 50-412

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DATE:	11/02/07	11/02/07	11/02/07	11/02/07

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Letter to D. Klima from R. Franovich dated November 2, 2007

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RBellamy, RI

Beaver Valley Power Station, Units 1 and 2

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Beaver Valley Power Station, -2-
Units 1 and 2

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Dr. Judith Johnsrud
Environmental Coalition on Nuclear Power
Sierra Club
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475 Allendale Road
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Resident Inspector
U.S. Nuclear Regulatory Commission
P.O. Box 298
Shippingport, PA 15077

November 2, 2007

Ms. Barbara Franco, SHPO
Pennsylvania Historical and Museum
 Commission
300 North Street
Harrisburg, PA 17120

SUBJECT: BEAVER VALLEY POWER STATION, UNITS 1 AND 2, LICENSE RENEWAL APPLICATION REVIEW

Dear Ms. Franco:

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B. Franco -2-

If you have any questions concerning the NRC staff's review of this license renewal application, please contact the Safety/Environmental Project Manager, Mr. Kent Howard, at 301-415-2989 or by e-mail at KLH1@nrc.gov.

Sincerely,

/RA by Bo Pham for/
Rani Franovich, Branch Chief
Projects Branch 2
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket Nos. 50-334 and 50-412

cc: See next page

B. Franco -2-

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Sincerely,

/RA by Bo Pham for/
Rani Franovich, Branch Chief
Projects Branch 2
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket Nos. 50-334 and 50-412

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Beaver Valley Power Station, Units 1 and 2

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Beaver Valley Power Station, Units 1 and 2

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Mayor of the Borough of Shippingport
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Julie Firestone
FirstEnergy Nuclear Operating Company
Beaver Valley Power Station
P.O. Box 4, Route 168

November 2, 2007

Mr. Mark Epstein
Department Head
Ohio Historic Preservation Office
Ohio Historical Society
567 E. Hudson Street
Columbus, OH 43211-1030

SUBJECT: BEAVER VALLEY POWER STATION, UNITS 1 AND 2, LICENSE RENEWAL APPLICATION REVIEW

Dear Mr. Epstein:

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M. Epstein -2-

If you have any questions concerning the NRC staff's review of this license renewal application, please contact the Safety/Environmental Project Manager, Mr. Kent Howard, at 301-415-2989 or by e-mail at KLH1@nrc.gov.

Sincerely,

/RA by Bo Pham for/
Rani Franovich, Branch Chief
Projects Branch 2
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket Nos. 50-334 and 50-412

cc: See next page

M. Epstein -2-

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Sincerely,

/RA by Bo Pham for/
Rani Franovich, Branch Chief
Projects Branch 2
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket Nos. 50-334 and 50-412

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DATE:	11/02/07	11/02/07	11/02/07	11/02/07

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Letter to M Epstein from R. Franovich dated November 2, 2007

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Beaver Valley Power Station, Units 1 and 2

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Dr. Judith Johnsrud
Environmental Coalition on Nuclear Power
Sierra Club
433 Orlando Avenue
State College, PA 16803

Beaver Valley Power Station,
Units 1 and 2

- 2 -

cc:

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Mayor of the Borough of Shippingport
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Julie Firestone
FirstEnergy Nuclear Operating Company
Beaver Valley Power Station
P.O. Box 4, Route 168
Shippingport, PA 15077

November 2, 2007

Ms. Susan M. Pierce
Deputy State Historic Preservation Officer
West Virginia Division of Culture & History
The Culture Center
1900 Kanawha Blvd., E.
Charleston, WV 25305-0300

SUBJECT: BEAVER VALLEY POWER STATION, UNITS 1 AND 2, LICENSE RENEWAL APPLICATION REVIEW

Dear Ms. Pierce:

The U.S. Nuclear Regulatory Commission (NRC) staff is reviewing an application to renew the operating license for Beaver Valley Power Station (BVPS), Units 1 and 2, which is located near the town of Shippingport, Beaver County, Pennsylvania. BVPS is operated by FirstEnergy Nuclear Operating Company (FENOC). The application for renewal was submitted by FENOC in a letter dated August 27, 2007, pursuant to Title 10 of the *Code of Federal Regulations* Part 51 & 54 (10 CFR Part 51 & 54).

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S. Pierce -2-

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Sincerely,

/RA by Bo Pham for/
Rani Franovich, Branch Chief
Projects Branch 2
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket Nos. 50-334 and 50-412

cc: See next page

S. Pierce -2-

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Sincerely,

/RA by Bo Pham for/
Rani Franovich, Branch Chief
Projects Branch 2
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket Nos. 50-334 and 50-412

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DATE:	11/02/07	11/02/07	11/02/07	11/02/07

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Letter to S Pierce from R. Franovich Dated November 2, 2007

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SUBJECT: BEAVER VALLEY POWER STATION, UNITS 1 AND 2, LICENSE RENEWAL APPLICATION REVIEW

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DWerkheiser, RI
RBellamy, RI

Beaver Valley Power Station,
Units 1 and 2

cc:

Joseph J. Hagan
President and Chief Nuclear Officer
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Beaver Valley Power Station,
Units 1 and 2

- 2 -

cc:

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November 2, 2007

Mr. Scott Hans
Acting Chief Regulatory Branch
United States Army Corps of Engineers
Federal Building, 21st Floor
1000 Liberty Ave.
Pittsburgh, PA 15222-4186

SUBJECT: BEAVER VALLEY POWER STATION, UNITS 1 AND 2, LICENSE RENEWAL APPLICATION REVIEW

Dear Mr. Hans:

The U.S. Nuclear Regulatory Commission (NRC) is reviewing an application, submitted by FirstEnergy Nuclear Operating Company (FENOC), for the renewal of the operating licenses for Beaver Valley Power Station (BVPS), Units 1 & 2, located near the town of Shippingport, Beaver County, Pennsylvania. As part of the review of the license renewal application (LRA), the NRC is preparing a Supplemental Environmental Impact Statement (SEIS) under the provisions of Title 10 of the *Code of Federal Regulations* Part 51 (10 CFR Part 51), the NRC's regulation that implements the National Environmental Policy Act (NEPA) of 1969.

BVPS is requesting the renewal of its operating licenses for Units 1 and 2 for a period of 20 years beyond the expiration of the current license term, renewing the licenses until July 2036 and March 2047, respectively. The proposed action would include the use and continued maintenance of existing plant facilities and transmission lines; BVPS does not plan to construct or alter any facilities associated with the plant during the period of extended operation.

The NRC staff plans to hold two identical public meetings covering the license renewal review process and NEPA scoping on November 27, 2007, at the Embassy Suites Pittsburgh – International Airport, 550 Cherrington Parkway, Pittsburgh, PA 15108. The first meeting will convene at 1:30 p.m., and will continue until 4:30 p.m., as necessary. The second meeting will convene at 7:00 p.m., and will continue until 10:00 p.m., as necessary. From November 13-16, 2007, the NRC plans to conduct a site audit. You and your staff are invited to attend the public meetings. Your office will receive a copy of the draft SEIS along with a request for comments. The anticipated publication date for the draft SEIS is September 2008.

S. Hans - 2 -

If you have any questions concerning the NRC staff's review of this LRA, please contact the Safety/Environmental Project Manager, Mr. Kent Howard, at 301-415-2989 or by e-mail at KLH1@nrc.gov.

Sincerely,

/RA by Bo Pham for/
Rani Franovich, Branch Chief
Projects Branch 2
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket Nos. 50-334 and 50-412

cc: See next page

S. Hans - 2 -

If you have any questions concerning the NRC staff's review of this LRA, please contact the Safety/Environmental Project Manager, Mr. Kent Howard, at 301-415-2989 or by e-mail at KLH1@nrc.gov.

Sincerely,

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Division of License Renewal
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Docket Nos. 50-334 and 50-412

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Letter to S. Hans From R. Franovich Dated November 2, 2007

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November 2, 2007

Mr. Rich Janati
Pennsylvania Department of Environmental
Protection
Radiological Protection, 13th Floor
400 Market Street
Harrisburg, PA 17101

SUBJECT: BEAVER VALLEY POWER STATION, UNITS 1 AND 2, LICENSE RENEWAL APPLICATION REVIEW

Dear Mr. Janati:

The U.S. Nuclear Regulatory Commission (NRC) is reviewing an application, submitted by FirstEnergy Nuclear Operating Company (FENOC), for the renewal of the operating licenses for Beaver Valley Power Station (BVPS), Units 1 & 2, located near the town of Shippingport, Beaver County, Pennsylvania. As part of the review of the license renewal application (LRA), the NRC is preparing a Supplemental Environmental Impact Statement (SEIS) under the provisions of Title 10 of the *Code of Federal Regulations* Part 51 (10 CFR Part 51), the NRC's regulation that implements the National Environmental Policy Act (NEPA) of 1969.

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Mr. Janati - 2 -

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Sincerely,

/RA by Bo Pham for/
Rani Franovich, Branch Chief
Projects Branch 2
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket Nos. 50-334 and 50-412

cc: See next page

Mr. Janati - 2 -

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Letter to R. Janati from R. Franovich Dated November 2, 2007

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SUBJECT: BEAVER VALLEY POWER STATION, UNITS 1 AND 2, LICENSE RENEWAL APPLICATION REVIEW

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November 2, 2007

David Densmore
Project Leader
U.S. Fish and Wildlife Services
Pennsylvania Field Office
315 South Allen St., Suite 322
State College, PA 16801-4850

SUBJECT: REQUEST FOR LIST OF PROTECTED SPECIES WITHIN THE AREA UNDER EVALUATION FOR THE BEAVER VALLEY POWER STATION, UNITS 1 AND 2, LICENSE RENEWAL APPLICATION REVIEW

Dear Mr. Densmore:

The U.S. Nuclear Regulatory Commission (NRC or the staff) is reviewing an application submitted by FirstEnergy Nuclear Operating Company (FENOC) for the renewal of the operating licenses for Beaver Valley Power Station (BVPS), Units 1 and 2. BVPS is located near the town of Shippingport, Beaver County, Pennsylvania. As part of the review of the license renewal application (LRA), the NRC is preparing a Supplemental Environmental Impact Statement (SEIS) under the provisions of Title 10 of the *Code of Federal Regulations* Part 51 (10 CFR Part 51), the NRC's regulation that implements the National Environmental Policy Act (NEPA) of 1969. The SEIS includes an analysis of pertinent environmental issues, including endangered or threatened species and impacts to fish and wildlife. This letter is being submitted under the provisions of the Endangered Species Act of 1973; as amended, and the Fish and Wildlife Coordination Act of 1934, as amended; and the Sustainable Fisheries Act of 1996.

The operating license for BVPS, Unit 1 will expire on January 29, 2016, and the license for BVPS, Unit 2 will expire May 27, 2027. FENOC is seeking to renew each of these licenses for an additional twenty-year term.

The BVPS site, comprising of approximately 453 acres, is situated on the south bank of the Ohio River approximately 25 miles northwest of Pittsburgh, Pennsylvania. The nearest population center of greater than 20,000 inhabitants is the township of McCandless, Pennsylvania, located approximately 17 miles east of the site. Approximately 230 acres of the 453 acres of land on the site are developed or maintained encompassing the plant, switchyard, and related support facilities and infrastructure. The remainder of the site consists of forested areas. The site is characterized by a smooth, undulating, upland surface cut by numerous narrow, relatively shallow river valleys. Upland areas have been altered over time by strip mining, stream erosion, and glacially induced erosion. Local relief on the uplands is generally less than 200 feet, with differences of as much as 600 feet between valley bottoms and upland surfaces. Valley sides are usually moderately steep except in the upper reaches of streams where the side slopes are fairly gentle. Elevations range from 660 to 1,700 feet. The BVPS site region encompasses portions of Pennsylvania, Ohio, and West Virginia.

D. Densmore -2-

The presence of the Ohio River and hilly topography of the area have contributed to the development of industrial river towns where the majority of industries and residences are concentrated on relatively level land adjacent to the river. Topography beyond the river valley is characterized by steep slopes and broad, relatively flat hilltops. Much of these rural upland areas are forested, particularly on slopes; pastureland, cropland, and new residential development predominately on the hilltops and gentler slopes.

The major river systems in the region consist of the Monongahela, Allegheny, and Ohio Rivers, and their tributaries. The Ohio River and lower portions of the Allegheny and Monongahela Rivers are maintained and controlled by a series of locks and dams operated by the U.S. Army Corps of Engineers (USACE).

Several public lands within or near the BVPS site vicinity are dedicated to wildlife management and recreation. These public lands include a Shippingport Community Park, a 7.5-acre public recreation facility, a portion of the Ohio River Islands National Wildlife Refuge, Raccoon Creek State Park, Pennsylvania Game Lands Number 189, Beaver Creek State Forest, Brady Run County Park, and Pennsylvania Game Lands Number 173.

BVPS uses two closed-cycle, natural draft cooling towers as their primary source of cooling. Water that is withdrawn from the river and not returned, termed consumptive use, reduces downstream flows. Facilities equipped with closed-cycle cooling systems typically are characterized as consumptive water users due to evaporative losses. River water consumption does result from withdrawals used to replace water lost, but primarily from evaporation, in closed-cycle cooling systems. Maximum consumptive loss from BVPS operation is approximately 26 mgd (40 cfs).

Power output from the BVPS, Unit 1 and BVPS, Unit 2 main generators is fed to the transmission grid at the BVPS switchyard (Beaver Valley Substation), situated on the southern perimeter of the power block area on the BVPS site. The substation is organized as a 345-kV switchyard on the east side of the substation and a 138-kV switchyard on the west side of the substation, providing connection for a total of 13 transmission lines (circuits), 150.7 miles in total length, six 345-kV lines and seven 138-kV lines. All of these transmission lines are operated as integral parts of the transmission grid or to service major electric customers from the grid independent of BVPS. Therefore, FENOC and Duquesne Light, owners of the lines, expect that these lines would remain in service irrespective of continued operation of BVPS, Unit 1 and BVPS, Unit 2. The corridors pass through land that is primarily forestland. The enclosed transmission line map shows the transmission system that is being evaluated in the SEIS. FENOC conducts routine vegetation maintenance of its rural transmission line corridors approximately every 5 years. Trees and shrubs that do not interfere with transmission facilities are not disturbed, and portions of corridors that are not cultivated or devoted to other intensive uses are managed to promote a diversity of shrubs, grasses, and other groundcover that provides wildlife food and cover. Maintenance includes removal or pruning of woody vegetation as necessary to ensure adequate line clearance (no less than 30 feet from the conductor for transmission lines operated above 138 kV) and to allow vehicular access for maintenance.

Provided for your information is the BVPS Site Layout (Enclosure 1) and Transmission Line Map (Enclosure 2). To support the SEIS preparation process and to ensure compliance with Section 7 of the Endangered Species Act, the NRC requests information on Federally-listed, proposed, and candidate species and critical habitat that may be in the vicinity of BVPS and its associated transmission line rights-of-way. In addition, please provide any information you consider appropriate under the provisions of the Fish and Wildlife Coordination Act.

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If you have any questions concerning the NRC staff's review of this LRA, please contact the Safety/Environmental Project Manager, Kent Howard, at 301-415-2989 or by e-mail at KLH1@nrc.gov.

Sincerely,

/RA by Bo Pham for/
Rani Franovich, Branch Chief
Projects Branch 2
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket Nos. 50-334 and 50-412

Enclosures:
1. Site Layout
2. Transmission Line Map

cc w/encls: See next page

D. Densmore -3-

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/RA by Bo Pham for/
Rani Franovich, Branch Chief
Projects Branch 2
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Docket Nos. 50-334 and 50-412

Enclosures:
1. Site Layout
2. Transmission Line Map

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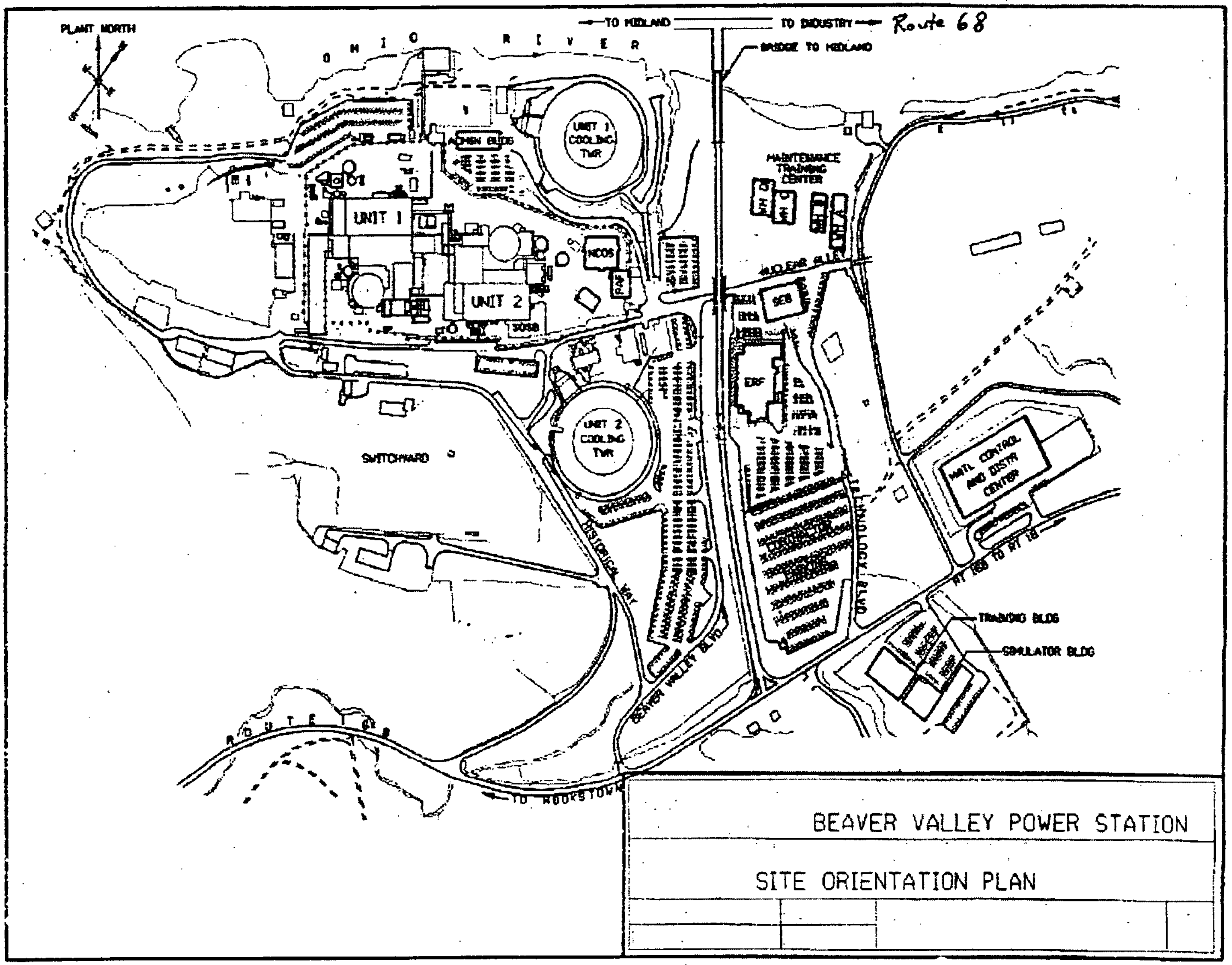
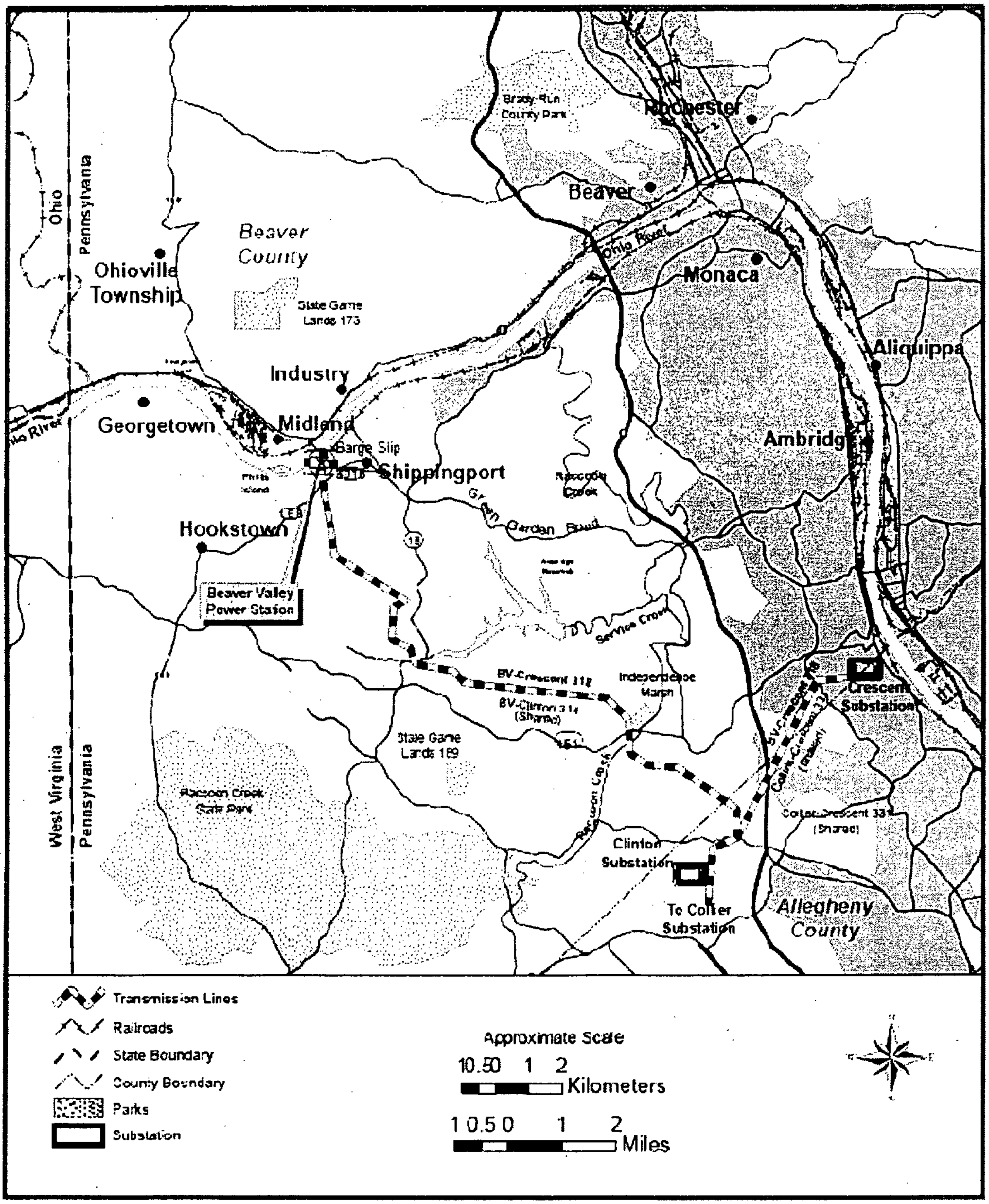
ENCLOSURE 1, Site Layout



