

5.0 Environmental Impacts of Postulated Accidents

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

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

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

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

This chapter describes the environmental impacts from postulated accidents that might occur during the license renewal term.

5.1 Postulated Plant Accidents

Two classes of accidents are evaluated in the GEIS. These are design-basis accidents (DBAs) and severe accidents, as discussed below.

(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 Addendum 1.

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5.1.1 Design-Basis Accidents

In order to receive The NRC approval to operate a nuclear power facility, an applicant must submit a safety analysis report (SAR) as part of the application. The SAR presents the design criteria and design information for the proposed reactor and comprehensive data on the proposed site. The SAR also discusses various hypothetical accident situations and the safety features that are provided to prevent and mitigate accidents. The NRC staff reviews the application to determine whether the plant design meets the Commission's regulations and requirements and includes, in part, the nuclear plant design and its anticipated response to an accident.

DBAs are those accidents that both the licensee and the NRC staff evaluate to ensure that the plant can withstand normal and abnormal transients, and a broad spectrum of postulated accidents without undue hazard to the health and safety of the public. A number of these postulated accidents are not expected to occur during the life of the plant but are evaluated to establish the design basis for the preventive and mitigative safety systems of the facility. The acceptance criteria for DBAs are described in 10 CFR Part 50 and 10 CFR Part 100.

The environmental impacts of DBAs are evaluated during the initial licensing process, and the ability of the plant to withstand these accidents is demonstrated to be acceptable before issuance of the operating license (OL). The results of these evaluations are found in license documentation such as the staff's safety evaluation report (SER), the final environmental statement (FES), the licensee's updated final safety analysis report (UFSAR), and Section 5.1 of this supplemental environmental impact statement (SEIS). The licensee is required to maintain the acceptable design and performance criteria throughout the life of the plant, including any extended-life operation. The consequences for these events are evaluated for the hypothetical maximally exposed individual; as such, changes in the plant environment will not affect these evaluations. Because of the requirements that continuous acceptability of the consequences and aging management programs be in effect for license renewal, the environmental impacts as calculated for DBAs should not differ significantly from initial licensing assessments over the life of the plant, including the license renewal period. Accordingly, the design of the plant relative to DBAs during the extended period is considered to remain acceptable, and the environmental impacts of those accidents were not examined further in the GEIS.

The Commission has determined that the environmental impacts of DBAs are of SMALL significance for all plants because the plants were designed to successfully withstand these accidents. Therefore, for the purposes of license renewal, design-basis accidents are designated as a Category 1 issue in 10 CFR Part 51, Subpart A, Appendix B, Table B-1. The early resolution of the DBAs make them a part of the current licensing basis of the plant; the current licensing basis of the plant is to be maintained by the licensee under its current license

and, therefore, under the provisions of 10 CFR 54.30, is not subject to review under license renewal. This issue, applicable to Quad Cities Units 1 and 2, is listed in Table 5-1.

Table 5-1. Category 1 Issue Applicable to Postulated Accidents During the Renewal Term

ISSUE—10 CFR Part 51, Subpart A, Appendix B, Table B-1	GEIS Section
POSTULATED ACCIDENTS	
Design-basis accidents	5.3.2; 5.5.1

Based on information in the GEIS, the Commission found that

The NRC staff has concluded that the environmental impacts of design-basis accidents are of small significance for all plants.

Exelon Generation Company, LLC (Exelon) stated in its Environmental Report (ER) that it is not aware of any new and significant information associated with the renewal of the Quad Cities Units 1 and 2 OLs (Exelon 2003a). The staff has not identified any new and significant information during the staff’s independent review of the Quad Cities ER (Exelon 2003a), the scoping process, the staff’s site visit, the staff’s evaluation of other available information, and public comments on the draft SEIS. Therefore, the staff concludes that there are no impacts of design basis accidents during the renewal term beyond those discussed in the GEIS.

5.1.2 Severe Accidents

Severe nuclear accidents are those that are more severe than DBAs because they could result in substantial damage to the reactor core, whether or not there are serious offsite consequences. The GEIS assessed the impacts of severe accidents during the license renewal period, using the results of existing analyses and site-specific information to conservatively predict the environmental impacts of severe accidents for each plant during the renewal period.

Based on information in the GEIS, the Commission found that

The probability weighted consequences of atmospheric releases, fallout onto open bodies of water, releases to ground water, and societal and economic impacts from severe accidents are small for all plants. However, alternatives to mitigate severe accidents must be considered for all plants that have not considered such alternatives.

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Therefore, the Commission has designated mitigation of severe accidents as a Category 2 issue in 10 CFR Part 51, Subpart A, Appendix B, Table B-1. This issue, applicable to Quad Cities Units 1 and 2, is listed in Table 5-2.

Table 5-2. Category 2 Issue Applicable to Postulated Accidents During the Renewal Term

ISSUE—10 CFR Part 51, Subpart A, Appendix B, Table B-1	GEIS Sections	10 CFR 51.53(c)(3)(ii) Subparagraph	SEIS Section
POSTULATED ACCIDENTS			
Severe Accidents	5.3.3; 5.3.3.2; 5.3.3.3; 5.3.3.4; 5.3.3.5; 5.4; 5.5.2	L	5.2

The staff has not identified any new and significant information during the staff's independent review of the Quad Cities ER (Exelon 2003a), the scoping process, the staff's site visit, the staff's evaluation of other available information, and public comments on the draft SEIS. Therefore, the staff concludes that there are no impacts of severe accidents beyond those discussed in the GEIS. However, in accordance with 10 CFR 51.53(c)(3)(ii)(L), the staff has reviewed severe accident mitigation alternatives (SAMAs) for Quad Cities. The results of the staff's review are discussed in Section 5.2.

5.2 Severe Accident Mitigation Alternatives (SAMAs)

10 CFR 51.53(c)(3)(ii)(L) requires that license renewal (LR) applicants consider alternatives to mitigate severe accidents if the staff has not previously evaluated SAMAs for the applicant's plant in an environmental impact statement (EIS) or related supplement or in an environmental assessment. The purpose of this consideration is to ensure that plant changes (i.e., hardware, procedures, and training) with the potential for improving severe-accident safety performance are identified and evaluated. SAMAs have not been previously considered for Quad Cities Units 1 and 2; therefore, the remainder of Chapter 5 addresses those alternatives.

5.2.1 Introduction

This section presents a summary of the SAMA evaluation for Quad Cities conducted by Exelon and described in the ER (Exelon 2003a) and of the NRC staff review of that evaluation. The details of the review are described in the NRC staff evaluation that was prepared by the staff with contract assistance from Information Systems Laboratories, Inc. The entire evaluation is presented in Appendix G.

The SAMA evaluation for Quad Cities was a four-step process. In the first step, Exelon quantified the level of risk associated with potential reactor accidents using the plant-specific probabilistic risk assessment and other risk models.

The second step was the examination of the major risk contributors to identify areas where plant improvements might have the greatest chance to reduce risk. Then, possible ways of reducing those risks were identified. Common ways of reducing risk are changes to components, systems, procedures, and training. Exelon identified 280 potential SAMAs. Using a set of screening criteria, the number of SAMAs requiring further consideration was reduced to 54. Preliminary cost estimates were made for these 54 SAMAs, and any SAMAs costing more than the maximum attainable benefit (discussed in Section 5.2.3) were removed from further consideration.

In the third step, the benefits and costs for the remaining 15 candidate SAMAs were estimated. Estimates were made of how much each proposed SAMA could reduce risk. Those estimates were developed in terms of dollars in accordance with The NRC guidance for performing regulatory analyses (NRC 1997). The costs of implementing the proposed SAMAs were also estimated.

Finally in the fourth step, the costs and benefits of each of the 15 final SAMAs were compared to determine whether the SAMA was cost-beneficial, meaning the benefits of the SAMA were greater than the costs (a positive cost-benefit). In the final analysis, Exelon concluded that none of these 280 SAMAs were cost-beneficial for Quad Cities. However, the staff concluded that four SAMAs are cost-beneficial and that two additional SAMAs may be cost-beneficial.

Each of these four steps is discussed in more detail in the sections that follow and in Appendix G.

5.2.2 Estimate of Risk

Exelon submitted an assessment of SAMAs for Quad Cities as part of the ER (Exelon 2003a). This assessment was based on the most recent Quad Cities Probabilistic Risk Assessment (PRA) (including the Level 1 and 2 analyses), a plant-specific offsite consequence analysis performed using the MELCOR Accident Consequence Code System (MACCS2) (essentially a Level 3 PRA model), and insights from the Quad Cities Individual Plant Examination (IPE) (ComEd 1993) and Individual Plant Examination of External Events (IPEEE) (ComEd 1997). The SAMA analysis is based on the most recent PRA model available at the time of the ER, referred to as the 2002B model (or Update Revision 02B). The baseline core damage frequency (CDF) for Quad Cities is approximately 2.2×10^{-6} per year, based on internally-initiated events. Exelon did not include the contribution to CDF from external events in these estimates even though the risk from external events is significantly higher for Quad Cities than

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the risk from internal events. Although the scope of the Quad Cities PRA does not include external events, Exelon concluded that the existing IPEEE and fire evaluations had adequately identified potential plant improvements to address external events. The breakdown of CDF by initiating event/accident class is summarized in Table 5-3. Loss of the 125-V DC buses, loss of offsite power, transients (such as turbine trip, loss of turbine building closed-cooling water, and loss of condenser vacuum), and loss of service water are the dominant contributors to the CDF.

Table 5-3. Quad Cities Units 1 and 2 Core Damage Frequency

Initiating Event/Accident Class	Frequency (CDF) (per Year)	Percent Contribution to the CDF
Loss of 125-V DC Buses 1 and 2	7.6×10^{-7}	35
Loss of offsite power (LOOP) ^(a) (dual-unit and single-unit)	4.2×10^{-7}	19
Transients	3.2×10^{-7}	15
Loss of service water	3.0×10^{-7}	14
Loss-of-coolant accident (LOCA)	1.5×10^{-7}	7
Loss of instrument air	6.8×10^{-8}	3
Manual shutdown	6.6×10^{-8}	3
Others	6.0×10^{-8}	3
Interfacing systems LOCA (ISLOCA)	2.3×10^{-8}	1
Total CDF (from internal events)	2.2×10^{-6}	100

(a) Includes station blackout.

Exelon estimated the dose from all postulated accidents to the population within 80 km (50 mi) of the Quad Cities site to be approximately 0.0167 person-Sv (1.67 person-rem). The breakdown of the population dose by containment release mode is summarized in Table 5-4. Early and late containment failures dominate the population dose.

The staff has reviewed Exelon's data and evaluation methods and concludes that the quality of the risk analyses is adequate to support an assessment of the risk reduction potential for the candidate SAMAs. Accordingly, the staff based its assessment of offsite risk on the CDF and offsite doses provided by Exelon.

Table 5-4. Breakdown of Population Dose by Containment Release Mode

Containment Release Mode	Population Dose (Person-Rem^(a) per Year)	Percent Contribution to Dose
Early containment failure	0.93	56
Late containment failure	0.67	40
Containment bypass	0.07	4
No containment failure	~0	~0
Total Population Dose	1.67	100

(a) One person-rem equals 0.01 person-Sv.

5.2.3 Potential Plant Improvements

Once the most risk significant parts of the plant design and operation were identified, Exelon searched for ways to reduce those risks. To identify potential plant improvements, Exelon reviewed improvements identified in the Quad Cities IPE and IPEEE and subsequent PRA revision processes, SAMA analyses submitted for other nuclear power plants, and The NRC and industry documents discussing potential plant improvements. Exelon identified 280 potential risk-reducing improvements to plant components, systems, procedures, and training (SAMAs).

All but 54 of these SAMAs were removed from further consideration because: (1) the SAMA was not applicable at Quad Cities due to design differences, (2) the SAMA had already been implemented at Quad Cities, (3) the SAMA was sufficiently similar to other SAMAs and was combined with another SAMA, or (4) the SAMA would not provide a significant safety benefit or has implementation costs greater than any possible risk benefit. A preliminary cost estimate was prepared for each of the remaining 54 SAMAs.

The preliminary cost estimate of each of the 54 remaining SAMAs was compared to the maximum attainable benefit (MAB) of \$110,000. The MAB is the dollar value of the benefit that would be achieved if the plant risk and population dose from postulated accidents could be reduced to zero. If the cost of a SAMA exceeded the MAB, it could not be cost-beneficial because no single SAMA could eliminate all the risk. Using this comparison, all but 15 of the candidate SAMAs were removed from further consideration. The ER only identified 14 candidate SAMAs for further examination because of an error. This error was identified and corrected in Exelon's response to an NRC staff request for additional information (RAI) (Exelon 2003b).

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The staff reviewed Exelon's screening methods and results and concluded that they were systematic and comprehensive.

5.2.4 Evaluation of Risk Reduction and Costs of Improvements

Exelon evaluated the risk reduction potential of the remaining 15 SAMAs. Bounding calculations were made for most of these SAMAs; bounding calculations overestimate the benefit and are conservative. The benefits (the estimated dollar value of these risk reductions) were developed by calculating and adding the averted public exposure, offsite property damage, occupational exposure, and onsite costs associated with each SAMA (Exelon 2003a).

The staff reviewed Exelon's bases for calculating the risk reduction for the various plant improvements and concluded that the rationale and assumptions for estimating risk reduction are reasonable and generally conservative. Therefore, the staff based its estimates of averted risk for the various SAMAs on Exelon's risk reduction estimates. However, the staff concluded that the benefit estimates should be increased by a factor of ten (Exelon used a factor of five) to fully account for the potential impacts of uncertainties and external events, especially fires.

The staff reviewed the cost estimates and concluded that the cost ranges provided by Exelon were reasonable and appropriate for use in the SAMA evaluation. However, the staff concluded that the cost estimates at the lower end of the cost ranges provided by Exelon were more appropriate than the values used by Exelon in the cost-benefit comparisons for two SAMAs. These two SAMAs are SAMA 6, develop procedures for locally starting equipment during a 125 V DC bus failure; and SAMA 8, develop procedures to control feedwater flow without 125-V DC power. These conclusions contributed to the staff's conclusions regarding cost-beneficial SAMAs (see Section 5.2.5).

5.2.5 Cost-Benefit Comparison

Based on the more detailed evaluations of potential risk reduction and cost discussed above, Exelon determined that none of the 15 remaining SAMAs were cost-beneficial. In response to the staff's RAIs (NRC 2003), Exelon evaluated the level of uncertainty in the calculations. Since the Quad Cities PRA did not include uncertainty analyses, Exelon used information from the uncertainty analyses performed for the LaSalle plant (another Exelon boiling water reactor plant) to estimate 95th percentile values of the CDF for Quad Cities. Use of these 95th percentile CDF values increased the estimated benefits of the SAMAs by approximately a factor of five. Exelon revisited the set of SAMAs screened out in the first part of the evaluation using the 95th percentile CDF values to account for the potential impact of external events and uncertainties. Exelon identified two additional SAMAs that could be cost-beneficial using the 95th percentile values of the CDF. However, all 17 SAMAs were found by Exelon to have implementation costs greater than their averted cost-risk (benefit), and thus, were eliminated

from further consideration. Therefore, Exelon's final conclusion was that there were no cost-beneficial SAMAs (Exelon 2003b).

The staff reviewed Exelon's calculation methods and logic arguments in the final cost-benefit comparisons and concluded that Exelon's original benefit estimates should be increased by a factor of 10 to fully account for the potential impact of uncertainties and external events, especially fires. As a result, the staff concluded that four SAMAs were cost-beneficial: SAMA 6, develop procedures for locally starting equipment during a 125-V DC bus failure; SAMA 8, develop procedures to control feedwater flow without 125-V DC power; SAMA 10, develop procedures to terminate reactor depressurization at a high enough pressure to keep the reactor core isolation cooling system operable; and SAMA 14, develop procedures to control containment venting within a narrow band of pressure. The staff concluded that two additional SAMAs could be cost-beneficial if a more detailed evaluation of the external events benefits or the uncertainties were performed: SAMA 1, develop procedures to provide alternate safe shutdown makeup pump room cooling; and SAMA 2, develop procedures to use the fire protection system as a source of water for the drywell spray system. The numbered SAMAs (1 through 17) are the 17 SAMAs that were included in the final cost-benefit analysis after Exelon increased the benefit estimates by a factor of five in response to staff RAIs.

5.2.6 Conclusions

The staff reviewed the Exelon SAMA analysis and concluded that the methods used and the implementation of those methods were sound. The treatment of SAMA benefits and costs, the generally large negative net benefits, and the inherently small baseline risks support the general conclusion that the SAMA evaluations performed by Exelon are reasonable and sufficient for the license renewal submittal. However, the staff concluded that four SAMAs were cost-beneficial: SAMA 6, develop procedures for locally starting equipment during a 125-V DC bus failure; SAMA 8, develop procedures to control feedwater flow without 125-V DC power; SAMA 10, develop procedures to terminate reactor depressurization at a high enough pressure to keep the reactor core isolation cooling system operable; and SAMA 14, develop procedures to control containment venting within a narrow band of pressure. The staff concluded that two additional SAMAs could be cost-beneficial if a more detailed evaluation of the external events benefits or the uncertainties were performed: SAMA 1, develop procedures to provide alternate safe shutdown makeup pump room cooling; and SAMA 2, develop procedures to use the fire protection system as a source of water for the drywell spray system. However, none of the six SAMAs relate to adequately managing the effects of aging during the period of extended operation. Therefore, they need not be implemented as part of license renewal pursuant to 10 CFR Part 54.

The staff concludes that none of the other candidate SAMAs are cost-beneficial. This conclusion is consistent with the low residual level of risk indicated in the Quad Cities PRA and

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the fact that Quad Cities has already implemented many plant improvements identified from the IPE and IPEEE process.

5.3 References

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

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

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

| 10 CFR Part 100. Code of Federal Regulations, Title 10, *Energy*, Part 100, “Reactor Site Criteria.”

| Commonwealth Edison Company (ComEd). 1993. Letter from Martin J. Vonk, Commonwealth Edison Company, to Thomas E. Murley, U.S. Nuclear Regulatory Commission. Subject: “Quad Cities Nuclear Power Station Units 1 and 2 Individual Plant Examination Submittal.” December 13, 1993.

| Commonwealth Edison Company (ComEd). 1997. Letter from E. S. Kraft, Commonwealth Edison Company, to U.S. Nuclear Regulatory Commission Document Control Desk. Subject: Quad Cities Nuclear Power Station Units 1 and 2 Final Report—Individual Plant Examination of External Events (IPEEE) Generic Letter 88-20, Supplement 4. February 17, 1997.

| Exelon Generation Company, LLC (Exelon). 2003a. *Applicant’s Environmental Report—Operating License Renewal Stage, Quad Cities Nuclear Power Station Units 1 and 2*. License Nos. DPR-29 and DPR-30. Exelon Generation Company, LLC. Warrenville, Illinois. January 2003.

| Exelon Generation Company, LLC (Exelon). 2003b. Letter from Jeffrey A. Benjamin, Exelon, to U.S. Nuclear Regulatory Commission. Subject: Quad Cities Nuclear Power Station, Units 1 and 2, Facility Operating License Nos. DPR-29 and DPR-30, NRC Docket Nos. 50-254 and 50-265, Response to Request for Additional Information—License Renewal Environmental Report for Quad Cities Nuclear Power Station, Units 1 and 2. July 17, 2003.

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

U.S. Nuclear Regulatory Commission. 1997. *Regulatory Analysis Technical Evaluation Handbook*. NUREG/BR-0184, Washington, D.C. |

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

U.S. Nuclear Regulatory Commission (NRC). 2003. Letter from Louis L. Wheeler, U.S. Nuclear Regulatory Commission, to John Skolds, Exelon. Subject: Request for Additional Information (RAI) Related to the Staff's Review of the License Renewal Environmental Report for the Quad Cities Nuclear Power Station, Unit 1 and 2 (TAC Nos. MB6845 and MB6846). May 23, 2003. |

6.0 Environmental Impacts of the Uranium Fuel Cycle and Solid-Waste Management

Environmental issues associated with the uranium fuel cycle and solid-waste management are discussed in the *Generic Environmental Impact Statement for License Renewal of Nuclear Plants* (GEIS), NUREG-1437, Volumes 1 and 2 (NRC 1996; 1999).^(a) The GEIS includes a determination of whether the analysis of the environmental issue could be applied to all plants and whether additional mitigation measures would be warranted. Issues are then assigned a Category 1 or a Category 2 designation. As set forth in the GEIS, Category 1 issues are those that meet all of the following criteria:

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

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

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

This chapter addresses the issues that are related to the uranium fuel cycle and solid-waste management during the license renewal term that are listed in Table B-1 of 10 CFR Part 51, Subpart A, Appendix B and are applicable to Quad Cities Units 1 and 2. The generic potential impacts of the radiological and nonradiological environmental impacts of the uranium fuel cycle and transportation of nuclear fuel and wastes are described in detail in the GEIS based, in part, on the generic impacts provided in 10 CFR 51.51(b), Table S-3, "Table of Uranium Fuel Cycle Environmental Data," and in 10 CFR 51.52(c), Table S-4, "Environmental Impact of Transportation of Fuel and Waste to and from One Light-Water-Cooled Nuclear Power

(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.

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Reactor.” The staff also addresses the impacts from radon-222 and technetium-99 in the GEIS.

6.1 The Uranium Fuel Cycle

Category 1 issues in 10 CFR Part 51, Subpart A, Appendix B, Table B-1 that are applicable to Quad Cities Units 1 and 2 from the uranium fuel cycle and solid-waste management are listed in Table 6-1.

Table 6-1. Category 1 Issues Applicable to the Uranium Fuel Cycle and Solid-Waste Management During the Renewal Term

ISSUE—10 CFR Part 51, Subpart A, Appendix B, Table B-1	GEIS Section
URANIUM FUEL CYCLE AND WASTE MANAGEMENT	
Off-site radiological impacts (individual effects from other than the disposal of spent fuel and high level waste)	6.1; 6.2.1; 6.2.2.1; 6.2.2.3; 6.2.3; 6.2.4; 6.6
Off-site radiological impacts (collective effects)	6.1; 6.2.2.1; 6.2.3; 6.2.4; 6.6
Off-site radiological impacts (spent fuel and high level waste disposal)	6.1; 6.2.2.1; 6.2.3; 6.2.4; 6.6
Nonradiological impacts of the uranium fuel cycle	6.1; 6.2.2.6; 6.2.2.7; 6.2.2.8; 6.2.2.9; 6.2.3; 6.2.4; 6.6
Low-level waste storage and disposal	6.1; 6.2.2.2; 6.4.2; 6.4.3; 6.4.3.1; 6.4.3.2; 6.4.3.3; 6.4.4; 6.4.4.1; 6.4.4.2; 6.4.4.3; 6.4.4.4; 6.4.4.5; 6.4.4.5.1; 6.4.4.5.2; 6.4.4.5.3; 6.4.4.5.4; 6.4.4.6; 6.6
Mixed waste storage and disposal	6.4.5.1; 6.4.5.2; 6.4.5.3; 6.4.5.4; 6.4.5.5; 6.4.5.6; 6.4.5.6.1; 6.4.5.6.2; 6.4.5.6.3; 6.4.5.6.4; 6.6
On-site spent fuel	6.1; 6.4.6; 6.4.6.1; 6.4.6.2; 6.4.6.3; 6.4.6.4; 6.4.6.5; 6.4.6.6; 6.4.6.7; 6.6
Nonradiological waste	6.1; 6.5; 6.5.1; 6.5.2; 6.5.3; 6.6
Transportation	6.1; 6.3.1; 6.3.2.3; 6.3.3; 6.3.4; 6.6; Addendum 1

Exelon Generation Company, LLC (Exelon) stated in its Environmental Report (ER) that it is not aware of any new and significant information associated with the renewal of the Quad Cities

Units 1 and 2 operating license (Exelon 2003). The staff has not identified any new and significant information during the staff's independent review of the Quad Cities ER (Exelon 2003a), the scoping process, the staff's site visit, the staff's evaluation of other available information, and public comments on the draft SEIS. Therefore, the staff concludes that there are no impacts related to these issues beyond those discussed in the GEIS. For these issues, the staff concluded in the GEIS that the impacts are SMALL except for the collective off-site radiological impacts from the fuel cycle and from HLW and spent fuel disposal, as discussed below, and that additional plant-specific mitigation measures are not likely to be sufficiently beneficial to be warranted.

A brief description of the staff review and the GEIS conclusions, as codified in Table B-1, 10 CFR 51, for each of these issues follows:

- Off-site radiological impacts (individual effects from other than the disposal of spent fuel and high level waste). Based on information in the GEIS, the Commission found that

Off-site impacts of the uranium fuel cycle have been considered by the Commission in Table S-3 of this part [10 CFR 51.51(b)]. Based on information in the GEIS, impacts on individuals from radioactive gaseous and liquid releases including radon-222 and technetium-99 are small.

The staff has not identified any new and significant information during the staff's independent review of the Quad Cities ER (Exelon 2003a), the scoping process, the staff's site visit, the staff's evaluation of other available information, and public comments on the draft SEIS. Therefore, the staff concludes that there are no off-site radiological impacts of the uranium fuel cycle during the renewal term beyond those discussed in the GEIS.

- Off-site radiological impacts (collective effects). Based on information in the GEIS, the Commission found that

The 100 year environmental dose commitment to the U.S. population from the fuel cycle, high level waste and spent fuel disposal excepted, is calculated to be about 14,800 person rem [148 person Sv], or 12 cancer fatalities, for each additional 20-year power reactor operating term. Much of this, especially the contribution of radon releases from mines and tailing piles, consists of tiny doses summed over large populations. This same dose calculation can theoretically be extended to include many tiny doses over additional thousands of years as well as doses outside the U.S. The result of such a calculation would be thousands of cancer fatalities from the fuel cycle, but this result assumes that even tiny doses have some statistical adverse health effect which will not ever be mitigated (for example no cancer cure in the next thousand years), and that these doses projected over thousands of years are meaningful. However, these

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assumptions are questionable. In particular, science cannot rule out the possibility that there will be no cancer fatalities from these tiny doses. For perspective, the doses are very small fractions of regulatory limits and even smaller fractions of natural background exposure to the same populations.

Nevertheless, despite all the uncertainty, some judgement as to the regulatory NEPA [National Environmental Policy Act] implications of these matters should be made and it makes no sense to repeat the same judgement in every case. Even taking the uncertainties into account, the Commission concludes that these impacts are acceptable in that these impacts would not be sufficiently large to require the NEPA conclusion, for any plant, that the option of extended operation under 10 CFR Part 54 should be eliminated. Accordingly, while the Commission has not assigned a single level of significance for the collective effects of the fuel cycle, this issue is considered Category 1.

The staff has not identified any new and significant information during the staff's independent review of the Quad Cities ER (Exelon 2003a), the scoping process, the staff's site visit, the staff's evaluation of other available information, and public comments on the draft SEIS. Therefore, the staff concludes that there are no off-site radiological impacts (collective effects) from the uranium fuel cycle during the renewal term beyond those discussed in the GEIS.

- Off-site radiological impacts (spent fuel and high level waste disposal). Based on information in the GEIS, the Commission found that

For the high level waste and spent fuel disposal component of the fuel cycle, there are no current regulatory limits for off-site releases of radionuclides for the current candidate repository site. However, if we assume that limits are developed along the lines of the 1995 National Academy of Sciences (NAS) report, "Technical Bases for Yucca Mountain Standards," and that in accordance with the Commission's Waste Confidence Decision, 10 CFR 51.23, a repository can and likely will be developed at some site which will comply with such limits, peak doses to virtually all individuals will be 100 millirem [1 mSv] per year or less. However, while the Commission has reasonable confidence that these assumptions will prove correct, there is considerable uncertainty since the limits are yet to be developed, no repository application has been completed or reviewed, and uncertainty is inherent in the models used to evaluate possible pathways to the human environment. The NAS report indicated that 100 millirem [1 mSv] per year should be considered as a starting point for limits for individual doses, but notes that some measure of consensus exists among national and international bodies that the limits should be a fraction of the 100 millirem [1

mSv] per year. The lifetime individual risk from 100 millirem [1 mSv] annual dose limit is about 3×10^{-3} .

Estimating cumulative doses to populations over thousands of years is more problematic. The likelihood and consequences of events that could seriously compromise the integrity of a deep geologic repository were evaluated by the Department of Energy in the “Final Environmental Impact Statement: Management of Commercially Generated Radioactive Waste,” October 1980 [DOE 1980]. The evaluation estimated the 70-year whole-body dose commitment to the maximum individual and to the regional population resulting from several modes of breaching a reference repository in the year of closure, after 1,000 years, after 100,000 years, and after 100,000,000 years. Subsequently, the NRC and other Federal agencies have expended considerable effort to develop models for the design and for the licensing of a HLW repository, especially for the candidate repository at Yucca Mountain. More meaningful estimates of doses to population may be possible in the future as more is understood about the performance of the proposed Yucca Mountain repository. Such estimates would involve very great uncertainty, especially with respect to cumulative population doses over thousands of years. The standard proposed by the NAS is a limit on maximum individual dose. The relationship of potential new regulatory requirements, based on the NAS report, and cumulative population impacts has not been determined, although the report articulates the view that protection of individuals will adequately protect the population for a repository at Yucca Mountain. However, EPA’s generic repository standards in 40 CFR Part 191 generally provide an indication of the order of magnitude of cumulative risk to population that could result from the licensing of a Yucca Mountain repository, assuming the ultimate standards will be within the range of standards now under consideration. The standards in 40 CFR Part 191 protect the population by imposing “containment requirements” that limit the cumulative amount of radioactive material released over 10,000 years. Reporting performance standards that will be required by EPA are expected to result in releases and associated health consequences in the range between 10 and 100 premature cancer deaths with an upper limit of 1,000 premature cancer deaths world-wide for a 100,000 metric tonne (MT) repository.

Nevertheless, despite all the uncertainty, some judgement as to the regulatory NEPA implications of these matters should be made and it makes no sense to repeat the same judgement in every case. Even taking the uncertainties into account, the Commission concludes that these impacts are acceptable in that these impacts would not be sufficiently large to require the NEPA conclusion, for any plant, that the option of extended operation under 10 CFR part 54 should be eliminated. Accordingly, while the Commission has not assigned a single level of

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significance for the impacts of spent fuel and HLW disposal, this issue is considered Category 1.

Since the GEIS was originally issued in 1996, the U.S. Environmental Protection Agency (EPA) has published radiation-protection standards for Yucca Mountain, Nevada, at 40 CFR Part 197, "Public Health and Environmental Radiation Protection Standards for Yucca Mountain, Nevada," on June 13, 2001 (66 FR 32074 [EPA 2001]). The Energy Policy Act of 1992 (42 USC 10101 et seq.) directs that the NRC adopt these standards into its regulations for reviewing and licensing the repository. The NRC published its regulations at 10 CFR Part 63 on November 2, 2001 (66 FR 55792 [NRC 2001]). These standards include the following: (1) 0.15-mSv/yr (15-mrem/yr) dose limit for members of the public during the storage period prior to repository closure; (2) 0.15-mSv/yr (15-mrem/yr) dose limit for the reasonably maximally exposed individual for 10,000 years following disposal; (3) 0.15-mSv/yr (15-mrem/yr) dose limit for the reasonably maximally exposed individual as a result of a human intrusion at or before 10,000 years after disposal; and (4) a groundwater-protection standard that states for 10,000 years of undisturbed performance after disposal, radioactivity in a representative volume of groundwater will not exceed (a) 0.19 Bq/L (5 pCi/L) (radium-226 and radium-228), (b) 0.56 Bq/L (15 pCi/L) (gross alpha activity), and (c) 0.04 mSv/yr (4 mrem/yr) to the whole body or any organ (from combined beta- and photon-emitting radionuclides).

On February 15, 2002, subsequent to the receipt of a recommendation by Secretary Abraham, U.S. Department of Energy, the President recommended the Yucca Mountain site for the development of a repository for the geologic disposal of spent nuclear fuel and high-level nuclear waste. The U.S. Congress approved this recommendation on July 9, 2002. On July 23, 2002, the President signed into law House Joint Resolution 87 designating Yucca Mountain as the repository for spent nuclear waste. These developments do not represent new and significant information with respect to the off-site radiological impacts related to spent fuel and HLW disposal during the renewal term.

The staff has not identified any new and significant information during the staff's independent review of the Quad Cities ER (Exelon 2003a), the scoping process, the staff's site visit, the staff's evaluation of other available information, and public comments on the draft SEIS. Therefore, the staff concludes that there are no off-site radiological impacts related to spent fuel and HLW disposal during the renewal term beyond those discussed in the GEIS.

- Nonradiological impacts of the uranium fuel cycle. Based on information in the GEIS, the Commission found that

The nonradiological impacts of the uranium fuel cycle resulting from the renewal of an operating license for any plant are found to be small.

The staff has not identified any new and significant information during the staff's independent review of the Quad Cities ER (Exelon 2003a), the scoping process, the staff's site visit, the staff's evaluation of other available information, and public comments on the draft SEIS. Therefore, the staff concludes that there are no nonradiological impacts of the uranium fuel cycle during the renewal term beyond those discussed in the GEIS.

- Low-level waste storage and disposal. Based on information in the GEIS, the Commission found that

The comprehensive regulatory controls that are in place and the low public doses being achieved at reactors ensure that the radiological impacts to the environment will remain small during the term of a renewed license. The maximum additional on-site land that may be required for low-level waste storage during the term of a renewed license and associated impacts will be small. Nonradiological impacts on air and water will be negligible. The radiological and nonradiological environmental impacts of long-term disposal of low-level waste from any individual plant at licensed sites are small. In addition, the Commission concludes that there is reasonable assurance that sufficient low-level waste disposal capacity will be made available when needed for facilities to be decommissioned consistent with the NRC decommissioning requirements.

The staff has not identified any new and significant information during the staff's independent review of the Quad Cities ER (Exelon 2003a), the scoping process, the staff's site visit, the staff's evaluation of other available information, and public comments on the draft SEIS. Therefore, the staff concludes that there are no impacts of low-level waste storage and disposal associated with the renewal term beyond those discussed in the GEIS.

- Mixed waste storage and disposal. Based on information in the GEIS, the Commission found that

The comprehensive regulatory controls and the facilities and procedures that are in place ensure proper handling and storage, as well as negligible doses and exposure to toxic materials for the public and the environment at all plants. License renewal will not increase the small, continuing risk to human health and the environment posed by mixed waste at all plants. The radiological and nonradiological environmental impacts of long-term disposal of mixed waste from any individual plant at licensed sites are small. In addition, the Commission concludes that there is reasonable assurance that sufficient mixed waste disposal capacity will be made available when needed for facilities to be decommissioned consistent with the NRC decommissioning requirements.

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The staff has not identified any new and significant information during the staff's independent review of the Quad Cities ER (Exelon 2003a), the scoping process, the staff's site visit, the staff's evaluation of other available information, and public comments on the draft SEIS. Therefore, the staff concludes that there are no impacts of mixed-waste storage and disposal associated with the renewal term beyond those discussed in the GEIS.

- On-site spent fuel. Based on information in the GEIS, the Commission found that

The expected increase in the volume of spent fuel from an additional 20 years of operation can be safely accommodated on site with small environmental effects through dry or pool storage at all plants if a permanent repository or monitored retrievable storage is not available.

The staff has not identified any new and significant information during the staff's independent review of the Quad Cities ER (Exelon 2003a), the scoping process, the staff's site visit, the staff's evaluation of other available information, and public comments on the draft SEIS. Therefore, the staff concludes that there are no impacts of onsite spent fuel associated with license renewal beyond those discussed in the GEIS.

- Nonradiological waste. Based on information in the GEIS, the Commission found that

No changes to generating systems are anticipated for license renewal. Facilities and procedures are in place to ensure continued proper handling and disposal at all plants.

The staff has not identified any new and significant information during the staff's independent review of the Quad Cities ER (Exelon 2003a), the scoping process, the staff's site visit, the staff's evaluation of other available information, and public comments on the draft SEIS. Therefore, the staff concludes that there are no nonradiological waste impacts during the renewal term beyond those discussed in the GEIS.

- Transportation. Based on information contained in the GEIS, the Commission found that

The impacts of transporting spent fuel enriched up to 5 percent uranium-235 with average burnup for the peak rod to current levels approved by the NRC up to 62,000 MWd/MTU and the cumulative impacts of transporting HLW to a single repository, such as Yucca Mountain, Nevada are found to be consistent with the impact values contained in 10 CFR 51.52(c), Summary Table S-4 – Environmental Impact of Transportation of Fuel and Waste to and from One

Light-Water-Cooled Nuclear Power Reactor. If fuel enrichment or burnup conditions are not met, the applicant must submit an assessment of the implications for the environmental impact values reported in § 51.52.

Quad Cities meets the fuel-enrichment and burnup conditions set forth in Addendum 1 to the GEIS. The staff has not identified any new and significant information during the staff's independent review of the Quad Cities ER (Exelon 2003a), the scoping process, the staff's site visit, the staff's evaluation of other available information, and public comments on the draft SEIS. Therefore, the staff concludes that there are no impacts of transportation associated with license renewal beyond those discussed in the GEIS.

There are no Category 2 issues for the uranium fuel cycle and solid-waste management.

6.2 References

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

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

10 CFR Part 63. Code of Federal Regulations, Title 10, *Energy*, Part 63, "Disposal of High-Level Radioactive Wastes in a Geologic Repository at Yucca Mountain, Nevada."

40 CFR Part 191. Code of Federal Regulations, Title 40, *Protection of Environment*, Part 191, "Environmental Radiation Protection Standards for Management and Disposal of Spent Nuclear Fuel, High-Level and Transuranic Radioactive Waste."

40 CFR Part 197. Code of Federal Regulations, Title 40, *Protection of Environment*, Part 197, "Public Health and Environmental Radiation Protection Standards for Management and Disposal for Yucca Mountain, Nevada."

Energy Policy Act of 1992. 42 USC 10101, et seq. Public Law 102-486.

Exelon Generation Company, LLC (Exelon). 2003. *Applicant's Environmental Report—Operating License Renewal Stage, Quad Cities Nuclear Power Station Units 1 and 2*. Docket Nos. 50-254 and 50-265. Warrenville, Illinois.

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National Academy of Sciences (NAS). 1995. *Technical Bases for Yucca Mountain Standards*. Washington, D.C.

National Environmental Policy Act of 1969 , as amended (NEPA). 42 USC 4321, et seq.

U.S. Department of Energy (DOE). 1980. *Final Environmental Impact Statement: Management of Commercially Generated Radioactive Waste*. DOE/EIS-0046F, Washington, D.C.

U.S. Environmental Protection Agency (EPA). 2001. “ Public Health and Environmental Radiation Protection Standards for Yucca Mountain, Nevada.” *Federal Register*. Vol. 66, No. 114, pp. 32132–32135. June 13, 2001.

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

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

U.S. Nuclear Regulatory Commission (NRC). 2001. “ Disposal of High-Level Radioactive Wastes in a Geologic Repository at Yucca Mountain, Nevada.” *Federal Register*. Vol. 66, No. 213, pp. 55792–55815. November 2, 2001.

7.0 Environmental Impacts of Decommissioning

Environmental impacts from the activities associated with the decommissioning of any reactor before or at the end of an initial or renewed license are evaluated in the *Generic Environmental Impact Statement for Decommissioning of Nuclear Facilities, Supplement 1 Regarding the Decommissioning of Nuclear Power Reactors*, NUREG-0586 (NRC 2002). The staff's evaluation of the environmental impacts of decommissioning presented in Supplement 1 resulted in a range of impacts for each environmental issue. These results may be used by licensees as a starting point for a plant-specific evaluation of the decommissioning impacts at their facilities.

The incremental environmental impacts associated with decommissioning activities resulting from continued plant operation during the renewal term are evaluated in the *Generic Environmental Impact Statement for License Renewal of Nuclear Plants* (GEIS), NUREG-1437, Volumes 1 and 2 (NRC 1996; 1999).^(a) The GEIS includes a determination of whether the analysis of the environmental issue could be applied to all plants and whether additional mitigation measures would be warranted. Issues are then assigned a Category 1 or a Category 2 designation. As set forth in the GEIS, Category 1 issues are those that meet all of the following criteria:

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

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

(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.

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Category 2 issues are those that do not meet one or more of the criteria for Category 1, and therefore, additional plant-specific review of these issues is required. There are no Category 2 issues related to decommissioning.

7.1 Decommissioning

Category 1 issues in Table B-1 of 10 CFR Part 51, Subpart A, Appendix B that are applicable to Quad Cities Units 1 and 2 decommissioning following the renewal term are listed in Table 7-1. Exelon Generation Company (Exelon) stated in its Environmental Report (ER) that it is not aware of any new and significant information regarding the environmental impacts of Quad Cities Units 1 and 2 license renewal (Exelon 2003). The staff has not identified any new and significant information during the staff's independent review of the Exelon ER, the scoping process, the staff's site visit, the evaluation of other available information, and public comments on the draft SEIS. Therefore, the staff concludes that there are no impacts related to these issues beyond those discussed in the GEIS. For all of these issues, the staff concluded in the GEIS that the impacts are SMALL and additional plant-specific mitigation measures are not likely to be sufficiently beneficial to be warranted.

Table 7-1. Category 1 Issues Applicable to the Decommissioning of Quad Cities Units 1 and 2 Following the Renewal Term

ISSUE—10 CFR Part 51, Subpart A, Appendix B, Table B-1	GEIS Section
DECOMMISSIONING	
Radiation doses	7.3.1; 7.4
Waste management	7.3.2; 7.4
Air quality	7.3.3; 7.4
Water quality	7.3.4; 7.4
Ecological resources	7.3.5; 7.4
Socioeconomic impacts	7.3.7; 7.4

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

- Radiation doses. Based on information in the GEIS, the Commission found that

Doses to the public will be well below applicable regulatory standards regardless of which decommissioning method is used. Occupational doses would increase no

more than 1 man-rem [0.01 person-Sv] caused by buildup of long-lived radionuclides during the license renewal term.

The staff has not identified any new and significant information during the staff's independent review of the Quad Cities ER (Exelon 2003), the scoping process, the staff's site visit, the staff's evaluation of other available information, and public comments on the draft SEIS. Therefore, the staff concludes that there are no radiation doses associated with decommissioning following the license renewal term beyond those discussed in the GEIS.

- Waste management. Based on information in the GEIS, the Commission found that

Decommissioning at the end of a 20-year license renewal period would generate no more solid wastes than at the end of the current license term. No increase in the quantities of Class C or greater than Class C wastes would be expected.

The staff has not identified any new and significant information during the staff's independent review of the Quad Cities ER (Exelon 2003), the scoping process, the staff's site visit, the staff's evaluation of other available information, and public comments on the draft SEIS. Therefore, the staff concludes that there are no impacts of solid waste associated with decommissioning following the license renewal term beyond those discussed in the GEIS.

- Air quality. Based on information in the GEIS, the Commission found that

Air quality impacts of decommissioning are expected to be negligible either at the end of the current operating term or at the end of the license renewal term.

The staff has not identified any new and significant information during the staff's independent review of the Quad Cities ER (Exelon 2003), the scoping process, the staff's site visit, the staff's evaluation of other available information, and public comments on the draft SEIS. Therefore, the staff concludes that there are no air quality impacts associated with decommissioning following the license renewal term beyond those discussed in the GEIS.

- Water quality. Based on information in the GEIS, the Commission found that

The potential for significant water quality impacts from erosion or spills is no greater whether decommissioning occurs after a 20-year license renewal period or after the original 40-year operation period, and measures are readily available to avoid such impacts.

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The staff has not identified any new and significant information during the staff's independent review of the Quad Cities ER (Exelon 2003), the scoping process, the staff's site visit, the staff's evaluation of other available information, and public comments on the draft SEIS. Therefore, the staff concludes that there are no water quality impacts associated with decommissioning following the license renewal term beyond those discussed in the GEIS.

- Ecological resources. Based on information in the GEIS, the Commission found that

Decommissioning after either the initial operating period or after a 20-year license renewal period is not expected to have any direct ecological impacts.

The staff has not identified any new and significant information during the staff's independent review of the Quad Cities ER (Exelon 2003), the scoping process, the staff's site visit, the staff's evaluation of other available information, and public comments on the draft SEIS. Therefore, the staff concludes that there are no impacts on ecological resources associated with decommissioning following the license renewal term beyond those discussed in the GEIS.

- Socioeconomic impacts. Based on information in the GEIS, the Commission found that

Decommissioning would have some short-term socioeconomic impacts. The impacts would not be increased by delaying decommissioning until the end of a 20-year relicense period, but they might be decreased by population and economic growth.

The staff has not identified any new and significant information during the staff's independent review of the Quad Cities ER (Exelon 2003), the scoping process, the staff's site visit, the staff's evaluation of other available information, and public comments on the draft SEIS. Therefore, the staff concludes that there are no socioeconomic impacts associated with decommissioning following the license renewal term beyond those discussed in the GEIS.

7.2 References

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

Exelon Generation Company (Exelon). 2003. *Applicant's Environmental Report—Operating License Renewal Stage Quad Cities Nuclear Power Station Units 1 and 2*. Docket Nos. 50-254 and 50-265. Warrenville, Illinois.

Environmental Impacts of Decommissioning

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

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

U.S. Nuclear Regulatory Commission (NRC). 2002. *Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities, Supplement 1, Regarding the Decommissioning of Nuclear Power Reactors*. NUREG-0586, Volumes 1 and 2, Washington, D.C. |

8.0 Environmental Impacts of Alternatives to Operating-License Renewal

This chapter examines the potential environmental impacts associated with denying the renewal of the operating license (OLs) (i.e., the no-action alternative); the potential environmental impacts from electricity-generating sources other than Quad Cities Units 1 and 2; the possibility of purchasing electric power from other sources to replace power generated by Quad Cities Units 1 and 2 and the associated environmental impacts; the potential environmental impacts from a combination of generating and conservation measures; and other generation alternatives that were deemed unsuitable for replacement of the power generated by Quad Cities Units 1 and 2. The environmental impacts are evaluated using the U.S. Nuclear Regulatory Commission's (NRC's) three-level standard of significance—SMALL, MODERATE, or LARGE—developed using the Council on Environmental Quality guidelines and set forth in a footnote to Table B-1 of 10 CFR Part 51, Subpart A, Appendix B:

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

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

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

The impact categories evaluated in this chapter are the same as those used in the *Generic Environmental Impact Statement for License Renewal of Nuclear Plants* (GEIS) NUREG-1437, Volumes 1 and 2 (NRC 1996; NRC 1999),^(a) with the additional impact category of environmental justice.

8.1 No-Action Alternative

The NRC's regulations implementing the National Environmental Policy Act (NEPA) specify that the no-action alternative be discussed in an NRC environmental impact statement (EIS) (10 CFR Part 51, Subpart A, Appendix A[4]). For license renewal, the no-action alternative refers to a scenario in which the NRC would not renew the OLs for Quad Cities Units 1 and 2

(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.

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and the Exelon Generation Company (Exelon) would then decommission Quad Cities Units 1 and 2 when plant operations cease.

The no-action alternative is a conceptual alternative resulting in a net reduction in electricity generation; there would be no replacement power and, therefore, no environmental impacts from replacement power. In actual practice, the power lost by not renewing the OLS for Quad Cities Units 1 and 2 would likely be replaced by (1) demand-side management (DSM) and energy conservation, (2) electricity generated from other sources, either by Exelon or by another generator, or (3) some combination of these alternatives. Any replacement power would produce environmental impacts in addition to those discussed under the no-action alternative. Environmental impacts of these other sources are discussed in Section 8.

