

Appendix A

Comments Received on the Environmental Review

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Comments Received on the Environmental Review

Part I – Comments Received During Scoping

On November 2, 2006, the U.S. Nuclear Regulatory Commission (NRC) published a Notice of Intent in the *Federal Register* (Volume 71, page 64566) to notify the public of the NRC staff's intent to prepare a plant-specific supplement to the *Generic Environmental Impact Statement for License Renewal of Nuclear Plants* (GEIS), NUREG-1437, Volumes 1 and 2, to support the renewal application for the Susquehanna Steam Electric Station, Units 1 and 2 (SSES) operating licenses and to conduct scoping. The plant-specific supplement to the GEIS has been prepared in accordance with the National Environmental Policy Act (NEPA) of 1969; Council on Environmental Quality (CEQ) guidance, and Title 10, Part 51, 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 by submitting written suggestions and comments no later than January 2, 2007.

The scoping process included two public scoping meetings that were held at the Eagles Building in Berwick, Pennsylvania, on November 15, 2006. Approximately 28 members of the public attended the meetings. Both sessions began with NRC staff members providing a brief overview of the license renewal process and the NEPA process. After the NRC's prepared statements, the meetings were open for public comments. Two attendees provided oral statements that were recorded and transcribed by a certified court reporter and written statements that were appended to the transcript. The afternoon and evening meeting transcripts are available from NRC's Agencywide Documents Access Management System (ADAMS) under accession numbers ML063330279 and ML063330281, respectively.

At the conclusion of the scoping period, the NRC staff and its contractors reviewed the transcripts and all written material to identify specific comments and issues. Each set of comments from a given commenter was given a unique identifier (Commenter ID), so that each set of comments from a commenter could be traced back to the transcript or letter by which the comments were submitted. Specific comments were numbered sequentially within each comment set. All of the comments received and the NRC staff responses are included in the SSES Scoping Summary Report dated April 16, 2007.

Appendix A

1 Table A-1 identifies the individuals who provided comments applicable to the environmental
2 review and the Commenter ID associated with each person's set(s) of comments. The
3 individuals are listed in the order in which they spoke at the public meeting, and in alphabetical
4 order for the comments received by letter or e-mail. To maintain consistency with the Scoping
5 Summary Report, the unique identifier used in that report for each set of comments is retained
6 in this appendix.

7
8 Specific comments were categorized and consolidated by topic. Comments with similar specific
9 objectives were combined to capture the common essential issues raised by the commenters.
10 The comments fall into one of the following general groups:

- 11
12 • Specific comments that address environmental issues within the purview of the NRC
13 environmental regulations related to license renewal. These comments address
14 Category 1 or Category 2 issues or issues that were not addressed in the GEIS. They
15 also address alternatives and related Federal actions.
- 16
17 • General comments (1) in support of or opposed to nuclear power or license renewal or
18 (2) on the renewal process, the NRC's regulations, and the regulatory process. These
19 comments may or may not be specifically related to the SSES license renewal
20 application.
- 21
22 • Questions that do not provide new information.
- 23
24 • Specific comments that address issues that do not fall within or are specifically excluded
25 from the purview of NRC environmental regulations related to license renewal. These
26 comments typically address issues such as the need for power, emergency
27 preparedness, security, current operational safety issues, and safety issues related to
28 operation during the renewal period.

29
30 Comments applicable to this environmental review and the NRC staff's responses are
31 summarized in this appendix. The parenthetical alphanumeric designator in parentheses after
32 each comment is the Comment ID (from Table A-1). More than one comment number after a
33 comment indicates that the same comment was made both orally and in a document submitted
34 at the meeting. This information, which was extracted from the SSES Scoping Summary
35 Report, is provided for the convenience of those interested in the scoping comments applicable
36 to this environmental review. The comments that are general or outside the scope of the
37 environmental review for SSES are not included in this section. More detail regarding the
38 disposition of general or inapplicable comments can be found in the Scoping Summary Report.
39 The ADAMS accession number for the Scoping Summary Report is ML070740684.

40
41

Table A-1. Individuals Providing Comments During Scoping Comment Period

Commenter ID^(a)	Issue Category	Comment Source^(b)
Sue Fracke, Sugarloaf, PA (Commenter 1)		
MC-1-1, D-1-1	A.2. General Radiological Health Effects	Evening Scoping Meeting
MC-1-2, D-1-2	A.4. Alternatives	Evening Scoping Meeting
MC-1-4, D-1-4	A.5. High-Level Radioactive Waste	Evening Scoping Meeting
Eric Epstein, TMI-Alert (Commenter 2)		
MC-2-1	A.4. Alternatives	Evening Scoping Meeting
MC-2-3	A.1. License Renewal Process	Evening Scoping Meeting
MC-2-9	A.3. Surface-Water Quality, Hydrology, and Use	Evening Scoping Meeting
MC-2-10	A.1. License Renewal Process	Evening Scoping Meeting
D-2-1	A.1. License Renewal Process	Evening Scoping Meeting
D-2-3	A.5. High-Level Radioactive Waste	Evening Scoping Meeting
D-2-8	A.3. Surface-Water Quality, Hydrology, and Use	Evening Scoping Meeting
D-2-10	A.1. License Renewal Process	Evening Scoping Meeting

(a) The Comment ID is defined as illustrated: MC-1-1 = Meeting Comment (MC), Commenter 1 (1), Comment 1 (1); D-1-1 = Document (D), Commenter 1 (1), Comment 1 (1).

(b) The ADAMS accession number for the afternoon transcript is ML063330279. The accession number for the evening transcript is ML063330281. The accession number for the attachments to the evening transcript is ML070380454.

This accession number is provided to facilitate access to the document through the Public Electronic Reading Room at <http://www.nrc.gov/reading-rm.html>.

Comments in this section are grouped in the following categories:

- A.1 License Renewal Process
- A.2 General Radiological Health Effects
- A.3 Surface-Water Quality, Hydrology, and Use
- A.4 Alternatives
- A.5 High-Level Radioactive Waste

1 **A.1. Comments Concerning the License Renewal Process**
2

3 **Comment:** And finally, we don't really have a lot of confidence in this process. As an
4 organization we were founded in '77. We have been to the Supreme Court twice. We have
5 litigated before the NRC almost nonstop for 30 years in just about every other venue. And as I
6 told some of the NRC employees before, we have no confidence in the Commission or the
7 adjudicatory process. I think the last three relicensing the first three were licensing contentions
8 that were admitted. So that we will participate and we will be involved to the end. But I'm letting
9 you know from the outset really since the implementation of the reactor oversight process we've
10 seen a precipitous decline in the NRC's relationship with the communities, reactor communities.
11 It's a shame. Because we worked hard at Peach Bottom and TMI. Against Susquehanna not
12 as much. (MC-2-10)
13

14 **Comment:** NRC's industry-driven relicensing process limits public involvement, and disallows
15 debate over factors involving a plant's safety and security record.
16

17 PPL is applying for the license renewal so early due to the rubber-stamp approach by the Bush
18 administration's NRC. PPL wants to secure an extension to preempt public challenges over
19 additional safety problems, which tend to increase as plant's age. (D-2-10)
20

21 **Comment:** I really oppose the license extensions for a couple of reasons. Number one is we
22 think it's premature. There's 17 years left on this license. You know, this is a very strange
23 scenario where a license has that much time and you're going to relicense it before some of the
24 aging and safety issues manifest, which happens in an industrial application. That's reality.
25

26 Just look at Three Mile Island which obviously came on line ten years earlier. We replaced the
27 reactor vessel head there two years ago and we're going to change out the steam generators.
28 So there are industrial applications that are going to age that we're not going to evaluate, and I
29 think that's a shame. I think we should wait until we get closer to the end of its initial life span.
30

31 (Page 22, Lines 9-4) Obviously, and I've raised this before, I think there's age related
32 problems. I would really hope that Susquehanna PPL would think about postponing their
33 relicensing until the plant is closer to the end of its initial useful period. I mean 17 years in my
34 mind makes no sense and it's premature. (MC-2-3)
35

36 **Comment:** Three Mile Island Alert, Inc. (TMIA) announced its decision to oppose PPL's
37 premature request to relicense the Susquehanna Steam Electric Station (SSES) to operate for
38 20 more years.
39

40 TMI-Alert believes PPL's application is premature. "It would be irresponsible for federal
41 regulators to begin a relicensing process 17 years before the original license expires. PPL

1 wants to secure an extension to preempt public challenges over additional safety problems,
2 which tend to increase as plants age." (D-2-1)
3

4 **Response:** *The comments are in regard to license renewal and its processes in general. The*
5 *purpose of the NRC staff's environmental review is to carefully consider the environmental*
6 *consequences of issuing a renewed operating license. Additionally, the NRC has a safety*
7 *review that focuses on managing the aging of structures, systems, and components during the*
8 *renewal term.*

9
10 *The NRC's environmental review process provides many avenues for public participation. As*
11 *part of the scoping process, the NRC staff held two public meetings seeking comments on the*
12 *scope of the Supplemental Environmental Impact Statement (SEIS) on November 15, 2006.*
13 *Additionally, comments regarding the environmental review and preparation of the draft SEIS*
14 *can be sent by e-mail to SusquehannaEIS@nrc.gov; by phone to the Environmental Project*
15 *Manager, Drew Stuyvenberg, at 301-415-4006; or by mail to Chief, Rules and Directives*
16 *Branch, Division of Administrative Services, Office of Administration, Mailstop T-6D59,*
17 *U.S. Nuclear Regulatory Commission, Washington, D.C. 20555-0001. Also, two public*
18 *meetings will be held regarding the draft SEIS where members of the public can submit*
19 *comments on the draft SEIS and the environmental review process.*

20
21 *The Commission has established a process, by rule, for the environmental and safety reviews to*
22 *be conducted to review a license renewal application. Section 54.17(c) of Title 10 of the Code*
23 *of Federal Regulations (10 CFR 54.17(c)) allows licensees to submit license renewal*
24 *applications up to 20 years before the expiration of the current license. Applications for license*
25 *renewal are submitted years in advance for several reasons. If a utility decides to replace a*
26 *nuclear power plant, it could take up to 10 years to design and construct new generating*
27 *capacity to replace that nuclear power plant if license renewal is not granted. In addition,*
28 *decisions to replace or recondition major components can involve significant capital investment.*
29 *As such, these decisions may involve financial planning many years in advance of the extended*
30 *period of operation. The comments provide no new and significant information; therefore, they*
31 *will not be evaluated further.*

32 **A.2. Comments Concerning General Radiological Health Effects**

33
34
35 **Comment:** Every year 20,000 people die of cancer from naturally occurring background
36 radiation. You would think that this fact alone would be enough to say let us not produce
37 anymore radiation as it will kill more people. With all our other means of making energy,
38 especially all the various kinds of solar energy that we now have the technology to do, it makes
39 no sense to me to use a source of energy that is dangerous and will cause more people to die
40 of cancer and other degenerative diseases.
41

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1 In the Federal Register December 15, 1982 Part 2 by the Environmental Protection Agency,
2 40 CFR Part 61 on national emission standards for hazardous air pollutants, radionuclides final
3 rule and notice of reconsideration stated "On December 27, 1979 the EPA listed radionuclides
4 as a hazardous air pollutant. EPA determined that radionuclides are a known cause of cancer
5 and genetic damage and that radionuclides cause or contribute to air pollution that may
6 reasonably be incapacitating and anticipated to result in an increase in mortality or an increase
7 in serious irreversible or incapacitating reversible illness and therefore, constitute a hazardous
8 air pollutant within the meaning of section 112(a)(1). There are three major types of long term
9 health impacts from exposure to radiation. Cancer, hereditary effects and developmental
10 effects on fetus such as mental retardation. In addition, risk distribution from radiation from
11 most of the sources considered for regulation show that fatal cancers occur much more
12 frequently than nonfatal cancers and cancers generally occur more often than genetic or
13 developmental effects." It also states that "numerous studies have demonstrated that radiation
14 is a carcinogen. It has assumed that there is no completely risk-free level of exposure to
15 radiation to cause cancer." Radiation corrodes metals such as in the pipes of nuclear power
16 plants causing holes that constantly emit radiation in our air under the routine operation of the
17 plants. Radiation is cumulative in our bodies and the effects of exposure can sometimes take
18 many years before showing up. And we were worried that Saddam Hussein had weapons of
19 mass destruction.

20
21 Along with radioactive air pollutants, the Environmental Protection Agency reports that in 2002
22 24,379 U.S. non-nuclear facilities released 4.79 billion pounds toxins into the atmosphere. Of
23 these pollutants, 72 million pounds were known carcinogens. We have no concept of the
24 synergistic effects of these toxins when they are mixed with radioactive pollutants. These toxins
25 impinge on health during your entire life, even before birth. A study in New York City shows that
26 the genetic material in fetuses still in their mother's womb is damaged by air pollution.

27
28 From the Radiation and Public Health Project in Norristown, Pennsylvania they have found that
29 current rates of infant deaths, childhood cancer and thyroid cancer all known to be effected by
30 emissions in nuclear reactors are elevated in Luzerne County, the site of the Susquehanna
31 Nuclear Plant.

32
33 These findings and other data on local disease rates should be part of the federal decision on
34 whether the U.S. Nuclear Regulatory Commission should approve the application of PPL
35 Susquehanna LLC to operate the plant until 2044. The current license only allows operations
36 until 2024. This information was presented at a federal hearing today in Berwick on the
37 application.

1 "These high disease rates should shock all Luzerne County residents and they should demand
2 a thorough study of the health risk posed by the Susquehanna plant," said Joseph Mangano,
3 MPH MBA of the Radiation and Public Health Project who presented the data. "If radioactive
4 emissions from the plant have been harmful, people should know this before the government
5 decides whether or not to extend the license."
6

7 The 2000-2004 [2003] county rate of white infants who died in their first month was 23 percent
8 above the U.S. rate based on 55 deaths. In that same period 43 Luzerne children under age 15
9 were diagnosed with cancer, a rate 38 percent above the nation. Data are taken from the
10 National Center for Health Statistics and the Pennsylvania Cancer Registry. (3) (4)
11 Thyroid cancer statistics may be most alarming. In the late 1980s as the two reactors at
12 Susquehanna were starting the Luzerne rate was 20 percent below the United States.
13 However, in 2000 to 2003 the Luzerne rate was a 100 percent above, double the nation.
14 Radioactive iodine found only in nuclear weapons and reactors seeks the thyroid gland where it
15 kills and impairs cells leading to cancer. (5)
16

17 Two large nuclear reactors have operated at Susquehanna beginning in 1982 and 1984
18 respectively. Virtually all of the 312,000 residents of Luzerne County live within 15 miles of the
19 plant and would be most likely to receive the greatest radiation exposures. Like all reactors,
20 Susquehanna routinely emits gases and particles into the air and water which enters human
21 bodies by breathing and the food chain. There are over 100 radioactive chemicals in this mix,
22 each causes cancer and is especially harmful to fetuses, infants and children.
23

24 INFORMATION ON SUSQUEHANNA NUCLEAR PLANT AND LOCAL HEALTH (submitted by
25 commenter, 11/15/06)
26

27 1. Susquehanna reactors 1/2 went critical (began producing radioactivity) on September 10,
28 1982 and May 8, 1984, respectively. Source: U.S. Nuclear Regulatory Commission.
29 www.nrc.gov.
30

31 2. From January 1, 1999 to September 30, 2006, Susquehanna 1 / 2 operated 91.8% and
32 93.0% of the time, an all time high. Source: U.S. Nuclear Regulatory Commission,
33 www.nrc.gov. Reactors operated 62345 and 63193 hours out of a maximum 67919.
34

35 3. From 2000-2003, 55 Luzerne county whites under 28 days old died out of 11601 live births, a
36 rate of 4.74 per 1000. This rate was 23% greater than the U.S. rate of 3.84. Source: National
37 Center for Health Statistics, <http://wonder.cdc.gov>, underlying cause of death.
38

39 4. From 2000-2003, 43 Luzerne county children under age fifteen were diagnosed with cancer.
40 Based on an annual average population of 52,567, the cancer incidence rate was 20.45 per
41 100,000, which was 38% greater than the U.S. average of 14.78. Sources: PA Cancer Registry

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1 (www.state.pa.us) and U.S. Centers for Disease Control (<http://wonder.cdc.gov>, National
2 Association of Cancer Registries – represents 39 states).

3
4 5. From 1985-1988 the Luzerne county thyroid cancer incidence rate was 3.54 per 100,000,
5 based on 86 cases, or 20% below the U.S. rate of 4.40. From 2000-2003, the county rate was
6 16.41, based on 229 cases or 100% above the U.S. rate of 8.20. Sources: PA Cancer registry
7 (www.state.pa.us) and Surveillance Epidemiology and End Results (www.seer.cancer.gov),
8 representing 9 states and cities. (MC-1-1, D-1-1)

9
10 **Response:** *The NRC's primary mission is to protect the public health and safety and the*
11 *environment from the effects of radiation from nuclear reactors, materials, and waste facilities.*
12 *The NRC's regulatory limits for radiological protection are set to protect workers and the public*
13 *from the harmful health effects of radiation on humans and can be found in 10 CFR Part 20,*
14 *"Standards for Protection Against Radiation." The limits are based on the recommendations of*
15 *standards-setting organizations. Radiation standards reflect extensive scientific study by*
16 *national and international organizations (International Commission on Radiological Protection*
17 *[ICRP], National Council on Radiation Protection and Measurements [NCRP], United Nations*
18 *Scientific Committee on the Effects of Atomic Radiation [UNSCEAR], and the National Academy*
19 *of Sciences [NAS]) and are conservative to ensure that the public and workers at nuclear power*
20 *plants are protected.*

21
22 *Health effects from exposure to radiation are dose-dependent. At low doses, radiation can be*
23 *responsible for inducing cancers such as leukemia, breast cancer, and lung cancer. At very*
24 *high doses (several hundred rem or higher) and dose rates, radiation has been known to cause*
25 *prompt (or early, also called "acute") effects, such as vomiting and diarrhea, skin burns,*
26 *cataracts, and even death.*

27
28 *Currently, there are no scientifically conclusive data that unequivocally establish the occurrence*
29 *of cancer following exposure to low doses, below about 0.1 Sv (10 rem). However, radiation*
30 *protection experts conservatively assume that any amount of radiation may pose some risk of*
31 *causing cancer and that the risk is higher for higher radiation exposures. Therefore, a linear,*
32 *no-threshold dose response relationship is used to describe the relationship between radiation*
33 *dose and cancer induction. Simply stated, any increase in dose, no matter how small, results in*
34 *an incremental increase in health risk. The NRC accepts this theory as a conservative model*
35 *for estimating health risks from radiation exposure and recognizes that the model probably*
36 *overestimates those risks. On the basis of this theory, the NRC conservatively establishes*
37 *limits for radioactive effluents and radiation exposures for workers and members of the public,*
38 *as found in 10 CFR Part 20.*

39
40 *The amount of radioactive material released from the Susquehanna Steam Electric Station,*
41 *Units 1 and 2 (SSES) is well measured, well monitored, and known to be very small. The total*

1 whole body dose from both ingested radionuclides due to liquid and gaseous releases and
2 direct radiation from SSES is negligible compared with the public's exposure from natural
3 background radiation, medical irradiation, and radiation from consumer products of more than
4 300 millirem per year. The annual radioactive offsite doses, since operation commenced in
5 1982, from the SSES have always been well below the 10 CFR Part 20 limits. These doses are
6 so low that resulting cancers have not been observed and would not be expected.

7
8 Although a number of studies of cancer incidence in the vicinity of nuclear power facilities have
9 been conducted, there are no studies to date that are accepted by the scientific community that
10 show a correlation between radiation dose from nuclear power facilities and cancer incidence in
11 the general public. Specific studies that have been conducted include:

12
13 In 1990, at the request of Congress, the National Cancer Institute conducted a study of cancer
14 mortality rates around 52 nuclear power plants and 10 other nuclear facilities. The study
15 covered the period from 1950 to 1984 and evaluated the change in mortality rates before and
16 during facility operations. The study concluded that there was no evidence that nuclear facilities
17 may be linked causally with excess deaths from leukemia or from other cancers in populations
18 living nearby.

19
20 In June 2000, investigators from the University of Pittsburgh found no link between radiation
21 released during the 1979 accident at the Three Mile Island power plant and cancer deaths
22 among nearby residents. Their study followed 32,000 people who lived within 5 mi (8 km) of the
23 plant at the time of the accident.

24
25 In January 2001, the Connecticut Academy of Sciences and Engineering issued a report on a
26 study around the Haddam Neck nuclear power plant in Connecticut and concluded that
27 radiation emissions were so low as to be negligible.

28
29 The American Cancer Society in 2001 concluded that although reports about cancer clusters in
30 some communities have raised public concern, studies show that clusters do not occur more
31 often near nuclear plants than they do by chance elsewhere in the population. Likewise, there
32 is no evidence that links strontium-90 with increases in breast cancer, prostate cancer, or
33 childhood cancer rates. Radiation emissions from nuclear power plants are closely controlled
34 and involve negligible levels of exposure for nearby communities.

35
36 Also in 2001, the Florida Bureau of Environmental Epidemiology reviewed claims that there are
37 striking increases in cancer rates in southeastern Florida counties caused by increased
38 radiation exposures from nuclear power plants. However, using the same data to reconstruct
39 the calculations on which the claims were based, Florida officials were not able to identify
40 unusually high rates of cancers in these counties compared with the rest of the State of Florida
41 and the nation.