ENCLOSURE 2, Transmission Line Map

BEAVER VALLEY-CRESCENT LINE 318 CORRIDOR



Letter to D. Densmore from R. Franovich dated November 2, 2007

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November 2, 2007

Ms. Patricia Kurkul
Northeast Regional Administrator
NOAA National Marine Fisheries Service
North East Regional Office
1 Blackburn Drive
Gloucester, MA 01930

SUBJECT: REQUEST FOR LIST OF PROTECTED SPECIES AND ESSENTIAL FISH HABITAT WITHIN THE AREA UNDER EVALUATION FOR THE BEAVER VALLEY POWER STATION, UNITS 1 AND 2, LICENSE RENEWAL APPLICATION REVIEW

Dear Ms. Kurkul:

The U.S. Nuclear Regulatory Commission (NRC or the staff) is reviewing an application submitted by FirstEnergy Nuclear Operating Company (FENOC) for the renewal of the operating licenses for Beaver Valley Power Station (BVPS), Units 1 & 2. BVPS is located near the town of Shippingport, Beaver County, Pennsylvania. As part of the review of the license renewal application (LRA), the NRC is preparing a Supplemental Environmental Impact Statement (SEIS) under the provisions of Title 10 of the *Code of Federal Regulations* Part 51 (10 CFR Part 51), the NRC's regulation that implements the National Environmental Policy Act (NEPA) of 1969. The SEIS includes an analysis of pertinent environmental issues, including endangered or threatened species and impacts to fish and wildlife. This letter is being submitted under the provisions of the Endangered Species Act of 1973, as amended, and the Fish and Wildlife Coordination Act of 1934, as amended; and the Sustainable Fisheries Act of 1996.

The operating license for BVPS, Unit 1 will expire on January 29, 2016, and the license for BVPS, Unit 2 will expire May 27, 2027. FENOC is seeking to renew each of these licenses for an additional twenty-year term.

The BVPS site, comprising approximately 453 acres, is situated on the south bank of the Ohio River approximately 25 miles northwest of Pittsburgh, Pennsylvania. The nearest population center of greater than 20,000 inhabitants is the township of McCandless, Pennsylvania, located approximately 17 miles east of the site. Approximately 230 acres of the 453 acres of land on the site are developed or maintained encompassing the plant, switchyard, and related support facilities and infrastructure. The remainder of the site consists of forested areas. The site is characterized by a smooth, undulating, upland surface cut by numerous narrow, relatively shallow river valleys. Upland areas have been altered over time by strip mining, stream erosion, and glacially induced erosion. Local relief on the uplands is generally less than 200 feet, with differences of as much as 600 feet between valley bottoms and upland surfaces. Valley sides are usually moderately steep except in the upper reaches of streams where the side slopes are fairly gentle. Elevations range from 660 to 1,700 feet. The BVPS site region encompasses portions of Pennsylvania, Ohio, and West Virginia.

The presence of the Ohio River and hilly topography of the area have contributed to the development of industrial river towns where the majority of industries and residences are concentrated on relatively level land adjacent to the river. Topography beyond the river valley is characterized by steep slopes and broad, relatively flat hilltops. Much of these rural upland areas are forested, particularly on slopes; pastureland, cropland, and new residential development predominately on the hilltops and gentler slopes.

The major river systems in the region consist of the Monongahela, Allegheny, and Ohio Rivers, and their tributaries. The Ohio River and lower portions of the Allegheny and Monongahela Rivers are maintained and controlled by a series of locks and dams operated by the U.S. Army Corps of Engineers (USACE).

Several public lands within or near the BVPS site vicinity are dedicated to wildlife management and recreation. These public lands include a Shippingport Community Park, a 7.5-acre public recreation facility, a portion of the Ohio River Islands National Wildlife Refuge, Raccoon Creek State Park, Pennsylvania Game Lands Number 189, Beaver Creek State Forest, Brady Run County Park, and Pennsylvania Game Lands Number 173.

BVPS uses two closed-cycle, natural draft cooling towers as their primary source of cooling. Water that is withdrawn from the river and not returned, termed consumptive use, reduces downstream flows. Facilities equipped with closed-cycle cooling systems typically are characterized as consumptive water users due to evaporative losses. River water consumption does result from withdrawals used to replace water lost, but primarily from evaporation, in closed-cycle cooling systems. Maximum consumptive loss from BVPS operation is approximately 26 mgd (40 cfs).

Power output from the BVPS, Unit 1 and BVPS, Unit 2 main generators is fed to the transmission grid at the BVPS switchyard (Beaver Valley Substation), situated on the southern perimeter of the power block area on the BVPS site. The substation is organized as a 345-kV switchyard on the east side of the substation and a 138-kV switchyard on the west side of the substation, providing connection for a total of 13 transmission lines (circuits), 150.7 miles in total length, six 345-kV lines and seven 138-kV lines. All of these transmission lines are operated as integral parts of the transmission grid or to service major electric customers from the grid independent of BVPS. Therefore, FirstEnergy and Duquesne Light, owners of the lines, expect that these lines would remain in service irrespective of continued operation of BVPS, Unit 1 and BVPS, Unit 2. The corridors pass through land that is primarily forestland. The enclosed transmission line map shows the transmission system that is being evaluated in the SEIS. FENOC conducts routine vegetation maintenance of its rural transmission line corridors approximately every 5 years. Trees and shrubs that do not interfere with transmission facilities are not disturbed, and portions of corridors that are not cultivated or devoted to other intensive uses are managed to promote a diversity of shrubs, grasses, and other groundcover that provides wildlife food and cover. Maintenance includes removal or pruning of woody vegetation as necessary to ensure adequate line clearance (no less than 30 feet from the conductor for transmission lines operated above 138 kV) and to allow vehicular access for maintenance.

P. Kurkul -3-

Provided for your information is the BVPS Site Layout (Enclosure 1) and Transmission Line Map (Enclosure 2). To support the SEIS preparation process and to ensure compliance with Section 7 of the Endangered Species Act, the NRC requests information on Federally-listed, proposed, and candidate species and critical habitat that may be in the vicinity of the BVPS site. In addition, please provide any information you consider appropriate under the provisions of the Fish and Wildlife Coordination Act. Also in support of the SEIS preparation and to ensure compliance with Section 305 of the Magnuson-Stevens Fishery Conservation and Management Act, the NRC requests a list of essential fish habitat that has been designated in the vicinity of the BVPS site.

The NRC staff plans to hold two identical public meetings covering the license renewal review process and NEPA scoping on November 27, 2007, at the Embassy Suites Pittsburgh – International Airport, 550 Cherrington Parkway, Pittsburgh, PA 15108. The first session will convene at 1:30 p.m. and will continue until 4:30 p.m., as necessary. The second session will convene at 7:00 p.m., with a repeat of the overview portions of the meeting, and will continue until 10:00 p.m., as necessary. In addition, during the week of November 13, 2007, the NRC staff plans to conduct a site audit at BVPS. You and your staff are invited to attend both the site audit and the public meetings. Your office will receive a copy of the draft SEIS along with a request for comments. The anticipated publication date for the draft SEIS is September 2008.

If you have any questions concerning the NRC staff's review of this LRA, please contact the Safety/Environmental Project Manager, Mr. Kent Howard, at 301-415-2989 or by e-mail at KLH1@nrc.gov.

Sincerely,

/RA by Bo Pham for/
Rani Franovich, Branch Chief
Projects Branch 2
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket Nos. 50-334 and 50-412

Enclosures:
1. Site Layout
2. Transmission Line Map

cc w/encls. See next page

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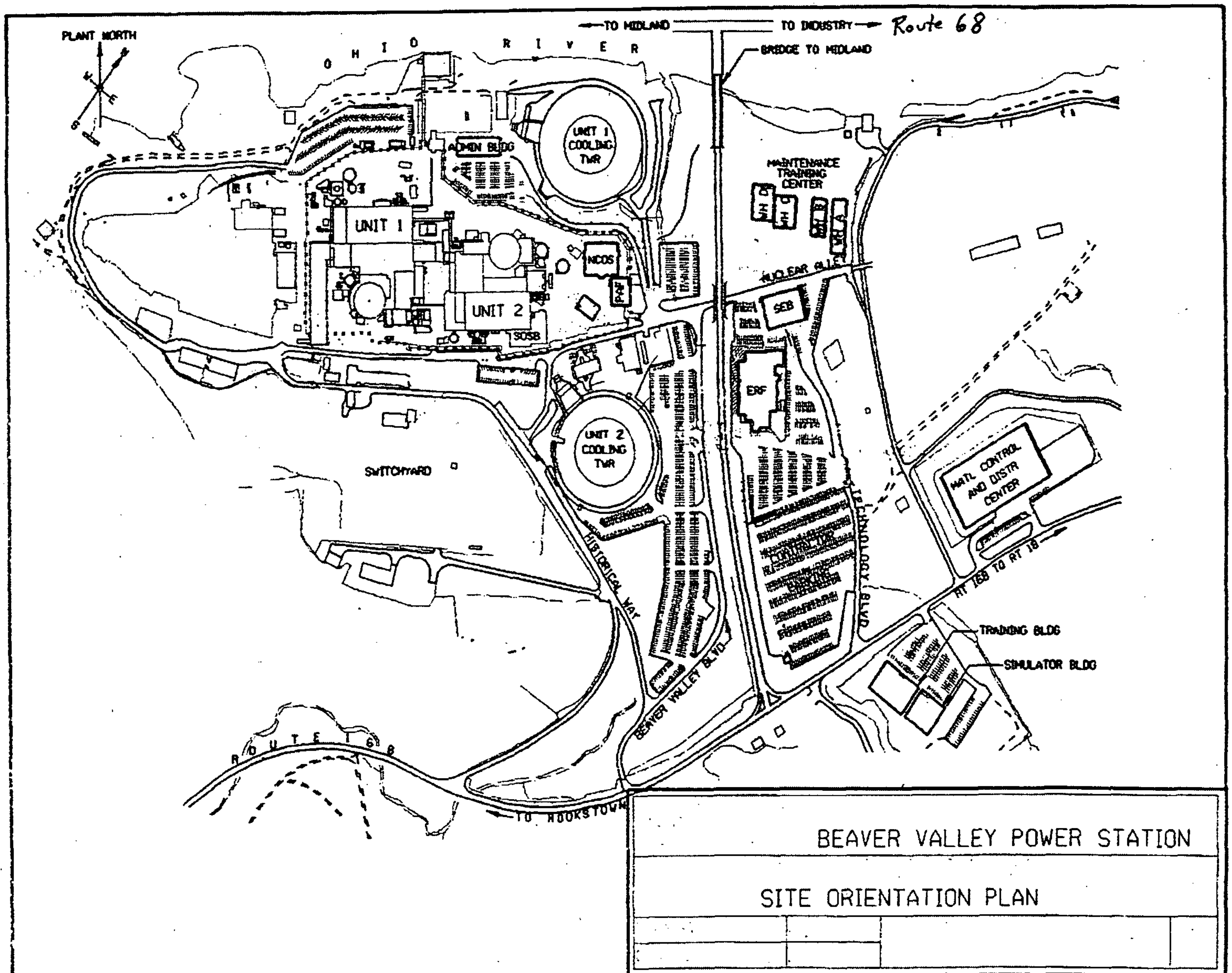
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TO INDUSTRY
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ADMIN BLDG
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MAINTENANCE TRAINING CENTER
UNIT 1
UNIT 2
NCOS
SOSB
NUCLEAR ALLEY
SEB
ERF
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HISTORICAL WAY
BEAVER VALLEY BLVD.
TECHNOLOGY BLVD
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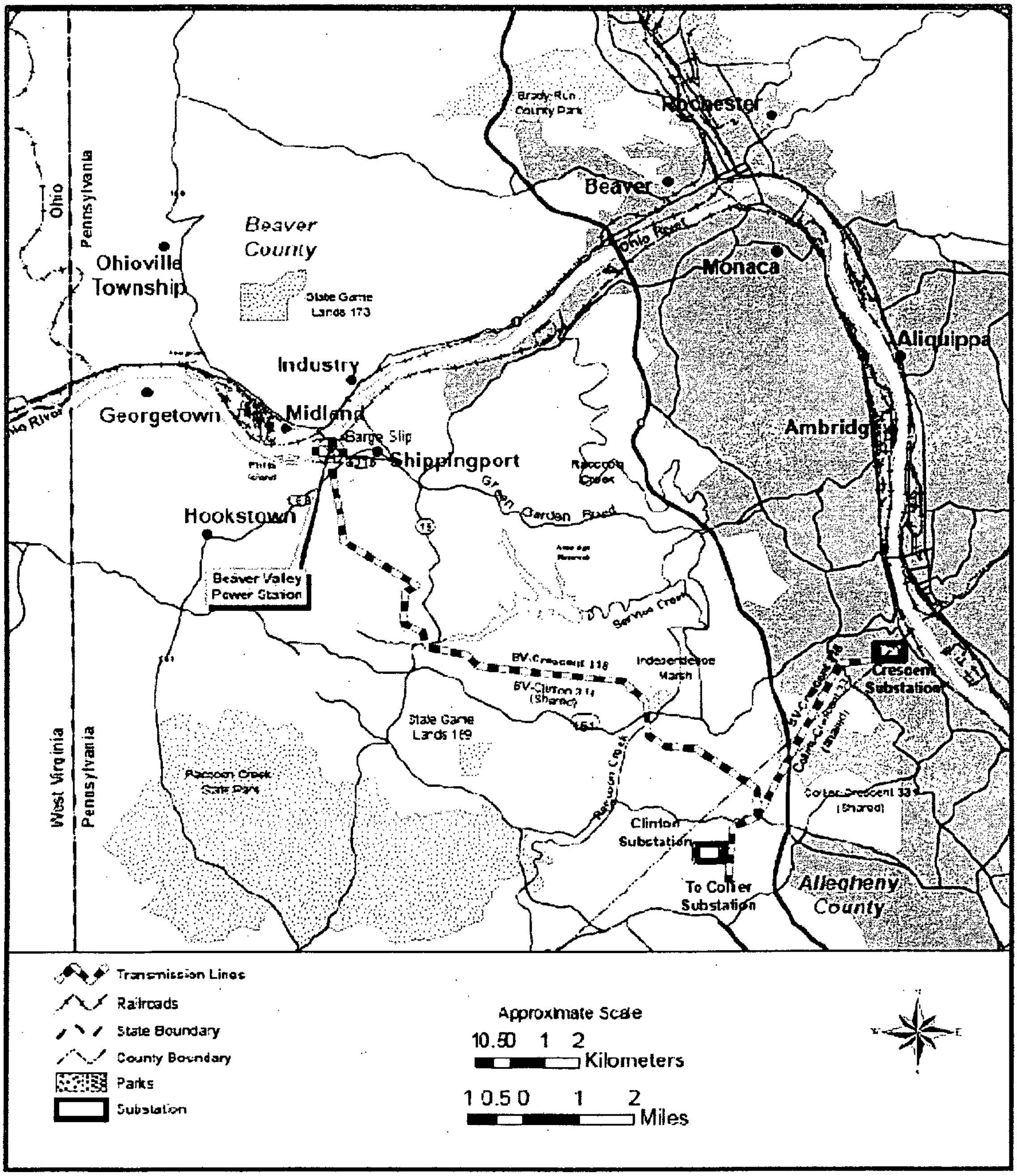
MATL CONTROL AND DISTR CENTER
RT 168 TO RT 18
TRAINING BLDG
SIMULATOR BLDG
ROUTE 168
TO HOOKSTOWN
BEAVER VALLEY POWER STATION
SITE ORIENTATION PLAN

ENCLOSURE 2, Transmission Line Map

BEAVER VALLEY-CRESCENT LINE 318 CORRIDOR



Letter to P. Kurkul from R. Franovich dated November 2, 2007

DISTRIBUTION:

SUBJECT: REQUEST FOR LIST OF PROTECTED SPECIES AND ESSENTIAL FISH HABITAT WITHIN THE AREA UNDER EVALUATION FOR THE BEAVER VALLEY POWER STATION, UNITS 1 AND 2, LICENSE RENEWAL APPLICATION REVIEW

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November 2, 2007

Dr. Samuel W. Speek
Director, Ohio Department
of Natural Resources
2045 Morse Road
Columbus, OH 43229

SUBJECT: BEAVER VALLEY POWER STATION, UNITS 1 AND 2, LICENSE RENEWAL APPLICATION REVIEW

Dear Dr. Speek:

The U.S. Nuclear Regulatory Commission (NRC) is reviewing an application, submitted by FirstEnergy Nuclear Operating Company (FENOC), for the renewal of the operating licenses for Beaver Valley Power Station (BVPS), Units 1 & 2, located near the town of Shippingport, Beaver County, Pennsylvania. As part of the review of the license renewal application (LRA), the NRC is preparing a Supplemental Environmental Impact Statement (SEIS) under the provisions of Title 10 of the *Code of Federal Regulations* Part 51 (10 CFR Part 51), the NRC's regulation that implements the National Environmental Policy Act (NEPA) of 1969.

BVPS is requesting the renewal of its operating licenses for Units 1 and 2 for a period of 20 years beyond the expiration of the current license term, renewing the licenses until July 2036 and March 2047, respectively. The proposed action would include the use and continued maintenance of existing plant facilities and transmission lines; BVPS does not plan to construct or alter any facilities associated with the plant during the period of extended operation.

The NRC staff plans to hold two identical public meetings covering the license renewal review process and NEPA scoping on November 27, 2007, at the Embassy Suites Pittsburgh – International Airport, 550 Cherrington Parkway, Pittsburgh, PA 15108. The first meeting will convene at 1:30 p.m., and will continue until 4:30 p.m., as necessary. The second meeting will convene at 7:00 p.m., and will continue until 10:00 p.m., as necessary. From November 13-16, 2007, the NRC plans to conduct a site audit. You and your staff are invited to attend both the site audit and the public meetings. Your office will receive a copy of the draft SEIS along with a request for comments. The anticipated publication date for the draft SEIS is September 2008.

S. Speek -2-

If you have any questions concerning the NRC staff's review of this LRA, please contact the Safety/Environmental Project Manager, Mr. Kent Howard, at 301-415-2989 or by e-mail at KLH1@nrc.gov.

Sincerely,

/RA by Bo Pham for/
Rani Franovich, Branch Chief
Projects Branch 2
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket Nos. 50-334 and 50-412

cc: See next page

S. Speek -2-

If you have any questions concerning the NRC staff's review of this LRA, please contact the Safety/Environmental Project Manager, Mr. Kent Howard, at 301-415-2989 or by e-mail at KLH1@nrc.gov.