Exelon will be required to comply with the NRC decommissioning requirements whether or not the OLS are renewed and, therefore, must comply under the no-action alternative. If the OLS for Quad Cities Units 1 and 2 are renewed, decommissioning activities would be postponed for up to an additional 20 years. If the OLS are not renewed, Exelon would conduct decommissioning activities according to the requirements in 10 CFR 50.82.

The environmental impacts associated with decommissioning under both license renewal and the no-action alternative would be bounded by the discussion of impacts in Chapter 7 of the GEIS (NRC 1996), Chapter 7 of this supplemental environmental impact statement (SEIS), and NUREG-0586, Supplement 1, *Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities, Supplement 1 Regarding the Decommissioning of Nuclear Power Reactors*, dated November 2002 (NRC 2002). The impacts of decommissioning after 60 years of operation are not expected to be significantly different from those occurring after 40 years of operation.

The environmental impacts associated with the no-action alternative are summarized in Table 8-1. Implementation of the no-action alternative would also have certain positive impacts in that adverse environmental impacts associated with the current operation of Quad Cities Units 1 and 2, for example, any adverse ecological impacts, would be eliminated.

Table 8-1. Summary of Environmental Impacts of the No-Action Alternative

Impact Category	Impact	Comment
Land Use	SMALL	Impacts would be expected to be temporary.
Ecology	SMALL	Impacts on ecology would be expected to be temporary and largely mitigated by using best management practices.
Water Quality	SMALL	Water use would decrease. Water quality unlikely to be adversely affected.
Air Quality	SMALL	Greatest impact would likely to be from fugitive dust; impact could be mitigated by best management practices.
Waste	SMALL	Low-level radioactive waste would be disposed of in licensed facilities. A permanent disposal facility for high-level waste is currently not available.
Human Health	SMALL	Radiological doses to workers and members of the public would be expected to be within regulatory limits and comparable to, or lower than, doses from operating plants. Occupational injuries would be possible, but injury rates at nuclear power plants are below the U.S. average industrial rate.
Socioeconomic	SMALL	Proximity to the Quad Cities metropolitan area would mitigate any impacts on employment. Small impacts on local tax revenue.
Aesthetics	SMALL	Positive impact from eventual removal of buildings and structures. Some noise impact during decommissioning operations.
Historic and Archaeological Resources	SMALL	Any impacts primarily confined to land use during plant operations. No impact on other lands on site.
Environmental Justice	SMALL	Impacts on minority and low-income communities would be similar to those experienced by the population as a whole.

• **Land Use**

Temporary changes in onsite land use for portions of the site could occur during decommissioning. Temporary changes may include addition or expansion of staging and lay down areas or construction of temporary buildings and parking areas. No offsite land use changes are expected as a result of decommissioning.^(a) The impacts of the no-action alternative on land use are considered SMALL.

(a) The Rock Island County Land Use Plan designates the site area as industrial, which will have implications for the future use of the site (Rock Island County Land Use Plan, 1998).

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- **Ecology**

Impacts on aquatic ecology at the Quad Cities site could result from removal of in-water pipes and structures or the filling of the intake and discharge canals. Negative impacts to aquatic ecology would likely be short-term and could be mitigated. The aquatic environment is expected to recover naturally. In the long term, decommissioning of Quad Cities Units 1 and 2 would shut down the open-cycle cooling system, with beneficial effects for aquatic biology. However, this no action alternative would result in the loss of the warm water effluent and, during winter, this area may no longer offer open water habitat to support bald eagle feeding with which bald eagles have been noted to use at the Quad Cities site.^(a) Also, impacts on terrestrial ecology could occur as a result of land disturbance for additional lay down yards, stockpiles, and support facilities. Land disturbance is expected to be minimal and result in relatively short-term impacts that can be mitigated using best management practices (BMPs). The land is expected to recover naturally. The impacts of the no-action alternative on ecology are considered SMALL.

- **Water Use and Quality**

The existing plant uses open-cycle cooling. Cessation of plant operations will reduce the cooling water needed and the condenser heat load sent to the river would be eliminated. As plant staff size decreases, the demand for potable water is expected also to decrease. Overall, the impacts of the no-action alternative on water use and quality are considered SMALL.

- **Air Quality**

Decommissioning activities that can adversely affect air quality include dismantlement of systems and equipment, demolition of buildings and structures, and the operation of internal combustion engines. The most likely adverse impact would be the generation of fugitive dust. BMPs, such as seeding and wetting, could be used to minimize the generation of fugitive dust. Overall, the impacts of the no-action alternative on air quality are considered SMALL.

- **Waste**

Decommissioning activities would result in the generation of radioactive and nonradioactive waste. The volume of low-level radioactive waste could vary greatly depending on the option chosen for decommissioning, and the waste treatment and volume reduction

(a) Personal communication with E. Bretton, District Manager, Savanna District, Upper Mississippi National Wildlife and Fish Refuge, May 8, 2003.

procedures used. Low-level radioactive waste must be disposed of in a facility licensed by the NRC or a State with authority delegated by the NRC. Recent advances in volume reduction and waste processing have significantly reduced waste volumes.

A permanent repository for high-level waste (HLW) is not currently available. The NRC has made a generic determination that, if necessary, spent fuel generated in any reactor can be stored safely and without significant environmental impacts for at least 30 years beyond the licensed life for operation (which may include the term of a revised or renewed license) of that reactor in its spent fuel pool or at either onsite or offsite independent spent fuel storage installations (10 CFR 51.23[a]). Overall, the impacts of the no-action alternative on waste are considered SMALL.

- **Socioeconomics**

If Quad Cities Units 1 and 2 cease operation, there will be a decrease in employment and possibly tax revenues associated with the closure. These impacts would be most concentrated in Rock Island and Whiteside counties, Illinois, and Scott County, Iowa, with smaller impacts in adjoining counties. There would be some adverse impacts on local housing values and the local economy in Rock Island County, and adjoining counties to a lesser extent, under the no-action alternative.

The tax revenue losses that might result from closure of Quad Cities Units 1 and 2 would occur in Rock Island County and its taxing bodies at the township. Annual property taxes from Quad Cities Units 1 and 2 accounted for approximately 2.7 percent of Rock Island County's total levee extension and approximately 2.8 percent of the county's total collections available for the distribution for the years 1997 to 2000. However, the local Cordova taxing districts for the township, library, school district, road and bridge district, and fire department derive significant revenue (31 to 73 percent of their total revenue from all sources) from the plant (Rock Island County Board of Review 2002). Exelon plans to negotiate a graduated reduction in payments to minimize the financial disruption to county and local operations caused by a change in the methods of plant value assessment due to the deregulation of the utility industry in the State of Illinois (Exelon 2003a). The local taxing districts that rely on the plant for a large portion of their revenue will be adversely affected to a significant degree by the decline in tax receipts.

The no-action alternative would result in the loss of plant payrolls 20 years earlier than if the OLs were renewed. Quad Cities Units 1 and 2 currently support approximately 850 permanent employees and approximately 130 contract workers (Exelon 2003a). Approximately 77 percent of employees who work at the Quad Cities site live in Rock Island and Whiteside counties, Illinois, or in Scott County, Iowa (Exelon 2003a). Therefore, primary employment impacts would be concentrated in these counties. However, the proximity to the Quad Cities metropolitan area would mitigate much of the employment

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impact. Most secondary employment impacts and impacts on population would also be concentrated in Rock Island, Whiteside, and Scott counties. Exelon employees working at the Quad Cities site currently contribute time and money toward community involvement, including schools, churches, charities, and other civic activities. It is likely that with a reduced presence in the community following decommissioning, Exelon's community involvement efforts in the region would be lessened. Overall, the staff concluded that the socioeconomic impacts associated with the no-action alternative are considered SMALL.

- **Human Health**

Radiological doses to occupational workers during decommissioning activities are estimated to average approximately 5 percent of the dose limits in 10 CFR Part 20, and to be similar to, or lower than, the doses received from operating nuclear power plants. Occupational injuries to workers engaged in decommissioning activities are possible. Overall, the impacts of the no-action alternative on human health are considered SMALL.

- **Aesthetics**

Decommissioning would result in the eventual dismantlement of buildings and structures at the site resulting in a positive aesthetic impact. Noise would be generated during decommissioning operations that may be detectable offsite; however, the impact is unlikely to be of significance, and noise would cease altogether following decommissioning. Overall, the impacts of the no-action alternative on aesthetics are considered SMALL.

- **Historic and Archaeological Resources**

Use of land resources at Quad Cities would be reduced following plant closure. Reduced use of the property will reduce the likelihood of adversely impacting historic and archaeological resources. The amount of undisturbed land needed to support the decommissioning process will be relatively small. The staff concluded in NRC (2002) that decommissioning activities conducted within the operational areas of a nuclear power plant are not expected to have a detectable effect on important cultural resources because these areas have been impacted during the operating life of the plant. Minimal disturbance of land outside the licensee's operational area for decommissioning activities is expected. Historic and archaeological resources on undisturbed portions of the site should not be adversely affected. Following decommissioning, the site would likely be retained by Exelon for other corporate purposes. Eventual sale or transfer of the site, however, could result in adverse impacts to cultural resources if the land-use pattern changes dramatically. Notwithstanding this possibility, the impacts of the no-action alternative and decommissioning on historic and archaeological resources are considered SMALL.

- **Environmental Justice**

Current operations at the Quad Cities site have no disproportionate impacts on the minority and low-income populations of the surrounding counties, and no environmental pathways have been identified that would cause disproportionate impacts. Closure of Quad Cities Units 1 and 2 would result in decreased employment opportunities in Rock Island County, Whiteside County, and Scott County, and somewhat reduced tax revenues in Rock Island County, with possible small, negative and disproportionate impacts on minority or low-income populations. Because the Quad Cities site is located in the Quad Cities metropolitan area, the impacts of closure on minority and low-income populations would be offset by other local employment opportunities. Overall, the impacts of the no-action alternative on minority and low-income populations are considered SMALL.

8.2 Alternative Energy Sources

This section discusses the environmental impacts associated with alternative sources of electricity to replace the electricity generated by Quad Cities Units 1 and 2, assuming that the OLS for Units 1 and 2 are not renewed. According to Exelon, the capacity of Quad Cities Units 1 and 2 is approximately 1860 megawatts electric (MW[e]), based on a capacity of 930 MW(e) for each unit. (Exelon 2003a).^(a)

The order of presentation of alternative energy sources in Section 8.2 does not imply which alternative would be most likely to occur or to have the least environmental impacts. The following generation alternatives are considered in detail:

- coal-fired generation at the Quad Cities site and at an alternate site (Section 8.2.1)
- natural gas-fired generation at the Quad Cities site and at an alternate site (Section 8.2.2)
- nuclear generation at the Quad Cities site and at an alternate site (Section 8.2.3)

The alternative of purchasing power from other sources to replace power generated at Quad Cities Units 1 and 2 is discussed in Section 8.2.4. Other power-generation alternatives and conservation alternatives considered by the staff and found not to be reasonable replacements for the full production at Quad Cities Units 1 and 2 are discussed in Section 8.2.5.

(a) The Department of Energy's (DOE's) Energy Information Administration (EIA) estimates the peak summer capacity of Quad Cities Units 1 and 2 to be 1537 MW(e) (DOE/EIA 2003c). For the remainder of this section, the staff considered the total capacity of Quad Cities Units 1 and 2 to be 1860 MW(e).

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Section 8.2.6 discusses the environmental impacts of a combination of generation and conservation alternatives.

Each year, the Energy Information Administration (EIA), a component of the U.S. DOE, issues an Annual Energy Outlook. The *Annual Energy Outlook 2002 with Projections to 2020* was issued in December 2001 (DOE/EIA 2001a). In this report, the EIA projects that combined-cycle^(a) or combustion-turbine technology fueled by natural gas is likely to account for approximately 88 percent of new electricity-generating capacity through the year 2020 (DOE/EIA 2001a). Both technologies are designed primarily to supply peak and intermediate capacity, but combined-cycle technology can also be used to meet base-load^(b) requirements. Coal-fired plants are projected by the EIA to account for approximately 9 percent of new capacity during this period. Coal-fired plants are generally used to meet base-load requirements. Renewable energy sources, primarily wind, geothermal, and municipal solid-waste units, are projected by the EIA to account for the remaining 3 percent of capacity additions.

The EIA projects that oil-fired plants will account for very little new generation capacity in the United States through the year 2020 because of higher fuel costs and lower efficiencies (DOE/EIA 2001a). The EIA's projections are based on the assumption that providers of new generating capacity will seek to minimize cost while meeting applicable environmental requirements. Combined-cycle plants are projected by the EIA to have the lowest generation cost in 2005 and 2020, followed by coal-fired plants and then wind generation (DOE/EIA 2001a).

The EIA also projects that new nuclear power plants will not account for any new generation capacity in the United States through the year 2020 because natural-gas- and coal-fired plants are projected to be more economical (DOE/EIA 2001a). In spite of this projection, since 1997, the NRC has certified three new standard designs for nuclear power plants under the procedures in 10 CFR Part 52 Subpart B. Therefore, a new nuclear plant alternative for replacing power generated by Quad Cities 1 and 2 is considered for reasons stated in Section 8.2.3. The submission to the NRC of these three applications for certification indicates continuing interest in the possibility of licensing new nuclear power plants. The NRC has established a new organization to prepare for and manage future reactor and site licensing applications.

(a) In the combined-cycle unit, hot combustion gases in a combustion turbine rotate the turbine to generate electricity. Waste combustion heat from the combustion turbine is routed through a heat-recovery boiler to make steam to generate additional electricity.

(b) A base-load plant normally operates to supply all or part of the minimum continuous load of a system and consequently produces electricity at an essentially constant rate. Nuclear power plants are commonly used for base-load generation; that is, these units generally run near full load.

Note that this section discusses the impacts of alternative generation technologies. It does not address the impacts of decommissioning. Further, it does not consider the impacts to the Quad Cities site of building alternative generation elsewhere, when such options are addressed. The no-action alternative discussed in Section 8.1, covers the impacts of shutting down Quad Cities Units 1 and 2.

8.2.1 Coal-Fired Generation

The environmental impacts of the coal-fired alternative are examined in this section for the Quad Cities site and an alternate site. Unless otherwise indicated, the assumptions and numerical values used in this section are from the Exelon environmental report (ER) (Exelon 2003a). The staff reviewed this information and compared it to environmental impact information in the GEIS, as well as other relevant information and sources where appropriate. Although the OL renewal period is only 20 years, the impact of operating the coal-fired alternative for 40 years is considered (as a reasonable projection of the operating life of a coal-fired plant). The staff assumed that Quad Cities Units 1 and 2 would remain in operation while the coal-fired alternative was constructed.

The coal-fired alternative is analyzed both for the existing Quad Cities site and for an unnamed alternate site. Siting a new coal-fired plant where an existing nuclear plant is located would reduce many construction impacts (NRC 1996). Further, siting a new facility at the existing Quad Cities site would allow it to take advantage of existing infrastructure. Hence, although the staff considered an alternate site, it is unlikely that it would be beneficial to place a new coal-fired facility at an alternate site based purely on environmental grounds.

The staff assumes construction of three 550-megawatts electric (MW[e]) units, for a combined capacity of 1650 MW(e), as potential replacements for Quad Cities Units 1 and 2, which is consistent with Exelon's ER (Exelon 2003a).^(a) Exelon chose this size to be consistent with the natural gas-fired alternative, which was chosen to match "standard" sizes for new combined-cycle facilities. The assumption of 1650 MW(e) understates the environmental impacts of replacing the 1860 MW(e) from Quad Cities Units 1 and 2. The remaining capacity would be made up from other sources. As a rough estimate, if a coal-fired plant of exactly 1860 MW(e) were to be built, any impacts (for example, quantities of air pollutants) in this section might simply be adjusted upward accordingly. However, given these adjustments, the staff has determined that the differences in impacts between 1650 MW(e) and 1860 MW(e) of coal-fired generation would not be significant and would not change the impact levels.

(a) The coal-fired units would have a rating of 583 gross MW(e) and 550 net MW(e). The difference between "gross" and "net" is the electricity consumed on site.

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Exelon assumes the coal-fired alternative would use tangentially fired, dry-bottom combustors with an associated heat rate^(a) of 10,200 Btu/kWh (a thermodynamic efficiency of approximately 30 percent) and a capacity factor^(b) of 0.85 (Exelon 2003a). According to Exelon, the coal-fired plant would consume approximately 6.3 million MT (6.9 million tons) per year of pulverized bituminous coal with an ash content of approximately 6.9 percent (Exelon 2003a). For emissions control, the facility would be outfitted with low nitrogen oxide (NO_x) burners, overfire air and selective catalytic reduction for NO_x control, fabric filters for control of particulates, and a wet scrubber using lime for sulfur oxide (SO₂) control.

The coal-fired alternative would require converting a significant quantity of land to industrial use for the power plant, coal storage, landfill disposal of ash, spent catalytic reduction catalyst (used for control of NO_x emissions), and scrubber sludge. Exelon believes that the Quad Cities site is adequate to support these requirements. The Quad Cities site consists of approximately 327 ha (817 ac) (Exelon 2003a). The GEIS asserts that approximately 700 ha (1700 ac) would be required to build a 1000 MW(e) coal-fired power plant at a greenfield site (NRC 1996). Locating a coal-fired power plant at an existing nuclear site would significantly lower this land requirement and would allow the new facility to take advantage of existing infrastructure at the Quad Cities site, including switchyard, offices, intake and discharge, and transmission rights-of-way. Exelon estimates that the coal-fired alternative would require approximately 75 ha (180 ac) for waste disposal and approximately 120 ha (300 ac) for the powerblock and coal storage area. To use the Quad Cities site, Exelon would likely need to acquire additional adjacent acreage, some of which had recently been divested.

Two coal-and-lime delivery options are most appropriate for the Quad Cities site: barge and rail. The Quad Cities site location lends itself to coal delivery by barge, which is a common practice along the Mississippi River waterway. The barge alternative would require construction of a barge offloading facility on Pool 14 and a conveyor system to the station coal yard. These new facilities would result in greater construction impacts than upgrading the existing rail line (Exelon 2003a). The alternative would trade barge traffic impacts for rail traffic impacts. The staff agrees with Exelon that such a tradeoff provides no obvious environmental benefit and the barge alternative is considered in this section. A coal slurry pipeline is another potential alternative for delivering coal. However, such a pipeline would need to cover a great distance to reach a suitable coal mining area or the coal would need to be transported by alternative means (e.g., rail) to a site closer to the Quad Cities site for introduction into the pipeline. The coal slurry pipeline alternative for delivering coal is not further evaluated.

(a) Heat rate is a measure of generating station thermal efficiency. It is generally expressed in British thermal units (Btu) per net kilowatt-hour (kWh). It is computed by dividing the total Btu content of fuel burned for electricity generation by the resulting net kWh generation.

(b) The capacity factor is the ratio of electricity generated, the period of time considered, to the energy that could have been generated at continuous full-power operation during the same period.

8.2.1.1 Closed-Cycle Cooling System

For purposes of this SEIS, the staff assumed a coal-fired plant at the Quad Cities site would use a closed-cycle cooling system. While the existing system is open-cycle, using water from the Mississippi River, Exelon notes that the U.S. Environmental Protection Agency (EPA) has revised requirements that could affect the design of the cooling-water intake structures for new facilities (EPA 2001a) and has proposed requirements that could affect modifications at existing facilities (EPA 2002). For this reason, this section considers a closed-cycle system using cooling towers at both the Quad Cities site and an alternate site.

The overall impacts of the coal-fired generating system using a closed-cycle cooling system are discussed in the following sections and are summarized in Table 8-2. For completeness, the staff also considered the impacts of a fully open-cycle cooling system at the Quad Cities site. Additional impacts from the use of an open-cycle cooling system are considered in Section 8.2.1.2.

- **Land Use**

For siting a new facility at the Quad Cities site, the existing infrastructure would be used to the extent practicable, thus limiting the amount of new construction that would be required. Specifically, the staff assumed that the new coal-fired facility would use the switchyard, offices, and transmission rights-of-way. If the coal-fired facility is built at the existing Quad Cities site, Exelon estimates that construction of the power block and coal storage area would impact approximately 120 ha (300 ac) of land and associated terrestrial habitat (Exelon 2003a). Exelon further estimates that ash- and scrubber-waste disposal over a 40-year facility lifetime would require approximately 75 ha (180 ac) (Exelon 2003a). In total, the facility is expected to require approximately 195 ha (480 acres) of land. The GEIS estimates 700 ha (1700 ac) for a 1000-MW(e), coal-fired greenfield, power plant, well above the estimates from Exelon for the 1650-MW(e) power plant. Much of the difference is due to the potential to use existing infrastructure at the Quad Cities site with neighboring land to support the coal-fired alternative.

The coal-fired alternative at the Quad Cities site would require construction of a barge offloading facility at Pool 14 and a conveyor system to the plant's coal yard, requiring the conversion of riverfront land to industrial use.

For an alternate, greenfield site, the land use would be above 700 ha (1700 ac) assumed in the GEIS for a new 1000-MW(e), coal-fired power plant, assuming scaling of the GEIS estimates. A new site would require land for the power block, coal storage and handling, and waste products. Additional land could be required for a transmission line and for a rail spur to the plant site, depending on the infrastructure in existence at the alternate site.

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Table 8-2. Summary of Environmental Impacts of Coal-Fired Generation at the Quad Cities Site and an Alternate Site Using Closed-Cycle Cooling

Impact Category	Quad Cities Site		Alternate Site	
	Impact	Comments	Impact	Comments
Land Use	MODERATE	Would use unused portion of Quad Cities site, and potentially, portions of neighboring land. Would require approximately 195 ha (480 ac) for power block, coal storage, and waste disposal. Would use any existing infrastructure (e.g., transmission lines). Additional land impacts for coal and limestone mining.	MODERATE to LARGE	Potentially 1150 ha (2800 ac) for new coal facility, including power block, infrastructure, coal storage, and waste disposal. Additional land impacts for coal and limestone mining. Total impact would depend on whether the alternate site is previously disturbed.
Ecology	MODERATE to LARGE	Would use undeveloped areas at Quad Cities site. There would be potential for significant habitat loss and fragmentation and reduced productivity and biological diversity.	MODERATE to LARGE	Impact would depend on whether site is previously developed. Factors to consider include location and ecology of site and transmission line route. There would be potential for habitat loss and fragmentation and reduced productivity and biological diversity.
Water Use and Quality	SMALL	Would use closed-cycle cooling system, reducing cooling water requirements while increasing evaporative, consumptive use and new heat rejection to the atmosphere and would continue very limited groundwater use.	SMALL to MODERATE	Impact would depend on volume of water withdrawal, the constituents of the discharge water, and the characteristics of surface water body or groundwater source.

Table 8-2. (contd)

Impact Category	Quad Cities Site		Alternate Site	
	Impact	Comments	Impact	Comments
Air Quality	MODERATE	<p>Sulfur oxides</p> <ul style="list-style-type: none"> • 6000 MT/yr (6600 tons/yr). Actual impact would depend on emissions offsets. <p>Nitrogen oxides</p> <ul style="list-style-type: none"> • 1514 MT/yr (1669 tons/yr). Actual impact would depend on emissions offsets. <p>Particulates</p> <ul style="list-style-type: none"> • 216 MT/yr (238 tons/yr) particulates, 50 MT/yr (55 tons/yr) PM₁₀ <p>Carbon monoxide</p> <ul style="list-style-type: none"> • 1561 MT/yr (1721 tons/yr) <p>Other</p> <ul style="list-style-type: none"> • Some hazardous air pollutants, CO₂ emissions contribute to global warming 	MODERATE	Same emissions as Quad Cities site, although offsets for SO ₂ and NO _x would depend on location.
Waste	MODERATE	Total ash production would be 431,000 MT (475,000 tons) annually, but 87 percent of this ash would be recycled. Facility would also generate 311,000 MT (343,000 tons) of scrubber sludge.	MODERATE	Same impacts as for Quad Cities site.
Human Health	SMALL	Impacts are uncertain but are considered SMALL in the absence of more quantitative data.	SMALL	Same impacts as for Quad Cities site.

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Table 8-2. (contd)

Impact Category	Quad Cities Site		Alternate Site	
	Impact	Comments	Impact	Comments
Socio-economics	SMALL to MODERATE	During construction, impacts would be SMALL. Up to 2500 workers might be required at the peak of the 5-year construction period.	SMALL to LARGE	Construction impacts at alternate site would be similar to those at Quad Cities site, but would depend on whether new site is located near a major metropolitan area.
		During operation, employment would decrease from approximately 1000 permanent and contract workers to approximately 250. All employment impacts would be tempered by proximity to the Quad Cities metropolitan area. No impact on tax base.		Minimal impacts on local tax base.
		Transportation impacts during operation would be SMALL due to the smaller workforce. Transportation impacts associated with construction workers would be SMALL to MODERATE.		Transportation impacts would be similar to those at the Quad Cities site.
Aesthetics	MODERATE	MODERATE aesthetic impact due to impact of plant buildings and structures, along with noise impacts from plant operation.	MODERATE to LARGE	Impact would be similar to those at the Quad Cities site, but would also include any aesthetic impacts from building a new transmission line(s). Impacts would depend on location.
Historic and Archaeological Resources	SMALL to MODERATE	Studies would likely be needed to identify, evaluate, and address mitigation of the potential cultural resource impacts from construction of a new plant on an undeveloped or developed site.	SMALL to MODERATE	Alternate location would necessitate cultural studies. Studies would likely be needed to identify, evaluate, and address mitigation of the potential cultural resource impacts from construction of a new plant on an undeveloped site.

Table 8-2. (contd)

Impact Category	Quad Cities Site		Alternate Site	
	Impact	Comments	Impact	Comments
Environmental Justice	SMALL	No environmental pathways or locations have been identified that would result in disproportionately high and adverse environmental impacts on minority and low-income populations. Impacts on minority and low-income communities should be similar to those experienced by the population as a whole.	SMALL to LARGE	Impacts would vary depending on population distribution and characteristics at new site. Impacts on Quad Cities site would be identical to those in the no-action alternative.

Regardless of whether the coal-fired alternative is built at the Quad Cities site or at an alternate site, additional land-use changes would occur offsite in an undetermined coal mining area to supply coal for the plant. In the GEIS, the staff estimated that approximately 8900 ha (22,000 ac) would be affected for mining the coal and disposing the waste to support a 1000-MW(e) coal plant during its operational life (NRC 1996). Partially offsetting this offsite land use would be the elimination of the need for uranium mining to supply fuel for Quad Cities Units 1 and 2. In the GEIS, the staff estimated that approximately 400 ha (1000 ac) would be affected for mining the uranium and processing it during the operating life of a 1000-MW(e) nuclear power plant.

Overall, the impacts of the coal-fired alternative at the Quad Cities site are considered MODERATE. Previously unused land would need to be converted to industrial use. Overall, the impacts of the coal-fired alternative at an alternate site are considered MODERATE to LARGE, depending on whether the alternate site had been developed previously or not and what new infrastructure might be required.

- **Ecology**

Locating a coal-fired plant at the Quad Cities site would alter ecological resources because of construction, and because of the need to convert currently unused land to industrial use for the plant, coal storage, and ash- and scrubber-sludge disposal. However, some of this land has been previously disturbed. Use of cooling towers would reduce operational impacts on the aquatic ecosystem. Impacts could include habitat degradation, fragmentation, or loss as a result of construction activities and conversion of land to industrial use. Ecological communities may experience reduced productivity and biological diversity from disturbing previously intact land. Construction of a barge offloading facility would affect terrestrial habitat along the river bluffs as well as aquatic habitat associated

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with construction, maintenance, and operation of the offloading facility. Overall, the impacts of the coal-fired alternative at the Quad Cities site are considered MODERATE to LARGE.

At an alternate site, the coal-fired alternative would introduce construction impacts and new incremental operational impacts. Even assuming siting at a previously disturbed area, the impacts may alter the ecology. Impacts could include habitat degradation, fragmentation or loss, reduced ecosystem productivity (i.e., including wildlife species), and a reduction in biological diversity. Construction and maintenance of transmission lines and a rail spur would have ecological impacts. Use of make-up cooling water from a nearby surface water body could have adverse aquatic resource impacts. Overall, the impacts of the coal-fired alternative at an alternate site are considered MODERATE to LARGE, depending on the degree to which the site has already been disturbed by industrial use.

- **Water Use and Quality**

The coal-fired alternative at the existing site would use cooling towers and would, therefore, reduce the cooling-water needs from their existing levels. There would still be consumptive use of water due to evaporation from the cooling towers. At both the Quad Cities site and an alternate site, plant discharges would consist mostly of cooling-tower blowdown, characterized primarily by an increased temperature and increased concentration of dissolved solids relative to the receiving body of water and intermittent low concentrations of biocides (e.g., chlorine). Treated process waste streams and sanitary waste water would also be discharged. All discharges would likely be regulated through a national pollution discharge elimination system (NPDES) permit. Some erosion and sedimentation probably would occur during construction (NRC 1996). At the Quad Cities site, the five groundwater wells that supply limited, specific uses at the Quad Cities site would continue to be used. Use of groundwater for a coal-fired plant at an alternate site is a possibility. Overall, the impacts of the coal-fired alternative at the Quad Cities site are SMALL. The impacts of the coal-fired alternative at an alternate site are considered SMALL to MODERATE.

- **Air Quality**

The air quality impacts of coal-fired generation are significantly higher than those of nuclear generation due to emissions of sulfur oxides (SO_x), nitrogen oxides (NO_x), particulates, carbon monoxide, hazardous air pollutants, such as mercury, and naturally occurring radioactive materials.

The Quad Cities site is located in the Metropolitan Quad Cities Interstate Air Quality Control Region. All counties in this air quality control region are designated as being in attainment for all criteria pollutants (40 CFR 81.102; 40 CFR 81.316). All counties in Illinois within 50 miles of the Quad Cities site are designated as being in attainment for all criteria pollutants, as are all counties in Iowa (40 CFR 81.314; 40 CFR 81.316).

A new coal-fired generating plant located at the Quad Cities site would likely need a prevention of significant deterioration (PSD) permit and an operating permit under the Clean Air Act (CAA). The plant would need to comply with the new source performance standards for such plants set forth in 40 CFR Part 60 Subpart Da, which consists of 40 CFR Part 60.40a through 40 CFR Part 60.49a. Standards establish limits for particulate matter and opacity (40 CFR 60.42a), SO₂ (40 CFR 60.43a), and NO_x (40 CFR 60.44a).

Section 169A of the CAA (42 USC 7491) establishes a national goal of preventing future, and remedying existing, impairment of visibility or mandatory Class 1 Federal areas when impairment results from man-made air pollution. In addition, EPA issued a new regional haze rule in 1999 (EPA 1999). The rule specifies that for each mandatory class I Federal area located within a State, the State must establish goals that provide for reasonable progress toward achieving natural visibility conditions. The reasonable-progress goals must provide for an improvement in visibility for the most-impaired days over the period of the implementation plan and ensure no degradation in visibility for the least-impaired days over the same period (40 CFR 1.308[d][1]). If a new coal-fired power station were located close to a mandatory class I Federal area, additional air pollution control requirements could be imposed. However, there are no mandatory class I Federal areas near the Quad Cities site. It is assumed that an alternate site would not be chosen near a mandatory class I Federal area.

The U.S. EPA has various regulatory requirements for visibility protection in 40 CFR Part 51, Subpart P, including a specific requirement for the review of any new major stationary source in an area designated as attainment or unclassified under the CAA. As noted above, the Quad Cities site is in a region that is either attainment or unclassified for all criteria pollutants.

Impacts and issues for particular pollutants follow. Unless otherwise stated, the impacts would be the same at the Quad Cities site or at an alternate site.

Sulfur oxides. A new coal-fired power plant would be subject to the requirements in Title IV of the CAA. Title IV was enacted to reduce emissions of SO₂ and NO_x, the two principal precursors of acid rain, by restricting emissions of these pollutants from power plants. Title IV caps aggregate annual power-plant SO₂ emissions and imposes controls on SO₂ emissions through a system of marketable allowances. The EPA issues one allowance for each ton of SO₂ that a unit is allowed to emit. New units do not receive allowances, but they are required to have allowances to cover their SO₂ emissions. Owners of new units must, therefore, purchase allowances from owners of other power plants or reduce SO₂ emissions at other power plants they own. Allowances can be banked for use in future years. Because Exelon has no fossil-fired power plants (Exelon 2003a), it would need to purchase

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allowances from the open market to operate a coal-fired power plant at the Quad Cities site. Whether the coal-fired alternative results in an aggregate increase in SO₂ emissions will depend on whether the permits are purchased when there is a surplus of permits or when the market is constrained. In the latter case, the coal-fired alternative would result in no net increase in aggregate national SO₂ emissions. Regardless, the coal-fired power plant would result in a local increase in SO₂ emissions whether located at the Quad Cities site or an alternate site.

Exelon states in its ER that the alternative coal-fired power plant would minimize air emissions through a combination of boiler technology and post-combustion pollution removal. SO₂ would be removed using lime in a flue-gas desulfurization process (Exelon 2003a). Exelon estimates that by using a wet-scrubber control technology, 95 percent of the stack emissions of SO₂ could be collected, so that total annual stack emissions, after scrubbing, would be approximately 6000 MT (6600 tons) of SO_x (Exelon 2003a).

Nitrogen oxides and Volatile Organic Compounds. Ground-level ozone is a primary concern of the U.S. EPA. Ground-level ozone is formed when oxides of nitrogen (NO_x) and volatile organic compounds (VOCs) react in the presence of sunlight. Ozone precursors such as these, and ozone itself, can be carried hundreds of miles from their source, potentially causing pollution over wide regions.

In 1998, the EPA promulgated a rule requiring 21 states, including Illinois, to reduce NO_x emissions (63 FR 57356 [EPA 1998a]). The rule specifies total NO_x emissions (40 CFR 51.121e) for each State, but leaves open the method of implementation. The emissions-reduction measures are to be in place by May 31, 2004. Illinois, in its State Implementation Plan (SIP), has chosen to implement a market-based emissions credit trading system for NO_x. According to the system, NO_x emissions from large, electricity-generating units may not exceed 27,851 MT (30,701 tons) during each ozone season. A small percentage of NO_x credits was set aside for new sources (Exelon 2003a). New NO_x emissions will, therefore, depend both on how many new credits are available and whether any purchases of credits are made in a constrained market. In the most extreme case, all of the credits would need to be purchased on the open market and such purchases would result in reductions from sources elsewhere. Even in this case, however, NO_x emissions could simply move out of State. The staff assumed that even if the coal-fired alternative were located at an alternate site, the alternate site would be in Illinois and, therefore, subject to the allowance system.

Section 407 of the CAA establishes technology-based limitations for NO_x emissions. The market-based allowance system used for SO₂ emissions is not used for NO_x emissions. A new coal-fired power plant would be subject to the new source performance standards for such plants at 40 CFR 60.44a(d)(1). This regulation, issued on September 16, 1998 (EPA

1998b), limits the discharge of any gases that contain nitrogen oxides (expressed as NO_x) in excess of 200 ng/J of gross energy output (1.6 lb/MWh), based on a 30-day rolling average.

Exelon estimates that by using the best available control technology, the total annual NO_x emissions for a new coal-fired power plant would be approximately 1561 MT (1721 tons) (Exelon 2003a). This level of NO_x emissions might not result in greater statewide emissions depending on the nature of the credit purchases to cover these emissions. Exelon estimates that annual VOC emissions from the coal-fired alternative would be approximately 188 MT (207 tons). The coal-fired alternative will most likely result in an increase in statewide VOC emissions, and certainly in local VOC emissions.

Particulates. Exelon estimates that the total annual stack emissions would include 216 MT (238 tons) of filterable total suspended particulates (particulates that range in size from less than 0.1 micrometer [μm] up to approximately 45 μm) (Exelon 2003a). This would include 50 MT (55 tons) per year of particulate matter having an aerodynamic diameter less than or equal to 10 μm (PM₁₀) (Exelon 2003a). Fabric filters, with a 99.9 percent removal efficiency, would be used to control particulates (Exelon 2003a). In addition, coal handling equipment would introduce fugitive particulate emissions.

Construction of a coal-fired plant would generate fugitive dust. In addition, exhaust emissions would come from vehicles and motorized equipment used during the construction process.

Carbon monoxide. Exelon estimates that the total carbon monoxide emissions would be approximately 1561 MT (1721 tons) per year (Exelon 2003a).

Hazardous air pollutants, including mercury. In December 2000, the EPA issued a regulatory finding on the emissions of hazardous air pollutants from electric utility steam-generating units (65 FR 79825 [EPA 2000b]). The EPA determined that coal- and oil-fired electric utility steam-generating units are significant emitters of hazardous air pollutants. Coal-fired power plants were found by the EPA to emit arsenic, beryllium, cadmium, chromium, dioxins, hydrogen chloride, hydrogen fluoride, lead, manganese, and mercury (65 FR 79825 [EPA 2000b]). The EPA concluded that mercury is the hazardous air pollutant of greatest concern. The EPA found that (1) there is a link between coal consumption and mercury emissions, (2) electric utility steam-generating units are the largest domestic source of mercury emissions, and (3) certain segments of the U.S. population (e.g., the developing fetus and subsistence fish-eating populations) are believed to be at potential risk of adverse health effects due to mercury exposures resulting from the consumption of contaminated fish (65 FR 79825 [EPA 2000b]). Accordingly, the EPA added coal- and oil-fired electric utility steam-generating units to the list of source categories under Section 112(c) of the CAA for which emission standards for hazardous air pollutants will be issued (65 FR 79825 [EPA 2000b]).

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Uranium and thorium. Coal contains uranium and thorium. Uranium concentrations are generally in the range of 1 to 10 parts per million. Thorium concentrations are generally about 2.5 times greater than uranium concentrations (Gabbard 1993). One estimate is that a typical coal-fired plant released roughly 4.7 MT (5.2 tons) of uranium and 11.6 MT (12.8 tons) of thorium in 1982 (Gabbard 1993). The population dose equivalent from the uranium and thorium releases and daughter products produced by the decay of these isotopes has been calculated to be significantly higher than that from nuclear power plants (Gabbard 1993).

Carbon dioxide. A coal-fired plant would have unregulated carbon dioxide emissions that would contribute to global warming. While these emissions have not traditionally been an important environmental concern, they are becoming increasingly relevant at both a national and an international level.

Summary. The GEIS analysis did not quantify emissions from coal-fired power plants, but the analysis implied that air impacts would be substantial. The GEIS also mentioned global warming from unregulated carbon dioxide emissions and acid rain from SO_x and NO_x emissions as potential impacts (NRC 1996). Adverse human health effects from coal combustion, such as cancer and emphysema, have been associated with the products of coal combustion. Overall, the air quality impacts from coal-fired generation at either the Quad Cities or an alternate site are considered MODERATE. The impacts would be clearly noticeable, but they would not destabilize air quality.

- **Waste**

Coal combustion generates waste in the form of ash; and equipment for controlling air pollution generates additional ash, spent selective catalytic reduction catalyst, and scrubber sludge. Assuming 99.9 percent ash removal, the three 550-MW(e) coal-fired units would generate approximately 431,000 MT (475,000 tons) of this ash annually (Exelon 2003a). According to Exelon, Illinois regulations encourage recycling of coal-combustion byproducts, and Exelon (then ComEd) historically recycled 87 percent of its coal ash (Exelon 2003a). Assuming continuation of this waste mitigation measure, the coal-fired alternative would generate approximately 56,000 (62,000 tons) of ash per year for disposal (Exelon 2003a). In addition, approximately 311,000 MT (343,000 tons) per year of scrubber sludge would be generated by SO_x-controlled equipment (Exelon 2003a). This equipment would use approximately 116,000 tons of calcium oxide (lime) in the scrubbing process to control SO_x emissions.

The waste would be disposed of onsite, accounting for approximately 75 ha (180 ac) of land area over the 40-year plant life, assuming a waste depth of 30 feet (Exelon 2003a). Waste

impacts to groundwater and surface water could extend beyond the operating life of the plant if leachate and runoff from the waste storage area occurs. Disposal of the waste could noticeably affect land use and groundwater quality, but with appropriate management and monitoring, it would not destabilize any resources. After closure of the waste site and revegetation, the land could be available for other uses.

In May 2000, the EPA issued a "Notice of Regulatory Determination on Wastes From the Combustion of Fossil Fuels" (EPA 2000a). The EPA concluded that some form of national regulation is warranted to address coal-combustion waste products because (1) the composition of these wastes could present danger to human health and the environment under certain conditions; (2) the EPA has identified 11 documented cases of proven damages to human health and the environment by improper management of these wastes in landfills and surface impoundments; (3) present disposal practices are such that in 1995, these wastes were being managed in 40 to 70 percent of landfills and surface impoundments without reasonable controls in place, particularly in the area of groundwater monitoring; and (4) the EPA identified gaps in the State oversight of coal-combustion wastes. Accordingly, the EPA announced its intention to issue regulations for the disposal of coal-combustion waste under Subtitle D of the Resource Conservation and Recovery Act.

Overall, the waste impacts of the coal-fired alternative at the Quad Cities site or at an alternate site are considered MODERATE. The impacts would be clearly noticeable, but they would not destabilize any important resource.

- **Human Health**

Coal-fired power generation introduces worker risks from coal and limestone mining, worker and public risks from coal and lime/limestone transportation, worker and public risks from disposal of coal-combustion wastes, and public risks from the inhalation of stack emissions. Emission impacts can be widespread, and health risks can be difficult to quantify. The coal alternative also introduces the risk of coal pile fires and attendant inhalation risks.

The staff stated in the GEIS that there could be human health impacts (cancer and emphysema) from the inhalation of toxins and particulates from coal-fired plants, but the staff did not identify the significance of these impacts (NRC 1996). In addition, the discharges of uranium and thorium from coal-fired plants can potentially produce radiological doses in excess of those arising from nuclear-power-plant operations (Gabbard 1993).

Regulatory agencies, including the EPA and State agencies, set air-emission standards and requirements based on human health impacts. These agencies also impose site-specific emission limits as needed to protect human health. The EPA has recently concluded that

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certain segments of the U.S. population (e.g., the developing fetus and subsistence fish-eating populations) are believed to be at potential risk of adverse health effects due to mercury exposures from sources such as coal-fired power plants. However, in the absence of more quantitative data, human health impacts from radiological doses and inhaling toxins and particulates generated by burning coal are characterized as SMALL. This characterization holds for a coal-fired generation plant at the Quad Cities site and at an alternate site.

- **Socioeconomics**

Construction of the coal-fired alternative would take approximately 5 years. The staff assumed that construction would take place while Quad Cities Units 1 and 2 continues operation and would be completed by the time Quad Cities Units 1 and 2 permanently cease operation. The GEIS estimates a peak workforce during construction of between 1200 and 2500 workers for a 1000-MW(e) power plant (NRC 1996). This workforce would likely be larger for the 1650-MW(e) coal-fired alternative.

If the facility were constructed at the Quad Cities site, these workers would be in addition to the 850 permanent employees and approximately 130 contract workers that currently work at the Quad Cities site. During construction of the new coal-fired plant, surrounding communities would experience demands on housing and public services that could have SMALL impacts. These impacts would be tempered because the Quad Cities site is part of the Quad Cities metropolitan area. After construction, the nearby communities would be impacted by the loss of the construction jobs.

Exelon estimates that the new coal-fired plant would have a workforce of approximately 250 (Exelon 2003a). If the coal-fired alternative were constructed at the Quad Cities site and Quad Cities Units 1 and 2 were decommissioned, there would be a loss of 600 permanent, high-paying jobs (850 for Quad Cities Units 1 and 2 down to 250 for the coal-fired alternative), along with the loss of 130 contract workers, with a commensurate reduction in demand on socioeconomic resources and contribution to the regional economy. These impacts may be offset because the Quad Cities site is in the Quad Cities metropolitan area. The coal-fired alternative would provide a new tax base to offset the loss of tax base associated with decommissioning of Quad Cities Units 1 and 2. For all of these reasons, the appropriate characterization of non-transportation socioeconomic impacts for operating a coal-fired plant constructed at the Quad Cities site is considered SMALL.

The capital expenditures associated with the new plant would lead to an increase in assessed value and tax revenue that would probably be substantial for several of the taxing bodies associated with Cordova Township. Therefore, this alternative would probably have a positive impact in tax revenues. However, even though these new tax revenues would probably more than replace tax revenues lost upon the decommissioning of the current

plant, they would not have more than a SMALL effect in terms of tax-related land use effects.

The impacts of a new coal-fired facility at an alternate site would depend on the socioeconomic characteristics of the new site. If the site were near a large urban center, as the Quad Cities site is, then the impacts would be small. On the other hand, in the GEIS, the staff stated that socioeconomic impacts at a rural site would be larger than at an urban site, because more of the peak construction workforce would need to move into the area to work (NRC 1996). Alternate sites would, therefore, need to be analyzed on a case-by-case basis. Socioeconomic impacts from construction of the new site could range from SMALL to LARGE, depending on the characteristics of the surrounding regions. Impacts from operating the facility could range from SMALL to MODERATE, depending on the characteristics of the surrounding regions.

For transportation related to the commuting of plant-operating personnel, the impacts are considered SMALL. The maximum number of plant-operating personnel would be approximately 250 compared to the current permanent workforce of 850 and contract workforce of 130 (Exelon 2003a). Therefore, traffic impacts associated with plant personnel commuting to a coal-fired plant would be expected to be SMALL compared to the current impacts from Quad Cities Units 1 and 2. This would hold for both the Quad Cities site and an alternate site.

During the 5-year construction period for the replacement coal-fired units, a large number of construction workers would be working at the site in addition to the workers currently at the Quad Cities site. The addition of these workers could place significant traffic loads on existing highways near either the Quad Cities site or an alternate site. Such impacts would be MODERATE.

For most alternate sites, coal and lime would likely be delivered by rail, although barge delivery is feasible for a location on navigable waters. Transportation impacts would depend upon the site location. Socioeconomic impacts associated with rail transportation would likely be MODERATE to LARGE. Barge delivery of coal and lime/limestone would likely have SMALL socioeconomic impacts.

- **Aesthetics**

The coal-fired power-plant units stand as high as 60 m (200 ft) tall. The exhaust stacks stand as high as 120 to 185 m (400 to 600 ft) tall. These structures would be visible offsite during daylight hours. Buildings and structures would also be visible at night because of outside lighting. Cooling towers would be required (up to 160 m [520 ft] high in the case of natural draft towers and up to 30 m [100 ft] high in the case of mechanical draft towers), and

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these towers and their associated plumes would also be visible offsite. The Federal Aviation Administration (FAA) generally requires that all structures exceeding an overall height of 61 m (200 ft) above ground level have markings and/or lighting so as not to impair aviation safety (FAA 2000). Visual impacts of buildings and structures could be mitigated by landscaping and color selection that is consistent with the environment. Nighttime visual impacts could be mitigated by appropriate use of light shielding and reduced use of lighting that still meets FAA requirements. There would also be impacts from the barge offloading facility on the river bluffs. At the Quad Cities site, visual aesthetic impacts are considered MODERATE.

At an alternate site, the aesthetic impacts could be mitigated if the plant were located in an industrial area adjacent to the other power plants. There would also be significant aesthetic impacts from a new transmission line and any rail line needed to deliver coal and lime. Overall, the visual aesthetic impacts associated with a replacement coal-fired power plant at an alternate site are considered MODERATE to LARGE and will depend on the exact location of the alternate site.