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1 *In 2000, the Illinois Public Health Department compared childhood cancer statistics for counties*
2 *with nuclear power plants to similar counties without nuclear plants and found no statistically*
3 *significant difference.*
4

5 *Radiation exposure to the public during the license renewal term is a Category 1 issue that was*
6 *evaluated in the Generic Environmental Impact Statement for License Renewal of Nuclear*
7 *Plants, NUREG-1437 (GEIS). As part of its search for new and significant information, the NRC*
8 *staff will review recent results from the licensee's effluent and environmental radiological*
9 *monitoring programs and perform a comprehensive evaluation. These programs and the*
10 *impacts from SSES radiological effluents will be discussed in Chapters 2 and 4 of the*
11 *Supplemental Environmental Impact Statement (SEIS). The staff also will consider planned*
12 *changes in the status of SSES, including the planned power uprate, in the preparation of the*
13 *SEIS. The comments provide no new and significant information; therefore, they will not be*
14 *evaluated further.*
15

16 **A.3. Comments Concerning Surface-Water Quality, Hydrology,**
17 **and Use**
18

19 **Comment:** Water supplies. I did talk to a gentleman from PPL. In the interest of open
20 disclosure, we met with the Susquehanna River Basis Commission in Pennsylvania and
21 especially the DEP is going through a statewide exercise in water use management. So a lot of
22 what we do tonight may be moot in terms of FERC and also the Susquehanna River Basin
23 Commission may rule. Again, in terms of open disclosure I've already stated to the Basin
24 Commission we're going to oppose the license extension until in our view you view water as a
25 commodity. It doesn't just evaporate. It comes from somewhere.
26

27 Everyday about 30 million gallons are taken from the river and not returned. That's even during
28 a drought. That's not being a good neighbor. You know, when we're being asked to conserve
29 water and the plant keeps churning the water, there has to be a balance. We're not saying you
30 can't use the water, but you have to moderate your use and pay your fair share. So I think
31 that's an issue that may not even be relevant to this particular venue, but an issue we will raise.
32 (MC-2-9)
33

34 **Comment:** The magnitude of the amount of water used at a nuclear power plant is readily
35 evidenced at the SSES every day. The Susquehanna Steam Electric Station loses 14.93 million
36 gallons of water per unit daily as vapor out of the cooling tower stack. Eleven million gallons per
37 day are returned to the river as cooling-tower basin blow down. On average, 29.86 million
38 gallons per day are taken from the river and not returned; even during periods of drought!
39 (PPL, Pennsylvania Environmental Permit Report) (D-2-8)
40

1 **Response:** *The consumptive use of water by SSES is regulated through the Susquehanna*
2 *River Basin Commission (SRBC), which manages water usage along the entire length of the*
3 *river. The current permit granted to SSES is for consumptive usage of up to 40 million gal/day*
4 *(151 million L/d) (Permit # 19950301 EPUL-0578). SSES has submitted an application to*
5 *the SRBC to increase the amount of consumptive water usage to 44 million gal/day*
6 *(167 million L/d). The SRBC is reviewing the application and will make a decision independent*
7 *of the NRC with regard to the modification of the current SSES permit to reflect the increased*
8 *consumptive water usage. SSES is required to adhere to the water usage limits set by the*
9 *permit and to any mitigative measures set by the SRBC for continued operation of the facility.*

11 **A.4. Comments Concerning Alternatives**

12
13 **Comment:** California closed down the Diablo County Nuclear Plant many years ago. Through
14 conservation solar and other forms of energy they created over 800 new jobs and lowered their
15 rates. Nuclear power is only 19 percent of our energy in the United States. Through
16 conservation and solar we could close down all the nuclear power plants in our country and
17 save thousands of lives. I know those little candlelights look cute at night in your windows. But
18 they aren't really necessary. Turning them off may help save someone's life, maybe your
19 child's.

20
21 Anyway who wants nuclear power plants, and our President wants 55 more in this country,
22 should be considered a terrorist. (MC-1-2, D-1-2)

23
24 **Response:** *Decisions regarding energy policy and energy planning, including whether to*
25 *implement energy options like solar power, conservation, or even nuclear power, are also made*
26 *by the utility and State and Federal (non-NRC) decisionmakers. These decisions are based on*
27 *economics, energy reliability goals, and other objectives over which the other entities may have*
28 *jurisdiction. The NRC does not have the authority to make these decisions. During license*
29 *renewal, the NRC does, however, conduct an environmental review that compares the potential*
30 *environmental impacts of a nuclear plant during the period of extended operation with the*
31 *environmental impacts of energy alternatives as part of the National Environmental Policy Act*
32 *(NEPA) process. The alternatives analysis may include consideration of conservation or solar*
33 *power when reasonable, often in combination with other alternatives. In addition to an*
34 *environmental review, NRC staff also evaluates nuclear plant safety and aging management in*
35 *the course of license renewal. If the NRC decides to renew a plant's license, the decision of*
36 *whether to operate the nuclear power plant or an alternative is left up to the appropriate State,*
37 *utility, and/or Federal entities.*

38
39 *The NRC staff notes that Diablo Canyon Units 1 and 2 are currently still in operation, as are*
40 *San Onofre Units 2 and 3. In California, the Santa Susana SRE (Sodium Reactor*

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1 *Experimental), Vallecitos Nuclear Power Plant, Humboldt Bay Nuclear Power Plant, Rancho*
2 *Seco Nuclear Power Plant, and San Onofre Unit 1 are no longer operating.*

3
4 **Comment:** I'm saying that because Pennsylvania is primarily a coal and nuclear state. And I
5 think we made a mistake before when we became so dependent on two sources of energy. So
6 my plea is that we rationally evaluate relicensing and then think how we're going to meet future
7 energy demand as we move forward. (MC-2-1)

8
9 **Response:** *Decisions about energy policy and energy planning, including choosing an energy*
10 *generation mix (sometimes referred to as a generation "portfolio"), fall under the authority of the*
11 *utility and State and Federal (non-NRC) decisionmakers. These entities may also decide which*
12 *energy generation options to implement in order to meet future energy demand. The NRC does*
13 *not have the authority or jurisdiction in energy policy and planning, or in deciding whether to*
14 *implement particular energy generation options. The NRC makes its decision whether or not to*
15 *renew a license based on safety and environmental considerations. The final decision on*
16 *whether or not to continue operating the nuclear plant will be made by the utility and State and*
17 *Federal (non-NRC) decisionmakers.*

18 19 **A.5. Comments Concerning High-Level Radioactive Waste**

20
21 **Comment:** Does everyone realize that our new plants are also becoming high level waste
22 sites? Everyone's life is at stake here. Do what's right. Shut them down. (MC-1-4, D-1-4)

23
24 **Comment:** The Susquehanna nuclear power plant produces approximately 30 metric tons of
25 high-level radioactive waste per year per reactor. The nuclear garbage has no forwarding
26 address. In reality, the SSES is a *de facto* high-level radioactive waste site on the
27 Susquehanna River. There is no solution in sight for disposal of highly radioactive "spent" fuel
28 rods, although the National Academy of Sciences and other technical experts argue that moving
29 all radioactive waste into hardened, dry storage would reduce the risks associated with current
30 high-density cooling ponds at each plant. Susquehanna is one of 21 nuclear power plants
31 where used reactor fuel pools have reached capacity. (D-2-3)

32
33 **Response:** *The comments relate to Category 1 uranium fuel cycle and waste management*
34 *issues. The environmental impacts of the uranium fuel cycle, including the onsite storage and*
35 *disposal of spent nuclear fuel, will be addressed in Chapter 6 of the SEIS.*

Appendix B

Contributors to the Supplement

Appendix B

Contributors to the Supplement

The overall responsibility for the preparation of this supplement was assigned to the U.S. Nuclear Regulatory Commission (NRC), Office of Nuclear Reactor Regulation. The supplement was prepared by members of the Office of Nuclear Reactor Regulation with assistance from other NRC organizations, Argonne National Laboratory, and Information Systems Laboratories, Inc.

Name	Affiliation	Function or Expertise
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Jennifer Davis	Nuclear Reactor Regulation	Backup Project Manager; Cultural Resources
Dennis Beissel	Nuclear Reactor Regulation	Hydrology
Jeffrey Rikhoff	Nuclear Reactor Regulation	Socioeconomics; Land Use; Environmental Justice
Nathan Goodman	Nuclear Reactor Regulation	Terrestrial Ecology; Aquatic Ecology
Evan Keto	Nuclear Reactor Regulation	Terrestrial Ecology
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Dennis Logan	Nuclear Reactor Regulation	Ecology
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Scott Werts	Nuclear Reactor Regulation	Air Quality and Meteorology
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Steve Klementowicz	Nuclear Reactor Regulation	Radiation Protection
Jessie Muir	Nuclear Reactor Regulation	Nonradioactive and Mixed Waste
Robert Palla	Nuclear Reactor Regulation	Severe Accident Mitigation Alternatives

Appendix B

Name	Affiliation	Function or Expertise
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<p>(a) Argonne National Laboratory is operated for the U.S. Department of Energy by UChicago Argonne, LLC.</p>		
<p>(b) Information Systems Laboratories, Inc., is located in Rockville, Maryland.</p>		

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Appendix C

Chronology of NRC Staff Environmental Review Correspondence Related to the PPL Susquehanna, LLC Application for License Renewal of Susquehanna Steam Electric Station, Units 1 and 2

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Appendix C

Chronology of NRC Staff Environmental Review Correspondence Related to the PPL Susquehanna, LLC Application for License Renewal of Susquehanna Steam Electric Station, Units 1 and 2

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This appendix contains a chronological listing of correspondence between the U.S. Nuclear Regulatory Commission (NRC) and PPL Susquehanna, LLC (PPL) and other correspondence related to the NRC staff's environmental review, under Title 10, Part 51, of the *Code of Federal Regulations* (10 CFR Part 51), of PPL's application for renewal of the Susquehanna Steam Electric Station, Units 1 and 2 (SSES) operating licenses. All documents, with the exception of those containing proprietary information, have been placed in the Commission's Public Document Room, at One White Flint North, 11555 Rockville Pike (first floor), Rockville, Maryland, and are available electronically from the Public Electronic Reading Room found on the Internet at the following Web address: <http://www.nrc.gov/reading-rm.html>. From this site, the public can gain access to the NRC's Agencywide Document Access and Management System (ADAMS), which provides text and image files of NRC's public documents in the Publicly Available Records System (PARS) component of ADAMS. The ADAMS accession numbers for each document are included below.

August 2, 2006	Letter from PPL to NRC, "Pre-application Activities Regarding License Application Review Schedule for Susquehanna Steam Electric Station, Units 1 and 2" (ADAMS No. ML062140549).
September 13, 2006	Letter from PPL to NRC forwarding the application for renewal of operating licenses for SSES, Units 1 and 2, requesting an extension of operating licenses for an additional 20 years (ADAMS No. ML062601570).
September 26, 2006	Letter to PPL from NRC, "Receipt and Availability of the License Renewal Application for the Susquehanna Steam Electric Station" (ADAMS No. ML062690158).

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- 1 October 2, 2006 *Federal Register* notice, "PPL Susquehanna, LLC; Notice of Receipt
2 and Availability of Application for Renewal of Susquehanna Steam
3 Electric Station, Units 1 and 2, Facility Operating License
4 Nos. NPF-14 and NPF-22 for an Additional 20-Year Period"
5 (71 FR 58014).
6
- 7 October 24, 2006 Letter from NRC to Mr. Clifford Farides, Executive Director, Mill
8 Memorial Public Library, regarding maintenance of reference material
9 for SSES license renewal at the Mill Memorial Public Library
10 (ADAMS No. ML0629600791).
11
- 12 October 26, 2006 Letter from NRC to PPL, "Determination of Acceptability and
13 Sufficiency for Docketing, Proposed Review Schedule, and
14 Opportunity for a Hearing Regarding the Application from PPL
15 Susquehanna, LLC., for Renewal of the Operating Licenses for the
16 Susquehanna Steam Electric Station, Units 1 and 2
17 (ADAMS No. ML062930293).
18
- 19 October 26, 2006 Letter from NRC to Ms. Alice Zaikoski, Co-Director Berwick Public
20 Library, regarding maintenance of reference material for SSES license
21 renewal at the Berwick Public Library (ADAMS No. ML062960060).
22
- 23 November 1, 2006 Letter to Ms. Susan Zacher, Historic Structures Section Chief, State
24 Historic Preservation Office, inviting participation in scoping process
25 related to NRC's environmental review of the license renewal
26 application for Susquehanna Steam Electric Station, Units 1 and 2
27 (SHPO No. 05-1588-079-A) (ADAMS No. ML062960009).
28
- 29 November 2, 2006 Letter from PPL to NRC, "Susquehanna Steam Electric Station
30 Acceptability and Sufficiency for Docketing – Application for Renewed
31 Operating Licenses Numbers NPF-14 and NPF-22"
32 (ADAMS No. ML063130413).
33
- 34 November 2, 2006 Notice of public meeting to discuss environmental scoping process for
35 the Susquehanna Steam Electric Station, Units 1 and 2, license
36 renewal application review (ADAMS No. ML062990010).
37

1 November 2, 2006 *Federal Register* notice, "Notice of Acceptance for Docketing of the
2 Application, Notice of Opportunity for Hearing and Notice of Intent to
3 Prepare an Environmental Impact Statement and Conduct Scoping
4 Process for Facility Operating License Nos. NPF-14 and NPF-22 for
5 an Additional 20-Year Period" (71 FR 64566).
6

7 November 13, 2006 Letter to Mr. Don Klima, Director, Advisory Council on Historic
8 Preservation, regarding Susquehanna Steam Electric Station, Units 1
9 and 2, license renewal review (ADAMS No. ML062980237).
10

11 November 13, 2006 Letter to Ms. Julie McMonagle, Director, Pennsylvania Environmental
12 Council, Northeast Regional Office, regarding Susquehanna Steam
13 Electric Station, Units 1 and 2 license renewal review
14 (ADAMS No. ML062980195).
15

16 November 14, 2006 Letter to The Honorable Mark Hartle, Chief, Aquatic Resources
17 Section, Pennsylvania Fish and Boat Commission, regarding
18 Susquehanna Steam Electric Station, Units 1 and 2 license renewal
19 review (ADAMS No. ML062990018).
20

21 November 14, 2006 Letter to Mr. Clint Halftown, Heron Clan Representative, inviting
22 participation in scoping process related to NRC's environmental
23 review of the license renewal application for Susquehanna Steam
24 Electric Station, Units 1 and 2 (ADAMS No. ML063030091).
25

26 November 14, 2006 Letter to Mr. Raymond Cline, Chairman, Delaware Trust Board,
27 inviting participation in scoping process related to NRC's
28 environmental review of the license renewal application for
29 Susquehanna Steam Electric Station, Units 1 and 2
30 (ADAMS No. ML063030370).
31

32 November 14, 2006 Letter to Mr. Gerald Danforth, Chairman, Oneida Nation of Wisconsin,
33 inviting participation in scoping process related to NRC's
34 environmental review of the license renewal application for
35 Susquehanna Steam Electric Station, Units 1 and 2
36 (ADAMS No. ML063050363).
37

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- 1 November 14, 2006 Letter to The Honorable Charles D. Enyart, Chief, East Shawnee
2 Tribe of Oklahoma, inviting participation in scoping process related to
3 NRC's environmental review of the license renewal application for
4 Susquehanna Steam Electric Station, Units 1 and 2
5 (ADAMS No. ML063050355).
6
- 7 November 14, 2006 Letter to The Honorable Raymond Halbritter, Nation Representative,
8 Oneida Indian Nation, inviting participation in scoping process related
9 to NRC's environmental review of the license renewal application for
10 Susquehanna Steam Electric Station, Units 1 and 2
11 (ADAMS No. ML063030437).
12
- 13 November 14, 2006 Letter to The Honorable Leo R. Henry, Clerk, Chief, Tuscarora Nation,
14 inviting participation in scoping process related to NRC's
15 environmental review of the license renewal application for
16 Susquehanna Steam Electric Station, Units 1 and 2
17 (ADAMS No. ML063040107).
18
- 19 November 14, 2006 Letter to Ms. Rebecca Hawkins, Tribal Historic Preservation Officer,
20 Shawnee Tribe, inviting participation in scoping process related to
21 NRC's environmental review of the license renewal application for
22 Susquehanna Steam Electric Station, Units 1 and 2
23 (ADAMS No. ML063050595).
24
- 25 November 14, 2006 Letter to Mr. Tony Gonyea, Faithkeeper, Onondaga Nation, inviting
26 participation in scoping process related to NRC's environmental
27 review of the license renewal application for Susquehanna Steam
28 Electric Station, Units 1 and 2 (ADAMS No. ML063050590).
29
- 30 November 14, 2006 Letter to Mr. Barry Snyder, Sr., President, Seneca Nation of Indians,
31 inviting participation in scoping process related to NRC's
32 environmental review of the license renewal application for
33 Susquehanna Steam Electric Station, Units 1 and 2
34 (ADAMS No. ML063040153).
35
- 36 November 14, 2006 Letter to Ms. Karen Kaniatobe, Tribal Historic Preservation Officer,
37 Absentee-Shawnee Tribe of Oklahoma, inviting participation in
38 scoping process related to NRC's environmental review of the license
39 renewal application for Susquehanna Steam Electric Station, Units 1
40 and 2 (ADAMS No. ML063050370).
41

1 November 14, 2006 Letter to The Honorable James Ransom, Chief, St. Regis Band of
2 Mohawk Indians, inviting participation in scoping process related to
3 NRC's environmental review of the license renewal application for
4 Susquehanna Steam Electric Station, Units 1 and 2
5 (ADAMS No. ML063040006).
6

7 November 14, 2006 Letter to The Honorable Paul Spicer, Chief, Seneca-Cayuga Tribe of
8 Oklahoma, inviting participation in scoping process related to NRC's
9 environmental review of the license renewal application for
10 Susquehanna Steam Electric Station, Units 1 and 2
11 (ADAMS No. ML063040032).
12

13 November 14, 2006 Letter to The Honorable Irving Powless, Jr., Chief, Onondaga Indian
14 Nation, inviting participation in scoping process related to NRC's
15 environmental review of the license renewal application for
16 Susquehanna Steam Electric Station, Units 1 and 2
17 (ADAMS No. ML063040171).
18

19 November 14, 2006 Letter to Mr. Robert Chicks, Tribal Chairman, Stockbridge-Munsee
20 Band of the Mohican Nation of Wisconsin, inviting participation in
21 scoping process related to NRC's environmental review of the license
22 renewal application for Susquehanna Steam Electric Station, Units 1
23 and 2 (ADAMS No. ML063050608).
24

25 November 15, 2006 Letter to The Honorable Roger Hill, Chief, Tonawanda Band of
26 Seneca, inviting participation in scoping process related to NRC's
27 environmental review of the license renewal application for
28 Susquehanna Steam Electric Station, Units 1 and 2
29 (ADAMS No. ML063040075).
30

31 November 15, 2006 Letter to Ms. Tamara Francis, National American Graves Protection
32 and Repatriation Act, Director, Delaware Nation of Western
33 Oklahoma, inviting participation in scoping process related to NRC's
34 environmental review of the license renewal application for
35 Susquehanna Steam Electric Station, Units 1 and 2
36 (ADAMS No. ML063030206).
37

Appendix C

- 1 November 15, 2006 Letter to Jennifer Kagel, Fishery Biologist, U.S. Fish and Wildlife
2 Service (FWS), inviting participation in scoping process related to
3 NRC's environmental review of the license renewal application for
4 Susquehanna Steam Electric Station, Units 1 and 2
5 (ADAMS No. ML062990053).
6
- 7 November 17, 2006 Letter to Ms. Chris Firestone, Native Plant Program Manager,
8 Pennsylvania Department of Conservation and Natural Resources,
9 regarding Susquehanna Steam Electric Station, Units 1 and 2 license
10 renewal review (ADAMS No. ML062990170).
11
- 12 November 20, 2006 Letter from Douglas McLearen, Chief, Division of Archaeology and
13 Protection, Pennsylvania Bureau for Historic Preservation, to NRC,
14 "Regarding ER 05-1558-079-C NRC: Susquehanna Steam Electric
15 Station License Renewal Salem Township, Luzerne County: Area of
16 Potential Effect" (ER 05-1558-079-C) (ADAMS No. ML063470607).
17
- 18 November 27, 2006 Letter from Greg Bunker, Environmental Manager, Stockbridge-
19 Munsee Band of Mohican Indians, regarding request for comments
20 concerning the SSES license renewal review
21 (ADAMS No. ML070240192).
22
- 23 December 7, 2006 Letter from Anthony Wonderley, Historian, Oneida Indian Nation,
24 regarding request for comments concerning the SSES license
25 renewal review (ADAMS No. ML070240190).
26
- 27 December 15, 2006 Letter from Pao-Tsin Kuo, NRC, to Britt T. McKinney, PPL,
28 "Correction to the Notice of the Public Comment Period on the
29 Environmental Scope of the Plant-Specific Supplement to the Generic
30 Environmental Impact Statement Regarding License Renewal for
31 Susquehanna, Units 1 and 2" (ADAMS No. ML063100474).
32
- 33 December 20, 2006 Letter from Mark Rubin, NRC Branch Chief, to Rani Franovich, NRC
34 Branch Chief, "Request for Additional Information to Support the
35 Staff's Severe Accident Mitigation Alternative Review for
36 Susquehanna Steam Electric Station, Units 1 and 2"
37 (ADAMS No. ML063600388).
38

1 December 21, 2006 Letter from David Densmore, Field Supervisor, FWS, forwarding a list
2 of protected species which are under evaluation for Susquehanna
3 Steam Electric Station, Units 1 and 2 license renewal
4 (ADAMS No. ML070040431).
5

6 December 29, 2006 Issuance of "Summary of Public Environmental Scoping Meetings
7 Related to the Review of the Susquehanna Steam Electric Station,
8 Units 1 and 2 License Renewal Application"
9 (ADAMS No. ML063470573).
10

11 January 8, 2007 Letter from Rebecca Bowen, Environmental Review Specialist,
12 Pennsylvania Department of Conservation and Natural Resources,
13 forwarding a list of protected species which are under evaluation for
14 Susquehanna Steam Electric Station, Units 1 and 2 license renewal
15 (ADAMS No. ML070190672).
16

17 January 16, 2007 Letter to PPL from NRC, "Request for Additional Information Related
18 to the Staff's Review of Severe Accident Mitigation Alternatives for
19 SSES" (ADAMS No. ML070030463).
20

21 March 1, 2007 Letter from David Densmore, Field Supervisor, FWS, regarding
22 USFWS Project #2007-1111 (ADAMS No. ML070720347).
23

24 March 2, 2007 Letter to PPL from NRC, "Summary of Telephone Conference Call
25 Held on February 12, 2007, Between the U.S. Nuclear Regulatory
26 Commission and PPL Susquehanna, LLC, Concerning Requests for
27 Additional Information Pertaining to the Susquehanna Steam Electric
28 Station, Units 1 and 2" (ADAMS No. ML070580092).
29

30 April 16, 2007 Issuance of "Environmental Scoping Summary Report Associated with
31 the NRC Staff's Review of the Application by PPL Susquehanna, LLC
32 for Renewal of the Operating Licenses for Susquehanna Steam
33 Electric Station, Units 1 and 2" (ADAMS No. ML070740684).
34

35 June 9, 2007 Letter to David Densmore, Field Supervisor, FWS, "Regarding
36 USFWS Project #2007-1111 Regarding Protected Species in the
37 Vicinity of the Susquehanna Steam Electric Station, Units 1 and 2,
38 and Associated Transmission Line Corridor"
39 (ADAMS No. ML071300230).
40

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- 1 June 14, 2007 Letter from PPL to NRC, "Susquehanna Steam Electric Station
2 Application for Renewed Operating Licenses Numbers NPF-14 and
3 NPF-22 Environmental Audit Document Requests Other Reference
4 Information" (ADAMS No. ML071800156).
5
- 6 June 15, 2007 Letter from PPL to NRC, "Susquehanna Steam Electric Station,
7 Application for Renewed Operating Licenses, Responses to
8 Environmental Audit Questions" (ADAMS No. ML071790414).
9
- 10 June 20, 2007 Letter from PPL to NRC, "Susquehanna, Units 1 and 2 – Application
11 for Renewed Operating Licenses Number NPF-14 and NPF-22,
12 Environmental Audit Document Requests Supplemental Information
13 PLA-6219" (ADAMS No. ML071800072).
14
- 15 July 13, 2007 Letter to PPL from NRC, "Request for Additional Information
16 Regarding the Review of the License Renewal Application for
17 Susquehanna Steam Electric Station Units 1 and 2"
18 (ADAMS No. ML071800479).
19
- 20 August 1, 2007 Letter from PPL to NRC, "Susquehanna, Units 1 and 2, Response to
21 Request for Additional Information – License Renewal Application
22 Environmental Site Audit Followup" (ADAMS No. ML072220245).
23
- 24 October 11, 2007 Letter from David Densmore, Field Supervisor, FWS, "Re: USFWS
25 Project #2007-1111" (ADAMS No. ML073110515).
26
- 27 April 4, 2008 Summary of Site Audit Related to the Review of the License Renewal
28 Application for Susquehanna Steam Electric Station (ADAMS No.
29 ML073480447).
30

Appendix D

Organizations Contacted

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Appendix D

Organizations Contacted

During the course of the U.S. Nuclear Regulatory Commission staff's independent review of environmental impacts from operations during the renewal term, the following Federal, State, regional, local, and Native American Tribal agencies were contacted:

Absentee-Shawnee Tribe of Oklahoma, Shawnee, Oklahoma

Advisory Council on Historic Preservation, Washington, D.C.