Sincerely,

/RA by Bo Pham for/
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Projects Branch 2
Division of License Renewal
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Docket Nos. 50-334 and 50-412

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Letter to S. Speek from R. Franovich dated November 2, 2007

SUBJECT: BEAVER VALLEY POWER STATION, UNITS 1 AND 2, LICENSE RENEWAL APPLICATION REVIEW

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Shippingport, PA 15077

November 2, 2007

Mr. Davitt Woodwell
Vice President
Pennsylvania Environmental Council
Western Regional Office
22 Terminal Way
Pittsburgh, PA 15219

SUBJECT: BEAVER VALLEY POWER STATION, UNITS 1 AND 2, LICENSE RENEWAL APPLICATION REVIEW

Dear Mr. Woodwell:

The U.S. Nuclear Regulatory Commission (NRC) is reviewing an application, submitted by FirstEnergy Nuclear Operating Company (FENOC), for the renewal of the operating licenses for Beaver Valley Power Station (BVPS), Units 1 & 2, located near the town of Shippingport, Beaver County, Pennsylvania. As part of the review of the license renewal application (LRA), the NRC is preparing a Supplemental Environmental Impact Statement (SEIS) under the provisions of Title 10 of the *Code of Federal Regulations* Part 51 (10 CFR Part 51), the NRC's regulation that implements the National Environmental Policy Act (NEPA) of 1969.

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D. Woodwell -2-

If you have any questions concerning the NRC staff's review of this LRA, please contact the Safety/Environmental Project Manager, Mr. Kent Howard, at 301-415-2989 or by e-mail at KLH1@nrc.gov.

Sincerely,

/RA by Bo Pham for/
Rani Franovich, Branch Chief
Project Branch 2
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket Nos. 50-334 and 50-412

cc: See next page

D. Woodwell -2-

If you have any questions concerning the NRC staff's review of this LRA, please contact the Safety/Environmental Project Manager, Mr. Kent Howard, at 301-415-2989 or by e-mail at KLH1@nrc.gov.

Sincerely,

/RA by Bo Pham for/
Rani Franovich, Branch Chief
Project Branch 2
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket Nos. 50-334 and 50-412

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Letter to D. Woodwell from R. Franovich, dated November 2, 2007

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Julie Firestone
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P.O. Box 4, Route 168
Shippingport, PA 15077

November 2, 2007

Mr. Matt Hough
Director, Southwest Regional Office
Pennsylvania Game Commission
4820 Route 711
Bolivar, PA 15923

SUBJECT: BEAVER VALLEY POWER STATION, UNITS 1 AND 2, LICENSE RENEWAL APPLICATION REVIEW

Dear Mr. Hough:

The U.S. Nuclear Regulatory Commission (NRC) is reviewing an application, submitted by FirstEnergy Nuclear Operating Company (FENOC), for the renewal of the operating licenses for Beaver Valley Power Station (BVPS), Units 1 & 2, located near the town of Shippingport, Beaver County, Pennsylvania. As part of the review of the license renewal application (LRA), the NRC is preparing a Supplemental Environmental Impact Statement (SEIS) under the provisions of Title 10 of the *Code of Federal Regulations* Part 51 (10 CFR Part 51), the NRC's regulation that implements the National Environmental Policy Act (NEPA) of 1969.

BVPS is requesting the renewal of its operating licenses for Units 1 and 2 for a period of 20 years beyond the expiration of the current license term, renewing the licenses until July 2036 and March 2047, respectively. The proposed action would include the use and continued maintenance of existing plant facilities and transmission lines; BVPS does not plan to construct or alter any facilities associated with the plant during the period of extended operation.

The NRC staff plans to hold two identical public meetings covering the license renewal review process and NEPA scoping on November 27, 2007, at the Embassy Suites Pittsburgh – International Airport, 550 Cherrington Parkway, Pittsburgh, PA 15108. The first meeting will convene at 1:30 p.m., and will continue until 4:30 p.m., as necessary. The second meeting will convene at 7:00 p.m., and will continue until 10:00 p.m., as necessary. From November 13-16, 2007, the NRC plans to conduct a site audit. You and your staff are invited to attend the public meetings. Your office will receive a copy of the draft SEIS along with a request for comments. The anticipated publication date for the draft SEIS is September 2008.

M. Hough - 2 -

If you have any questions concerning the NRC staff's review of this LRA, please contact the Safety/Environmental Project Manager, Mr. Kent Howard, at 301-415-2989 or by e-mail at KLH1@nrc.gov.

Sincerely,

/RA by Bo Pham for/
Rani Franovich, Branch Chief
Projects Branch 2
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket Nos. 50-334 and 50-412

cc: See next page

M. Hough - 2 -

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Sincerely,

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Rani Franovich, Branch Chief
Projects Branch 2
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket Nos. 50-334 and 50-412

cc: See next page

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DATE:	11/02/07	11/02/07	11/02/07	11/02/07

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Letter to M. Hough From R. Franovich Dated November 2, 2007

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SUBJECT: BEAVER VALLEY POWER STATION, UNITS 1 AND 2, LICENSE RENEWAL APPLICATION REVIEW

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Beaver Valley Power Station, Units 1 and 2

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Beaver Valley Power Station, Units 1 and 2 - 2 -

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November 2, 2007

Mr. Michael DiBerardinis
Rachel Carson State Office Building
Pennsylvania Department of Conservation
and Natural Resources
P.O. Box 8767
400 Market Street
Harrisburg, PA 17105-8767

SUBJECT: BEAVER VALLEY POWER STATION, UNITS 1 AND 2, LICENSE RENEWAL APPLICATION REVIEW

Dear Mr. DiBerardinis:

The U.S. Nuclear Regulatory Commission (NRC) is reviewing an application, submitted by FirstEnergy Nuclear Operating Company (FENOC), for the renewal of the operating licenses for Beaver Valley Power Station (BVPS), Units 1 & 2, located near the town of Shippingport, Beaver County, Pennsylvania. As part of the review of the license renewal application (LRA), the NRC is preparing a Supplemental Environmental Impact Statement (SEIS) under the provisions of Title 10 of the *Code of Federal Regulations* Part 51 (10 CFR Part 51), the NRC's regulation that implements the National Environmental Policy Act (NEPA) of 1969.

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If you have any questions concerning the NRC staff's review of this LRA, please contact the Safety/Environmental Project Manager, Mr. Kent Howard, at 301-415-2989 or by e-mail at KLH1@nrc.gov.

Sincerely,

/RA by Bo Pham for/
Rani Franovich, Branch Chief
Projects Branch 2
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket Nos. 50-334 and 50-412

cc: See next page

M. DiBerardinis -2-

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Sincerely,

/RA by Bo Pham for/
Rani Franovich, Branch Chief
Projects Branch 2
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket Nos. 50-334 and 50-412

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DATE:	11/02/07	11/02/07	11/02/07	11/02/07

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Letter to MDiBerardinis from RFranovich, dated November 2, 2007

SUBJECT: BEAVER VALLEY POWER STATION, UNITS 1 AND 2, LICENSE RENEWAL APPLICATION REVIEW

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Beaver Valley Power Station,
Units 1 and 2

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Julie Firestone
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Shippingport, PA 15077

November 2, 2007

Mr. Thomas C. Shetterly
Commissioner – Second District
Pennsylvania Fish and Boat Commission
236 Lake Road
Somerset, PA 15501

SUBJECT: BEAVER VALLEY POWER STATION, UNITS 1 AND 2, LICENSE RENEWAL APPLICATION REVIEW

Dear Mr. Shetterly:

The U.S. Nuclear Regulatory Commission (NRC) is reviewing an application, submitted by FirstEnergy Nuclear Operating Company (FENOC), for the renewal of the operating licenses for Beaver Valley Power Station (BVPS), Units 1 & 2, located near the town of Shippingport, Beaver County, Pennsylvania. As part of the review of the license renewal application (LRA), the NRC is preparing a Supplemental Environmental Impact Statement (SEIS) under the provisions of Title 10 of the *Code of Federal Regulations* Part 51 (10 CFR Part 51), the NRC's regulation that implements the National Environmental Policy Act (NEPA) of 1969.

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T. Shetterly -2-

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Sincerely,

/RA by Bo Pham for/
Rani Franovich, Branch Chief
Project Branch 2
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket Nos. 50-334 and 50-412

cc: See next page

T. Shetterly -2-

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Sincerely,

/RA by Bo Pham for/
Rani Franovich, Branch Chief
Project Branch 2
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket Nos. 50-334 and 50-412

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DATE:	11/02/07	11/02/07	11/02/07	11/02/07

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Letter to T. Shetterly from R. Franovich, dated November 2, 2007

SUBJECT: BEAVER VALLEY POWER STATION, UNITS 1 AND 2, LICENSE RENEWAL APPLICATION REVIEW

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Beaver Valley Power Station, Units 1 and 2

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Beaver Valley Power Station, Units 1 and 2 - 2 -

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Julie Firestone
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November 2, 2007

Ms. Pat Lampe
Shippingport Borough
Council President
P.O. Box 76,
Shippingport, PA 15077

SUBJECT: BEAVER VALLEY POWER STATION, UNITS 1 AND 2, LICENSE RENEWAL APPLICATION REVIEW

Dear Ms. Lampe:

The U.S. Nuclear Regulatory Commission (NRC) is reviewing an application, submitted by FirstEnergy Nuclear Operating Company (FENOC), for the renewal of the operating licenses for Beaver Valley Power Station (BVPS), Units 1 & 2, located near the town of Shippingport, Beaver County, Pennsylvania. As part of the review of the license renewal application (LRA), the NRC is preparing a Supplemental Environmental Impact Statement (SEIS) under the provisions of Title 10 of the *Code of Federal Regulations* Part 51 (10 CFR Part 51), the NRC's regulation that implements the National Environmental Policy Act (NEPA) of 1969.

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P. Lampe -2-

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Sincerely,

/RA by Bo Pham for/
Rani Franovich, Branch Chief
Projects Branch 2
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket Nos. 50-334 and 50-412

cc: See next page

P. Lampe -2-

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Rani Franovich, Branch Chief
Projects Branch 2
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket Nos. 50-334 and 50-412

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Letter to P. Lampe From R. Franovich Dated November 2, 2007

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PBuckberg
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DWerkheiser, RI
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Beaver Valley Power Station, Units 1 and 2

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Shippingport Borough
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Beaver Valley Power Station,
Units 1 and 2

-2-

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Julie Firestone
FirstEnergy Nuclear Operating Company
Beaver Valley Power Station
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November 2, 2007

Ms. Pat Lampe
Shippingport Borough
Council President
P.O. Box 76,
Shippingport, PA 15077

SUBJECT: BEAVER VALLEY POWER STATION, UNITS 1 AND 2, LICENSE RENEWAL APPLICATION REVIEW

Dear Ms. Lampe:

The U.S. Nuclear Regulatory Commission (NRC) is reviewing an application, submitted by FirstEnergy Nuclear Operating Company (FENOC), for the renewal of the operating licenses for Beaver Valley Power Station (BVPS), Units 1 & 2, located near the town of Shippingport, Beaver County, Pennsylvania. As part of the review of the license renewal application (LRA), the NRC is preparing a Supplemental Environmental Impact Statement (SEIS) under the provisions of Title 10 of the *Code of Federal Regulations* Part 51 (10 CFR Part 51), the NRC's regulation that implements the National Environmental Policy Act (NEPA) of 1969.

BVPS is requesting the renewal of its operating licenses for Units 1 and 2 for a period of 20 years beyond the expiration of the current license term, renewing the licenses until July 2036 and March 2047, respectively. The proposed action would include the use and continued maintenance of existing plant facilities and transmission lines; BVPS does not plan to construct or alter any facilities associated with the plant during the period of extended operation.

The NRC staff plans to hold two identical public meetings covering the license renewal review process and NEPA scoping on November 27, 2007, at the Embassy Suites Pittsburgh – International Airport, 550 Cherrington Parkway, Pittsburgh, PA 15108. The first meeting will convene at 1:30 p.m., and will continue until 4:30 p.m., as necessary. The second meeting will convene at 7:00 p.m., and will continue until 10:00 p.m., as necessary. From November 13-16, 2007, the NRC plans to conduct a site audit. You and your staff are invited to attend the public meetings. Your office will receive a copy of the draft SEIS along with a request for comments. The anticipated publication date for the draft SEIS is September 2008.

P. Lampe -2-

If you have any questions concerning the NRC staff's review of this LRA, please contact the Safety/Environmental Project Manager, Mr. Kent Howard, at 301-415-2989 or by e-mail at KLH1@nrc.gov.

Sincerely,

/RA by Bo Pham for/
Rani Franovich, Branch Chief
Projects Branch 2
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket Nos. 50-334 and 50-412

cc: See next page

P. Lampe -2-

If you have any questions concerning the NRC staff's review of this LRA, please contact the Safety/Environmental Project Manager, Mr. Kent Howard, at 301-415-2989 or by e-mail at KLH1@nrc.gov.

Sincerely,

/RA by Bo Pham for/
Rani Franovich, Branch Chief
Projects Branch 2
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Office of Nuclear Reactor Regulation

Docket Nos. 50-334 and 50-412

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Letter to P. Lampe From R. Franovich Dated November 2, 2007

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November 2, 2007

Mr. Curtis Taylor
West Virginia Division of Natural Resources
Division of Wildlife
1900 Kanawha Boulevard, East
Capitol Complex, Building 3, Room 663
Charleston, WV 25305-0660

SUBJECT: BEAVER VALLEY POWER STATION, UNITS 1 AND 2, LICENSE RENEWAL APPLICATION REVIEW

Dear Mr. Taylor:

The U.S. Nuclear Regulatory Commission (NRC) is reviewing an application, submitted by FirstEnergy Nuclear Operating Company (FENOC), for the renewal of the operating licenses for Beaver Valley Power Station (BVPS), Units 1 & 2, located near the town of Shippingport, Beaver County, Pennsylvania. As part of the review of the license renewal application (LRA), the NRC is preparing a Supplemental Environmental Impact Statement (SEIS) under the provisions of Title 10 of the *Code of Federal Regulations* Part 51 (10 CFR Part 51), the NRC's regulation that implements the National Environmental Policy Act (NEPA) of 1969.

BVPS is requesting the renewal of its operating licenses for BVPS, Units 1 and 2 for a period of 20 years beyond the expiration of the current license term, renewing the licenses until July 2036 and March 2047, respectively. The proposed action would include the use and continued maintenance of existing plant facilities and transmission lines; BVPS does not plan to construct or alter any facilities associated with the plant during the period of extended operation.

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If you have any questions concerning the NRC staff's review of this LRA, please contact the Safety/Environmental Project Manager, Mr. Kent Howard, at 301-415-2989 or by e-mail at KLH1@nrc.gov.

Sincerely,

/RA by Bo Pham for/
Rani Franovich, Branch Chief
Projects Branch 2
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket Nos. 50-334 and 50-412

cc: See next page

C. Taylor -2-

If you have any questions concerning the NRC staff's review of this LRA, please contact the Safety/Environmental Project Manager, Mr. Kent Howard, at 301-415-2989 or by e-mail at KLH1@nrc.gov.

Sincerely,

/RA by Bo Pham for/
Rani Franovich, Branch Chief
Projects Branch 2
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket Nos. 50-334 and 50-412

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Letter to C. Taylor from R. Franovich dated November 2, 2007

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November 9, 2007

Chairman Robert Chicks
Stockbridge-Munsee Band of the
Mohican Nation, Wisconsin
Route 1, P.O. Box 70
Bowler, WI 54416

SUBJECT: REQUEST FOR COMMENTS CONCERNING THE BEAVER VALLEY POWER STATION, UNITS 1 AND 2, LICENSE RENEWAL APPLICATION REVIEW

Dear Chairman Chicks:

The U.S. Nuclear Regulatory Commission (NRC) is seeking input for its environmental review of an application from FirstEnergy Nuclear Operating Company (FENOC) for the renewal of the operating licenses for the Beaver Valley Power Station (BVPS), Units 1 and 2, located in Shippingport in Beaver County, Pennsylvania. BVPS is in close proximity to lands that may be of interest to the Stockbridge-Munsee Band of the Mohican Nation, Wisconsin. As described below, the NRC's process includes an opportunity for public and inter-governmental participation in the environmental review. We want to ensure that you are aware of our efforts and, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 51, Section 51.28(b), the NRC invites the Stockbridge-Munsee Band of the Mohican Nation, Wisconsin to provide input to the scoping process relating to the NRC's environmental review of the application. In addition, as outlined in 36 CFR 800.8(c), the NRC plans to coordinate compliance with Section 106 of the National Historic Preservation Act of 1966 through the requirements of the National Environmental Policy Act (NEPA) of 1969.

Under NRC regulations, the original operating license for a nuclear power plant is issued for up to 40 years. The license may be renewed for up to an additional 20 years if NRC requirements are met. The current operating licenses for BVPS will expire on January 29, 2016, and May 27, 2027, respectively. FirstEnergy submitted its application for renewal of the BVPS operating licenses in a letter dated August 27, 2007.

The NRC is gathering information for a BVPS site-specific supplement to its "Generic Environmental Impact Statement for License Renewal of Nuclear Plants" (GEIS), NUREG-1437. The supplement will contain the results of the review of the environmental impacts on the area surrounding the BVPS site related to terrestrial ecology, aquatic ecology, hydrology, cultural resources, and socioeconomic issues (among others) and will contain a recommendation regarding the environmental acceptability of the license renewal action. Provided for your information is the BVPS Site Layout (Enclosure 1) and Transmission Line Map (Enclosure 2).

To accommodate interested members of the public, the NRC will hold two identical public meetings covering the license renewal review process and NEPA scoping for the BVPS license renewal supplement to the GEIS on November 27, 2007, located at the Embassy Suites, Pittsburgh-International Airport, 550 Cherrington Parkway, Pittsburgh, PA 15108. There will be two sessions to accommodate interested parties. The first session will convene at 1:30 p.m. and will continue until 4:30 p.m., as necessary. The second session will convene at 7:00 p.m., with a repeat of the overview portions of the meeting, and will continue until 10:00 p.m., as necessary. Additionally, the NRC staff will host informal discussions one hour before the start of each session.

R. Chicks - 2 -

The license renewal application (LRA) and the GEIS are publicly available at the NRC Public Document Room (PDR), located at One White Flint North, 11555 Rockville Pike, Rockville, Maryland 20852, or from the NRC's Agencywide Documents Access and Management System (ADAMS). The ADAMS Public Electronic Reading Room is accessible at http://adamswebsearch.nrc.gov/dologin.htm. The accession number for the LRA is ML072430913. Persons who do not have access to ADAMS, or who encounter problems in accessing the documents located in ADAMS, should contact the NRC's PDR Reference staff by telephone at 1-800-397-4209, or 301-415-4737, or by e-mail at pdr@nrc.gov.

The BVPS LRA is also available on the Internet at http://www.nrc.gov/reactors/operating/licensing/renewal/applications/bvalley.html. In addition, the Beaver Area Memorial Library, located at 100 College Ave., Beaver, PA 15009-2704, and the Beaver County Library System, located at 1 Campus Drive, Monaca, PA 15061, have agreed to make the LRA available for public inspection.

Please submit any comments that the Stockbridge-Munsee Band of the Mohican Nation, Wisconsin may have to offer on the scope of the environmental review by December 17, 2007. Written comments should be submitted by mail to the Chief, Rules and Directives Branch, Division of Administrative Services, Mail Stop T-6D59, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001. Electronic comments may be submitted to the NRC by e-mail at BeaverValleyEIS@nrc.gov. At the conclusion of the scoping process, the NRC staff will prepare a summary of the significant issues identified and the conclusions reached, and mail a copy to you.

The staff expects to publish the draft supplement to the GEIS in September 2008. The NRC will hold another set of public meetings in the site vicinity to solicit comments on the draft supplemental environmental impact statement (SEIS). A copy of the draft SEIS will be sent to you for your review and comment. After consideration of public comments received on the draft, the NRC will prepare a final SEIS. The issuance of a final SEIS for BVPS is planned for May 2009.

If you need additional information regarding the environmental review process, please contact Kent Howard, Safety/Environmental Project Manager, at 301-415-2989 or by e-mail at KJH1@nrc.gov.

Sincerely,

/RA Bo Pham for/

Rani L. Franovich, Branch Chief
Projects Branch 2
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket Nos. 50-334 and 50-412

Enclosures:
1. Site Layout
2. Transmission Line Map

cc w/encls: See next page

If you need additional information regarding the environmental review process, please contact Kent Howard, Safety/Environmental Project Manager, at 301-415-2989 or by e-mail at KJH1@nrc.gov.