Coal-fired generation would introduce mechanical sources of noise that would be audible offsite. Sources contributing to total noise produced by plant operation are classified as continuous or intermittent. Continuous sources include the mechanical equipment associated with normal plant operations. Intermittent sources include the equipment related to coal handling, solid-waste disposal, transportation related to coal and lime/limestone delivery, use of outside loudspeakers, and the commuting of plant employees. Noise impacts associated with rail delivery of coal and lime/limestone at an alternate site would be most significant for residents living in the vicinity of the facility and along the rail route. Although noise from passing trains significantly raises noise levels near the rail corridor, the short duration of the noise reduces its impact. The noise impacts of a coal-fired plant at the Quad Cities site are considered to be MODERATE. At an alternate site, these noise impacts would be SMALL to LARGE, depending on the site. Aesthetic impacts at the plant site would be mitigated if the plant were located in an industrial area adjacent to other power plants or industrial facilities.

- **Historic and Archaeological Resources**

At the Quad Cities site or an alternate site, a cultural-resource inventory would likely be needed for any onsite property that has not been previously surveyed. Other lands, if any, that are acquired to support the plant would also likely need an inventory of cultural resources, identification, and recording of existing historic and archaeological resources, and possible mitigation of adverse effects from subsequent ground-disturbing actions related to physical expansion of the plant site.

Before construction at the Quad Cities site or an alternate site, studies would likely be needed to identify, evaluate, and address mitigation of the potential impacts of new plant construction on cultural resources. The studies would likely be needed for all areas of potential disturbance at the proposed plant site and along associated corridors where new construction would occur (e.g., roads, transmission corridors, rail lines, or other rights-of-ways). Historic and archaeological resource impacts need to be evaluated on a site-specific basis. The impacts can generally be effectively managed, and as such, impacts would vary between SMALL to MODERATE, depending on what historic and archaeological resources are present, and whether mitigation is necessary.

- **Environmental Justice**

No environmental pathways or locations have been identified that would result in disproportionately high and adverse environmental impacts on minority and low-income populations if a replacement coal-fired plant were built at the Quad Cities site. Other impacts, such as impacts on housing availability and prices during construction, might occur, and this could disproportionately affect minority and low-income populations. Closure of Quad Cities Units 1 and 2 would result in a decrease in employment of approximately 850 permanent operating employees and 130 contract employees (same as in the no-action case), but this would be partially offset by construction and operation of the replacement power plant. Resulting economic conditions could reduce employment prospects for minority or low-income populations. However, the Quad Cities site is located near an active urban area with many employment possibilities. Overall, impacts would be SMALL and would depend on the ability of minority or low-income populations to commute to other jobs outside the area. The impacts around the alternate site would depend upon the site chosen and the nearby population distribution. These impacts could vary between SMALL and LARGE.

8.2.1.2 Open-Cycle Cooling System

The environmental impacts of constructing a coal-fired generation system at the Quad Cities site using the existing open-cycle cooling system are largely the same as the impacts for a coal-fired plant using a closed-cycle system. However, there are some environmental differences between the closed-cycle and once-through cooling systems. Table 8-3 summarizes the incremental differences.

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Table 8-3. Summary of Environmental Impacts of Coal-Fired Generation at the Quad Cities Site Using Open-Cycle Cooling

Impact Category	Change in Impacts from Open-Cycle Cooling System
Land Use	10 to 12 ha (25 to 30 ac) less land required because cooling towers and associated infrastructure are not needed.
Ecology	Impacts would depend on ecology at the site. No impact to terrestrial ecology from cooling-tower drift. Increased water withdrawal with possible greater impact on aquatic ecology.
Surface Water Use and Quality	No discharge of cooling-tower blowdown. Increased water withdrawal and more thermal load on the Mississippi River.
Groundwater Use and Quality	No change.
Air Quality	No change.
Waste	No change.
Human Health	No change.
Socioeconomics	No change.
Aesthetics	Reduced aesthetic impact because cooling towers would not be used.
Historic and Archaeological Resources	Less land impacted.
Environmental Justice	No change.

8.2.2 Natural Gas-Fired Generation

The environmental impacts of the natural-gas alternative are examined in this section. Unless otherwise indicated, the assumptions and numerical values used in this section are from the Exelon ER (Exelon 2003a). The staff reviewed this information and compared it to environmental impact information in the GEIS, as well as other relevant information and sources when appropriate. Although the OL renewal period is only 20 years, the impact of operating the natural gas-fired alternative for 40 years is considered as a reasonable projection of the operating life of a natural gas-fired plant.

The staff assumed that Quad Cities Units 1 and 2 would remain in operation while the natural gas-fired alternative was constructed. Consistent with the Exelon ER (Exelon 2003a), the staff assumed a combined-cycle^(a) natural-gas facility based on three 550-MW(e) combined-cycle

(a) In a combined-cycle unit, hot combustion gases in a combustion turbine rotate the turbine to generate electricity. Waste-combustion heat from the combustion turbine is routed through a heat-recovery boiler to make steam to generate additional electricity.

units, for a total facility size of 1650 MW(e) (Exelon 2003a).^(a) The 550-MW(e) units are a standard size, which would minimize the cost of the new facility. Any shortfall in capacity would be made up from other sources. This assumption understates the environmental impacts of replacing the 1860 MW(e) from Quad Cities Units 1 and 2. As a rough estimate, if a natural gas-fired plant of exactly 1860 MW(e) were to be built, any numerical impacts in this section, for example, quantities of air pollutants, might simply be adjusted upward accordingly.

However, given these adjustments, the staff has determined that the differences in impacts between 1650 MW(e) and 1860 MW(e) of natural gas-fired generation would not be significant and would not change the impact levels.

The natural gas-fired alternative is analyzed both for the existing Quad Cities site and for an unnamed alternate site. Siting a new natural gas-fired plant where an existing nuclear plant is located would result in less impact. Hence, although the staff considered an alternate site, it is unlikely that it would be beneficial to place a new natural gas-fired facility at an alternate site based purely on environmental grounds. The GEIS estimates that 45 ha (110 ac) would be required for a new 1000-MW(e) combined-cycle facility, a much smaller land requirement than for a coal-fired facility. Exelon concluded in its ER that the Quad Cities site would be a reasonable site for location of a natural gas-fired generating unit (Exelon 2003a). Locating the natural gas-fired alternative at an existing nuclear site would allow the new facility to take advantage of existing infrastructure at the Quad Cities site, including switchyard, offices, intake and discharge, and transmission rights-of-way.

Exelon made the following estimates to describe the combined-cycle facility (Exelon 2003a):

- Heat Rate: 6120 Btu/kWhr
- Natural Gas Heating Value: 1021 Btu/ft³
- Capacity Factor: 0.85

These assumptions were deemed by the staff to be consistent with current practice with combined-cycle facilities. For emissions control, the facility would be outfitted with standard technologies, which include selective catalytic reduction and steam/water injection for NO_x control.

Operation of a new combined-cycle facility at the Quad Cities site would require a new gas line. Exelon estimated that at least 9.6 km (6 mi) of 0.41-m (16-in.) gas pipeline would be required (Exelon 2003a). Exelon further estimated that this pipeline would require approximately 40 to

(a) The natural gas-fired units would have a rating of 572 gross MW(e) and 550 net MW(e). The difference between "gross" and "net" is the electricity consumed on site.

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49 ha (100 to 120 ac) for an easement (Exelon 2003a). The gas line requirements at an alternate site would depend on the characteristics and location of the alternate site.

8.2.2.1 Closed-Cycle Cooling System

For purposes of this SEIS, the staff assumed a natural gas-fired plant would use a closed-cycle cooling system at the Quad Cities site. The overall impacts of the natural gas-fired generating system using a closed-cycle cooling system at the Quad Cities site and at an alternate site are discussed in the following sections and summarized in Table 8-4. For completeness, the staff also considered the impacts of a fully open-cycle cooling system at the Quad Cities site, consistent with current practice. Additional impacts from the use of an open-cycle cooling system are considered in Section 8.2.1.2.

Table 8-4. Summary of Environmental Impacts of Natural Gas-Fired Generation at the Quad Cities Site and an Alternate Site Using Closed-Cycle Cooling

Impact Category	Quad Cities Site		Alternate Site	
	Impact	Comments	Impact	Comments
Land Use	SMALL to MODERATE	Upwards 45 ha (110 ac) for power block, offices, roads, and parking areas. Additional impact for construction of underground gas pipeline.	SMALL to LARGE	Upwards of 45 ha (110 ac) for power block, offices, roads, and parking areas. Additional impact for construction and/or upgrade of an underground gas pipeline, if required, along with any needed transmission lines.
Ecology	SMALL to MODERATE	Would use undeveloped areas at Quad Cities site. There would be potential for significant habitat loss and fragmentation and reduced productivity and biological diversity.	SMALL to LARGE	Impact would depend on whether site is previously developed. Factors to consider include location and ecology of site and transmission line route. There would be potential for habitat loss and fragmentation and reduced productivity and biological diversity.

Table 8-4. (contd)

Impact Category	Quad Cities Site		Alternate Site	
	Impact	Comments	Impact	Comments
Water Use and Quality	SMALL	Would use closed-cycle cooling system with natural gas-fired combined cycle units. This would result in a significant reduction in cooling water requirements. The facility would continue very limited groundwater use.	SMALL to MODERATE	Impact would depend on volume of water withdrawal, the constituents of the discharge water, the characteristics of surface water or groundwater source, and the new intakes structures required.
Air Quality	MODERATE	<p>Sulfur oxides</p> <ul style="list-style-type: none"> • 121 MT/yr (133 tons/yr). <p>Nitrogen oxides</p> <ul style="list-style-type: none"> • 386 MT/yr (426 tons/yr). <p>Actual impact would depend on emissions offsets.</p> <p>Particulates</p> <ul style="list-style-type: none"> • 67 MT/yr (74 tons/yr) PM₁₀ <p>Carbon monoxide</p> <p>80 MT/yr (88 tons/yr)</p> <p>Other</p> <ul style="list-style-type: none"> • CO₂ emissions contribute to global warming. 	MODERATE	Same emissions as Quad Cities site, although offsets for NO _x would depend on location.
Waste	SMALL	Minimal waste product from fuel combination.	SMALL	Same impacts as for Quad Cities site.
Human Health	SMALL	Impacts are considered to be minor.	SMALL	Same impacts as for Quad Cities site.

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Table 8-4. (contd)

Impact Category	Quad Cities Site		Alternate Site	
	Impact	Comments	Impact	Comments
Socioeconomics	SMALL to MODERATE	<p>During construction, impacts would be SMALL. Peak workforce during two-to-three-year construction period would be significantly smaller than for other steam-generation facilities.</p> <p>During operation, employment would decrease from approximately 1000 permanent and contract workers to less than 100. All employment impacts would be tempered by proximity to Quad Cities metropolitan area. No impact on tax base.</p> <p>Transportation impacts during operation would be SMALL due to the smaller workforce.</p> <p>Transportation impacts associated with construction workers would be SMALL to MODERATE.</p>	SMALL to MODERATE	<p>Construction impacts at alternate site would be similar to those at Quad Cities site, but would depend on whether new site is located near a major metropolitan area.</p> <p>Minimal impacts on local tax base.</p> <p>Transportation impacts would be similar to those at the Quad Cities site.</p>
Aesthetics	MODERATE	SMALL aesthetic impact due to impact of plant buildings and structures, along with noise impacts from plant operation. Visual impact would be similar to current Quad Cities Units 1 and 2.	MODERATE to LARGE	Impact would depend on location. Greatest impact would likely be from the new transmission line(s) that would be needed.
Historic and Archaeological Resources	SMALL to MODERATE	Studies would likely be needed to identify, evaluate, and address mitigation of the potential cultural resource impacts from construction of a new plant on an undeveloped or developed site.	SMALL to MODERATE	Alternate location would necessitate cultural studies. Studies would likely be needed to identify, evaluate, and address mitigation of the potential cultural resource impacts from construction of a new plant on an undeveloped site.

Table 8-4. (contd)

Impact Category	Quad Cities Site		Alternate Site	
	Impact	Comments	Impact	Comments
Environmental Justice	SMALL	No environmental pathways or locations have been identified that would result in disproportionately high and adverse environmental impacts on minority and low-income populations. Impacts on minority and low-income communities should be similar to those experienced by the population as a whole. Any impacts would be tempered by proximity to the Quad Cities metropolitan area.	SMALL to LARGE	Impacts would vary depending on population distribution and characteristics at new site. Impacts on Quad Cities site would be identical to those in the no-action alternative.

• **Land Use**

For siting a new facility at the Quad Cities site, the existing infrastructure would be used to the extent practicable, thus limiting the amount of new construction that would be required there. Specifically, the staff assumed that the new combined-cycle facility would make use of the switchyard, offices, and transmission rights-of-way. The GEIS assumes that approximately 45 ha (110 ac) would be needed for a 1000-MW(e) natural-gas facility (NRC 1996). Scaling up for the 1650-MW(e) facility considered by Exelon would indicate a proportionally larger land requirement. According to Exelon, previously disturbed acreage already exists and is available at the Quad Cities site, minimizing land-use impacts (Exelon 2003a).

If the natural gas-fired facility were built at the Quad Cities site, there would be an additional land requirement to bring in enough gas to supply the combined-cycle facility. Exelon estimated that a minimum of 9.6 km (6 mi) of 0.41-m (16-in.) gas pipeline would be required (Exelon 2003a). Exelon further estimated that this pipeline would require approximately 40 to 49 ha (100 to 120 ac) for an easement (Exelon 2003a). Exelon asserts that this would likely be of only minimal impact, because Exelon would use BMPs during construction, such as minimizing soil loss and restoring vegetation immediately after the excavation is backfilled (Exelon 2003a).

For construction at an alternate site, the full land requirement for a natural gas-fired facility would be required because no existing infrastructure would be available. Additional land could be impacted for construction of a transmission line, and natural gas and oil pipelines to serve the plant.

Regardless of whether the natural-gas facility is built at the Quad Cities site or at an alternate site, additional land could be required for natural gas wells and collection stations. In the GEIS, the staff estimated that approximately 1500 ha (3600 ac) would be needed for

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a 1000-MW(e) plant (NRC 1996). Proportionately more land would be needed for the 1650-MW(e) facility considered here. Partially offsetting these offsite land requirements would be the elimination of the need for uranium mining to supply fuel for Quad Cities Units 1 and 2. In the GEIS (NRC 1996), the staff estimated that approximately 400 ha (1000 ac) would be affected for mining the uranium and processing it during the operating life of a 1000-MW(e) nuclear power plant.

Overall, the land-use impacts of constructing the natural gas-fired alternative at the Quad Cities site are considered SMALL to MODERATE. Overall, the land-use impacts of siting the natural gas-fired alternative at an alternate site would depend on the chosen site, but are characterized as SMALL to LARGE.

- **Ecology**

Locating a natural gas-fired plant at the Quad Cities site would alter ecological resources because of the need to convert currently unused land to industrial use for the plant and for building a new natural gas line to the site. Some of this land would have been previously disturbed. Exelon asserts the new gas pipeline would likely be of only minimal impact, because Exelon would use BMPs during construction, such as minimizing soil loss and restoring vegetation immediately after the excavation is backfilled (Exelon 2003a). There could be potential onsite habitat degradation, fragmentation or loss, reduced ecological productivity and a reduction in biological diversity, resulting from disturbing previously intact land. Use of a closed-cycle cooling system would limit operational impacts on the aquatic ecosystem, and would reduce the use of water below current levels. Overall, the ecological impacts of the natural gas-fired alternative at the Quad Cities site are considered SMALL to MODERATE.

At an alternate site, the natural gas-fired alternative would introduce construction impacts and new incremental operational impacts. Even assuming siting at a previously disturbed area, the impacts may alter the ecology. Impacts could include habitat degradation, fragmentation, or loss, reduced ecological productivity and a reduction in biological diversity.

If needed, construction and maintenance of new transmission lines would have similar ecological impacts. Use of make-up cooling water from a nearby surface water body could have adverse aquatic resource impacts. Overall, the ecological impacts are dependent on whether a site had been previously developed (SMALL to MODERATE) or is an undeveloped greenfield site (MODERATE to LARGE impact).

- **Water Use and Quality**

Each of the natural gas-fired units would include a heat-recovery boiler from which steam would turn an electric generator. Steam would be condensed and circulated back to the boiler for reuse. Overall, water requirements for combined-cycle generation are much less than for conventional closed-cycle steam-electric generators. The natural gas-fired

alternative at the existing or at an alternate site would use a closed-cycle cooling system with cooling towers and would, therefore, significantly reduce water needs from what they would otherwise be in an open-cycle configuration. Plant discharges would consist mostly of cooling-tower blowdown, characterized primarily by an increased temperature and increased concentration of dissolved solids relative to the receiving body of water and intermittent low concentrations of biocides (e.g., chlorine). Treated process waste streams and sanitary waste water may also be discharged. All discharges would likely be regulated through a NPDES permit. Some erosion and sedimentation probably would occur during construction (NRC 1996). Use of groundwater for a natural gas-fired plant at an alternate site is a possibility. At the existing site, the five groundwater wells that supply limited specific uses would continue to be used. Some erosion and sedimentation probably would occur during construction (NRC 1996). Overall, the impacts of the natural gas-fired alternative at the Quad Cities site are considered SMALL. Overall, the impacts at an alternate site are considered SMALL to MODERATE.

- **Air Quality**

Natural gas is a relatively clean-burning fuel. The natural gas-fired alternative would release similar types of emissions, but in lesser quantities, than the coal-fired alternative. Hence, it would be subject to the same type of air quality regulations as a coal-fired plant, discussed in Section 8.2.1.1. The greatest concern from combined-cycle facilities are the emissions of ozone precursors, NO_x and VOCs.

Exelon projects the following emissions for the natural gas-fired alternative (Exelon 2003a):

- Sulfur oxides – 121 MT/yr (133 tons/yr)
- Nitrogen oxides – 386 MT/yr (426 tons/yr)
- Carbon monoxide – 80 MT/yr (88 tons/yr)
- PM₁₀ particulates – 67 MT/yr (74 tons/yr)
- VOC – 74 MT/yr (82 tons/yr)

A combined-cycle facility would also have unregulated CO₂ emissions that could contribute to global warming. While these emissions have not traditionally been an important environmental concern, they are becoming increasingly relevant at both a national and an international level.

In December 2000, the EPA issued regulatory findings on emissions of hazardous air pollutants from electric utility steam-generating units (65 FR 79825 [EPA 2000b]). Natural gas-fired power plants were found by the EPA to emit arsenic, formaldehyde, and nickel (65 FR 79825 [EPA 2000b]). Unlike coal- and oil-fired plants, the EPA did not determine that emissions of hazardous air pollutants from natural gas-fired power plants should be regulated under Section 112 of the CAA.

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Construction activities would result in temporary fugitive dust. Exhaust emissions would also come from vehicles and motorized equipment used during the construction process.

The preceding emissions would likely be the same at the Quad Cities site or at the alternate site. Impacts from the above emissions would be clearly noticeable, but they would not be sufficient to destabilize air resources as a whole. The overall air-quality impact for a new natural gas-fired generating facility sited at the Quad Cities site or at an alternate site is considered MODERATE.

- **Waste**

Natural gas firing results in very few combustion by-products because of the clean nature of the fuel. There will be small amounts of solid-waste products (i.e., ash) from burning natural-gas fuel. In the GEIS, the staff concluded that waste generation from natural gas-fired technology would be minimal (NRC 1996). Waste generation at an operating natural gas-fired plant would be largely limited to typical office wastes. Construction-related debris would be generated during construction activities. Overall, the waste impacts would be SMALL for a natural-gas-fired plant sited at the Quad Cities site or at an alternate site.

- **Human Health**

In the GEIS, the staff identifies cancer and emphysema as potential health risks from natural gas-fired plants (NRC 1996). The risk may be attributable to NO_x emissions that contribute to ozone formation, which, in turn, contributes to health risks. NO_x emissions from the plant would be regulated. As discussed in Section 8.2.1.1, NO_x emissions for a new combined-cycle plant at the Quad Cities site would be offset through the Emissions Reduction Trading Program. Human health effects are not expected to be detectable or would be sufficiently minor that they would neither destabilize nor noticeably alter any important attribute of the resource. Overall, the impacts on human health of the natural gas-fired alternative at the Quad Cities site or at an alternate site are considered SMALL.

- **Socioeconomics**

Construction of a natural-gas-combined facility at the Quad Cities site would take approximately 2 to 3 years. The staff assumed that construction would take place while Quad Cities Units 1 and 2 continued operation and would be completed by the time the units permanently ceased operations. In the GEIS (NRC 1996), the staff concluded that socioeconomic impacts from constructing a natural gas-fired power plant would be low compared to other steam plants.

If the facility were constructed at the Quad Cities site, the number of construction workers would be in addition to the 850 permanent employees and approximately 130 contract workers that currently work at the Quad Cities site. During construction, the communities immediately surrounding the Quad Cities site would experience demands on housing and

public services that would have SMALL impacts. These impacts would be tempered because construction workers would be commuting to the site from a wider range of cities and towns comprising the Quad Cities metropolitan area. After construction, the nearby communities would be impacted by the loss of the construction jobs.

The capital expenditures associated with the new plant would lead to an increase in assessed value and tax revenue that would probably be substantial for several of the small taxing bodies associated with the Cordova Township. Therefore, this alternative would probably have a positive impact in tax revenues. However, even though these new tax revenues would probably more than replace tax revenues lost upon the decommissioning of the current plant, they would not have more than a SMALL effect in terms of tax-related land use effects.

Exelon estimates that the new combined-cycle facility would have a workforce of approximately 25 to 40 (Exelon 2003a), significantly less than the 150 assumed in the GEIS for a 1000-MW(e) natural-gas facility. Assuming a workforce of approximately 50 workers, if the combined-cycle facility were constructed at the Quad Cities site and Quad Cities Units 1 and 2 were decommissioned, there would be a loss of 800 permanent, high-paying jobs (850 for Quad Cities Units 1 and 2 down to 50 for the natural-gas alternative), along with the loss of 130 contract workers, with a commensurate reduction in demand on socioeconomic resources and contribution to the regional economy. These impacts would be tempered because the Quad Cities site is within the Quad Cities metropolitan area. The natural-gas alternative would provide a new tax base to offset the loss of tax base associated with the decommissioning of Quad Cities Units 1 and 2. For all these reasons, the appropriate characterization of non-transportation socioeconomic impacts for operating a natural-gas plant constructed at the Quad Cities site is considered SMALL.

If the alternative natural gas-fired power plant were constructed at an alternate site, impacts would depend on the socioeconomic characteristics of the new site. If the site were near a large urban center, as the Quad Cities site is, then the impacts would be small. On the other hand, socioeconomic impacts at a rural site would be larger than at an urban site, because more of the peak construction workforce would need to move into the area to work (NRC 1996). Alternate sites would, therefore, need to be analyzed on a case-by-case basis. Socioeconomic impacts from construction of the new site could range from SMALL to MODERATE, depending on the characteristics of the surrounding regions. Impacts from operating the facility would likely be SMALL.

For transportation related to commuting of plant operating personnel, the impacts are considered small. The number of plant operating personnel would be small compared to the current workforce of 850 (Exelon 2003a). Therefore, traffic impacts associated with plant personnel commuting to a natural-gas plant would be expected to be SMALL compared to the current impacts from Quad Cities Units 1 and 2. This would exist for both the Quad Cities site and an alternate site.

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During the construction period for the replacement natural gas-fired units, a significant number of construction workers would be working on the site, in addition to the 850 permanent and 130 contract workers currently at the Quad Cities site. The addition of these workers could place significant traffic loads on existing highways near the Quad Cities site. Such impacts would be SMALL to MODERATE. At an alternate site, such impacts are also considered SMALL to MODERATE.

- **Aesthetics**

The turbine buildings, the exhaust stacks (approximately 60 m [200 ft] tall), and the gas pipeline compressors would be visible from offsite during daylight hours. Buildings and structures would also be visible at night because of outside lighting. Cooling towers would be required, and these towers and their associated plumes would also be visible offsite. Visual impacts of buildings and structures could be mitigated by landscaping and selecting a color that is consistent with the environment. Visual impacts at night could be mitigated by reduced use of lighting and appropriate use of shielding. At the Quad Cities site, visual aesthetic impacts of a natural gas combined-cycle facility are considered MODERATE. At an alternate site, the aesthetic impacts could be mitigated if the plant were located in an industrial area adjacent to other industrial plants. There would also be significant aesthetic impact from a new transmission line. Overall, the aesthetic impacts associated with a replacement natural gas-fired power plant at an alternate site are considered MODERATE to LARGE and will depend on the exact location of the alternate site.

Natural-gas generation would introduce mechanical sources of noise that would be audible offsite. Sources contributing to total noise produced by plant operation are classified as continuous or intermittent. Continuous sources include the mechanical equipment associated with normal plant operations. Intermittent sources include the use of outside loudspeakers, and the commuting of plant employees. The incremental noise impacts of a natural gas-fired plant compared to existing operations at the Quad Cities are considered MODERATE. At an alternate site, these noise impacts would be SMALL to LARGE, depending on the site and location. Again, the aesthetic impacts at the plant site would be mitigated if the plant were located in an industrial area adjacent to other power plants or industrial facilities.

- **Historic and Archaeological Resources**

At the Quad Cities site or an alternate site, a cultural-resource inventory would likely be needed for any onsite property that has not been previously surveyed. Other lands, if any, that are acquired to support the plant would also likely need an inventory of field cultural resources, identification, and recording of existing historic and archaeological resources, and possible mitigation of adverse effects from subsequent ground-disturbing actions related to physical expansion of the plant site.

Before construction at the Quad Cities site or an alternate site, studies would likely be needed to identify, evaluate, and address mitigation of the potential impacts of new plant construction on cultural resources. The studies would likely be needed for all areas of potential disturbance at the proposed plant site and along associated corridors where new construction would occur (e.g., roads, transmission corridors, rail lines, or other rights-of-ways). Historic and archaeological resource impacts need to be evaluated on a site-specific basis. The impacts can generally be effectively managed; and as such, impacts would vary between SMALL to MODERATE, depending on what historic and archaeological resources are present, and whether mitigation is necessary.

- **Environmental Justice**

No environmental pathways or locations have been identified that would result in disproportionately high and adverse environmental impacts on minority and low-income populations if a replacement natural gas-fired plant were built at the Quad Cities site. Other impacts, such as impacts on housing availability and prices during construction, might occur, and this could disproportionately affect minority and low-income populations. Closure of Quad Cities Units 1 and 2 would result in a decrease in employment of approximately 850 permanent operating employees and 130 contract employees (same as in the no-action case), offset by construction and operation of the replacement power plant. Resulting economic conditions could reduce employment prospects for minority or low-income populations. However, the Quad Cities site is located near an active urban area with many employment possibilities. Overall impacts are expected to be SMALL, and would depend on the ability of minority or low-income populations to commute to other jobs outside the area. The impacts around the alternate site would depend upon the site chosen and the nearby population distribution. These impacts could vary between SMALL and LARGE.

8.2.2.2 Open-Cycle Cooling System

The environmental impacts of constructing a natural gas-fired generation system at the Quad Cities site using an open-cycle cooling system are largely the same as the impacts for a natural gas-fired plant using a closed-cycle system. However, there are some environmental differences between the closed-cycle and once-through cooling systems. Table 8-5 summarizes these incremental differences.

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Table 8-5. Summary of Environmental Impacts of Natural Gas-Fired Generation at the Quad Cities Site Using Open-Cycle Cooling

Impact Category	Change in Impacts from Closed-Cycle Cooling System
Land Use	10 to 12 ha (25 to 30 ac) less land required because cooling towers and associated infrastructure are not needed.
Ecology	Impacts would depend on ecology at the site. No impact to terrestrial ecology from cooling-tower drift. Increased water withdrawal with possible greater impact on aquatic ecology.
Surface Water Use and Quality	No discharge of cooling-tower blowdown. Increased water withdrawal and more thermal load on receiving body of water.
Groundwater Use and Quality	No change.
Air Quality	No change.
Waste	No change.
Human Health	No change.
Socioeconomics	No change.
Aesthetics	Reduced aesthetic impact because cooling towers would not be used.
Historic and Archaeological Resources	Less land impacted.
Environmental Justice	No change.

8.2.3 Nuclear Power Generation

Since 1997, the NRC has certified three new standard designs for nuclear power plants under 10 CFR Part 52, Subpart B. These designs are the U.S. Advanced Boiling Water Reactor (10 CFR Part 52, Appendix A), the System 80+ Design (10 CFR Part 52, Appendix B), and the AP600 Design (10 CFR Part 52, Appendix C). All of these plant designs are light-water reactors. Although no applications for a construction permit or a combined license based on these certified designs have been submitted to the NRC, the submission of the design certification applications indicates continuing interest in the possibility of licensing new nuclear power plants. Recent volatility in prices of natural gas and electricity has made new nuclear power plant construction more attractive from a cost standpoint. Additionally, System Energy Resources, Inc., Exelon Generation Company, LLC, and Dominion Nuclear North Anna, LLC, have recently submitted applications for early site permits for new advanced nuclear power plants under the procedures in 10 CFR Part 52, Subpart A (SERI 2003; Dominion 2003; Exelon 2003b). Therefore, construction of a new nuclear plant, either at the Quad Cities site or at an

alternate site in Illinois using both closed and open-cycle cooling, is considered in this section. The staff assumed that the new nuclear plant would have a 40-year lifetime.

The NRC summarized environmental data associated with the uranium fuel cycle in Table S-3 of 10 CFR 51.51. The impacts shown in Table S-3 are representative of the impacts that would be associated with a replacement nuclear power plant built to one of the certified designs, sited at Quad Cities or an alternate site. The impacts shown in Table S-3 are for a 1000-MW(e) reactor and would need to be adjusted to reflect replacement of Quad Cities Units 1 and 2, which have a net capacity of 1860 MW(e). The environmental impacts associated with transporting fuel and waste to and from a light-water cooled nuclear power reactor are summarized in Table S-4 of 10 CFR 51.52. The summary of the NRC's findings on NEPA issues for license renewal of nuclear power plants in Table B-1 of 10 CFR Part 51, Subpart A, Appendix B, is also relevant, although not directly applicable, for consideration of environmental impacts associated with the operation of a replacement nuclear power plant. Additional environmental impact information for a replacement nuclear power plant using a closed-cycle cooling is presented in Section 8.2.3.1 and using open-cycle cooling in Section 8.2.3.2.

8.2.3.1 Closed-Cycle Cooling System

For purposes of this SEIS, the staff assumed a nuclear plant would use a closed-cycle cooling system at the Quad Cities site. The overall impacts of the nuclear generating system using closed-cycle cooling at the Quad Cities site and at an alternate site are discussed in the following sections and summarized in Table 8-6. For completeness, the staff also considered the impacts of a fully open-cycle cooling system at the Quad Cities site. Additional impacts from the use of an open-cycle cooling system are considered in Section 8.2.1.2.

- **Land Use**

According to the GEIS, a light-water reactor requires approximately 200 to 400 ha (500 to 1000 ac) excluding transmission lines. Exelon believes that the Quad Cities site is adequate to support a new nuclear facility. However, to support a new nuclear facility at the Quad Cities site, it may be necessary to supplement the site with neighboring land. For siting a new facility, the existing infrastructure would be used to the extent practicable, thus limiting the amount of new construction that would be required. Specifically, the staff assumed that the new nuclear facility would use the existing switchyard, offices, intake and discharge, and transmission rights-of-ways.

There would be no net change in land needed for uranium mining because land needed to supply the new nuclear plant would offset the land needed to supply uranium for fueling the existing reactors at Quad Cities Units 1 and 2. Overall, the impact of a replacement nuclear generating plant on land use at the existing Quad Cities site is best characterized as MODERATE.

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Table 8-6. Summary of Environmental Impacts of New Nuclear Power Generation at the Quad Cities Site and an Alternate Site Using Closed-Cycle Cooling

Impact Category	Quad Cities Site		Alternate Site	
	Impact	Comments	Impact	Comments
Land Use	MODERATE	Would use unused portion of Quad Cities site, possibly supplemented with neighboring land. Would require approximately 200 to 400 ha (500 to 1000 ac). Existing infrastructure (e.g., transmission lines) used.	MODERATE to LARGE	Same as Quad Cities site, plus land for transmission line and any existing infrastructure. Total impact would depend on whether the alternate site is previously disturbed.
Ecology	SMALL to MODERATE	Would use undeveloped areas at Quad Cities site. There would be potential for significant habitat loss and fragmentation and reduced productivity and biological diversity.	MODERATE to LARGE	Impact would depend on whether site is previously developed. Factors to consider include location and ecology of site and transmission line route. There would be potential for habitat loss and fragmentation and reduced productivity and biological diversity.
Water Use and Quality	SMALL	Would use closed-cycle cooling system, reducing cooling water requirements while increasing evaporative, consumptive use and new heat rejection to the atmosphere, and continues very limited groundwater use.	SMALL to MODERATE	Impact would depend on volume of water withdrawal, the constituents of the discharge water, and the characteristics of surface water or groundwater source.
Air Quality	SMALL	Fugitive emissions and emissions from vehicles and equipment during construction. Small amount of emissions from diesel generators and possibly other sources during operation. Emissions would be similar to current releases at Quad Cities Units 1 and 2.	SMALL	Same impacts as at Quad Cities.
Waste	SMALL	Waste impacts for an operating nuclear power plant are set out in 10 CFR Part 51, Appendix B, Table B-1. Debris would be generated and removed during construction.	SMALL	Same impacts as at Quad Cities.

Table 8-6. (contd)

Impact Category	Quad Cities Site		Alternate Site	
	Impact	Comments	Impact	Comments
Human Health	SMALL	Human health impacts for an operating nuclear power plant are set out in 10 CFR Part 51, Appendix B, Table B-1.	SMALL	Same impacts as for Quad Cities site.
Socioeconomics	SMALL to MODERATE	<p>During construction, impacts would be SMALL to MODERATE. Upwards of 2500 workers might be required at peak of the five-year construction period.</p> <p>During operation, employment would be similar to current employment. Tax base would be preserved.</p> <p>Transportation impacts during operation would be SMALL due to the smaller workforce. Transportation impacts associated with construction workers would be SMALL to MODERATE.</p>	SMALL to LARGE	<p>Construction impacts at alternate site would be similar to those at Quad Cities site, but would depend on whether new site is located near a major metropolitan area.</p> <p>Minimal impacts on local tax base.</p> <p>Transportation impacts would be similar to those at the Quad Cities site.</p>
Aesthetics	MODERATE	MODERATE aesthetic impact due to impact of plant buildings and structures, along with noise impacts from plant operation. Visual impact would be similar to current Quad Cities Units 1 and 2.	MODERATE to LARGE	Impacts would be similar to those at Quad Cities site, but would also include any aesthetic impacts from building new transmission lines.
Historic and Archaeological Resources	SMALL to MODERATE	Studies would likely be needed to identify, evaluate, and address mitigation of the potential cultural resource impacts from construction of a new plant on an undeveloped or developed site.	SMALL to MODERATE	Alternate location would necessitate cultural studies. Studies would likely be needed to identify, evaluate, and address mitigation of the potential cultural resource impacts from construction of a new plant on an undeveloped site.

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Table 8-6. (contd)

Impact Category	Quad Cities Site		Alternate Site	
	Impact	Comments	Impact	Comments
Environmental Justice	SMALL	No environmental pathways or locations have been identified that would result in disproportionately high and adverse environmental impacts on minority and low-income populations. Impacts on minority and low-income communities should be similar to those experienced by the population as a whole.	SMALL to LARGE	Impacts vary depending on population distribution and characteristics at new site. Impacts on Quad Cities site would be identical to those in the no-action alternative.

Land-use requirements at an alternate site would be approximately 200 to 400 ha (500 to 1000 ac) plus the possible need for land for a new transmission line (NRC 1996). In addition, it may be necessary to construct a rail spur or barge offloading facility to an alternate site to deliver equipment during construction. Depending on new transmission-line routing, siting a new nuclear power plant at an alternate site could result in MODERATE to LARGE land-use impacts.

- **Ecology**

Locating a new nuclear power plant at the Quad Cities site would alter ecological resources because of the need to convert currently unused land to industrial use. However, some of this land would have been previously disturbed. Use of a closed-cycle cooling system would reduce water needs below their current levels. There could be potential habitat degradation, fragmentation or loss, reduced ecological productivity and a reduction in biological diversity resulting from disturbing previously intact land. Siting a new nuclear power plant at the Quad Cities site would have a SMALL to MODERATE ecological impact that would be greater than renewal of the OLS due to the construction impacts.

At an alternate site, the new nuclear power alternative would introduce construction impacts and comparable operational impacts. Even assuming siting at a previously disturbed area, the impacts may alter the ecology. Impacts could include habitat degradation, fragmentation, or loss, reduced ecological productivity and a reduction in biological diversity. If needed, construction and maintenance of a transmission line would have similar ecological impacts. If the site had been previously developed, the impact would be MODERATE and if the site was undeveloped, the impact would be MODERATE to LARGE.

- **Water Use and Quality**

The nuclear alternative at the existing site or at an alternate site would use a closed-cycle cooling system instead of the current practice of using open-cycle cooling, and would,

therefore, decrease cooling-water needs. Plant discharges would consist mostly of cooling-tower blowdown, characterized primarily by an increased temperature and increased concentration of dissolved salts relative to the receiving body of water and intermittent low concentrations of biocides (e.g., chlorine). Treated process waste streams and sanitary waste water may also be discharged. All discharges would likely be regulated through a NPDES permit. The five groundwater wells that supply limited specific uses at the Quad Cities site could continue to be used. Some erosion and sedimentation probably would occur during construction (NRC 1996). At an alternate site, the cooling water would likely be drawn from a surface body of water. Use of groundwater for a nuclear plant at an alternate site is a possibility. Some erosion and sedimentation probably would occur during construction (NRC 1996). Overall, the impacts of the nuclear alternative at the Quad Cities site are considered SMALL. Overall, the impacts at an alternate site are considered SMALL to MODERATE depending on the location.

- **Air Quality**

Construction of a new nuclear plant at the Quad Cities site or an alternate site would result in fugitive emissions during the construction process. Exhaust emissions would also come from vehicles and motorized equipment used during the construction process. An operating nuclear plant would have minor air emissions associated with emergency diesel generators. These emissions would be regulated. Overall, emissions and associated impacts are considered SMALL.

- **Waste**

The waste impacts associated with the operation of a nuclear power plant are set out in Table B-1 of 10 CFR Part 51, Subpart A, Appendix B. In addition to the impacts shown in Table B-1, construction-related debris would be generated during construction activities and would be removed to an appropriate disposal site. Overall, waste impacts are considered SMALL at either the Quad Cities site or an alternate site.

- **Human Health**

Human health impacts for an operating nuclear power plant are set out in 10 CFR Part 51, Subpart A, Appendix B, Table B-1. Overall, human health impacts are considered SMALL at either the Quad Cities site or at an alternate site.

- **Socioeconomics**

The construction period and the peak workforce associated with the construction of a new nuclear power plant are currently unquantified (NRC 1996). In the absence of quantified data, the staff assumed a construction period of 5 years and a peak workforce of 2500. The staff assumed that construction would take place while Quad Cities Units 1 and 2

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continues operation and would be completed by the time Quad Cities Units 1 and 2 permanently cease operations.

If the facility were constructed at the Quad Cities site, the number of construction workers would be in addition to the 850 permanent employees and approximately 130 contract workers that currently work at the Quad Cities site. During construction of the new nuclear power plant, the surrounding communities would experience demands on housing and public services that could have MODERATE impacts. These impacts would be tempered because the Quad Cities site is part of the Quad Cities metropolitan area. After construction, the nearby communities would be impacted by the loss of the construction jobs.

The replacement nuclear units are assumed to have an operating workforce comparable to the approximately 1000 workers currently working at Quad Cities Units 1 and 2. The new nuclear power plant alternative would provide a new tax base to offset the loss of tax base associated with decommissioning Quad Cities Units 1 and 2. For all these reasons, the appropriate characterization of non-transportation socioeconomic impacts for operating a new nuclear power plant constructed at the Quad Cities site is considered SMALL.

The capital expenditures associated with the new plant would lead to an increase in assessed value and tax revenue that would probably be substantial for several of the small taxing bodies in the Cordova Township. Therefore, this alternative would probably have a positive impact in tax revenues. However, even though these new tax revenues would probably more than replace tax revenues lost upon the decommissioning of the current plant, they would not have more than a SMALL effect in terms of tax-related land use effects.

The impacts around the alternate site would depend on the socioeconomic characteristics of the new site. If the site were near a large urban center, as the Quad Cities site is, then the impacts would be SMALL. On the other hand, in the GEIS, the staff stated that the socioeconomic impacts at a rural site would be larger than at an urban site, because more of the peak construction workforce would need to move into the area to work (NRC 1996). Alternate sites would, therefore, need to be analyzed on a case-by-case basis. Socioeconomic impacts from construction of the new site could range from SMALL to LARGE, depending on the characteristics of the surrounding regions.

For transportation related to commuting of plant-operating personnel, the impacts are considered small. The number of personnel would be similar to the number currently working at the Quad Cities site. Therefore, traffic impacts associated with plant personnel commuting to a new nuclear power plant would expected to be SMALL compared to the current impacts from Quad Cities Units 1 and 2. This would hold for both the Quad Cities site and an alternate site.

During the 5-year construction period for the replacement new nuclear power plant, a large number of construction workers would be working at the site, in addition to the workers currently at the Quad Cities site. The addition of these workers could place significant traffic loads on existing highways near either the Quad Cities site or an alternate site. Such impacts would be MODERATE.

- **Aesthetics**

The containment buildings and other associated buildings required for a replacement nuclear power plant sited at Quad Cities would be visible in daylight hours. Buildings and structures would also be visible at night because of outside lighting. Cooling towers would be required and these towers and their associated plumes would also be visible offsite. Visual impacts of buildings and structures could be mitigated by landscaping and selecting a color that is consistent with the environment. Visual impact at night could be mitigated by reduced use of lighting and appropriate use of shielding. At the Quad Cities site, visual aesthetic impacts are considered MODERATE. At an alternate site, the aesthetic impacts could be mitigated if the plant were located in an industrial area adjacent to other power plants. There would also be significant aesthetic impacts from a new transmission line. Overall, the aesthetic impacts associated with a replacement nuclear-fired power plant at an alternate site are considered MODERATE to LARGE and will depend on the exact location of the alternate site.

Nuclear generation would introduce mechanical sources of noise that would be audible offsite. Sources contributing to total noise produced by plant operation are classified as continuous or intermittent. Continuous sources include the mechanical equipment associated with normal plant operations. Intermittent sources include the use of outside loudspeakers and the commuting of plant employees. The incremental noise impacts of a nuclear-fired plant compared to existing operations at the Quad Cities site are considered to be MODERATE. At an alternate site, these noise impacts would be SMALL to LARGE, depending on the site. Again, aesthetic impacts at the plant site would be mitigated if the plant were located in an industrial area adjacent to other power plants or industrial facilities.

- **Historic and Archaeological Resources**

At the Quad Cities site or an alternate site, a cultural-resource inventory would likely be needed for any onsite property that has not been previously surveyed. Other lands, if any, that are acquired to support the plant would also likely need an inventory of field cultural resources, identification, and recording of existing historic and archaeological resources, and possible mitigation of adverse effects from subsequent ground-disturbing actions related to physical expansion of the plant site.

Before construction at the Quad Cities site or an alternate site, studies would likely be needed to identify, evaluate, and address mitigation of the potential impacts of new plant

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construction on cultural resources. The studies would likely be needed for all areas of potential disturbance at the proposed plant site and along associated corridors where new construction would occur (e.g., roads, transmission corridors, rail lines, or other rights-of-ways). Historic and archaeological resource impacts need to be evaluated on a site-specific basis. The impacts can generally be effectively managed, and as such, impacts would vary between SMALL to MODERATE, depending on what historic and archaeological resources are present, and whether mitigation is necessary.

- **Environmental Justice**

No environmental pathways or locations have been identified that would result in disproportionately high and adverse environmental impacts on minority and low-income populations if a new nuclear power plant were built at the Quad Cities site. Other impacts, such as impacts on housing availability and prices during construction, might occur during construction, and this could disproportionately affect minority and low-income populations. Closure of Quad Cities Units 1 and 2 would result in a decrease in employment of approximately 850 permanent operating employees and 130 contract employees (same as in the no-action case), but this would be offset by construction and operation of the replacement power plant. Resulting economic conditions could reduce employment prospects for minority or low-income populations. However, the Quad Cities site is located near an active urban area with many employment possibilities. Overall, impacts would be SMALL and would depend on the ability of minority or low income populations to commute to other jobs outside the area. The impacts around the alternate site would depend upon the site chosen and the nearby population distribution. These impacts could vary between SMALL and LARGE.

8.2.3.2 Open-Cycle Cooling System

The environmental impacts of constructing a nuclear generation system at the Quad Cities site using an open-cycle cooling system are largely the same as the impacts for a nuclear generation system using a closed-cycle and once-through cooling systems. Table 8-7 summarizes the incremental differences. This section discusses the environmental impacts of constructing a nuclear power plant at an alternate site using closed-cycle cooling. The impacts of this option are essentially the same as the impacts for a nuclear power plant using once-through cooling. However, there are minor environmental differences between the closed-cycle and once-through cooling systems. Table 8-7 summarizes the incremental differences.

Table 8-7. Summary of Environmental Impacts of a New Nuclear Power Plant at Quad Cities Site Using Open-Cycle Cooling

Impact Category	Change in Impacts from Closed-Cycle Cooling System
Land Use	10 to 12 ha (25 to 30 ac) less land required because cooling towers and associated infrastructure are not needed.
Ecology	Impacts would depend on ecology at the site. No impact to terrestrial ecology from cooling-tower drift. Increased water withdrawal with possible greater impact on aquatic ecology.
Surface Water Use and Quality	No discharge of cooling-tower blowdown. Increased water withdrawal and more thermal load on receiving body of water.
Groundwater Use and Quality	No change.
Air Quality	No change.
Waste	No change.
Human Health	No change.
Socioeconomics	No change.
Aesthetics	Reduced aesthetic impact because cooling towers would not be used.
Historic and Archaeological Resources	Less land impacted.
Environmental Justice	No change.

8.2.4 Purchased Electrical Power

This section considers the option of Exelon decommissioning Quad Cities Units 1 and 2, not replacing the lost generation with a new power plant or other option, and then purchasing an equal amount of power and capacity to replace that generated by Quad Cities Units 1 and 2. There are two possibilities for the source of this power. It could come from facilities that are already built but not producing power. Alternatively, it could come from new generation facilities. The likely outcome would be a combination of both sources. Initially, replacement power would come from existing sources. Under normal economic conditions, this will raise the price of capacity and energy because supply will be lowered while demand will remain the same. Over time, this increase in price will spur new generation capacity to take advantage of the new opportunities for profit. In this case, the new generation could be attributed to a mix of sources, most likely natural gas- and coal-fired generation, which were discussed above. If there were significant excess supply in the U.S., then it might be the case that no new generation would be brought online to replace the lower supply. No such excess supply condition exists in the Eastern Grid, of which Illinois is a part.

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According to DOE/EIA, in 2001, the reserve margin^(a) in the Eastern Grid was 13.9 percent in 2001, well below the traditional levels of 25 to 30 percent (DOE/EIA 2003b). No such excess supply condition exists in the Eastern Grid of which Illinois is a part.