Borough of Berwick, Berwick, Pennsylvania

Cayuga Nation, Versailles, New York

Chamber of Commerce, Berwick, Pennsylvania

Delaware Nation of Oklahoma, Anadarko, Oklahoma

Delaware Trust Board, Bartlesville, Oklahoma

East Shawnee Tribe of Oklahoma, Seneca, Missouri

Luzerne Township, Pennsylvania

Oneida Indian Nation, Verona, New York

Oneida Nation of Wisconsin, Oneida, Wisconsin

Onondaga Nation, Nedrow, New York

Pennsylvania Department of Conservation and Natural Resources, Harrisburg, Pennsylvania

Pennsylvania Department of Environmental Protection, Harrisburg, Pennsylvania

Pennsylvania Department of Environmental Protection, Northeast Region, Wilkes-Barre, Pennsylvania

Appendix D

- 1 Pennsylvania Department of Environmental Protection, Bureau of Radiation Protection,
2 Harrisburg and Wilkes-Barre, Pennsylvania
- 3
- 4 Pennsylvania Environmental Council, Northeast Regional Office, Luzerne, Pennsylvania
- 5
- 6 Pennsylvania Fish and Boat Commission, Bellefonte, Pennsylvania
- 7
- 8 Pennsylvania Historical and Museum Commission, Harrisburg, Pennsylvania
- 9
- 10 Seneca-Cayuga Tribe of Oklahoma, Miami, Oklahoma
- 11
- 12 Seneca Nation of Indians, Irving, New York
- 13
- 14 Shawnee Tribe, Miami, Oklahoma
- 15
- 16 St. Regis Band of Mohawk Indians, Akwesasne, New York
- 17
- 18 Stockbridge-Munsee Band of the Mohican Nation of Wisconsin, Bowler,
19 Wisconsin
- 20
- 21 Susquehanna River Basin Commission, Harrisburg, Pennsylvania
- 22
- 23 Tonawanda Band of Seneca, Basom, New York
- 24
- 25 Town Supervisor, Berwick, Pennsylvania
- 26
- 27 Tuscarora Nation, Lewistown, New York
- 28
- 29 U.S. Fish and Wildlife Service, State College, Pennsylvania

Appendix E

PPL Susquehanna, LLC Compliance Status and Consultation Correspondence

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Appendix E

PPL Susquehanna, LLC Compliance Status and Consultation Correspondence

Consultation correspondence related to the evaluation of the application for renewal of the operating licenses for Susquehanna Steam Electric Station (SSES) is identified in Table E-1. Copies of the correspondence are included at the end of this appendix.

The licenses, permits, consultations, and other approvals obtained from Federal, State, regional, and local authorities for SSES are listed in Table E-2.

Table E-1. Consultation Correspondence

Source	Recipient	Date of Letter
U.S. Nuclear Regulatory Commission (R. Franovich)	State Historical Preservation Office (S. Zacher)	November 1, 2006
U.S. Nuclear Regulatory Commission (R. Franovich)	Pennsylvania Environmental Council, Northeast Regional Office (J. McMonagle)	November 13, 2006
U.S. Nuclear Regulatory Commission (R. Franovich)	Advisory Council on Historic Preservation (D. Klima)	November 13, 2006
U.S. Nuclear Regulatory Commission (R. Franovich)	Pennsylvania Fish and Boat Commission (M. Hartle)	November 14, 2006
U.S. Nuclear Regulatory Commission (R. Franovich)	Cayuga Nation (C. Halftown)	November 14, 2006 ^(a)
U.S. Nuclear Regulatory Commission (R. Franovich)	U.S. Fish and Wildlife Service (J. Kagel)	November 15, 2006
U.S. Nuclear Regulatory Commission (R. Franovich)	Pennsylvania Department of Conservation and Natural Resources (C. Firestone)	November 17, 2006
State Historical Preservation Office (D. McLearn)	U.S. Nuclear Regulatory Commission (R. Franovich)	November 20, 2006
Stockbridge-Munsee Community (G. Bunker)	U.S. Nuclear Regulatory Commission (R. Franovich)	November 27, 2006

Appendix E

Table E-1. (contd)

Source	Recipient	Date of Letter
Oneida Indian Nation (A. Wonderley)	U.S. Nuclear Regulatory Commission (R. Franovich)	December 7, 2006
U.S. Fish and Wildlife Service (D. Densmore)	U.S. Nuclear Regulatory Commission (R. Franovich)	December 21, 2006
Pennsylvania Department of Conservation and Natural Resources (R. Bowen)	U.S. Nuclear Regulatory Commission (A. Mullins)	January 8, 2007
U.S. Fish and Wildlife Service (D. Densmore)	U.S. Nuclear Regulatory Commission (R. Franovich)	March 1, 2007
U.S. Nuclear Regulatory Commission (R. Franovich)	U.S. Fish and Wildlife Service (D. Densmore)	June 9, 2007
U.S. Fish and Wildlife Service (D. Densmore)	U.S. Nuclear Regulatory Commission (R. Franovich)	October 11, 2007

(a) Similar letters were sent to fifteen other Native American Tribes listed in Appendix C.

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Table E-2. Federal, State, Local, and Regional Licenses, Permits, Consultations, and Other Approvals for Susquehanna Steam Electric Station

Agency	Authority	Description	Number	Issue Date	Expiration Date	Remarks
NRC	10 CFR Part 50	Operating license, Susquehanna Steam Electric Station, Unit 1	NPF-022	07/17/82	07/17/22	Authorizes operation of the SSES Unit 1.
NRC	10 CFR Part 50	Operating license, Susquehanna Steam Electric Station, Unit 2	NPF-014	03/23/84	03/23/24	Authorizes operation of the SSES Unit 2.
NRC	Atomic Energy Act (42 USC 2011 et seq.)	License renewal	NA	NA	NA	Environmental Report submitted in support of license renewal application.
EPA	40 CFR Part 68	Risk Management Program	EPA Facility ID # 1000 0004 9128	06/15/04	06/30/09	Hydrogen Tank Farm.
FWS	Section 7 of the Endangered Species Act (16 USC 1536)	Consultation	NA	NA	NA	Requires a Federal agency to consult with the FWS regarding whether a proposed action will affect endangered or threatened species.
Pennsylvania Historical and Museum Commission	Section 106 of the National Historic Preservation Act	Consultation	NA	NA	NA	The National Historic Preservation Act requires Federal agencies to take into account the effect of any undertaking on any district, site, building, structure, or object that is included in or eligible for inclusion in the <i>National Register of Historic Places</i> .
PDEP	Clean Water Act (33 USC 1251 et seq.); PA Title 25, Chapter 92	NPDES permit	PA-0047325	09/01/05	08/31/10 ^(a)	Industrial wastewater discharges to Susquehanna River.

Table E-2. (contd)

Agency	Authority	Description	Number	Issue Date	Expiration Date	Remarks
PDEP	Pennsylvania Public Laws 834, 204, 851, 1987, etc.	Water Obstruction & Encroachment Permit Joint Permit	PASPGP-2 E40-195	02/15/06	06/30/06	Same as COE permit.
PDEP	Pennsylvania Public Laws 834, 204, 851, 1987, etc.	Water Obstruction & Encroachment Permit Joint Permit	E40-192	08/31/88	12/31/90	Boat Ramp Env. Lab; can perform routine maintenance.
PDEP	Title 25, Chapter 105, Dam Safety and Waterway Management	Water Obstruction & Encroachment Permit Joint Permit	PASPGP-2 E40-609 APS No. 457878	12/19/02	12/19/05	Work in wetlands.
PDEP	Clean Air Act (42 USC 7401 et seq.); PA Title 25, Chapter 127, Construction, Modification, Reactivation and Operation of Sources	Operating permit	40-00027	11/24/03	11/24/08	All air emission sources at SSES.
PDEP	Clean Water Act (33 USC 1251 et seq.); Clean Air Act (42 USC 7401 et seq.); Resource Conservation and Recovery Act (42 USC 6901 et seq.); PA Title 245, Administration of the Storage Tank and Spill Prevention Program	Registration or certificate	40-10748-008A	04/04/07	04/04/08	Used diesel oil tank "A."
PDEP	Same	Registration or certificate	40-10748-011A	04/04/07	04/04/08	Unit 1 condensate demineralizer sulfuric acid storage tank.
PDEP	Same	Registration or certificate	40-10748-012A	04/04/07	04/04/08	Unit 1 condensate demineralizer sodium hydroxide storage tank.
PDEP	Same	Registration or certificate	40-10748-020A	04/04/07	04/04/08	Raw water treatment alum storage tank.
PDEP	Same	Registration or certificate	40-10748-025A	04/04/07	04/04/08	Sodium bisulfite.

Table E-2. (contd)

Agency	Authority	Description	Number	Issue Date	Expiration Date	Remarks
PDEP	Same	Registration or certificate	40-10748-023A	04/04/07	04/04/08	Sodium hypochlorite.
PDEP	Same	Registration or certificate	40-10748-024A	04/04/07	04/04/08	Sodium hypochlorite.
PDEP	Same	Registration or certificate	40-10748-026A	04/04/07	04/04/08	Raw water treatment sodium hypochlorite storage tank.
PDEP	Same	Registration or certificate	40-10748-016	04/04/07	04/04/08	Unit 1 batch lube oil tank.
PDEP	Same	Registration or certificate	40-10748-017	04/04/07	04/04/08	Unit 2 batch lube oil tank.
PDEP	Same	Registration or certificate	40-10748-018	04/04/07	04/04/08	Fuel farm gasoline tank.
PDEP	Same	Registration or certificate	40-10748-019	04/04/07	04/04/08	Fuel farm diesel fuel tank.
PDEP	PA Title 25, Chapter 109, Safe Drinking Water	Public Water Supply Brief Description Form	ID 2400994 Site Well System (Wells TW1 & TW2)	02/17/89	NA	Well registration continues indefinitely unless there are upgrades.
PDEP	PA Title 25, Chapter 109, Safe Drinking Water	Public Water Supply Brief Description Form	ID 2400995 Riverlands Recreation Area	12/04/85	NA	Well registration continues indefinitely unless there are upgrades.
PDEP	PA Title 25, Chapter 109, Safe Drinking Water	Public Water Supply Brief Description Form	ID 2400999 Energy Information Center	12/04/85	NA	Well registration continues indefinitely unless there are upgrades.
PDEP	PA Title 25, Chapter 109, Safe Drinking Water	Public Water Supply Brief Description Form	ID 2400938 West Building (formerly Emergency Operations Facility)	12/04/85	NA	Well registration continues indefinitely unless there are upgrades.

Table E-2. (contd)

Agency	Authority	Description	Number	Issue Date	Expiration Date	Remarks
PDEP	Section 3010 of Resource Conservation and Recovery Act	Acknowledgement of notification of hazardous waste activity	PAD000765883	08/09/00	NA	Hazardous waste.
PDEP	Clean Water Act, Section 401 (33 USC 1341)	Certification	NA	NA	NA	State issuance of NPDES permit constitutes 401 certification.
PFBC	Chapter 29 of the Fish and Boat Code, Act 1980-175 amended	Scientific Collecting Permit	008 Type III (R) 007 Type III (R)	04/25/07 04/20/07	12/31/07	Collect fish, epilithic algae, zooplankton, macroinvertebrate, amphibians, reptiles.
SRBC	Regulation 18 CFR Part 803 for consumptive use	Approval for consumptive use water	Application 19950301	03/09/95	NA	Low-flow augmentation.
USACE	Section 10 of River and Harbor Act of 1899 (33 USC 403)	Water and Obstruction & Encroachment Permit Joint Permit	CENAB-OP-RPA 06-10107-P12	10/06/06	10/06/09	Maintenance dredging in front of the river intake structure and cleaning the cooling tower blowdown discharge diffuser pipe.
USACE	Section 10 of River and Harbor Act of 1899 (33 USC 403)	Water and Obstruction & Encroachment Permit Joint Permit	CENAB-OP-RR 87-1767-4	08/31/88	12/31/90	Boat Ramp Env. Lab; can perform routine maintenance.
USACE	Section 10 of River and Harbor Act of 1899 (33 USC 403)	Water and Obstruction & Encroachment Permit Joint Permit	PASPGP-2 E40-609 APS No. 457878	12/19/02	12/19/05	Work in wetlands.
DOT	49 USC 5108	Registration	0615065500290Q	06/15/06	06/30/09	Hazardous materials shipments.
CVDEM	Title 44, Code of Virginia, Chapter 3.3, Section 44-146.30	Application for Registration to Transport Hazardous Radioactive Materials	PS-S-013109	01/30/07	01/31/09	Transportation of radioactive waste into the Commonwealth of Virginia.
SCDHEC	Act No. 429 of 1980, South Carolina Radioactive Waste Transportation and Disposal Act	South Carolina Radioactive Waste Transport Permit	0162-37-07-X	11/13/06	12/31/07	Transportation of radioactive waste into the State of South Carolina.

TDEC	Tennessee Department of Environment and Conservation Regulations	Tennessee Radioactive Waste-License-for-Delivery	T-PA001-L08	01/01/08	12/31/08	Shipment of radioactive material into Tennessee to a disposal/processing facility.
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Table E-2. (contd)

(a) Application pending.

- CFR = Code of Federal Regulations
- CVDEM = Code of Virginia, Department of Emergency Management
- DOT = U.S. Department of Transportation
- FWS = U.S. Fish and Wildlife Service
- NA = not applicable
- NOAA = National Oceanic and Atmospheric Administration
- NPDES = National Pollutant Discharge Elimination System
- NRC = U.S. Nuclear Regulatory Commission
- PDEP = Pennsylvania Department of Environmental Protection
- PFBC = Pennsylvania Fish and Boat Commission
- RCRA = Resource Conservation and Recovery Act
- SCDHEC = South Carolina Department of Health and Environmental Control
- SSES = Susquehanna Steam Electric Station
- SRBC = Susquehanna River Basin Commission
- TDEC = Tennessee Department of Environment and Conservation
- USACE = U.S. Army Corps of Engineers
- USC = United States Code



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

November 1, 2006

Susan M. Zacher, Historic Structures Section Chief
Pennsylvania Historical & Museum Commission
Bureau for Historic Preservation
Commonwealth Keystone Building, 2nd Floor
400 North Street
Harrisburg, PA 17120-0093

**SUBJECT: SUSQUEHANNA STEAM ELECTRIC STATION LICENSE RENEWAL
APPLICATION REVIEW (SHPO NO. 05-1588-079-A)**

Dear Ms. Zacher:

The U.S. Nuclear Regulatory Commission (NRC) staff is reviewing an application to renew the operating licenses for Susquehanna Steam Electric Station (SSES), Units 1 and 2, which is located on the western bank of the Susquehanna River, five miles northeast of Berwick, (Latitude N41°05'27", Longitude W76°08'45"), in Salem Township, Luzerne County, Pennsylvania. SSES is operated by PPL Susquehanna, LLC (PPL). The application for renewal was submitted by PPL in a letter dated September 13, 2006, pursuant to Title 10 of the Code of Federal Regulations Part 54 (10 CFR Part 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 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.

In the context of the National Historic Preservation Act of 1966, as amended, the NRC staff has determined that the area of potential effect (APE) for a license renewal action is the area at the power plant site and its immediate environs that may be impacted by post-license renewal land-disturbing operations or projected refurbishment activities associated with the proposed action. The APE may extend beyond the immediate environs in those instances where post-license renewal land-disturbing operations or projected refurbishment activities specifically related to license renewal may potentially have an effect on known or proposed historic sites. This determination is made irrespective of ownership or control of the lands of interest.

On November 15, 2006, the NRC will conduct two public NEPA meetings at 1:30 p.m. and 7:00 p.m. at the Eagles Building, 107 South Market Street, Berwick, Pennsylvania 18603. On May 07, 2007, the NRC plans to conduct a site audit at the SSES facility. You and your staff are invited to attend both the public meetings and the site audit. Your office will receive a copy of the draft SEIS along with a request for comments. The staff expects to publish the draft SEIS in December 2007.

S. Zacher

-2-

If you have any questions or require additional information, please contact Ms. Alicia Mullins, Environmental Project Manager, by phone at 301-415-1224 or by e-mail at axm7@nrc.gov.

Sincerely,



Rani Franovich, Branch Chief
Environmental Branch B
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket Nos. 50-387 and 50-388

Enclosures:

1. 50-Mile-Vicinity Map
2. Site Area Map

cc w/ends: See next page



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

November 13, 2006

Julie A. McMonagle, Director
Pennsylvania Environmental Council
Northeast Regional Office
175 Main Street
Luzerne, PA 18709

SUBJECT: SUSQUEHANNA STEAM ELECTRIC STATION LICENSE RENEWAL
APPLICATION REVIEW

Dear Ms. McMonagle:

The U.S. Nuclear Regulatory Commission (NRC) is reviewing an application submitted by PPL Susquehanna, LLC (PPL), for renewal of the operating licenses for Susquehanna Steam Electric Station (SSES), Units 1 and 2. SSES is located along the Susquehanna River, approximately five miles northeast of Berwick, 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 regulations that implement 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.

PPL 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, extending unit operation until July 2042 and March 2044, respectively. The proposed action would include the use and continued maintenance of existing plant facilities and transmission lines; PPL does not plan to construct or alter any facilities associated with the plant to support license renewal.

In total, PPL owns 2,355 acres of land on both sides of the Susquehanna River. In general, this land is characterized by open deciduous woodlands interspersed with grasslands and orchards. Approximately 487 acres are used for power generation, and the remainder of the land is primarily river floodplain forest, upland forest, and marshes. PPL maintains a 401-acre nature preserve, the Susquehanna Riverlands, located between SSES and the river; US Route 11 separates these areas. East of the Susquehanna River are 717 acres of mostly undeveloped land, which includes natural, recreational, and wildlife areas. Additionally, PPL owns Gould Island, a 65-acre island just up the Susquehanna River.

SSES uses a closed-cycle heat dissipation system to remove waste heat from the circulating water system. The circulating water and the service water systems draw water from, and discharge to, the Susquehanna River. The river intake structure is located on the western bank of the river and consists of two water entrance chambers with one-inch, on-center vertical bar screens and 3/8-inch mesh traveling screens. A low-pressure screen-wash system periodically operates to release aquatic organisms and debris impinged on the traveling screens to the

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trash rack. Cooling tower blowdown, spray pond overflow, and other permitted effluents are discharged to the Susquehanna River through a buried pipe leading to a submerged discharge structure/diffuser, approximately 600 feet downstream of the river intake structure. The diffuser pipe is 200 feet long, with the last 120 feet containing 72 four-inch portals that direct the discharge upwards at a 45 degree angle then going downstream. Warm circulating water from the cooling towers can be diverted to the river intake structure to prevent icing; this usually occurs from November through March.

For the specific purpose of connecting SSES to the regional transmission system, there is a total of approximately 150 miles of transmission line corridors that occupy approximately 3,341 acres of land. These transmission line corridors are being evaluated as part of the environmental review process. The corridors pass through land that is primarily agricultural and forest land with low population densities. Two 500-kilovolt (kV) lines and one 230-kV transmission line connect SSES to the electric grid, with approximately 2.3 miles of short ties in the immediate plant vicinity to connect SSES to the 230-kV system. The 230-kV Stanton-Susquehanna #2 transmission line corridor runs northeast from the plant for approximately 30 miles and ranges from 100 to 400 feet wide. The Susquehanna-Wescosville-Alburtis 500-kV transmission line corridor ranges from 100 to 350 feet wide and runs generally southeast from the plant for approximately 76 miles. The Sunbury-Susquehanna #2 500-kV line is approximately 325 feet wide and runs 44 miles west-southwest from the plant. Pennsylvania counties crossed by the transmission line corridors include Luzerne (the location of SSES), Carbon, Columbia, Lehigh, Northampton, Northumberland, Montour, and Snyder. PPL plans to maintain these transmission lines and the associated corridors, which are integral to the larger transmission system, indefinitely. Except for the short 230-kV transmission lines, the lines will remain a permanent part of the transmission system even after SSES is decommissioned.

We plan to hold two public NEPA scoping meetings at 1:30 p.m. and 7:00 p.m. on November 15, 2006, at the Eagles Building, 107 South Market Street, Berwick, Pennsylvania 18603. 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 December 2007.

Appendix E

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If you have any questions concerning the NRC staff review of this LRA, please contact Ms. Alicia Mullins, Project Manager at 301-415-1224 or by e-mail at axm7@nrc.gov.

Sincerely,

A handwritten signature in black ink, appearing to read "Rani Franovich". The signature is written in a cursive style with a large initial "R".

Rani Franovich, Branch Chief
Environmental Branch B
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket Nos. 50-387 and 50-388

cc: See next page

November 13, 2006

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: SUSQUEHANNA STEAM ELECTRIC STATION 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 Susquehanna Steam Electric Station (SSES), Units 1 and 2, which are located on the western bank of the Susquehanna River, approximately five miles northeast of Berwick, in Salem Township, Luzerne County, Pennsylvania. SSES is operated by Susquehanna PPL, LLC (PPL). The application for renewal was submitted by PPL in a letter dated September 13, 2006, pursuant to Title 10 of the *Code of Federal Regulations* Part 54 (10 CFR Part 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 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.

On November 15, 2006, the NRC will conduct two public meetings at the Eagles Building, 107 South Market Street, Berwick, Pennsylvania 18603. The purpose of these meetings is to solicit comments on the scope of the staff's environmental review. 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 staff expects to publish the draft SEIS in December 2007.