Sincerely,

/RA Bo Pham for/

Rani L. Franovich, Branch Chief
Projects Branch 2
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket Nos. 50-334 and 50-412

Enclosures:
1. *Site Layout*
2. Transmission Line Map

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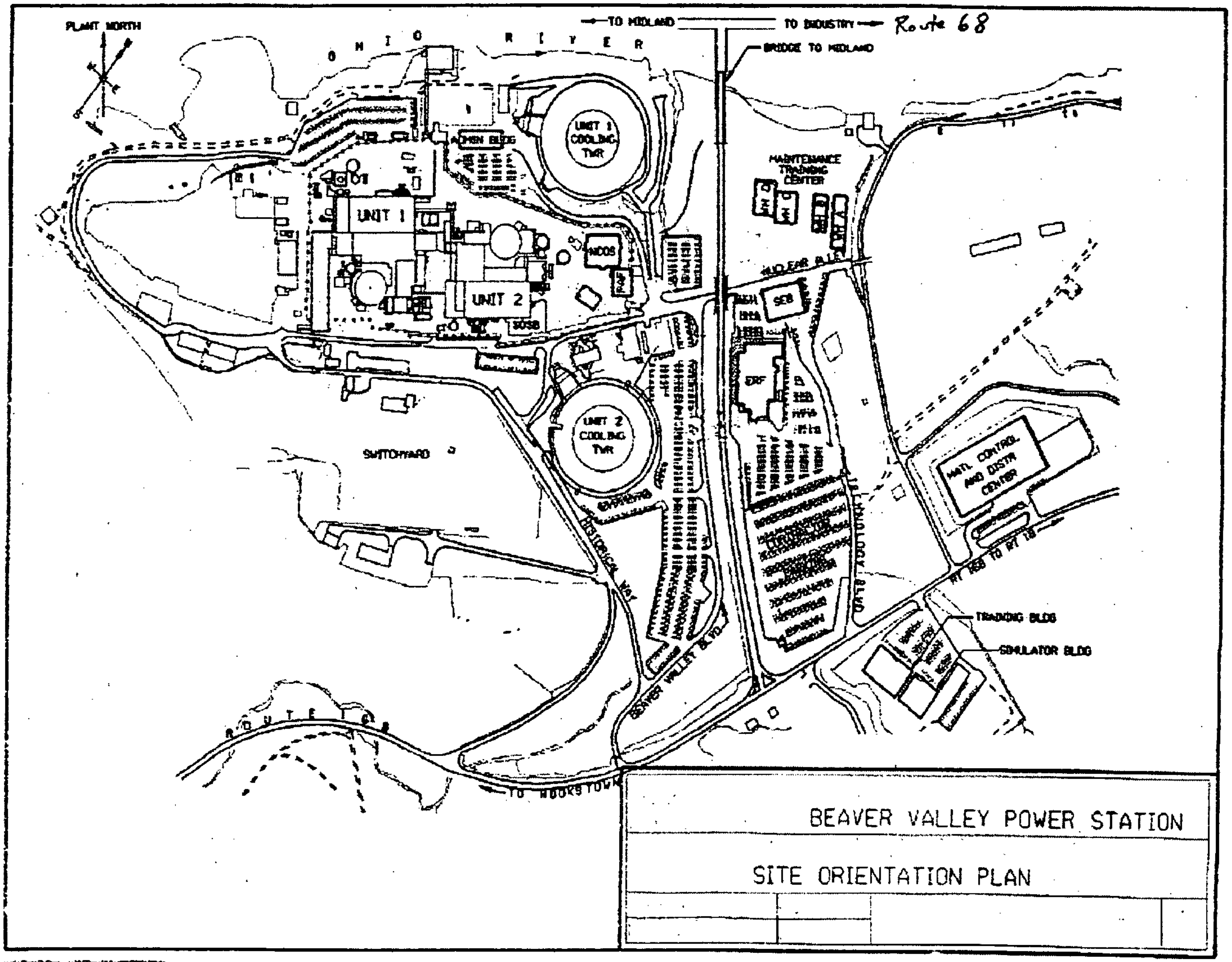
Site Layout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TO MIDLAND
TO INDUSTRY
Route 68
BRIDGE TO MIDLAND
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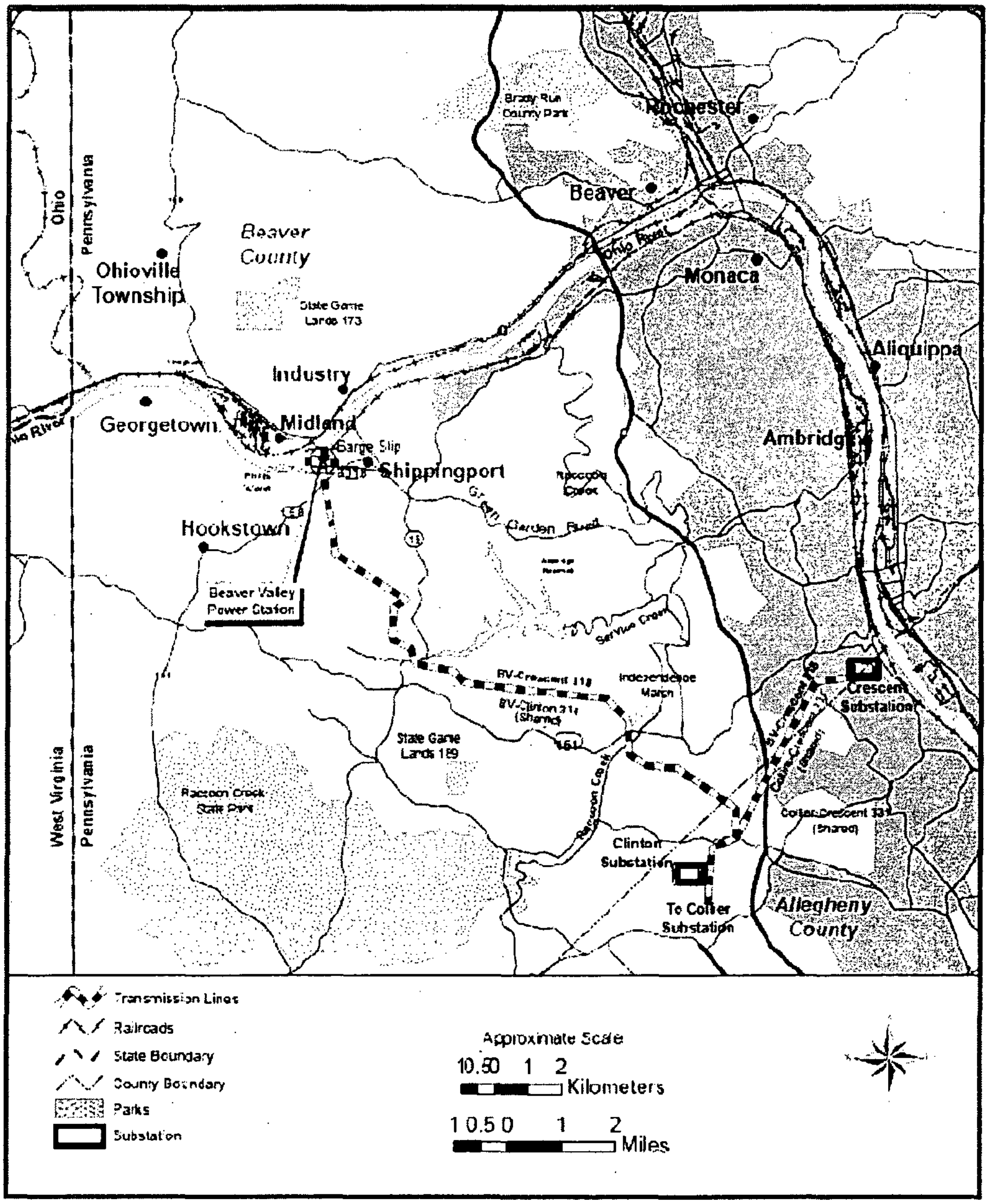
ERF
UNIT 2 COOLING TWR
SWITCHYARD
HISTORICAL WAY
BEAVER VALLEY BLVD
MAT'L CONTROL AND DISTR CENTER
RT 168 TO RT 18
TRAINING BLDG
SIMULATOR BLDG
R O U T E 1 6 8
TO HOOKSTOWN
BEAVER VALLEY POWER STATION
SITE ORIENTATION PLAN

Transmission Line Map

BEAVER VALLEY-CRESCENT LINE 318 CORRIDOR



ENCLOSURE 2

Letter to R. Chicks From R. Franovich Dated November 9, 2007

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UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
NORTHEAST REGION
One Blackburn Drive
Gloucester, MA 01930-2298

Rani Franovich, Chief
Projects Branch 2
Division of License Renewal
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

NOV 15 2007

Dear Ms. Franovich,

This is in response to your letter dated November 2, 2007 regarding the FirstEnergy Nuclear Operating Company's (FENOC) application to renew the operating licenses for Beaver Valley Power Station (BVPS) near Shippingport, Beaver County, Pennsylvania. The BVPS is located on the south Bank of the Ohio River approximately 25 miles northwest of Pittsburgh. Your letter requested information on the presence of federally-protected species and critical habitats recognized by NOAA's National Marine Fisheries Service (NMFS) in the vicinity of the BVPS.

No threatened or endangered species under the jurisdiction of NOAA's National Marine Fisheries Service (NMFS) are known to exist in the vicinity of the BVPS. Therefore, no consultation pursuant to Section 7 of the Endangered Species Act of 1973, as amended, is required. Should project plans change or new information become available that changes the basis for this determination, or a new species be listed or critical habitat designated, consultation should be initiated. If you have any questions about these comments, please contact William Barnhill of my staff at (978) 281-9300 ext. 6510 or by email (William.Barnhill@noaa.gov).

Sincerely,

Mary A. Colligan
Assistant Regional Administrator
for Protected Resources

cc: Greene, F/NER4

File Code: Sec 7 no species 2007

Tony Gonyea
Onondaga Nation
RR #1, Route 11A
Box 319B
via Nedrow, NY 13120

November 19, 2007

Rani L. Franovich, Branch Chief
Projects Branch 2
Division of License Renewal
Office of Nuclear Reactor Regulation
United States Nuclear Regulatory Commission
Washington DC, 20555-001

REGARDING: Request for Comments concerning the Beaver Valley Power Station, Units 1 and 2, License Renewal Application Review

Dear Mr. Franovich:

On behalf of the Onondaga Nation I have reviewed the information you have provided . Please add me as a contact for any further information.

I would like to review a copy of the archeological reports prepared at the time of construction. Please mail these to me at the above address.

If you have any comments or questions about this matter, please do not hesitate to let me know. I can be contacted by phone at (315)952-3109. Thank you for your help.

Sincerely,

Tony Gonyea

Tony Gonyea
A Faithkeeper for the Onondaga Nation
Onondaga Nation Historic Preservation Office

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pennsylvania Field Office
315 South Allen Street, Suite 322
State College, Pennsylvania 16801-4850

November 20, 2007

Rani Franovich
Projects Branch 2
Division of License Renewal
Office of Nuclear Reactor Regulation

RE: USFWS Project #2008-0311

Dear Mr. Franovich:

This responds to your letter of November 2, 2007, requesting information about federally listed and proposed endangered and threatened species within the area affected by the proposed license renewal application for the Beaver Valley power station located in Beaver County, Pennsylvania. The following comments are provided pursuant to the Endangered Species Act of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*) to ensure the protection of endangered and threatened species.

Except for occasional transient species, no federally listed or proposed threatened or endangered species under our jurisdiction are known to occur within the project impact area. Therefore, based on currently available information, no biological assessment or further consultation under the Endangered Species Act is required with the Fish and Wildlife Service. Should project plans change, or if additional information on listed or proposed species becomes available, this determination may be reconsidered.

Please note that a field survey may reveal previously undocumented populations of one or more species of concern within a project area. Refer to the enclosed list of *Federally Listed, Proposed, and Candidate Species in Pennsylvania* to determine which species may be found in your project area if suitable habitat is present. If surveys or further information reveals that a federally listed, proposed, or candidate species exists in your project area, contact the Fish and Wildlife Service immediately to discuss measures to avoid or minimize potential impacts to the species prior to initiating your project.

This determination is valid for one year from the date of this letter. If the proposed project has not been fully implemented prior to this, please access the PNDI Project Planning Environmental Review tool on the Pennsylvania Natural Heritage Program's website (www.naturalheritage.state.pa.us) to screen this project for potential impacts to species of special concern, including federally listed and proposed species. If this project is considered a "large project" as defined on the subject website, submit the project directly to our office for review, rather than using the online screening tool.

This response relates only to endangered or threatened species under our jurisdiction, based on an office review of the proposed project's location. No field inspection of the project area has been conducted by this office. Consequently, this letter is not to be construed as addressing potential Service concerns under the Fish and Wildlife Coordination Act or other authorities.

To avoid potential delays in reviewing your project, please use the above-referenced USFWS project tracking number in any future correspondence regarding this project.

Please contact Kathy Gipe of my staff at 814-234-4090 if you have any questions or require further assistance.

Sincerely,

David Densmore
Supervisor

Enclosure

Federally Listed, Proposed, and Candidate Species in Pennsylvania
(revised August 15, 2007)

Common Name	Scientific Name	Status[1]	Distribution (Counties and/or Watersheds)
MAMMALS			
Indiana bat	*Myotis sodalis*	E	Hibernacula: Armstrong, Beaver, Blair, Centre, Fayette, Huntingdon, Lawrence, Luzerne, Mifflin and Somerset Co. Maternity sites: Bedford, Berks and Blair Counties. Potential winter habitat state-wide in caves or abandoned mines. Potential summer habitat state-wide in forests or wooded areas.
BIRDS			
Piping plover	*Charadrius melodus*	E	Designated critical habitat on Presque Isle (Erie Co.). Migratory. No nesting in PA since 1950s, but recent colonization attempts at Presque Isle
REPTILES			
Bog turtle	*Clemmys (Glyptemys) muhlenbergii*	T	Adams, Berks, Bucks, Chester, Cumberland, Delaware, Franklin, Lancaster, Lebanon, Lehigh, Monroe, Montgomery, Northampton, Schuylkill and York Co. *Historically found in Crawford, Mercer and Philadelphia Co.*
Eastern massasauga rattlesnake	*Sistrurus catenatus catenatus*	C	Butler, Crawford, Mercer and Venango Co. *Historically found in Allegheny and Lawrence Co.*
MUSSELS			
Clubshell	*Pleurobema clava*	E	French Creek and Allegheny River (and some tributaries) in Armstrong, Clarion, Crawford, Erie, Forest, Mercer, Venango, and Warren Co.; Shenango River (Mercer and Crawford Co.) *Has not been found recently in 13 streams of historical occurrence in Butler, Beaver, Fayette, Greene, Indiana, Lawrence, and Westmoreland Co.*
Dwarf wedgemussel	*Alasmidonta heterodon*	E	Delaware River (Pike and Wayne Co.). *Has not been found recently in streams of historical occurrence in the Delaware River watershed (Bucks, Carbon, Chester, Philadelphia Co.) or Susquehanna River watershed (Lancaster Co.)*
Northern riffleshell	*Epioblasma torulosa rangiana*	E	French Creek and Allegheny River (and some tributaries) in Armstrong, Clarion, Crawford, Erie, Forest, Mercer, Venango, and Warren Co. *Has not been found recently in streams of historical occurrence, including: Shenango River (Lawrence Co.), Conewango Creek (Warren Co.)*

US Fish and Wildlife Service
315 South Allen Street, Suite 322, State College, Pennsylvania 16801

Common Name	Scientific Name	Status[1]	Distribution (Counties and/or Watersheds)
MUSSELS (continued)			
Rayed bean	*Villosa fabalis*	C	French Creek and Allegheny River (Armstrong, Clarion, Crawford, Erie, Forest, Mercer, Venango, Warren Co.); Cussewago Creek (Crawford Co.). *Has not been found recently in 5 streams of historical occurrence in Armstrong, Lawrence, Mercer and Warren Co.*
Sheepnose	*Plethobasus cyphyus*	C	Allegheny River (Forest and Venango Co.). *Has not been found recently in streams of historical occurrence, including: Allegheny River (Armstrong Co.), Beaver River (Lawrence Co.), Ohio River (Allegheny and Beaver Co.), and Monongahela River (Washington Co.)*
FISH			
Shortnose sturgeon[2]	*Acipenser brevirostrum*	E	Delaware River and other Atlantic coastal waters
PLANTS			
Northeastern bulrush	*Scirpus ancistrochaetus*	E	Adams, Bedford, Blair, Cambria, Carbon, Centre, Clinton, Columbia, Cumberland, Dauphin, Franklin, Fulton, Huntingdon, Lackawanna, Lehigh, Lycoming, Mifflin, Monroe, Perry, Snyder, Tioga, and Union Co. *Historically found in Northampton Co.*
Small-whorled pogonia	*Isotria medeoloides*	T	Centre, Chester and Venango Co. *Historically found in Berks, Greene, Monroe, Montgomery and Philadelphia Co.*

[1] E = Endangered; T = Threatened; P = Proposed for listing; C = Candidate.
[2] Shortnose sturgeon is under the jurisdiction of the National Marine Fisheries Service

US Fish and Wildlife Service
315 South Allen Street, Suite 322, State College, Pennsylvania 16801

From: Sarah Lopas
Sent: Thursday, June 19, 2008 12:32 PM
To: pamela_shellenberger@fws.gov
Cc: Emmanuel Sayoc
Subject: USFWS Project #2008-0311 (Beaver Valley Power Station License Renewal)
Attachments: FENOC Dredging Information.pdf; NRC letter to USFWS.pdf; USFWS letter to NRC.pdf

Hi Pam,

Sorry for the bit of phone tag lately. I decided just to email - and if we need to schedule a call to discuss this further we most certainly can - at your convenience. I have CC'ed Manny Sayoc, who is the Project Manager for the Beaver Valley Power Station (BVPS) license renewal environmental review. I am the aquatic ecology reviewer for this project. So a quick background - we wrote the PA Field Office a letter on Nov. 2, 2007, asking for a list of T&E species that may be impacted by license renewal at BVPS. We received a response from your office on November 20, 2007 - and two endangered mussels (Clubshell and Northern riffleshell) were listed as occurring in the Allegheny River - which is a tributary of the Ohio River, where BVPS is located. However, it was noted that both mussels have "...not been found recently in 13 streams of historical occurrence in Butler, Beaver, Fayette, Greene, Indiana, Lawrence, and Westmoreland Co." So it is likely these mussels are not present in the portion of the Ohio River where BVPS is located - the New Cumberland Pool. However, other non-endangered freshwater mussels have been making a small comeback around dam tailwaters and higher current areas around small islands in the Ohio, suggesting the potential for a recolonization of listed mussels. (I have attached both letters for your reference.) Since that letter, FirstEnergy Nuclear Operating Company (FENOC) declared that they may undertake refurbishment at the plant - they would replace the steam generators for one of their units. They replaced Unit 1's steam generators and the vessel head back in 2006. The new equipment was delivered to the site via barge up the Mississippi and Ohio Rivers. To accommodate the barge - BVPS's barge slip had to be dredged about 50 feet beyond what their current Army Corps (USACE) dredging permit allows. To get a modification of their current permit (valid through 2011) - they submitted an application to USACE, as well as the PA Dept. of Environmental Protection (PADEP), and also the PA Fish & Boat Commission. They consulted with the Fish & Boat Commission regarding T&E aquatic species - to which the Fish & Boat Commission requested that dredging not take place during April-July to avoid the spawning period of State-listed fish, as well as implementing best management procedures to avoid siltation/run-off into the river. However, no mention was made of impacts to mussels that may occur in the New Cumberland Pool. PADEP granted the permit modification, and reiterated the April-July restriction and best management procedures. It is the NRC belief that the one-time maintenance dredging would not impact endangered mussels in the New Cumberland Pool (if they do indeed occur there - which FWS documentation seems to suggest they likely do not) - primarily because the location of the dredging is in an area of the pool where the substrate is not suitable for colonization of mussels. The third attachment to this email is a package of information from FENOC detailing the dredging project (location, bathymetry survey, etc.), as well as their communications with PADEP, Fish & Boat Commission, and USACE. It is expected that FENOC would undergo the same application/T&E species consultation process if they replace the steam generators for the other unit (the new steam gens would come via barge again).

So - after all that (!) - Do you have any other concerns or information that could help us in evaluating the impact of the one-time dredging on the mussels?

Thank you!

Sarah Lopas

Sarah L. Lopas
Project Manager, Division of License Renewal
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001
Mail Stop O-11F1
(301) 415.1147 office
(301) 415.2002 fax
sarah.lopas@nrc.gov

From: Sarah Lopas
Sent: Tuesday, June 24, 2008 1:56 PM
To: Pamela_Shellenberger@fws.gov
Cc: Emmanuel Sayoc
Subject: RE: USFWS Project #2008-0311 (Beaver Valley Power Station License Renewal)

Pam, thank you for the quick response. Your suggestions will be incorporated into our draft Supplemental Environmental Impact Statement, and will be communicated to FENOC. They are similar to FBC and PADEP instructions - and I believe PADEP is the agency that has authority/responsibility (via their encroachment permit) in making sure FENOC implements these measures.