In a traditional regulated utility environment, utilities manage all portions of the utility system from generation to transmission to distribution. In this environment, utilities buy and sell power from other utilities to make up for any shortfalls in demand or excess of generation capacity. However, Illinois, like many states, has altered the regulation of their electric utilities so that generation is decoupled from transmission and distribution. Generators sell power and energy as commodities. While Exelon holds both generation and distribution companies, these companies are not linked in the traditional fashion. Exelon generation can sell to any distributor and Exelon distribution can purchase from any generator. Exelon's generating arm could purchase and then sell the electricity, but this would not change supply or demand, it would simply add a middle-man in the electricity market.

For these reasons, the staff does not believe that purchasing power to make up for the generation at Quad Cities Units 1 and 2 is a meaningful alternative that requires independent analysis. Any impacts from purchasing power in the open market will follow those of the generation sources that end up supplying the power, which are covered in other sections in this chapter.

8.2.5 Other Alternatives

Other generation technologies considered by the NRC are discussed in the following subsections. The staff felt that none of these options alone was sufficient to replace the capacity and energy of Quad Cities Units 1 and 2. However, such alternatives might be used in combination, as is discussed in Section 8.2.6.

8.2.5.1 Oil-Fired Generation

The EIA projects that oil-fired plants will account for very little of the new generation capacity in the United States through the year 2020 because of higher fuel costs and lower efficiencies (DOE/EIA 2001a). Oil-fired operation is more expensive than nuclear or coal-fired operation. Future increases in oil prices are expected to make oil-fired generation increasingly more expensive than coal-fired generation. The high cost of oil has prompted a steady decline in its use for electricity generation. Increasing domestic concerns over oil security will only exacerbate the move away from oil-fired electricity generation. Therefore, the staff does not consider oil-fired generation, by itself, a feasible alternative to Quad Cities Units 1 and 2.

(a) The reserve margin is defined as excess available capacity as a fraction of total demand at a given time.

8.2.5.2 Wind Power

According to the DOE (2003), Illinois has a capacity of approximately 3000 MW(e) of Class 4 wind sites. In addition, there are 6000 MW(e) of Class 3+ sites. Class 3+ sites might prove economically viable for wind generation with near-term technological advances. Wind power plants typically run at capacity factors of 30 to 35 percent (Northwest Power Planning Council [NWPPC] 2000). These capacity factors are much lower than those for a nuclear power plant, which commonly run above 90 percent. Therefore, approximately 4200 to 4900 MW(e) would have to be developed to make up for the approximately 13 billion kWh(e) generated by Quad Cities Units 1 and 2 in 2001 (DOE/EIA 2003c). Because the largest, commercially available wind turbines are in the range of 1 MW to 1.5 MW, approximately 2800 to 4900 of these turbines would be required to replace the generation from Quad Cities Units 1 and 2.

Although the wind resource in Illinois, in theory, is sufficient to support replacement of the capacity and energy from Quad Cities Units 1 and 2, many difficulties render full replacement a problematic option. For one, the vast bulk of the wind resource would have to be developed; and this development would be an enormously extensive undertaking, especially when one considers that total wind power capacity in the United States at the end of 2002 was approximately 4500 MW. Although wind power production in the United States is expected to grow many times over the coming decades, installation of approximately 4200 MW to 4900 MW in the Midwest to replace the generation from Quad Cities Units 1 and 2 would require approximately near-term doubling of current U.S. wind generation capacity. Further, access to many of the best wind power sites would require easements, extensive road building and, potentially, extensive clearing (for towers and blades). Construction of thousands of wind turbines in Illinois would also require extensive construction of transmission lines to bring the power and the energy to market. Wind energy is an intermittent resource, whereas Quad Cities Units 1 and 2 provide constant baseload power. When there is little wind, wind energy simply would not compensate for Quad Cities Units 1 and 2 energy production. For all these reasons, the staff concludes that wind power alone is not a feasible substitute at this time for the baseload generation from Quad Cities Units 1 and 2.

Wind power could be included in a combination of alternatives to replace Quad Cities Units 1 and 2. The environmental impacts of a large-scale wind farm are described in NUREG-1437, Section 8.3. The construction of roads, transmission lines, and turbine tower supports would result in short-term impacts, such as increases in erosion and sedimentation, and decreases in air quality from fugitive dust and equipment emissions. Construction in undeveloped areas would have the potential to disturb and impact cultural resources or habitat for sensitive species. During operation, some land near wind turbines could be available for compatible uses such as agriculture. The continuing aesthetic impact would be considerable, and there is a potential for bird collisions with turbine blades. Wind farms generate very little waste and pose no human health risk other than from occupational injuries.

8.2.5.3 Solar Power

Solar technologies use the sun's energy and light to provide heat and cooling, light, hot water, and electricity for homes, businesses, and industry. Solar-power technologies, both photovoltaic (PV) and thermal, cannot currently compete with conventional fossil-fueled technologies in grid-connected applications due to higher capital costs per kilowatt of capacity. The average capacity factor of photovoltaic cells is about 25 percent (NRC 1996), and the capacity factor for solar thermal systems is about 25 to 40 percent (NRC 1996). These capacity factors are low because solar power is an intermittent resource, providing power when the sun is strong, whereas Quad Cities Units 1 and 2 provide constant base-load power. Solar technologies simply cannot make up for the capacity from Quad Cities Units 1 and 2 when the sun is not shining.

There are substantial impacts to natural resources (ecological, land-use, and aesthetic impacts) from the construction of solar-generating facilities. As stated in the GEIS, land requirements are high—140 km² (55 mi²) per 1000 MW for photovoltaic and approximately 57 km² (22 mi²) per 1000 MW for solar thermal systems (NRC 1996). Neither type of solar electric system would fit at the Quad Cities site, and both would have large environmental impacts at an alternate site.

Currently available PV cell conversion efficiencies range from approximately 7 to 17 percent. The average solar energy falling on a horizontal surface in the Illinois region in June, a peak month for sunlight, is approximately 6.0 to 6.5 kWh/m² per day. If an average solar energy flux throughout the year of approximately 3 kWh/m² per day (Exelon 2003a) and a conversion efficiency of 10 percent are assumed, PV cells would yield an annual electricity production of approximately 110 kWh(e)/m² per year in Illinois. At this assumed rate of generation, replacing the 13 billion kWh generated in 2001 by Quad Cities Units 1 and 2 (DOE/EIA 2003c) would require approximately 120 million m² or 120 km² (46 mi²) of PV arrays. Because of the area's low rate of solar radiation, the high technology costs, and the intermittent nature of the resource, solar power is limited to niche applications and is not a feasible baseload alternative to license renewal of Quad Cities Units 1 and 2.

Installations of solar panels on residential and commercial rooftops are referred to as "distributed solar power." Based on an average house size of 139 m² (1500 ft²) with a usable roof space of 70 m² (753 ft²) and a higher conversion efficiency of 15 percent, over 1 million new or existing homes would have to be fitted with solar panels to replace the generation from Quad Cities Units 2 and 3. Without significant government or utility incentives, installation of distributed solar panels on this scale is unlikely. However, distributed solar power could be included in a combination of alternatives to replace Quad Cities. Distributed solar power would result in fewer construction-related impacts because solar panels would usually be placed on existing buildings, eliminating the need for land clearing or transmission lines. Aesthetic impacts would be only marginally greater than those already created by the existing or new buildings. Impacts from the manufacture of solar panels would still occur.

Solar power could, however, be included in a combination of alternatives to replace Quad Cities Units 1 and 2. The potential environmental impacts associated with a large scale solar generation facility and transmission lines are described in NUREG-1437, Section 8.3. The construction impacts would be similar to those associated with a large wind farm as discussed in Section 8.2.5.2. The operating facility would also have considerable aesthetic impact. Solar installations pose no human health risk other than from occupational injuries. The manufacturing process for constructing a large amount of PV cells would result in waste generation, but this waste generation has not been quantified.

8.2.5.4 Hydropower

Less than 0.1 percent of Illinois electricity-generating capacity and its electricity generation come from hydroelectric power (DOE/EIA 2003a). As stated in Section 8.3.4 of the GEIS, Hydropower's percentage of the country's generating capacity is expected to decline because hydroelectric facilities have become difficult to site as a result of public concern over flooding, destruction of natural habitat, and alteration of natural river courses. According to the U.S. Hydropower Resource Assessment for Illinois (INEEL 1997), there is only 301 MW of undeveloped hydroelectric capacity in Illinois, far below that required to replace the 1860 MW(e) of Quad Cities Units 1 and 2.

The staff estimated in the GEIS that land requirements for hydroelectric power are approximately 400,000 ha (1 million ac or approximately 1600 mi²) per 1000 MW. This requirement would need to be adjusted proportionately upward to meet the requirements of Quad Cities Units 1 and 2. This would result in a large impact on land use, most of which would be out of State because of Illinois' limited hydroelectric potential. Further, operation of a hydroelectric facility would alter aquatic habitats above and below the lock and dam, which would impact existing aquatic species. Due to the relatively low amount of undeveloped hydropower resource in Illinois and the large land-use and related environmental and ecological resource impacts associated with siting hydroelectric facilities large enough to replace Quad Cities Units 1 and 2, the staff concludes that local hydropower is not a feasible alternative to Quad Cities Units 1 and 2 OL renewal.

8.2.5.5 Geothermal Energy

Geothermal energy has an average capacity factor of 90 percent and can be used for base-load power where available. However, geothermal technology is not widely used as base-load generation due to the limited geographical availability of the resource and the immature status of the technology (NRC 1996). As illustrated by Figure 8.4 in the GEIS, geothermal plants are most likely to be sited in the western continental United States, Alaska, and Hawaii, where hydrothermal reservoirs are prevalent. There is no feasible eastern location for geothermal capacity to serve as an alternative to Quad Cities Units 1 and 2. The staff concludes that geothermal energy is not a feasible alternative to renewing the Quad Cities Units 1 and 2 OLs.

8.2.5.6 Wood Waste

A wood-burning facility can provide base-load power and can operate with an average annual capacity factor of around 70 to 80 percent and with 20 to 25 percent efficiency (NRC 1996). The fuels required are variable and site-specific. A significant barrier to the use of wood waste to generate electricity is the high delivered-fuel cost and high construction cost per MW of generating capacity. The larger wood-waste power plants are only 40 to 50 MW(e) in size. Estimates in the GEIS suggest that the overall level of construction impact per MW of installed capacity should be approximately the same as that for a coal-fired plant, although facilities using wood waste for fuel would be built at smaller scales (NRC 1996). Like coal-fired plants, wood-waste plants require large areas for fuel storage and processing and involve the same type of combustion equipment.

Due to uncertainties associated with obtaining sufficient wood and wood waste to fuel a base-load generating facility, the ecological impacts of large-scale timber cutting (e.g., soil erosion, reduction of biodiversity, habitat degradation, fragmentation and loss), and high inefficiency, the staff has determined that wood waste is not a feasible alternative to renewing the Quad Cities Units 1 and 2 OLS.

8.2.5.7 Municipal Solid Waste

Municipal waste combustors incinerate the waste and use the resultant heat to generate steam, hot water, or electricity. The combustion process can reduce the volume of waste by up to 90 percent and the weight of the waste by up to 75 percent (EPA 2001b). Municipal waste combustors use three basic types of technologies: mass burn, modular, and refuse-derived fuel (DOE/EIA 2001b). Mass-burning technologies are most commonly used in the United States. This group of technologies process raw municipal solid waste "as is," with little or no sizing, shredding, or separation before combustion. Because of the need for specialized waste-separation and handling equipment for municipal solid waste, the initial capital costs for municipal solid-waste plants are greater than for comparable steam-turbine technology at wood-waste facilities (NRC 1996).

Growth in the municipal waste-combustion industry slowed dramatically during the 1990s after rapid growth during the 1980s. The slower growth was due to three primary factors: (1) the Tax Reform Act of 1986, which made capital-intensive projects such as municipal waste-combustion facilities more expensive relative to less capital-intensive, waste-disposal alternatives such as landfills; (2) the 1994 Supreme Court decision *C & A Carbone, Inc. vs. Town of Clarkstown*, which struck down local flow-control ordinances that required waste to be delivered to specific municipal waste-combustion facilities rather than landfills that may have had lower fees; and (3) increasingly stringent environmental regulations that increased the capital cost necessary to construct and maintain municipal waste-combustion facilities (DOE/EIA 2001b).

Municipal solid-waste combustors generate an ash residue that is buried in landfills. The ash residue is composed of bottom ash and fly ash. Bottom ash refers to the portion of unburned waste that falls to the bottom of the grate or furnace. Fly ash represents the small particles that rise from the furnace during the combustion process. Fly ash is generally removed from flue-gases using fabric filters and/or scrubbers (DOE/EIA 2001b).

Currently, there are approximately 102 waste-to-energy plants operating in the United States. These plants generate approximately 2800 MW(e), or an average of approximately 28 MW(e) per plant (Integrated Waste Services Association 2001), much smaller than the amount needed to replace the 1826-MW(e) base-load capacity of Quad Cities Units 1 and 2. Therefore, the staff concludes that municipal solid waste would not be a feasible alternative to renewal of the Quad Cities Units 1 and 2 OLs, particularly at the scale required.

8.2.5.8 Other Biomass-Derived Fuels

In addition to wood and municipal solid-waste fuels, there are several other concepts for fueling electric generators, including burning crops, converting crops to a liquid fuel such as ethanol, and gasifying crops (including wood waste). In the GEIS, the staff stated that none of these technologies has progressed to the point of being competitive on a large scale or of being reliable enough to replace a base-load plant such as Quad Cities Units 1 and 2 (NRC 1996). For these reasons, such fuels do not offer a feasible alternative to renewing the Quad Cities Units 1 and 2 OLs.

8.2.5.9 Fuel Cells

Fuel cells work without combustion and its local environmental side effects. Power is produced electrochemically by passing a hydrogen-rich fuel over an anode and air over a cathode and separating the two by an electrolyte. The only by-products are heat, water, and carbon dioxide. Hydrogen fuel can come from a variety of hydrocarbon resources by subjecting them to steam under pressure. It can also be produced from electricity using electrolysis. Phosphoric acid fuel cells are the most mature fuel cell technology, but they are only in the initial stages of commercialization. Phosphoric acid fuel cells are generally considered first-generation technology. These are commercially available today at a cost of approximately \$4500 per kilowatt of installed capacity (DOE 2002). Higher-temperature, second-generation fuel cells achieve higher fuel-to-electricity and thermal efficiencies. The higher temperatures contribute to improved efficiencies and give the second-generation fuel cells the capability to generate steam for co-generation and combined-cycle operations.

DOE has a performance target that in 2003, two second-generation, fuel-cell technologies using molten-carbonate and solid-oxide technology, respectively, will be commercially available in sizes of approximately 3 MW at a cost of \$1000 to \$1500 per kW of installed capacity (DOE 2002). For comparison, the installed capacity cost for a natural gas-fired combined-cycle plant is on the order of \$500 to \$600 per kW (NWPPC 2000). As market acceptance and manufacturing capacity increase, natural-gas-fueled, fuel-cell plants in the 50- to 100-MW

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range are projected to become available (DOE 2002). At the present time, however, fuel cells are not economically or technologically competitive with other alternatives for base-load electricity generation. Fuels cells are, consequently, not a feasible alternative to renewing the Quad Cities Units 1 and 2 OLS.

8.2.5.10 Delayed Retirement

Exelon has no plans for retiring any reactors in its fleet of nuclear plants and expects to need additional capacity in the near future (Exelon 2003a). Further, Exelon indicates that any fossil plants slated for retirement tend to use less efficient generation and pollution control technologies. With more stringent environmental restrictions, the impact of delaying retirement of a fossil fuel plant to compensate for the loss of electricity from Quad Cities Units 1 and 2 would be bounded by the impacts for the natural gas and coal-fired alternatives, and would potentially be more severe because of the less efficient pollution control equipment from older plants. The staff, therefore, concluded that delayed retirement of other Exelon generating units could not provide a replacement of the power supplied by Quad Cities Units 1 and 2 and could not be a feasible alternative to Quad Cities Units 1 and 2 license renewal.

8.2.5.11 Utility-Sponsored Conservation

The utility-sponsored conservation alternative refers to a situation in which Quad Cities Units 1 and 2 cease to operate, no new generation is brought online to meet the lost generation, and the lost generation is instead replaced by more efficient use of electricity. More efficient use would arise from utility-sponsored conservation programs, potentially including energy audits, incentives to install energy-efficient equipment, and informational programs to inform electricity consumers of the benefits of, and possibilities for, electricity conservation. There are two reasons to believe that conservation is not an appropriate alternative to the energy and capacity provided by Quad Cities Units 1 and 2.

The first reason is the potential that the supply of cost-effective energy conservation measures, above and beyond what is already planned, may not be large enough to replace the energy and capacity of Quad Cities Units 1 and 2. While it is possible, for example with large incentives, to decrease usage of electricity to meet the lost generation, it is the cost of such measures that ultimately matters. If the costs are high, for example, significantly higher than the costs of coal-fired or natural gas-fired generation or new nuclear generation, then it is infeasible to consider such measures as a replacement for Quad Cities Units 1 and 2. Hence, the feasibility of the utility-sponsored conservation alternative hinges largely on the costs of reducing demand, which will increase with the level of demand reduction. The cost of these measures has been under debate for many years. One estimate of utility demand-side management (DSM) programs in 1992 gave an average cost of \$0.040/kWh in 1992 dollars (Eto, et al. 1996), more than competitive with new generation. However, others have argued that if such measures are this cost-effective, consumers would undertake them irrespective of utility programs, so such cost estimates must understate full consumer costs. Regardless, replacing the capacity and energy from Quad Cities Units 1 and 2 would require a significant increase in the magnitude

and energy conservation in the U.S. According to the EIA (DOE/EIA 2001c), the sum of all large, electric-utility energy conservation programs up through 2000 saved approximately 54,000 million kWh(e) in 2000. In 2001, Quad Cities Units 1 and 2 provided approximately 12,500 million kWh of electricity (DOE/EIA 2003c). Hence, to replace the lost generation at Quad Cities Units 1 and 2 would require an increase of over 25 percent in the total effect of large-utility sponsored conservation since the time that utilities have been reporting these numbers to the EIA. Such an increase would clearly increase the cost of energy conservation by moving beyond the more cost-effective measures.

The second reason that energy-conservation might not be an effective replacement for Quad Cities Units 1 and 2 involves the changing regulatory structure of the electric-utility industry. Even if it were cost-effective to replace the capacity from Quad Cities Units 1 and 2 using energy conservation, the regulatory structure in Illinois largely eliminates any incentive for Exelon to do so unilaterally. In a traditional, regulated utility environment, utilities managed all portions of the utility system from generation to transmission to distribution. In this environment, it was feasible for utilities to invest in energy-efficiency programs because they could, in many states, receive reimbursement through changes in their electricity rates. However, Illinois, like many states, has altered the regulation of their electric utilities so that generation is decoupled from transmission and distribution. Generators sell power and energy as commodities. While Exelon holds both generation and distribution companies, these companies are not linked in the traditional fashion. Exelon's generating organization can sell to any distributor and Exelon distribution can purchase from any generator. Generation companies will not be reimbursed for energy-efficiency investments, making such investments infeasible from the perspective of the stockholder. Exelon's generating organization will not be able to offer competitively priced power if it subsidizes demand reduction alternatives. Any energy-efficiency investments would, therefore, need to come from other sources not associated with Exelon, for example, state-sponsored energy-efficiency programs.

For the two reasons stated above—that the costs of electricity reduction may be too high to cost-effectively replace Quad Cities Units 1 and 2 and that it is out of the purview of Exelon to bring about these reductions—the staff does not consider energy efficiency, by itself, as a feasible alternative to license renewal. However, conservation could be considered in combination with other alternatives to replace Quad Cities Units 1 and 2. Accordingly, the combination of alternatives discussed in Section 8.2.6 includes 300 MW(e) of energy conservation.

8.2.6 Combination of Alternatives

Should the OLS not be renewed, the lost energy and capacity would be replaced by a combination of more than one, and perhaps many of the alternatives discussed thus far. As discussed in Section 8.2, Quad Cities Units 1 and 2 have a combined net summer rating of 1826 MW(e).

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There are many possible combinations of alternatives. Some alternatives could include renewable energy sources, such as wind or solar power. Table 8-8 contains a summary of the environmental impacts of an assumed combination of alternatives consisting of 1100 MW(e) of generation from a combined-cycle facility at the Quad Cities site, 300 MW(e) of energy conservation, and 429 MW(e) purchased from other generators. The impacts associated with the combined-cycle natural gas-fired units are based on the gas-fired generation impact assumptions discussed in Section 8.2.2, adjusted for the reduced generation capacity. While the DSM measures would have few environmental impacts, operation of the new natural gas-fired plant would result in increased emissions and environmental impacts. The environmental impacts associated with power purchased from other generators would still occur but would be located elsewhere within the region or nation, as discussed in Section 8.2.4. The environmental impacts associated with purchased power are not shown in Table 8-8. The staff concludes that it is very unlikely that the environmental impacts of any reasonable combination of generating and conservation options could be reduced to the level of impacts associated with renewing the Quad Cities Units 1 and 2 OLs.

Table 8-8. Summary of Environmental Impacts of an Assumed Combination of Generation and Acquisition Alternatives

Impact Category	Quad Cities Site		Alternate Site	
	Impact	Comments	Impact	Comments
Land Use	SMALL to MODERATE	Upward of 30 ha (75 ac) for power block, offices, roads, and parking areas. Additional impact for construction of underground gas pipeline.	SMALL to LARGE	Same as for Quad Cities site with addition of transmission lines.
Ecology	SMALL to MODERATE	Would use undeveloped areas at Quad Cities site. There would be potential for significant habitat loss and fragmentation and reduced productivity and biological diversity.	SMALL to LARGE	Impact would depend on whether site is previously developed. Factors to consider include location and ecology of site and transmission line route. There would be potential for habitat loss and fragmentation and reduced productivity and biological diversity.

Table 8-8. (contd)

Impact Category	Quad Cities Site		Alternate Site	
	Impact	Comments	Impact	Comments
Water Use and Quality	SMALL	Would use closed-cycle cooling system with natural gas combined cycle units. This would result in a significant reduction in cooling water requirements. Facility would continue very limited groundwater use.	SMALL to MODERATE	Impact would depend on volume of water withdrawal, the constituents of the discharge water, the characteristics of surface water or groundwater source, and the new intake structures required.
Air Quality	MODERATE	<p>Sulfur oxides</p> <ul style="list-style-type: none"> • 81 MT/yr (89 tons/yr) <p>Nitrogen oxides</p> <ul style="list-style-type: none"> • 257 MT/yr (284 tons/yr). <p>Actual impact would depend on emissions offsets.</p> <p>Carbon monoxide:</p> <ul style="list-style-type: none"> • 53 MT/yr (59 tons/yr) PM₁₀ <p>Particulates</p> <ul style="list-style-type: none"> • 49 MT/yr (54 tons/yr) PM₁₀ <p>Other</p> <ul style="list-style-type: none"> • CO₂ emissions contribute to global warming 	MODERATE	Same emissions as at Quad Cities site, although offsets for NO _x would depend on location.
Waste	SMALL	Minimal waste product from fuel combination.	SMALL	Impacts identical to those for Quad Cities site.
Human Health	SMALL	Impacts considered minor.	SMALL	Impacts identical to those for Quad Cities site.

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Table 8-8. (contd)

Impact Category	Quad Cities Site		Alternate Site	
	Impact	Comments	Impact	Comments
Socioeconomics	SMALL to MODERATE	During construction, impacts would be SMALL. Peak workforce during two-to-three year construction period would be significantly smaller than for other steam generation facilities.	SMALL to MODERATE	Construction impacts at alternate site would be similar to those at Quad Cities site, but would depend on whether new site is located near a major metropolitan area.
		During operation, employment would be decreased from approximately 1000 permanent and contract employees to less than 100. All employment impacts would be tempered by proximity to Davenport-Moline-Rock Island, Iowa-Illinois Metropolitan Area. Tax base would be preserved.		Minimal impacts on local tax base.
		Transportation impacts during operation would be SMALL due to the smaller workforce. Transportation impacts associated with construction workers would be SMALL to MODERATE.		Transportation impacts would be similar to those at the Quad Cities site.
Aesthetics	MODERATE	MODERATE aesthetic impact due to impact of plant buildings and structures, along with noise impacts from plant operation. Visual impact would be similar to current Quad Cities Units 1 and 2.	MODERATE	Impact would depend on location. Greatest impact likely would be from the new transmission line(s) that would be needed.
Historic and Archaeological Resources	SMALL to MODERATE	Studies would likely be needed to identify, evaluate, and address mitigation of the potential cultural resource impacts from construction of a new plant on an undeveloped or developed site.	SMALL to MODERATE	Alternate location would necessitate cultural studies. Studies would likely be needed to identify, evaluate, and address mitigation of the potential cultural resource impacts from construction of a new plant on an undeveloped site.

Table 8-8. (contd)

Impact Category	Quad Cities Site		Alternate Site	
	Impact	Comments	Impact	Comments
Environmental Justice	SMALL	No environmental pathways or locations have been identified that would result in disproportionately high and adverse environmental impacts on minority and low-income populations. Impacts on minority and low-income communities would be similar to those experienced by the population as a whole. Any impacts would be tempered by proximity to Davenport-Moline-Rock Island, Iowa-Illinois Metropolitan Area.	SMALL to LARGE	Impacts would vary depending on population distribution and characteristics at new site. Impacts on Quad Cities site would be identical to those in the no-action alternative.

8.3 Summary of Alternatives Considered

This chapter considered the alternative actions, (i.e., the no-action alternative [discussed in Section 8.1], new generation alternatives [from coal, natural gas, and nuclear discussed in Sections 8.2.1 through 8.2.3, respectively], purchased electrical power [discussed in Section 8.2.4], alternative technologies [discussed in Section 8.2.5], and the combination of alternatives [discussed in Section 8.2.6]).

The no-action alternative would result in decommissioning Quad Cities Units 1 and 2 and would have SMALL environmental impacts for all impact categories. The no-action alternative is a conceptual alternative resulting in a net reduction in electricity generation; there will be no replacement power, and, therefore, no environmental impacts from replacement power. In actual practice, the power lost by not renewing the OLs for Quad Cities Units 1 and 2 would likely be replaced by (1) demand-side management (DSM) and energy conservation, (2) electricity generated from other sources, either be Exelon or by another generator, or (3) some combination of these alternatives. Any replacement power would produce environmental impacts in addition to those discussed under the no-action alternative.

For each of the new generation alternatives (coal, natural gas, and nuclear), the environmental impacts would not be less than the impacts of license renewal. For example, the air quality impacts from a coal-fired or natural gas-fired facility would be greater than the impacts of continued operation of Quad Cities Units 1 and 2. The impacts of purchased electrical power would still occur, but they would occur elsewhere, and the notion of purchased power is confused by changes in the electricity regulatory structure in Illinois. Alternative technologies are not considered feasible at this time, and it is very unlikely that the environmental impacts of

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any reasonable combination of generation and conservation options could be reduced to the level of impacts associated with the renewal of the OLs for Quad Cities Units 1 and 2.

8.4 References

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

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

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

10 CFR Part 52. Code of Federal Regulations, Title 10, *Energy*, Part 52, “Early Site Permits; Standard Design Certifications; and Combined Licenses for Nuclear Power Plants.”

40 CFR Part 50. Code of Federal Regulations, Title 40, *Protection of Environment*, Part 50, “National Primary and Secondary Ambient Air Quality Standards.”

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

40 CFR Part 60. Code of Federal Regulations, Title 40, *Protection of Environment*, Part 60, “Standards of Performance for New Stationary Sources.”

40 CFR Part 81. Code of Federal Regulations, Title 40, *Protection of Environment*, Part 81, “Designation of Areas for Air Quality Planning Purposes.”

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U.S. Nuclear Regulatory Commission (NRC). 2002. *Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities, Supplement 1 Regarding the Decommissioning of Nuclear Power Reactors*. NUREG-0586, Supplement 1, Volumes.1 and 2, Washington, D.C.

9.0 Summary and Conclusions

By letter dated January 3, 2003, the Exelon Generation Company, LLC (Exelon) submitted an application to the U.S. Nuclear Regulatory Commission (NRC) to renew the operating licenses (OLs) for the Quad Cities Units 1 and 2 nuclear power plants for an additional 20-year period (Exelon 2003a). If the OLs are renewed, State regulatory agencies and Exelon will ultimately decide whether the plant will continue to operate based on factors such as the need for power or other matters within the State's jurisdiction or the purview of the owners. If the operating licenses are renewed, the renewed licenses would supersede the current licenses. The renewed licenses would expire on December 14, 2032, which is 20 years after the original license expiration date. If the OLs are not renewed, the plant must be shut down at or before the expiration of the current OLs, both of which expire on December 14, 2012.

Section 102 of the National Environmental Policy Act (NEPA) (42 USC 4321) directs that an environmental impact statement (EIS) is required for major Federal actions that significantly affect the quality of the human environment. The NRC has implemented Section 102 of NEPA in 10 Code of Federal Regulations (CFR Part 51), which identifies licensing and regulatory actions that require an EIS. In 10 CFR 51.20(b)(2), the Commission requires the preparation of an EIS or a supplement to an EIS for the renewal of a reactor OL; 10 CFR 51.95(c) states that the EIS prepared at the OL renewal stage will be a supplement to the *Generic Environmental Impact Statement for License Renewal of Nuclear Plants* (GEIS), NUREG-1437, Volumes 1 and 2 (NRC 1996; 1999).^(a)

Upon acceptance of the Exelon application, the NRC began the environmental review process described in 10 CFR Part 51 by publishing a notice of intent to prepare an EIS and conduct scoping in the *Federal Register* (68 FR 12385 [NRC 2003a]) on March 14, 2003. The staff visited the Quad Cities site in March 2003 and held public scoping meetings on April 8, 2003, in Moline, Illinois (NRC 2003b). The staff reviewed the Exelon Environmental Report (ER; Exelon 2003b), compared it to the GEIS, consulted with other agencies, and conducted an independent review of the issues following the guidance set forth in NUREG-1555, Supplement 1, *Standard Review Plans for Environmental Reviews for Nuclear Power Plants, Supplement 1: Operating License Renewal* (NRC 2000). The staff also considered the public comments received during the scoping process for preparation of this supplemental environmental impact statement (SEIS) for Quad Cities Units 1 and 2. The public comments received during the scoping process that were considered to be within the scope of the environmental review are provided in Appendix A, Part 1, of this SEIS.

(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.

Summary and Conclusions

The staff held two public meetings in Moline, Illinois, in December 2003 to describe the preliminary results of the NRC environmental review and to answer questions to provide members of the public with information to assist them in formulating their comments. All the comments received on the SEIS were considered by the staff in developing this final SEIS and are presented in Appendix A, Part II.

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

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

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

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

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

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

The supplemental environmental impact statement for license renewal is not required to include discussion of need for power or the economic costs and economic benefits of the proposed action or of alternatives to the proposed action except insofar as such benefits and costs are either essential for a determination regarding the inclusion of an alternative in the range of alternatives considered or relevant to mitigation. In addition, the supplemental environmental impact statement prepared at the license renewal stage need not discuss other issues not related to the environmental effects of the proposed action and the alternatives, or any aspect of the storage of spent fuel for the facility within the scope of the generic determination in § 51.23(a) ["Temporary storage of spent fuel after cessation of

reactor operation — generic determination of no significant environmental impact”] and in accordance with § 51.23(b).^(a)

The GEIS contains the results of a systematic evaluation of the consequences of renewing an OL and operating a nuclear power plant for an additional 20 years. In the GEIS, the NRC evaluated 92 environmental issues using the NRC’s three-level standard of significance—SMALL, MODERATE, or LARGE—developed using the Council on Environmental Quality guidelines. The following definitions of the three significance levels are set forth in a footnote to Table B-1 of 10 CFR Part 51, Subpart A, Appendix B:

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

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

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

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

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

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

(a) The title of 10 CFR 51.23 is “Temporary storage of spent fuel after cessation of reactor operations – generic determination of no significant environmental impact.”

Summary and Conclusions

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

This SEIS documents the staff's consideration of all 92 environmental issues considered in the GEIS. The staff considered the environmental impacts associated with alternatives to license renewal and compared the environmental impacts of license renewal and the alternatives. The alternatives to license renewal that were considered include the no-action alternative (not renewing the OLS for Quad Cities Units 1 and 2) and alternative methods of power generation. These alternatives are evaluated assuming that the replacement power-generation plant is located at the Quad Cities site or some other unspecified location.

9.1 Environmental Impacts of the Proposed Action — License Renewal

Exelon and the NRC staff have established independent processes for identifying and evaluating the significance of any new information on the environmental impacts of license renewal. Neither Exelon nor the staff has identified information that is both new and significant related to Category 1 issues that would call into question the conclusions in the GEIS.

Similarly, neither public comments, Exelon, nor the staff has identified any new issue applicable to Quad Cities Units 1 and 2 that has a significant environmental impact. Therefore, the staff relies upon the conclusions of the GEIS for all Category 1 issues that are applicable to Quad Cities Units 1 and 2.

Exelon's license renewal application presents an analysis of the Category 2 issues that are applicable to Quad Cities Units 1 and 2 plus environmental justice. The staff has reviewed the Exelon analysis for each issue and has conducted an independent review of each issue. Four Category 2 issues are not applicable because they are related to plant design features or site characteristics not found at Quad Cities. Four Category 2 issues are not discussed in this SEIS because they are specifically related to refurbishment. Exelon has indicated that its evaluation of structures and components, as required by 10 CFR 54.21, did not identify any major plant refurbishment activities or modifications as necessary to support the continued operation of Quad Cities Units 1 and 2 for the license renewal period (Exelon 2003b). In addition, any replacement of components or additional inspection activities are within the bounds of normal plant component replacement and, therefore, are not expected to affect the environment outside of the bounds of the plant operations evaluated in the *Final Environmental Statement Related to the Operation of Quad Cities Units 1 and 2* (AEC 1972).

Thirteen Category 2 issues related to operational impacts and postulated accidents during the renewal term, as well as environmental justice and chronic effects of electromagnetic fields, are discussed in detail in this SEIS. For 12 Category 2 issues and environmental justice, the staff concludes that the potential environmental effects are of SMALL significance in the context of the standards set forth in the GEIS. In addition, the staff determined that appropriate Federal health agencies have not reached a consensus on the existence of chronic adverse effects from electromagnetic fields. Therefore, no further evaluation of this issue is required. For threatened or endangered species, the staff's conclusion is that the impact of resulting license renewal would be SMALL and further mitigation is not warranted. For severe accident mitigation alternatives (SAMAs), the staff concludes that a reasonable, comprehensive effort was made to identify and evaluate SAMAs. Based on its review of the SAMAs for Quad Cities Units 1 and 2, and the plant improvements already made, the staff concludes that four of the candidate SAMAs are cost-beneficial and two other SAMAs are potentially cost-beneficial. However, these SAMAs do not relate to adequately managing the effects of aging during the period of extended operation. Therefore, they do not need to be implemented as part of license renewal pursuant to 10 CFR Part 54.

For one issue, the staff's conclusion is that the potential environmental impact of renewal term operations of Quad Cities Units 1 and 2 is greater than SMALL. The staff concludes that the impact of the potential for induced electric shock from transmission lines along transmission line corridors is MODERATE for the portions of the north Nelson line where calculated induced currents exceed the National Electric Safety Code specification of 5 mA. For a portion of the north Nelson line, the calculated induced electric shock was 6 mA. The NRC staff has informed the transmission line owner of this finding.

Mitigation measures were considered for each category 2 issue. Current measures to mitigate the environmental impacts of plant operation were found to be adequate for 11 issues, and no additional mitigation measures were deemed sufficiently beneficial in these issue areas to be warranted. However, for the issue of electric shock potential, consideration of further mitigation is recommended.

The following sections discuss unavoidable adverse impacts, irreversible or irretrievable commitments of resources, and the relationship between local short-term use of the environment and long-term productivity.

9.1.1 Unavoidable Adverse Impacts

An environmental review conducted at the license renewal stage differs from the review conducted in support of a construction permit because the plant is in existence at the license renewal stage and has operated for a number of years. As a result, adverse impacts associated with the initial construction have been avoided, have been mitigated, or have

Summary and Conclusions

already occurred. The environmental impacts to be evaluated for license renewal are those associated with refurbishment and continued operation during the renewal term.

The adverse impacts identified for 12 of the 13 Category 2 issues relevant to continued operation are considered to be of SMALL significance, and none warrant the implementation of additional mitigation measures. The potential adverse impact of electric shock for the north Nelson line is considered MODERATE. As noted above, consideration of mitigation measures for this issue may be warranted. The adverse impacts of likely alternatives if Quad Cities Units 1 and 2 cease operation at or before the expiration of the current OLS will not be smaller than those associated with continued operation of these units, and they may be greater for some impact categories in some locations.

9.1.2 Irreversible or Irrecoverable Resource Commitments

The commitment of resources related to construction and operation of Quad Cities Units 1 and 2 during the current license periods was made when the plant was built. The resource commitments to be considered in this SEIS are associated with the continued operation of the plant for an additional 20 years. These resources include materials and equipment required for plant maintenance and operation, the nuclear fuel used by the reactors, and ultimately, permanent offsite storage space for the spent fuel assemblies.

The most significant resource commitments related to operation during the renewal term are the fuel and the permanent storage space. Quad Cities Units 1 and 2 replace approximately one-third of the fuel assemblies in each of the two units during every refueling outage, which occurs on a 24-month cycle.

The likely power-generation alternatives if Quad Cities Units 1 and 2 cease operation on or before the expiration of the current OLS will require a commitment of resources for constructing the replacement plants as well as for fuel to run the plants.

9.1.3 Short-Term Use Versus Long-Term Productivity

An initial balance between short-term use and long-term productivity of the environment at the Quad Cities site was set when the plant was approved and construction began. That balance is now well established. Renewing the OLS for Quad Cities Units 1 and 2 and the continued operation of the plant will not alter the existing balance, but renewing the OL may postpone the availability of the site for other uses. Denial of the application to renew the OLS will lead to the shutdown of the plant and will alter the balance in a manner that depends on subsequent uses of the site. For example, the environmental consequences of turning the Quad Cities site into a park or an industrial facility are quite different.

9.2 Relative Significance of the Environmental Impacts of License Renewal and Alternatives

The proposed action is renewal of the OLs for Quad Cities Units 1 and 2. Chapter 2 describes the site, power plant, and interactions of the plant with the environment. As noted in Chapter 3, no refurbishment and no refurbishment impacts are expected at Quad Cities Units 1 and 2. Chapters 4 through 7 discuss environmental issues associated with renewing the OLs. Environmental issues associated with the no-action alternative and alternatives involving power generation and use reduction are discussed in Chapter 8.

The significance of the environmental impacts from the proposed action (approval of the application for renewing the OLs); the no-action alternative (denial of the application); alternatives involving nuclear, or coal- or gas-fired generation of power at the Quad Cities site or an unspecified alternate site; and a combination of alternatives are compared in Table 9-1. Use of a closed-cycle cooling system with cooling towers for alternate power generation is assumed for Table 9-1. Once-through cooling impacts will be smaller in some instances (e.g., land use) and larger in others (e.g., aquatic ecology).

Table 9-1 shows that the significance of the environmental effects of the proposed action are SMALL for nine impact categories (except for collective offsite radiological impacts from the fuel cycle and from HLW and spent fuel disposal, for which a single significance level was not assigned [See Chapter 6]). The significance of the potential for shock is considered MODERATE for that portion of the north Nelson line where the induced shock is greater than 5 mA. The alternative actions, including the no-action alternative, may have environmental effects in at least some impact categories that reach MODERATE or LARGE significance.

9.3 Staff Conclusions and Recommendations

Based on (1) the analysis and findings in the GEIS (NRC 1996; 1999); (2) the ER submitted by Exelon (Exelon 2003b); (3) consultation with Federal, State, and local agencies; (4) the staff's own independent review; and (5) the staff's consideration of the public comments, the recommendation of the staff is that the Commission determine that the adverse environmental impacts of license renewal for Quad Cities Units 1 and 2 are not so great that preserving the option of license renewal for energy-planning decisionmakers would be unreasonable.

Table 9-1. Summary of Environmental Significance of License Renewal, the No-Action Alternative, and Alternative Methods of Generation^(a)

Impact Category	Proposed Action–License Renewal	No Action Alternative–Denial of Renewal	Coal-Fired Generation		Natural-Gas-Fired Generation		New Nuclear Generation		Combination of Alternatives	
			Quad Cities Site	Alternate Site ^(b)	Quad Cities Site	Alternate Site ^(b)	Quad Cities Site	Alternate Site ^(b)	Quad Cities Site	Alternate Site ^(b)
Land Use	SMALL	SMALL	MODERATE	MODERATE to LARGE	SMALL to MODERATE	SMALL to LARGE	MODERATE	MODERATE to LARGE	SMALL to MODERATE	SMALL to LARGE
Ecology	SMALL	SMALL	MODERATE to LARGE	MODERATE to LARGE	SMALL to MODERATE	SMALL to LARGE	MODERATE to LARGE	MODERATE to LARGE	SMALL to MODERATE	SMALL to LARGE
Surface-Water Use and Quality	SMALL	SMALL	SMALL	SMALL to MODERATE	SMALL	SMALL to MODERATE	SMALL	SMALL to MODERATE	SMALL	SMALL to MODERATE
Groundwater Use and Quality	SMALL	SMALL	SMALL	SMALL to MODERATE	SMALL	SMALL to MODERATE	SMALL	SMALL to MODERATE	SMALL	SMALL to MODERATE
Air Quality	SMALL	SMALL	MODERATE	MODERATE	MODERATE	MODERATE	SMALL	SMALL	MODERATE	MODERATE
Waste	SMALL	SMALL	MODERATE	MODERATE	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL
Human Health ^(c)	SMALL to MODERATE	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL
Socioeconomics	SMALL	SMALL	SMALL to MODERATE	SMALL to LARGE	SMALL to MODERATE	SMALL to MODERATE	SMALL to MODERATE	SMALL to LARGE	SMALL to MODERATE	SMALL to MODERATE
Aesthetics	SMALL	SMALL	MODERATE	MODERATE to LARGE	MODERATE	MODERATE to LARGE	MODERATE	MODERATE to LARGE	MODERATE	MODERATE to LARGE
Historic and Archaeological Resources	SMALL	SMALL	SMALL to MODERATE	SMALL to MODERATE	SMALL to MODERATE	SMALL to MODERATE	SMALL to MODERATE	SMALL to MODERATE	SMALL to MODERATE	SMALL to MODERATE
Environmental Justice	SMALL	SMALL	SMALL	SMALL to LARGE	SMALL	SMALL to LARGE	SMALL	SMALL to LARGE	SMALL	SMALL to LARGE

(a) Alternatives located at the Quad Cities site are assumed to utilize the existing once-through cooling system; alternatives located at an alternate site are assumed to use a closed-cycle cooling system with cooling towers.
 (b) An alternate site is assumed, for the purpose of bounding potential impacts, to be an undeveloped site with no previous construction.
 (c) Except for collective offsite radiological impacts from the fuel cycle and from high-level waste and spent-fuel disposal, for which a significance level was not assigned. See Chapter 6 for details.

9.4 References

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

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

Exelon Generation Company, LLC (Exelon). 2003a. *Application for Renewed Operating Licenses, Quad Cities Units 1 and 2*. Warrenville, Illinois.

Exelon Generation Company, LLC (Exelon). 2003b. *Applicant’s Environmental Report — Operating License Renewal Stage Quad Cities Units 1 and 2*. Docket Nos. 50-254 and 50-265. Warrenville, Illinois.

National Environmental Policy Act of 1969, as amended (NEPA). 42 USC 4321, et seq. |

U.S. Atomic Energy Commission (AEC). 1972. *Final Environmental Statement Related to the Operation of Quad-Cities Nuclear Power Station, Units 1 and 2, Commonwealth Edison Company and the Iowa-Illinois Gas and Electric Company*. Docket Nos. 50-254 and 50-265. Directorate of Licensing, Washington, D.C. |

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

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

U.S. Nuclear Regulatory Commission (NRC). 2000. *Standard Review Plans for Environmental Reviews for Nuclear Power Plants, Supplement 1: Operating License Renewal*. NUREG-1555, Supplement 1, Washington, D.C.

U.S. Nuclear Regulatory Commission (NRC). 2003a. “Notice of Intent to Prepare an Environmental Impact Statement and Conduct Scoping Process.” *Federal Register*. Vol. 68, No. 50, pp. 12385–123386. March 14, 2003.

U.S. Nuclear Regulatory Commission (NRC). 2003b. *Environmental Impact Statement Scoping Process: Summary Report—Quad Cities Units 1 and 2*. Moline, Illinois. Washington, D.C.

Appendix A

Comments Received on the Environmental Review

Appendix A

Comments Received on the Environmental Review

Part I – Comments Received During Scoping

On March 14, 2003, the U.S. Nuclear Regulatory Commission (NRC) published a Notice of Intent in the *Federal Register* (68 FR 12385) to notify the public of the 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 Quad Cities Units 1 and 2 operating licenses and to conduct scoping. This plant-specific supplement to the GEIS has been prepared in accordance with the National Environmental Policy Act (NEPA), Council on Environmental Quality (CEQ) guidelines, and 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; local organizations; and individuals to participate in the scoping process by providing oral comments at scheduled public meetings and/or submitting written suggestions and comments no later than May 12, 2003.

The scoping process included two public scoping meetings, which were held at The Mark of the Quad Cities in Moline, Illinois, on April 8, 2003. To publicize the meetings, the NRC staff issued a press release and posted flyers in nearby areas commonly visited by local residents. Approximately 120 members of the public attended the meetings. Both sessions began with NRC staff members providing brief overviews of the license renewal process and the NEPA process. After the NRC's prepared statements, the meetings were opened for public comments. Thirteen attendees provided either oral or written statements that were recorded and transcribed by a certified court reporter. The meeting transcripts are an attachment to the *Summary of Public Scoping Meetings to Support Review of the Quad Cities Nuclear Power Station, Units 1 and 2 License Renewal Application*, dated June 16, 2003. The Public Electronic Reading Room (ADAMS) accession number for the document package containing the summary report, the transcripts and presentation slides is ML0321631260. (This accession number is provided to facilitate access to the document through the Agencywide Documents Access and Management System [ADAMS] at <http://www.nrc.gov/reading-rm.html>.) In addition to the comments provided during the public meetings, four e-mail messages were received by the NRC in response to the Notice of Intent published in the *Federal Register*.

The scoping process provides an opportunity for public participation to identify issues to be addressed in the plant-specific supplement to the GEIS and highlight public concerns and issues. The Notice of Intent to prepare an environmental impact statement (EIS) identified the following objectives of the scoping process:

Appendix A

- Define the proposed action
- Determine the scope of the supplement to the GEIS and identify significant issues to be analyzed in depth
- Identify and eliminate peripheral issues
- Identify any environmental assessments and other environmental impact statements being prepared that are related to the supplement to the GEIS
- Identify other environmental review and consultation requirements
- Indicate the schedule for preparation of the supplement to the GEIS
- Identify any cooperating agencies
- Describe how the supplement to the GEIS will be prepared.

At the conclusion of the scoping period, the NRC staff and its contractors reviewed the transcripts and all written material received to identify specific comments and issues. All comments and suggestions received orally or in writing during the scoping meetings were considered. Each set of comments from an individual was given a unique identifier (Commenter ID) so that the comments could be traced back to the original transcript, letter, or e-mail containing the comment. Several commenters submitted more than one set of comments (e.g., they made statements in both the afternoon and evening scoping meetings). In these cases, there is a unique Commenter ID for each set of comments.

Table A-1 identifies the individuals who provided comments applicable to the environmental review and gives the Commenter ID associated with each set of comments. Individuals who spoke at the scoping meetings are listed in the order in which they spoke at the public meeting, and in alphabetical order for the comments received by letter or e-mail.