Appendix E

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If you have any questions or require additional information, please contact the Environmental Project Manager, Ms. Alicia Mullins, at 301-415-1224 or by e-mail at axm7@nrc.gov.

Sincerely,

/RA/

Rani Franovich, Branch Chief
Environmental Branch B
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket Nos. 50-387 and 50-388

cc: See next page



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

November 14, 2006

Mark Hartle, Chief, Aquatic Resources Section
Pennsylvania Fish & Boat Commission
Environmental Services
450 Robinson Lane
Bellefonte, PA 16823-9620

SUBJECT: SUSQUEHANNA STEAM ELECTRIC STATION LICENSE RENEWAL
APPLICATION REVIEW

Dear Mr. Hartle:

The U.S. Nuclear Regulatory Commission (NRC) is reviewing an application submitted by PPL Susquehanna, LLC (PPL), for the renewal of the operating licenses for Susquehanna Steam Electric Station (SSES), Units 1 and 2. SSES is located along the Susquehanna River approximately five miles northeast of Berwick, 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 regulations that implement the National Environmental Policy Act (NEPA) of 1969.

PPL 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 2042 and March 2044, respectively. The proposed action would include the use and continued maintenance of existing plant facilities and transmission lines; PPL 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 NEPA scoping meetings on November 15, 2006, at the Eagles Building, located at 107 South Market Street in Berwick, Pennsylvania. 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 May 7-11, 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 December 2007.

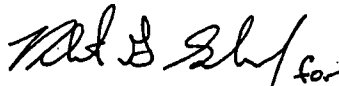
Appendix E

M. Hartle

-2-

If you have any questions concerning the NRC staff review of this LRA, please contact Ms. Alicia Mullins, Project Manager at 301-415-1224 or via e-mail at axm7@nrc.gov.

Sincerely,

Handwritten signature of Rani Franovich in black ink.

Rani Franovich, Branch Chief
Environmental Branch B
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket Nos. 50-387 and 50-388

cc: See next page



UNITED STATES
NUCLEAR REGULATORY COMMISSION
 WASHINGTON, D.C. 20555-0001

November 14, 2006

The Honorable Clint Halfown
 Heron Clan Representative
 Cayuga Nation
 P.O. Box 11
 Versailles, NY 14168

SUBJECT: REQUEST FOR COMMENTS CONCERNING THE SUSQUEHANNA STEAM-ELECTRIC STATION, UNITS 1 AND 2, LICENSE RENEWAL APPLICATION REVIEW

Dear Mr. Halfown:

The U.S. Nuclear Regulatory Commission (NRC) is seeking input for its environmental review of an application from PPL Susquehanna, LLC (PPL), for the renewal of the operating licenses for the Susquehanna Steam Electric Station (SSES), Units 1 and 2, located along the Susquehanna River approximately five miles northeast of Berwick, Pennsylvania. SSES is in close proximity to lands that may be of interest to the Cayuga Nation. 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* 51.28(b) [10 CFR 51.28(b)], the NRC invites the Cayuga Nation 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 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 SSES, Units 1 and 2, will expire on July 17, 2022, and March 23, 2024, respectively. PPL submitted its application for renewal of the SSES operating licenses in a letter dated September 13, 2006.

The NRC is gathering information for a SSES site-specific supplement to its "Generic Environmental Impact Statement for License Renewal of Nuclear Plants" (GEIS), NUREG-1437. The GEIS is a programmatic environmental impact statement; it documents the NRC staff's assessment of environmental impacts that would be associated with license renewal at nuclear power plant site. The supplement to the GEIS will contain the results of the review of the environmental impacts on the area surrounding the SSES site that are 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. Enclosed for your information is a map showing the location of the SSES site.

C. Halftown

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To accommodate interested members of the public, the NRC will hold two identical public scoping meetings for the SSES license renewal supplement to the GEIS on November 15, 2006, at the Eagles Building, 107 South Market Street, Berwick, Pennsylvania. 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. Additionally, the NRC staff will host informal discussions one hour before the start of each session. To be considered, comments must be provided either at the transcribed public meetings or in writing. No formal comments on the proposed scope of the supplement to the GEIS will be accepted during informal discussions.

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://www.nrc.gov/reading-rm/adams/web-based.html>. The accession number for the LRA is ML062620157. 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 via e-mail at pdrc@nrc.gov.

The SSES LRA is also available on the internet at <http://www.nrc.gov/reactors/operating/licensing/renewal/applications/susquehanna.html>. In addition, the following public libraries have agreed to make the LRA available for public inspection: Berwick Public Library, 205 Chestnut Street, Berwick, Pennsylvania, 18603; and the Mill Memorial Library, 495 E. Main Street, Nanticoke, Pennsylvania, 18634.

Please submit any comments the Cayuga Nation may have to offer on the scope of the environmental review by January 2, 2007. Written comments should be submitted by mail to the Chief, Rules and Directives Branch, Division of Administrative Services, Mail Stop T-8D59, U.S. Nuclear Regulatory Commission, Washington D.C., 20555-0001. Electronic comments may be submitted to the NRC by e-mail at SusquehannaEIS@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.

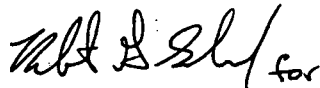
The staff expects to publish the draft supplement to the GEIS in December 2007. The NRC will hold another set of public meetings in the site vicinity to solicit comments on the draft. A copy of the draft supplemental environmental impact statement (SEIS) will be sent to you for your

C. Halftown

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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 SSES is planned for August 2008. If you need additional information regarding the environmental review process, please contact Ms. Alicia Mullins, Environmental Project Manager, at 301-415-1224 or via e-mail at axm7@nrc.gov.

Sincerely,



Rani L. Franovich, Branch Chief
Environmental Branch B
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket Nos. 50-387 and 50-388

Enclosure:
SSES Location Map

cc w/enc: See next page



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

November 15, 2006

Jennifer Kagel, Fishery Biologist
Pennsylvania Field Office
U.S. Fish & Wildlife Service
315 South Allen Street, Suite 322
State College, PA 16801-4850

SUBJECT: REQUEST FOR LIST OF PROTECTED SPECIES WITHIN THE AREA UNDER EVALUATION FOR THE SUSQUEHANNA STEAM ELECTRIC STATION, UNITS 1 AND 2, LICENSE RENEWAL APPLICATION REVIEW

Dear Ms. Kagel:

The U.S. Nuclear Regulatory Commission (NRC) is reviewing an application submitted by PPL Susquehanna, LLC (PPL) for the renewal of the operating licenses for Susquehanna Steam Electric Station (SSES), Units 1 and 2. SSES is located along the Susquehanna River approximately five miles northeast of Berwick, Pennsylvania at Latitude N41°05'27", Longitude W76°08'45". 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 regulations that implement 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.

PPL 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, extending the operating licenses until July 2042; and March 2044, respectively. The proposed action would include the use and continued maintenance of existing plant facilities and transmission lines. PPL does not plan to construct or alter any facilities associated with the plant to support the renewed licensing period.

In total, PPL owns 2,355 acres of land on both sides of the Susquehanna River. In general, this land is characterized by open deciduous woodlands interspersed with grasslands and orchards. Approximately 487 acres are used for power generation, and the remainder of the land is primarily river floodplain forest, upland forest, and marshes. PPL maintains a 401-acre nature preserve, the Susquehanna Riverlands, located between SSES and the river; US Route 11 separates these areas. East of the Susquehanna River are 717 acres of mostly undeveloped land, which includes natural, recreational, and wildlife areas. Additionally, PPL owns Gould Island, a 65-acre island just up the Susquehanna River.

SSES uses a closed-cycle heat dissipation system to remove waste heat from the Circulating Water System. The Circulating Water and the Service Water Systems draw water from, and discharge to, the Susquehanna River. The River Intake Structure is located on the western

J. Kagel

-2-

bank of the river, and consists of two water entrance chambers with one-inch, on-center vertical bar screens and 3/8-inch mesh traveling screens. A low pressure screen-wash system periodically operates to release aquatic organisms and debris impinged on the traveling screens to the trash rack. Cooling Tower blowdown, spray pond overflow, and other permitted effluents are discharged to the Susquehanna River through a buried pipe leading to a submerged discharge structure/diffuser, approximately 600 feet downstream of the River Intake Structure. The diffuser pipe is 200 feet long, with the last 120 feet containing 72 four-inch portals that direct the discharge upwards at a 45 degree angle then going downstream. Warm circulating water from the Cooling Towers can be diverted to the River Intake Structure to prevent icing, this usually occurs from November through March.

For the specific purpose of connecting SSES to the regional transmission system, there is a total of approximately 150 miles of transmission line corridors that occupy approximately 3,341 acres of land. These transmission line corridors are being evaluated as part of the SEIS process. The corridors pass through land that is primarily agricultural and forest land with low population densities. Two 500-kilovolt (kV) lines and one 230-kV line connect SSES to the electric grid, with approximately 2.3 miles of short ties in the immediate plant vicinity to connect SSES to the 230-kV system. The 230-kV Stanton-Susquehanna #2 transmission line corridor runs northeast from the plant for approximately 30 miles, and ranges from 100-400 feet wide. The Susquehanna-Wescosville-Alburtis 500-kV transmission line corridor ranges from 100 to 350 feet wide and runs generally southeast from the plant for approximately 76 miles; the Sunbury-Susquehanna #2 500-kV transmission line corridor is approximately 325 feet wide and runs 44 miles west-southwest from the plant. Pennsylvania counties crossed by the transmission line corridors include Luzerne (the location of SSES), Carbon, Columbia, Lehigh, Northampton, Northumberland, Montour, and Snyder. PPL plans to maintain these transmission lines, which are integral to the larger transmission system, indefinitely. Except for the short 230-kV transmission lines, the lines will remain a permanent part of the transmission system even after SSES is decommissioned.

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 SSES 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.

We plan to hold two public NEPA scoping meetings at 1:30 p.m., and 7:00 p.m., on November 15, 2006, at the Eagles Building, located at 107 South Market Street in Berwick, Pennsylvania, 18603. Also the week May 7, 2007, the NRC plans to conduct a site audit at the SSES facility. You and your staff are invited to attend both the public meetings and the site audit. 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 December 2007.

Appendix E

J. Kagel

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If you have any questions concerning the NRC staff review of this LRA, please contact Ms. Alicia Mullins, Project Manager at 301-415-1224 or by e-mail at axm7@nrc.gov.

Sincerely,

A handwritten signature in black ink, appearing to read 'Rani Franovich' with a small 'for' written below it.

Rani Franovich, Branch Chief
Environmental Branch B
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket Nos. 50-387 and 50-388

Enclosures:

1. 50-Mile-Vicinity Map
2. Site Area Map

cc w/encls: See next page



UNITED STATES
 NUCLEAR REGULATORY COMMISSION
 WASHINGTON, D.C. 20555-0001

November 17, 2006

Ms. Chris Firestone, Native Plant Program
 Manager
 Pennsylvania Department of Conservation and
 Natural Resources
 Bureau of Forestry
 Forest Advisory Services
 P.O. Box 8552
 Harrisburg, PA 17105-1673

**SUBJECT: REQUEST FOR LIST OF STATE PROTECTED SPECIES WITHIN THE AREA
 UNDER EVALUATION FOR THE SUSQUEHANNA STEAM ELECTRIC
 STATION, UNITS 1 AND 2, LICENSE RENEWAL APPLICATION REVIEW**

Dear Ms. Firestone:

The U.S. Nuclear Regulatory Commission (NRC) is reviewing an application submitted by PPL Susquehanna, LLC (PPL), for the renewal of the operating licenses for Susquehanna Steam Electric Station (SSES), Units 1 and 2. The coordinates of SSES are Latitude N41°05'27", Longitude W76°08'45"; it is located along the Susquehanna River approximately five miles northeast of Berwick, 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.

PPL 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, extending unit operation until July 2042 and March 2044, respectively. The proposed action would include the use and continued maintenance of existing plant facilities and transmission lines. PPL does not plan to construct or alter any facilities associated with the plant to support the renewed licensing period.

In total, PPL owns 2,355 acres of land on both sides of the Susquehanna River. In general, this land is characterized by open deciduous woodlands interspersed with grasslands and orchards. Approximately 487 acres are used for power generation, and the remainder of the land is primarily river floodplain forest, upland forest, and marshes. PPL maintains a 401-acre nature preserve, the Susquehanna Riverlands, located between SSES and the river; US Route 11 separates these areas. East of the Susquehanna River are 717 acres of mostly undeveloped land, which includes natural, recreational, and wildlife areas. Additionally, PPL owns Gould Island, a 65-acre island just up the Susquehanna River.

SSES uses a closed-cycle heat dissipation system to remove waste heat from the circulating water system. The circulating water and the service water systems draw water from, and discharge to, the Susquehanna River.

The river intake structure is located on the western bank of the river and consists of two water entrance chambers with one-inch, on-center vertical bar screens and 3/8-inch mesh traveling screens. A low-pressure screen-wash system periodically operates to release aquatic organisms and debris impinged on the traveling screens to the trash rack. Cooling tower blowdown, spray pond overflow, and other permitted effluents are discharged to the Susquehanna River through a buried pipe leading to a submerged discharge structure/diffuser, approximately 600 feet downstream of the river intake structure. The diffuser pipe is 200 feet long, with the last 120 feet containing 72 four-inch portals that direct the discharge upwards at a 45 degree angle then going downstream. Warm circulating water from the cooling towers can be diverted to the river intake structure to prevent icing; this usually occurs from November through March.

For the specific purpose of connecting SSES to the regional transmission system, there is a total of approximately 150 miles of transmission line corridors that occupy approximately 3,341 acres of land. These transmission line corridors are being evaluated as part of the environmental review process. The corridors pass through land that is primarily agricultural and forest land with low population densities. Two 500-kilovolt (kV) lines and one 230-kV transmission line connect SSES to the electric grid, with approximately 2.3 miles of short ties in the immediate plant vicinity to connect SSES to the 230-kV system. The 230-kV Stanton-Susquehanna #2 transmission line corridor runs northeast from the plant for approximately 30 miles and ranges from 100 to 400 feet wide. The Susquehanna-Wescosville-Albertis 500-kV transmission line corridor ranges from 100 to 350 feet wide and runs generally southeast from the plant for approximately 76 miles. The Sunbury-Susquehanna #2 500-kV line is approximately 325 feet wide and runs 44 miles west-southwest from the plant. Pennsylvania counties crossed by the transmission line corridors include Luzerne (the location of SSES), Carbon, Columbia, Lehigh, Northampton, Northumberland, Montour, and Snyder. PPL plans to maintain these transmission lines, which are integral to the larger transmission system, indefinitely. Except for the short 230-kV transmission lines, the lines will remain a permanent part of the transmission system even after SSES is decommissioned.

To support the environmental review process, the NRC requests information on state listed, proposed, and candidate species and critical habitat that may be in the vicinity of SSES and its associated transmission line right-of-way. In addition, please provide any information you consider appropriate that might help the NRC to evaluate impacts that extended operation of SSES for up to an additional 20 years under the terms of a license renewal might impose on state listed species.

During the week of May 7, 2007, we plan to conduct a site audit at the SSES facility. You and your staff are invited to attend the site audit. 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 December 2007.

-3-

If you have any questions concerning the NRC staff review of this LRA, please contact Ms. Alicia Mullins, Project Manager at 301-415-1224 or by e-mail at axm7@nrc.gov.

Sincerely,



Rani Franovich, Branch Chief
Environmental Branch B
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket Nos. 50-387 and 50-388

Enclosures:

1. 50-Mile-Vicinity Map
2. Site Area Map

cc w/encs: See next page

Appendix E



Commonwealth of Pennsylvania
Pennsylvania Historical and Museum Commission
Bureau for Historic Preservation
Commonwealth Keystone Building, 2nd Floor
400 North Street
Harrisburg, PA 17120-0093

November 20, 2006

Rani Franovich, Branch Chief
Environmental Branch B, Div. of License Renewal
Office of Nuclear Reactor Regulation
Nuclear Regulatory Commission
Washington, DC 20555-0001

TO EXPEDITE REVIEW USE
BHP REFERENCE NUMBER

Re: ER 05-1588-079-C
NRC: Susquehanna Steam Electric Station License Renewal
Salem Township, Luzerne County: Area of Potential Effect

Dear Ms. Franovich:

The Bureau for Historic Preservation (the State Historic Preservation Office) has reviewed the above named project in accordance with Section 106 of the National Historic Preservation Act of 1966, as amended in 1980 and 1992, and the regulations (36 CFR Part 800) of the Advisory Council on Historic Preservation as revised in 1999. These requirements include consideration of the project's potential effect upon both historic and archaeological resources.

We disagree with the Area of Potential Effect selected for this project. We recommend the use of the boundaries of this facility as the Area of Potential Effect, since license renewal could trigger actions within the entire facility.

If you need further information regarding archaeological survey please contact Steven McDougal at (717) 772-0923. If you need further information concerning historic structures please consult Susan Zacher at (717) 783-9920.

Sincerely,

Susan M. Zacher for
Douglas C. McLearn, Chief
Division of Archaeology &
Protection

DCM/smz



Stockbridge-Munsee

Band of Mohican Indians

ENVIRONMENTAL OFFICE

P.O. Box 70, Bowler, WI 54416

715-793-4262 ~~4363~~ gbunker@ironiernet.net

greg.bunker@mohican-nsn.gov

Rani Franovich, Branch Chief
Environmental Branch B
Division of License Renewal
Office of Nuclear Reactor Regulation

November 27, 2006.


Dear Rani Franovich;

Enclosed are twelve "Request for Comment" packets I received in three different envelopes in today's mail. I kept the one addressed to our tribal president, Robert Chicks. I sent six of these same packets back to you in today's outgoing mail. I have also enclosed two other announcements I received concerning the license renewal application review.

Thus far I have received 21 notifications concerning this project, addressed to 21 different persons, only one of which is affiliated with this Tribe. I hope I will not be receiving the rest of the four page list of addresses for the "cc" of this letter.

Hopefully you can find and corrected the glitch in the mailing of this material. At this Tribe we do like getting announcements on actions within former lands; however Sherry White is the main contact for our Historic 106 program, and I am the contact for environmental issues.

Thank you for addressing this issue;


Greg Bunker
Environmental Manager
Stockbridge-Munsee Community
P.O. Box 70
Bowler, WI. 54416

ONEIDA INDIAN NATION

(attached map) the location of the
 and copies of many similar letters to others). Lying outside Oneida aboriginal
 territory (attached map), the location is beyond our purview.



ONEIDA NATION HOMELANDS

December 7, 2006

Rani L. Franovich, Branch Chief
 Environmental Branch B
 Division of License Renewal
 Office of Nuclear Reactor Regulation
 United States Nuclear Regulatory Commission
 Washington, D.C. 20555-0001

Dear Branch Chief Franovich,

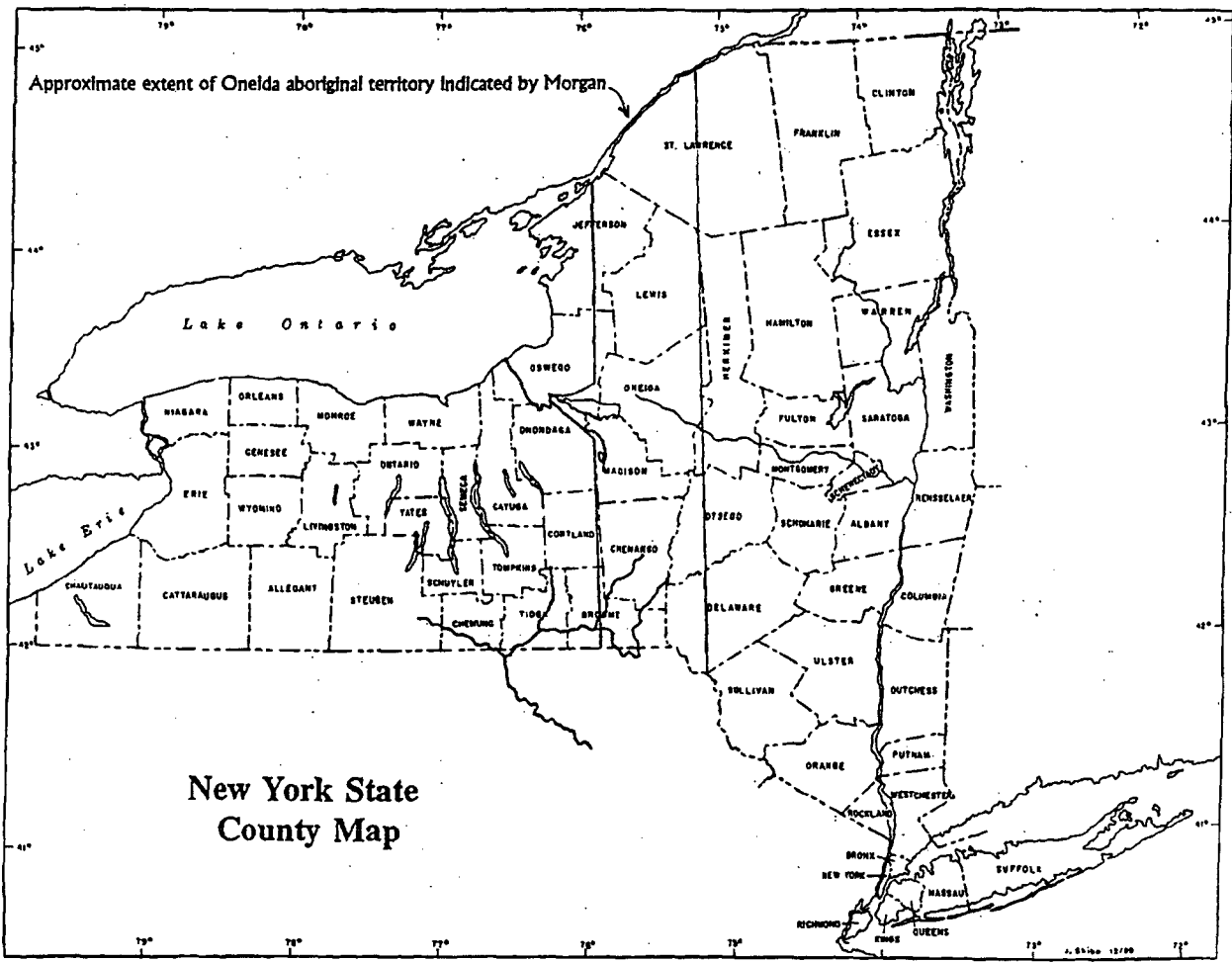
Thank you for soliciting Oneida input into the process of environmental review necessary
 to relicensing the Susquehanna Steam Electric Station in Berwick, PA (letters of Nov. 11
 and 17 and copies of many similar letters to others). Lying outside Oneida aboriginal
 territory (attached map), the location is beyond our purview.