Thanks again,
Sarah Lopas
301.415.1147
Division of License Renewal
U.S. NRC

-----Original Message-----
From: Pamela_Shellenberger@fws.gov [mailto:Pamela_Shellenberger@fws.gov]
Sent: Tuesday, June 24, 2008 1:02 PM
To: Sarah Lopas
Subject: Re: USFWS Project #2008-0311 (Beaver Valley Power Station License Renewal)

Sarah,

You are correct, it is likely federally listed mussels are not present in the portion of the Ohio River where BVPS is located - the New Cumberland Pool. We would recommend that best management practices (silt fence around any spoil piles, conduct dredging during low flow periods) be implemented in order to minimize sediment runoff into the river.

Pamela Shellenberger
Fish and Wildlife Biologist
Endangered Species Program
U.S. Fish and Wildlife Service
315 South Allen Street, Suite 322
State College, PA 16801
814-234-4090 x241
814-234-0748 Fax

Sarah Lopas <Sarah.Lopas@nrc.gov>
To "pamela_shellenberger@fws.gov"
06/19/2008 12:32 PM <pamela_shellenberger@fws.gov>
cc Emmanuel Sayoc <Emmanuel.Sayoc@nrc.gov>
Subject USFWS Project #2008-0311 (Beaver Valley Power Station License Renewal)

Hi Pam,

Sorry for the bit of phone tag lately. I decided just to email - and if we need to schedule a call to discuss this further we most certainly can - at your convenience. I have CC'ed Manny Sayoc, who is the Project Manager for the Beaver Valley Power Station (BVPS) license renewal environmental review. I am the aquatic ecology reviewer for this project.

So a quick background - we wrote the PA Field Office a letter on Nov. 2, 2007, asking for a list of T&E species that may be impacted by license renewal at BVPS. We received a response from your office on November 20, 2007 - and two endangered mussels (Clubshell and Northern riffleshell) were listed as occurring in the Allegheny River - which is a tributary of the Ohio River, where BVPS is located. However, it was noted that both mussels have "...not been found recently in 13 streams of historical occurrence in Butler, Beaver, Fayette, Greene, Indiana, Lawrence, and Westmoreland Co." So it is likely these mussels are not present in the portion of the Ohio River where BVPS is located - the New Cumberland Pool. However, other non-endangered freshwater mussels have been making a small comeback around dam tailwaters and higher current areas around small islands in the Ohio, suggesting the potential for a recolonization of listed mussels. (I have attached both letters for your reference.)

Since that letter, FirstEnergy Nuclear Operating Company (FENOC) declared that they may undertake refurbishment at the plant - they would replace the steam generators for one of their units. They replaced Unit 1's steam generators and the vessel head back in 2006. The new equipment was delivered to the site via barge up the Mississippi and Ohio Rivers. To accommodate the barge - BVPS's barge slip had to be dredged about 50 feet beyond what their current Army Corps (USACE) dredging permit allows. To get a modification of their current permit (valid through 2011) - they submitted an application to USACE, as well as the PA Dept. of Environmental Protection (PADEP), and also the PA Fish & Boat Commission. They consulted with the Fish & Boat Commission regarding T&E aquatic species - to which the Fish & Boat Commission requested that dredging not take place during April-July to avoid the spawning period of State-listed fish, as well as implementing best management procedures to avoid siltation/run-off into the river. However, no mention was made of impacts to mussels that may occur in the New Cumberland Pool. PADEP granted the permit modification, and reiterated the April-July restriction and best management procedures. It is the NRC belief that the one-time maintenance dredging would not impact endangered mussels in the New Cumberland Pool (if they do indeed occur there - which FWS documentation seems to suggest they likely do not) - primarily because the location of the dredging is in an area of the pool where the substrate is not suitable for colonization of mussels. The third attachment to this email is a package of information from FENOC detailing the dredging project (location, bathymetry survey, etc.), as well as their communications with PADEP, Fish & Boat Commission, and USACE. It is expected that FENOC would undergo the same application/T&E species consultation process if they replace the steam generators for the other unit (the new steam gens would come via barge again).

So - after all that (!) - Do you have any other concerns or information that could help us in evaluating the impact of the one-time dredging on the mussels?

Thank you!

Sarah Lopas

Sarah L. Lopas
Project Manager, Division of License Renewal U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001 Mail Stop O-11F1
(301) 415.1147 office
(301) 415.2002 fax
sarah.lopas@nrc.gov
(See attached file: FENOC Dredging Information.pdf)(See attached file: NRC letter to USFWS.pdf)(See attached file: USFWS letter to NRC.pdf)

Appendix F

GEIS Environmental Issues Not Applicable

to Beaver Valley Power Station, Units 1 and 2

F. Appendix F

GEIS Environmental Issues Not Applicable to Beaver Valley Power Station, Units 1 and 2

F.1 Environmental Issues Not Applicable to BVPS

Table F-1 lists those environmental issues identified in NUREG-1437, "Generic Environmental Impact Statement for License Renewal of Nuclear Plants," Volumes 1 and 2, issued 1996 and 1999, respectively (hereafter referred to as the GEIS)[30], and in Table B-1 of Appendix B to Subpart A of Title 10, Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions," of the *Code of Federal Regulations* (10 CFR Part 51), that are not applicable to Beaver Valley Power Station (BVPS), Units 1 and 2, because of plant or site characteristics.

Table F-1 GEIS Environmental Issues Not Applicable to BVPS, Units 1 and 2

ISSUE—10 CFR Part 51, Subpart A, Appendix B, Table B-1	Category	GEIS Sections	Comment
SURFACE WATER QUALITY, HYDROLOGY, AND USE (FOR ALL PLANTS)			
Altered salinity gradients	1	4.2.1.2.2	The BVPS heat dissipation system does not discharge to an estuary.
Water use conflicts (plants with once-through cooling systems)	1	4.2.1.3	A once-through cooling system is a feature not applicable to BVPS.
Water use conflicts (plants with cooling ponds or cooling towers using makeup water from a small river with low flow)	2	4.3.2.1, 4.4.2.1	The BVPS cooling system does not use makeup water from a small river with low flow, and the cooling pond heat dissipation system is not applicable to BVPS.
AQUATIC ECOLOGY (FOR PLANTS WITH ONCE-THROUGH AND COOLING POND HEAT DISSIPATION SYSTEMS)			
Entrainment of fish and shellfish in early life stages for plants with once-through and cooling pond heat dissipation systems	2	4.2.2.1.2	A once-through heat dissipation system is a feature not applicable to BVPS.
Impingement of fish and shellfish	2	4.2.2.1.3	A once-through heat dissipation system is a feature not applicable to BVPS.

[30] The NRC originally issued the GEIS in 1996, followed by Addendum 1 to the GEIS in 1999. Hereafter, all references to the "GEIS" include the GEIS and its Addendum 1.

Table F-1. (contd)

ISSUE—10 CFR Part 51, Subpart A, Appendix B, Table B-1	Category	GEIS Sections	Comment
AQUATIC ECOLOGY (FOR PLANTS WITH ONCE-THROUGH AND COOLING POND HEAT DISSIPATION SYSTEMS)			
Heat shock	2	4.2.2.1.4	A once-through heat dissipation system is a feature not applicable to BVPS.
GROUND-WATER USE AND QUALITY			
Ground-water use conflicts (potable and service water, and dewatering; plants that use more than 100 gallons per minute (gpm))	2	4.8.1.1, 4.8.1.2	BVPS does not use more than 100 gpm of ground water.
Ground-water use conflicts (plants using cooling towers withdrawing makeup water from a small river)	2	4.8.1.3	BVPS does not use cooling towers withdrawing makeup water from a small river.
Ground-water use conflicts (Ranney wells)	2	4.8.1.4	BVPS does not have or use Ranney wells.
Ground-water quality degradation (Ranney wells)	1	4.8.2.2	BVPS does not have or use Ranney wells.
Ground-water quality degradation (saltwater intrusion)	1	4.8.2.1	The BVPS cooling system does not withdraw ground water from an estuary or an oceanic area.
Ground-water quality degradation (cooling ponds in salt marshes)	1	4.8.3	This issue is related to a cooling pond heat dissipation system that is not applicable to BVPS.
Ground-water quality degradation (cooling ponds at inland sites)	2	4.8.3	This issue is related to a cooling pond heat dissipation system that is not applicable to BVPS.
TERRESTRIAL RESOURCES			
Cooling pond impacts on terrestrial resources	1	4.4.4	This issue is related to a cooling pond heat dissipation system that is not applicable to BVPS.
HUMAN HEALTH			
Microbial organisms (public health) (plants using lakes or canals, or cooling towers or cooling ponds that discharge to a small river)	2	4.3.6	The BVPS heat dissipation system does not discharge to a small river.

F.2 References

Code of Federal Regulations, *Title 10*, *Energy*, Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions."

U.S. Nuclear Regulatory Commission, NUREG-1437, "Generic Environmental Impact Statement for License Renewal of Nuclear Plants," Volumes 1 and 2, May 1996.

Appendix G

NRC Staff Evaluation of Severe Accident Mitigation Alternatives for Beaver Valley Power Station, Units 1 and 2.

G. Appendix G

U.S. Nuclear Regulatory Commission Staff Evaluation of Severe Accident Mitigation Alternatives for Beaver Valley Power Station Units 1 and 2 in Support of the License Renewal Application Review.

G.1 Introduction

First Energy Nuclear Operating Company (FENOC), on its own behalf and as an agent for FirstEnergy Nuclear Generation Corporation, Ohio Edison Company, and the Toledo Edison Company (licensees), submitted an assessment of severe accident mitigation alternatives (SAMAs) for Beaver Valley Power Station (BVPS) Units 1 and 2 as part of the environmental report (ER) (FENOC 2007). This assessment was based on the most recent probabilistic safety assessment (PSA) for each unit available at that time, a site-specific offsite consequence analysis performed using the MELCOR Accident Consequence Code System 2 (MACCS2) computer code and insights from the individual plant examination (IPE) (Duquesne Light Company (DLC) 1992a and 1992b) and individual plant examination of external events (IPEEE) (DLC 1995 and 1997) for each unit. In identifying and evaluating potential SAMAs, FENOC considered SAMAs that addressed the major contributors to core damage frequency (CDF) and large early release frequency (LERF) at BVPS, as well as SAMA candidates for other operating plants which have been documented in the Nuclear Energy Institute (NEI) 05-01, "Severe Accident Mitigation Alternatives (SAMA) Analysis—Guidance Document" (NEI 2005). FENOC identified 189 and 190 potential SAMA candidates for Units 1 and 2. This list was reduced to 63 (Unit 1) and 56 (Unit 2) unique SAMAs by eliminating SAMAs that are not applicable to BVPS for reasons of design differences or because they have already been implemented, are addressed by a similar SAMA, or require extensive changes that would involve implementation costs known to exceed any possible benefit. FENOC assessed the costs and benefits associated with each of the potential SAMAs and concluded in the ER that several of the candidate SAMAs evaluated for each unit are potentially cost beneficial.

Based on a review of the SAMA assessment, the U.S. Nuclear Regulatory Commission (NRC) issued a request for additional information (RAI) to FENOC by letter dated January 28, 2008 (NRC 2008a). Key questions concerned additional details regarding the PSA model and changes to the model since the IPE; updated information on dominant sequences in flood, fire, and seismic events; the use of the MAAP-DBA code to develop the plant-specific source terms used in the offsite consequence analysis; and more information on several specific candidate SAMAs and low-cost alternatives. FENOC submitted additional information by letters dated March 7, 2008 (FENOC 2008a) and May 2, 2008 (FENOC 2008b). In response to the RAIs, FENOC provided information regarding PSA models, results, and recent changes; additional justification for the identification of SAMA candidates based on the PSA results from the external event initiators; a comparison of the MAAP 4.0.4 and MAAP-DBA codes and associated source terms; and additional information regarding several specific SAMAs. FENOC responses addressed the NRC staff's concerns.

The following presents an assessment of SAMAs for BVPS Units 1and 2.

G.2 Estimate of Risk for Beaver Valley Power Station Units 1 and 2

Section G.2.1 summarizes the FENOC estimates of offsite risk at BVPS. The NRC staff's review of the FENOC risk estimates follows in Section G.2.2.

G.2.1 FENOC Risk Estimates

Two distinct analyses are combined to form the basis for the risk estimates used in the SAMA analysis. These are (1) the BVPS Level 1 and Level 2 PSA models, which are updated versions of the IPE (DLC 1992a and 1992b) and IPEEE (DLC 1995 and 1997) for each unit, and (2) a supplemental analysis of offsite consequences and economic impacts (essentially a Level 3 PSA model) developed specifically for the SAMA analysis. The SAMA analysis is based on the most recent BVPS Level 1 and 2 PSA model available at the time of the ER, referred to as BV1REV4 for Unit 1 (June 2006) and BV2REV4 for Unit 2 (April 2007). The scope of the model includes both internal and external initiating events. The external events evaluated are internal fires and seismic events. These events are integrated with the internal events model.

The baseline CDF for the purpose of the SAMA evaluation is approximately 1.95×10^{-5} per year for Unit 1 and 2.40×10^{-5} per year for Unit 2. The CDF values are based on the risk assessment for both internally and externally initiated events.

Table G-1 provides the breakdown of CDF by initiating event. This information is compiled from that provided in the ER and in the responses to RAIs (FENOC 2007 and 2008a). As shown in this table, support system initiators, such as events initiated by loss of one emergency alternating current (ac) bus, one emergency direct current (dc) bus, or loss of service water, are major contributors to the internal event CDF for each unit. The overall contribution from anticipated transient without scram (ATWS) is 3.9×10^{-7} per year and 1.6×10^{-7} per year for Units 1 and 2, whereas the contribution from station blackout (SBO) is 2.6×10^{-7} per year and 8.1×10^{-7} per year for Units 1 and 2. Internal flooding events are a minor contributor to CDF for Unit 1 (1.2×10^{-7} per year), but a much larger contributor to CDF for Unit 2 (1.2×10^{-6} per year). In addition, events involving loss of emergency 4160-volt (V) ac bus, loss of offsite power, loss of all river water, loss of containment instrument air, and interfacing system loss-of-coolant accident (LOCA) have larger contributions to CDF at Unit 2. The differences in the CDF contributions result largely from several significant differences between the two BVPS units. Section G.2.2 discusses these differences in greater detail.

Table G-1. BVPS Core Damage Frequency

Initiating Event	Unit 1		Unit 2	
	CDF (per year)	**% of Total CDF***	**CDF (per year)**	**% of Total CDF***
Internal Events—At Power				
Loss of Emergency 4160-V ac	1.3×10^{-6}	7	3.8×10^{-6}	16
Partial Loss of Main Feedwater	3.1×10^{-7}	2	1.7×10^{-7}	<1
Loss of Emergency 125-V dc	3.1×10^{-7}	2	5.2×10^{-7}	2
Loss of River Water/Service Water	2.7×10^{-7}	1	8.1×10^{-7}	3
Excessive LOCA	2.7×10^{-7}	1	2.7×10^{-7}	1
Reactor Trip	2.2×10^{-7}	1	1.3×10^{-7}	<1
Turbine Trip	2.0×10^{-7}	1	2.3×10^{-7}	<1
Loss of Offsite Power	1.9×10^{-7}	<1	8.2×10^{-7}	3
Small, Medium, or Large LOCA	1.5×10^{-7}	<1	1.2×10^{-7}	<1
Closure of One Main Steam Isolation Valve	1.4×10^{-7}	<1	4.9×10^{-8}	<1
Internal Floods	1.2×10^{-7}	<1	1.2×10^{-6}	5
Excessive Feedwater Flow	1.0×10^{-7}	<1	6.6×10^{-8}	<1
Inadvertent Safety Injection Initiation	5.7×10^{-8}	<1	4.4×10^{-8}	<1
Steam Generator Tube Rupture	5.6×10^{-8}	<1	3.7×10^{-7}	2
Total Loss of Main Feedwater	5.0×10^{-8}	<1	4.0×10^{-8}	<1
V-Sequence Initiating Event	2.0×10^{-8}	<1	2.8×10^{-7}	1
Loss of Containment Instrument Air	6.2×10^{-9}	<1	2.9×10^{-7}	1
All Other Internal Initiating Events	1.9×10^{-7}	1	3.2×10^{-7}	1
CDF from Internal Events	**3.98×10^{-6}**	**21**	**9.53×10^{-6}**	**40**
External Events—At Power				
Seismic	1.19×10^{-5}	61	9.70×10^{-6}	40
Fire	3.67×10^{-6}	18	4.80×10^{-6}	20
CDF from External Events	**1.55×10^{-5}**	**79**	**1.45×10^{-5}**	**60**
Total CDF	**1.95×10^{-5}**	**100**	**2.40×10^{-5}**	**100%**

* Percentages are rounded off to whole numbers.

The current Level 2 BVPS PSAs are based on the most recent updates to reflect changes to the plant, including the extended power uprate (EPU) and the steam generator replacement for Unit 1. The models utilize a direct linkage of Level 1 sequences to the containment event tree (CET). Although the CET was linked directly to the Level 1 trees, the concept of plant damage states was retained to minimize the number of CET top event split fractions that must be calculated. The CET endpoints resulted in the definition of 21 release categories (one containment intact category plus 20 release categories with containment failure or bypass). The frequency of each release category was obtained by summing the frequency of the individual accident progression CET endpoints into the release category. The 21 release categories were further collapsed into 11 containment release modes used for the plant's SAMA evaluations. The release characteristics for the release modes are based on MAAP-DBA analyses that reflect the revised BVPS configuration.

The offsite consequences and economic impact analyses use the MACCS2 code to determine the offsite risk impacts on the surrounding environment and public. Inputs for these analyses include plant-specific and site-specific input values for core radionuclide inventory, source term and release characteristics, site meteorological data, projected population distribution (within an 80-kilometer (50-mile) radius) for the year 2047, emergency response evacuation modeling, and economic data. The magnitude of the onsite impacts (in terms of cleanup and decontamination costs and occupational dose) is based on information provided in NUREG/BR-0184, "Regulatory Analysis Technical Evaluation Handbook" (NRC 1997a).

In the ER, FENOC estimated the dose to the population within 80 kilometers (50 miles) of the BVPS site to be approximately 0.579 person-sievert (person-Sv) (57.9 person-rem) per year for Unit 1 and 0.559 person-Sv (55.9 person-rem) for Unit 2. Table G-2 summarizes the breakdown of the total population dose by containment release mode, based on information provided in the ER. Containment bypass resulting from interfacing system loss-of-coolant accidents (ISLOCAs) and late containment failures dominate the population dose risk at BVPS.

Table G-2. Breakdown of Population Dose by Containment Release Mode

Containment Release Mode	Unit 1		Unit 2	
	Population Dose (Person-Rem* Per Year)	% Contri-bution	Population Dose (Person-Rem* Per Year)	% Contri-bution
Intact Containment	<0.1	<0.1	<0.1	<0.1
Containment Bypass—ISLOCA	37.8	65	18.9	34
Containment Bypass—SGTR	0.2	<1	0.5	1
Containment Isolation Failure	0.4	<1	0.4	<1
Early Containment Failure	<0.1	<0.1	0.1	<1
Late Containment Failure	19.0	33	35.8	64
Basemat Melt-Through	0.4	<1	0.1	<1
Total	**57.9**	**100**	**55.8**	**100**

* One person-rem = 0.01 person-Sv.

G.2.2 Review of FENOC Risk Estimates

FENOC based its determination of offsite risk at BVPS on the following three major elements of analysis:

(1) the Level 1 and Level 2 risk models that form the bases for the 1992 IPE submittals (DCL 1992a and 1992b) and the external events analyses of the IPEEE submittals (DCL 1995 and 1997)

(2) the major modifications to the IPE model that have been incorporated in the BVPS PSA updates (BV1REV4 updated June 2006 and BV2REV4 updated April 2007)

(3) the MACCS2 analyses performed to translate fission product source terms and release frequencies from the Level 2 PSA model into offsite consequence measures

The NRC staff reviewed each of these analyses to determine the acceptability of the FENOC risk estimates for the SAMA analysis, as summarized below.

The NRC staff described its reviews of the BVPS IPE submittals in NRC reports dated September 30, 1996 (NRC 1996), and May 13, 1993 (NRC 1993), for Units 1 and 2, respectively. Based on review of the IPE submittals and responses to RAIs, the NRC staff concluded that the IPE submittals met the intent of Generic Letter (GL) 88-20, "Individual Plant Examination of External Events for Severe Accident Vulnerabilities" (NRC 1991); that is, the licensee's IPE process is capable of identifying the most likely severe accidents and severe accident vulnerabilities. The IPE for each unit identified several severe accident vulnerabilities associated with core damage and numerous potential safety improvements. These improvements have been either implemented at the site or addressed by a SAMA in the current evaluation (FENOC 2007).

The PSA models for Units 1 and 2 have undergone four revisions since the 1992 IPE submittals. A comparison of the internal events CDF between the IPE submittals and the current PSA models indicates a decrease of approximately 95 percent for both units (from 2.1×10^{-4} per year to 4.0×10^{-6} per year for Unit 1 and from 1.9×10^{-4} per year to 9.5×10^{-6} per year for Unit 2.). Section 3.1.1.2 of Attachments C-1 and C-2 of the ER describes those changes that resulted in the greatest impact on the internal events CDF, and Tables G-3a and G-3b summarize this information for Units 1 and 2, respectively. The CDF values reported in these tables are for internal events only.