Specific comments were categorized and consolidated by topic. Comments with similar specific objectives were combined to capture the common essential issues raised by the commenters. The comments fall into one of several general groups. These groups include:

- Specific comments that address environmental issues within the purview of the NRC environmental regulations related to license renewal. These comments address Category 1 or Category 2 issues or issues that were not addressed in the GEIS. They also address alternatives and related Federal actions.

- General comments (1) in support of or opposed to nuclear power or license renewal or (2) on the renewal process, the NRC's regulations, and the regulatory process. These comments may or may not be specifically related to the Quad Cities license renewal application.
- Questions that do not reveal new information.
- Specific comments that address issues that do not fall within or are specifically excluded from the purview of NRC environmental regulations. These comments typically address issues such as the need for power, emergency preparedness, current operational safety issues, and safety issues related to operation during the renewal period.

Each comment received during the scoping process is summarized in the *Environmental Scoping Summary Report Associated with the Staff's Review of the Application by Exelon Generation Company for Renewal of the Operating Licenses for the Quad Cities Nuclear Power Station, Units 1 and 2*, dated July 21, 2003. The ADAMS accession number for this document is ML032030456.

Each comment applicable to this environmental review is summarized here in Part 1 of Appendix A. This information, which was extracted from the July 21, 2003, scoping summary report, is provided for the convenience of those interested in the scoping comments applicable to this environmental review. The comments that are general in nature or outside the scope of the environmental review for the proposed Quad Cities Units 1 and 2 license renewal are not included here. More detail regarding the disposition of general or inapplicable comments can be found in the summary report. The following pages summarize the contents and suggestions received as part of the scoping process that are applicable to this environmental review and discuss the disposition of the comments and suggestions. The parenthetical identifier after each comment refers to the comment set (Commenter ID) and the comment number.

Comments in this section are grouped in the following categories:

- A.1.1 Comments Concerning Category 2 Aquatic Ecology Issues
- A.1.2 Comments Concerning Category 2 Terrestrial Resource Issues
- A.1.3 Comments Concerning Category 2 Socioeconomic Issues
- A.1.4 Comments Concerning Alternatives

Appendix A

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

Commenter ID	Commenter	Affiliation (If Stated)	Comment Source and ADAMS Accession Number^(a)
QCS-A	Jim Bohnsack	Rock Island County Board	Afternoon Scoping Mtg.
QCS-B	Leo Geerts	Albany Fire Protection District	Afternoon Scoping Mtg.
QCS-C	Tim Tulon	Quad Cities Nuclear Power Station	Afternoon Scoping Mtg.
QCS-D	Fred Polaski	Exelon	Afternoon Scoping Mtg.
QCS-E	Rob Lamb	Quad Cities Development Group	Afternoon Scoping Mtg.
QCS-F	Stuart Whitt	Whitt Law	Afternoon Scoping Mtg.
QCS-G	Chris Filbert	Cordova Township Road Commission	Afternoon Scoping Mtg.
QCS-H	Larry Toppert	Toppert Jetting Service	Afternoon Scoping Mtg.
QCS-I	Don Swensson		Afternoon Scoping Mtg.
QCS-J	Patrick O'Conner	Newberg-Perinni/Stone and Webster	Afternoon Scoping Mtg.
QCS-K	John Malvik	Rock Island County Board	Afternoon Scoping Mtg.
QCS-L	Tim Tulon	Quad Cities Nuclear Power Station	Evening Scoping Mtg.
QCS-M	Fred Polaski	Exelon	Evening Scoping Mtg.
QCS-N	Sue Hebel	Cordova District Library	Evening Scoping Mtg.
QCS-O	Leslie Perrigo		Evening Scoping Mtg.
QCS-P	David Olson		Email (ML031400167)
QCS-Q	Joyce/Jack Wiley		Email (ML031400174)
QCS-R	M. J. Regan		Email ML031400177)
QCS-S	Scott Gardner	Cordova Dragway Park	Email (ML031700164)

(a) The afternoon transcripts can be found under accession number ML031640068 and the evening transcripts can be found under accession number ML031640085.

A.1 Comments and Responses

A.1.1. Comments Concerning Category 2 Aquatic-Ecology Issues

As stated in 10 CFR Part 51, Table B-1, Category 2 aquatic ecology issues include the following:

- Entrainment of fish and shellfish in early life stages
- Impingement of fish and shellfish
- Heat shock.

Comment: I think many people probably do not realize that we are the only private sector facility to operate a fish hatchery on the Mississippi River. And ever since 1984 we have put four million fish right here locally in Mississippi Pools 13 and 14. (QCS-C-9)

Comment: Also the station supports this fish hatchery and stocks the river with walleye and striped bass. (QCS-N-3)

Comment: Now because of the elevated temperature of the river which is directly related to the nuclear plant dumping radioactive warmer water back into the Mississippi, it no longer freezes completely. This has directly resulted in loss of larger clams which no longer can be found in the area. (QCS-R-3)

Response: *The comments are noted. The comments relate to aquatic ecology issues and are discussed in Chapters 2 and 4 of this draft SEIS.*

A.1.2. Comments Concerning Category 2 Terrestrial Resource Issues

As stated in 10 CFR Part 51, Table B-1, Category 2 terrestrial resource issues include the following:

- Refurbishment impacts to terrestrial resources
- Threatened or endangered species.

Comment: The plant keeps the river open in the winter time. Because of this, there are many more eagles and water fowl in the area. (QCS-N-2)

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Response: *The comment is noted. The comment relates to terrestrial resource issues and are discussed in Chapter 4 of this draft SEIS.*

A.1.3. Comments Concerning Category 2 Socioeconomic Issues

As stated in 10 CFR Part 51, Table B-1, Category 2 socioeconomic issues include the following:

- Housing
- Public services: public utilities
- Public services: education (refurbishment)
- Offsite land use (refurbishment)
- Offsite land use (license renewal term)
- Public services: transportation
- Historic and archaeological resources.

Comment: And of course we could not go without saying that it does provide an economic stability in this area. (QCS-B-3)

Comment: So it is an economic source that we don't want to lose. (QCS-B-5)

Comment: So our payroll is 57 million dollars, 57 million dollars worth of payroll which directly helps the local community. (QCS-C-4)

Comment: Right here in the Quad Cities to obtain that labor and so last year that resulted in 30 million dollars, a 30-million dollar payroll to these local craftsmen. (QCS-C-5)

Comment: So I would offer to you that, number one, is we are a very significant source of employment for the local area and number two, we are a positive economic force. (QCS-C-6)

Comment: And regardless of any extreme positions that were taken in the appeal process at PECO and Chairman Bohnsack, I want to just tell you flat out is that we intend to pay property taxes. We intend to be a good neighbor. (QCS-C-7)

Comment: Also, I want to mention that our employees are generous and involved in many local activities. (QCS-C-8)

Comment: The second is in terms of jobs. The station employs about 700 local citizens and provides good income to many area families. The annual payroll from the station puts about 50 million dollars into the greater Quad Cities community. (QCS-E-3)

Comment: Finally, the station pays about three and a half million dollars in taxes annually. These taxes support our schools and our community infrastructure, making the greater Quad Cities more attractive to companies looking to expand in this area and making the Quad Cities a better place for our residents and corporate citizens as well. (QCS-E-4)

Comment: Since that time the Quad Cities Nuclear Power Station has had a significant, positive impact upon the area's economic vitality. The county, the college, and the school district all recognize and appreciate the positive benefits the station has brought to the area. (QCS-F-1)

Comment: They have provided quality jobs to many residents of Cordova Township and funds to the area school district. (QCS-G-3)

Comment: The biggest boost to the road and bridge district is the tax share supported by Exelon. Without that tax base our district would be in serious and desperate trouble. Approximately 70 percent of the monies collected in taxes are Exelon's share. This tax base helps keep our roads in tip top condition. (QCS-G-5)

Comment: Last year our firm worked more than 750,000 person-hours at the Quad Cities Station. That's the equivalent of 375 full-time employees working at the site throughout the year. Our employees earned more than \$30 million, much of which was returned to the local economy. (QCS-J-2)

Comment: That investment has resulted in additional jobs for our employees in the short term and will mean plenty of work in the future for refueling outages and to maintain that equipment to a high state of readiness and availability. (QCS-J-6)

Comment: I'm also in charge of Academic Achievement Award Program for Riverdale High School, which is supported by the Quad Cities Chamber of Commerce, and the plant has been very generous with this scholarship program. (QCS-N-4)

Comment: Aside from the tax issue, the Quad Cities Nuclear Power Station has been a good neighbor financially to the Cordova Library as well. (QCS-N-5)

Response: *The comments are noted. Socioeconomic issues specific to the plant are Category 2 issues and are addressed in Chapter 4 of this draft SEIS.*

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Comment: Our concern is that they pay their fair taxes and I know this is talking about environmental but also had calls from different public and private sectors in the last week saying Exelon or MidAmerica has called them asking them as a public relations and I think that's, that's not the fair gimmick or the thing that you want to hear today. (QCS-A-1)

Comment: In their tax appeal, they pretty much show that they want nothing, it's over \$700 million and they're saying they don't want to pay any, any property taxes. We think that's terrible. We are trying to negotiate with them now to have some kind of equitable property tax. (QCS-A-2)

Comment: And so I want to make sure you understand that they're worthy of, of running a good facility, but they also need to be paying their fair share. (QCS-A-3)

Comment: However, reduction of the station's taxable value as requested by the owners will have a devastating impact upon the local taxing districts responsible for those social services which are vital to the community. The county will lose over \$400,000 and the college will lose over a quarter of a million, resulting in substantial layoffs and the corresponding reduction of social services. The school district will lose more than \$2 million or nearly 29 percent of its entire budgeted revenue. (QCS-F-2)

Comment: With this loss, it will be impossible for the district to maintain a quality educational program for its students. (QCS-F-3)

Comment: The county, the college, and the school district all request that the Nuclear Regulatory Commission solicit and accept statements from the local taxing bodies for inclusion in the supplemental environmental impact statement and further ask that Edison drop its appeal. (QCS-F-4)

Comment: Exelon doesn't want to pay for its fair share of taxes. That's the bottom line. They don't want to pay as much in taxes as they are paying. (QCS-K-1)

Comment: This giant and profitable corporation wants to shift its civic duty to pay taxes to the little guy, the working men and women of our community, our senior citizens, those who have to struggle to make ends meet. (QCS-K-2)

Comment: I realize that Cordova is a major employer for our area, but I would also like to point out that under deregulation, many jobs have already been cut. (QCS-O-9)

Response: *The comments are noted. Socioeconomic issues specific to the plant are Category 2 issues and are addressed in Chapter 4 of this draft SEIS.*

A.1.4 Comments Concerning Alternatives

Comment: During the preparation of the license extension paperwork, a comparison was done to say, okay, if you take the generation of Quad Cities and you don't use the nuclear option and you use a coal-burning type of option, what would that result in? The result would be 6000 tons of sulphur dioxide emission to the environment. Seventeen hundred tons of both nitric oxides and also carbon monoxides. So it's a very significant benefit, I think, that nuclear has is the avoidance of this greenhouse issue. (QCS-C-11)

Comment: And we looked at other ways of generating nuclear power and determined that any alternate means of generating electricity that 1800 megawatts would have more of an impact on the environment than if we continued to operate Quad Cities for an additional 20 years. (QCS-D-2)

Comment: Although the nuclear industry does produce far less, or does emit far less carbon than conventional plants, such as coal, carbon dioxide is still emitted at every step of the nuclear fuel chain from uranium mining to the decommissioning of old reactors. (QCS-O-7)

Comment: So it is possible to function in the Quad Cities without nuclear power plants, and we do have amazing potential for renewable energy. (QCS-O-10)

Comment: Every year the sun emits two thousand times more energy than the world consumption needs. When resources in the West and Midwest have more potential energy than the oil fields of Saudi Arabia and together electricity and hydrogen can meet all the energy needs of a modern society. (QCS-O-11)

Comment: This is a very exciting time in technology, so we would just like the NRC to consider other options and just acknowledge that there are other options out there and taking it into consideration all the safety concerns regarding nuclear power. (QCS-O-12)

Comment: There are other sources of energy that are renewable and environmentally safe, such as wind and solar that would also create good, high-paying jobs. (QCS-P-5)

Response: *The comments are noted. Impacts from reasonable alternatives for the Quad Cities license renewal will be evaluated in Section 8 of the SEIS.*

Part II - Comments Received on the Draft SEIS

Pursuant to 10 CFR Part 51, the staff transmitted the *Generic Environmental Impact Statement for License Renewal of Nuclear Plants, Regarding Quad Cities Nuclear Power Station, Units 1*

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and 2, *Draft Report for Comment* (NUREG-1437, Supplement 16, referred to as the draft SEIS) to Federal, State, Native American Tribal, and local government agencies as well as interested members of the public. As part of the process to solicit public comments on the draft SEIS, the staff:

- placed a copy of the draft SEIS in the NRC's electronic Public Document Room; its license renewal website; at the Cordova District Library, Cordova, Illinois; the River Valley Library, Port Byron, Illinois; and the Davenport Public Library, Davenport, Iowa
- sent copies of the draft SEIS to the applicant, members of the public who requested copies, and certain Federal, state, Native American Tribal, and local agencies
- published a notice of availability of the draft SEIS in the Federal Register on November 13, 2003 (68 FR 64372)
- issued public announcements, such as advertisements in the local newspapers and posting in public places, of the availability of the draft SEIS
- announced and held two public meetings in Moline, Illinois, on December 16, 2003, to describe the results of the environmental review and answer related questions
- issued public service announcements and press releases announcing the issuance of the draft SEIS, the public meeting, and instructions on how to comment on the draft SEIS
- established a website to receive comments on the draft SEIS through the Internet.

During the comment period, the staff received a total of 12 comment letters in addition to comments received during the public meetings.

The staff has reviewed the public meeting transcripts and the comment letters that are part of the docket file for the application, all of which are available in the NRC's electronic Public Document Room. Appendix A, Part II, Section A.2, contains a summary of the comments and the staff's responses. Related issues are grouped together. Appendix A, Part II, Section A.3, contains copies of the public meeting transcripts and the comment letters.

Each comment identified by the staff was assigned a specific alphanumeric identifier (marker). That identifier is typed in the margin of the letter at the beginning of the discussion of the page where the comment can be found, and the section(s) of this report in which the comment is addressed is provided in Table A-2. The 12 written comment letters are identified by the identifiers QC04 through QC16. The accession number is provided for the written comments after the letter date to facilitate access to the document through the Public Electronic Reading Room (ADAMS) <<http://www.nrc.gov/reading-rm/adams/login.html>>.

The staff made a determination on each comment that it was one of the following:

- (1) A comment that was either related to support of, or opposition to license renewal in general (or specifically the Quad Cities Nuclear Power Station) or made a general statement about the license renewal process. It may have made only a general statement regarding Category 1 and/or Category 2 issues. In addition, it provided no new information and does not relate to safety considerations reviewed under 10 CFR Part 54.
- (2) A comment regarding environmental issues pertaining to 10 CFR Part 51.
- (3) A comment that raised an environmental issue that was not addressed in the GEIS or the Draft SEIS.
- (4) A comment regarding severe accident mitigation alternative analysis.
- (5) A comment outside the scope of license renewal (not related to 10 CFR Parts 51 or 54).

Comments without a supporting technical basis or without any new information are discussed in this appendix, and not in other sections of this report. Relevant references that address the issues within the regulatory authority of the NRC are provided where appropriate. Many of these references can be obtained from the NRC Electronic Public Document Room.

Within each section of Part II of this appendix (A.2.1 through A.2.14), similar comments are grouped together for ease of reference, and a summary description of the comments is given followed by the staff's response. Where the comment or the question resulted in a change in the text of the SEIS, Table A-2 refers the reader to the appropriate section of this report where the change was made. Revisions to the text in this SEIS are designated by vertical lines in the margin beside the text.

Appendix A

Table A-2. Comments Received on the Draft SEIS

Comment Number	Speaker or Author	Source	Page of Comment	Section(s) Where Addressed
QC01-1	J. Bohnsack	Afternoon meeting transcript (12/16/03) ML040360159	A-69	A.2.7
QC01-2	J. Bohnsack	Afternoon meeting transcript (12/16/03)	A-70	A.2.7
QC02-1	L. Perrigo	Afternoon meeting transcript (12/16/03)	A-80	A.2.13
QC02-2	L. Perrigo	Afternoon meeting transcript (12/16/03)	A-80	A.2.13
QC02-3	L. Perrigo	Afternoon meeting transcript (12/16/03)	A-80	A.2.13
QC02-4	L. Perrigo	Afternoon meeting transcript (12/16/03)	A-81	A.2.9
QC02-5	L. Perrigo	Afternoon meeting transcript (12/16/03)	A-81	A.2.9
QC02-6	L. Perrigo	Afternoon meeting transcript (12/16/03)	A-81	A.2.9
QC02-7	L. Perrigo	Afternoon meeting transcript (12/16/03)	A-81	A.2.13
QC02-8	L. Perrigo	Afternoon meeting transcript (12/16/03)	A-81	A.2.13
QC02-9	L. Perrigo	Afternoon meeting transcript (12/16/03)	A-81	A.2.3
QC03-1	B. Brown	Evening meeting transcript (12/16/03) ML040360183	A-110	A.2.13
QC03-2	B. Brown	Evening meeting transcript (12/16/03)	A-110	A.2.13
QC03-3	B. Brown	Evening meeting transcript (12/16/03)	A-111	A.2.13
QC03-4	B. Brown	Evening meeting transcript (12/16/03)	A-111	A.2.13
QC03-5	B. Brown	Evening meeting transcript (12/16/03)	A-112	A.2.13
QC03-6	B. Brown	Evening meeting transcript (12/16/03)	A-112	A.2.13
QC03-7	B. Brown	Evening meeting transcript (12/16/03)	A-112	A.2.13
QC03-8	B. Brown	Evening meeting transcript (12/16/03)	A-112	A.2.13
QC03-9	B. Brown	Evening meeting transcript (12/16/03)	A-112	A.2.13
QC03-10	B. Brown	Evening meeting transcript (12/16/03)	A-112	8.2.3, A.2.12
QC03-11	B. Brown	Evening meeting transcript (12/16/03)	A-113	8.2.5.2, 8.2.6, A.2.12
QC03-12	B. Brown	Evening meeting transcript (12/16/03)	A-114	8.2.5.2, 8.2.6, A.2.12
QC03-13	B. Brown	Evening meeting transcript (12/16/03)	A-115	A.2.13
QC03-14	B. Brown	Evening meeting transcript (12/16/03)	A-115	8.2.5.2, A.2.12

Table A-2. (contd)

Comment Number	Speaker or Author	Source	Page of Comment	Section(s) Where Addressed
QC03-15	B. Brown	Evening meeting transcript (12/16/03)	A-115	8.2.5.2, 8.2.6, A.2.12
QC03-16	B. Brown	Evening meeting transcript (12/16/03)	A-115	A.2.12
QC03-17	B. Brown	Evening meeting transcript (12/16/03)	A-116	A.2.12
QC03-18	B. Brown	Evening meeting transcript (12/16/03)	A-116	8.2.5.2, 8.2.6, A.2.12
QC04-1	D. Monahan	Dec. 16, 2003, Letter ML040090255	A-118	A.2.5
QC04-2	D. Monahan	Dec. 16, 2003, Letter	A-118	A.2.9
QC04-3	D. Monahan	Dec. 16, 2003, Letter	A-118	A.2.11
QC04-4	D. Monahan	Dec. 16, 2003, Letter	A-118	A.2.4
QC04-5	D. Monahan	Dec. 16, 2003, Letter	A-118	8.2.5.11, A.2.12
QC05-1	K. A. Nagel	Jan. 1, 2004, Letter ML040080780	A-119	A.2.3
QC05-2	K. A. Nagel	Jan. 1, 2004, Letter	A-119	A.2.8
QC05-3	K. A. Nagel	Jan. 1, 2004, Letter	A-119	A.2.9
QC05-4	K. A. Nagel	Jan. 1, 2004, Letter	A-119	A.2.12
QC05-5	K. A. Nagel	Jan. 1, 2004, Letter	A-119	A.2.13
QC05-6	K. A. Nagel	Jan. 1, 2004, Letter	A-119	A.2.13
QC05-7	K. A. Nagel	Jan. 1, 2004, Letter	A-119	A.2.13
QC05-8	K. A. Nagel	Jan. 1, 2004, Letter	A-119	A.2.9
QC05-9	K. A. Nagel	Jan. 1, 2004, Letter	A-119	A.2.3
QC06-1	D. P. Jeffery and E. M. Jeffery	Dec. 16, 2003, Letter ML040080776	A-120	A.2.13
QC06-2	D. P. Jeffery and E. M. Jeffery	Dec. 16, 2003, Letter	A-120	8.2.5.2, 8.2.5.3, 8.2.5.11, 8.2.6, A.2.12
QC06-3	D. P. Jeffery and E. M. Jeffery	Dec. 16, 2003, Letter	A-120	A.2.3
QC07-1	M. Chezik	Jan. 16, 2004, Letter ML040230534	A-121	A.2.10
QC08-1	P. Simpson	Jan. 26, 2004, Letter ML040330857	A-125	A.2.14
QC08-2	P. Simpson	Jan. 26, 2004, Letter	A-125	2.1.5, A.2.14
QC08-3	P. Simpson	Jan. 26, 2004, Letter	A-125	A.2.14
QC08-4	P. Simpson	Jan. 26, 2004, Letter	A-125	A.2.14

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Table A-2. (contd)

Comment Number	Speaker or Author	Source	Page of Comment	Section(s) Where Addressed
QC08-5	P. Simpson	Jan. 26, 2004, Letter	A-125	4.2.2, A.2.14
QC08-6	P. Simpson	Jan. 26, 2004, Letter	A-125	A.2.14
QC08-7	P. Simpson	Jan. 26, 2004, Letter	A-125	4.4.1, A.2.14
QC08-8	P. Simpson	Jan. 26, 2004, Letter	A-126	A.2.14
QC08-9	P. Simpson	Jan. 26, 2004, Letter	A-126	4.4.1, A.2.14
QC08-10	P. Simpson	Jan. 26, 2004, Letter	A-126	A.2.14
QC08-11	P. Simpson	Jan. 26, 2004, Letter	A-126	A.2.14
QC08-12	P. Simpson	Jan. 26, 2004, Letter	A-127	4.4.5, A.2.14
QC08-13	P. Simpson	Jan. 26, 2004, Letter	A-127	4.6.2, A.2.14
QC08-14	P. Simpson	Jan. 26, 2004, Letter	A-127	A.2.14
QC08-15	P. Simpson	Jan. 26, 2004, Letter	A-127	4.6.2, A.2.14
QC08-16	P. Simpson	Jan. 26, 2004, Letter	A-127	4.6.2, A.2.14
QC08-17	P. Simpson	Jan. 26, 2004, Letter	A-127	4.6.2, A.2.14
QC08-18	P. Simpson	Jan. 26, 2004, Letter	A-127	4.6.2, A.2.14
QC08-19	P. Simpson	Jan. 26, 2004, Letter	A-127	A.2.14
QC08-20	P. Simpson	Jan. 26, 2004, Letter	A-127	4.8.6.2, A.2.14
QC08-21	P. Simpson	Jan. 26, 2004, Letter	A-127	4.8.6.2, A.2.14
QC08-22	P. Simpson	Jan. 26, 2004, Letter	A-127	4.8.7, A.2.14
QC08-23	P. Simpson	Jan. 26, 2004, Letter	A-127	4.9, A.2.14
QC08-24	P. Simpson	Jan. 26, 2004, Letter	A-128	A.2.14
QC08-25	P. Simpson	Jan. 26, 2004, Letter	A-128	8.2.4, A.2.14
QC08-26	P. Simpson	Jan. 26, 2004, Letter	A-128	9.1, A.2.14
QC08-27	P. Simpson	Jan. 26, 2004, Letter	A-128	9.2, A.2.14
QC08-28	P. Simpson	Jan. 26, 2004, Letter	A-128	9.2, A.2.14
QC08-29	P. Simpson	Jan. 26, 2004, Letter	A-128	9.2, A.2.14
QC08-30	P. Simpson	Jan. 26, 2004, Letter	A-130	9.2, A.2.9
QC08-31	P. Simpson	Jan. 26, 2004, Letter	A-130	9.2, A.2.9
QC08-32	P. Simpson	Jan. 26, 2004, Letter	A-130	9.2, A.2.9
QC08-33	P. Simpson	Jan. 26, 2004, Letter	A-131	9.2, A.2.9
QC09-1	N. Howey	Undated Letter ML040330869	A-133	A.2.6
QC09-2	N. Howey	Undated Letter	A-133	A.2.6

Table A-2. (contd)

Comment Number	Speaker or Author	Source	Page of Comment	Section(s) Where Addressed
QC09-3	N. Howey	Undated Letter	A-133	A.2.6
QC09-4	N. Howey	Undated Letter	A-134	A.2.63
QC09-5	N. Howey	Undated Letter	A-134	A.2.6
QC09-6	N. Howey	Undated Letter	A-134	A.2.6
QC10-1	S. Fisk	Jan. 26, 2004, Letter ML040330862	A-136	A.2.13
QC10-2	S. Fisk	Jan. 26, 2004, Letter	A-136	8.2.5.2, 8.2.5.3, 8.2.5.11, 8.2.6, A.2.12
QC10-3	S. Fisk	Jan. 26, 2004, Letter	A-136	A.2.13
QC10-4	S. Fisk	Jan. 26, 2004, Letter	A-137	8.2.5.2, 8.2.5.3, 8.2.5.11, 8.2.6, A.2.12
QC10-5	S. Fisk	Jan. 26, 2004, Letter	A-137	8.2.5.11, A.2.13
QC10-6	S. Fisk	Jan. 26, 2004, Letter	A-137	8.2.5.11, A.2.13
QC10-7	S. Fisk	Jan. 26, 2004, Letter	A-138	8.2.5.11, A.2.12
QC10-8	S. Fisk	Jan. 26, 2004, Letter	A-138	8.2.5.11, A.2.12
QC10-9	S. Fisk	Jan. 26, 2004, Letter	A-138	A.2.2
QC10-10	S. Fisk	Jan. 26, 2004, Letter	A-139	8.2.5.2, 8.2.6, A.2.12
QC10-11	S. Fisk	Jan. 26, 2004, Letter	A-139	8.2.5.2, A.2.12
QC10-12	S. Fisk	Jan. 26, 2004, Letter	A-139	8.2.5.2, 8.2.6, A.2.12
QC10-13	S. Fisk	Jan. 26, 2004, Letter	A-139	A.2.13
QC10-14	S. Fisk	Jan. 26, 2004, Letter	A-139	8.2.5.2, A.2.12
QC10-15	S. Fisk	Jan. 26, 2004, Letter	A-139	A.2.12
QC10-16	S. Fisk	Jan. 26, 2004, Letter	A-140	A.2.12
QC10-17	S. Fisk	Jan. 26, 2004, Letter	A-140	8.2.5.2, A.2.12
QC10-18	S. Fisk	Jan. 26, 2004, Letter	A-140	A.2.12

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Table A-2. (contd)

Comment Number	Speaker or Author	Source	Page of Comment	Section(s) Where Addressed
QC10-19	S. Fisk	Jan. 26, 2004, Letter	A-140	A.2.12
QC10-20	S. Fisk	Jan. 26, 2004, Letter	A-140	8.2.5.2, 8.2.5.3, 8.2.5.11, 8.2.6, A.2.12
QC10-21	S. Fisk	Jan. 26, 2004, Letter	A-140	A.2.13
QC11-1	C. Montgomery, T. J. Budler	Jan. 27, 2004, Letter ML040330882	A-143	8.2.5.2, 8.2.6, A.2.12
QC11-2	C. Montgomery, T. J. Budler	Jan. 27, 2004, Letter	A-143	8.2.5.2, A.2.12
QC11-3	C. Montgomery, T. J. Budler	Jan. 27, 2004, Letter	A-143	8.2.5.2, 8.2.6, A.2.12
QC11-4	C. Montgomery, T. J. Budler	Jan. 27, 2004, Letter	A-144	A.2.13
QC11-5	C. Montgomery, T. J. Budler	Jan. 27, 2004, Letter	A-144	A.2.13
QC11-6	C. Montgomery, T. J. Budler	Jan. 27, 2004, Letter	A-144	A.2.13
QC11-7	C. Montgomery, T. J. Budler	Jan. 27, 2004, Letter	A-144	A.2.13
QC11-8	C. Montgomery, T. J. Budler	Jan. 27, 2004, Letter	A-145	8.2.5.2, A.2.12
QC11-9	C. Montgomery, T. J. Budler	Jan. 27, 2004, Letter	A-145	A.2.12
QC12-1	L. Perrigo	Jan. 27, 2004, Letter ML040330875	A-146	A.2.3
QC12-2	L. Perrigo	Jan. 27, 2004, Letter	A-146	A.2.3
QC12-3	L. Perrigo	Jan. 27, 2004, Letter	A-146	8.2.5.2, 8.2.5.3, 8.2.5.11, 8.2.6, A.2.12
QC12-4	L. Perrigo	Jan. 27, 2004, Letter	A-147	8.2.5.2, 8.2.5.3, 8.2.5.11, 8.2.6, A.2.12
QC12-5	L. Perrigo	Jan. 27, 2004, Letter	A-147	A.2.9
QC13-1	L. Perrigo	Feb. 3, 2004, Letter ML040420166	A-151	A.2.1.3
QC13-2	L. Perrigo	Feb. 3, 2004, Letter	A-152	A.2.13
QC13-3	L. Perrigo	Feb. 3, 2004, Letter	A-155	A.2.13

Table A-2. (contd)

Comment Number	Speaker or Author	Source	Page of Comment	Section(s) Where Addressed
QC13-4	L. Perrigo	Feb. 3, 2004, Letter	A-155	A.2.13
QC13-5	L. Perrigo	Feb. 3, 2004, Letter	A-156	8.2.5.11, A.2.12
QC13-6	L. Perrigo	Feb. 3, 2004, Letter	A-156	A.2.13
QC13-7	L. Perrigo	Feb. 3, 2004, Letter	A-156	A.2.9
QC13-8	L. Perrigo	Feb. 3, 2004, Letter	A-156	A.2.8
QC13-9	L. Perrigo	Feb. 3, 2004, Letter	A-156	8.2.5.2, 8.2.5.3, 8.2.5.11, 8.2.6, A.2.12
QC13-10	L. Perrigo	Feb. 3, 2004, Letter	A-156	A.2.7
QC13-11	L. Perrigo	Feb. 3, 2004, Letter	A-156	A.2.13
QC13-12	L. Perrigo	Feb. 3, 2004, Letter	A-156	A.2.13
QC13-13	L. Perrigo	Feb. 3, 2004, Letter	A-156	A.2.13
QC13-14	L. Perrigo	Feb. 3, 2004, Letter	A-157	A.2.13
QC13-15	L. Perrigo	Feb. 3, 2004, Letter	A-157	A.2.4
QC13-16	L. Perrigo	Feb. 3, 2004, Letter	A-157	A.2.1
QC13-17	L. Perrigo	Feb. 3, 2004, Letter	A-157	8.2.5.2, 8.2.5.3, 8.2.5.11, 8.2.6, A.2.12
QC13-18	L. Perrigo	Feb. 3, 2004, Letter	A-157	A.2.3
QC13-19	L. Perrigo	Feb. 3, 2004, Letter	A-157	8.2.5.2, 8.2.5.3, 8.2.5.11, 8.2.6, A.2.3
QC14-1	C. Perrigo	Feb. 3, 2004, Letter ML040420166	A-178	A.2.3
QC14-2	C. Perrigo	Feb. 3, 2004, Letter	A-178	A.2.19
QC15-1	R. Fischer	Feb. 3, 2004, Letter ML040420166	A-179	A.2.3
QC16-1	K. Westlake	Feb. 5, 2004, Letter ML040500711	A-182	A.2.8
QC16-2	K. Westlake	Feb. 5, 2004, Letter	A-182	A.2.13
QC16-3	K. Westlake	Feb. 5, 2004, Letter	A-182	A.2.6
QC16-4	K. Westlake	Feb. 5, 2004, Letter	A-183	A.2.9
QC16-5	K. Westlake	Feb. 5, 2004, Letter	A-183	A.2.8
QC16-6	K. Westlake	Feb. 5, 2004, Letter	A-183	A.2.8

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Table A-2. (contd)

Comment Number	Speaker or Author	Source	Page of Comment	Section(s) Where Addressed
QC16-7	K. Westlake	Feb. 5, 2004, Letter	A-183	A.2.8
QC16-8	K. Westlake	Feb. 5, 2004, Letter	A-184	A.2.11
QC16-9	K. Westlake	Feb. 5, 2004, Letter	A-184	A.2.12
QC16-10	K. Westlake	Feb. 5, 2004, Letter	A-184	A.2.12

A.2 Comments and Responses

Comments in this section are grouped into the following categories:

- A.2.1 General Comments in Opposition to Nuclear Power
- A.2.2 General Comments in Opposition to the License Renewal Process
- A.2.3 General Comments in Opposition to License Renewal at Quad Cities
- A.2.4 Comments Concerning Category 1 Air Quality Issues
- A.2.5 Comments Concerning Category 1 Terrestrial Resource
- A.2.6 Comments Concerning Category 1 Human Health Issues
- A.2.7 Comments Concerning Socioeconomic Issues
- A.2.8 Comments Concerning Category 1 Uranium Fuel Cycle and Waste Management
- A.2.9 Comments Concerning Category 1 Postulated Accident Issues
- A.2.10 Comments Concerning Threatened and Endangered Species Issues
- A.2.11 Comments Concerning Decommissioning Issues
- A.2.12 Comments Concerning Alternatives to License Renewal
- A.2.13 Comments Concerning Out-of-Scope Issues: Operational Safety, Aging Management, Cost of Power, and Need for Power
- A.2.14 Editorial Comments

A.2.1 General Comments in Opposition to Nuclear Power

Comment: The overall inherent dangers of radiation far outweigh the benefits of nuclear power. (QC13-16)

Response: *The comment is noted. The comment is opposed to nuclear power and is general in nature. The comment provides no additional information. There were no changes made in the supplement because of this comment.*

A.2.2 General Comments in Opposition to the License Renewal Process

Comment: Exelon and its subsidiary Commonwealth Edison should consider investments in energy efficiency to meet Illinois' power needs. But even if they prefer not to do so, that does not obviate the NRC's legal obligation under NEPA to do so. The point made in the Draft Supplement is legally flawed – an otherwise reasonable alternative cannot be rejected under NEPA simply because an applicant may not want to or cannot carry it out. Cf. 42 C.F.R. [sic] 1502.14(c) (agency cannot reject an alternative simply because it is outside the agency's jurisdiction); *Muckleshoot Indian Tribe v. U.S. Forest Serv.*, 177 F.3d 800, 814 (9th Cir. 1999) (same). Instead, the NRC has the legal authority to tell Exelon that there is a better, cheaper, and environmentally preferable alternative to license renewal. The fact that energy efficiency efforts are more likely to materialize as a result of State or Federal government initiatives (such as an energy efficiency investment fund or an energy-efficient building code) in no way provides a basis for rejecting the economically, technologically, and environmentally feasible alternative of energy efficiency. (QC10-9)

Response: *The comment is noted. The Supplemental EIS presents the staff's analysis of the environmental impacts associated with the proposed license renewal and with reasonable alternatives. Staff agrees with the commenter's statements that increases in efficiency are technically possible and could result in energy savings that could replace Quad Cities generation. Staff also agrees with the commenter's inference that the overall impacts associated with implementing energy conservation would likely be SMALL. However, as discussed in 8.2.5.11, Exelon would not pursue large-scale conservation programs unless these were mandated or an incentive were provided by a government agency because of their high relative cost. Therefore, staff disagrees with the commenter's statement that a large-scale increase in energy efficiency is an economically feasible alternative to license renewal because the possibility of Congressional or State passage of incentives for conservation measures is speculative. Without these incentives, the costs of conservation programs are so high relative to other generation options that it is not reasonable to assume conservation programs would be implemented.*

The comment provides no additional information. There were no changes made in the supplement because of this comment.

A.2.3 General Comments in Opposition to License Renewal at Quad Cities

Comment: Under the circumstances, it would be prudent to retire the Quad Cities Nuclear Power Station in 2012 and seek out safer more financial viable solutions for the community. (QC02-9)

Comment: I am writing to express my dismay and horror at the thought of any extension to the use of the Cordova Nuclear power plant! I am a citizen with a family living in the shadows of this plant. Personally, I wish all nuclear plants had never been built! They are a constant threat to our environment, and in fact to our lives. (QC05-1)

Comment: Please do not endanger me and my family, and our environment by allowing the Cordova plant to continue operating beyond its original useful life-span!!! This is truly a matter of life and death, do not let it be a matter of money in some corporate pockets! (QC05-9)

Comment: Don't keep this plant open for another twenty years. I speak for my whole family, and all my neighbors. They, like my husband and me are older and handicapped. We can't get to the meetings, etc., so I've chosen this method of contacting you with our plea to get rid of the nuclear generator plant in our midst. (QC06-3)

Comment: The plant at Cordova is one of twenty-one nuclear power plants along the Mississippi River watershed, and one of the oldest Boiling Water Reactors in the nation. The inherent [sic] design flaws of this model pose a serious [sic] threat to not only members of the Quad Cities, but all those down stream from us. (QC12-1)

Comment: We cannot afford to put the Quad Cities and our neighbors downstream at risk. (QC12-2)

Comment: The Quad Cities Nuclear Power Station has outlived its purpose. We, the people, demand responsible energy solutions. Options, which can increase efficiency, meet our needs, create new jobs, and stimulate the local economy. (QC13-17)

Comment: A license renewal for the QCNPS offers little more than higher utility bills, further environmental degradation and greater potential for a nuclear disaster. (QC13-18)

Comment: In regard to the relicensing of the Quad City Nuclear Power Station, please retire this plant as it served its time, give us the opportunity to develop alternative energy sources, which will not pollute air and waterways. (QC14-1)

Comment: The Quad Cities nuclear power station has outlived its purpose. Increasing energy efficiency would actually provide us with more power than the QCNPS currently generates. The

people of the Quad Cities deserve responsible energy solutions which can increase efficiency, meet our needs, create new jobs and stimulate the local economy. License renewal for the QCNPS offers little more than higher utility bills, further environmental degradation and greater potential for a nuclear disaster. (QC15-1)

Response: *The comments are noted. The comments oppose license renewal at Quad Cities Nuclear Power Station, Units 1 and 2, and are general in nature. The comments provide no additional information. There were no changes made in the supplement because of these comments.*

A.2.4 Comments Concerning Category 1 Air Quality Issues

Comment: Although emissions from nuclear plants are significantly lower than emissions from fossil fuels, carbon is emitted at every step of the nuclear fuel chain. (QC13-15)

Response: *The staff recognizes that atmospheric emissions occur during the uranium fuel cycle, including carbon emissions. The 1996 GEIS on License Renewal includes Table S-3, which lists both hydrocarbon and carbon monoxide emissions from the uranium fuel cycle. The GEIS also states that in a comparison with a coal-fired power plant of the same size with an abatement system, a 1300-MW(e) nuclear power plant reduces annual emissions to the air of about 8.5 million tons of CO₂ even after taking into account the entire uranium fuel cycle. The comment provides no additional information. There were no changes made in the supplement because of this comment.*

A.2.5 Comments Concerning Category 1 Terrestrial Resources

Comment: I have been concerned about it for a good number of years, particularly when flocks of birds were found dead near it. (QC04-1)

Response: *The NRC staff contacted the commenter to obtain additional information regarding the "flocks of dead birds found dead near it [the Quad Cities Nuclear Power Plant]." The commenter was unable to state when the dead birds were observed, other than to say it was many years ago along a road to the power plant. The NRC staff also contacted the local field office of the U.S. Fish and Wildlife Service to obtain any available information which could be used to assess the significance of the comment. The FWS had no information regarding dead birds being found in the vicinity of the power plant. Based on the lack of available information which could be used to assess the significance of the observation noted in the comment, the NRC staff plans no further action. The comment provides no additional information. There were no changes made in the supplement because of this comment.*

A.2.6 Comments Concerning Category 1 Human Health Issues

Comment: We understand that collective doses are related to the background radiation levels resulting from the source term from activated corrosion products in the reactor and related systems, and the number of outages at a plant each year. IEMA hopes that 800 and 1,700 person-rem/year level collective doses are not indicative of the doses to be expected during the renewal term. Part of our concern is that the QC plants are in the bottom quartile of nuclear plants in regard to source term. Therefore, we question the NRC conclusion that no mitigative measures are needed in the renewal term. Many of those accumulating these exposures are Illinois citizens.

Therefore, IEMA would like to see as a condition to PLEX application approval, a requirement for the licensee to proactively monitor and control the source term over the renewal period. Decontamination and preventive methods are available to keep source terms under control. (QC09-1)

Comment: The plant's UFSARs assume structurally sound steam dryers in their current licensing basis. The QC steam dryers have not remained structurally sound. In addition, the root cause analyses and corrective actions done as a result of the first failure did not prevent the second failure. (QC09-2)

Comment: Extended power upgrades are speculated to be the root cause of the dryer failures. That may or may not turn out to be the case. Regardless, we assume those increased power levels will extend into the renewal period. We noted from inspection reports that during the scoping inspections done at QC, the steam dryers were not considered reactor internal components for PLEX purposes, although the FSAR does list them as a reactor internal component. Additionally, they were excluded from age related degradation management programs prior to and during the renewal period. The reason given was because they were non-safety related, and failure is an operational concern, but not a safety concern. We are not so sure. (QC09-3)

Comment: The conclusions of operability evaluations concerning the steam dryer failures made some assumptions. Among them was that any dryer parts that broke off would stay in the area of the separator/dryer, or be carried down the main steam line, where they would not affect any safety-related functions. It was determined as a result of the second dryer failure, some dryer material did not remain in the dryer area, but did travel through a recirculation loop and into the reactor vessel as a loose part. We anticipate that further engineering safety evaluations will conclude that the loose part(s) will cause no harm in the vessel. Regardless, thus far, steam dryer structural integrity is a present issue and contains large uncertainties over a twenty-year renewal term. Therefore, IEMA recommends that the status of the steam dryers

at Quad Cities be re-evaluated as to their non-safety related status under PLEX, and be considered a reactor component subject to an aging management program. (QC09-4)

Comment: In conclusion, our observations are that recent steam dryer problems at QC have caused forced outages. Only time will tell if the root cause of the dryer failures is a result of an extended power upgrade program. Regardless, the program will extend into the renewal term. It is not clear what effect the upgraded power level program might have on future plant component failures, but the increased number of outages needed to deal with them so far has dramatically increased the collective occupational exposure at the station. This was not anticipated in assumptions that went into the GEIS. Therefore, IEMA would like to see the steam dryers re-classified as a reactor component subject to an age-related degradation program under PLEX, and the licensee be required to commit to a proactive source term management program through the renewal term. (QC09-5)

Response: *The comments discuss the steam dryer cracking issue at Quad Cities and the higher occupational exposures received repairing the steam dryers. Steam dryer cracking is an issue of degradation of components that is addressed in the safety review of the license renewal application and is outside the scope of the environmental review. However, the higher occupational radiation exposures were reviewed against the evaluation in the GEIS. Based on that evaluation, the staff concluded that the higher occupational radiation exposures do not constitute new and significant information that challenges the GEIS conclusion that occupational radiation exposure is a Category 1 issue.*

The comments provide no additional information. There were no changes made in the supplement because of these comments.

Comment: Under Section 4.1 Environmental Impacts of Operation, Cooling System, page 4-6: The generic no-impact language referenced in this section about sediments states that sediment contamination is not a problem at most plants, and no new or significant information has been identified for the Quad Cities site. Accumulation of contaminants in sediments is a cumulative impact. The absence of an impact over the past years of operation does not demonstrate that accumulations will not reach a level of concern over an additional 20 years of operation. Furthermore, copper discharge was an issue at one power plant and was satisfactorily mitigated, according to the GEIS. We recommend the final SEIS for the Quad Cities site describe the potential for accumulation of contaminants in sediments in light of 20 additional operating years and consider whether mitigation may be advisable. (QC16-3)

Response: *The accumulation of both radioactive and nonradioactive contaminants from plant operation in receiving water sediments was evaluated in the GEIS on License Renewal. Section 2.2.7 of this SEIS briefly describes the radiological environmental monitoring program (REMP) conducted by the licensee at the Quad Cities site since 1968. The program requires*

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sampling and analysis for surface waters, the aquatic environment (fish, invertebrates and shoreline sediment), the atmospheric environment (airborne radioiodine, gross beta and gamma), the terrestrial environment (vegetation), milk, and direct radiation. The sediment sampling program includes eight locations downstream of the Quad Cities site. The sampling results are summarized in an "Annual Radiological Environmental Operating Report." The results from sampling found in this report for 2002 were below detectable levels. These results were found to be consistent with those from previous years. Therefore, the staff believes that radiological contamination of river sediments will not be a problem during the renewal period.

The Commission found in the GEIS that the accumulation of nonradioactive heavy metal contaminants in receiving water sediments has been a problem at a few nuclear power plants in the past, but the problem has been satisfactorily mitigated by replacing copper alloy condenser tubes with those of a more environmentally benign metal. Copper contamination of Mississippi River sediments is not an issue at Quad Cities because the facility's condenser tubes are, and have always been, stainless steel.

Prior to the periodic renewal of the facility's NPDES permit, the licensee samples Mississippi River sediments for heavy metals in the vicinity of the plant. The results of those studies are forwarded with the application for renewal of the NPDES permit to the permitting agency. The results of those studies have not revealed the accumulation of heavy metals in receiving water sediments attributable to plant operation. Furthermore, there is no reason to believe that future plant operations would result in the accumulation of nonradioactive heavy metal contaminants in river sediments.

The comment provides no additional information. There were no changes made in the supplement because of this comment.

A.2.7 Comments Concerning Socioeconomic Issues

Comment: And one of the problems we're having with Exelon is, and it's the major company, that's refusing to pay any property taxes in the Quad City area and that comes to about four million dollars a year. And they protested their taxes last year. They also did it again this year. And if we were to lose that that's \$8 million that comes out of the coffers out of the county and somebody has to make that up. (QC01-1)

Comment: If they don't pay that and we look at endangered species, you're going to see some very big children that are going to be endangered in that area school system. They pay about \$2 million in that school system. And I believe it's very important that they pay their fair share of taxes. And I'm just sure that the farmer's not going to be able to pay that kind of money for their children. (QC01-2)

Comment: Furthermore, it is unacceptable to expect ratepayers and Illinois residents, through their taxes, to continue to support a decrepit power plant that does not benefit its investors due to the many inevitable repairs which accompany the extension of an operating license.