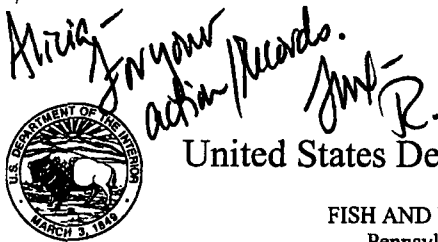
Sincerely,

Anthony Wonderley
 Historian
 Legal Department
 1256 Union St. PO Box 662
 Oneida, NY 13421-0662

cc: Brian Patterson, Jesse Bergevin (OIN)

221 Union Street
 PO Box 662 • Oneida, NY 13421-0662
 (315) 829-8461 • Fax (315) 829-8473





United States Department of the Interior



FISH AND WILDLIFE SERVICE
Pennsylvania Field Office
315 South Allen Street, Suite 322
State College, Pennsylvania 16801-4850

December 21, 2006

Ms. Rani Franovich, Branch Chief
Nuclear Regulatory Commission
(ATTN: Alicia Mullins)
Washington, D.C. 20555-0001

Dear Ms. Franovich:

This responds to your letter dated November 15, 2006, requesting information on fish and wildlife resources within the area affected by the Susquehanna Steam Electric Station located near Berwick, in Luzerne County, Pennsylvania. PPL Susquehanna, LLC, is requesting the renewal of its operating license for a period of 20 years beyond the expiration of the current license term. This proposed action includes the continued operation and maintenance of existing plant facilities and transmission lines. 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 federally endangered and threatened species, and the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 *et seq.*) to ensure protection of other fish and wildlife resources.

Federally Listed and Proposed Species

The proposed project is located within the range of the Indiana bat (*Myotis sodalis*), a species that is federally listed as endangered. Due to the proximity of the project area to a known Indiana bat hibernaculum, removal of trees and forested areas within the project area could result in the direct take of roosting Indiana bats, which could be injured or killed when trees are cut. Studies have found that forested areas located within five miles of hibernacula provide important foraging and roosting habitat for Indiana bats, especially during the fall and spring, when bats are building up their fat reserves prior to and after hibernation. Additionally, female maternity colonies and individual male bats may be found in the vicinity of hibernacula throughout the summer months. If any tree-cutting activities are proposed in the future, or the proposed scope of the project changes, further consultation with this office will be necessary.

Aquatic Resources

The National Wetland Inventory maps indicate that wetlands occur within the boundaries of the project. Although NWI maps were prepared using aerial photography, and are therefore not always completely accurate, the Soil Survey for Luzerne County also indicates that wetlands are likely to occur there. Holly silt loam (hydric); Pope and Linden soils (hydric inclusions); Oquaga and Lordstown Channery silt loam (hydric inclusions) and Braceville gravelly loam (hydric inclusions) occur within this area. These soil types are typically found in depressions, pot holes, and bottomlands, and may indicate the presence of wetlands on the site. Any final determination of whether wetlands are present on the proposed project site should include a site visit by a qualified individual trained in wetland identification. Furthermore, the proposed project area includes perennial streams. We recommend that the applicant avoid, and minimize any unavoidable impacts to aquatic resources.

Work in streams and wetlands requires permits from the Pennsylvania Department of Environmental Protection and/or the Army Corps of Engineers. We suggest that the applicant contact the DEP and the Corps for information on permit requirements should any new construction occur in wetland areas. By copy of this letter, we are informing these agencies of the project. Please be advised that the Service generally recommends that the Corps and DEP not grant permits to destroy streams and wetlands. If any construction is proposed in the future, or the proposed scope of the project changes, further consultation with this office may be necessary.

Other Concerns

We understand that the Nuclear Regulatory Commission is in the process of preparing a Supplemental Environmental Impact Statement which will analyze environmental issues associated with this project. We recommend that, at a minimum, the document address: the effects of thermal releases, fish impingement and entrainment (including the use of appropriate draw rates and mesh size), transmission line management and routing (including right-of way contaminant and wildlife management, erosion control, forest fragmentation, and right-of-way maintenance), cumulative impacts (to avian, terrestrial, and aquatic resources), avian strikes (on transmission lines and cooling towers, as has been the case in the past), and raptor electrocution.

If you have any questions regarding this response, please contact Jennifer Kagel of my staff at 814-234-4090.

Sincerely,



David Densmore
Supervisor



Pennsylvania Department of Conservation and Natural Resources

Bureau of Forestry

January 8, 2007

Ms. Alicia Mullins
 Environmental Branch B
 Division of License Renewal
 Office of Nuclear Reactor Regulation
 U.S. Nuclear Regulatory Commission
 Washington, DC 20555-0001

<i>Pennsylvania Natural Diversity Inventory Review, PNDI Number 19031</i>
Susquehanna Steam Electric Station Units 1 & 2 License Renewal
Salem Twp.; Luzerne County

Dear Ms. Mullins,

This responds to your request for information on species of special concern within the area under evaluation for this project. We screened this project for potential impacts to species and resources of special concern under the Department of Conservation and Natural Resources' responsibility, which includes plants, natural communities, terrestrial invertebrates and geologic features only.

PNDI records indicate that species and communities of special concern under DCNR's jurisdiction are known to occur in the vicinity of the above-mentioned project. Please see the attached list for species found in the project area. If any earth disturbance is planned or more detailed project information becomes available, please submit this project to our office for further review of potential impacts to the attached species list.

Scientific Name	Common Name	Global Rank	State Rank
<i>Enodia anhedon</i>	Northern Peary-eye	G5 (secure)	S3S4 (vulnerable to apparently secure)
<i>Polltes mystic</i>	Long Dash	G5 (secure)	S3 (vulnerable)
<i>Poanes massasoit</i>	Mulberry Wing	G4 (apparently secure)	S3 (vulnerable)
<i>Speyeria aphrodite</i>	Aphrodite Fritillary	G5 (secure)	S3S4 (vulnerable to apparently secure)
<i>Euphydryas phaeton</i>	Baltimore Checkerspot	G4 (apparently secure)	S3S4 (vulnerable to apparently secure)

These species are utilizing the area east of the plant, near Rt. 11, although they may be found elsewhere onsite as well. If you are inclined to enhance habitat for these species, the following plants are preferred hosts: willows, poplars, milkweed, mountain laurel, bluegrasses, upright sedge, flower nectar, violets, and turtlehead.

Stewardship Partnership Service

An Equal Opportunity Employer

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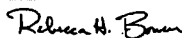
Bureau of Forestry

January 8, 2007

Pg. 2 of 2

This response represents the most up-to-date summary of the PNDI data files and is good for one (1) year from the date of this letter. An absence of recorded information does not necessarily imply actual conditions on-site. A field survey of any site may reveal previously unreported populations. Should project plans change or additional information on listed or proposed species become available, this determination may be reconsidered.

This finding applies to impacts to plants, natural communities, terrestrial invertebrates and geologic features only. To complete your review of state and federally-listed species of special concern, please be sure the U.S. Fish and Wildlife Service, the PA Game Commission and the Fish and Boat Commission has been contacted regarding this project either directly or by performing a search with the online PNDI ER Tool found at www.naturalheritage.state.pa.us.



Rebecca H. Bowen, Environmental Review Specialist, PNHP

DCNR/BOF/PNDI, PO Box 8552, Harrisburg, PA 17105 ~ Ph: 717-772-0258 ~ F: 717-772-0271 ~ crbowen@state.pa.us



United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pennsylvania Field Office
315 South Allen Street, Suite 322
State College, Pennsylvania 16801-4850



March 1, 2007

Ms. Rani Franovich, Branch Chief
Nuclear Regulatory Commission
Washington, D.C. 20555-0001

RE: USFWS Project #2007-1111

Dear Ms. Franovich:

This responds to your letter of November 15, 2007, requesting information about federally listed and proposed endangered and threatened species within the area affected by the Susquehanna Steam Electric Station license renewal project located in Luzerne County, Pennsylvania. The proposed project is located within the range of the Indiana bat (*Myotis sodalis*), a species that is federally listed as endangered. 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.

Based on a telephone conversation with Nathan Goodman on February 20, 2007, we have been advised that the only disturbance to the site would be routine vegetation maintenance underneath existing transmission lines. Therefore, based on this information and anticipated effects on forest habitat, we have determined that the proposed project will not have a significant adverse effect on overall habitat quality for the Indiana bat, and the project is not likely to adversely affect this species.

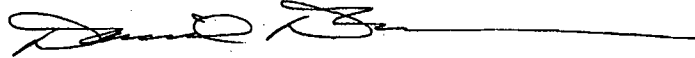
This determination is valid for two years from the date of this letter. If the proposed project has not been fully implemented prior to this, an additional review by this office is recommended. Should project plans change, or if additional information on listed or proposed species becomes available, this determination may be reconsidered.

This response relates only to endangered and 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 other 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.

If you have any questions regarding this matter, please contact Pam Shellenberger of my staff at 814-234-4090.

Sincerely,

A handwritten signature in black ink, appearing to read "David Densmore", followed by a long horizontal line extending to the right.

David Densmore
Supervisor

June 9, 2007

David Densmore, Supervisor
(ATTN: Pamela Shellenberger)
United States Department of the Interior
Fish and Wildlife Service
Pennsylvania Field Office
315 South Allen Street, Suite 322
State College, PA 16801-4850

**SUBJECT: U.S. FISH AND WILDLIFE SERVICE PROJECT 2007-1111 REGARDING
PROTECTED SPECIES IN THE VICINITY OF THE SUSQUEHANNA
STEAM ELECTRIC STATION, UNITS 1 AND 2, AND ASSOCIATED
TRANSMISSION LINE CORRIDOR**

Dear Mr. Densmore,

This letter is intended to serve as a record of the discussions between the U.S. Nuclear Regulatory Commission (NRC) staff and Ms. Pamela Shellenberger of the U.S. Fish and Wildlife Service (FWS) on March 28, 2007. In addition, this letter is intended to allow FWS to respond with an updated version of their March 1, 2007, determination regarding endangered species in the vicinity of Susquehanna Steam Electric Station (SSES), thus concluding NRC's informal Section 7 conference with FWS relating both to SSES license renewal and extended power uprate (EPU) reviews.

As noted in the March 28, 2007, discussion, PPL Susquehanna, LLC, (PPL) has applied for an EPU for Units 1 and 2. NRC's review of PPL's EPU application began after NRC's initial license renewal consultation letter to FWS, dated November 15, 2006. If approved, the EPU will allow SSES to increase maximum thermal power at both SSES Units 1 and 2 from 3489 megawatts thermal (MWT) to 3953 MWT - or by approximately 14 percent. NRC staff, in the March 28, 2007, discussion, requested that FWS issue a revised determination addressing both EPU and license renewal. This will not only assist staff in developing a supplemental environmental impact statement for license renewal, but will also assist NRC staff in preparing an environmental assessment for the EPU. Should NRC staff find that EPU will have significant impacts on the human environment, we will develop an environmental impact statement for the EPU.

Also during the March 28, 2007, call to FWS, NRC staff noted that PPL's March 24, 2005, letter to FWS is a more reliable characterization of PPL's maintenance activities than the NRC staff's assertion FWS referenced in the March 1, 2007, determination. According to PPL's letter, any maintenance activities necessary to support license renewal would be limited to previously disturbed areas, and no additional land disturbance is anticipated for license renewal.

Finally, as discussed in the March 28, 2007, call, NRC staff requested that FWS issue a determination without a set duration, as it is possible that NRC's staff review of license renewal and EPU may take longer than the two-year limit invoked in the March 1, 2007, letter. In return, NRC staff will promptly notify FWS in the unlikely event that either EPU or license renewal reviews change in scope.

D. Densmore

-2-

NRC staff greatly appreciates your time and attention in providing an updated version of your previous determination based on the requested EPU. If you have any questions concerning this matter, please contact Drew Stuyvenberg, License Renewal Environmental Project Manager at 301-415-4006 or by e-mail at als3@nrc.gov.

Sincerely,

/RA/
Rani Franovich, Branch Chief
Environmental Branch B
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket No. 50-387

cc: See next page



United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pennsylvania Field Office
315 South Allen Street, Suite 322
State College, Pennsylvania 16801-4850



October 11, 2007

Rani Franovich, Branch Chief
Nuclear Regulatory Commission
Washington, D.C. 20555-0001

RE: USFWS Project #2007-1111

Dear Ms. Franovich:

This responds to your email of August 22, 2007, requesting information about federally listed and proposed endangered and threatened species within the area affected by the Susquehanna Steam Electric Station license renewal and extended power uprate project, located in Luzerne County, Pennsylvania. The proposed project is located within the range of the Indiana bat (*Myotis sodalis*), a species that is federally listed as endangered. 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.

Based on a telephone conversation with Nathan Goodman on February 20, 2007, we have been advised that the only disturbance to the site will be routine vegetation maintenance underneath existing transmission lines. Therefore, based on this information and anticipated effects on forest habitat, we have determined that the proposed project will not have a significant adverse effect on overall habitat quality for the Indiana bat, and the project is not likely to adversely affect this species.

This determination is valid for two years from the date of this letter. If the proposed project has not been fully implemented prior to this, an additional review by this office is recommended. Should project plans change, or if additional information on listed or proposed species becomes available, this determination may be reconsidered.

This response relates only to endangered and 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 other 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.

If you have any questions regarding this matter, please contact Bonnie Dershem of my staff at 814-234-4090.

Sincerely,

A handwritten signature in black ink, appearing to read "David Densmore", followed by a long horizontal line extending to the right.

David Densmore
Supervisor

Appendix F

GEIS Environmental Issues Not Applicable to Susquehanna Steam Electric Station, Units 1 and 2

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Appendix F

GEIS Environmental Issues Not Applicable to Susquehanna Steam Electric Station, Units 1 and 2

Table F-1 lists those environmental issues identified in the *Generic Environmental Impact Statement for License Renewal of Nuclear Plants (GEIS) (NRC 1996, 1999)^(a)* and Title 10, Part 51, of the *Code of Federal Regulations (10 CFR Part 51)*, Subpart A, Appendix B, Table B-1, that are not applicable to Susquehanna Steam Electric Station, Units 1 and 2 (SSES) because of plant or site characteristics.

Table F-1. GEIS Environmental Issues Not Applicable to SSES

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; 4.4.2.2	SSES is located on a freshwater river.
Altered thermal stratification of lakes	1	4.2.1.2.2; 4.4.2.2	SSES does not use surface water from lakes.
Water-use conflicts (plants with once-through cooling systems)	1	4.2.1.3	SSES does not use a once-through cooling system.
AQUATIC ECOLOGY (FOR PLANTS WITH ONCE-THROUGH AND COOLING POND HEAT DISSIPATION SYSTEMS)			
Entrainment of fish and shellfish in early life stages	2	4.2.2.1.2; 4.4.3	SSES does not have a once-through cooling system or a cooling pond.
Impingement of fish and shellfish	2	4.2.2.1.3; 4.4.3	SSES does not have a once-through cooling system or a cooling pond.
Heat shock	2	4.2.2.1.4; 4.4.3	SSES does not use a once-through cooling system or a cooling pond.

13

(a) The GEIS was originally issued in 1996. Addendum 1 to the GEIS was issued 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
GROUNDWATER USE AND QUALITY			
Groundwater-use conflicts (potable and service water, and dewatering; plants that use >100 gpm)	2	4.8.1.1; 4.8.2.1	SSES uses <100 gpm of groundwater.
Groundwater-use conflicts (Ranney wells)	2	4.8.1.4	SSES does not have or use Ranney wells.
Groundwater-quality degradation (Ranney wells)	1	4.8.2.2	SSES does not have or use Ranney wells.
Groundwater-quality degradation (saltwater intrusion)	1	4.8.2.1	SSES is located on a freshwater river.
Groundwater-quality degradation (cooling ponds in salt marshes)	1	4.8.3	SSES is located on a freshwater river.
Groundwater-quality degradation (cooling ponds at inland sites)	2	4.8.3	SSES is located on a freshwater river and does not use a cooling pond.
TERRESTRIAL RESOURCES			
Cooling pond impacts on terrestrial resources	1	4.4.4	SSES does not use a cooling pond.

1
2
3 **F.1 References**
4

5 10 CFR Part 51. *Code of Federal Regulations*, Title 10, *Energy*, Part 51, "Environmental
6 Protection Regulations for Domestic Licensing and Related Regulatory Functions."

7
8 U.S. Nuclear Regulatory Commission (NRC). 1996. *Generic Environmental Impact Statement*
9 *for License Renewal of Nuclear Plants*. NUREG-1437, Volumes 1 and 2, Washington, D.C.

10
11 U.S. Nuclear Regulatory Commission (NRC). 1999. *Generic Environmental Impact Statement*
12 *for License Renewal of Nuclear Plants: Main Report*, "Section 6.3, Transportation, Table 9.1,
13 Summary of Findings on NEPA Issues for License Renewal of Nuclear Power Plants, Final
14 Report." NUREG-1437, Volume 1, Addendum 1, Washington, D.C.
15
16

Appendix G

U.S. Nuclear Regulatory Commission Staff Evaluation of Severe Accident Mitigation Alternatives (SAMAs) for Susquehanna Steam Electric Station Units 1 and 2 in Support of License Renewal Application Review

Appendix G

U.S. Nuclear Regulatory Commission Staff Evaluation of Severe Accident Mitigation Alternatives (SAMAs) for Susquehanna Steam Electric Station Units 1 and 2 in Support of License Renewal Application Review

G.1 Introduction

PPL Susquehanna, LLC (PPL) submitted an assessment of severe accident mitigation alternatives (SAMAs) for Susquehanna Steam Electric Station (SSES) as part of the environmental report (ER) (PPL 2006). This assessment was based on the most recent SSES probabilistic risk assessment (PRA) available at that time, a plant-specific offsite consequence analysis performed using the MELCOR Accident Consequence Code System 2 (MACCS2) computer code, and insights from the SSES individual plant examination (IPE) (PPL 1991) and the IPE of external events (IPEEE) (PPL 1994). In identifying and evaluating potential SAMAs, PPL considered SAMAs that addressed the major contributors to core damage frequency (CDF) and population dose at SSES, as well as SAMA candidates for other operating plants which have submitted license renewal applications. PPL identified 15 potential SAMA candidates. This list was reduced to 11 unique SAMAs by eliminating SAMAs that were determined to provide no measurable benefit or have estimated costs that would exceed the dollar value associated with completely eliminating all severe accident risk at SSES. PPL assessed the costs and benefits associated with each of the potential SAMAs and concluded in the ER that several of the candidate SAMAs evaluated 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 PPL by letter dated January 16, 2007 (NRC 2007a). Key questions concerned: PRA revisions since the IPE and major changes implemented in each version; the current Level 2 PRA model and the approach used to assign source term and release characteristics for each release category; uncertainties in the fire analysis results and their impact in the SAMA identification process; the potential for additional SAMAs specific to fire events; and further information on the costs and benefits of several specific candidate SAMAs and low cost alternatives. SSES submitted additional information by letters dated April 12, 2007 (PPL 2007a) and July 3, 2007 (PPL 2007b). In response to the RAIs, SSES provided: a summary of the major changes made in each PRA revision since the IPE; a description of the Level 2 model and the process for assigning severe accident source terms; a discussion of the technical issue causing the increase in fire CDF mentioned in the

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1 NRC staff's review of the IPE and its applicability to the other fire zones in the fire CDF; a
2 discussion of the potential for SAMAs to address the unique cause of a fire; and additional
3 information regarding several specific SAMAs. PPL's responses addressed the NRC staff's
4 concerns.

5
6 An assessment of SAMAs for SSES is presented below.

7
8 ENCLOSURE
9

10 **G.2 Estimate of Risk for Susquehanna Steam Electric Station**

11
12 PPL's estimates of offsite risk at the SSES are summarized in Section G.2.1. The summary is
13 followed by the NRC staff's review of PPL's risk estimates in Section G.2.2.

14 **G.2.1 PPL's Risk Estimates**

15
16
17 Two distinct analyses are combined to form the basis for the risk estimates used in the SAMA
18 analysis: (1) the SSES Level 1 and 2 PRA model, which is an updated version of the IPE
19 (PPL 1991), and (2) a supplemental analysis of offsite consequences and economic impacts
20 (essentially a Level 3 PRA model) developed specifically for the SAMA analysis. The SAMA
21 analysis is based on the most recent SSES Level 1 and 2 PRA models available at the time of
22 the ER, referred to as the Feb06preEPU and Feb06EPU models. These two models reflect the
23 plant's configuration before and after, respectively, the implementation of the extended power
24 uprate (EPU). The SSES SAMA analysis contained in the ER uses both models in a parallel
25 evaluation to document how the proposed EPU could impact the results. For purposes of its
26 SAMA evaluation, the NRC staff relied on results from the post-EPU model since this model
27 generally provides CDF, population dose, and SAMA benefit estimates that bound those from
28 the pre-EPU model. The scope of the SSES PRA does not include external events.

29
30 The baseline CDF for the purpose of the SAMA evaluation is approximately 1.97×10^{-6} per year
31 for Unit 1 and 1.94×10^{-6} per year for Unit 2 following implementation of the EPU. The CDF is
32 based on the risk assessment for internally-initiated events. PPL did not include the
33 contribution from external events within the SSES risk estimates; however, it did account for the
34 potential risk reduction benefits associated with external events by doubling the estimated
35 benefits for internal events. This is discussed further in Sections G.2.2 and G.6.2.

36
37 The breakdown of CDF by initiating event is provided in Table G-1. The results shown are for
38 Unit 1, but are also representative of those for Unit 2. As shown in this table, events initiated by
39 loss of offsite power are the dominant contributors to CDF. As reported by PPL in their
40 responses to NRC questions (PPL 2007a), station blackout (SBO) sequences contribute

1 3.2×10^{-7} per year and 2.3×10^{-7} per year (17 percent and 13 percent of the total internal events
 2 CDF) for Units 1 and 2, respectively. Anticipated transient without scram (ATWS) sequences
 3 contribute 9.5×10^{-8} per year and 9.7×10^{-8} per year to CDF (about 5 percent of the total
 4 internal events CDF) for Units 1 and 2, respectively.
 5

6 The current SSES PRA consists of a fully integrated set of Level 1 and Level 2 event trees and
 7 is an extension of prior models which focused on large early release (LERF) and non-LERF end
 8 states. The extended model includes additional system-based and phenomenological top
 9 events. The sequence end points of this extended model are assigned to one of 12 release
 10 categories based on timing and expected magnitude of release. The release category
 11 definitions are provided in Tables E.2-1 and E.2-2 of the ER, and the frequency of each release
 12 category is given in Table E.2-3. The frequency of each release category was obtained by
 13 summing the frequency of the individual accident progression endpoints binned into the release
 14 category.
 15

16 The release characteristics (release fractions, timing, etc.) for each release category are based
 17 on the results of an accident progression analysis for a representative sequence for that
 18 category using Version 4.05 of the Modular Accident Analysis Program (MAAP) computer code.
 19 The MAAP case was selected primarily so that the timing and magnitude of release would agree
 20 with that for the release category. The release fractions and times for each release category
 21 are provided in Table E.2-4 of the ER.
 22
 23
 24

Table G-1. SSES Core Damage Frequency

Initiating Event	CDF (Per Year)	Percent Contribution to CDF
Loss of offsite power	1.4×10^{-6}	72
Trip w/o MSIV closure	1.8×10^{-7}	9
Interfacing system LOCA	1.1×10^{-7}	6
Loss of DC power bus	8.8×10^{-8}	4
Small LOCA	4.9×10^{-8}	3
MSIV Closure	4.4×10^{-8}	2
Manual shutdown	1.8×10^{-8}	1
Medium LOCA	1.6×10^{-8}	1
Internal flooding	1.5×10^{-8}	1
Excessive rupture	1.0×10^{-8}	1
Others	1.8×10^{-8}	1
Total CDF	2.0×10^{-6}	100

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1 The offsite consequences and economic impact analyses use the MACCS2 code to determine
2 the offsite risk impacts on the surrounding environment and public. Inputs for these analyses
3 include plant-specific and site-specific input values for core radionuclide inventory, source term
4 and release characteristics, site meteorological data, projected population distribution (within an
5 80-kilometer [50-mile] radius) for the year 2044, emergency response evacuation modeling, and
6 economic data. The core radionuclide inventory is derived from an Oak Ridge Isotope
7 Generator (ORIGEN) 2.1 using best estimate, end of cycle values for the SSES core. The
8 magnitude of the onsite impacts (in terms of clean-up and decontamination costs and
9 occupational dose) is based on information provided in NUREG/BR -0184 (NRC 1997b).