Table G-3a. BVPS Unit 1 Probabilistic Safety Assessment Historical Summary

PSA Version	Summary of Changes from Prior Model	CDF (per year)
1992	IPE Submittal (Internal Flooding Contribution 3.0×10^{-6})	2.14×10^{-4}
Rev. 1	June 30, 1995, PSA Update – revised ATWS model to give full pressure relief capacity credit for each of the three pressure-operated relief valves (PORVs) to reduce the unfavorable exposure time – added credit for the 4160-V station cross-tie from the Unit 2 emergency diesel generators (EDGs) to the 1AE emergency bus	1.17×10^{-4}
Rev. 2	June 30, 1998, PSA Update – added credit for operator depressurization of the reactor coolant system (RCS) during small-break LOCAs – revised 4-kilovolt (kV) cross-tie model to permit credit for the Unit 2 EDGs to power either Unit 1 emergency ac bus 1AE or 1DF – added credit for either the dc bus 2 charger or batteries to supply the load to start standby components, given a loss of ac power to the normally operating equipment	6.24×10^{-5}
Rev. 3	September 5, 2003, PSA Update – updated reactor coolant pump (RCP) seal LOCA model based primarily on WCAP-15603, Rev. 0 – removed the high head safety injection (HHSI)/charging pump ventilation support system based on heatup analysis – updated failure rates, recovery actions, CCF rates, initiating event, and split fractions with latest generic and plant-specific information	7.45×10^{-6}
Rev. 4	June 2, 2006, PSA Update – reduced the steam generator tube rupture (SGTR) initiating event frequency based on replacement Model 54F (Alloy 690) steam generators installed during outage 1R17 – included the third train of station instrument air – updated RCP seal LOCA model based on WCAP-15603, Rev. 1-A – incorporated the latest generic and plant-specific failure rates, initiator event frequencies, and other recovery actions – changed the methodology for calculating human error probabilities from the Success Likelihood Index Methodology (SLIM) to the Electric Power Research Institute (EPRI) Human Reliability Analysis (HRA) Calculator	3.98×10^{-6}

Table G-3b. BVPS Unit 2 Probabilistic Safety Assessment Historical Summary

PSA Version	Summary of Changes from Prior Model	CDF (per year)
1992	IPE Submittal (Internal Flooding Contribution 7.30×10^{-6})	1.9×10^{-4}
Rev. 1	September 30, 1997, PSA Update – added credit for operator depressurization of the RCS during small-break LOCAs – revised 4-kV cross-tie model to permit credit for the Unit 1 EDGs to power either Unit 2 emergency ac bus 2AE or 2DF – revised ATWS model to give full pressure relief capacity credit for each of the three PORVs to reduce the unfavorable exposure time	5.96×10^{-5}
Rev. 2	October 31, 1997, PSA Update – developed integrated model for internal and external initiator with a fully linked Level 2 model	5.96×10^{-5}
Rev. 3	May 31, 2003, PSA Update – updated RCP seal LOCA model based primarily on WCAP-15603, Rev. 0 – updated failure rates, recovery actions, common-cause failure (CCF) rates, initiating event, and split fractions with latest generic and plant-specific information	2.00×10^{-5}
Rev. 4	April 2, 2007, PSA Update – added credit for operator aligning a spare battery charger on the 125-V dc busses 2-1 and 2-2, given that their primary battery charger has failed – added credit for main feedwater pump discharge check valves (2FWS-1 and 2FWS-2) preventing flow diversion from the auxiliary feedwater (AFW) pumps, in conjunction with the previously modeled main feedwater check valves – added credit for the alternate HHSI flowpath through 2SIS-MOV836, given failure of the primary HHSI flowpath through the 2SIS-MOV867 valve – included the third train of station instrument air – updated RCP seal LOCA model based on WCAP-15603, Rev. 1-A – incorporated the latest generic and plant-specific failure rates, initiator event frequencies, and other recovery actions – changed the methodology for calculating human error probabilities from the SLIM to the EPRI HRA calculator	9.53×10^{-6}

The CDF values from the 1992 BVPS Unit 1 and 2 IPE submittals (2.1×10^{-4} per year and 1.9×10^{-4} per year, respectively) are at the high end of the range of the CDF values reported in the IPEs for Westinghouse three-loop plants. Figure 11.6 of NUREG-1560, "Individual Plant Examination Program: Perspectives on Reactor Safety and Plant Performance," shows that the IPE-based total internal events CDF for three-loop Westinghouse plants ranges from 7×10^{-5} per year to $4x10^{-4}$ per year (NRC 1997b). It is recognized that other plants have updated the values for CDF subsequent to the IPE submittals to reflect modeling and hardware changes. The current internal events CDF results for BVPS Units 1 and 2 ($4.0x10^{-6}$ per year and $9.5x10^{-6}$ per year, respectively) are lower than those for other plants of similar vintage and characteristics.

The NRC staff considered the peer reviews performed for the BVPS PSAs and the potential impact of the review findings on the SAMA evaluation. In Section 3.3 of Attachments C-1 and C-2 of the ER, FENOC described the peer review by the (former) Westinghouse Owners Group (WOG) of Revision 2 PSA models for Units 1 and 2. In response to an RAI on peer reviews (FENOC 2008a), FENOC stated that this July 2002 peer review was performed using NEI guidance. FENOC issued the final documentation of the review in December 2002 with the following overall conclusions:

(1) All of the technical elements were graded as sufficient to support applications requiring the capabilities defined for grade 2. The BVPS PSA thus provides an appropriate and sufficiently robust tool to support such activities as Maintenance Rule implementation, supported as necessary by deterministic insights and input from the plant expert panel.

(2) All of the elements were further graded as sufficient to support applications requiring the capabilities defined for grade 3 (e.g., risk-informed applications supported by deterministic insights but in some cases this is contingent upon implementation of recommended enhancements).

FENOC indicated that following the peer review, the preliminary Category A and B facts and observations (F&Os) with a potential impact on the model were entered into the BVPS Corrective Action Program, dispositioned, and incorporated into a subsequent PSA update. FENOC provided a listing of Category A F&Os (three for Unit 1 and five for Unit 2) and summarized their disposition. In Section 3.1.1.2 of Attachments C-1 and C-2 of the ER, FENOC states that it addressed all Category A and B F&Os in Revision 3. The NRC staff requested additional information regarding other review activities that might have been performed on the subsequent PSA revisions, especially for the latest revision of the PSA which was used for the SAMA evaluation. In response to the RAI (FENOC 2008a), FENOC provided a detailed discussion of the various peer reviews done on the last two PSA versions for Units 1 and 2. The licensee indicated that additional reviews were performed on the external event models, Level 2 PSA models, and internal event model revisions subsequent to the WOG peer review conducted in July 2002. These reviews included those performed during the NRC significance determination process Phase 2 Notebook Benchmarking Visit in July 2003; an NRC EPU PSA model audit in October 2005; a gap assessment in October 2007 on Unit 2 conducted according to Regulatory Guide 1.200, "An Approach for Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk-Informed Activities"; and an HRA focused peer review in October 2007. As a result of these reviews, the licensee indicated that it has addressed all of the WOG peer review comments.

The risk contributions shown in Table G-1 reflect several significant differences between the two units. These differences include the following:

- Unit 1 has a feedwater pump (dedicated auxiliary feedwater pump or DAFW) powered from the emergency response facility (ERF) diesel generator, which can be used during an SBO. This pump, which can provide secondary heat removal even if the steam generators are water solid, is independent of the EDGs and the station batteries. This pump is not available to Unit 2.

- The low fragility of the concrete block wall construction for the Unit 1 emergency dc battery rooms is a significant seismic contributor to Unit 1. The Unit 2 emergency dc battery rooms are constructed with reinforced concrete walls that have significant seismic capacity.

- The Unit 1 steam generators were replaced during 1RO17 refueling outage and have about half of the calculated SGTR initiating event frequency of Unit 2 (2.09×10^{-3} per year versus 4.82×10^{-7} per year).

The NRC staff requested additional information from the licensee to clarify the other noted differences in the PSA results between the two units for the containment air system and internal flooding initiating events. The licensee explained in the response to the RAI (FENOC 2008a) that a combination of physical plant differences and PSA modeling differences account for the differences. The licensee explained that air compressor and receiver configuration differences contribute to the higher Unit 2 loss of containment instrument air contribution. The licensee also discussed all the flood scenarios for each of the units and identified major differences in plant layout that contribute to differences in the PSA results.

Given that the BVPS internal events PSA models have been subject to peer review and the peer review findings were all addressed, and that FENOC has satisfactorily addressed NRC staff questions regarding the PSA, the NRC staff concludes that the licensee PSA model for internal event initiators is of sufficient quality to support the SAMA evaluation.

As indicated above, the current BVPS PSA includes external events. The integrated PSA models have been used to identify the highest risk accident sequences both from the internal and external event initiators and the potential means of reducing the risk posed by those sequences, as discussed below.

The BVPS IPEEEs for Units 1 and 2 were submitted in June 1995 (DLC 1995) and September 1997 (DLC 1997), in response to Supplement 4 of GL 88-20 (NRC 1991). These submittals included a seismic PSA using both the Electric Power Research Institute (EPRI) and Lawrence Livermore National Laboratory seismic frequency-intensity curve, a fire PSA, and a screening analysis for other external events. While these methods identified no fundamental weaknesses or vulnerabilities to severe accident risk in regard to the external events, they did discover several opportunities for seismic and fire risk reduction, as discussed below. In a letter dated December 11, 2000, the NRC staff concluded that the submittals for both Units 1 and 2 met the intent of Supplement 4 to GL 88-20 and that the licensee's IPEEE process is capable of identifying the most likely severe accidents and severe accident vulnerabilities (NRC 2000).

The IPEEE estimated a seismic CDF of 1.29×10^{-5} and 1.03×10^{-5} per year for Units 1 and 2 based on a revised analysis in response to NRC RAIs. Section 3.1.2.2 of Attachment C-1 of the ER identified the two items that have the lowest high confidence in low probability of failure

(HCLPF) values for Unit 1 (i.e., offsite power grid and 125-V dc ERF substation battery) and identified the 125-V dc battery room block walls as the most risk-significant seismic fragility. Section 7.2.1 of the Unit 1 IPEEE states that failure of these walls results in loss of both sets of emergency dc control power and eventual core damage. The Unit 1 IPEEE also states that enhancements to these walls were considered but, based on the low contribution to overall CDF, no modifications or additional analyses were planned. Section 3.1.2.2 of Attachment C-2 of the ER also identifies the three lowest HCLPF values for Unit 2 (i.e., offsite power grid, 125-V dc ERF substation batteries, and station air compressor/turbine building block walls). However, Section 7.2.1 of the Unit 2 IPEEE states that the most risk-significant seismic fragility is that of the 4-kV emergency bus transformers and the diesel generator building. The failure of these structures and components results in the loss of emergency ac power and in SBO leading to eventual core damage. Section 7.2.1 further states that although enhancements to these items could substantially reduce the seismic CDF, they are not considered feasible since their HCLPF values exceed 0.28 g, and the seismic CDF contribution is already low when compared to the internal events CDF (as reported in the IPE). Section G.3.2 discusses the identification of seismic-related SAMAs, including the treatment of the IPEEE improvements.

Section 3.1.2.2 of Attachments C-1 and C-2 of the ER states that the seismic PSAs have not been explicitly updated since the IPEEE; however, as the seismic sequences depend on internal event modeling, the seismic sequences have implicitly been updated as a result of updates to the internal events models. The current seismic CDFs based on the latest internal model are 1.2×10^{-5} and 9.7×10^{-6} per year for Units 1 and 2, respectively.

The BVPS IPEEE fire analyses employed a combination of probabilistic risk analysis with the EPRI fire-induced vulnerability evaluation (FIVE) methodology. The evaluation was performed in four phases—(1) qualitative screening, (2) quantitative screening, (3) fire damage evaluation screening, and (4) fire scenario evaluation and quantification. Each phase focused on those fire areas not screened out by the prior phases. The licensee used a quantitative screening criterion of 1.17×10^{-7} per year (based on 1 percent of the IPE CDF), which was an order of magnitude below the recommendation of the FIVE methodologies. The final phase involved using the IPE model for internal events to quantify the CDF resulting from a fire-initiating event. The CDF for each area was obtained by multiplying the frequency of a fire in a given fire area by the conditional core damage probability associated with that fire area including, where appropriate, the impact of fire suppression and fire propagation. In most cases, it was assumed that the fire damaged all equipment in the area. The potential impact on containment performance and isolation was evaluated following the core damage evaluation. The total fire CDF from the IPEEE was estimated to be 1.75×10^{-5} per year for Unit 1 (DLC 1995) and 1.05×10^{-5} per year for Unit 2 (DLC 1992).

Section 3.1.2.1 of Attachments C-1 and C-2 of the ER state that the fire risk models have not been explicitly updated since the IPEEE submittal. However, major updates that have been made to the internal events PSA have changed the contributions of various fire scenarios significantly since the IPEEE submittal. The current CDF contributions from fires are 3.7×10^{-6} per year and 4.8×10^{-6} per year for Units 1 and 2, respectively. Hardware changes introduced in the plant post-IPEEE (e.g., improved RCP seals), further analysis of risk-significant issues (e.g., switchgear area heatup following loss of heating, ventilation, and air conditioning (HVAC)), and PSA data and model updates all have contributed to this significant reduction in fire risk. The NRC staff requested additional information regarding the dominant fire contributors in the most recent update. Based on the licensee response (FENOC 2008a), Tables G-4a and G-4b list the dominant fire areas and their contributions to the fire CDF for Units 1 and 2, respectively.

Table G-4a. Major Fire Areas and Their Contribution to Fire Core Damage Frequency for BVPS Unit 1 Based on the Latest Probabilistic Safety Assessment (Revision 4)

Fire Area	Major Equipment Failed	CDF (per year)
CV3L1A	Cable tunnel fire, initiated by cable in trays at northernmost end of room, that damages cables from east wall to west wall at the north end of room resulting in reactor trip from loss of river water trains A and B and impact on the turbine plant component cooling water.	6.3×10^{-7}
CR1L1P	Control room cable fire in Benchboard C resulting in reactor trip from loss of main feedwater and loss of instrument air. It also impacts AFW, turbine plant component cooling water, main steam, station, and containment instrument air.	4.6×10^{-7}
CS1L1E	Cable spreading room cable fire in northeast corner trays that damages two stacks of cable trays running side by side resulting in loss of river water.	3.6×10^{-7}
CS1L1C	Cable spreading room fire with one of the three clustered emergency switchgear HVAC fans igniting and destroying one of the other nearby fans. Credits operator action to establish alternate cooling for the normal or emergency switchgear.	2.8×10^{-7}
CV3L1B	Cable tunnel fire initiated by cable in trays just south of northernmost end of room that damages cables from east wall to west wall at the north end of room impacting river water trains A and B and turbine plant component cooling water.	2.3×10^{-7}
CR4L1C	Process rack room normal battery (BAT-5) fire that damages vertical cable trays at middle of south wall, impacting virtually all safety systems. Modeled as going directly to core damage.	1.9×10^{-7}

Table G-4b. Major Fire Areas and Their Contribution to Fire Core Damage Frequency for BVPS Unit 2 Based on the Latest Probabilistic Safety Assessment (Revision 4)

Fire Area	Major Equipment Failed	CDF (per year)
DG1L1A	Fire in DG#1 area resulting in a manual reactor trip because of loss of #1 EDG.	9.1×10^{-7}
DG2L1A	Fire in DG#2 area resulting in a manual reactor trip because of loss of #2 EDG.	9.1×10^{-7}
CT1L1A	Transient combustible fires in cable tunnel damaging both orange and purple cables in southeast corner of room. This scenario is modeled as going directly to core damage.	5.1×10^{-7}
CT1L1B	Transient combustible fires in cable tunnel damaging both orange and purple cables in north wall. This scenario is modeled as going directly to core damage.	3.1×10^{-7}
CB3L1P	Control room cable fire in Benchboard C, resulting in reactor trip and loss of main feedwater (MFW), AFW, and instrument air. Impacts secondary plant component cooling water, station and containment instrument air, and main steam.	2.6×10^{-7}
SBOP4A	Battery room 2-5 fire from any source in area with >20-foot radius that propagates to the west cable vault, primary auxiliary building, and normal switchgear area that damages cables in all four fire zones. Modeled as going directly to core damage.	2.5×10^{-7}

The IPEEE analysis of high winds, floods, and other external events followed the screening and evaluation approaches specified in NUREG/CR-4839, "Methods for External Event Screening Quantification: Risk Methods Integration and Evaluation Program (RMIEP) Methods Development" (NRC 1992), and did not identify any significant sequences or vulnerabilities for either unit (DLC 1995 and 1997). Based on this result, DLC concluded that these other external hazards would not be expected to impact the conclusions of the SAMA analysis and did not consider specific SAMAs for these events. The risks from deliberate aircraft impacts were explicitly excluded, since other forums were considering this and other sources of sabotage.

In the ER, FENOC used an integrated model of Level 1 and Level 2 that includes the contribution of internal and external flood, fire, and seismic initiators for the purpose of SAMA evaluation. As a result, the SAMA candidates are evaluated without the need for a separate external event assessment or multiplier.

The NRC staff reviewed the general process used by FENOC to translate the results of the Level 1 PSA into containment releases, as well as the results of the Level 2 analysis, as described in the ER and in response to NRC staff RAIs (FENOC 2008a). The containment designs and the Level 2 analyses are similar for BVPS Units 1 and 2. The current Level 2 PSAs are based on the most recent updates to reflect changes to the plant including the EPU (both units), steam generator replacement (Unit 1), and other modeling assumptions and input changes. The models utilize a direct linkage of Level 1 sequences to the CET. The CET end states were grouped into 21 release categories (RCs) similar to those used in the IPE. The frequency of each RC was obtained by summing the frequency of the individual accident progression CET endpoints assigned to the release category. These 21 RCs were collapsed into 14 RCs as shown in Tables 3.2.1-5 and 3.2.1-6 of Attachments C-1 and C-2 of the ER. FENOC reanalyzed the source terms for each of these 14 RCs to account for the EPU for both units, as described below. These 14 RCs were subsequently collapsed into 11 RCs as shown in Table 2.A-1 of the FENOC response to an RAI (FENOC 2008a).

FENOC reanalyzed the source terms for each release category using the MAAP-DBA computer code. The MAAP-DBA computer code is the current licensing-basis analysis tool for containment response analysis for design-basis accidents (DBAs) and is based on MAAP 4.0.5 code. The NRC staff accepted the use of MAAP-DBA for the containment conversion from subatmospheric to atmospheric operation conditions (NRC 2006). Although the MAAP-DBA code is accepted for DBA containment pressure response analysis, the prior NRC staff review did not address the use of the code for source term analysis. Accordingly, the NRC staff requested additional information regarding the use of the MAAP-DBA computer code to develop the plant-specific source terms used in the offsite consequence analysis, in lieu of the MAAP 4.0.4 code which is the current industry standard for such analyses. In response to the RAI (FENOC 2008a), the licensee provided a comparison of the MAAP 4.0.4 and MAAP-DBA codes. The licensee's response included a description of the major differences between the two codes and comparisons of the fission product release histories for the two codes for release categories BV1, BV3, BV5, and BV9. In all cases, the MAAP-DBA results appear to be more conservative in terms of predicting higher radionuclide release fractions and earlier times of release compared to MAAP 4.0.4.

As described in response to an RAI (FENOC 2008a), FENOC performed source term analyses for both BVPS units and generated a composite set of data by taking the maximum release fraction of the two units. The resulting fission product release characteristics were used for the plant's Level 3 PSA and SAMA evaluations.

The NRC staff's reviews of the Level 2 IPEs for Units 1 and 2 concluded that they addressed the most important severe accident phenomena normally associated with large, dry (subatmospheric) containments and identified no significant problems or errors (NRC 1993 and 1995). The WOG peer reviews mentioned previously included the Level 2 PSA model. Section 3.3 of Attachments C-1 and C-2 of the ER described the changes to the Level 2 model to update the methodology and to address peer review recommendations. Based on the NRC staff's review of the Level 2 methodology, and the fact that the Level 2 model was reviewed in more detail as part of the WOG peer review and updated to address peer review findings, the NRC staff concludes that the Level 2 PSA provides an acceptable basis for evaluating the benefits associated with various SAMAs.

As indicated in Section 3.4.3 of Attachments C.1 and C.2 of the ER, the reactor core radionuclide inventory used in the consequence analysis is based on the BVPS Containment

Conversion Licensing Report. This document indicates that the inventory is based on the updated power level of 2918 megawatt thermal (MWt), with 18-month fuel cycles, and a burnup of up to 62,000 megawatt-days per metric ton of uranium (MWD/MTU) for the maximum pin, or 54,000 MWD/MTU for the average discharge assembly. The inventory table in the BVPS Containment Conversion Licensing Report matches the table in the ER.