As it stands, Exelon has submitted an appeal for a reduction of the stations taxable value, which would have a devastating effect upon the local taxing districts, and deprive the county of over \$400,000. The college will lose over a quarter million, resulting in substantial layoffs and the corresponding reduction of social services. The school district will lose more than \$2 million – nearly 29 percent of its entire budgeted revenues. (QC13-10)

Response: *Public services, such as education, public safety, and social services that are supported by tax revenues from nuclear power plants, were evaluated in the GEIS and determined to be Category 1 issues. Declines in tax revenues associated with changes in the assessed value of the Quad Cities Nuclear Power Station are not linked to license renewal and may occur at any time during the life of the facility. Therefore, changes in the assessed value of Quad Cities Units 1 and 2 are outside the scope of the SEIS. However, staff notes that even though tax revenues may be reduced during the license renewal period when compared to historic levels, some level of tax revenue would still be generated by the Quad Cities plant. This is considered a beneficial impact of license renewal. The comments provide no additional information. There were no changes made in the supplement because of these comments.*

A.2.8 Comments Concerning Category 1 Uranium Fuel Cycle and Waste Management

Comment: The waste aspect alone caused by nuclear plants is enough reason for me to object vehemently to them. (QC05-2)

Comment: Because there is no known way to dispose of radioactive waste – the byproduct of nuclear facilities, and the Yucca Mountain Repository is not a suitable choice due to flawed science and the potential exposure of millions of people who live, work and play within mere miles of the proposed transport route, it would be prudent to reduce the amount of waste BEING GENERATED until a viable solution is discovered. (QC13-8)

Comment: Although the license applicant's environmental report (ER) to the NRC need not discuss aspects of storage of spent fuel, as noted on page 1-5, citing 10 CFR 51.23 (b), we suggest the NRC's final supplemental environmental impact statement (SEIS) discuss impacts from dry storage casks, because it would be a change in operation for the new license period. The draft SEIS states that Exelon plans to build an independent spent fuel storage installation for storing spent fuel in dry storage casks for use in 2005 (section 2.1.4, page 2-9). The change in storage option is not addressed elsewhere in the document. We suggest the NRC's final SEIS address spent fuel storage in dry storage casks, at least as far as it may be

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addressed in the License Renewal Generic EIS, and include discussion about potential environmental impacts. In particular, the final SEIS should describe any differences in environmental impacts associate with this change to storage. (QC16-1)

Comment: *Section 6.1, The Uranium Fuel Cycle, page 6-6. Under the bullet point for Off-site radiological impacts (spent fuel and high level waste disposal), no consideration appears to be given to the potential long term storage of the spent fuel and high level waste materials on site until such time as a permanent facility is finally licensed and begins to accept these materials for disposal. A reference to other sections or documents where this evaluation may have been included should be provided here; otherwise the issue needs to be considered and evaluated. (QC16-5)*

Response: *The Waste Confidence Rule, found in 10 CFR Part 51.23, states that “the Commission has made a generic determination that, if necessary, spent fuel generated in any reactor can be stored safely and without significant environmental impacts for at least 30 years beyond the licensed life for operation (which may include the term of a revised or renewed license) of that reactor at its spent fuel storage basin or at either onsite or offsite independent spent fuel storage installations. Further, the Commission believes there is reasonable assurance that at least one mined geologic repository will be available within the first quarter of the twenty-first century, and sufficient repository capacity will be available within 30 years beyond the licensed life for operation of any reactor to dispose of the commercial high-level waste and spent fuel originating in such reactor and generated up to that time.” Onsite spent fuel storage facilities, and the associated storage casks, are licensed by the NRC and must meet standards set forth in 10 CFR Part 72. The comments provide no additional information. There were no changes made in the supplement because of these comments.*

Comment: *Section 6.1, The Uranium Fuel Cycle, page 6-8. Under the bullet point for On-Site Spent Fuel. A more thorough evaluation for the volume of spent fuel expected to be generated during the addition licensed time needs to be provided along with more specific information as to site specific circumstances that may impair or improve the risk values for potential exposures to this spent fuel. (QC16-6)*

Response: *The impact associated with the volume of spent fuel expected to be generated during the license renewal period was evaluated in the GEIS and determined to be a Category 1 issue. The comment provides no additional information. There were no changes made in the supplement because of this comment.*

Comment: *Section 6.1, The Uranium Fuel Cycle, page 6-8. The draft SEIS should be clearer about environmental impacts of transporting spent fuel to a repository site. We realize it may be premature to assess this fully on a power plant-specific basis; however, transportation to the nuclear waste repository appears to be reasonably foreseeable. The SEIS refers to the License*

Renewal GEIS (where transportation was discussed in a supplement: NUREG-14137, Vol 1, Addendum 1, 1999). The GEIS supplement, in turn, refers to the Draft Environmental Impact Statement (DEIS) for the Yucca Mountain Repository, which had not been finished at the time. These generic documents appear to assess impacts only within the State of Nevada. We recommend the final SEIS include more specific information about transport from this site, or else include a reference to route-specific information, as they may be covered in the Yucca Mountain Repository DEIS. In addition, we suggest the final SEIS be clear about whether transportation includes the process of removing spent fuel from casks and pools and loading it into vehicles. We suggest these processes be part of the transportation section, if not handled elsewhere, and we suggest the final SEIS discuss their impacts. (QC16-7)

Response: *The radiological and nonradiological environmental impacts from the transportation of fuel and waste attributable to license renewal of a power reactor were evaluated in Section 6.3 of the GEIS and the Addendum and are considered Category 1 issues. The Addendum to the GEIS specifically addressed whether the environmental impacts of the transportation of spent nuclear fuel are consistent with the values of 10 CFR Part 51.52, Table S-4, "Environmental Impact of Transportation of Fuel and Waste to and from One Light-Water-Cooled Nuclear Power Reactor," as applicable to license renewal, given that it is likely that spent fuel will be shipped to a single destination, such as the proposed repository at Yucca Mountain in Nye County, Nevada. The values in Table S-4 were found to be bounding when accounting for spent fuel shipments to a single destination. A discussion of route-specific information is not provided for two reasons: first, the Yucca Mountain facility is not licensed or completed; and, second, there are physical security issues related to the transport of the spent fuel that preclude a detailed discussion of routes. The NRC staff licenses the dry cask system to allow for the safe transport of the casks, regardless of the route selected. The comment provides no additional information. There were no changes made in the supplement because of this comment.*

A.2.9 Comments Concerning Category 1 Postulated Accident Issues

Comment: The Quad Cities units are members of an aging fleet of Boiling Water Reactors (BWR), engineered long before terrorism was even a consideration. In addition to the physical and chemical processes, which accelerate aging degradation of the systems, structures and components – such as corrosion, embrittlement, fabrication defects, vibration, water hammer and wear – there is also the concern of structural vulnerability. None of the 103 nuclear power plants operating in the United States were designed to withstand suicide attacks from the air, such as we tragically experienced on September 11, 2001. (QC13-12)

Comment: Currently, nuclear waste, or spent fuel, is kept in high-density pools six to ten stories up in the reactor's secondary containment building. The pools share a common wall with an exterior wall of the building, and do not appear to have any structural reinforcement to

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prevent the likelihood of penetration by deliberate attack. Attack on a reactor could lead to rapid onset core melt with an open containment, accompanied by a raging fire. Due to high radiation fields across the site access to the site by personnel would be precluded. (QC13-13)

Comment: Lastly, the continued operation of any General Electric Mark 1 boiling water reactor relies upon a nuclear waste storage and cooling pond that is elevated six to ten stories up in the reactor's secondary containment building and does not appear to have any significant structure to reduce the likelihood of penetration by deliberate attack. (QC02-4)

Comment: The identified structural vulnerability of Mark 1 radiated fuel storage and cooling pond constitutes an unreviewed safety issue. (QC02-5)

Comment: Defense of nuclear facilities should be seen as a key component to Homeland Security. As such, spent fuel pools should be reequipped with low density racks and all other spent fuel should be hardened and dispersed throughout the site to make it a less attractive target. (QC02-6)

Comment: We are fighting terrorists without, but living with the potential for terror within. (QC04-2)

Comment: In addition, we now face the added threat of terrorists using a nuclear plant for their evil purposes! (QC05-3)

Comment: Also, this plant and most others were designed and built long before 9/11; and therefore they have inherent risks to terrorist attacks, which we never planned for. (QC05-8)

Comment: PS- The following text is a copy of my summation from the afternoon session at the Mark in December, which I had told members of the NRC I would get to them. I was told that these were more "security issues," yet the security of the plant and its aging components has direct bearing on the surrounding environment, and its neighbors downstream. Please encourage your counterparts to take these issues seriously in that they affect us in the Quad Cities, and the Mississippi River watershed immediately. Thanks. (QC12-5)

Comment: Since containment buildings were not designed to withstand attacks by aircraft, there is an inherent possibility that a terrorist attack on a spent fuel pool could contaminate the surrounding environment and do irreversible harm to the Mississippi River watershed. (QC13-7)

Response: *In a recent decision in another license renewal proceeding, the Commission discussed the terrorism and sabotage issues raised in the comments. See Duke Energy Corp. (McGuire Nuclear Station, Units 1 & 2, and Catawba Nuclear Station, Units 1 & 2), CLI-02-26,*

56 NRC 358,365, slip op. At 6-7 (Dec. 18, 2002). In that decision, the Commission found that NEPA imposes no legal duty on the NRC to consider intentional malevolent acts on a case-by-case basis in conjunction with commercial power reactor license renewal applications. The Commission concluded that the “environmental” effect caused by third-party miscreants is simply too far removed from the natural or expected consequences of agency action to require a study under NEPA.

The Commission has also indicated that terrorism differs from matters ordinarily considered in an environmental impact statement (EIS). An EIS may discuss, for example, such matters as likely effects on local water, air quality, vegetation, wildlife, culture, and socioeconomic concerns. These effects are reasonably certain; an EIS can quantify them to a fair degree of precision. Terrorism, by contrast, comes in innumerable forms and at unexpected times and places. It is decidedly not predictable, and it is not a natural or inevitable byproduct of renewing the license. For these reasons, the Commission has stated that an EIS is not an appropriate format in which to address the challenges of terrorism.

Nevertheless, the Commission did indicate that its decision not to use NEPA as a vehicle for a terrorism review does not mean that it is ignoring the issue. Rather the Commission continues to closely examine the current security and protective framework and orders interim improvements at licensed nuclear facilities, including reactors, if needed.

The comments provide no additional information. There were no changes made in the supplement because of these comments.

Comment: Section 5.2.2, *Estimate of Risk*: Page 5-5 states “The baseline core damage frequency (CDF) for Quad Cities is approximately 2.2×10^{-6} per year, base on internally-initiated events. Exelon did not include the contribution to CDF from external events in these estimates even though the risk from external events is significantly higher for Quad Cities than risk from internal events.”

We recommend evaluating and presenting risk estimates from both internal and external events. In addition, given the draft SEIS statements referenced above, effects of external events should be included in the risk decision considerations, as necessary, to get an accurate portrayal of the risk of the licensing renewal. If the final SEIS does not incorporate external events into risk calculations or risk decisions, it should provide a rationale for using internally-initiated events only. (QC16-4)

Response: Although Exelon did not include the contribution to Core Damage Frequency from external events, the NRC staff evaluated these risks and factored the contribution from external events into the decision regarding severe accident mitigation alternatives (SAMAs). A detailed discussion of the risks from fire, seismic, and other external events is provided in Section G.2.2 of the SEIS. As described in Section 5.2.5 and G.6.2, the NRC staff increased the risk

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reduction estimates for candidate SAMAs by a factor of 10 to specifically account for their additional benefits in external events. The contribution to risk from external events dominates the total risk reduction estimates for each SAMA, and was an important factor in the cost-benefit evaluation for each SAMA. The impact of external events on the risk reduction estimates, and the dispositioning of each candidate SAMA is described in Sections G.6.2 and G.7 of the SEIS. The comment provides no additional information. There were no changes made in the supplement because of this comment.

Comment: Both Exelon and NRC agree that significant conservatism exist in the current fire PRA. These conservatisms overstate the actual risk from fire at Quad Cities (QC DEIS, page G-24). The NRC staff reviewers, however, disagreed with a risk multiplier of 5 used by Exelon to account for uncertainties in external events analysis, mostly for fire. The NRC suggested a value of 10. It should be pointed out that the existing 1999 fire PRA study was performed not to provide detailed estimates for fire risk to be used in routine plant analysis, but was limited to the IPEEE purpose of discovery major fire vulnerabilities. Furthermore, the NRC has provided no basis for the determination of their suggest value of 10. If additional consideration by Exelon were performed, it would included a more realistic review of fire impacts. This more realistic review is expected to verify that the factor of 5 used by Exelon is accurate. (QC08-30)

Response: *The contribution to risk from fire events is discussed in detail in Section G.6.2. As noted therein, the staff believes that the information provided by Exelon was not sufficient to support a risk multiplier of five; and for reasons presented in the discussion, the staff used a multiplier of 10 in its assessment. The staff acknowledged that a more realistic assessment could result in a lower fire CDF. However, the factor of 10 multiplier was considered appropriate given the large risk contribution from external events relative to internal events, and the lack of information from the licensee on which to base a more precise risk reduction estimate for external events. The comment provides no additional information. There were no changes made in the supplement because of this comment.*

Comment: For SAMAs #1 and #2 regarding cooling for the Safe Shutdown Makeup Pump (SSMP) room and alternate drywell spray, the NRC has already concluded only marginal risk-cost benefit exists (QC DEIS, page G-25). (QC08-31)

Response: *As noted in Section G.6.2, these SAMAs have a negative net value, however, they could be cost-beneficial given a more detailed assessment of their benefits in external events, or when uncertainties are taken into account. Given their potential risk reduction and relatively modest implementation cost, the staff concluded that further evaluation of these SAMAs by Exelon is warranted. The comment provides no additional information. There were no changes made in the supplement because of this comment.*

Comment: For SAMAs #6 & #8, local electrical breaker operation would require human actions to close breakers onto energized, high voltage buses. Such actions create an industrial safety concern for the personnel performing such actions. Testing the capability to perform such actions would imposed actual hazards on personnel during the testing, while the likelihood of ever having to perform the actions during an accident are quite remote (loss of all 125 V DC power is calculated to occur roughly once per 1 million years as documented in the Quad Cities 2002 PRA). (QC08-32)

Response: *The staff agrees that routine testing of the capability to perform local breaker operation on an energized bus is not warranted due to the potential personnel hazard, and that the associated human actions can instead be simulated. The staff believes that given appropriate procedures and training and the skill-of-the-craft, the risk associated with these actions would be comparable to that for other industrial high-voltage work. Considering the cost-beneficial nature of this improvement, it is the staff's position that written guidance detailing the actions and the precautions associated with local breaker closure onto an energized bus is far more effective and safe if developed and trained in advance. The staff's conclusion is unchanged and further evaluation of these SAMAs by Exelon is warranted. The comment provides no additional information. There were no changes made in the supplement because of this comment.*

Comment: For SAMAs #10 and #14, the changes suggested in the QC DEIS would require deviations for NRC-approved emergency procedure guidelines. Each would be impacted by the change suggested by the Staff as well as causing a significant deviation from the approved Boiling Water Owners Group (BWROG) strategy. (QC08-33)

Response: *Although the procedure enhancements associated with these SAMAs may constitute deviations from the generic Emergency Procedure and Severe Accident Guidelines, such deviations may be preferable to strict adherence to the generic guidelines and could be justified on the basis of the overall reduction in risk. The fact that a procedure enhancement may represent a deviation from the generic guidance is not a sufficient basis for dismissing the enhancement from further consideration. The staff's conclusion is unchanged and that further evaluation of these SAMAs by Exelon is warranted. The comment provides no additional information. There were no changes made in the supplement because of this comment.*

A.2.10 Comments Concerning Threatened and Endangered Species Issues

Comment: The Generic EIS and Draft Supplement 16 adequately address the concerns of the Department regarding fish and wildlife resources, as well as species protected by the Endangered Species Act. We concur with the preliminary conclusions of the U.S. Nuclear Regulatory Commission staff with respect to the impacts of continued operations on these

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resources and species. We have no comment on the adequacy of other resource discussions presented in the document. (QC07-1)

Response: *The comment is noted. The commenter concurs with the staff's determination that the proposed action will not adversely impact threatened or endangered species. The comment provides no additional information. There were no changes made in the supplement because of this comment.*

A.2.11 Comments Concerning Decommissioning Issues

Comment: About 15 years ago I asked a speaker for the plant what the plan was for when it was closed down. He said he didn't know, was not an engineer, but supposed that it could be cemented over. I didn't find this particularly reassuring because of the condition of many of our roads.

Is there a new technology for permanently sealing it off? (QC04-3)

Response: *The NRC regulations require the decommissioning of all nuclear power facilities. The environmental effects associated with the activities required to decommission a nuclear power plant were evaluated in the GEIS and found to be Category 1 issues. Additionally, the NRC staff published in 2002 the GEIS on Decommissioning of Nuclear Facilities, Supplement 1 Regarding the Decommissioning of Nuclear Power Reactors (NUREG-0586). The supplement evaluates the impact of various decommissioning alternatives for power reactors, including the entombment alternative. Entombment is a decommissioning option in which radioactive contaminants are encased in a structurally long-lived material, such as concrete. The entombed structure is appropriately maintained, and surveillance is continued until the radioactivity decays to a level permitting unrestricted release of the property. Although entombment is considered in the supplement, all commercial nuclear plants that have begun or completed decommissioning have opted to either immediately begin dismantlement or place the plant in long-term storage with eventual dismantlement and decontamination planned. No licensee has proposed entombment as a decommissioning option to date. The comment provides no additional information. There were no changes made in the supplement because of this comment.*

Comment: *Section 7.1, Decommissioning, page 7-2, 7-3: Under bullet point Radiation Doses. As the GEIS is based on a forty-year licensing period, an extension of another twenty years would have an site-specific impact with respect to radiation doses that needs to be quantified and reported. This information should be included specifically in the final SEIS as part of the risk that would be associated with the license extension. (QC16-8)*

Response: *The radiation dose reported on pages 7-2 and 7-3 of the draft SEIS is the additional dose that would be incurred by the public and the workers during the decommissioning of the facility as a result of operating the plant for an additional 20 years. The NRC staff concluded in the GEIS that the incremental radiation exposures during decommissioning due to license renewal was small and could be treated generically. Therefore, no site specific analysis is needed. The comment provides no additional information. There were no changes made in the supplement because of this comment.*

A.2.12 Comments Concerning Alternatives to License Renewal

General

Comment: Renewable energy is where all of our resources and development should be placed. (QC05-4)

Comment: Please find other more suitable fuel alternatives. (QC06-2)

Comment: Second, the NRC has not complied with its legal duty to objectively evaluate energy efficiency, renewable energy resources, and other clean energy resources as viable alternatives to the renewal of the Quad Cities operating license. (QC10-2)

Comment: The Draft Supplement does not adequately address the opportunities for meeting baseload power needs through efficient on-site natural gas-fired generation, such as Combined Heat and Power (“CHP”), district energy systems, and fuel cells. Such natural gas distributed generation emits substantially less air pollution than coal-fired power plants, and does not pose the high-level waste and safety hazards inherent to nuclear power, and therefore could serve as a cleaner and safer baseload supplement to energy efficiency and renewable energy alternatives. *Repowering the Midwest* [p. 83] estimates that Illinois alone has the potential for 2,162 MW of efficient distributed gas-fired generation by 2010, and 5,000 MW by 2020. (QC10-20)

Comment: The Draft Supplement fails to “rigorously explore and objectively evaluate all reasonable alternatives” to renewing the Quad Cities license, as required by NEPA. 40 C.F.R. [sic] 1502.14(a). In particular, the Draft Supplement erroneously rejects energy efficiency and renewable energy resources as not feasible from an economic, technological, and/or environmental standpoint. The analysis of these alternatives in the Draft Supplement is unsupported or it relies on flawed and outdated information. As explained below, energy efficiency, renewable energy sources, and clean distributed generation, in combination with “clean coal” resources, present a lower-cost, safer, and environmentally preferable approach to meeting energy needs than renewing the license for the aging Quad Cities nuclear power plant. (QC10-4)

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Comment: Iowa and Illinois have a monumentous [sic] opportunity to set an example for the rest of the country and help our great nation claim its energy independence. Investing in renewable energy today could create thousands of new jobs and stimulate the local economy. Efficiency is a viable alternative that could actually eliminiate [sic] the need for over 127 power plants by 2010. And it does not take mass amounts of money, create toxic waste, or pollute the environment for thousands of years. (QC12-3)

Comment: Also of concern to me is the draft supplement's blatant misrepresentation of alternative technologies. The investigators obviously made little effort to seriously work out the details of alleged [sic] technologies which they illegedly [sic] deemed unfeasible, too costly or needing too much space. Solar and geothermal alternatives are generally incorporated into existing structures, and wind turbines can share the field with crops, with farmers harvesting up to within 1 foot of the turbine tower. As a board member of the Iowa Renewable Energy Association, I know whereof I speak. I believe you have heard the same from Bennett Brown as well. So please, before you discount the benefits of renewable alternatives AND efficiency, I implore you to undergo an independent study of viable alternatives for the Quad Cities. (QC12-4)

Comment: There are numerous alternatives to nuclear power which are renewable; do not pollute like coal or diesel, and do not produce thousands of tons of radioactive waste which we have no feasible means to dispose of. These clean, abundant technologies have a real potential to create new job markets, boost the economy and improve the environment. (QC13-9)

Comment: We urge you to deny Exelon's request for an extension of their operating license for Quad Cities Units 1 and 2, and give us the opportunity to develop alternative energy sources that are renewable, do not pollute like coal or diesel, and do not generate dangerous toxic waste which we have no feasible means to dispose of. (QC13-19)

Response: *The SEIS for the Quad Cities Nuclear Power Station presents the staff's analysis of the environmental impacts of the proposed action, i.e., renewal of the operating licenses for Quad Cities, and of reasonable alternatives. These impacts are presented in discrete resource areas so that environmental impacts can be compared between the proposed action and reasonable alternatives. The Supplemental EIS is not an evaluation of the best mix of energy generation sources for the Illinois area or a determination regarding which mix would result in the least overall environmental impacts. The decisions regarding which generation sources to deploy are made by the licensee and State energy planning agencies, not the NRC.*

The viabilities of the various alternatives to renewal of the operating licenses for Quad Cities are pertinent to the discussion of alternatives to the extent that an alternative is considered reasonable. However, staff recognizes that although some alternative energy sources, when

considered by themselves, may not be viable replacements for Quad Cities, these alternatives could be part of a combination of generation sources that could replace Quad Cities. The many possible combinations could include combined-cycle gas-fired plants, clean-coal plants, renewable energy sources such as wind and solar power, and energy conservation. A likely combination of alternatives that includes 300 MW(e) of energy conservation was chosen for discussion in Section 8.6 of the SEIS. Text has been modified.

Wind Power

Comment: And I find a section on considering wind energy as a replacement for the Quad Cities plants incomplete and in some cases misleading. (QC03-11)

Comment: What's misleading is to use Illinois numbers. This plant, after all, is on the border of Iowa and Illinois. Illinois has a pathetic wind resource. I don't mean that to any detriment of Illinois but it's not a windy state despite Chicago's moniker.

Iowa is a windy state. In fact, Iowa has enough Class 4 and better sites to replace the Quad Cities, both of the Quad Cities plants 20 times over. Furthermore, north of Iowa, in the Dakotas, we could easily power the entire Midwest on turbines. The only issue would be how do you get the power to the population centers? The areas that are easily developed in the Dakotas are not on transmission lines so part of the cost of developing those turbines would have to include transmission.

So the first point here that sufficient power is marginal I think is incorrect. There is more than enough wind power in the vicinity to replace the Quad Cities. (QC03-12)

Comment: And finally the fourth point that SEIS brings up is that wind, I forget the wording, that wind can only provide intermittent power. That the Quad Cities plants provide a base load power that simply cannot be replaced by wind. This statement is inconsistent with a variety of conclusions that utilities both within the United States and internationally have reached. (QC03-15)

Comment: The Draft Supplement erroneously rejects wind power, which is a viable alternative. First, the Draft Supplement improperly limits its analysis to wind resources in Illinois. As documented in *Repowering the Midwest*, six of the 10 states with the highest wind power potential in the U.S. are in the Midwest. With some improvements to the transmission grid, wind farms in neighboring states such as Iowa could be a viable source of energy for Illinois. Just as the Quad Cities nuclear power plant supplies 25% of its energy to Iowa, wind farms in Iowa can supply energy to Illinois. (QC10-10)

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Comment: As an overall comment, MidAmerica would note that it is not opposed to wind-generated power as evidenced by our past and present participation in wind generation projects. However, MidAmerica sees wind-powered generation as a complement to, and not a viable substitute for, base load nuclear generation already in existence. (QC11-1)

Response: *The discussion of the viability of wind power in Chapter 8 of this SEIS is presented to support the staff's conclusion that wind power alone is not a reasonable replacement for the baseload capacity provided by the Quad Cities plant. However, the staff acknowledges that wind resources are available and are being developed in other areas of the Midwest. As noted in comment QC11-1, current plans for development of wind farms clearly indicate that wind power can be an import complement to other generation sources. As such, staff agrees it is reasonable to include wind power in a combination of alternatives that could replace Quad Cities generation. Of the many possible combinations of alternatives, staff chose an alternative that includes 300 MW(e) of energy conservation for discussion in Section 8.6. Text has been modified to note reasonable combinations could include wind energy, and to briefly discuss impacts associated with construction and operation of a large-scale wind farm.*

Comment: But the primary comment in the SEIS statement was that it would represent a doubling of U.S. wind capacity if we were to replace the Quad Cities plants with wind. That's true but it's, again, it's a irrelevant statistic. (QC03-18)

Response: *The discussion of the viability of wind power in Chapter 8 of this SEIS is presented to support the staff's conclusion that wind power alone is not a reasonable replacement for the baseload capacity provided by the Quad Cities plant. As noted in the previous response, staff agrees that it is reasonable to include wind power in a combination of alternatives that could replace Quad Cities. Text has been modified.*

Comment: But wind turbines will take up land. A two megawatt turbine takes up about a quarter of an acre of land that you can farm right up to the turbine. If you were to replace the Quad

Cities plants, they would take about a square mile. It's not a significant consumption of land and it is an environmentally responsible consumption of land. It is a good neighbor to the farmers. In fact, farmers are clamoring to have wind turbines on their farms. I don't see a line of farmers here clamoring to have caskets on their farms. So, I think that the NRC needs to develop that section quite a bit more. (QC03-14)

Comment: Second, technological advancements are increasing the amount of power created by wind turbines. The largest commercially available wind turbine is 1.65MW (not 1.5MW as stated in the Draft Supplement), and will likely increase to 2.1MW in 2005, and may increase to

3MW to 5MW in the near future [Ari Reeves, *Wind Energy For Electric Power: A REPP Issue Brief* (Nov. 2003) at 22]. (QC10-11)

Comment: The Draft Supplement also overestimates the impact that an expansion of wind power would have. Nearly 95% of the land devoted to a wind power site remains available for other uses such as agriculture. (QC10-14)

Comment: The SEIS noted that a capacity of 4,200 megawatts would be necessary to replace the capacity of QCNPS. In fact, the necessary capacity would probably be even greater. MidAmerica's experience has shown that MAPP, the NERC reliability council with which MidAmerica's wind generation is accredited, actually credits wind capacity at approximately 17% of rated nameplate. This means that to replace the generating capacity of the QCNPS some 10,729 megawatts of wind generation would actually have to be installed. (QC11-2)

Comment: Mr. Brown also comments [see Transcript, pp. 124-125] on the NRC document noting the land use for a wind facility would be significant. Mr. Brown states that a two megawatt turbine required only a quarter of an acre of actual land use and that farmers are still able to utilize much of their land. This in fact is fairly consistent with what MidAmerica has seen with its wind project development. What Mr. Brown fails to account for is the necessary spacing for capture of the wind resource. Wind turbines must be sufficiently spaced apart to maximize capture of the available wind energy. If the turbines are too close together one turbine can impact the efficiency of another turbine. Based on MidAmerica's experience the appropriate spacing of wind turbines equates to approximately 72 acres per megawatt. This would mean the project footprint for 10,729 megawatts would entail over 772,000 acres. This is a more significant number than that cited by Mr. Brown. (QC11-8)

Response: *The SEIS describes the impacts of the proposed license renewal and of the alternatives to discrete environmental resources such as land use or aesthetics. These impacts are comparable between the proposed action and alternatives. The SEIS does not attempt to compare the overall impact of the proposed action to the overall impact of any reasonable alternative.*

Staff conclusions in Chapter 8 of this SEIS, regarding land use impacts are not dependent upon any threshold value of acres per turbine. It is noted in the GEIS that after installation, turbines occupy only 10 percent of the land committed to wind generation; and most of the remaining land would be available for agriculture or other compatible uses. Impacts are associated with construction and operation. Construction impacts are due to land disturbances, air emissions, and noise during road and transmission line construction and during turbine installation. Operational impacts result from minor waste generation, noise, erosion, and aesthetic impacts of turbines, access roads, and transmission lines. Staff agrees with commenters that operational impacts on land are smaller than those that would occur during construction.

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However, impacts of construction in sensitive areas and other continuing impacts during operation, such as the continuing aesthetic impact, could be large, depending on the location of the resource. These impacts do not depend critically on the exact number of acres required for the alternative. Text has been modified.

Comment: In addition, wind turbines have an availability factor of 98%, higher than most other power sources [American Wind Energy Association, *The Most Frequently Asked Questions About Wind Energy* (2002), p. 5]. (QC10-12)

Comment: Mr. Brown also notes, at page 77 of the transcript, that 4,200 megawatts of wind generation would be about 1,000 megawatts of consistent power production throughout the year. In fact, during MidAmerica's research for development of its Iowa Wind Power Project, the Company discovered historical wind resource records showing that for approximately 10% of the available operating time there would be insufficient wind to produce any wind generation at all. Moreover, these historical records show that for approximately 37% of available operating time the wind generating facilities would be generating at less than 25% of nameplate capacity. Therefore, for nearly 50% of the available operating time, a wind facility in Iowa would likely be operating at less than 25% of its rated capacity. (QC11-3)

Response: *The staff agrees with the commenter (QC10-12) that suggests wind power can have a high availability factor in strong wind resource areas. However, the staff also agrees with the other commenter (QC11-3) that suggests a wind facility would operate over half of the time at a small fraction of its rated capacity. Therefore, the fluctuating generation from a wind farm would be markedly different from the generation from the Quad Cities plant, and wind power alone could not be described as a replacement of Quad Cities baseload capacity. This is not to say that wind power is not an important generation source. Current plans by utilities for the construction of new wind farms clearly indicate that wind farms are attractive additions to the mix of generation capacity available to utilities. This is acknowledged in SEIS, Section 8.2.6, which states that many combinations of alternatives are possible to replace the generation from Quad Cities. The impacts associated with construction of a new wind farm would be similar to those presented in Table 8-8 of the SEIS for the assumed combination of alternatives at an alternate site. The primary impacts would be from the construction of road and transmission lines and the continuing aesthetic impact of wind turbines and transmission lines. Other impacts, such as waste and air quality, would be smaller for a wind farm. Text has been modified.*

Comment: Studies have been commissioned by the independent system operators that maintain the grid. And the conclusion is that the use of wind does not represent any change necessary to the grid of the United States as long as penetration is up to 25 percent. We could replace 25 percent of our electricity generation with wind and not have to change the grid at all.

If we were to go beyond 25 percent penetration, we would have to address the fact that wind gusts. (QC03-16)

Comment: So, in conclusion, wind energy, I believe, is a very viable replacement for the Quad Cities plants. In neighboring Iowa, it could be done very easily. In the Dakotas it would require some transmission. (QC03-17)

Comment: Mr. Brown also discusses the short- and medium-term fluctuations in wind generation, noting that a penetration of 25% is viable with no change to the transmission grid. MidAmerica plans to install 310 MW of wind generation in the next three years, in Iowa. As of May 2003, this 310 MW represents approximately 7% of MidAmerica's nameplate generation. Transmission system impact studies note nineteen separate upgrades necessary to accommodate this generation. There would likely need to be significant changes and related investments in the transmission grid to accommodate an additional 18% penetration. To say that no changes would be required in the transmission grid and that Iowa could very easily accommodate a 25% penetration of wind energy is clearly not correct. (QC11-9)

Response: *The commenters apparently are commenting on two different aspects of the transmission system, or grid. Comment QC03-16 seems to address the overall transmission system capacity and that sufficient capacity exists to accommodate an increase in system generation up to 25%. Comment QC11-9 notes that significant local upgrades are necessary to connect a planned wind farm to the grid. For the purpose of this SEIS, it is sufficient to assume that transmission facilities would be required to be modified to connect the wind farm to the grid. It is certainly unreasonable to assume the contrary, that developable wind resources are conveniently located along transmission systems that have both facilities and sufficient capacities to allow connection to the grid without improvements. The impacts associated with the construction of these transmission facilities at alternate sites, as discussed in Section 8.2.5.2 and Table 8-8, are consistent with this assumption. The comments provide no additional information. There were no changes made in the supplement because of these comments.*

Comment: Most new wind facilities would also be located near existing transmission lines. Therefore, the land impacts of new wind power would not be significant. (QC10-15)

Response: *This comment is presented without supporting information regarding the availability of transmission lines in areas with developable wind potential. The staff believes that significant upgrades and new transmission lines would be required to develop new wind power. The comment provides no additional information. There were no changes made in the supplement because of this comment.*

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Comment: In addition, wind generation uses no coolant water, has no emissions and does not degrade land. (QC10-16)

Response: *Staff agrees that in general, impacts of waste products from wind farms is SMALL. Minor erosion may occur due to use of access roads for turbines and transmission lines. No text was modified.*

Comment: There are very few avian collisions with modern wind turbines [National Wind Coordinating Committee, Avian/Wind Turbine Interaction: A Short Summary of Research Results and Remaining Questions (Dec. 2002)]. (QC10-17)

Response: *Impacts associated with bird collisions with wind turbines are discussed in NUREG-1437, which describes bird collisions as "likely," but the anticipated number was not quantified. Text has been modified to indicate there is a potential for bird collisions with turbines.*

Solar Power

Comment: Most solar power units are located on rooftops of buildings, meaning that solar power would not cause land disturbance. (QC10-18)

Comment: In addition, it is important to note that solar PV [photovoltaic] technology has advanced to the point where PVs are a good source of power, especially in remote areas and to help meet peak power demand. The average solar PV cell has a conversion rate of 12% to 17%, not the 10% assumed in the Draft Supplement. (QC10-19)

Response: *The range of conversion efficiencies in comment QC10-19 is presented without supporting information. Section 8.2.5.3 of the SEIS states that currently available photovoltaic cell conversion efficiencies range from approximately 7 to 17 percent, which generally agrees with the comment. A 10 percent efficiency was assumed as a reasonable efficiency for estimating land use requirements. However, assuming 15 percent efficiency, approximately 80 million m², or 80 km² (31 mi²) of photovoltaic cells, would be required to replace the generation capacity of Quad Cities. As a distributed generation source, solar panels could be placed on residential rooftops. Assuming an average home size of 139 m² (1500 ft²) with half of the roof space available for solar panels, each home could support about 70 m² of solar panels. As such, over 1 million homes would have to be retrofitted with solar panels to replace Quad Cities generation even with efficiency rates as high as 15 percent. However, staff agrees with the commenters that distributed solar power is an attractive addition to generation sources considered by energy planners. As noted in Section 8.2.5 of the SEIS, staff concluded that although solar power alone was not sufficient to replace the generation from Quad Cities, solar could be used in combination with other reasonable alternatives. The impacts associated with*

construction of new distributed solar panel arrays would generally be smaller than those presented in Table 8-8 for an alternate site. The comments provide no additional information. There were no changes made in the supplement because of these comments.

Nuclear Power

Comment: And as you consider alternatives to this aged plant, I think it's relevant to mention that there is an alternative site already being assessed and considered by the NRC. (QC03-10)

Response: *As noted in Section 8.2.3 of the SEIS, the NRC is currently reviewing applications for Early Site Permits for new reactors. An Early Site Permit under 10 CFR Part 52, Subpart A, is used to set aside a site(s) for one or more nuclear power facilities. Text has been modified.*

Comment: *Nuclear Power Generation Alternative, Section 8.2.3.1, Closed-Cycle Cooling System, page 8-44: Both waste impacts and human health impacts need to be specified rather than referenced to provide a clearer understanding of the risk determination made in this section of the document. (QC16-10)*

Response: *The comment is noted. The SEIS relies to a great degree on impact analyses presented in NUREG-1437. As a supplement, this SEIS does not need to repeat all analysis and conclusions of the GEIS. Appropriate sections of the GEIS are referenced, when necessary. A reiteration of the analysis of the waste and human health impacts related to closed-cycle cooling are presented in 10 CFR Part 51, Appendix B, Table B. This table can be found at <<http://www.nrc.gov/reading-rm/doc-collections/cfr/part051/part051-appb.html>>. The comment provides no additional information. There were no changes made in the supplement because of this comment.*

Coal

Coal Fired Generation Alternative, Section 8.2.1.1, Closed-Cycle Cooling System, page 8-21, Under the Human Health bullet point: Any dose estimate that would have the potential to fall within the risk range of 10^{-6} to 10^{-4} or greater needs to be specifically evaluated for potential regulatory requirements of risk impacts to the public health. This should be estimated conservatively using the data that is currently available or that can be logically extrapolated from currently available information. (QC16-9)

Response: *The SEIS for the Quad Cities Nuclear Power Station presents the staff's analysis of the environmental impacts of the proposed action, i.e., renewal of the operating license for Quad Cities; and of reasonable alternatives. It is not the staff's intention to precisely define the impacts of each alternative but rather to develop enough information to be able to compare on a relative basis, the impact categories for each alternative. As stated in Section 8.2.1.1 of this*

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SEIS, the staff has determined that the radiological impacts associated with the operation of a coal facility would be greater than those from a comparably sized nuclear plant. No risk assessment for the coal facility is required to fulfill the staff's requirements under NEPA to evaluate alternatives. The comment provides no additional information. There were no changes made in the supplement because of this comment.

Conservation

Comment: How about rationing energy use instead? We are a very wasteful society. Somehow its ok to kill and have our young people killed in order to keep energy available. I don't find this acceptable. (QC04-5)

Comment: The Draft Supplement cites a 1992 study suggesting that energy efficiency improvements cost 4 cents for every kilowatt-hour saved. The Draft Supplement then rejects this cost estimate arguing that: (1) if energy efficiency were really that cost-effective it would have already occurred, and (2) replacing the energy produced by Quad Cities would require such a large-scale energy efficiency effort that the cost of energy efficiency would increase well beyond 4 cents. The Draft Supplement, however, provides no support for these contentions and does not even attempt to estimate the cost of using energy efficiency to replace the power produced by Quad Cities. (QC10-5)

Comment: In contrast to the unsupported analysis provided in the Draft Supplement, recent studies demonstrate that energy efficiency is an even more viable and cost effective alternative. For example, the 2001 *Repowering the Midwest* study [Environmental Law and Policy Center, et al., *Repowering the Midwest: The Clean Energy Development Plan for the Heartland* (2001)], which is one of the most comprehensive clean energy development analyses conducted on the Midwest's energy sector, demonstrated that energy efficiency efforts can significantly reduce the demand for power at a cost of 2.5 cents per kilowatt hour or less – lower than the cost of generation, transmission, and distribution of electricity from power plants. (QC10-6)

Comment: Additionally, the economic benefits of greater efficiency should not be ignored. A follow-up analysis of the economic impact of the recommendations in *Repowering the Midwest* concluded that with investments in energy efficiency, 43,000 new jobs would be created and \$4.7 billion in additional economic output would be created by 2020 [Environmental Law and Policy Center, et al., *Job Jolt: The Economic Impacts of Repowering the Midwest* (2002)]. Clearly, energy efficiency is a technologically and economically feasible alternative to the renewal of the Quad Cities operating license. (QC10-7)

Comment: Perhaps realizing that energy efficiency alternatives cannot be rejected on their merits, the Draft Supplement also asserts that energy efficiency is not viable because utility

deregulation has removed the incentive for Exelon to invest in energy efficiency. Energy efficiency, however, is a cheaper (and less environmentally destructive) alternative to new power generation. (QC10-8)

Comment: Energy efficiency is the quickest, cheapest, easiest way to achieve energy independence. Adopting the household appliance efficiency standards agreed to by both the Clinton and Bush (senior) administrations would eliminate the need for 127 power plants by 2020. (QC13-5)

Response: *The comments are noted. The SEIS presents the staff's analysis of the environmental impacts associated with the proposed license renewal and with reasonable alternatives. Staff agrees with the commenter's statement that increases in efficiency are technically possible and could result in energy savings that could replace Quad Cities generation. As noted in the GEIS, the environmental impacts of electrical energy conservation programs are not well understood. The U.S. Environmental Protection Agency warns that indoor air quality can be impaired if energy considerations override human health considerations. Replacing older equipment with newer, energy efficient equipment involves a large manufacturing effort and creates waste equipment and byproducts of the manufacturing process. However, as discussed in Section 8.2.5.11 of the SEIS, Exelon would not pursue large-scale conservation programs unless these were mandated or an incentive were provided by a government agency because of their high relative cost. Therefore, staff disagrees with the commenter's statement that a large-scale increase in energy efficiency alone is an economically feasible alternative to license renewal. This is not to say that energy efficiency is not an important component in energy planning. Accordingly, the staff assumed that a reasonable combination of alternatives would include 300 MW(e) of energy conservation (see Section 8.2.6). The text has been modified.*

A.2.13 Comments Concerning Out-of-Scope Issues: Operational Safety, Aging Management, Cost of Power, and Need for Power

Operational Safety

Comment: And I don't feel as a physicist that it's appropriate to renew the license for a plant that bypasses such a fundamental component of its containment and safety systems. (QC03-1)

Comment: I think it's unnecessary to continue operating a reactor beyond the year 2012 given that it has a fundamental design flaw. So that's the first of my objections to this particular reactor. And I would like to see the torus vent system addressed in the SEIS. (QC03-3)

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Comment: This particular plant, the core shroud on one of the reactor cores exhibited severe cracking. The NRC classifies the cracking in this study as none, slight, moderate and severe. And at the Quad Cities plant the core shroud cracking was severe, in some cases with fissures up to a half of an inch in the core shroud wall, and they hadn't yet penetrated through the wall but if they did, that would be a disastrous event. (QC03-5)

Comment: The components that concern me the most are the plates which keep the rods, both the control rods and fuel assembly rods in place so that if sudden insertion of a control rod is necessary, as it is every time a plant scrams, if those plates are worked or have creeped [sic] or have buckled, all of these are consequences of radiation exposure of metals, then it's completely plausible that the control rods will be unable to insert as expected during a scram. If a plant fails to scram, the reaction continues and the heat has to go somewhere. That would be the torus, which brings me back to the design flaw of this particular plant. (QC03-6)

Comment: So, to summarize, I think there are two problems with the Quad Cities plants. Number one, they utilize an old flawed design that should be retired. (QC03-7)

Comment: I understand it was not constructed properly for chimney emissions and that correcting this problem would be terribly expensive. (QC04-4)

Comment: This plant has NOT operated without problems or violations, therefore why would you seek to continue operations of Quad Cities Units 1 and 2, beyond their useful life span of 25 years. (QC05-6)

Comment: The Quad Cities need to have the generator at Cordova repaired, better yet, replaced. It is no longer safe to use. (QC06-1)

Comment: This plant in particular has a rich history of poor routine maintenance; testing violations, equipment failure, security weakness, inoperable safety systems, and human performance errors. In light of these events, it is neither safe nor cost effective for the community, to continue to operate these reactors beyond their original lifespan. (QC13-1)

Comment: The concern is that separation of the neutron-absorbing material used in high density fuel storage racks might compromise safety. (QC13-2)

Comment: The flaw in the torus design, and the dangerous solution intended to get the plants through their 40-year license, call into question whether the licenses for flawed nuclear plants should be renewed. (QC13-3)

Comment: We believe that these incidents constitute concerns that relate directly to the health, safety and general well being of the surrounding population. These events characterize

a blatant disregard for the NRC's own policies, and the people and environment which they are intended to protect; and present unwarranted risks to public health, safety and general well being. (QC13-4)

Comment: Even with the highest NRC rating or upgrades, nuclear plants are not invincible. They can approach near-meltdown conditions through mechanical failure alone, without any security breach from outside. The Project on Government Oversight found that nuclear plants in general still remain ill equipped, under-staffed, and under-trained. Public assurances by the NRC do little to dispel this impression. (QC13-14)

Response: *The comments are noted. The NRC's environmental review is confined to environmental matters relevant to the extended period of operation requested by the applicant. Operational safety is outside the scope of this review. An NRC safety review for the license renewal is conducted separately. Although a topic may not be within the scope of review for license renewal, the NRC is always concerned with protecting health and safety. Any matter potentially affecting safety can be addressed under processes currently available for existing operating licenses absent a license renewal application. The comments do not pertain to the scope of license renewal as set forth in 10 CFR Parts 51 and 54. The comments provide no additional information. There were no changes made in the supplement because of these comments.*

Aging Management

Comment: Regarding plant performance, failure to comply with the NRC procedures and complete basic routine maintenance on schedule has incurred preliminary wear and irreversible damage to vital reactor components increasing the possibility of a mechanical failure and the likelihood of a major accident. (QC02-1)

Comment: The NRC has confirmed that age-related degradation of boiling water reactors will damage or destroy vital internal components well before the standard 40-year license expires. Yet the readiness of the industry to meet the projected maintenance and repair challenges is unclear. (QC02-2)

Comment: Reactor aging will require a major continuous effort by the industry officials to anticipate emergent age related problems and resolve them before they become a crisis. By dealing with the whole problem of age related degradation now, Federal and State regulators can insure the safety and engineering implications of multiple failures in boiling water reactors. (QC02-3)

Comment: In conclusion, I would just like to point out that the useful life time of a nuclear power plant is 25 years in actual practice. (QC02-7)

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Comment: It is becoming abundantly clear that aging of reactor components poses serious economic and safety risk at boiling water reactors. The General Electric Mark 1, in particular, has significant inherent design flaws and lost containment integrity during nuclear accident. (QC02-8)

Comment: Now, the plant is designed to be able to withstand a scram. But it still ages the plant and there are a number of scrams that have occurred at this plant over the years. (QC03-2)

Comment: And this plant is aged. It's part of a fleet of boiling water reactors that have shown unexpected stresses due to radiation. (QC03-4)

Comment: And number two, they are subject to aging. That aging will be 40 years by the time of this license expiration. And the NRC study fairly clearly showed that reactors that were greater than 20 years old exhibited an unexpected spike in their aging characteristics. (QC03-8)

Comment: So I think to operate this for 40 years is iffy and I think to extend the license for 20 years is unnecessary. (QC03-9)

Comment: All of this aside even, I must stress that any extension of this plant's operations beyond it's original intended use is utterly unthinkable. Surely, this would be asking for disaster! (QC05-5)

Comment: There is always an unknown factor of wear and tear on these reactors; this can not be seen or accurately measured, but will over time increasingly put all life around them at higher risk. (QC05-7)

Comment: We consider plant life extension to be a practical program in the nation's energy policy, and believe radiation and reactor safety can be maintained over a renewal term if adequate measures are taken to manage age related degradation. (QC09-6)

Comment: Failure to comply with NRC procedures and complete basic routine maintenance on schedule has incurred preliminary wear and irreversible damage to vital reactor components, increasing the possibility of mechanical failure and the likelihood of a major accident. (QC13-6)

Comment: The useful lifetime of a nuclear power plant is approximately 25 years, in actual practice. Materials have a fixed number of cycles of strain they can bear before they begin to crack and fail. Due to radiation induced within their originally non-radioactive components, reactors and other major nuclear facilities may become dangerous to operate – or even approach – long BEFORE they show signs of physical deterioration. (QC13-11)

Comment: The initial licensing period wasn't based upon safety specifications. As the plant ages, the chances of accidents grow bigger. (QC14-2)

Response: *The comments are noted. The NRC's environmental review is confined to environmental matters relevant to the extended period of operation requested by the applicant. Safety matters related to aging are outside the scope of this environmental review. The comments do not pertain to the scope of license renewal as set forth in 10 CFR Parts 51 and 54. The comments provide no additional information. There were no changes made in the supplement because of these comments.*

Cost of Power

Comment: So, I think to say that it is enormously expensive to develop is only correct in a silly expense. It is expensive. Power's expensive. It takes a lot of money to build a new nuclear power plant. It takes a lot of money to operate a nuclear power plant and it takes a lot of money to develop wind. But to compare it to other fuel sources I think is simply false. It's not economically expensive to develop in comparison with other fuels. It is economically viable. (QC03-13)

Comment: Third, the cost of wind power has fallen dramatically since the 1980s, with an average generation cost of three to six cents per kilowatt-hour [*Repowering the Midwest*, at p. 26], so that it is now competitive with most other energy sources. In addition, because wind is free fuel, wind power generation bears no risk of fluctuating fuel prices. These technological advancements and economic advantages have led to a substantial increase in the amount of wind power installed – from 2001 through 2003 a total of 3,795 megawatts of wind energy was installed nationwide, raising the total wind energy in the U.S. to 6,374 megawatts [American Wind Energy Association, *Wind Power Outlook 2003* (2003); American Wind Energy Association, *Wind Energy Fast Facts* (Jan. 2004)]. Within Illinois, the first utility-scale wind project has recently begun operations and approximately 1,700 MW of additional wind projects are in various stages of development. Across the border in Iowa, there are 420 MW of wind generation installed with an additional 345 MW in development. In light of these facts, the NRC's concerns regarding the need for substantial growth in the wind industry in order for wind to be a viable alternative are misplaced, especially given that the current operating license for Quad Cities does not expire until 2012. (QC10-13)

Comment: MidAmerica's knowledge of the wind industry would suggest that approximately 5.0 cents/kWh is the more commonly accepted production cost figure for wind generation. That cost can be reduced through use of government subsidies (e.g., the federal Production Tax Credit and CO₂ credits), however, it is important to note that the federal Production Tax Credit expired on December 31, 2003, and has not yet been renewed by Congress. The federal Production Tax Credit is currently valued at 1.8 cent/kWh and the value of CO₂ credits is

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currently estimated at 0.4 cents/kWh, though there is still not a mature market for trading CO₂ credits. (QC11-4)

Comment: In contrast, MidAmerica's existing coal units generate at an average cost of 2.1 cents/kWh, existing nuclear units generate at a cost of 2.7 cents/kWh, and combined cycle units generate at approximately 6.0 cents/kWh. However, it should be noted that all of these units are counted as reliable and dispatchable for capacity during system peak. ("Dispatchable" used herein means the ability to control generation output to match load and economics requirements.) It should be noted that wind generation is neither reliable nor dispatchable in any given specific time of need for capacity or generation. (QC11-5)

Comment: Mr. Brown asserts that it is inappropriate to compare the cost of wind generation with generation based on other fuels. MidAmerica would agree that wind generation cannot be compared to other dispatchable generation since wind is not dispatchable based on system load. Wind generation is only dispatchable when the wind resource is available. However, with the above-noted subsidies, and to the extent that wind is available, MidAmerica's wind facilities will displace all other generating units in the dispatch order. This utilization makes wind generation a very important part of MidAmerica's overall generation portfolio. (QC11-6)

Comment: In his cost discussion, Mr. Brown also ignores the significant cost of transmission system impacts. (Mr. Brown appears to assert that his 2.0 to 2.5 cents/kWh does include outlet transmission costs, but then apparently ignores the costs of transmission system impacts.) As a member of MAPP, MidAmerica is required to meet MAPP's reliability criteria. A requirement of MAPP is that the transmission system must be sufficient such that the generation is able to deliver rated output for certain system conditions. As discussed in number 1, above, this means the transmission system would have to be upgraded sufficiently to address all impacts for the additional 10,729 megawatts of nameplate wind generation. This could be a very significant cost when taken in consideration with a wind project location and existing transmission system constraints. (QC11-7)

Response: *The comments are noted. As stated in 10 CFR Part 51.95(c)(2), the SEIS for license renewal does not need to discuss cost of power. In relation to alternatives, the cost of power is only presented in support of staff's conclusions regarding the viability of the alternative. The comments provide no additional information. There were no changes made in the supplement because of these comments.*

Need for Power

Comment: The NRC's analysis in the Draft Supplement fails to comply with the requirements of the National Environmental Policy Act ("NEPA") in at least two ways. First, there is no

analysis in the Draft Supplement of whether or not there is a need for the power created by Quad Cities. (QC10-1)

Comment: The need for power, however, is at the heart of the purpose and need statement which, in turn, serves as the baseline by which the reasonableness of various alternatives are to be measured. Without this essential factor, there is no way for the NRC to use the EIS process to accurately weigh alternatives against one another or to conclude whether it is appropriate to allow Quad Cities to continue operating for an additional 20 years. While the NRC suggests that the need for power can be considered by the State government at some later date, it clearly violates NEPA to abdicate the analysis of the “need for power” issue to non-federal decisionmakers long after the EIS process has been concluded. (QC10-3)

Comment: For the above reasons, the NRC should complete a rigorous and objective analysis of the need for power and reasonable alternatives such as energy efficiency, renewable energy resources, clean distributed generation, and “clean coal” resources before deciding whether or not to relicense the aging Quad Cities nuclear power plant. (QC10-21)

Response: *In the license renewal context, the NRC has adopted a definition of the purpose and need for license renewal reviews as providing “an option that allows power generation capability beyond the term of a current nuclear power plant operating license to meet future system generating needs, as such needs may be determined by state, utility, and where authorized, Federal (other than NRC) decisionmakers.” This purpose and need reflects the Commission’s recognition that, absent findings in its safety review or NEPA analysis, the NRC has no role in the energy planning decisions of State regulators and utility officials. The underlying need for power that will be met by the continued availability of the nuclear plant is defined by the various operational and investment objectives of the licensee that may be dictated or strongly influenced by State regulatory requirements or State energy policy and programs or, in special circumstances, by Federal agencies such as the Federal Energy Regulatory Commission or Tennessee Valley Authority. These various entities may place different emphasis on lower energy costs, increased efficiency of energy production, reliability in generation and distribution of electric power, improved fuel diversity, and environmental objectives such as improved air quality and minimization of land use. Thus, the NRC’s identification of the purpose and need for license renewal strikes a reasonable balance between the NRC’s mission, the licensee’s needs and the State’s (or in limited situations, Federal agency’s) objectives.*

The comment also suggests that by not considering “need for power,” the NRC is prevented from accurately weighing alternatives against one another. The NRC’s role in evaluating the environmental impacts of license renewal is to determine whether the impacts of license renewal are so great that preserving the option of continued operation for energy planning decisionmakers would be unreasonable. To make that determination, the NRC examined a

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range of alternatives that included a net reduction in electricity generation with no replacement power, demand side management and energy conservation, electricity generated from other sources, and some combination of these alternatives. The impacts from these alternatives are discussed in detail in the SEIS.