10
11 In the ER, PPL estimated the dose to the population within 80 kilometers (50 miles) of the SSES
12 site to be approximately 0.0190 person-sievert (SV) (1.90 person-rem) per year for both units.
13 The breakdown of the total population dose by containment release mode is summarized in
14 Table G-2. The results shown are for Unit 1, but are also representative of those for Unit 2.
15 Containment failures within the intermediate time frame (greater than 6 hours but less than
16 24 hours following accident initiation) dominate the population dose risk at SSES.

17
18 **Table G-2. Breakdown of Population Dose by Timing of Containment Release**

Timing of Containment Release	Population Dose (Person-Rem Per Year)^(a)	% Contribution^(b)
Early Containment Failure	0.52	27
Intermediate Containment Failure	1.20	63
Late Containment Failure	0.18	9
Intact Containment	negligible	negligible
Total CDF	1.90	100

(a) One person-Rem = 0.01 person-Sv.
(b) Does not total 100 percent due to round off.

20 21 22 **G.2.2 Review of PPL's Risk Estimates**

23
24 PPL's determination of offsite risk at SSES is based on the following three major elements of
25 analysis:

- 26
27 • The Level 1 and 2 risk models that form the bases for the 1991 IPE submittal
28 (PPL 1991), and the external event analyses of the 1994 IPEEE submittal (PPL 1994),
29

- 1 • The major modifications to the IPE model that have been incorporated in the SSES
2 Feb06EPU model, and
- 3
- 4 • The MACCS2 analyses performed to translate fission product source terms and release
5 frequencies from the Level 2 PRA model into offsite consequence measures.
6

7 Each of these analyses was reviewed to determine the acceptability of PPL's risk estimates for
8 the SAMA analysis, as summarized below.
9

10 The NRC staff's review of the SSES IPE is described in NRC reports dated October 27, 1997
11 (NRC 1997a), and August 11, 1998 (NRC 1998). Based on a review of the IPE submittals, the
12 NRC staff concluded that the IPE submittal met the intent of Generic Letter (GL) 88-20; that is,
13 the licensee's IPE process is capable of identifying the most likely severe accidents and severe
14 accident vulnerabilities. The IPE did not identify any severe accident vulnerabilities associated
15 with either core damage or poor containment performance.
16

17 Although no vulnerabilities were identified in the IPE, several plant improvements were identified
18 and considered for implementation at the plant. These improvements have been either
19 implemented at the site, or addressed by an alternate SAMA in the current evaluation
20 (PPL 2006).
21

22 There have been eight revisions to the original IPE model since the 1991 IPE submittal. The
23 February 2006 PRA model used for the SAMA analysis is considered to be the current model.
24 (A subsequent revision was made in August 2006 that resulted in a minor reduction in CDF, but
25 the SAMA analysis was not revised to reflect the August 2006 revision.) A comparison of
26 internal events CDF between the 1998 IPE revision and the current PRA model indicates an
27 increase of approximately a factor of 3 for both Units 1 and 2. A description of those changes
28 that resulted in the greatest impact on the internal events CDF was provided in response to a
29 staff request for additional information (PPL 2007a), and is summarized in Table G-3.
30

31 The CDF value from the revised IPE (1998) submittal (5.6×10^{-7} per year) is well below the
32 average of the CDF values reported in the IPEs for BWR 3/4 plants. Figure 11.2 of NUREG-
33 1560 shows that the IPE-based total internal events CDF for BWR 3/4 plants ranges from
34 1×10^{-7} per year (the original SSES IPE value) to 8×10^{-5} per year, with an average CDF for the
35 group of 2×10^{-5} per year (NRC 1997c). It is recognized that other plants have updated the
36 values for CDF subsequent to the IPE submittals to reflect modeling and hardware changes.
37 The current internal events CDF results for SSES remain lower than that for other plants of
38 similar vintage and characteristics.
39
40

Table G-3. SSES PRA Historical Summary

PRA Version	Summary of Changes from Prior Model	CDF (per year)
Original IPE (1991)	Original IPE submittal (PPL 1991)	8×10^{-8}
Revised IPE (1998)	Revised in response to NRC initial SER (NRC 1997a) on original IPE - Revised treatment of common cause failure - Revised human reliability analysis - Revised plant specific data analysis	5.6×10^{-7}
Modified IPE (1/2002)	Included enhancements implemented as a result of the IPE	3.7×10^{-7}
Modified IPE (8/2002)	- Corrected treatment of offsite power recovery - Eliminated credit for manual rod insertion on LOOP - Eliminated credit for manual HPCI suction transfer	5.3×10^{-7}
Revised IPE (10/2002)	- Assumed all containment failures or venting leads to core damage - Eliminated credit for high-pressure make-up using CRD pumps - Eliminated credit for late injection following containment failure - Eliminated credit for RWCU blowdown as a heat removal method	2.3×10^{-5}
012903 (1/2003)	- Added credit for 'E' EDG as backup for the Blue Max portable generator to supply power to the 125 VDC battery chargers - Limited changes to event trees based on analyses using the BWR SAR code - Change core damage success criteria to be <1800°F peak clad temperature - Added LOOP initiating event fault tree - Added credit for late injection following containment failure or venting from systems outside the reactor building	2.5×10^{-6}
SSESCertR20 (10/2003)	- Updated event trees to be consistent with current EOPs - Added event trees for inadvertent opening of a relief valve (IORV) and interfacing system LOCA - Extended sequence progression to more realistically model radiological releases when containment fails prior to the occurrence of core damage - Changed number of ADS SRVs required for medium LOCA depressurization success	3.2×10^{-6}
Feb05 (2/2005)	- Updated model in response to significant peer review Level B facts and observations (No Level A-level F&Os received) - Added flooding initiators - Created a single model including both units - Eliminated credit for operator recovery actions in the reactor building following core damage	3.0×10^{-6} (Unit 1) 2.8×10^{-6} (Unit 2)

Table G-3. (contd)

PRA Version	Summary of Changes from Prior Model	CDF (per year)
Feb06EPU (2/2006)	<ul style="list-style-type: none"> - Created a separate two-unit model for post-EPU conditions - Completely revised event trees with success criteria based on MAAP4 calculations - Added complete Level 2 model (twelve specific release categories) - Revised LOOP frequency based on INEEL/EXT-0402326 - Used industry standard core damage criteria for ATWS stability events - Modified large and medium LOCA success criteria to one loop of CS and one division of ADS (3 valves) 	<p>2.0×10^{-6} (Unit 1)</p> <p>1.9×10^{-6} (Unit 2)</p>

1
2 The NRC staff considered the peer reviews performed for the SSES PRA, and the potential
3 impact of the review findings on the SAMA evaluation. In the ER, PPL described the peer
4 review by the Boiling Water Reactors Owner's Group (BWROG) of the SSES CertR20 PRA
5 Model conducted in October 2003. The BWROG review concluded that all of the PRA technical
6 elements were sufficient to support applications involving risk ranking and that with the
7 exception of the Containment Performance and the Maintenance & Update elements, all of the
8 PRA technical elements were sufficient to support applications involving risk significance
9 determinations supported by deterministic analysis. The ER lists all significant Facts and
10 Observations (F&Os) and their applicable status in ER Section E.2.3.1. It should be noted that
11 the containment performance assessment (Level 2 PRA) has been completely revised and
12 extended subsequent to the BWROG review. The ER also states that for the Maintenance &
13 Update element, a PRA maintenance and update procedure was issued, which defines the
14 process used by PPL to develop, control, and update the Susquehanna PRA.

15
16 The ER states that the peer review identified no Level A F&Os (important and necessary to
17 address before the next regular PRA update), and that the Level B F&Os (important and
18 necessary to address but disposition may be deferred until the next PRA update) determined to
19 be the most significant in their effect on the PRA results were resolved as part of the Feb05
20 PRA model revision. The remainder of the Level B F&Os were scheduled to be resolved prior
21 to the next scheduled model periodic update (i.e., the Feb06 model).

22
23 The ER describes a self-assessment of the Feb05 model performed by PPL using the guidance
24 included in RG1.200. This review indicated that some of the remaining open Level B F&Os
25 must be addressed to support the EPU implementation. ER Table E.2-5 tabulates 19 open
26 items and indicates their disposition for the FEB06 PRA model. These F&Os were either
27 resolved by incorporating changes in the current PRA models or judged not to have a significant
28 impact on the EPU application. In response to an RAI, PPL clarified that the self-assessment

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1 was performed to support the SAMA assessment as well as the EPU and that remaining open
2 items were judged not to significantly impact the SAMA assessment (PPL 2007a).

3
4 Given that the SSES internal events PRA model has been peer-reviewed and the peer review
5 findings were either addressed or judged to have no adverse impact on the SAMA evaluation,
6 and that PPL has satisfactorily addressed NRC staff questions regarding the PRA, the NRC
7 staff concludes that the internal events Level 1 PRA model is of sufficient quality to support the
8 SAMA evaluation.

9
10 As indicated above, the current SSES PRA does not include external events. In the absence of
11 such an analysis, PPL used the SSES IPEEE to identify the highest risk accident sequences
12 and the potential means of reducing the risk posed by those sequences, as discussed below.

13
14 The SSES IPEEE was submitted in June 1994 (PPL 1994), in response to Supplement 4 of
15 Generic Letter 88-20 (NRC 1991a). This submittal included a seismic margin analysis, a fire
16 PRA, and a screening analysis for other external events. While no fundamental weaknesses or
17 vulnerabilities to severe accident risk in regard to the external events were identified, several
18 opportunities for seismic and fire risk reduction were identified as discussed below. In a letter
19 dated April 27, 1999, the NRC staff concluded that the submittal met the intent of Supplement 4
20 to Generic Letter 88-20, and that the licensee's IPEEE process is capable of identifying the
21 most likely severe accidents and severe accident vulnerabilities (NRC 1999).

22
23 The SSES IPEEE used a focused scope Electric Power Research Institute (EPRI) seismic
24 margins analysis. This method is qualitative and does not provide numerical estimates of the
25 CDF contributions from seismic initiators (EPRI 1991). For this assessment, a detailed
26 walkdown was performed in which components were screened using an overall high confidence
27 of low probability of failure (HCLPF) capacity of 0.3g, the review level earthquake (RLE) value
28 for the plant, and the screening level that would be used for a focused-scope plant. All
29 components either met the 0.3g HCLPF capacity, or, for the four items with lower HCLPF
30 values, would have low risk significance and would not warrant further enhancement as
31 discussed in Section G.3.2.

32
33 The SSES IPEEE fire analysis employed a fire probabilistic risk analysis following the general
34 approach of the PRA Procedures Guide, NUREG/CR-2300 (NRC 1983). The methodology
35 consists of four parts: fire hazard analysis, fire propagation analysis, plant and system analysis
36 and release frequency analysis. The hazard analysis is primarily a screening to eliminate fire
37 zones which are considered to be risk-insignificant and determining the frequency of fires in
38 remaining zones. The fire propagation analysis is the determination of the impacts a fire has on
39 cables and equipment in the fire zone. The system analysis is the determination of the
40 consequences of the damaged cables or equipment on the ability to reach safe shutdown. The
41 release frequency analysis uses the above information to determine the CDF. The last two

1 steps utilized the models and data from the SSES IPE to assess the failure frequency of the
2 remaining success path.

3
4 In the original IPEEE submittal (PPL 1994) the fire CDF was reported to be 1×10^{-9} per cycle
5 (taken to be a refueling cycle of 12 to 18 months). This was subsequently revised to 4.5×10^{-8}
6 per cycle in response to an NRC audit of the IPEEE (PPL 1998). The dominant fire areas and
7 their contributions to the fire CDF are listed in Table G-4.
8

Table G-4. Fire Areas and Their Contribution to Fire CDF

Fire Area	Area Description	CDF(a)
1-2B	Reactor Building Access Corridor El. 670'	2.1×10^{-9}
0-28B-II	Battery Charger Area	1.3×10^{-9}
0-27C	Upper Cable Spreading Room	3.5×10^{-10}
0-25E	Lower Cable Spreading Room	3.3×10^{-9}
15 zones	Various	3.3×10^{-8}
0-26H	Main Control Room	5.1×10^{-9}
Total Fire CDF		4.5×10^{-8}

(a) The CDF calculated in the revised fire IPEEE was only 4.52×10^{-8} per cycle, which corresponds to a CDF of about 3.62×10^{-8} per reactor year given an 18 month fuel cycle with 15 months of on-line operation. Although the reported CDFs were calculated per cycle, it is reasonable and somewhat conservative to report fire CDFs on a per year basis.

9
10 In the ER, PPL states that the use of the fire PRA results as a reflection of CDF may be
11 inappropriate and that while the fire PRA is generally self-consistent within its calculational
12 framework, the fire PRA does not compare well with internal events PRAs because of limitations
13 on the state of technology for fire PRA, lack of an update program, and some divergences from
14 what were typical fire modeling techniques.
15

16 Even after revising the fire risk results in response to the NRC audit, the NRC in the IPEEE SER
17 found that the fire CDF may be too low by as much as three orders of magnitude (NRC 1999).
18 The NRC staff requested PPL to address the impact of this issue on the assumption that the fire
19 CDF is approximately equal to the internal events CDF. In response, PPL noted that a three
20 order of magnitude increase from the originally reported value of 1.0×10^{-9} per cycle is fairly
21 consistent with the assumption in the SAMA analysis that the fire CDF is about equal to the
22 internal events CDF of 2.0×10^{-6} per year. In addition, PPL reported the results of a new fire
23 analysis which utilized a current cable and raceway database and the current Level 1 internal
24 events PRA model (PPL 2007b). The analysis is stated to utilize conservative assumptions

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1 (e.g. all cables in the zone are damaged due to a large fire, BOP systems are assumed to be
2 unavailable, and in the most vulnerable fire zones, off-site power is failed. The result of this
3 new analysis indicates a fire CDF of 9.2×10^{-7} per year with credit for automatic and manual fire
4 suppression, 2.7×10^{-6} per year with only credit for manual suppression, and 2.7×10^{-5} per year
5 with no credit for either automatic or manual suppression. PPL concludes and the NRC staff
6 concurs that these results support the assumption of the SAMA analysis that the fire CDF is
7 approximately equal to that for internal events.

8
9 The IPEEE analysis of high winds, floods, and other external events followed the screening and
10 evaluation approaches specified in Supplement 4 of FL 88-20 (NRC 1991a) and did not identify
11 any significant sequences or vulnerabilities (PPL 1994). Based on this result, PPL concluded
12 that these other external hazards would not be expected to impact the conclusions of the SAMA
13 analysis and did not consider them further. It is noted that the risks from deliberate aircraft
14 impacts were explicitly excluded since this was being considered in other forums along with
15 other sources of sabotage.

16
17 Based on the aforementioned results, PPL assumed that the external events CDF is
18 approximately equal to the internal events CDF. Accordingly, the total CDF from internal and
19 external events would be approximately 2 times the internal events CDF. In the SAMA analysis
20 submitted in the ER, PPL doubled the benefit that was derived from the internal events model to
21 account for the combined contribution from internal and external events. The exception to this
22 is SAMA 9 – develop procedures and install pre-staged cables to bypass failed DC bus in order
23 to power critical loads. In the ER, PPL explained that a separate contribution is included in the
24 benefit assessment for SAMA 9 to specifically address the fire contributions from a fire zone
25 (Fire Zone 0-28B-II) where fire damage could render critical DC equipment inoperable. The
26 NRC staff agrees with the licensee's overall conclusion concerning the multiplier used to
27 represent the impact of external events and concludes that the licensee's use of a multiplier of 2
28 to account for external events is reasonable for the purposes of the SAMA evaluation.

29
30 The NRC staff reviewed the general process used by PPL to translate the results of the Level 1
31 PRA into containment releases, as well as the results of the Level 2 analysis, as described in
32 the ER and in response to NRC staff requests for additional information. The SSES PRA
33 consists of a fully integrated set of Level 1 and Level 2 event trees and is an extension of prior
34 models which focused on large early release (LERF) and non-LERF end states. The current
35 model and these prior models are not upgrades of the IPE but are completely new models. The
36 extended portions of the model include additional system-based and phenomenological top
37 events.

38
39 Approximately 25 event trees are used to model the full spectrum of initiating events from
40 sequence initiation to containment response to atmospheric release characterization. Each
41 event tree end state was referenced to a MAAP case by utilizing a strategy that considered

1 availability of containment, location of containment failure, availability of the suppression pool,
2 status of containment sprays, and accident sequence timing. The sequence end points are
3 then assigned to one of 12 release categories based on timing and magnitude of release. The
4 release category definitions are provided in Tables E.2-1 and E.2-2 of the ER, and the
5 frequency of each release category is given in Table E.2-3.

6
7 The release characteristics (release fractions, timing, etc.) for each release category are based
8 on the results of a representative MAAP4.05 analysis for that category. The MAAP case was
9 selected primarily so that the timing and magnitude of release would agree with that for the
10 release category. The release fractions and times for each release category are provided in
11 Table E.2-4 of the ER.

12
13 The NRC staff's review of the IPE concluded that, while the intent of GL 88-20 was met, several
14 weaknesses remained in the licensee's back-end (Level 2) analysis. In Section E.2.3.2 of the
15 ER, PPL describes how each of these weaknesses has been addressed and corresponding
16 changes had been made in the SSECertR20 PRA model reviewed by the BWROG in 2003.
17 Despite these changes, the results of the BWROG peer review provided in Section E.2.3.3 of
18 the ER indicate that the containment performance PRA element (which addresses only LERF
19 considerations) was given only a summary grade of 2 indicating that it is supportive of risk-
20 ranking applications but not fully supportive of absolute risk determinations. In response to an
21 RAI, PPL indicated that the five F&Os related to the Level 2 PRA were addressed in the
22 expanded Level 2 analysis performed for the license renewal and EPU applications (PPL
23 2007a). PPL also indicated that the current Level 2 analysis had the benefit of input and/or
24 review by recognized industry consultants (PPL 2007a and 2007b). Based on the NRC staff's
25 review of the Level 2 methodology, the fact that the Level 2 model was reviewed in more detail
26 as part of the BWROG peer review and the PPL self-assessment and resulting comments
27 addressed in the expanded Level 2 model used in the SAMA analysis, and the responses to the
28 RAIs concerning the analysis and review process, the NRC staff concludes that the Level 2
29 PRA provides an acceptable basis for evaluating the benefits associated with various SAMAs.