The NRC staff reviewed the process used by FENOC to extend the containment performance (Level 2) portion of the PSA to an assessment of offsite consequences (essentially a Level 3 PSA). This included consideration of the source terms used to characterize fission product releases for the applicable containment release categories and the major input assumptions used in the offsite consequence analyses. Version 1.13.1 of MACCS2 was utilized to estimate offsite consequences. Plant-specific input to the code includes the source terms for each release category and the reactor core radionuclide inventory (both discussed above), site-specific meteorological data, projected population distribution within an 80-kilometer (50-mile) radius for the year 2047, emergency evacuation modeling, and economic data. Attachments C-1 and C-2 of the ER provide this information.

FENOC used site-specific meteorological data for the 5 years 2001 through 2005 as input to the MACCS2 code. FENOC performed MACCS2 analyses for each of the 5 years and averaged the results of the MACCS2 analyses. Section 3.4.5 of Attachments C-1 and C-2 of the ER discusses the development of the meteorological data, which were collected from the BVPS site weather facility. Each year of meteorological data consists of 8760 weather data sets of hourly recordings of wind direction, windspeed, atmospheric stability, and accumulated precipitation. Missing data were obtained from measurements at Pittsburgh International Airport (the nearest most complete source of data). The NRC staff notes that previous SAMA analyses results have shown little sensitivity to year-to-year differences in meteorological data and concludes that the approach taken for collecting and applying the meteorological data in the SAMA analysis is reasonable.

The population distribution that the licensee used as input to the MACCS2 analysis was estimated for the year 2047, based on the U.S. Census Bureau population data for 2000, as provided by the SECPOP2000 program (NRC 2003), the 2000 county-level census data (USCB 2000), and the annual growth rate for each county in the 80-kilometer (50-mile) radius from State and national population projections. Section 3.4.1 of Attachments C-1 and C-2 of the ER states that for Ohio and Pennsylvania, the growth rates are based on 2030 county projections, and for West Virginia, projections were available through 2050. The NRC staff considers the methods and assumptions for estimating population reasonable and acceptable for purposes of the SAMA evaluation.

The emergency evacuation was modeled as a single evacuation zone extending out 16 kilometers (10 miles) from the plant. FENOC assumed that 95 percent of the population would move at an average speed of approximately 0.2 meters per second. This assumption is conservative relative to NUREG-1150, "Severe Accident Risks: An Assessment for Five U.S. Nuclear Power Plants" (NRC 1990), which assumed evacuation of 99.5 percent of the population within the emergency planning zone. Sensitivity analyses were performed in which the evacuation speed was decreased to 0.05 meters/second and increased to a 2.24 meters/second. The results show that decreasing the evacuation speed resulted in a maximum increase in population dose of 10 percent for both units. Additional sensitivity analyses were performed in which the alarm delay time (the time after accident initiation when the accident reaches General Emergency conditions or when plant personnel can reliably predict that General Emergency conditions will be attained) was increased by a factor of 1.5 (FENOC 2008a). Section 8 of Attachments C-1 and C-2 of the ER shows that the total dose is not sensitive to an increase in the alarm delay time. The NRC staff concludes that the evacuation assumptions and analysis are reasonable and acceptable for the purposes of the SAMA evaluation.

The evaluation took much of the site-specific economic data from SECPOP2000 (NRC 2003) by specifying the data for each of the counties surrounding the plant to a distance of 80 kilometers (50 miles). SECPOP2000 utilizes economic data from the 1997 Census of Agriculture (USDA 1998). In addition, the county data file was updated to circa 2002 for the 26 counties within 80 kilometers (50 miles) of the plant (FENOC 2008a).

The staff review of the MACCS2 input data in Section 3.4.2 of Attachments C-1 and C-2 of the ER noted that several parameter values exceeded those in the example table of NEI 05-01 (NEI 2005) by about 15 to 70 percent (e.g., the population relocation cost and the land decontamination cost values). In response to an RAI, FENOC provided the referenced calculation that forms the bases for the economic values (FENOC 2008b). The staff's review of this document found that the higher values result from the inflation adjustment of these values to a later year than considered in the NEI document (FENOC 2008a).

The NRC staff concludes that the methodology used by FENOC to estimate the offsite consequences for BVPS Units 1 and 2 provides an acceptable basis from which to proceed with an assessment of risk reduction potential for candidate SAMAs. Accordingly, the NRC staff based its assessment of offsite risk on the CDF and offsite doses reported by FENOC.

G.3 Potential Plant Improvements

This section discusses the process for identifying potential plant improvements, an evaluation of that process, and the improvements evaluated in detail by FENOC.

G.3.1 Process for Identifying Potential Plant Improvements

The FENOC process for identifying potential plant improvements (SAMAs) consists of the following elements:

- review of the most significant sequences and the components/systems having the greatest potential for risk reduction worth (RRW) from the internal events portion of the current plant-specific PSA

- review of potential plant improvements identified in the IPE and IPEEE

- review of dominant contributors to fire and seismic events in the current fire and seismic analyses

- review of generic SAMA enhancements as documented in NEI 05-01 (NEI 2005)

- plant staff input based on plant-specific experience

Based on this process, FENOC identified an initial set of 189 potential SAMA candidates for Unit 1 and 190 SAMAs for Unit 2, referred to as Phase I SAMAs. In Phase I of the evaluation, FENOC performed a qualitative screening of the initial list of SAMAs and eliminated SAMAs from further consideration using the following criteria:

- The SAMA is not applicable at BVPS because of design differences.

- The SAMA has already been implemented at BVPS or the intent of the SAMA has been met.

- The SAMA is similar to and could be combined with another SAMA candidate.

- The estimated costs of the SAMA would exceed the dollar value associated with completely eliminating all severe accident risk at BVPS.

Based on this screening, FENOC eliminated 126 Unit 1 SAMAs and 134 Unit 2 SAMAs, leaving 63 unique SAMAs for Unit 1 and 56 unique SAMAs for Unit 2 for further evaluation. Table 7-1 of Attachments C.1 and C.2 of the ER lists the remaining SAMAs, referred to as Phase II SAMAs (FENOC 2007). In Phase II, FENOC evaluated each of the remaining SAMA candidates in detail, as discussed in Sections G.4 and G.6 below. Section G.3.2 describes the NRC's review of the FENOC process for identifying and screening SAMA candidates.

G.3.2 Review of the FENOC Process

The FENOC efforts to identify potential SAMAs took advantage of the integrated PSA model that included both internal and external initiating events. The initial list of SAMAs generally addressed the accident sequences considered to be important to CDF from the perspectives of function, initiating event, and RRW at BVPS and included all generic SAMAs listed in NEI 05-01 (NEI 2005).

FENOC provided a tabular listing of the top 10 PSA basic events sorted according to their RRW for CDF and LERF in Attachments C.1 and C.2 of the ER (FENOC 2007). In response to an RAI, FENOC provided a more complete listing of the basic events down to an RRW of 1.005 (FENOC 2008a). SAMAs impacting these basic events would have the greatest potential for reducing risk. FENOC used an RRW cutoff of 1.005, which corresponds to about a 0.5-percent change in CDF given 100-percent reliability of the SAMA. This equates to a benefit of approximately $25,000 for Units 1 and 2 (based on a total benefit of about $5.1 million for each unit). FENOC also provided a listing of the top 10 basic events and hardware failures with an RRW of 1.04 based on the contribution to LERF. FENOC correlated the top CDF and LERF events with the SAMAs evaluated in the ER and showed that one or more SAMAs address all of the significant events (FENOC 2007 and 2008a).

For some of the Phase II SAMAs listed in the ER, the information provided did not sufficiently describe the proposed modification. Therefore, the NRC staff asked the licensee to provide more detailed descriptions of the modifications for several of the Phase II SAMA candidates (NRC 2007). In response to the RAI, the licensee provided further clarification for these SAMA candidates. In addition, the staff requested and received a copy of the "Beaver Valley Power Station ELT 2004 Strategic Plan—Safe Plant Operations," which was used as a basis for identifying some of the SAMA candidates.

For several SAMA candidates, the staff questioned whether FENOC could have considered lower cost alternative fixes, including the following:

- for Unit 1 SAMAs 183 and 184 (which both involve rerouting river water or auxiliary river water pump power and control cables), partial rerouting of one train of power cables and modifying the fire procedure(s) to manually control the river water or the auxiliary river water pump, or using rated fire blankets/barriers rather than rerouting cables

- for Unit 2 SAMAs 179 and 180 (which involve control room and cable tunnel fires, respectively), partially rerouting or protecting one train of service water combined with procedures to allow manual local actions

- for Unit 1 SAMA 54 and Units 1 and 2 SAMAs 55, 56, and 165 (which are focused on reducing the likelihood of RCP seal LOCAs), the addition of a dedicated self-contained diesel-driven pump for seal cooling or cross-connecting the chemical and volume control systems from the opposite unit for RCP seal injection

In response to the RAIs, FENOC addressed the lower cost alternatives and gave specific reasons why the cost of these alternative SAMA candidates would be high enough that the decision on final SAMA selection would not have been affected (FENOC 2008a). Section G.6.2 discusses this in greater depth.

As discussed earlier, the IPE and IPEEE analyses identified a number of plant improvements. These analyses found eight vulnerabilities and associated enhancements in the Unit 1 IPE and seven in the Unit 2 IPE. These are listed below:

Table G-5. Vulnerabilities and Associated Enhancements for BVPS Unit 1 and 2

Vulnerability	Enhancement	Applicable Unit
ac power generation capability	Provide a Unit 1 and 2 4160-V bus cross-tie	Both
Reactor trip breaker failure	Enhance procedures for removing power from the bus	Both
Pressurizer PORV block valve alignment	Operate plant with all PORV block valves open or provide procedure to open block valves when MFW is lost	Unit 1
Loss of emergency switchgear room HVAC	Enhance loss of HVAC procedures	Both
RCP seal cooling for SBO	New seal materials and/or alternate seal cooling	Both
Battery capacity for steam generator level during SBO	Enhance procedures on shedding loads or using portable battery chargers	Both
Pressurizer PORV sticking after loss of offsite power	Eliminate challenge by defeating the 100% load refection capability	Both
Fast 4160-V bus transfer failures	Explicit procedure and training on breaker repair or changeout	Both

Based on information provided in the ER, it appeared that each of these improvements had either already been implemented or addressed by a SAMA (either explicitly or as a part of a more general SAMA candidate). However, the disposition of the improvement to enhance the 4160-V breaker repair and changeout procedures and training was unclear. The NRC staff therefore requested that FENOC confirm the status of this improvement. In response to an RAI, FENOC stated that procedures and training for manually racking 4-kV breakers have been enhanced, and spare breaker internals are available near the required locations to support the replacement. Therefore, this improvement has been implemented.

In the IPEEE, five Unit 1 and five Unit 2 design enhancements were identified. Section 8 of both the Unit 1 and Unit 2 IPEEEs states that potential enhancements associated with key contributors were considered; however, based on the low contribution to overall (internal plus external) CDF, no modifications or additional analyses were planned. Table 5.6-1 of Attachments C-1 and C-2 of the ER shows that all but one of the IPEEE enhancements are included as SAMA candidates. The one enhancement not included is the reevaluation of the diesel generator building seismic fragility. The IPEEE states that the diesel generator building HCLPF is greater than 0.29 g and that the building has a low contribution to total CDF.

Based on the preceding, the NRC staff concludes that the FENOC SAMA identification process has adequately considered the potential plant enhancements identified in the IPE/IPEEE.

The ER did not provide details regarding the identification of SAMA candidates based on review of the external event risk information, specifically for fire and seismic initiators. In response to an RAI and followup questions, the licensee indicated that for fire events, it identified potential SAMAs by considering all fire scenarios that have a greater than 1 percent contribution to the total CDF (FENOC 2008a and 2008b). Furthermore, the licensee identified specific SAMA candidates for the top five Unit 1 and Unit 2 fire scenarios.

For seismic events, the licensee provided tables showing the top 10 dominant seismic scenarios, and the top 10 seismic split fraction importances, ranked in order of decreasing importance (FENOC 2008a). These tables also show the split fraction value (failure probability) and the split fraction failed sequence frequency (i.e., the CDF associated with sequences involving failures of the given seismic split fraction). The licensee stated that it considered only the risk contributors associated with peak ground acceleration (PGA) ranging from 0.1 g to 0.25 g in the seismic SAMA identification process, since this range of earthquakes encompasses the site design-basis earthquake value of 0.125 g, and since it was judged that trying to design against higher PGAs would result in excessive costs. In a followup question, the NRC staff requested additional justification for limiting the consideration of seismic SAMAs to events with PGA less than 0.25 g, given that the seismic CDF is dominated by events associated with higher PGAs. In response, FENOC applied an alternate method for identifying potential seismic SAMAs (FENOC 2008b). FENOC examined the top 100 seismic core damage sequences, which represent 72 and 56 percent of all seismic CDFs for Units 1 and 2, respectively. FENOC applied several screening steps that removed sequences triggered by seismic events with PGAs greater than 0.5 g and sequences that contained a seismic failure of the primary auxiliary building or river/service water system based on the judgment that enhancement cost would exceed the maximum cost-benefit value. The retained sequences contribute 24 and 4 percent of the seismic CDF for Units 1 and 2, respectively. FENOC then demonstrated that the previously identified seismic SAMAs effectively address the remaining seismic risk and that no additional SAMAs beyond those originally identified could be cost beneficial.

Based on this information, the NRC staff concludes that the set of SAMAs evaluated in the ER, together with those identified in response to NRC staff RAIs, addresses the major contributors to both internal and external event risk.

The NRC staff notes that the set of SAMAs submitted is not all inclusive, since additional, possibly even less expensive, design alternatives can always be postulated. However, the staff concludes that the benefits of any additional modifications are unlikely to exceed the benefits of the modifications evaluated and that the alternative improvements would not likely cost less than the least expensive alternatives evaluated, when the subsidiary costs associated with maintenance, procedures, and training are considered.

The NRC staff concludes that FENOC used a systematic and comprehensive process for identifying potential plant improvements for BVPS and that the set of potential plant improvements identified by FENOC is reasonably comprehensive and therefore acceptable. This search included reviewing insights from the plant-specific risk studies and reviewing plant improvements considered in previous SAMA analyses. The NRC staff also notes that the use of the integrated PSA to facilitate identification of SAMAs for external events, the prior implementation of plant modifications for seismic and fire events, and the absence of external event vulnerabilities ensure that the search for external event SAMAs was reasonably comprehensive.

G.4 Risk Reduction Potential of Plant Improvements

FENOC evaluated the risk reduction potential of the 63 Unit 1 and 56 Unit 2 remaining SAMAs applicable to BVPS. In the SAMA evaluations, FENOC used realistic assumptions with some conservatism. On balance, such calculations overestimate the benefit and are conservative.

For all of the SAMAs, FENOC used model requantification to determine the potential benefits. The CDF and population dose reductions were estimated using the latest version of the BVPS PSA models. Appendix A to Attachments C.1 and C.2 of the ER details the changes made to the models to quantify the impact of the SAMAs. FENOC performed a total of 39 analysis cases for Unit 1 and 51 analysis cases for Unit 2 to assess the risk reduction for all Phase 2 SAMAs. Because of the large number of Phase 2 SAMA calculations, Tables G-5a and G-5b list the assumptions considered to estimate the risk reduction for a sample of SAMAs where the estimated implementation cost for the SAMA was less than three times the estimated baseline benefit (based on a 7-percent discount rate). Also included in these tables are the estimated risk reduction, in terms of percent reduction in CDF and population dose, and the estimated total benefit (present value) of the averted risk. The estimated benefits reported in Tables G-5a and G-5b reflect the combined benefits in both internal and external events. Section G.6 discusses the determination of the benefits of the various SAMAs in greater detail.

The NRC staff questioned the assumptions used in evaluating the benefits or risk reduction estimates of certain SAMAs provided in the ER (NRC 2007). For example, for Unit 1 SAMA 98, which involves increasing the containment and core debris cooling following core damage, the NRC staff questioned how applicable the benefit of eliminating the hydrogen burn in the containment is to this improvement, which involves the placement of refractory material underneath the reactor vessel. In response, FENOC explained that the two cases are equivalent. For example, the major contributor to hydrogen inside containment results from the core-concrete interaction between the corium and the concrete beneath the reactor vessel following a high-pressure melt ejection. The use of refractory material therefore eliminates the hydrogen generation from this mechanism, which eliminates the risk of hydrogen combustion and potential containment failure.

The NRC staff also questioned the assumptions used in evaluating the benefit or risk reduction estimates of certain SAMAs provided in the ER for Unit 2. For example, SAMA 55 and 56 yield the same benefit, even though SAMA 55 includes a dedicated diesel generator which is not a part of SAMA 56. In response, FENOC clarified that for all such cases, the analyses are done in a manner to bound the benefits such that it is conservative for the SAMA selection process.

The NRC staff noted that some SAMA candidates have a dual-unit benefit. This includes Unit 1 SAMAs 14, 186, 187, and 188 and Unit 2 SAMAs 14, 186, and 190. Section 7.3 of the ER addresses the shared benefits and costs for each of these SAMAs and demonstrates that FENOC considered the combined benefits in its cost-benefit evaluation for these dual-unit SAMAs.

The NRC staff has reviewed the bases for the FENOC calculations of the risk reduction for the various plant improvements and concludes that the rationale and assumptions for estimating risk reduction are reasonable and generally conservative (i.e., the estimated risk reduction is higher than what would actually be realized). Accordingly, the NRC staff based its estimates of averted risk for the various SAMAs on the FENOC risk reduction estimates.

Table G-6a. SAMA Cost/Benefit Screening Analysis for BVPS Unit 1[a]

SAMA	Assumptions	% Risk Reduction[b]		Total Benefit Using 7% Discount Rate ($)	Cost ($)
		CDF	Population Dose		
SAMA 98: Place refractory material underneath the reactor vessel such that concrete attack would not occur	Eliminate containment failures that result from hydrogen burns and detonations [Analysis Case H2BURN]	0	0.49	30K	>100K
SAMA 164: Provide procedural guidance to close the RCS loop stop valves to isolate the generator from the core and provide mechanical device to close (gag) a stuck-open steam generator safety valve	**Eliminate all SGTR events [Analysis Case NOSGTR]**	**0**	**0.46**	**31K**	**50K**
SAMA 165: Install an independent RCP seal injection system	Eliminate all RCP seal LOCA events and all failures of high-pressure injection [Analysis Case RCPLOCA2]	29	25	1.3M	>4M
SAMA 167: Strengthen the ruggedness of the emergency 125-V dc battery room block walls	**Eliminate seismic failure of the block walls [Analysis Case DC02]**	**15**	**26**	**1.3M**	**>300K**
SAMA 168: Install a fire barrier between the four emergency switchgear ventilation fans in the cable spreading room	**Eliminate the cable spreading room fire scenario impacting the switchgear ventilation fans [Analysis Case FIRE01]**	**1.5**	**2.7**	**130K**	**80K**
SAMA 170: Improve operator performance for starting the portable fans and opening the doors in emergency switchgear room	Reduce the failure probability for starting portable fans and opening doors by a factor of 3 [Analysis Case HEP2]	1.0	1.9	93K	NA

Table G-6a. (contd)

SAMA	Assumptions	% Risk Reduction[b]		Total Benefit Using 7% Discount Rate ($)	Cost ($
		CDF	Population Dose		
SAMA 187: Increase seismic ruggedness of the ERF substation batteries by strengthening the battery racks	**ERF battery seismic strength and fragility parameters are increased to the same values as those of the station batteries [Analysis Case SEISMIC1]**	**15**	**9.8**	**525K**	**300K**
SAMA 189: Provide diesel-backed power for the fuel pool purification pumps and valves used for makeup to the RWST	**The RWST never empties [Analysis Case LOCA04]**	**17**	**14**	**730K**	**200K**

[a] SAMAs in bold are potentially cost beneficial.

[b] Estimated benefits are derived from information provided in the ER (FENOC 2007) and are stated as a percentage reduction of risk from an integrated model covering both internal and external initiating events.