Lastly, 10 CFR Part 51.95(c) was developed through notice and comment rulemaking. Accordingly, there was an opportunity to participate in the rulemaking process by submitting comments on the proposed rule language. During the rulemaking, the NRC received and responded to several comments regarding consideration of the need for power and provided a detailed explanation of its decision. 61 FR 28471-28473. In addition, NRC regulations at 10 CFR Part 2.206 provide an opportunity for any person to request that the NRC undertake certain actions, including petitioning for a rulemaking. However, absent a revision, NRC regulations explicitly state that NRC evaluation of the "need for power" is not required for license renewal environmental reviews.

On balance, the NRC has chosen a definition of purpose and need for its Supplemental EIS and has evaluated a set of alternatives that are fully consistent with NEPA. In addition, properly promulgated regulations govern the definition of purpose and need for a license renewal EIS. Therefore, the NRC will not consider the "need for power" as part of this EIS. The comments provide no additional information. There were no changes made in the supplement because of these comments.

Comment: Although the applicant's ER need not discuss the demand for power, as noted on page 1-5, citing 10 CFR 51.53(c)(2), we note it is a reasonably foreseeable action and therefore should be discussed in the NRC's final SEIS. We note that Exelon requested and received NRC approval for a license amendment to carry out an 18% power uprate, which took place in May 2002 (section 2.1.4, page 2-9). The reports documenting the uprate's impact will not be delivered until May 2004, though the NRC estimates that the uprate could increase radiological effluent releases by a corresponding 18%. The draft SEIS states that the 18% radiological effluent increase will be within NRC limits. The draft SEIS does not, however, assess the potential for future uprates and the possible effects of future uprates. We recommend the final SEIS (1) include a discussion of environmental impacts from past power uprates, (2) assess the potential for future power uprates during the extended license period, and (3) discuss potential and cumulative environmental impacts from uprates. (QC16-2)

Response: *The comment is noted. As stated in 10 CFR Part 51.95(c)(2), the SEIS for license renewal does not need to include a discussion of the need for power. The power uprate for Quad Cities Units 1 and 2 was the subject of a separate NEPA review in which the environmental effects of uprates were assessed (U.S. Nuclear Regulatory Commission, Letter from Stewart N. Bailey, Project Manager, Office of Nuclear Reactor Regulation to Oliver D. Kingsley, President, Exelon. Subject: "Quad Cities Nuclear Power Station, Units 1 and 2 - Environmental Assessment and Finding of No Significant Impact Related to a Proposed License*

Amendment to Increase the Licensed Power Level,” December 17, 2001). In Section 2.1.4 of the SEIS for Quad Cities, staff concludes that the uprate was not information that was both new and significant; consequently, the staff relies on the generic conclusions in the GEIS that radiological impacts are SMALL even with the power uprate. Future uprates using the existing plant configuration are unlikely. However, any future uprate would require a separate NEPA review in which the environmental impacts of the uprate would be assessed. The comment provides no additional information. There were no changes made in the supplement because of this comment.

A.2.14 Editorial Comments

Comment: What is in the DEIS (pg. xviii/14): ...specified in the National Electric Safety...

What should be in the DEIS: ...specified in the 1981 National Electric Safety...

Why the change: The year of the National Electric Safety Code that the NRC uses in the GEIS for analyzing this issue should be specified in the report. (QC08-1)

Response: *The 5-mA standard for induced shock from transmission lines was first introduced in the 1981 version of the National Electric Safety Code (NESC). The current version was published in 2002. However, the GEIS did not refer to any specific version of the NESC. The comment provides no additional information. There were no changes made in the supplement because of this comment.*

Comment: What is in the DEIS (pg. 2-13/35): ...(ComEd 2000).

What should be in the DEIS: ...(Exelon 20003a).

Why the change: The reference for the NPDES Permit is incorrect. (QC08-2)

Response: *Text has been modified.*

Comment: What is in the DEIS (pg. 2-47/36): ...and plotted it on land that would...

What should be in the DEIS: ..and plotted it on or near land that would...

Why the change: Changes make wording consistent with prior sentence describing approximate location. (QC08-3)

Response: *The statement on page 2-47, line 36 is accurate as stated. The previous sentence on line 31 refers to the text of the University of Chicago report that describes the general*

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location of the site. The exact position, when plotted, is on land that would be used for the Quad Cities site. The comment provides no additional information. There were no changes made in the supplement because of this comment.

Comment: What is in the DEIS (pg. 2-48/11-16): Though he felt what he had observed had little likelihood of proving significant, he recommended 'use of due caution' during excavation.

What should be in the DEIS: Though he felt that the likelihood of what he observed as proving significant was remote, he had alerted appropriate plant personnel to the areas of interest and they were to use due caution during excavation operations.

Why the change: The replacement wording comes directly from the letter and, more appropriately, characterizes Mr. Bareis' finding in his letter. (QC08-4)

Response: *The statement as presented in the SEIS accurately and adequately characterizes Mr. Bareis' finding. The comment provides no additional information. There were no changes made in the supplement because of this comment.*

Comment: What is in the DEIS (pg. 4-16/17): Blank line. What should be in the DEIS: Remove line.

Why the change: The line appears to be unnecessary. (QC08-5)

Response: *Text has been modified.*

Comment: What is in the DEIS (pg. 4-20/9): Consideration of mitigation is warranted in the vicinity...

What should be in the DEIS: Consideration of mitigation may be warranted in the vicinity...

Why the change: The wording change is in keeping with the wording used elsewhere in the report. (QC08-6)

Response: *The staff's conclusion is the impact of the potential for electric shock is MODERATE on the segment of the north Nelson line where calculated induced currents exceed 5 mA. Accordingly, consideration of mitigation is warranted. The comment provides no additional information. There were no changes made in the supplement because of this comment.*

Comment: What is in the DEIS (pg. 4-25/33): ...to perform routine maintenance and other activities...

What should be in the DEIS: ...to perform routine maintenance and other activities related to license renewal.

Why the change: As noted in the Environmental Report and the GEIS, the assumption used is that these additional personnel would be needed to perform those activities related to aging management activities that need to be performed as a result of the renewing the license. (QC08-7)

Response: *Text has been modified.*

Comment: What is in the DEIS (pg. 4-25/34): ...these routine activities during scheduled outages.

What should be in the DEIS: ...these routine activities.

Why the change: As noted in the Environmental Report and the GEIS, the assumption used is that these additional personnel would be needed to perform those activities related to aging management activities that need to be performed as a result of the renewing the license. (QC08-8)

Response: *Staff agrees with the commenter that the assumption used the activities would be related to aging management activities. However, the statement on page 25, line 34 refers to the timing of the activities, not the purpose. The comment provides no additional information. There were no changes made in the supplement because of this comment.*

Comment: What is in the DEIS (pg. 4-25/35-36): ...to their permanent staff during license renewal....

What should be in the DEIS: ...to their permanent staff during the license renewal period....

Why the change: Wording change for grammatical reasons. (QC08-9)

Response: *Text was modified.*

Comment: What is in the DEIS (pg. 4-30/15-17): The Quad Cities site is in an area of moderate-to-high potential. However, there are reports of archaeological resources on the Quad Cities site.

What should be in the DEIS: Areas of the Quad Cities site may have moderate-to-high potential. There is a report of an archaeological resource on or near the Quad Cities site.

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Why the change: The archaeological reports cited as a the basis for this statement do not state that the entirety of the Quad Cities site possesses the possibility for moderate to high potential. Furthermore, there are no references cited from any State or National source (other than the University of Chicago report listed on pg 2-47) that could be used to form the basis for the conclusion regarding areas having a potential for archaeological resources. (QC08-10)

Response: *The reasoning for the conclusion is provided in the paragraphs below the cited statement and is the opinion of the staff. The archaeological reports cited are not the sole basis of the conclusion. The comment provides no additional information. There were no changes made in the supplement because of this comment.*

Comment: What is in the DEIS (pg. 4-31/32-33): ...for guidance on requirements for an archaeological survey when any...

What should be in the DEIS: for guidance when any...

Why the change: The wording change is needed to bring into it into conformance with what was committed to by Exelon in e-mail under ADAMS Accession # ML033090462. (QC08-11)

Response: *The statement as presented on page 4-31, lines 32-33 reflect staff's understanding of the commitment by Exelon in the referenced e-mail and is part of the basis for the staff's conclusion that the impact of the proposed action on cultural and historic properties is SMALL. The comment provides no additional information. There were no changes made in the supplement because of this comment.*

Comment: What is in the DEIS (pg. 4-32/1): ...the staff's preliminary determination is...

What should be in the DEIS: ...the staff's determination is...

Why the change: Wording change needed for final report. (QC08-12)

Response: *Text has been modified.*

Comment: What is in the DEIS (pg. 4-39/24, 30, 32): These lines mention Exelon practices as they pertain to vegetation management in the transmission corridors. There is no discussion of the owners of the other transmission lines under this review (i.e., MidAmerica and Alliant). (QC08-13)

Response: *Text has been modified to include the owners of other transmission lines under review.*

Comment: What is in the DEIS (pg. 4-40/12): ...the staff has preliminarily concluded that...

What should be in the DEIS: ...the staff has concluded that...

Why the change: Wording change needed for final report. (QC08-14)

Response: *Text has been modified.*

Comment: What is in the DEIS (pg. 4-40/18): This line mentions Exelon practices as they pertain to vegetation management in the transmission corridors in this review. There is no discussion of the owners of the other transmission lines under this review (i.e., MidAmerica and Alliant). (QC08-15)

Response: *Text has been modified to include the owners of other transmission lines under review.*

Comment: What is in the DEIS (pg. 4-40/19): ...it is the staff's preliminary finding that...

What should be in the DEIS: ...it is the staff's finding that...

Why the change: Wording change needed for final report. (QC08-16)

Response: *Text has been modified.*

Comment: What is in the DEIS (pg. 4-44/30, 41): These lines mention Exelon practices as they pertain to vegetation management in the transmission corridors in this review. There is no discussion of the owners of the other transmission lines under this review (i.e., MidAmerica and Alliant). (QC08-17)

Response: *Text has been modified to include the owners of other transmission lines under review.*

Comment: What is in the DEIS (pg. 4-44/41): ...and its contractors at the end of the consultation,

Why the change: It is not clear what consultation the staff is referencing in this section. (QC08-18)

Response: *The consultation referred to is between the NRC and the U.S. Fish and Wildlife Service (FWS). Consultation with the FWS for license renewal was completed by letter from the FWS to the NRC dated January 16, 2004. Text was modified to clarify the parties involved.*

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Comment: What is in the DEIS: Agency for direction on level of effort necessary for archaeological survey in such project areas, ...

What should be in the DEIS (pg. 4-46/18): Agency for guidance, ...

Why the change: This wording change is needed to bring into it into conformance with what was committed to by Exelon in e-mail under ADAMS Accession # ML033090462. (QC08-19)

Response: *The text has been modified to accurately reflect the commitment made by Exelon in its email dated October 27, 2003.*

Comment: What is in the DEIS (pg. 4-50/18, 37): These lines mention Exelon practices as they pertain to vegetation management in the transmission corridors in this review. There is no discussion of the owners of the other transmission lines under this review (i.e., MidAmerica and Alliant). (QC08-20)

Response: *Text has been modified to include the owners of other transmission lines under review.*

Comment: What is in the DEIS (pg. 4-51/1-2): ...the staff has preliminarily determined...

What should be in the DEIS: ...the staff has determined...

Why the change: Wording change needed for final report. (QC08-21)

Response: *Text has been modified.*

Comment: What is in the DEIS: ...the staff's preliminary conclusion...

What should be in the DEIS (pg. 4-51/35): ...the staff's conclusion...

Why the change: Wording change needed for final report. (QC08-22)

Response: *Text has been modified.*

Comment: What is in the DEIS (pg. 4-51/39): ...the transmission line owner, ComEd, is...

What should be in the DEIS: ...the transmission line owner, Exelon Power Delivery, is...

Why the change: Wording change reflects the addressee in the letter sent (ADAMS Accession #ML032660226). (QC08-23)

Response: *Text has been modified.*

Comment: What is in the DEIS (pg. 8-42/7, 8-45/31 through 8-46/12, 9-8/16): These discussions of aesthetic impacts of the alternative nuclear plant are not consistent with the analysis presented in the GEIS for aesthetic impacts of license renewal for the existing plant. During the construction of the alternate plant on the Quad Cities site, impacts would [sic] be introduced that may bring the overall site to a MODERATE level of impact, however, once the alternate plant is operating and the existing site is fully decommissioned, the overall impacts would not be much different than what currently exists. As stated in the GEIS in the conclusion of the analysis of this issue, the “staff believes that the impacts on aesthetic resources would be small in the future”. For this reason, Exelon believes the staff should review their conclusions with respect to their analysis of this issue. (QC08-24)

Response: *The staff does not rely on generic conclusions in the GEIS with regard to environmental impacts of alternatives. For the Quad Cities site, the staff concluded that a new nuclear facility located on the banks of the Mississippi River would have a MODERATE aesthetic impact. The comment provides no additional information. There were no changes made in the supplement because of this comment.*

Comment: What is in the DEIS (pg. 8-48/20-22): Duplicate of lines 18-19 that can be deleted. (QC08-25)

Response: *Text has been modified.*

Comment: What is in the DEIS (pg. 9-5/8): ...the staff’s preliminary conclusion is...

What should be in the DEIS: ...the staff’s conclusion is...

Why the change: Wording change needed for final report. (QC08-26)

Response: *Text has been modified.*

Comment: What is in the DEIS (pg. 9-8/5): LARGE, under Historic and Archaeological Resources

What should be in the DEIS: SMALL, under Historic and Archaeological Resources

Why the change: This makes the wording here consistent with the conclusion in Section 4.4.5. (QC08-27)

Response: *Text has been modified.*

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Comment: What is in the DEIS (pg. 9-8/31): ...MODERATE...

What should be in the DEIS: ...MODERATE for that portion of the North Nelson line where the induced shock is greater than 5 ma.

Why the change: This wording change clarifies the area where the impact has been analyzed as being MODERATE. (QC08-28)

Response: *Text has been modified.*

Comment: What is in the DEIS (pg. 9-8/32): ...considered LARGE...

What should be in the DEIS: ...considered SMALL...

Why the change: This makes the wording here consistent with the conclusion in Section 4.4.5. (QC08-29)

Response: *Text has been modified.*

A.3 Public Meeting Transcript Excerpts and Comment Letters

Transcript of the Afternoon Public Meeting on December 16, 2003, Moline, Illinois

MR. CAMERON: All right. Good afternoon everyone. My name is Chip Cameron. I'm the Special Counsel for Public Liaison at the Nuclear Regulatory Commission. And I just want to welcome you to the NRC's public meeting today. And the subject of the meeting is the Draft Environmental Impact Statement that was prepared to help the NRC review an application that we have from the Exelon Company to renew the license for the Quad Cities Power Generating Station. And it's my pleasure to serve as your facilitator for today's meeting.

And in that role I'm just going to try to help you have a productive meeting. We want to get to the substance of today's discussions quickly. So I'm just going to briefly cover what the format for the meeting is going to be and the ground rules and just give you an idea of what the agenda is so that you know what to expect.

The format of the meeting is going to be divided into two parts. The first part is to give all of you information on the NRC's license renewal process, and specifically the environmental review part of the NRC's review process. And we also want to talk to you about the findings in the Draft Environmental Impact Statement. So, we'll be giving you information on that.

And the second part of the meeting is to hear from you a little bit more formally. Any formal comments that you might want to give us today on the Draft Environmental Impact Statement or any concerns that you want to express about the license renewal process generally.

And ground rules are real simple. If you have a question that you want to ask, just signal me and I'll bring you this cordless mike. And just tell us your name and affiliation, if appropriate. I would ask that only one person speak at a time. We are keeping a transcript. Mr. LeGrand is our stenographer this afternoon. And we not only want to pay attention to whomever has the floor at the moment, but one person at a time will allow us to get a clean transcript. And that will be the public record of this meeting and it will be available to whoever wants to look at it.

I would also ask you to just follow a little brevity in your remarks so that we can make sure that we hear from everyone. I don't think we're going to have a problem with time today, so just think about that when you're talking. When we get to the formal comment part, usually we use the guideline of five minutes for formal presentations, comments. But, as I said, I think we'll be able to have some leeway on that today.

The NRC is also taking written comments on the Draft Environmental Impact Statement. But I just want to assure you that anything that you say today will carry the same weight as comment that we receive in writing. And you may, you may hear things today either from the NRC or from others in the audience that will either encourage you to submit a written comment or perhaps inform any written comments that you do, that you do submit.

And we were here a few months back doing scoping. And we hopefully addressed all of the comments that you made in the Scoping Meeting in the Draft Environmental Impact Statement. But that's another thing you may want to focus on is see how your comments were treated in the Draft Environmental Impact Statement and if you want to put a finer point on that for us, do that by submitting a written comment. And the staff is going to tell you in a minute how you do that.

In terms of the agenda, we're going to go to John Tappert, who's right here, for a more formal welcome for you. And John is the Chief of the Environmental Section in our Office of Nuclear Reactor Regulation back in Washington, D.C. And John and his staff are responsible for supervising the preparation of any type of environmental review, be it for license renewal or some other type of activity.

We are then going to go for an overview of the entire license renewal process. That includes more components than just an environmental review. And we're going to ask Kimberley Corp, who's right here, to do that for us. And Kimberley is relatively new to the agency. She's been here three years but she's worked on every license renewal application on the safety evaluation side. And that will become clear as we go through some of the comments.

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After that we're going to go to Mr. Duke Wheeler, who's the Project Manager for the environmental review on the Quad Cities' license renewal application. He'll take us through the environmental review process. We'll then go on to you for any questions that you might have about the process. Then we're going to the heart of the meeting, so to speak. And we have Mr. Bruce McDowell, right here, who's going to take us through the findings in the Draft Environmental Impact Statement. Now Bruce is a team leader. The NRC uses expert consultants and contractors to help us to do the environmental review. And Bruce is the leader of that team. He's an environmental assurance manager from Lawrence Livermore National Lab, Master's in Business Administration and a Master's in Resource Economics. A lot of experience in the environmental review. He'll take us through that.

And then we're going to go to Mr. Robert Palla, who's right here. And Bob is with the NRC and he's going to talk about something called Severe Accident Mitigation Alternatives or SAGAS, as they're known. And Bob has been with the agency for about 20 years in the, some call it the dark science of Probabilistic Risk Assessment. So he has lots of experience with that. I would just thank all of you for being here today and we just want to try to answer your questions as well as we can, address any concerns here which you have to tell us.

And, John, would you like to talk at this point?

MR. TAPPERT: Thank you, Chip, and good afternoon and welcome. As Chip said, my name is John Tappert. And on behalf of the Nuclear Regulatory Commission, I'd like to thank everyone for coming out today and participating in this process. I hope that you find the information we will share with you today to be helpful. And we look forward to receiving your comments both today and in the future.

I'd like to start off right now by going over briefly the agenda and the purpose of this meeting. First of all, we're going to have a brief overview of the entire license renewal process. And this includes both the safety review as well as the environmental review, which is the principle focus of today's meeting.

Then we'll go over the preliminary findings in our Draft Environment Impact Statement, which assesses the impacts associated with extending the operation to the Quad Cities Units 1 and 2 for an additional 20 years. Then we'll give you some information on the schedule for the balance of our review and how you can submit comments in the future. And then finally we get to the real heart of the meeting today, which is to receive any comments that you may have today.

But first we can provide some brief context for the License Renewal Program itself. The Atomic Energy Act gives the NRC the authority to issue operating licenses to commercial nuclear power plants for a period of 40 years. For Quad Cities Units 1 and 2, those operating licenses will expire in 2012. Our regulations also made provisions for extending those operating licenses

for an additional 20 years as part of a license renewal program. And Exelon has requested a renewal for both units.

Now, an important part of the NRC's review of that license renewal application is an assessment of the environmental impact associated with extended operation. Now, we had a public meeting here last April to seek your input early in our environmental review. As we indicated at that earlier scoping meeting, we return here now today to present the preliminary results of our review. And again, the real purpose of today's meeting here is to receive your comments on our draft review.

So with that brief introduction, I'd like to ask Kimberley to provide some more information on the safety review.

MS. CORP: Thanks, John. As Chip said, my name is Kimberley Corp and I'm the NRC's Backup Project Manager supporting the safety review of Exelon's license renewal application for both Quad Cities and Dresden. Before I get into the discussion of the license renewal process I'd like to take a minute to talk about the Nuclear Regulatory Commission in terms of what we do and what our mission is.

As John just said the Atomic Energy Act of 1954 is a legislation that authorizes the NRC to regulate the civilian use of nuclear materials. In carrying out that authority, the NRC's mission is threefold. One is to ensure adequate protection of public health and safety, two is to protect the environment, and three is to provide for a common defense and security.

The NRC accomplishes its mission through a combination of regulatory programs and processes such as inspections, enforcement actions, assessment of licensees' performance and the evaluation of operating experience of the nuclear power plants throughout the country.

The NRC's license renewal review is similar to the original licensing process and that it involves two parts; a safety review, which includes a safety evaluation, plant inspections and also an independent review by the ACRS or the Advisory Committee on Reactor Safeguards as well as an environmental review, which Duke will discuss next.

First you might ask what does the safety review consider. There are two types of safety issues; current operating issues which are dealt with now and aging management issues that are dealt with in license renewal. Under the current operating license, the NRC's regulatory oversight deals with current safety issues. We do not wait for a plant to come in for license renewal before requiring them to address any issue.

Because the NRC has or is dealing with those issues such as security or emergency planning, we do not reevaluate them in license renewal. The license renewal safety review focuses an

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aging management issues and the program that the licensee has already implemented or will implement to maintain the equipment safely.

The safety evaluation report is independently reviewed by the ACRS. The ACRS is a group of nationally recognized technical experts in the nuclear safety area that basically serves as a consulting body to the Commission itself. They review each application as well as the staff safety evaluation report and they form their own conclusions and recommendations and report them directly to the Commission.

The environmental review evaluates the impact of license renewal on a number of areas. These areas include, among others, ecology, hydrology, cultural resources and socioeconomic issues. As I said earlier, Duke will discuss these in the environmental review in greater detail next.

The next slide will discuss the license renewal process. This slide really gives the big picture overview of the license renewal process. And as you can see from this slide, the process involves two parallel paths; safety review and environmental review. The safety review involves the NRC staff review and assessment of the technical information that is contained in the licensee's application.

There's a team of about 30 NRC technical reviewers and contractors back at the NRC Headquarters in D.C. who are conducting the safety review right now. And the team is also supported by the technical experts at three different national laboratories, including Argonne, outside of Chicago; Brookhaven in Long Island, New York; and Pacific Northwest in Washington State. So there's a lot of expertise in the team to conduct this safety review.

The staff's safety review focuses on the effectiveness of the proposed aging management program for those plant systems, structures and components that are within the scope of license renewal. The NRC staff reviews the effectiveness of these programs to ensure that the plant's safety can be maintained throughout the term of license renewal.

The safety review also focuses on the applications, time limited aging analysis. Each original design analysis that assumed a 40-year life must be reevaluated to extend the 40-year term to the 60 year renewal term. This safety process also involves audits and on-site inspections. These inspections have been conducted by a team of inspectors pulled together from both the NRC Headquarters and NRC's Regional office in Chicago.

The results of inspections were documented in separate inspection reports and the results of the staff's safety review, as well as the results of the inspection, will be documented in the Safety Evaluation Report. And a copy of that will be provided to the ACRS for an independent evaluation. Both the Regional scoping and aging management review inspections have been completed and we are in the process of writing a Safety Evaluation Report right now.

The second part of the review process involved an environmental review, which involved scoping activities and developing the Draft Supplement to the GEIS, Generic Environmental Impact Statement for License Renewal of Nuclear Plants. And eventually we will be issuing a final supplemental to the GEIS for license renewal which will address the comments received from the meeting today as well as written comments received later.

So as you can see from the slide, the final agency decision on whether to approve or deny the application will require a number of things. A Safety Evaluation Report, which documents the results of the safety review, the final supplement to the GEIS, which documents the results of the environmental review. And then inspection reports, which document the results of the Regional inspection. All three of these reports will be factored in as well as the independent report from ACRS into the final agency decision.

And that concludes the license renewal overview process.

MR. CAMERON: Okay, thank you, Kimberley. And we'll hold questions until we hear from Duke on the environmental review process. Then we'll go out to see if there's any questions that you have.

MR. WHEELER: Good afternoon. My name is Duke Wheeler, and I am the Environmental Project Manager responsible for coordinating the efforts of the NRC staff and the national labs for the environmental review that supports Exelon's application for license renewals for Quad Cities Units 1 and 2.

The National Environmental Policy Act of 1969 requires a systematic approach in evaluating environmental impacts of proposed major Federal actions. Consideration is to be given to the environmental impacts of the proposed action and mitigation for any impacts believed to be significant. In addition, alternatives, including taking no action on the applicant's request are also to be considered in our environmental review.

The environmental impact statement is a disclosure tool and it does involve public participation. NRC regulations required that an environmental impact statement will be prepared for proposed license renewals.

Simply stated, our decision standard basically asks are the environmental impacts of the proposed action great enough that maintaining the license renewal option is unreasonable. And I'd like to point out that we do not decide whether or not a plant's going to run for an additional 20 years. Other regulatory agencies and the licensee make that decision. Kimberley had shown you a slide of the overall license renewal process. And the bottom line along that slide indicated the steps that we go through for an environmental review. And this is an expansion of that slide. And basically we start with the application being submitted by Exelon. That took place January 3rd of this year. And then we make known to the public via the

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Federal Register and other means that we are going to be doing an environmental impact statement. We publish what is referred to as a Notice of Intent to develop an environmental impact statement.

That leads us right into the scoping process. And this is our first opportunity for significant public participation in what we do. The purpose of the scoping process is basically to give the public an opportunity to provide information to us to help us basically scope out the bounds of the environmental interest that we should take as we continue on with our review.

We conducted a site audit and we were out at the site in Quad Cities March 2003 of this year to gather substantial amount of information. And for whatever additional information we require, we'll send a formal request for additional information to the licensee. We did that. The licensee responded. We now take into consideration all the information that we have in our hands and we publish a draft of our environmental impact statement.

And this is where we are right now. We published that draft last month and then one of the things that we do, it's published for public comment. And to assist, to provide one additional avenue of the public providing us comments on the draft environmental impact statement is we have this meeting put together for that purpose.

There are also other ways you can provide information to us. As Chip indicated, I'll get to that as we get toward the end of the meeting.

The final step is after we've gotten all the comments that we received on the draft of our environmental impact statement, we will publish a final environmental impact statement. And our schedule provides for us to produce that final environmental impact statement in July of 2004.

This concludes my overview up to this point. I'd like to turn the meeting back over to Chip. And then we'll get into the meat of our findings.

MR. CAMERON: Okay, thanks, Duke. I wanted to see if there's any questions about the process, license renewal process, either safety or environmental before we go on. And for those of you who don't have a copy of this draft, EIS is on the table outside the meeting room.

Any questions about the process at this point? Okay. Let's go to Bruce for a description of the findings and the draft environmental impact statement. Bruce?

MR. MCDOWELL: I'm Bruce McDowell from the Lawrence Livermore Laboratory. I'm the task leader for the team that wrote the supplemental environment impact statement for the Quad Cities.

This slides shows our analysis approach. The Generic Environmental Impact Statement for License Renewal, NUREG-1437, identifies 92 environmental issues that are evaluated for license renewal. Sixty-nine of these issues are considered generic for Category 1, which means that the impacts are the same for all reactors with certain features such as plants that use water from large rivers.

For the other 23 issues referred to as Category 2, the NRC found that the impacts were not the same at all sites. And therefore site specific analysis was needed. Only certain issues addressed in the GEIS are applicable to the Quad Cities plant. For those generic issues that are applicable to Quad Cities, we assessed if there was any new and significant information related to the issue that might change the conclusion in the guidance.

If there is no new information then the conclusions of the GEIS are adopted. If new information is identified and determined to be significant, then a site specific analysis would be performed. For the site specific issues related to Quad Cities, the site specific analysis was performed. Finally, during the scoping period the public was invited to provide information on potential new issues. And the team, during their review, looked to see if there were any new issues that needed evaluation.

For each issue identified in the GEIS, an impact level is assigned. These impact levels are consistent with the Counsel on Environmental Quality. For a small impact, the effect is not detectable or too small to destabilize or noticeably alter any important attribute of the resource. For example, the plant may cause the loss of adult fish at the intake structure. If the loss of fish is so small that it cannot be detected in relation to the total population of the river, the impact would be small. For a moderate impact, effect is significant to alter noticeably but not destabilize important attributes of the resource. Using the fish example again, if loses at the intake causes the fish population to decline and then stabilize at a lower level, the impact would be moderate.

And finally for an impact to be considered large, the affect must be clearly noticeable and sufficient to destabilize important attributes of the resource. So if the losses at the intake cause the fish population to decline to the point where it cannot be stabilized and continues to decline, then the impact would be large.

The team that evaluated the impacts for the Quad Cities plant, evaluated several different areas and they're shown on this slide; socioeconomic and environmental justice, — science, terrestrial ecology, land use, archaeology and historical resources, radiation protection, nuclear safety, regulatory compliance in aquatic ecology and hydrology.

The staff has considered information from a broad range of sources during the development of this draft supplemental EIS. We have considered the licensee's evaluation of environmental impacts that was submitted with the license application. We have conducted a site audit which

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is the site visit. The staff visited the plant and interviewed plant personnel. We have talked to Federal, State and local officials as well as local service agencies.

In addition, we have also considered all of the comments received from the public during the scoping period. These comments are listed in Appendix A, along with NRC's responses. The information received from all these sources is the basis for the analysis and the preliminary conclusions in the draft SEIS that you have in front of you.

In Chapter 2 of the draft SEIS, we discuss the plant and the environment around the plant. In Chapter 4, we then looked at the potential environmental impacts for additional 20 years of operation for the Quad Cities nuclear station. The team looked at issues related to the cooling system, transmission lines, radiological impacts, socioeconomic impacts, ground water use and quality, threatened and endangered species.

Each of these issues are discussed in detail in the draft SEIS and I'll take a few minutes to highlight, to identify the highlights of our review.

One of the issues we looked closely at is the cooling system for the Quad Cities plant. This slide shows the layout of the cooling system intake and discharge canals. Although there are a number of Category 1 issues related to the cooling system, and remember we said the Category 1 issues are those that have been determined to have the same significance for all plants.

No new and significant information was identified during scoping by the applicant or by the staff during their review of the issues.

The issues that the team looked at on a site specific basis include entrainment and impingement of fish and shellfish, heat shock and enhancement of microbiological organisms. The potential impacts in these areas were determined to be small and no additional mitigation was warranted.

Radiological impacts are a Category 1 issue. As you recall this means that the NRC has made a generic determination that impacts resulting from radiological releases during nuclear plant operations are small. But because it is often a concern to the public I wanted to take just a minute to briefly discuss it.

During the site visit we looked at the release and monitoring program documentation. We looked at how the gaseous and liquid effluents were treated and released as well as how the solid waste were treated, packaged and shipped. This information is found in Chapter 2 of the draft SEIS. We looked at how the applicant determines and demonstrates that they are in compliance with the regulations for release of radiological effluents.

The licensee monitors the near site and on site locations for airborne releases and direct radiation. There are other monitoring stations beyond the site boundary including locations where water, milk, fish and food products are sampled. The releases from the plant and the resulting outside potential doses are not expected to increase on a year to year basis during the 20-year license renewal term. No new and significant information was identified during the staff's review, the public input during the scoping process or the evaluation of other available information.

The generic EIS determined that the impacts of the 69 Category 1 issues were small based on the information known at that time. As part of my team's review, we looked at all information collected during the scoping process to identify any information that was both new and significant with regard to any of these issues.

We looked at information developed by the licensee, information developed independently by my team and information received during the public comment process. We determined that none of the information was both new and significant. Therefore, the conclusions of the generic EIS or adopted in this draft supplemental EIS.

The last issue from Chapter 4 I'd like to discuss is that of threatened and endangered species. The only Federally listed aquatic species that currently occurs in the vicinity of Quad Cities site is the Higgins Eye pearly mussel. Essential habitat for this species is located about one mile downstream from the plant.

There are a number of terrestrial species listed as threatened or endangered that could occur in the range of the Quad City site and the transmission lines. These include the bald eagle, Indiana bat, the river otter, the Iowa Pleistocene Snail and the western hognosed snake. During winter migration bald

eagles visit open water in the Mississippi River caused by the plant's thermal discharges. They also use the area for summer nesting and a known nest is about eight miles north of the site.

The Indiana bat, river otter, Iowa Pleistocene Snail and western hognosed snake could occur in the counties where the plant's transmission lines are located. But since the licensee does not plan any refurbishment or construction as part of relicensing, the natural area where these species would be found would not be disturbed.

This would also be true for the three threatened plant species; the eastern and western prairie fringe orchid and the prairie bush clover. The staff's preliminary determination is that the impact of operation of Quad Cities plant during the license renewal period on threatened and endangered species would be small.

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The staff also considered cumulative impacts. These are impacts that are minor when considered individually but significant when considered with other past, present or reasonably foreseeable future actions regardless of what agency or person undertakes the other actions.

The staff considered cumulative impacts resulting from operation of the cooling system, operation of the transmission lines, releases of radiological and radiation material, sociological impacts, ground water use and quality impacts and threatened and endangered species impacts.

These impacts were evaluated to the end of the 20-year license renewal term. The geographical boundary of the analysis was dependent upon the resource. For instance, the area analyzed for transmission lines was different than the area analyzed for the cooling water system. The staff's preliminary determination is that cumulative impacts resulting from the operation of the Quad Cities plant during the license renewal period would be small.

The team also looked at uranium fuel cycle and solid waste management and decommissioning. All issues for uranium fuel cycle and solid waste management as well as decommissioning are considered Category 1. For these issues, no new and significant information was identified.

Our team evaluated the potential impacts associated with the Quad Cities plant not continuing operation and replacing this generation with alternative power sources. In 2001, Quad Cities Units 1 and 2 generated 13 billion kilowatt hours of electricity. The team looked at no action alternative, new generation from coal-fired, gas-fired and nuclear, purchased power, alternative technology such as wind, solar and hydropower and then a combination of alternatives.

For each of the alternatives, we looked at the same type of issues. For example, land use, ecology, socioeconomics, these same issues that we looked at for the operation of the Quad Cities during the license renewal term. And for two alternatives, solar and wind, I'd like to describe the scale of the alternatives that we considered because the scale is important in understanding our conclusions.

First solar. Based upon the average solar energy available in Illinois and the current conversion efficiencies of solar panels, these cells would produce about 100 kilowatt hours per square meter per year. As such, 120 million square meters or about 46 square miles cells would be required to replace the generation of the Quad Cities plant.

Regarding wind power, wind turbines have a capacity factor between 30 and 35 percent. As such, at least 4,200 megawatts of wind power would have to be developed to replace Quad Cities 1800 megawatts. To put this in context, in 2002 total wind power capacity in the United States was 4,500 megawatts. In other words, the total wind power in the United States would have to double to replace the generation from Quad Cities.

Due to these scale issues and other siting requirements of reasonable alternatives, the team's preliminary conclusion is that the environmental impacts of alternatives, at least in some impact categories, is moderate or large.

So to review our approach. In their Generic Environmental Impact Statement, NRC examined environmental issues at all sites and found that the same conclusion could be made for 69 Category 1 issues. In our analysis we found no information that was new and significant. And we adopted the generic EIS conclusions. We also performed site specific analysis for Category 2 issues applicable to Quad Cities, as I've just discussed. Lastly, we found no new impacts that were not discussed in the Generic Environmental Impact Statement.

To summarize our findings, for 69 Category 1 issues presented in the generic EIS, we found no information that was both new and significant. Therefore, we adopted the conclusions of the generic EIS. Our team analyzed the remaining issues in this supplemental EIS. And we found that the environmental affects resulting from these issues were also a small significance with one exception.

On one segment of the transmission lines, the induced currents were calculated to be six milliamps. Since this slightly exceeds the NESC standard of five milliamps, we judge the impact to be of moderate significance. Since this line is not owned by the licensee, NRC has notified the owner of our findings.

And I will take it back to Chip if there's any questions.

MR. CAMERON: Okay, we're going to go to Bruce before questions in a minute and also hear from Bob Palla on accidents. But we're going to exercise a little bit of flexibility now to allow one of our local government officials to present some remarks to us so he can make another meeting. And Mr. Jim Bohnsack, who is the Chairman of the Rock Island County Board of Supervisors.

Jim, do you want to come up and we'll ask Bruce to take a seat and you can come up here and give us your comments. Thank you.

MR. BOHNSACK: Thanks, Chip. And I appreciate it and I apologize. It's difficult to meet but I really appreciate having an opportunity to speak. And my opportunity to speak is the same what I did the last time. And one of the problems we're having with Exelon is, and it's the major company, that's refusing to pay any property taxes in the Quad City area and that comes to about four million dollars a year. And they protested their taxes last year. They also did it again this year. And if we were to lose that that's \$8 million that comes out of the coffers out of the county and somebody has to make that up.

QC01-1

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And all we're asking in Rock Island County is for the people to pay their fair share. People that own homes do pay their fair shares. All companies have the right to protest their taxes and they do and we have a settlement. But when you have a company like Exelon that comes in and tells you that their property is worth nothing and when they're generating what we understand is a million dollars a day out of that facility and their taxes are about \$4 million, it's pretty hard for us to believe that that facility is worth nothing.

Also they've come back and made an offer of \$33 million of a ramping down, as they call it. And they've done that to other ones. And now just last week they came and protested them again. Now they're saying \$22 million. So, when you look at a large company like that that I think is very ruthless to talk about the value is zero. It's \$33 million, it's \$22 million. And so we have concerns on really how to operate their facility. And I understand the local people doing an excellent job. And we don't want them to leave, that's for sure. We want them to pay their fair share.

QC01-2 | If they don't pay that and we look at endangered species, you're going to see some very big children that are going to be endangered in that area school system. They pay about \$2 million in that school system. And I believe it's very important that they pay their fair share of taxes. And I'm just sure that the farmer's not going to be able to pay that kind of money for their children. And they shouldn't if you have businesses that are very, very good at doing what they're doing and making money. They ought to pay their fair share.

So I guess my biggest comments are that we do need your help from the environmental to some how put the pressure on companies like Exelon that they pay their fair share of taxes and then they should be able to continue to operate for 20 years. But if they operate for another 20 years and they pay no taxes, I'm telling you we are spending a considerable amount of money trying to get it assessed, the value that we believe that it should get assessed at.

Preliminary says we've got them valued at \$68 million and that it should be somewhere around \$120 million from a company that we've hired. And it's costing us thousands and thousands and thousands of dollars to get that kind of information, which is taking money out of everybody's coffers and making everybody else pay more money so we can provide the services in Rock Island County that we should do.

I appreciate you letting me speak early. I apologize that meetings are getting pretty complex. But thank you very much.

MR. CAMERON: Okay, thank you, Mr. Bohnsack. And his remarks will be reflected in the record of today's proceeding.

We are going to go to others who want to speak after we get done with the information portion of the session. And before we go to severe accident mitigation alternatives, why don't we see if

there's any questions for Bruce on the findings in the draft Environmental Impact Statement. He covered a lot of different — the team looked at a lot of different potential impacts including socioeconomic.

Any questions for Bruce at this point?

Yes, and let me get you on the transcript. And if you could just give us your name and affiliation, if appropriate.

MS. PERRIGO: Hi, I'm Leslie Perrigo with IECAN. I was just wondering if you could repeat the figure on the amount of wind power we would need to make up for the power plant?

MR. MCDOWELL: I can repeat all the figures. Wind capacity factors between 30 and 35 percent. As such, at least 4200 megawatts of wind power would have to be developed to replace Quad Cities 1800.

Is that it?

MR. CAMERON: And Leslie, what's the full name of your group?

MS. PERRIGO: The Independent Environmental Conservation Act is the Network.

MR. CAMERON: And the acronym is pronounced?

MS. PERRIGO: IECAN.

MR. CAMERON: IECAN, okay. Thank you, Leslie. Other questions? Let's go right here and then we'll go back to Neill. Please tell us your name.

MR. WHITT: Joshua Whitt, we represent the Rock Island Taxing Bodies. And we just had a quick question. Where you have your conclusions and recommendations, we understand that these are generic statements, but what does this mean for the entire process? I mean, does it make it more likely? Less likely? What affect does it have on the process of relicensing the facility?

MR MCDOWELL: Are you talking about the decline in the tax revenues?

MR. WHITT: No, I'm just talking about conclusions and recommendations. What affect does that have on the likelihood of renewing the license?

MR. MCDOWELL: Any particular conclusion and recommendation?