30
31 As indicated in the ER and clarifying RAI responses, the reactor core radionuclide inventory
32 used in the consequence analysis was derived from a 2004 plant-specific ORIGEN 2.1
33 calculation and corresponds to best estimate, end-of-cycle values for a 24-month fuel cycle and
34 the licensed thermal power of 3489 MWth (PPL 2006 and 2007a). In response to a staff
35 question, PPL indicated that for the post-EPU analysis, these results were linearly scaled to
36 4031 MWth (post-EPU licensed power plus 2 percent). All releases were modeled as occurring
37 at 60 meters (197 feet) (top of the reactor building) with an assumed thermal content of
38 1×10^7 watts. PPL assessed the impact of alternative assumptions (i.e., ground level releases
39 and thermal content same as ambient) in sensitivity analyses. The results of these analyses
40 showed that the elevated release and higher thermal content were slightly conservative.
41

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1 The NRC staff reviewed the process used by SSES to extend the containment performance
2 (Level 2) portion of the PRA to an assessment of offsite consequences (essentially a Level 3
3 PRA). This included consideration of the source terms used to characterize fission product
4 releases for the applicable containment release categories and the major input assumptions
5 used in the offsite consequence analyses. The MACCS2 code was utilized to estimate offsite
6 consequences. Plant-specific input to the code includes the source terms for each release
7 category and the reactor core radionuclide inventory (both discussed above), site-specific
8 meteorological data, projected population distribution within an 80-kilometer (50-mile) radius for
9 the year 2044, emergency evacuation modeling, and economic data. This information is
10 provided in Attachment E of the ER.
11

12 PPL used site-specific meteorological data for the 2001 calendar year as input to the MACCS2
13 code. The data were collected from the onsite meteorological tower. Data from 2002 and 2003
14 was also considered, but the 2001 data was chosen because it was the most complete and
15 because results of a MACCS2 sensitivity case comparing the use of 2002 and 2003 data
16 indicated that the 2001 data produced slightly more conservative results (i.e., about a 8 to
17 9 percent increase in offsite economic cost risk). There were two gaps of missing data. One
18 gap of less than six consecutive hours was filled by interpolation between data points. The
19 other gap of 52 hours was filled using data from the previous or following hours or days. The
20 NRC staff notes that previous SAMA analysis results have shown little sensitivity to year-to-year
21 differences in meteorological data and concludes that the use of the 2001 meteorological data
22 in the SAMA analysis is reasonable.
23

24 The population distribution the licensee used as input to the MACCS2 analysis was estimated
25 for the year 2044, using SECPOP2000 (NRC 2003), U.S. Census block-group level population
26 data (USCB 2000a) and population growth rate estimates (USCB 2000b). The 1990 and 2000
27 county-level census data were used to estimate the annual population growth rate for each of
28 the 50-mile radius rings (USCB 2000b). PPL states that the annual population growth estimate
29 for each ring was applied uniformly to all sectors in the ring to calculate the year 2044
30 population distribution. A population sensitivity case was performed assuming a 30 percent
31 uniform increase in population for all sectors within the 50-mile (80-km) radius. The result was
32 a 27 percent increase in population dose risk and in offsite economic cost risk. The NRC staff
33 considers the methods and assumptions for estimating population reasonable and acceptable
34 for purposes of the SAMA evaluation.
35

36 The emergency evacuation model assumed a single evacuation zone extending out
37 16 kilometers (10 miles) from the plant. It was assumed that 95 percent of the population would
38 move at an average speed of approximately 0.97 meters per second (2.2 mph) with a delayed
39 start time of 60 minutes (PPL 2006). This assumption is conservative relative to the NUREG-
40 1150 study (NRC 1990), which assumed evacuation of 99.5 percent of the population within the
41 emergency planning zone. A sensitivity analysis was performed in which the evacuation speed

1 was decreased by 50 percent. The result was an 11 percent increase in the total population
2 dose. A second sensitivity analysis was performed in which the start time of evacuation was
3 delayed from 60 minutes to 90 minutes. The result was a 2 percent increase in the total
4 population dose. The NRC staff concludes that the evacuation assumptions and analysis are
5 reasonable and acceptable for the purposes of the SAMA evaluation.
6

7 Much of the site-specific economic data was provided from SECPOP2000 (NRC 2003) by
8 specifying the data for each of the counties surrounding the plant to a distance of 50 miles
9 (80 km). SECPOP2000 utilizes economic data from the 1997 Census of Agriculture
10 (USDA 1998). In addition, generic economic data that applied to the region as a whole were
11 revised from the MACCS2 sample problem input when better information was available. This
12 data was adjusted to the year 2000 using the consumer price index. These revised parameters
13 included the value of farm and non-farm wealth.
14

15 Subsequent to the ER, several input/output problems related to use of the SECPOP2000 code
16 were identified. PPL performed a re-analysis of the benefit estimates using corrected
17 input/output, and found that the net values calculated for each of the SAMA candidates would
18 be slightly reduced (PPL 2007c). Thus, the overall results of the SAMA assessment were not
19 affected. This is discussed further in Section G.6.1.
20

21 The NRC staff concludes that the methodology used by PPL to estimate the offsite
22 consequences for SSES provides an acceptable basis from which to proceed with an
23 assessment of risk reduction potential for candidate SAMAs. Accordingly, the NRC staff based
24 its assessment of offsite risk on the CDF and offsite doses reported by PPL.
25

26 **G.3 Potential Plant Improvements**

27

28 The process for identifying potential plant improvements, an evaluation of that process, and the
29 improvements evaluated in detail by PPL are discussed in this section.
30

31 **G.3.1 Process for Identifying Potential Plant Improvements**

32

33 PPL's process for identifying potential plant improvements (SAMAs) consisted of the following
34 elements:
35

- 36 • Review of the most significant basic events from the current plant-specific PRA,

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- 1 • Review of potential plant improvements identified in the SSES IPE, and IPEEE,
- 2
- 3 • Review of dominant fire areas from the Fire PRA and SAMAs that could potentially
- 4 reduce the associated fire risk,
- 5
- 6 • Review of Phase II SAMAs from license renewal applications for other U.S. nuclear
- 7 sites, and
- 8
- 9 • Review of other industry documentation discussing potential plant improvements.

10
11 Based on this process, an initial set of 15 potential SAMA candidates (14 SAMA candidates with
12 one containing two options), referred to as Phase I SAMAs, was identified. In Phase I of the
13 evaluation, PPL performed a qualitative screening of the initial list of SAMAs and eliminated
14 SAMAs from further consideration using the following criteria:

- 15 • The SAMA was determined to provide no measurable benefit, or
- 16
- 17 • The SAMA has estimated costs that would exceed the dollar value associated with
- 18 completely eliminating all severe accident risk at SSES.
- 19

20
21 Based on this screening, four SAMAs were eliminated, leaving 11 unique SAMAs for further
22 evaluation. The remaining SAMAs, referred to as Phase II SAMAs, are listed in Table E.6-1 of
23 the ER (PPL 2006). In Phase II, a detailed evaluation was performed for each of the 11
24 remaining SAMA candidates, as discussed in Sections G.4 and G.6 below. To account for the
25 potential impact of external events, the estimated benefits based on internal events were
26 multiplied by a factor of 2.0 (with the exception of SAMA 9 for which the benefits from fire events
27 were separately assessed).

28 29 **G.3.2 Review of PPL's Process**

30
31 PPL's efforts to identify potential SAMAs focused primarily on areas associated with internal
32 initiating events, but also included explicit consideration of potential SAMAs for fire and seismic
33 events. The initial list of SAMAs generally addressed the accident sequences considered to be
34 important to CDF from functional, initiating event, and risk reduction worth perspectives at
35 SSES, and included selected SAMAs from prior SAMA analyses for other plants.

36
37 PPL provided a tabular listing of the PRA basic events sorted according to their risk reduction
38 worth (RRW) (PPL 2006). SAMAs impacting these basic events would have the greatest
39 potential for reducing risk. PPL used a RRW cutoff of 1.02, which corresponds to about a two-
40 percent change in CDF given 100-percent reliability of the SAMA. This equates to a benefit of
41 approximately \$21,000 (for Units 1 and 2 combined, after the benefits have been multiplied to

1 account for external events, and assuming post-EPU conditions). PPL also provided and
2 reviewed the LERF-based RRW events down to an RRW of 1.02. PPL correlated the basic
3 events with highest risk importance in the Level 1 and 2 PRA with the SAMAs evaluated in
4 Phase I or Phase II, and showed that, with a few exceptions, all of the significant basic events
5 are addressed by one or more SAMAs (PPL 2006). Of the basic events of high risk importance
6 that are not addressed by SAMAs, each is closely tied to other basic events that had been
7 addressed by one or more SAMAs.

8
9 For a number of the Phase II SAMAs listed in the ER, the information provided did not
10 sufficiently describe the proposed modification. Therefore, the NRC staff asked the licensee to
11 provide more detailed descriptions of the modifications for several of the Phase II SAMA
12 candidates (NRC 2007a). In response to the RAI, PPL provided the requested information
13 (PPL 2007a).

14
15 The NRC staff questioned PPL about lower cost alternatives to some of the SAMAs evaluated
16 (NRC 2007a), including:

- 17 • Developing guidance/procedures for local, manual control of reactor core isolation
18 cooling following loss of DC power, and
- 19 • Developing procedures to control containment venting to avoid adverse impacts on
20 emergency core cooling system.

21
22
23
24 In response to the RAIs, PPL addressed the suggested lower cost alternatives (PPL 2007a).
25 This is discussed further in Section G.6.2.

26
27 Although the IPE did not identify any vulnerabilities, nine potential enhancements to the plant,
28 procedures, and training at SSES were identified as part of the IPE process. The nine
29 enhancements include:

- 30
31 • Revise the control strategy for high pressure coolant injection (HPCI) suction transfer,
32 and raise the HPCI / Reactor Core Isolation Cooling (RCIC) back-pressure trip setpoints
33 in order to ensure timely availability and alignment of HPCI and RCIC for high pressure
34 injection,
- 35 • Provide guidance for aligning the Control Rod Drive system for reactor vessel high
36 pressure makeup,
- 37 • Revise guidance regarding primary containment control; e.g., use of Reactor Water
38 Cleanup (RWCU) for heat removal, water mass addition to the suppression pool as a
39 means of slowing containment pressurization, redefinition of the Heat Capacity
40
41

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1 Temperature Limit (HCTL), and priority on core integrity protection rather than
2 containment integrity,

- 3
- 4 • Revise guidance regarding reactor pressure vessel (RPV) flooding actions to allow
5 adequate core cooling to be verified even when reactor water level instrumentation is not
6 available,
- 7
- 8 • Revise guidance regarding reactor scram recovery actions to ensure that plant cool
9 down does not occur unless the reactor is shutdown with control rods,
- 10
- 11 • Provide guidance to vent primary containment when fission products have not been
12 released from the core and specific plant conditions exist,
- 13
- 14 • Revise the control logic which would allow immediate operator control of low pressure
15 coolant injection (LPCI) and Core Spray injection and install a bypass switch on the Low
16 Pressure Permissive,
- 17
- 18 • Provide an alternate, independent power supply for the Condensate Transfer Pumps,
19 and
- 20
- 21 • Revise guidance regarding reactor vessel level control to allow safety relief valves
22 (SRVs) to cycle automatically rather than to be manually operated.
- 23

24 PPL noted that the first six of these enhancements have been implemented. The seventh
25 enhancement, to revise the LPCI and Core Spray injection control logic and install a bypass
26 switch on the Low Pressure Permissive, was only implemented for Core Spray. With regard to
27 the LPCI modification, PPL indicated that the current SSES PRA shows that these control logic
28 issues are no longer an important issue and no further review is required (PPL 2006). The
29 eighth enhancement, to provide alternate power to the condensate transfer pumps, was not
30 implemented but was determined to be adequately addressed through the installation of a head
31 tank. The ninth enhancement, to revise guidance regarding reactor vessel level control to allow
32 SRVs to cycle automatically rather than be manually operated, was not implemented based on
33 a determination that it is not required for safe operation of the plant. The NRC staff requested
34 that PPL provide a further description of the disposition of this enhancement. In response, PPL
35 stated that the RPV pressure control procedures in place at SSES are in conformance with
36 current BWROG guidance and are considered safer than those recommended in the IPE (which
37 were based on an earlier version of the BWROG Emergency Procedure Guidelines) since they
38 will avoid undesirable cycling of the safety relief valves (PPL 2007a).

39
40 Based on this information, the NRC staff concludes that the set of SAMAs evaluated in the ER
41 address the major contributors to internal event CDF.

1 PPL did not identify SSES-specific candidate SAMAs for seismic events. In the SSES IPEEE,
2 there were five seismic-related potential plant enhancements. Four of these were implemented
3 and the fifth was made irrelevant through the removal of seismically-sensitive equipment.
4 Recommended plant improvements included miscellaneous equipment issues associated with
5 housekeeping and general work practices. Housekeeping items included office furniture which
6 could interact with safety related equipment, transient items in close proximity to safety-related
7 equipment, and equipment with missing or loose screws or broken latches. These
8 housekeeping improvements have been implemented. General work practices required
9 improvements to housekeeping procedures and training on seismic issues. The ER notes that
10 these general work practices enhancements have been implemented. PPL also discovered that
11 breaker lifting devices (trolleys) were stored on top of electrical panels, CRTs in the control
12 room were not adequately anchored, and a number of adjacent plant control and
13 instrumentation panels could interact but were not fastened together. These last three items
14 were corrected at the time of the IPEEE. The staff's review of IPEEE found these resolutions
15 acceptable (NRC 1999). In the IPEEE, all high confidence low probability of failure (HCLPF)
16 values were greater than the 0.3 g review level earthquake except for the following, which had
17 HCLPF values as indicated below:

- 18
- 19 • The HPCI pump discharge valve with a HCLPF value of 0.21 g,
- 20
- 21 • The residual heat removal (RHR) suppression pool cooling return valve with a HCLPF of
- 22 0.21 g,
- 23
- 24 • The E diesel generator automatic transfer switch with a HCLPF of 0.25 g, and
- 25
- 26 • The motor control center for a number of RHR and RHRSW valves with a HCLPF of
- 27 0.26 g.
- 28

29 The ER discusses each of these seismic issues and concludes that for each of the four items
30 with HCLPF values less than 0.3 g, other components would have to fail and/or human recovery
31 actions are possible and therefore no additional SAMAs to address these outliers are
32 necessary. The staff agrees that given the low likelihood of seismic damage combined with the
33 probability of additional failures that must occur for core damage, it is unlikely that cost effective
34 SAMAs would exist for these outliers.

35

36 In the SSES IPEEE, three opportunities for improvement related to seismic-fire interactions
37 were identified. The first improvement is related to drip shields for electrical panels. The ER
38 states that this improvement was not implemented because a redundant power source was
39 found to be available if the impacted panels fail due to spray. The second improvement
40 required the addition of a second restraining ring on H₂/O₂ bottles where they are only attached
41 by a single ring. According to the ER, this improvement was not implemented because the

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1 subject bottles were spares and were removed. The third improvement required the revision of
2 "Natural Phenomena" procedures to discuss the potential impact a large seismic event could
3 have on the fire protection system. This enhancement has been implemented according to the
4 ER.

5
6 Based on the licensee's efforts to identify and address seismic outliers and the expected cost
7 associated with further seismic risk analysis and potential plant modifications, the NRC staff
8 concludes that the opportunity for seismic-related SAMAs has been adequately explored and
9 that it is unlikely that there are any cost-beneficial, seismic-related SAMA candidates.

10
11 The SSES IPEEE did not identify any changes required for conformance with the design basis
12 related to fire events. However, several opportunities for improvement were identified and
13 several plant modifications were put in place as a result of PPL's Appendix R compliance effort.
14 These modifications include a curb installed on the floor of the control structure chiller bays
15 which limits lube oil and fire suppression water spread, and a heat shield in the control structure
16 which separates division I and II control structure HVAC electrical switchgear. Procedural
17 improvements which have been completed include a modification which allows for the opening
18 of drains in the cable spreading rooms for removal of fire suppression water, and procedural
19 enhancements for housekeeping.

20
21 In addition, the licensee further considered potential SAMAs for fire, and identified two
22 opportunities for additional reduction of fire risk, specifically, SAMA 1 – install diesel-driven high
23 pressure injection pump to provide makeup to the reactor pressure vessel, and SAMA 9 –
24 develop procedures and install pre-staged cables to bypass failed DC bus in order to power
25 critical loads. Although these two SAMAs contribute to the reduction in SSES fire risk, no
26 SAMAs unique to the fire analysis were identified. In response to an RAI on the potential for
27 SAMAs that could reduce the fire initiators, improve fire detection or suppression, or relocate
28 components or cabling, PPL stated that the individual fire zone risks were so low that no SAMAs
29 would be cost effective. They quantitatively demonstrated this in a manner similar to that used
30 for SAMA 9 showing that the maximum averted cost-risk associated with each fire zone would
31 not support changes associated with cable wrapping or re-routing. PPL also stated that no
32 procedure changes have been identified that could measurably reduce the SSES fire CDF, and
33 that all areas included fire detection and most included automatic suppression capabilities. For
34 areas without automatic suppression, they provided a discussion supporting the absence of
35 suppression due to continuous manning or limited combustibles (PPL 2007a). The NRC staff
36 concludes that the opportunity for fire-related SAMAs has been adequately explored and that it
37 is unlikely that there are additional potentially cost-beneficial, fire-related SAMA candidates.

38
39 The NRC staff notes that the set of SAMAs submitted is not all inclusive, since additional,
40 possibly even less expensive, design alternatives can always be postulated. However, the NRC
41 staff concludes that the benefits of any additional modifications are unlikely to exceed the

1 benefits of the modifications evaluated and that the alternative improvements would not likely
2 cost less than the least expensive alternatives evaluated, when the subsidiary costs associated
3 with maintenance, procedures, and training are considered.
4

5 The NRC staff concludes that PPL used a systematic and comprehensive process for identifying
6 potential plant improvements for SSES, and that the set of potential plant improvements
7 identified by PPL is reasonably comprehensive and therefore acceptable. This search included
8 reviewing insights from the plant-specific risk studies and reviewing plant improvements
9 considered in previous SAMA analyses. While explicit treatment of external events in the SAMA
10 identification process was limited, it is recognized that the prior implementation of plant
11 modifications for seismic and fire events and the absence of external event vulnerabilities
12 reasonably justifies examining primarily the internal events risk results for this purpose.
13

14 **G.4 Risk Reduction Potential of Plant Improvements**

15
16 PPL evaluated the risk-reduction potential of the 11 remaining SAMAs that were applicable to
17 SSES. The SAMA evaluations were performed using realistic assumptions with some
18 conservatism. On balance, such calculations overestimate the benefit and are conservative.
19

20 For most of the SAMAs PPL used model re-quantification to determine the potential benefits.
21 The CDF and population dose reductions were estimated using the Feb06EPU version of the
22 SSES PRA. The changes made to the model to quantify the impact of the SAMAs are detailed
23 in Section E.6 of Attachment E to the ER. Table G-5 lists the assumptions considered to
24 estimate the risk reduction for each of the evaluated SAMAs, the estimated risk reduction in
25 terms of percent reduction in CDF and population dose, and the estimated total benefit (present
26 value) of the averted risk. The estimated benefits reported in Table G-5 reflect the combined
27 benefit in both internal and external events. The determination of the benefits for the various
28 SAMAs is further discussed in Section G.6.
29

30 The NRC staff questioned the assumptions used in evaluating the benefits or risk reduction
31 estimates of certain SAMAs provided in the ER (NRC 2007a). For example, for SAMA 3, modify
32 procedures to stagger RPV depressurization when fire protection system injection is the only
33 available makeup source, the NRC staff requested a description of the failure events that were
34 assumed to be impacted by this enhancement. The licensee provided high level failure events
35 that fail the fire main, the diesel-driven fire pump failure modes, and the flow path failure modes.
36 The NRC staff considers the failure events, as clarified, to be reasonable and acceptable for
37 purposes of the SAMA evaluation.

Table G-5. SAMA Cost/Benefit Screening Analysis for SSES^(a)

SAMA	Assumptions	% Risk Reduction ^(b)		Total Benefit Using 3% Discount Rate (\$) ^(b,c)	Cost (\$) ^(c)
		CDF	Population Dose		
1 - Install diesel driven high pressure injection pump to provide makeup to the reactor pressure vessel (RPV).	Assumed additional failure of new high pressure pump to start or to run required to fail high pressure injection.	61	65	750,000	2,800,000
2a - Install minimal hardware modifications and modify procedures to provide cross-tie capability between 4 kV AC emergency buses.	Assumed 100% reliable cross tie between A and D emergency buses and B and C emergency buses.	56	63	700,000	660,000
2b - Improve cross-tie capability between 4kV AC emergency buses (A-B-C-D) ^(d)	Same assumptions as for 2a, and in addition, assumed a 100% reliable cross tie between A or D emergency buses to B or C emergency buses.	57	64	700,000	1,400,000
3 - Modify procedures to stagger RPV depressurization when fire protection system injection is the only available makeup source.	Added fire main as alternate late injection source. Modeled fire pump failure, maintenance unavailabilities, operator alignment failures, and active and passive flowpath failures. Failure modes were provided in response to a request for additional information.	21	14	140,000	150,000
5 - Modify portable station diesel generator to automatically align to 125 V DC battery chargers.	Assumed alignment of portable station diesel generator was 100% reliable by setting all independent and dependent human action to false.	25	33	370,000	400,000
6 - Procure an additional portable 480 V AC station diesel generator.	Assumed existing and new additional portable station diesel generator both must fail. Independent failures to start and run included with no common cause failures between the two diesel generators.	18	23	270,000	200,000

Table G-5. (contd)

SAMA	Assumptions	% Risk Reduction ^(b)		Total Benefit Using 3% Discount Rate (\$) ^(b,c)	Cost (\$) ^(c)
		CDF	Population Dose		
7 - Modify piping to sectionalize the cooling paths so that each emergency service water (ESW) division cools the corresponding residual heat removal (RHR) division.	Revised the RHR pump and room cooling support logic for trains C and D so that they are supplied by the same division as the pump.	11	6	76,000	970,000
8 - Install automatic feedwater runback logic.	Assumed feedwater runback is 100% reliable.	4	0.5	10,000	600,000
9 - Develop procedures and install pre-staged cables to bypass failed DC bus in order to power critical loads.	Assumed that DC bus initiating events, independent failure events and common cause failure events could not occur. Also assumed that the fire risk in zone 0-28B-11, which makes up about 3% of the fire risk based on IPEEE audit results, is eliminated.	7	1	35,000	350,000
10 - Install a pressure control valve between instrument air and containment instrument gas systems to automate the cross-tie and remove human dependence.	Assumed that the cross-tie is 100% reliable by setting all independent and dependent human action to false.	6	1	19,000	390,000
12 - Improve existing procedures for containment venting after core damage when containment failure is imminent.	Revised base case to account for venting after core damage at direction of technical support center with a 0.1 failure probability. Risk with SAMA implemented based on venting failure probability of 0.0.	0	~0	~0	50,000
14 - Enhance fire main connection to RHR.	Conservatism in current model inflate the importance of the basic event which was the source of this SAMA. Eliminating these conservatism would reduce RRW below the cost-beneficial cutoff.	NOT ESTIMATED			

(a) SAMAs in bold are potentially cost-beneficial.

(b) Reported values for risk reduction and benefits represent the larger of the Unit 1 and Unit 2 specific values, and are based on post-EPU conditions.

(c) Estimated benefits and costs are provided on a "per site" basis unless otherwise noted.

(d) This SAMA was not in the initial screening, but was added based on consideration of the results of an uncertainty analysis of the internal events CDF described in G.6.2.

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1 PPL doubled the benefit that was derived from the internal events model to account for the
2 combined contribution from internal and external events with the exception of SAMA 9 –
3 develop procedures and install pre-staged cables to bypass failed DC bus in order to power
4 critical loads. The risk reduction for this SAMA was calculated by setting the DC bus failure
5 initiating events, independent failure events, and common cause failure events to zero in the
6 PRA model. A separate contribution was also included to specifically address the fire
7 contributions from a fire zone (Fire Zone 0-28B-II) where fire damage could render critical DC
8 equipment inoperable. This contribution was developed by assuming that all external events
9 risk corresponds to the fire risk and that the risk from Fire Zone 0-28B-II accounts for three
10 percent of the total fire risk. The NRC staff considers the method and assumptions used to
11 determine the risk reduction potential for SAMA 9 to be reasonable and acceptable for purposes
12 of the SAMA evaluation.
13

14 The NRC asked the applicant to explain the reasons for the small risk reduction for SAMA 12 –
15 improve existing procedures for containment venting after core damage when containment
16 failure is imminent. PPL responded that procedures exist at SSES to perform containment
17 venting after core damage, but were not credited in the PRA model. A sensitivity analysis was
18 performed to determine the impact of crediting post core damage venting relative to the baseline
19 PRA model. The results of this sensitivity confirm the conclusion of the original SAMA 12
20 analysis that changes to the SSES guidance on post core damage containment venting would
21 not be cost beneficial.
22

23 The NRC requested further information as to why the frequencies of high and moderate
24 releases in the intermediate and late time periods (which include drywell overpressure failures)
25 are not reduced more significantly by SAMA 12. PPL responded that the actual failure mode in
26 these cases is better characterized as containment over-temperature failure (COTF) rather
27 than over-pressure failure. Containment venting is assumed ineffective in COTF scenarios
28 since the high temperature conditions will lead to separate containment failure modes, and so it
29 is not credited in the event tree sequence model. There are some cases where credit for
30 containment vent in the wetwell results in a source term reduction, but the frequency of these
31 contributors is much lower than the COTF contributions. PPL concluded that the overall impact
32 of providing more credit for containment venting when viable has a relatively small impact in
33 reducing the source terms and associated cost benefits.
34

35 The NRC staff has reviewed PPL's bases for calculating the risk reduction for the various plant
36 improvements and concludes that the rationale and assumptions for estimating risk reduction
37 are reasonable and generally conservative (i.e., the estimated risk reduction is higher than what
38 would actually be realized). Accordingly, the NRC staff based its estimates of averted risk for
39 the various SAMAs on PPL's risk reduction estimates.
40

1 **G.5 Cost Impacts of Candidate Plant Improvements**

2
3 PPL estimated the costs of implementing the 11 candidate SAMAs through the application of
4 engineering judgment and use of other licensees' estimates for similar improvements. The
5 cost estimates conservatively did not include the cost of replacement power during extended
6 outages required to implement the modifications, nor did they include contingency costs
7 associated with unforeseen implementation obstacles. In response to an RAI, the licensee
8 indicated that the cost estimates provided in the ER also did not account for inflation
9 (PPL 2007a), which is considered another conservatism. All cost estimates were provided on
10 a "per site" basis.