Table G-6b. SAMA Cost/Benefit Screening Analysis for BVPS Unit 2[a]

SAMA	Assumptions	% Risk Reduction[b] CDF	Population Dose	Total Benefit Using 7% Discount Rate ($)	Cost ($)
SAMA 3: Add a portable generator to supply power to steam generator level instrumentation	**Eliminate failure or depletion of dc power [Analysis Case DC01]**	**35**	**30**	**1.5M**	**120K**
SAMA 55: Install an independent RCP seal injection system with dedicated diesel	Eliminate all RCP seal LOCA events from loss of CCW, service water, or SBO [Analysis Case RCPLOCA]	31	26	1.4M	>4M
SAMA 78: Modify the startup feedwater pump so that it can be used as a backup to the emergency feedwater system, including during an SBO scenario	**Unit 2 baseline model with two additions—(1) DAFW train and (2) portable dc generator for steam generator level indication power [Analysis Case DAFW]**	**42**	**35**	**1.8M**	**3M**
SAMA 164: Provide procedural guidance to close the RCS loop stop valve to isolate the generator from the core and provide mechanical device to close (gag) a stuck-open steam generator safety valve	**Reduce SGTR initiating event frequency by 50% and further reduce unscrubbed containment bypass release bin frequency (BV18) by 50% [Analysis Case SGTR4]**	**0.83**	**1.5**	**86K**	**50K**
SAMA 165: Install an independent RCP seal injection system	Eliminate all RCP seal LOCA events [Analysis Case RCPLOCA]	31	26	1.4M	>4M
SAMA 172: Improve operator performance to initiate AFW following transients	Reduce the failure probability for manual actuation of AFW following a transient by a factor of 3 [Analysis Case HEP4]	0.83	0.84	43K	NA

Table G-6b. (contd)

SAMA	Assumptions	% Risk Reduction[b] CDF	% Risk Reduction[b] Population Dose	Total Benefit Using 7% Discount Rate ($)	Cost ($
SAMA 175: Improve operator performance to initiate feed and bleed	Reduce the failure probability for feed and bleed by a factor of 3 [Analysis Case HEP7]	1.2	0.25	20K	NA
SAMA 179: Reduce risk contribution from fires originating in Zone CB-3, causing a total loss of MFW and AFW with subsequent failure of feed and bleed	Eliminate the contribution of fire from Zone CB-3 [Analysis Case FIRE05]	2.1	0.44	34K	>100K
SAMA 188: Reduce risk contribution from internal flooding in safeguards building	Eliminate the internal flood risk contribution from safeguard building [Analysis Case FLOOD2]	1.2	1.2	63K	>200K

[a] SAMAs in bold are potentially cost beneficial.

[b] Estimated benefits are derived from information provided in the ER (FENOC 2007) and are stated as a percentage reduction of risk from an integrated model covering both internal and external initiating events.

G.5 Cost Impacts of Candidate Plant Improvements

FENOC estimated the costs of implementing the candidate SAMAs through the use of screening values and an expert panel. FENOC used a procedure screening value of $15,000 and a hardware screening value of $100,000. These screening values considered the cost of the change including postimplementation costs such as training. In addition to the screening values, an expert panel consisting of senior staff members from the PSA group, the design group, operations, and license renewal reviewed the benefit calculation results and made judgments as to whether a modification could be made to the plant that would be cost beneficial in comparison with the calculated benefit. Section 4.21.3 of the ER states that the cost estimates conservatively did not include the cost of replacement power during extended outages required to implement the modifications, nor did they include contingency costs associated with unforeseen implementation obstacles. Estimates based on modifications that were implemented or estimated in the past were presented in terms of dollar values at the time of estimation and were not adjusted to present-day dollars. Therefore, the cost estimates were conservatively low.

Several of the SAMAs in Tables G-5a and G-5b are shown with a not applicable or "NA" in the cost column. As stated in the note to Table 7.1 in Attachments C-1 and C-2 of the ER, these SAMAs are included to demonstrate the sensitivity of the PSA model to a factor of 3 reduction in the associated human error probability. The factor of 3 was selected to demonstrate the impact of a significant procedure or training improvement. For these SAMAs, FENOC states that the current plant procedures and training meet industry standards and that no specific procedure improvements were identified.

For SAMAs 55, 46, and 165 (alternative approaches for reducing the likelihood of RCP seal LOCAs), the NRC staff noted that, although these SAMA candidates have different scopes, the same cost and benefit values were used for all three. SAMA 55 would eliminate seal LOCAs for all initiators, whereas SAMAs 56 and 165 would eliminate seal LOCAs for all initiators except SBO. In response to an RAI, FENOC stated that the cost value for the least costly alternative was compared with the maximum benefit achievable from any of the three alternatives (FENOC 2008a). The NRC staff concluded that the licensee's approach was conservative and bounding for the purpose of the SAMA evaluation.

The NRC staff raised additional questions regarding the estimated cost of the SAMA candidates, especially those that could have benefited both units (NRC 2008a). In response, FENOC provided a detailed account of the assumptions behind the analysis performed for the SAMA cost evaluation, which was done by an expert licensee team. FENOC confirmed that the cost of SAMA candidates that affect both units has been apportioned appropriately to each unit. FENOC also confirmed that for some cases, where the minimum cost associated with the procedure changes exceeded the SAMA benefits, detailed cost evaluations were not performed, and the SAMA candidates were screened out.

The NRC staff reviewed the bases for the licensee's cost estimates (presented in Section 4.21.3 of the ER and Section 7.2 of Attachments C-1 and C-2 to the ER). The NRC staff questioned the cost estimates for some SAMA candidates and requested that the licensee provide attributes considered by the expert panel in arriving at those cost estimates. Specifically, the costs for SAMAs 112 (addition of redundant and diverse limit switches to each containment isolation valve) and 113 (increased leak testing of valves in ISLOCA paths) appeared high. In response to an RAI, FENOC provided additional detail for these estimates, which showed that the cost for SAMA 112 was based on a conceptual design involving installation of additional safety-related valve limit switches, cables, conduit, supports, and repairs to breached fire barriers, as well as associated drawing changes, design analyses, procedure changes, and training. For SAMA 113, FENOC indicated that the cost was based on an assumption that additional testing would be performed midcycle, since the current testing is required to be performed at least once each refueling outage. Therefore, increasing the frequency of testing would involve power replacement cost, because of the midcycle shutdown, at a rate of $800,000 per day (FENOC 2008a). The NRC staff reviewed the costs and found them to be reasonable and generally consistent with estimates provided in support of other plants' analyses.

The NRC staff concludes that the cost estimates provided by FENOC are sufficient and appropriate for use in the SAMA evaluation.

G.6 <u>Cost-Benefit Comparison</u>

The following sections describe the FENOC cost-benefit analysis and the NRC staff's review.

G.6.1 FENOC Evaluation

The methodology used by FENOC was based primarily on the NRC's guidance for performing cost-benefit analysis in NUREG/BR-0184 (NRC 1997a). The guidance involves determining the net value for each SAMA according to the following formula:

Net Value = (APE + AOC + AOE + AOSC) - COE,
where
APE = present value of averted public exposure ($)
AOC = present value of averted offsite property damage costs ($)
AOE = present value of averted occupational exposure costs ($)
AOSC = present value of averted onsite costs ($)
COE = cost of enhancement ($)

If the net value of a SAMA is negative, the cost of implementing the SAMA is larger than the benefit associated with the SAMA, and it is not considered cost beneficial. The FENOC derivation of each of the associated costs is summarized below.

The NRC has recently revised NUREG/BR-0058, "Regulatory Analysis Guidelines of the U.S. Nuclear Regulatory Commission," to reflect the agency's policy on discount rates (NRC 2004). Revision 4 of NUREG/BR-0058 states that two sets of estimates should be developed, one at 3 percent and one at 7 percent. FENOC performed the SAMA analysis using 7 percent and provided a sensitivity analysis using the 3-percent discount rate (FENOC 2007).

Averted Public Exposure Costs

The averted public exposure (APE) costs were calculated using the following formula:

APE = Annual reduction in public exposure (Δperson-rem per year)
x monetary equivalent of unit dose ($2000 per person-rem)
x present value conversion factor (1.076 based on a 20-year period with a 7-percent discount rate)

As stated in NUREG/BR-0184 (NRC 1997a), it is important to note that the monetary value of the public health risk after discounting does not represent the expected reduction in public health risk resulting from a single accident. Rather, it is the present value of a stream of potential losses extending over the remaining lifetime (in this case, the renewal period) of the facility. Thus, it reflects the expected annual loss resulting from a single accident, the possibility that such an accident could occur at any time over the renewal period, and the effect of discounting these potential future losses to present value. For the purposes of initial screening, which assumes elimination of all severe accidents, FENOC calculated an APE of approximately $1,250,000 for Unit 1 and $1,200,000 for Unit 2 for the 20-year license renewal period.

Averted Offsite Property Damage Costs

The averted offsite property damage costs (AOCs) were calculated using the following formula:

AOC = Annual CDF reduction
x offsite economic costs associated with a severe accident (on a per-event basis)
x present value conversion factor

For the purposes of initial screening, which assumes that all severe accidents are eliminated, FENOC calculated an annual offsite economic risk of about $324,000 for Unit 1 and $316,000 for Unit 2 based on the Level 3 risk analysis. This results in a discounted value of approximately $3,480,000 for Unit 1 and $3,400,000 for Unit 2 for the 20-year license renewal period.

Averted Occupational Exposure Costs

The averted occupational exposure (AOE) costs were calculated using the following formula:

AOE = Annual CDF reduction
x occupational exposure per core damage event
x monetary equivalent of unit dose
x present value conversion factor

FENOC derived the values for averted occupational exposure from information in Section 5.7.3 of the regulatory analysis handbook (NRC 1997a). Best estimate values provided for immediate occupational dose (3300 person-rem) and long-term occupational dose (20,000 person-rem over a 10-year cleanup period) were used. The present value of these doses was calculated using the equations provided in the handbook in conjunction with a monetary equivalent of unit dose of $2000 per person-rem, a real discount rate of 7 percent, and a time period of 20 years to represent the license renewal period. For the purposes of initial screening, which assumes that all severe accidents are eliminated, FENOC calculated an AOE of approximately $7400 for Unit 1 and $9100 for Unit 2 for the 20-year license renewal period.

Averted Onsite Costs

Averted onsite costs (AOSC) include averted cleanup and decontamination costs and averted power replacement costs. Repair and refurbishment costs are considered for recoverable accidents only and not for severe accidents. FENOC derived the values for AOSC based on Section 5.7.6 of NUREG/BR-0184 (NRC 1997a).

FENOC divided this cost element into two parts, the onsite cleanup and decontamination cost, also commonly referred to as averted cleanup and decontamination costs, and the replacement power cost.

Averted cleanup and decontamination costs (ACC) were calculated using the following formula:

ACC = Annual CDF reduction
x present value of cleanup costs per core damage event
x present value conversion factor

The total cost of cleanup and decontamination subsequent to a severe accident is estimated in NUREG/BR-0184 to be $\$1.5\times10^9$ (undiscounted). This value was converted to present costs over a 10-year cleanup period and integrated over the term of the proposed license extension. For the purposes of initial screening, which assumes all severe accidents are eliminated, FENOC calculated an ACC of approximately $226,000 for unit 1 and $279,000 for unit 2 for the 20-year license renewal period.

Long-term replacement power costs (RPC) were calculated using the following formula:

RPC = Annual CDF reduction
x present value of replacement power for a single event
x factor to account for remaining service years for which replacement power is required
x reactor power scaling factor

FENOC based its calculations on the rated power levels of 984 megawatt electric (MWe) for Unit 1 and 977 MWe for Unit 2. Therefore, FENOC applied a power scaling factor of 984/910 for Unit 1 and 977/910 for Unit 2 to determine the replacement power costs. For the purposes of initial screening, which assumes that all severe accidents are eliminated, FENOC calculated an RPC of approximately $166,000 for Unit 1 and $204,000 for Unit 2 for the 20-year license renewal period.

Using the above equations, FENOC estimated the total present dollar value equivalent associated with completely eliminating severe accidents at BVPS to be about $5.1 million for each unit and represents the dollar value associated with completely eliminating all internal and external event severe accident risk at each unit. This value is also referred to as the maximum averted cost risk. As the BVPS PSAs include both internal and external events, no multiplier to account for additional SAMA benefits in external events is required.

FENOC Results

If the implementation costs for a candidate SAMA exceeded the calculated benefit, the SAMA was considered not to be cost beneficial. In the baseline analysis contained in the ER (using a 7-percent discount rate), FENOC identified five potentially cost-beneficial SAMAs for Unit 1 and two for Unit 2. Based on an analysis using a 3-percent real discount rate, as recommended in NUREG/BR-0058 (NRC 2004), no additional SAMA candidates were determined to be potentially cost beneficial (FENOC 2007).

FENOC performed additional analyses to evaluate the impact of parameter choices and uncertainties on the results of the SAMA assessment (FENOC 2007). FENOC considered the impact of analysis uncertainties on the results of the SAMA analysis by increasing the benefits by the ratio of the 95th percentile CDF to the mean CDF based on the PSA for each unit. As a result of that analysis, FENOC determined that one additional Phase II SAMA candidate, SAMA 78, is potentially cost beneficial for Unit 2.

The potentially cost-beneficial SAMAs are the following:

Unit 1

- SAMA 164—Modify the emergency procedures to direct the operators to close the RCS loop stop valves to isolate a steam generator that has had a tube failure and obtain a gagging device that could be used to close a stuck-open steam generator safety valve on the ruptured steam generator before core damage occurs.

- SAMA 167—Increase the seismic ruggedness of the 125–V dc battery room masonry block walls to reduce the failure of these walls following seismic events and prevent damage to the four emergency batteries located in the room.

- SAMA 168—Install a fire barrier or fire curtain between the four emergency switchgear fans located in the cable spreading room. This would reduce propagation of a fire from one fan to another.

- SAMA 187—Increase the seismic ruggedness of the ERF substation batteries to increase reliability of the ERF substation diesel following seismic events. This applies to the battery rack only and not to the entire structure.

- SAMA 189—Provide diesel-backed power for the fuel pool purification pumps and valves used for makeup to the refueling water storage tank (RWST) to increase availability of the RWST during loss of offsite power and SBO events.

Unit 2

- SAMA 3—Provide a portable generator to supply power to the steam generator level instrumentation. This would improve the capability of the Unit 2 turbine-driven AFW pump in SBO sequences and make its performance more comparable to that of the DAFW pump in Unit 1.

- SAMA 78—Modify the startup feedwater pump so that it can be used as a backup to the emergency feedwater system, including during an SBO scenario, to increase the reliability of decay heat removal. This would provide a system similar to the DAFW pump in Unit 1, which is powered from the ERF diesel generator.

- SAMA 164—Modify the emergency procedures to direct the operators to close the RCS loop stop valves to isolate a steam generator that has had a tube failure and obtain a gagging device that could be used to close a stuck-open steam generator safety valve on the ruptured steam generator before core damage occurs.

Section G.6.2 discusses in more detail the potentially cost-beneficial SAMAs and FENOC plans for further evaluation of these SAMAs.

G.6.2 Review of the FENOC Cost-Benefit Evaluation

FENOC based its cost-benefit analysis primarily on NUREG/BR-0184 (NRC 1997a) and implemented the analysis consistent with this guidance.

The current BVPS PSAs are integrated models that include both internal and external events. The integrated PSA models have been used to identify the most significant accident sequences from both internal and external event initiators, to identify potential means of reducing the risk posed by those sequences, and to quantify the associated benefit of the potential enhancement.

FENOC considered the impact that possible increases in benefits from analysis uncertainties would have on the results of the SAMA assessment. In the ER, FENOC presents the results of an uncertainty analysis of the total CDF, which indicates that the ratio of the 95th percentile CDF to the mean CDF is approximately 2.04 for Unit 1 and 1.62 for Unit 2. FENOC reexamined the Phase II SAMAs to determine if any additional SAMAs would become cost-beneficial if the benefits (and maximum averted cost-risk) were increased by a factor of 2.04 for Unit 1 and 1.62 for Unit 2. This analysis identified one additional SAMA, the Unit 2 SAMA 78, which involves modifying the startup feedwater pump for use as a backup to the emergency feedwater system.

FENOC performed additional sensitivity analyses, including use of a 3-percent discount rate, use of a longer plant life, and use of different evacuation assumptions. These analyses identified no additional SAMAs.

The NRC staff notes that the intent of Unit 2 SAMAs 3 and 78 is largely met in Unit 1 by the DAFW pump (powered from the ERF diesel generator) and the dual battery chargers (fed from different buses) currently installed in Unit 1. Accordingly, these SAMAs were not found to be cost beneficial in Unit 1.

FENOC states in Section 4.21.6 of the ER that it plans to implement Unit 1 SAMA 189 through the use of a portable pump that can provide makeup to the RWST. In addition, FENOC states that it will enter the other potentially cost-beneficial improvements, including Unit 2 SAMA 78, into the Beaver Valley Long-Range Plan development process for further consideration.

The NRC staff noted that for certain SAMAs considered in the ER, there may be alternatives that could achieve much of the risk reduction at a lower cost. The NRC staff asked the licensee to evaluate several lower cost alternatives to the SAMAs considered in the ER. The specific SAMA candidates in question are discussed below:

- SAMAs 183 and 184 (Unit 1) involve rerouting river water or auxiliary river water pump power and control cables. A lower cost SAMA could involve a partial rerouting of one train of power cables and modifying the fire procedure(s) to manually control the river water or the auxiliary river water pump, or using rated fire blankets/barriers rather than rerouting cables.

- SAMAs 179, improvements for fires that impact control room, and 180, improvements for fires that impact the Unit 2 cable tunnel, also involve rerouting power and control cables of service water pumps. A lower cost SAMA could involve a partial rerouting or protecting one train of service water combined with procedures to allow manual local actions.

- SAMA 54 (Unit 1) and SAMAs 55, 56, and 165 (both units) focus on reducing the likelihood of RCP seal LOCAs. However, there could be other lower cost SAMAs such as adding a dedicated self-contained diesel-driven pump for seal cooling or cross-connecting the chemical and volume control system from the opposite unit for RCP seal injection.

The NRC staff requested additional information regarding these lower cost alternatives. The licensee discussed the cost associated with these alternatives and concluded that, because of specific plant design features and layout, the cost of these lower cost alternatives would far exceed the benefit associated with the noted SAMA candidates. The NRC staff examined the licensee's response and concluded that the licensee's final selection of the SAMA candidates is reasonable.

The NRC staff concludes that, with the exception of the potentially cost-beneficial SAMAs discussed above, the costs of the SAMAs evaluated would be higher than the associated benefits.

G.7 Conclusions

FENOC compiled a list of 189 Unit 1 and 190 Unit 2 SAMAs based on a review of the most significant basic events from the current plant-specific PSA, insights from the plant-specific IPE and IPEEE, and review of other industry documentation. An initial screening removed SAMA candidates that (1) were determined not to be applicable to the BVPS design, (2) were already implemented or their intent had been met, (3) were similar and could be combined with another SAMA candidate, or (4) had estimated costs that would exceed the maximum dollar benefit. This screening eliminated 126 Unit 1 and 134 Unit 2 SAMAs, which left 63 Unit 1 and 56 Unit 2 candidate SAMAs for evaluation.

For the remaining SAMA candidates, FENOC performed more detailed evaluation as shown in Tables G-5a and G-5b. The cost-benefit analyses in the ER showed that five Unit 1 and two Unit 2 SAMA candidates were potentially cost beneficial in the baseline analysis. FENOC performed additional analyses to evaluate the impact of parameter choices and uncertainties on the results of the SAMA assessment. As a result, it identified one additional SAMA (Unit 2 SAMA 78) as potentially cost beneficial. FENOC has indicated that it will consider all eight potentially cost-beneficial SAMAs (Unit 1 SAMAs 164, 167, 168, 187, and 189 and Unit 2 SAMAs 3, 78, and 164) for implementation at BVPS.

The NRC staff reviewed the FENOC analysis and concludes that the methods used and the implementation of those methods were sound. The treatment of SAMA benefits and costs support the general conclusion that the SAMA evaluations performed by FENOC are reasonable and sufficient for the license renewal submittal.

The NRC staff concurs with the FENOC identification of areas in which risk can be further reduced in a cost-beneficial manner through the implementation of the SAMAs identified as potentially cost beneficial. Given the potential for cost-beneficial risk reduction, the NRC staff agrees that FENOC should further evaluate these SAMAs. However, these SAMAs do not relate to adequate management of the effects of aging during the period of extended operation. Therefore, they need not be implemented as part of license renewal pursuant to Title 10, Part 54, "Requirements for Renewal of Operating Licenses for Nuclear Power Plants," of the *Code of Federal Regulations*.

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11. ABSTRACT *(200 words or less)*

This supplemental environmental impact statement (SEIS) has been prepared in response to an application submitted by FisrtEnergy Nuclear Operating Company (FENOC) to the Nuclear Regulatory Commission (NRC) to renew the operating license for the Beaver Valley Power Station, Units 1 and 2, for an additional 20 years under 10 CFR part 54. The SEIS includes the NRC staff's analysis that considers and weighs the environmental impacts of the proposed action, the environmental impacts of alternatives to the proposed action, and mitigation measures available for reducing or avoiding adverse impacts. It also includes staff's recommendation regarding the proposed action.

The NRC staff's preliminary recommendation is that the Commission determine that the adverse environmental impacts of license renewal for BVPS are not so great that preserving the option of license renewal for energy-planning decision makers would be unreasonable. The recommendation is based on (1) the analysis and findings in the GEIS; (2) the Environmental Report and supplemental information submitted by FENOC; (3) consultation with Federal, State, and local agencies; (4) the staff's own independent review; and (5) the staff's consideration of public comments.

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