11
12 The NRC staff reviewed the bases for the licensee's cost estimates (presented in Section E.6
13 of Attachment E to the ER). For certain improvements, the NRC staff also compared the cost
14 estimates to estimates developed elsewhere for similar improvements, including estimates
15 developed as part of other licensees' analyses of SAMAs for operating reactors and advanced
16 light-water reactors. The NRC staff reviewed the costs and found them to be reasonable, and
17 generally consistent with estimates provided in support of other plants' analyses.

18
19 The NRC staff concludes that the cost estimates provided by PPL are sufficient and
20 appropriate for use in the SAMA evaluation.
21

22 **G.6 Cost-Benefit Comparison**

23
24 PPL's cost-benefit analysis and the NRC staff's review are described in the following sections.
25

26 **G.6.1 PPL's Evaluation**

27
28 The methodology used by PPL was based primarily on NRC's guidance for performing
29 cost-benefit analysis, i.e., NUREG/BR-0184, *Regulatory Analysis Technical Evaluation*
30 *Handbook* (NRC 1997b). The guidance involves determining the net value for each SAMA
31 according to the following formula:
32

$$33 \qquad \text{Net Value} = (\text{APE} + \text{AOC} + \text{AOE} + \text{AOSC}) - \text{COE},$$

34
35 where

36
37 APE = present value of averted public exposure (\$)
38 AOC = present value of averted offsite property damage costs (\$)
39 AOE = present value of averted occupational exposure costs (\$)

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1 AOSC = present value of averted onsite costs (\$)
2 COE = cost of enhancement (\$).

3
4 If the net value of a SAMA is negative, the cost of implementing the SAMA is larger than the
5 benefit associated with the SAMA and it is not considered cost-beneficial. PPL's derivation of
6 each of the associated costs is summarized below.

7
8 NUREG/BR-0058 has recently been revised to reflect the agency's policy on discount rates.
9 Revision 4 of NUREG/BR-0058 states that two sets of estimates should be developed: one at 3
10 percent and one at 7 percent (NRC 2004). PPL provided both sets of estimates
11 (PPL 2006).

12
13 Averted Public Exposure (APE) Costs

14
15 The APE costs were calculated using the following formula:

16
17 APE = Annual reduction in public exposure (Δ person-rem per year)
18 × monetary equivalent of unit dose (\$2000 per person-rem)
19 × present value conversion factor (15.04 based on a 20-year period with a
20 3-percent discount rate).

21
22 As stated in NUREG BR-0184 (NRC 1997b), it is important to note that the monetary value of
23 the public health risk after discounting does not represent the expected reduction in public
24 health risk due to a single accident. Rather, it is the present value of a stream of potential
25 losses extending over the remaining lifetime (in this case, the renewal period) of the facility.
26 Thus, it reflects the expected annual loss due to a single accident, the possibility that such an
27 accident could occur at any time over the renewal period, and the effect of discounting these
28 potential future losses to present value. For the purposes of initial screening, which assumes
29 elimination of all severe accidents due to internal events, PPL calculated an APE of
30 approximately \$57,000 for the 20-year license renewal period.

31
32 Averted Offsite Property Damage Costs (AOC)

33
34 The AOCs were calculated using the following formula:

35
36 AOC = Annual CDF reduction
37 × offsite economic costs associated with a severe accident (on a per-event basis)
38 × present value conversion factor.

39
40 For the purposes of initial screening which assumes all severe accidents due to internal events
41 are eliminated, PPL calculated an annual offsite economic risk of about \$11,200 based on the

1 Level 3 risk analysis. This results in a discounted value of approximately \$168,000 for the
2 20-year license renewal period.

3
4 Averted Occupational Exposure (AOE) Costs

5
6 The AOE costs were calculated using the following formula:

7
8
$$\text{AOE} = \text{Annual CDF reduction}$$

9
$$\quad \times \text{occupational exposure per core damage event}$$

10
$$\quad \times \text{monetary equivalent of unit dose}$$

11
$$\quad \times \text{present value conversion factor.}$$

12

13 PPL derived the values for averted occupational exposure from information provided in
14 Section 5.7.3 of the regulatory analysis handbook (NRC 1997b). Best estimate values provided
15 for immediate occupational dose (3300 person-rem) and long-term occupational dose
16 (20,000 person-rem over a 10-year cleanup period) were used. The present value of these
17 doses was calculated using the equations provided in the handbook in conjunction with a
18 monetary equivalent of unit dose of \$2000 per person-rem, a real discount rate of 3 percent,
19 and a time period of 20 years to represent the license renewal period. For the purposes of
20 initial screening, which assumes all severe accidents due to internal events are eliminated, PPL
21 calculated an AOE of approximately \$1200 for the 20-year license renewal period.

22
23 Averted Onsite Costs

24
25 Averted onsite costs (AOSC) include averted cleanup and decontamination costs and averted
26 power replacement costs. Repair and refurbishment costs are considered for recoverable
27 accidents only and not for severe accidents. PPL derived the values for AOSC based on
28 information provided in Section 5.7.6 of NUREG/BR-0184, the regulatory analysis handbook
29 (NRC 1997b).

30
31 PPL divided this cost element into two parts – the onsite cleanup and decontamination cost,
32 also commonly referred to as averted cleanup and decontamination costs, and the replacement
33 power cost.

34
35 Averted cleanup and decontamination costs (ACC) were calculated using the following formula:

36
37
$$\text{ACC} = \text{Annual CDF reduction}$$

38
$$\quad \times \text{present value of cleanup costs per core damage event}$$

39
$$\quad \times \text{present value conversion factor.}$$

Appendix G

1 The total cost of cleanup and decontamination subsequent to a severe accident is estimated in
2 NUREG/BR-0184 to be $\$1.3 \times 10^9$ (discounted over a 10-year cleanup period). This value is
3 integrated over the term of the proposed license extension. For the purposes of initial
4 screening, which assumes all severe accidents due to internal events are eliminated, PPL
5 calculated an ACC of approximately \$32,000 for the 20-year license renewal period.

6
7 Long-term replacement power costs (RPC) were calculated using the following formula:

8
9
$$\text{RPC} = \text{Annual CDF reduction}$$

10
$$\times \text{present value of replacement power for a single event}$$

11
$$\times \text{factor to account for remaining service years for which replacement power is}$$

12
$$\text{required}$$

13
$$\times \text{reactor power scaling factor}$$

14

15 PPL based its calculations on the value of 1304 megawatt electric (MW(e)), which is the current
16 electrical output for SSES. Therefore, PPL applied a power scaling factor of 1304/910 to
17 determine the replacement power costs. For the purposes of initial screening, which assumes
18 all severe accidents due to internal events are eliminated, PPL calculated an RPC of
19 approximately \$16,000 for the 20-year license renewal period. For the purposes of initial
20 screening, which assumes all severe accidents are eliminated, PPL calculated the AOSC to be
21 approximately \$48,000 for the 20-year license renewal period.

22
23 It should be noted that PPL performed the SAMA analysis on a unit-specific basis, and summed
24 the values for each unit to obtain a site value. The averted cost values cited above are based
25 on Unit 1 (post-EPU), but are also representative (within about 2 percent) of the Unit 2 values.

26
27 Using the above equations, PPL estimated the total present dollar value equivalent associated
28 with completely eliminating severe accidents due to internal events at SSES to be about
29 \$275,000 for a single unit, and \$550,000 for the two-unit site. Use of a multiplier of two to
30 account for external events increases the value to \$1.1M and represents the dollar value
31 associated with completely eliminating all internal and external event severe accident risk at the
32 SSES site, also referred to as the Modified Maximum Averted Cost Risk (MAACR).

33 PPL's Results

34
35
36 If the implementation costs for a candidate SAMA exceeded the calculated benefit, the SAMA
37 was considered not to be cost-beneficial. In the baseline analysis contained in the ER (using a
38 3 percent discount rate), PPL identified two potentially cost-beneficial SAMAs. The potentially
39 cost-beneficial SAMAs are:
40

- 1 • SAMA 2a - Install minimal hardware changes and modify procedures to provide cross-
2 tie capability between the 4 kV AC emergency buses, and
3
- 4 • SAMA 6 - Procure an additional portable 480 V AC station diesel generator to power
5 battery chargers in scenarios where AC power is unavailable.
6

7 PPL performed additional analyses to evaluate the impact of parameter choices and
8 uncertainties on the results of the SAMA assessment (PPL 2006). If the benefits are increased
9 by a factor of 2.1 to account for uncertainties, three additional SAMA candidates were
10 determined to be potentially cost-beneficial:

- 11 • SAMA 2b - Improve cross-tie capability between 4 kV AC emergency buses, i.e.,
12 between A or D emergency buses and B or C emergency buses (a more flexible cross-
13 tie option than SAMA 2a),
14
- 15 • SAMA 3 - Modify procedures to stagger RPV depressurization when fire protection
16 system injection is the only available makeup source, and
17
- 18 • SAMA 5 - Modify portable station diesel generator to automatically align to 125 V DC
19 battery chargers.
20

21
22 Subsequent to the ER, three problems related to use of the SECPOP2000 code were identified.
23 These deal with: (1) a formatting error in the regional economic data block text file generated by
24 SECPOP2000 for input to MACCS2 which results in MACCS2 misreading the data, (2) an error
25 associated with the formatting of the COUNTY97.DAT economic database file used by
26 SECPOP2000 which results in SECPOP2000 processing incorrect economic and land use data,
27 and (3) gaps in the numbered entries in the COUNTY97.DAT economic database file which
28 result in any county beyond county number 955 being handled incorrectly in SECPOP2000.
29 PPL performed a re-analysis of the benefit estimates using corrected input to MACCS2
30 (PPL 2007c). The correction of the identified problems resulted in a small reduction in the
31 maximum averted cost risk (i.e., about a 5 percent decrease), and a small decrease in both the
32 dose-risk and economic cost risk for each of the release categories considered in the SAMA
33 analysis (also about 5 percent). Therefore, the net values calculated for each of the SAMA
34 candidates would be slightly reduced. Given that the impact is small and would reduce rather
35 than increase the net values of the SAMAs, the Phase II cost benefit calculations were not
36 revised, and the SAMAs identified as cost-beneficial were assumed to retain their classification
37 as cost-beneficial. Thus, the overall results of the SAMA assessment were not affected.
38

39 The potentially cost-beneficial SAMAs and PPL's plans for further evaluation of these SAMAs
40 are discussed in more detail in Section G.6.2.

1 **G.6.2 Review of PPL's Cost-Benefit Evaluation**

2
3 The cost-benefit analysis performed by PPL was based primarily on NUREG/BR-0184
4 (NRC 1997b) and was implemented consistent with this guidance.

5
6 To account for external events, PPL multiplied the internal event benefits by a factor of 2.0 for
7 each SAMA. Given that the CDF from internal fires, and other external events as reported by
8 PPL is less than the CDF for internal events, the NRC staff agrees that the factor of
9 2.0 multiplier for external events is reasonable.

10
11 PPL considered the impact that possible increases in benefits from analysis uncertainties would
12 have on the results of the SAMA assessment. In the ER, PPL presents the results of an
13 uncertainty analysis of the internal events CDF which indicates that the 95th percentile value is
14 a factor of 2.1 times the mean CDF. PPL re-examined the initial set of SAMAs to determine if
15 any additional Phase I SAMAs would be retained for further analysis if the benefits (and
16 Modified Maximum Averted Cost Risk) were increased by a factor of 2.1. Two such Phase I
17 SAMAs were identified: SAMA 2b – improve cross-tie capability between 4 kV AC emergency
18 buses (a more flexible cross-tie option than SAMA 2a), and SAMA 4 – install 100 percent
19 capacity battery chargers to support the full DC load requirements early in LOOP or LOCA
20 sequences. The staff finds the PPL methods and assumptions used for this Phase I sensitivity
21 analysis to be reasonable and acceptable for the purposed of the SAMA evaluation.

22
23 PPL also considered the impact on the Phase II screening if the estimated benefits were
24 increased by a factor of 2.1 (in addition to the factor of 2.0 multiplier for external events). The
25 two additional Phase I SAMAs, 2b and 4, discussed above, were included in this Phase II
26 sensitivity review. PPL's Phase II analysis identified three additional SAMAs that are potentially
27 cost-beneficial, i.e., SAMA 2b – improve cross-tie capability between 4 kV AC emergency
28 buses, SAMA 3 – modify procedures to stagger RPV depressurization when fire protection
29 system injection is the only available makeup source, and SAMA 5 – modify portable station
30 diesel generator to automatically align to 125 VDC battery chargers. Although not cost-
31 beneficial in the baseline analysis, PPL included SAMAs 2b, 3, and 5 within the set of potentially
32 cost-beneficial SAMAs that they intend to examine further for implementation.

33
34 PPL did not develop a cost-risk analysis for the Phase II SAMA 14 – Enhance fire main
35 connection to RHR. In the ER, PPL noted that no SAMAs are considered to be required to
36 address the importance of this event because:

- 37
38 • The CDF based RRW of the event is below the review cutoff,
39

- 1 • Over 88 percent of the Level 2 contribution from the event is based on long term
2 scenarios. The HEP used to represent the action is based on early injection
3 requirements,
4
- 5 • An easily aligned hard pipe connection already exists that can be used for 88 percent of
6 the cases,
7
- 8 • For the early injection component, the RHRSW alignment is assigned the HEP based on
9 characteristic of the FP system cross-tie requirements, and
10
- 11 • The Level 2 based RRW for the early injection component is only 1.005, and below the
12 cutoff limit of 1.02.
13

14 The NRC staff questioned the ability of some of the candidate SAMAs identified in the ER to
15 accomplish their intended objectives (NRC 2007a). In response to the RAIs, PPL addressed
16 each SAMA and provided revised or new evaluations as discussed below.
17

- 18 • SAMA 8 – install automatic feedwater runback logic for ATWS, was identified as a
19 potential SAMA to further reduce the risk contribution from operator failures related to
20 the feedwater runback action to mitigate an ATWS (PPL 2006). Too much feedwater will
21 dilute the boron concentration in the core. Too little water causes the core to become
22 uncovered and results in core damage. The NRC staff noted that the reduction in CDF
23 for this SAMA is mostly in the low/early release category and that a reduction in CDF
24 due to ATWS would typically be expected to impact the high and medium release
25 categories (NRC 2007a). In response, PPL explained that in the SSES Level 2 analysis,
26 when there is a high power discharge rate to the pool (as in the ATWS scenario with
27 failure to control RPV level near the top of active fuel), containment failure is assumed
28 when the suppression pool temperature exceeds 260°F. The dominant contributors to
29 core damage sequences which involve feedwater runback failures do not include failures
30 to depressurize the RPV; and scenarios with successful RPV depressurization are
31 assigned a low/early release category. PPL justified that although other containment
32 failure impacts on accident progression were considered, the majority of the CDF
33 reduction attributed to reduced feedwater runback failures were in the low/early release
34 category (PPL 2007a). The NRC staff concludes that the licensee's rationale for
35 evaluation of this SAMA is reasonable.
36
- 37 • SAMA 12 – improve existing procedures for containment venting after core damage
38 when containment failure is imminent, was identified as a potential SAMA to further
39 reduce the risk contribution from drywell failure and the subsequent "unscrubbed"
40 release of the primary containment contents to the atmosphere. The NRC staff
41 questioned the small risk reduction provided by PPL for this SAMA (NRC 2007a).

Appendix G

1 In response to a RAI clarification request, PPL stated that procedures to vent
2 containment after core damage already exist at SSES, but were not credited in the PRA
3 model used in the SAMA analysis. As a result, a new baseline case was developed to
4 credit the existing procedures, and the benefits of further procedure improvements were
5 assessed relative to this new baseline case. Even when the assumed failure probability
6 after procedure modifications is set to zero, the risk reduction offered by further
7 procedure improvements is extremely limited and the corresponding risk reduction is
8 small (PPL 2007a). Accordingly, the NRC staff concurs that further procedure
9 improvements would not likely be cost-beneficial.

10
11 The NRC staff noted that for certain SAMAs considered in the ER, there may be alternatives
12 that could achieve much of the risk reduction at a lower cost. The NRC staff asked the licensee
13 to evaluate several lower cost alternatives to the SAMA considered in the ER, including SAMAs
14 that had been found to be potentially cost-beneficial at other BWR plants. These alternatives
15 were: (1) developing guidance/procedures for local, manual control of RCIC following loss of DC
16 power, (2) protecting a critical subset of fire cables in key fire zones (in lieu of protecting all
17 cables, as assumed in PPL's search for potential fire SAMAs), and (3) procedures to control
18 containment venting to avoid adverse impacts on ECCS (NRC 2007). PPL provided a further
19 evaluation of these alternatives, as summarized below.

- 20
21 • *Developing guidance/procedures for local, manual control of RCIC following loss of DC*
22 *power.* In an RAI response (PPL 2007a), PPL indicated that a procedure for manual
23 control of RCIC following loss of DC power already exists at SSES. The procedure
24 requires multiple operators working with flashlights and handheld tachometers to give
25 them an indication of pump speed. This procedure is not practiced because of its undue
26 risk to plant personnel and plant safety. Due to its complexity, the PRA assumed no
27 credit for the use of this procedure. Since the procedure already exists, the SAMA does
28 not need to be identified or explored to determine if it is cost beneficial.
29
- 30 • *Protecting a critical subset of fire cables in key fire zones (in lieu of protecting all cables,*
31 *as assumed in PPL's search for potential fire SAMAs).* In an RAI response
32 (PPL 2007b), PPL explained that the cost for determining a minimal set of cables to be
33 wrapped was much greater than the highest averted cost risk in the initial RAI response.
34 PPL concluded that there would be no one area that would show a cost-benefit from the
35 performance of their analysis.
36
- 37 • *Procedures to control containment venting to avoid adverse impacts on ECCS.* In an
38 RAI response (PPL 2007a), PPL indicated that SSES does not have a hard pipe
39 containment vent capability. The current venting procedure relieves containment
40 pressure through the existing soft duct work. The strategy includes the pre-alignment of
41 alternate injection systems external to the reactor building since it is likely that the steam

1 environment in the reactor building following containment venting would preclude the
2 use of the ECCS injection systems that reside in the reactor building. As such, a venting
3 strategy that attempts to control containment venting to avoid NPSH impacts on ECCS
4 injection would not be useful as it would not eliminate the subsequent steam
5 environment in the reactor building. Therefore, this alternative was not pursued further.
6

7 The staff finds the PPL rationale to be reasonable and acceptable for the purposes of this
8 SAMA evaluation.
9

10 The NRC staff also requested PPL to consider the costs and benefits of adding either an active
11 or a passive (no operator action required) hard vent, based on consideration of both internal
12 and external events (NRC 2007b). In response, PPL used cost estimates reported by other
13 plants to show that the costs of implementing an unfiltered hard vent exceeds the Modified
14 Maximum Averted Cost Risk (MMACR), which considers internal and external events, even
15 when the 95th percentile MMACR is used (PPL 2007b).
16

17 The NRC staff notes that the five potentially cost-beneficial SAMAs 2a, 2b, 3, 5, and 6 identified
18 in either PPL's baseline analysis or uncertainty analysis are included within the set of SAMAs
19 that PPL will consider for implementation. The NRC staff concludes that with the exception of
20 these potentially cost-beneficial SAMAs, the costs of the SAMAs evaluated would be higher
21 than the associated benefits.
22

23 **G.7 Conclusions**

24

25 PPL compiled a list of 15 SAMAs based on a review of: the most significant basic events from
26 the current plant-specific PRA, potential plant improvements identified in the SSES IPE and
27 IPEEE, a review of the dominant fire areas, Phase II SAMAs from license renewal applications
28 for other plants, and review of other industry documentation. An initial screening removed
29 SAMA candidates that (1) were determined to provide no measurable benefit, or (2) had
30 estimated costs that would exceed the dollar value associated with completely eliminating all
31 severe accident risk at SSES. Based on this screening, four SAMAs were eliminated leaving
32 11 candidate SAMAs for evaluation.
33

34 For the remaining SAMA candidates, a more detailed design and cost estimate was developed
35 as shown in Table G-5. The cost-benefit analyses in the original ER showed that two SAMA
36 candidates were potentially cost-beneficial in the baseline analysis (SAMAs 2a and 6). PPL
37 performed additional analyses in the revised assessment to evaluate the impact of parameter
38 choices and uncertainties on the results of the SAMA assessment. As a result, three additional
39 SAMAs (SAMAs 2b, 3, and 5) were identified as potentially cost-beneficial. PPL has indicated

Appendix G

1 that all five potentially cost-beneficial SAMAs (2a, 2b, 3, 5, and 6) will be considered for
2 implementation at SSES.

3
4 The NRC staff reviewed the PPL analysis and concludes that the methods used and the
5 implementation of those methods were sound. The treatment of SAMA benefits and costs
6 support the general conclusion that the SAMA evaluations performed by PPL are reasonable
7 and sufficient for the license renewal submittal. Although the treatment of SAMAs for external
8 events was somewhat limited, the likelihood of there being cost-beneficial enhancements in this
9 area was minimized by improvements that have been realized as a result of the IPEEE process,
10 and inclusion of a multiplier to account for external events.

11
12 The NRC staff concurs with PPL's identification of areas in which risk can be further reduced in
13 a cost-beneficial manner through the implementation of the identified, potentially cost-beneficial
14 SAMAs. Given the potential for cost-beneficial risk reduction, the NRC staff agrees that further
15 evaluation of these SAMAs by PPL is warranted. However, these SAMAs do not relate to
16 adequately managing the effects of aging during the period of extended operation. Therefore,
17 they need not be implemented as part of license renewal pursuant to Title 10 of the *Code of*
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Appendix G

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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 to the NRC by PPL Susquehanna, LLC (PPL) to issue renewed operating licenses for Susquehanna Steam Electric Station, Units 1 and 2 (SSES) for an additional 20 years under 10 CFR Part 54. This draft 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 the NRC staff's preliminary 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 SSES 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 Environmental Report submitted by PPL; (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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