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MR. CAMERON: I think what he wants, perhaps, and I'm sorry to interrupt you, Mr. Whitt, but maybe it would be useful if someone described how the environmental review comes together with the safety review and how that decision, all of that is weighed perhaps. Is that what you need to know? All right. John Tappert.

MR. TAPPERT: Your question is is the conclusion and how is that factored into the decision?

MR. WHITT: Yes.

MR. TAPPERT: The reason we're doing these environmental reviews is because of the law that Duke referred to, which is the National Environmental Policy Act. And the purpose of that law was to make sure that agencies made informed decisions. What we're trying to do with this review is reveal all the environmental impacts, to provide our senior decision makers all the information available when they make their final decision.

The finding that we make preliminarily in this draft is that the impacts from license renewal are not so adverse to preclude future energy policy makers renewing the license or using the facility. So, it's not dispositive. It doesn't determine whether it's going to be renewed or not. But if we make that finding in the safety review, which Kimberley spoke about, also comes out with no safety issues, it's highly likely that the Commission will renew the license.

MR. WHITT: Just out of curiosity, at what point is the safety analysis at right now and when will that report be coming out?

MR. CAMERON: And can we go through the full schedule of when the safety analysis is done, when the environmental review is done and when we expect a final decision on the license renewal application?

MS. CORP: The Safety Evaluation Report will be issued with open items February 16th of next year. Then it will go to the ACRS for their independent review and analysis. And then they will give their recommendation to the Commission. And we will issue the final SER in July of next year. And according to the schedule, since there were no petitions to intervene, the Director of NRR has the capability to make the decision. So the recommendation will be given to the Director of NRR. And that is set to be given to him in November.

MR. CAMERON: Okay, so it's Office of Nuclear Reactor Regulation. So basically we have the final environmental impact statement in the April, in the July time frame. We have the final Safety Evaluation Report in the same time frame. And that is after the Advisory Committee on Reactor Safeguards looks at it. So, pardon me?

MS. CORP: The ACRS —

MR. CAMERON: Okay, the ACRS looks at it in April and then a final decision will be made in the November time frame. Okay? All right. Thanks for asking that question because that's good information to have on the record.

Is there any other questions about process, schedule? Oh, Neill has a question. And introduce yourself to us, please.

MR. HOWEY: I'm Neill Howey from Illinois Emergency Management. I just had a curiosity question, follow up to this young lady's question about wind turbines. Do we know what a typical electrical output of one of those single wind turbine generators is?

MR. MCDOWELL: I think the assumption that we used was, I can get to you after the meeting. I can show you the assumptions that we used in our analysis.

MR. CAMERON: Okay. And was there any implication or concern behind the question, Neill, that you want to follow up?

MR. HOWEY: I just wondered how many —

MR. CAMERON: Okay, just wondered how many it would take to replace it.

MR. MCDOWELL: We have that in the document. I can —

MR. CAMERON: Okay. And if you find it before we're done we can put it on the record.

MR. MCDOWELL: Sure.

MR. CAMERON: Yes, and just tell us your name.

MR. MAHER: Bill Maher with Exelon Corporation. The answer to Neill's question is anywhere from 2,800 to 4,900 of the wind turbines, depending on whether the capacity is one megawatt to one and-a-half megawatts.

MR. CAMERON: Okay. And Bruce, you can, if you have anything else on that later we'll put that on the record.

MR. MCDOWELL Well, I remember that it was around one megawatt.

MR. CAMERON; Okay, other questions before we go to severe accident mitigation alternative? All right, thank you very much, Bruce.

Let's go to Bob Palla from the NRC on severe accidents.

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MR. PALLA: Hi, my name is Bob Palla and I'm with the Probabilistic Safety Assessment Branch of the NRC. And I'm going to be discussing the environmental impacts of postulated accidents. Section 5 of the GEIS is entitled, Environmental Impacts of Postulated Accidents. The GEIS evaluates two classes of accidents; design-basis accidents and severe accidents.

Design-basis accidents are those accidents that both the licensee and the NRC staff evaluate to ensure that plant can safely respond to a broad spectrum of postulated accidents without risk to the public. The environmental impacts of design basis accidents are evaluated during the initial licensing process and the ability of the plant to withstand these accidents has to be demonstrated before the plant is granted a license.

Most importantly, a licensee's required to maintain an acceptable design and performance capability throughout the life of the plant including any extended life operation. Since the licensee has to demonstrate acceptable plant performance for the design-basis accidents throughout the life of the plant, the Commission has determined that the environmental impact of the designed basis accidents are of small significance.

Neither the licensee nor the NRC is aware of any new and significant information on the capability of the Quad Cities plant to withstand design basis accidents. Therefore, the staff concludes that there are no impacts related to design-basis accidents beyond those discussed in the GEIS.

The second category of accidents evaluated in the GEIS are severe accidents. Severe accidents are, by definition, more severe than design-basis accidents because they result in substantial damage to the reactor core. The Commission found in the GEIS that the risk of a severe accident in terms of atmospheric releases fall out onto open bodies of water, releases the ground water and societal impacts are small for all plants. Nevertheless, the Commission determined that alternatives to mitigate the consequences of severe accidents must be considered for all plants that have not done so.

We refer to these alternatives as severe accident mitigation alternatives or SAMA, for short. The SAMA evaluation is a site specific assessment and is a Category 2 issue as explained earlier. The SAMA review for Quad Cities is summarized in Section 2 and described in detail in Appendix G of the GEIS supplement.

The purpose of performing the SAMA evaluation is to ensure that plant changes with the potential for improving severe accident safety performance are identified and evaluated. The scope of potential plant improvements that were considered included hardware modifications, procedure changes, training program improvements as well as other changes. Basically a full spectrum of plant changes and other potential changes. The scope includes SAMA's that would prevent core damage and SAMA's that improve containment performance given that a core damage event would occur.

The SAMA evaluation consists of a four step process. The first step is to characterize overall plant risk and leading contributors to risk. This typically involves the extensive use of the plant specific probabilistic risk assessment study, which is also known as the PRA. The PRA is a study that identifies the different combinations of system failures and human errors that would be required for an accident to progress to either core damage or containment failure.

The second step in the evaluation is to identify potential improvements that could further reduce risk. The information from the PRA such as a dominant accident sequences is used to help identify plant improvements that would have the greatest impact in reducing risk. Improvements identified in other NRC and industry studies as well as SAMA analysis for other plants are also considered.

The third step in the evaluation is to quantify the risk reduction potential in the implementation costs for each improvement. The risk reduction in the implementation cost for each SAMA are typically estimated using a bounding analysis. The risk reduction is generally over estimated by assuming that the plant improvement is completely effective in eliminating the accident sequences it is intended to address.

The implementation costs are generally under estimated by neglecting certain cost factors such as maintenance costs and surveillance costs associated with the improvement. The risk reduction and cost estimates are used in the final step to determine whether implementation of any of the improvements can be justified.

In determining whether an improvement is justified, the NRC staff looks at three factors. The first is whether the improvement is cost beneficial. In other words, is the estimated benefit greater than the estimated implementation cost of the SAMA. The second factor is whether the improvement provides a significant reduction in total risk. For example, does it eliminate a sequence or a containment failure mode that contributes to a large fraction of plant risk.

The third factor is whether the risk reduction is associated with aging affects during the period of extended operation, in which case, if it was, we would consider implementation as part of the license renewal process.

The preliminary results of the Quad Cities SAMA evaluation are summarized on this slide. Two hundred eighty candidate improvements were identified for Quad Cities based on review of the plant specific PRA, relevant industry and NRC studies on severe accidents and SAMA analysis performed for other plants.

Exelon reduced this list to a set of 15 potential SAMA's based on a multi-step screening process. Factors considered during the screening included whether the SAMA is applicable to Quad Cities. It may not be applicable if it was, for example, identified for a different reactor type. We also considered whether the SAMA would involve major plant modifications that

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would clearly exceed the maximum obtainable benefit or whether the SAMA would provide only a minimal risk reduction based on the review of the PRA.

A more detailed assessment of the conceptual design and cost was then performed for each of the 15 remaining SAMA's. This is described in detail in Appendix G of the GEIS supplement. The cost benefit analysis shows that four of the 15 SAMA's are cost beneficial when evaluated in accordance with NRC guidance for performing regulatory analysis. All four cost beneficial SAMA's involved procedure improvements rather than hardware modifications.

As shown on this next slide, the cost beneficial SAMA's involve developing procedures to operate equipment locally during the loss of 125 volt buss by using temporary connections to the second unit. The second SAMA involves procedures to manually control feedwater given the loss of 120-volt DC control power. The third SAMA involves developmental procedures to terminate reactor depressurization prior to the lose of the steam driven injection pump so that core cooling could be maintained.

And the fourth, SAMA involves procedural changes to control containment pressure during containment venting in order to assure that adequate suction head for injection pumps is maintained. None of these SAMA's are related to managing the affects of plant aging. Therefore, none of the SAMA's are required to be implemented as part of license renewal.

So to summarize, the NRC's staff's preliminary conclusion is that additional plant improvements to further mitigate severe accidents are not required at Quad Cities as part of license renewal.

I'll take any questions you may have.

MR. CAMERON: Okay, thank you, Bob. I suppose one question that people might have is if the four cost beneficial SAMA's are not required for license renewal, what happens to those in terms of the NRC process, licensee implementation?

MR. PALLA: Well, at this stage, these are preliminary conclusions. We would expect to have some further dialogue with the licensee in these areas, and conceivably would transfer these over to the safety side. These are not real issues for part of renewal. But we would pursue these as operating plant issues under the current operating license.

MR. CAMERON: Because Kimberley pointed out that current operating framework, you would plug these into that framework.

MR. PALLA: Yes, we would consider whether they were justified.

MR. CAMERON: All right. Questions for Bob on the SAMA evaluation? Anything on that?

Okay, Bob, thank you very much.

I'm going to ask Duke to wrap up here in terms of conclusions and more importantly, perhaps, how you submit comments on everything in the draft EIS including the SAMA evaluations. Duke?

MR. WHEELER: Thank you, Chip. Our preliminary conclusions after all of that are first of all that the impact of license renewal are small for all the areas with the exception that Bruce pointed out. There's one part of the North Nelson Transmission line where the report that we got from Exelon was that the calculated induced current was 6 milliamps compared to the National Electric Safety Code specification of 5 milliamps.

And what we did with that was informal correspondence. I did send a letter out to the corporate entity that owns, operates and maintains that transmission line and basically said, here's what we found. In line with the intent of the National Environmental Policy Act, we are disclosing this to you.

The impacts of alternatives to license renewal range anywhere from small to large, to summarize a good part of Bruce's presentation. And so our bottom line, preliminary recommendation is that the adverse impacts of license of renewal for Quad Cities Units 1 and 2 are not so bad that preserving the option would be unreasonable.

And this just gives us a couple more of the key dates coming up for the environmental review. We did issue the environmental impact statement back in November per the prescribed schedule. For the comment period that we are in presently ends on January the 27th next year. I make one comment on that. Any comments that I receive prior to that time will be addressed in the final environmental impact statement that's going out in July. But I'm not going to slam the door shut on July the 27th as I leave the office. If comments come in later and it is still practical for me to consider those comments and address them in the final EIS before we go into our final manuscript and send it out to the print plant, then I will do that. And the final date is noted on the slide for issuing the environmental impact statement is July of 2004.

This slide just identifies myself as your primary point of contact with our staff on this environmental impact statement. And a few other ways that the document is made available to you, three libraries in the local area, the Cordova District Library and, welcome aboard, the River Valley Library at Fort Byron and also the Davenport Public Library. I've been on the phone with them and when we did mail out the environmental impact statement to our mailing list, they all did receive copies of the environmental impact statement. It's there for you to take a look at.

In addition, if you have a computer at home and can get on line, there's information on this slide which let's you know how you can go about accessing the environmental impact statement

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electronically. It's kind of a long drawn out link. If you have any problems with it, give me a phone call and you and I will sit there at the keyboards, you at yours and me at my keyboard and we'll go through it one keystroke at a time if that's what it takes for you to access this through our external web site.

Other ways of providing comments. That you may certainly also send snail mail, if you will, to the NRC staff. And I would ask that you use the address that's on this slide. The Chief of our Rules and Directives Branch, one of the advantages of using that part of our staff is that guarantees that your comments will go into the public record.

And if just by chance somebody happens to be in the area of Rockville, Maryland, during the comment period, you're certainly welcome to stop by and make comments to me. I will jot them down and they will go into the public record. And also we have established an e-mail address for the expressed purpose of receiving comments on the Quad Cities license renewal environmental review. And that e-mail address is at the bottom of the slide there. And I'm the person that opens up that e-mail address every day. And if I'm not in, there's two other, two or three other people who have access to it. And you may certainly do that. Anything that comes in by way of e-mail will become part of the official record.

And there's kind of an underlying thought on ways that we will and will not accept public comment. Bottom line is we want it in a form that we can make it a matter of public record, which means at the open house out here, preceding this meeting. We would discourage you from coming up to one of the staff with your comments unless you had a piece of paper to hand to us. We want it to be something that can be made a matter of record. And words that just disappear into the air don't fit that.

If you have any documents that you would like attached to the transcript that is being developed for this meeting, give those documents to me and I will attach those documents to the transcript as long as it is not completely impractical, if it's not three ring binders full of stuff.

This concludes my prepared remarks and if there are any questions, I'd be happy to entertain them. Otherwise, I'll turn it back over to Chip.

MR. CAMERON: And Duke, just to put another sort of a slant on what you said about discouraging comments, you're not talking about discouraging people from talking to us about issues. But if they want to get their comment on the record they should do it in here or in writing.

MR. WHEELER: Absolutely. If it's a comment that's substantive, it's related to one of the environmental disciplines that we examine. If you meet me outside in the hallway and just say, hey, I know of four more bald eagle nests within eight or ten miles of the site, I would ask, at a minimum, that you either write that down and hand it to me and I'll put it on the transcript or take

my e-mail address, go back to a keyboard, send it in to me, give it to me in some form that I can get it into the record.

Now, if it's a comment about general process, well, how long does it take to get the environmental impact statement out? How sacred is that July date? That I don't take as a comment on the substance of the environmental review. And we can talk that over the telephone or face to face without it having to be written.

MR. CAMERON: Okay. And just one other question in terms of the comments that do come into us, Duke, can people look at the web site and see what comments other people have submitted? Is that part of the public, you mentioned it's part of the public record. But is it part of the public record then so that people can look at them.

MR. WHEELER: Yes, after a fashion. Now, people cannot get into this e-mail address and go look and see all the e-mails that's been received. However, I will print out that e-mail and I'll send it over to our document control people. And, you know, with a specification that this be scanned into the public record. And then you get into another arena that a lot of people have come to know and love with the NRC, the ADAMS, Agency Document Management Access System. And that is publicly available. So after a period of time through a process, yes. If anybody here would like to see what I received at that e-mail address, you'll be able to do it. What I would strongly suggest doing is getting on the phone with me telling me of your interest and I'll help you through it.

MR. CAMERON: That's great, Duke, to offer to do that. Thank you very much.

Are there any final questions before we go to hear from those of you who wanted to make comments? Any questions for Duke about schedule and as Mr. Whitt question emphasized, the answer to that question is that the environmental review is one part of what the NRC looks at in making its decision on the license renewal application. There's also the safety evaluation that Kimberley talked about.

Questions? Okay, thank you very much, Duke. And we have three commenters. And there's Leslie Perrigo from IECAN and then we're going to go to Joshua Whitt — Bohnsack? Okay, great. So we're going to go to Leslie Perrigo first and then we're going to go to Mr. Timothy Tulon from, he's the Site VP, Vice President, Site Vice President at the Quad Cities Nuclear Power Station.

So, Leslie, would you like to come up here and talk to us please? Thank you.

MS. PERRIGO: Hello. I'm Leslie Perrigo. My organization is IECAN, as I said, Independent Environmental Conservation and Activist in that work. We work on energy reform and public issues, sort of like a much smaller version of Public Citizens.

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QC02-1 | There are a couple of concerns which I feel need to be addressed as they are legitimate concerns that relate directly to the health, safety and general well being of the environment surrounding the Quad Cities Nuclear Power Station. Regarding plant performance, failure to comply with the NRC procedures and complete basic routine maintenance on schedule has incurred preliminary wear and irreversible damage to vital reactor components increasing the possibility of a mechanical failure and the likelihood of a major accident.

| In June of 1996 a fine of \$100,000 was proposed against the utility for failing to correct design deficiencies for components in one of the plant's emergency core cooling systems. Modifications to pipe supports and structural steel in the 1980's had resulted in additional loads on steel beams. In some cases, exceeding those permitted in the original plant design. These deficiencies were not corrected until 1996.

| In June of 1997, a fine of \$50,000 was proposed for deferring repairs to the interior and exterior siting of the reactor building at Quad Cities Nuclear Power Station. Both interior and external siting are needed for the reactor building to fulfill its designed purpose, which is containment.

| In 1998, the NRC proposed fines in excess of \$450,000 for failure to implement an adequate program for monitoring maintenance, failure to develop adequate procedures and systems to safely shut down the Quad Cities Nuclear Power Station and for performing pressure tests of the interior reactor vessel in piping after the reactor had started up instead of before the reactor start up in order to detect any leaks in the reactor vessel and piping, which is the NRC regulation.

| Between June of 1999 and September of 2002, the utility neglected to correct multiple switch failures, which impacted the availability, reliability and capability of equipment used to respond to initiating events and prevent undesirable consequences from a plant fire. In March of 2003, the NRC staff identified a number of human performance issues, including damage to a control drive pump due to improper setting of a lubricating device, failure to recognize the unit to shut down cooling system was inoperable for several months and several instances of valves being placed in the wrong position.

QC02-2 | These are but a few of the events which have increased the amount of [undistressed] on the reactor components and accelerated the aging process. The NRC has confirmed that age-related degradation of boiling water reactors will damage or destroy vital internal components well before the standard 40-year license expires. Yet the readiness of the industry to meet the projected maintenance and repair challenges is unclear.

QC02-3 | For some components as in 1994, methodologies were still in the conceptual phase of development. The course route is one of many safety related components that may be damaged or destroyed by age related degradation and boiling water reactors. A German utility operating a General Electric Mark 1 boiling water reactor of the same design as Quad Cities 1

and 2 where extensive core shrouding was found estimated the cost of replacement at \$65 million. Germany's oldest boiling water reactor was closed in 1995 after German nuclear regulators rejected a plan to repair rather than replace the cracked core shroud. Extensive core shroud cracking was discovered at Quad Cities Unit 1 in 1994. Reactor aging will require a major continuous effort by the industry officials to anticipate emergent age related problems and resolve them before they become a crisis. By dealing with the whole problem of age related degradation now, Federal and State regulators can insure the safety and engineering implications of multiple failures in boiling water reactors.

QC02-4 Lastly, the continued operation of any General Electric Mark 1 boiling water reactor relies upon a nuclear waste storage and cooling pond that is elevated six to ten stories up in the reactor's secondary containment building and does not appear to have any significant structure to reduce the likelihood of penetration by deliberate attack. Only four of the 103 operating nuclear reactors in the United States have design features intended to resist aircraft impact.

Mark 1 and 2 and Seivert Reactors have design features that intend to resist aircraft impacts up to six times and Three Mile Island, Unit No. 1 was designed to resist aircraft impact up to 90 times. No other US reactor was designed to withstand aircraft impact.

QC02-5 The identified structural vulnerability of Mark 1 radiated fuel storage and cooling pond constitutes an unreviewed safety issue. Attack on a reactor could lead to rapid onset — with open containment and a raging fire. An NRC study concluded that a generic estimate of 100 percent of the radioactive isotope — 137 in the field pool would be released in the event of a spent fuel pool fire. A spent fuel pool contains, a full spent fuel pool contains 74 million curies of — 137.

QC02-6 Defense of nuclear facilities should be seen as a key component to Homeland Security. As such, spent fuel pools should be reequipped with low density racks and all other spent fuel should be hardened and dispersed throughout the site to make it a less attractive target.

QC02-7 In conclusion, I would just like to point out that the useful life time of a nuclear power plant is 25
QC02-8 years in actual practice. This comes directly from something we found on the NRC web site. It is becoming abundantly clear that aging of reactor components poses serious economic and safety risk at boiling water reactors. The General Electric Mark 1, in particular, has significant inherent design flaws and lost containment integrity during nuclear accident.

QC02-9 Under the circumstances, it would be prudent to retire the Quad Cities Nuclear Power Station in 2012 and seek out safer more financial viable solutions for the community. Thank you.

MR. CAMERON: Thank you, Leslie. And, Leslie, do you want us to put a, we can attach the written version if you want to the record.

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MS. PERRIGO: Yes.

MR. CAMERON: Okay. Good, thank you very much, Leslie, for those comments. Let's go to Mr. Tulon to talk to use for a few minutes.

MR. TULON: Chip, thank you. I appreciate the opportunity to comment today. And I just want to thank Leslie for her comments because it's important within our environment that we have a very open commentary and debate on the issue.

But really what I want to comment on here in closing is the property tax issue because the property tax issue is a very difficult issue for both sides. Taking a look at a little background on the topic is the laws in the State of Illinois have changed. And they changed in 1997 to the year 2000.

And basically what happened is you changed the way the plant was assessed from going from essentially cost minus depreciation to what's termed the fair market value. And so here's the question, right? Is what is the fair market value of Quad Cities. We listened to Chairman Bohnsack talk about this offer and this value. It's a very difficult question to come around with.

And we have publicly stated in the past, and I am publicly stating here again today is that we intend to pay taxes and that the position of zero assessment for Quad Cities is really an extreme position. So I would tell you is we remain committed to solving this issue going forward. And we recognize the impact that this potentially has on local taxing bodies. And we are optimistic that we can reach agreement that's going to minimize the impact of the tax issue on Quad Cities.

Chip, I appreciate the opportunity to comment, thank you.

MR. CAMERON: All right. Thank you. Because we do have some time left, Duke had mentioned the open house and the opportunity to talk to the NRC staff. I just wanted to introduce some of the other NRC staff that are here from Headquarters and the Region in case any of you want to have any conversations with them after we formally conclude the meeting.

And you know the people who spoke. From Headquarters we have Jenny Davis right here who is on the Environmental Review Team, License Renewal. We have Laura Zaccari, who's from our Office of General Counsel. Headquarters, Mr. Rich Emch back there. And Rich is a Health Physicist. If you have health physics types of questions, please talk to him. And we're lucky to have a strong contingent here from our Regional Office.

And I first want to introduce the Resident Inspectors for Quad Cities. And these are the people who really are at the plant. They live in the community. They're looking to make sure the NRC regulations are met. And we have Carla Stoedter. Carla is the Senior Resident. And we have

Mike Kurth who is with us right here. And also Laura Kozak, who used to be a resident here and now she is the Lead Inspector in our Region 3 Office for license renewal. And we have Mark Ring here who's a Branch Chief within the Reactor Projects Division. And Theresa Ray, who's right over here from our Regional Office too.

And I didn't know whether, if Mark or any of you wanted to say anything about anything that you heard today. I'm not trying to put you on the spot but I just wanted to give you the opportunity if you wanted to say anything.

The staff is here and if you want to talk to them, please do so. And I just thank all of you for coming out and I'm going to turn it over to John. Do you want to say, John Tappert, say a few words to close the meeting out?

MR. TAPPERT: Just to thank everyone for coming out today. And notwithstanding Duke's caveats on the formal commenting process, if anyone wants to stay after the meeting and discuss any issues, we'll be happy to do that. And thanks again.

MR. CAMERON: We're adjourned.

Transcript of the Evening Public Meeting on December 16, 2003, Moline, Illinois

MR. CAMERON: Good evening, everyone. And welcome to the NRC's public meeting tonight. My name is Chip Cameron. I'm the Special Counsel for Public Liaison at the Nuclear Regulatory Commission. And it's my pleasure to serve as your facilitator for the meeting tonight. And in that role I'll just try to make sure that all of you have a productive meeting.

And the topic tonight is the Draft Environmental Impact Statement that the NRC has prepared to assist it in its evaluation of the license application that we got for renewal of the Quad Cities operating license from the Exelon Company. Our format for the meeting is fairly simple. We're going to give you some background information. We have a number of presentations tonight on the NRC process and also on what the conclusions and findings and analysis are that are contained in the Draft Environmental Impact Statement.

We also want to hear from any of you who want to make a more formal comment on the record for us tonight on any of the issues in the Draft Environmental Impact Statement. And ground rules, if you have any questions or whatever, just signal me. I'll bring you this cordless microphone. Tell us who you are and your affiliation if appropriate. And we'll capture that on a transcript. Mr. Ron LeGrand is our stenographer tonight. That transcript of this meeting will be available, publicly available for anybody who wants to see it.

And the agenda is going to start out with Mr. John Tappert, who is the Chief of the Environmental Section in the Office of Nuclear Reactor Regulation back at NRC Headquarters

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in Rockville, Maryland. John's going to give you a formal welcome. And then we're going to move to Kimberley Corp, who's here, who is also with the NRC at NRC Headquarters in our Office of Nuclear Reactor Regulation. Kimberley is the backup Project Manager on the evaluation of the Quad Cities license renewal application, on the safety evaluation. And you'll be hearing there's an environmental evaluation. There's a safety evaluation to aid us in making a decision on whether to grant the renewal. And Kimberley will tell us about the overall license renewal process.

We're then going to focus in on the environmental review process. And we do have the project manager for the environmental review for the Quad Cities license renewal and that's Mr. Duke Wheeler. He's right here. Also, Office of Nuclear Reactor Regulation. Then we'll go on to you to see if there are any questions about the license renewal process.

And then we're going to get into some substantive conclusions. We're going to have Mr. Bruce McDowell, who's right over here. And Bruce is the team leader for the group of experts that the NRC has helping us to prepare the Draft Environmental Impact Statement. Bruce is from Lawrence Livermore National Lab in California. And he leads the team of experts from labs around the country who have been looking at the environmental impact. He's going to tell you what's in the Draft Environmental Impact Statement. He's going to do a summary of that for you.

We have a short subject, so to speak, something called Severe Accident Mitigation Alternatives. That's part of the Environmental Impact Statement and Bob Palla from the NRC staff, again Office of Nuclear Reactor Regulation, is going to lead us through that. And then we'll go for questions. And then we'll go to those who might want to make a formal comment. And if you decide to make a formal comment, just let me know. We've asked people to sign up in advance but we don't have a big crowd, so if the moment seizes you during the meeting, just let us know.

And thank you for being here tonight and we'll try to do our best to answer your questions. And we definitely want to listen to your comments. And I'm going to ask John to start us up.

MR. TAPPERT: Thank you, Chip. And good evening and welcome. And for those of you back from this afternoon, welcome back. My name is John Tappert and on behalf of the Nuclear Regulatory Commission I'd like to thank everyone for coming out tonight and participating in this process. I hope that you'll find the information we will share with you tonight to be useful and we look forward to receiving your comments tonight and in the future.

I'd like to start off by briefly going over the agenda and the purposes of tonight's meeting. First of all, we're going to provide a brief overview of the entire license for renewal process. This includes both a safety review as well as the environmental review, which will be the principle focus of tonight's meeting. Then we're going to present the preliminary findings of our

environmental review, which assesses the impacts associated with extending the operating licenses, the Quad Cities Units 1 and 2, for an additional 20 years. Then we'll give you some information about the schedule for the balance of our review and how you can submit comments in the future. And then finally, really the most important part of tonight's meeting where we receive any comments that you may have tonight.

But first let me provide some general context for the license renewal process. The Atomic Energy Act gives the NRC the authority to issue operating licenses to commercial nuclear power plants for a period of 40 years. For the Quad Cities units, those licenses will expire in 2012. And our regulations also make provisions for extending those operating licenses for an additional 20 years. And Exelon has requested license renewal for both units.

As part of the NRC's review of that license renewal application, we do an environmental review to look at the impacts on the environment for 20 years of extended operation. And we held a meeting here last April to seek your input early in our review and now we've returned, as we indicated at that earlier scoping meeting, to present the preliminary results in our Draft Environmental Impact Statement. And again, the real reason we're here tonight is to receive any comments that you may have on that draft.

And with that brief introduction, I'd like to ask Kimberley to give us more information on the safety review.

MS. CORP: Thank you, John. As Chip said, my name is Kimberley Corp and I'm the NRC's Backup Project Manager supporting the safety review of the Exelon's license renewal application for both Quad Cities in Dresden. Before I get into the discussion of the license renewal process, I'd like to take a minute to talk about the Nuclear Regulatory Commission in terms of what we do and what our mission is.

As John said earlier, the Atomic Energy Act of 1954 is the legislation that authorizes the NRC to regulate the civilian use of nuclear materials. In carrying out that authority, the NRC's mission is threefold. One is to insure adequate protection of public health and safety, two is to protect the environment, and three is to provide for common defense and security.

The NRC accomplishes its mission through a combination of regulatory programs and processes such as inspections, enforcement actions, assessment of licensee performance and evaluation of operating experience of nuclear plants across the country. The NRC's license renewal review is similar to the original licensing process in that it involves two parts.

The safety review, which includes a safety evaluation, plant inspections and independent review by the ACRS or Advisory Committee on Reactor Safeguards, as well as an environmental review, which Duke will discuss later. First you might ask what does the safety review

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consider? There are two types of safety issues, current operating issues which are dealt with now and aging management issues that are dealt with in license renewal.

Under the current operating license, the NRC's regulatory oversight deals with current safety issues. We do not wait for a plant to come in for license renewal before requiring them to address any issue. Because the NRC has or is dealing with those issues such as security or emergency planning, we do not re-evaluate them in license renewal.

The license renewal safety review focuses on aging management issues and the programs that the licensee has already implemented or will implement to maintain the equipment safely. The safety evaluation report is independently reviewed by the ACRS. The ACRS is a group of nationally recognized technical experts in the nuclear safety area that serve as a consulting body to the Commission itself. They review each license renewal application as well as the Staff's Safety Evaluation Report and form their own conclusions and recommendations and report them directly to the Commission.

The environmental review evaluates the impact of license renewal on a number of areas. These areas include, among others, ecology, hydrology, cultural resources and socioeconomic issues. As I said earlier, Duke will discuss the environmental review in greater detail next.

The next slide will discuss the license renewal process. You might ask, how does all this come together? This slide really gives a big picture overview of the license renewal process. And as you can see from this slide, the process involves two parallel paths; the safety review and the environmental review.

The safety review involves the NRC staff review and assessment of the technical information that's contained in the licensee's application. There's a team of about 30 NRC technical reviewers and contractors back at the NRC Headquarters in D.C. who are conducting the safety review right now. And the team is also supported by the technical experts at three different national laboratories including Argonne, outside of Chicago, Brookhaven in Long Island New York and Pacific Northwest in Washington State. So there's a lot of expertise in the team conducting this review.

The staff safety review focuses on the effectiveness of the proposed aging management programs for these plants systems, structures and components that are within the scope of license renewal. The NRC staff reviews the effectiveness of these programs to insure that the plant safety can be maintained throughout the license renewal term.

The safety review also focuses on the application's time limited aging analysis. Each original design analysis that had assumed a 40-year life must be reevaluated to extend the 40-year term to a sixty year life term for license renewal. This safety review process also involves audits and on site inspections. These inspections have been conducted by a team of

inspectors pulled together from both Headquarters as well as the NRC's Regional Office in Chicago.

The results of their inspections were documented in separate inspection reports. And the results of the staff's safety review as well as the results of inspections will be documented in the Safety Evaluation Report. And a copy of that will be provided to the ACRS for independent evaluation. Both the regional scoping and aging management review inspections have been completed. And we are in the process of writing the Safety Evaluation Report right now.

The second part of the review process involves an environmental review with scoping activities and developing a draft supplement to the GEIS, or Generic Environmental Impact Statement, for license renewal of nuclear plants. And this has been published for comment. And eventually we'll be issuing a final supplement to the GEIS for license renewal of nuclear plants which will address the comments that we receive here today at this meeting or in the future from any written comments.

So, as you can see from the slide, the final agency decision on whether to approve or deny the application will require a number of things. A Safety Evaluation Report, which documents the results of the safety review; the final supplement of the Generic Environmental Impact Statement, which documents the results of the environmental review as well as inspection reports that documents the results from the Regional inspections. All three of these reports will be factored in as well as the independent review of the ACRS into the final agency decision.

And that concludes the license renewal process.

MR. WHEELER: Good evening. I'm Duke Wheeler and I'm the Environmental Project Manager responsible for the environmental review that's being performed to support the license renewal application for Exelon for license renewal of Quad Cities Units 1 and 2.

The National Environmental Policy Act of 1969 requires a systematic approach in evaluating the impacts of proposed major Federal actions. Consideration is to be given to environmental impacts of the proposed action and mitigation for any impacts believed to be significant. Alternatives to the proposed action including taking no action on the applicant's request are also to be considered. Our environmental impact statement is a disclosure tool and it does involve public participation. The NRC regulations require that an environmental impact statement be prepared for license renewals.

Our decision standard, stated perhaps a bit more simply than what you read on this slide, is basically, are environmental impacts of the proposed action great enough that maintaining the license renewal option for Quad Cities Units 1 and 2 is unreasonable. And I'd like to point out at this time that we, the NRC, do not decide whether or not Quad Cities will operate for an

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additional 20 years. Other regulatory agencies and the licensee will actually make that decision.

Now, this slide is just an expansion of that bottom that you saw on Kimberley's, I think it's Slide 5 that you have, the bottom line was the path for the environmental review. This is an expansion of that. And basically where we stand in the process, the applicant did submit their application back in January the 3rd of this year through the *Federal Register* and other avenues. We publicized our intent to prepare an environmental impact statement.

One of the early phases of our process that's laid out by the National Environmental Policy Act was referred to as the scoping process. And there is an opportunity there for public participation. And basically the scoping process is, it's an activity whereby we receive comments from interested members of the public that help us to scope out the bonds of the environmental review for the various disciplines that we're going to be performing.

We also had a site audit. A team of environmental experts came out and visited the site in March. And also we had a public meeting in April, as John mentioned a bit earlier, another opportunity for public participation. And that was just a part of the scoping process.

After the site audit, if it's determined that we still don't have enough information for us to prepare our environmental impact statement, then we will send a formal request for additional information out to the licensee. We did that. They responded. We now have all the information we need. And we then published a draft of our environmental impact statement. And some of the alphabet soup here is GEIS. This is a Generic Environmental Impact Statement that we published several years ago. And it addressed, it gave common conclusions related to a lot of different environmental issues for license renewal of power plants across the country.

As each plant comes in for license renewal, we will publish a plant specific supplement to that Generic Environmental Impact Statement. And what I have published here in November is the supplement for Quad Cities Units 1 and 2. That's Supplement 16. And this meeting here is an opportunity for the public to provide us their comments on that Draft Environmental Impact Statement.

Once we get comments in from the public, and we'll go back, and because it's a draft, we'll take a look at it ourselves to see if there's any parts of it that need to be tweaked to be put into final form. And then July of 2004 we're going to be on schedule to publish our final environmental impact statement.

And I'd like to conclude my comments at the moment at this portion of it, turn the meeting back over to Chip. And then I'll be followed by our team leader, Bruce McDowell, who will get right into the real substance of what our environmental findings are. Chip?

MR. CAMERON: Okay, thanks, Duke. And before we get into the substance, let's see if there's any questions about the NRC process or about the NRC itself. Kimberley gave us a little bit of information on what our responsibilities are. And if you can just give us your name and affiliation, if appropriate.

MS. REGAN: Hi, my name is Molly Regan, and I'm with ICAN. And you made a comment, Duke, that other agencies and Exelon would be the ones that would determine whether this license is renewed or not.

MR. WHEELER: Right.

MS. REGAN: So does that mean that the NRC does not determine —

MR. WHEELER: Right, we do not.

MS. REGAN: What agencies then —

MR. WHEELER: State regulators have a say in whether or not the plant will operate and under what conditions.

MS. REGAN: But what other Federal agencies are involved in the final determination of issuing a license?

MR. CAMERON: I think that one thing we need to make clear here is that Duke didn't say that other agencies were involved in the decision to renew the license but whether to continue operating. In other words, the company needs an approval from the NRC in order to operate. But it's the company's business decision about whether they actually will operate and the State agencies who have an influence on whether the company will operate and at what rates. What agency is that, Duke?

MR. WHEELER: I would have to defer to the licensee, excuse me. If you're asking which State agency is the one that determines whether or not they can or cannot operate?

MR. CAMERON: Well, when you were referring to the statement that Molly was asking about and you said that other agencies and the licensee would be involved in whether the plant actually would operate.

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MR. WHEELER: My real message was although we issue the license to operate we are not the ones who make the actual decision as to whether or not they really do operate. It's our license that they must have in order to operate. But it's not our decision as to whether or not they actually will operate. That decision is a very large part up to, among others, the licensee.

MR. CAMERON: Is that clear, Molly? It's a distinction perhaps between the safety aspects of operation and the business economic aspects of operation. Do you want us to go further?

MS. REGAN: So is it the State where it's located? So it's just Illinois that has a determination in this? It's not any of — it wouldn't be like Iowa agencies would have anything to do with that?

MR. WHEELER: I would ask if there is a representative from Exelon here that can shed some light on who you have to deal with in order to get all the permissions you need to operate the plant. Can anybody —

MR. CAMERON: Fred, do you want to take a shot at this or?

MR. STORMER: Molly, to answer your question, I think the question that you're asking — I'm Bill Stormer, Site Communicator from Exelon Nuclear. I want to clarify your question. I think the question that you're asking, Molly, is who makes the decision whether to renew the license or not, who gives us the final permission as Exelon to operate the plant. Is that the question you're asking?

MR. CAMERON: You're going back to the NRC statement again.

MS. REGAN: Maybe I should read what I wrote down when Duke was speaking. Other agencies and Exelon will determine whether or not Quad Cities 1 and 2 will have their license renewed. And my question was what other agencies?

MR. CAMERON: Duke, and just to make sure that we know what you were saying, did you say that other agencies would make the decision about whether the license was renewed or —

MR. WHEELER: No.

MR. CAMERON: — they would operate. Okay. First of all, —

MR. WHEELER: Right. The decision on whether or not to renew the license is an NRC decision. Does that clarify anything?

MR. CAMERON: That's one thing.

MR. WHEELER: Once the renewed license then is issued, it's up to the utility and other regulators to decide what they want to do with what that renewed license will allow.

MR. CAMERON: John, do you want to try to shed some light on this for us?

MR. TAPPERT: Yeah, I don't know if I can or not but the point we're trying to make with that, the NRC is the sole regulatory authority for issuing the license, okay? So we're going to make the determination some time late next year whether to extend their license for another 20 years or not. The distinction that we're trying to make in the presentation is just because we extend that license to 2032, they may or may not operate during that period of time. They have a license to operate. You may have a license to drive. You may chose not to drive for any number of reasons. You don't have a car. You don't have, you know. They may decide for economic reasons it's not appropriate to continue to operate the facility but they have a license.

That's not to say that the NRC just issues a license and then walks away. There's a continuing and ongoing oversight process to make sure that if they do operate they will operate safely. I'm not sure if that helps at all but that was the point we were trying to make there.

MR. CAMERON: Okay. Thanks, Molly, for at least allowing us to try to clarify what we were talking about there.

How about other questions? Anything on process or the NRC before we go on to the findings? And if something comes up during the meeting, a question, we'll deal with it then.

Duke, thank you and Kimberley and John.

And now we're going to go to Bruce McDowell who's going to talk about the findings in the Draft Environmental Impact Statement.

MR. MCDOWELL: Good evening, I'm Bruce McDowell from the Lawrence Livermore Laboratory and I am the team leader for the team of experts that prepared the Supplemental Environmental Impact Statement for Quad Cities license renewal.

In the Generic Environmental Impact Statement for license renewal, the NRC identifies 92 environmental issues that are evaluated for license renewal. Sixty-nine of these issues are considered generic or Category 1, which means that the impacts are the same for all reactors or the same for all reactors with certain features such as plants that use water from large rivers.

For the other 23 issues, referred to as Category 2, the NRC found that the impacts were not the same at all sites and therefore a site specific analysis was needed. Only certain issues addressed in the Generic Environmental Impact Statement are applicable to the Quad Cities

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plant. For those generic issues that are applicable to Quad Cities, we assessed if there was any new information related to the issue that might change the conclusion in the Generic Environmental Impact Statement. If there is no new information then the conclusions of the Generic Environmental Impact Statement are adopted.

If new information is identified and determined to be significant, then a site specific analysis would be performed. For site specific issues related to Quad Cities, site specific analyses were performed. Finally, during the scoping period, the public was invited to provide information on potential new issues. And the team, during their review, looked to see if there were any new issues that needed evaluation.

For each issue identified in the Generic Environmental Impact Statement, which I'm going to call the GEIS, an impact level is assigned. These impact levels are consistent with the Counsel on Environmental Quality. For a small impact the effect is not detectable or too small to de-stabilize or noticeably alter any important attribute of the resource. For example, the plant may cause loss of adult and juvenile fish at the intake structure. If the loss of fish is so small that it cannot be detected in relation to the total population in the river, the impact would be small.

For a moderate impact the effect is sufficient to alter noticeably but not de-stabilize the important attributes of the resource. Using the fish example again, if losses of intake cause the population to decline and then stabilize at a lower level, the impact would be moderate. And finally for an impact to be considered large, the effect must be clearly noticeable and sufficient to de-stabilize important attributes of the resource. So if losses at the intake cause fish population to decline to the point where it cannot be stabilized and continually declines, then the impact would be large.

As Kim said earlier, there's a team with a broad expertise that wrote this supplemental environmental impact statement. And these are some of the areas, these are the areas that we addressed in our analysis. The staff has considered information from a broad range of sources during the development of this supplemental EIS. We have considered the licensee's evaluation of environmental impacts that was submitted with the license application.

We have conducted a site audit during which the staff visited the plant and interviewed staff personnel. We talked to Federal, State and local officials as well as local service agencies. In addition, we have also considered all the comments received from the public during the scoping period. These comments are listed in Appendix A along with the NRC responses. The information received from all these sources is the basis for the analysis and a preliminary conclusions in the draft EIS that you have in front of you.

In Chapter 2 of the draft supplemental EIS, we discuss the plant and the environment around the plant. In Chapter 4 we looked at the potential environmental impacts for an additional

20 years of operation for the Quad Cities nuclear station. The team looked at issues related to the cooling system, transmission lines, radiological impacts, socioeconomic impacts, ground water use and quality and threatened and endangered species. Each of these issues are discussed in detail in the draft supplemental EIS. I'll take just a few minutes to identify the highlights of our review.

One of the issues we looked closely at is the cooling system for the Quad Cities plant. This is the layout of the cooling intake and discharge canals. Although there are a number of Category 1 issues related to the cooling system, and remember that we said the Category 1 issues are those that have been determined to have the same significance for all plants. No new and significant information was identified during scoping by the applicant or the staff during the review of the issues.

The issues that the team looked at on a site specific basis include entrainment and impingement of fish and shellfish, heat shock and enhancement of microbiological organisms. Potential impacts in these areas were determined to be small and additional mitigation is not warranted.

Radiological impacts are a Category 1 issue. As you recall, this means that NRC has made a generic determination that the impacts resulting from radiological releases during nuclear plant operations are small. But because it is often a concern of the public I wanted to take a minute to briefly discuss it. During the site visit we looked at the effluent release and monitoring program documentation. We looked at how the gases and liquid effluents were treated and released as well as how the solid waste were treated, packaged and shipped. This information is found in Chapter 2 of the Draft Supplemental EIS.

We also looked at how the applicant determines and demonstrates that they are in compliance with regulations for a release of radiological effluence. The licensee monitors the near site and on site locations for airborne releases and direct radiation. There are other monitoring stations beyond the site boundary including locations where water, milk, fish and food products are sampled. Releases from the plant and the resulting off site potential doses are not expected to increase on a year to year basis during the 20-year license renewal period.

No new and significant information was identified during the staff's review. The public's input during the scoping process or other evaluation or the evaluation of other available information.

The generic EIS determines that the impacts of the 69 Category 1 issues were small based upon the information known at that time. As part of my team's review we looked at all information collected during the scoping process to identify any information that was both new and significant with regard to any one of these 69 issues.

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We looked at the information developed by the licensee, information developed independently by my team and information received during the public comment process. We determined that none of the information was both new and significant. Therefore, the conclusions of the generic EIS are adopted in this draft supplemental EIS.

The last issue from Chapter 4 I'd like to discuss is that of threatened and endangered species. The only Federally listed aquatic species that currently occurs in the vicinity of the Quad Cities plant is the Higgins eye pearly mussel. The essential habitat for this species is located about one mile downstream from the site.

There are a number of terrestrial species listed as threatened or endangered that could occur in the range of the Quad Cities site and transmission lines. These include the bald eagle, Indiana bat, the river otter, the Iowa pleistocene snail and the western hognose snake. During winter migration, bald eagles visit open water in the Mississippi River caused by the plant's thermal discharges. They also use the area for summer nesting and there is a known nest about eight miles north of the site.

The Indiana bat, river otter, Iowa pleistocene snail and western hognose snake could occur in the counties where the plant and the transmission line are located. Since the licensee does not plan any refurbishment or construction activities as part of relicensing, the natural area where these species would be found would not be disturbed. This would also be true for the three threatened plant species; the eastern and western prairie fringe orchid and the prairie bush clover.

Therefore, the staff's preliminary determination is that the impact of the operation on the Quad Cities plant during the license renewal period on threatened and endangered species would be small.

The staff also considered cumulative impacts. These are impacts that are minor when considered individually but significant when considered with other past, present or reasonably foreseeable future actions regardless of what agency or person undertakes the other actions. The staff considered cumulative impacts resulting from operation of the cooling system, operation of transmission lines, releases of radiation and radiological materials, sociological impacts, ground water use and quality impacts and threatened and endangered species impacts.

These impacts were evaluated to the end of the 20-year license term, license renewal term. The geographical boundary of the analysis was dependent upon the resource. For instance, the area analyzed for transmission lines was of course different than the area analyzed with the cooling water system. The staff's preliminary conclusion is that any cumulative impacts

resulting from the operation of the Quad Cities plant during the license renewal period would be small.

The team also looked at the uranium fuel cycle and solid waste management and decommissioning. All issues for uranium fuel cycle and solid waste management as well as decommissioning are considered Category 1. And for these issues, no new and significant information was identified and we therefore adopted the conclusions of the Generic Environmental Impact Statement.

Our team evaluated the potential environmental impact associated with the Quad Cities plant not continuing operation and replacing this generation with alternative power sources. In 2001, Quad Cities Units 1 and 2 generated 13 billion kilowatt hours of electricity. The team looked at no action alternatives, — action alternative, new generation from coal-fired, gas-fired and new nuclear, purchased power, alternative technologies such as wind, solar and hydro power and then a combination of alternatives.

For each alternative we looked at the same types of issues. For example, water use, land use, ecology and socioeconomics that we looked at for the operation of Quad Cities during the license renewal term. For two alternatives, solar and wind, I'd like to describe the scale of the alternatives that we considered because scale is important in understanding our conclusions.

First solar. Based on the average solar energy available in Illinois and the current conversion efficiencies of photovoltaic panels, these cells would produce about 100 kilowatt hours per square meter per year. As such, about 120 million square meters or about 46 square miles of cells would be required to replace the generation from the Quad Cities plant.

Regarding wind power, wind turbines have capacity factors of between 30 and 35 percent. As such, at least 4,200 megawatts of wind power would have to be developed to replace Quad Cities' 1800 megawatts. To put this in context, in 2002, total wind power capacity in the United States was 4,500 megawatts. In other words, the total wind power in the United States would have to double to replace the generation of the Quad Cities.

Due to these scale issues and other siting requirements of reasonable alternatives, the team's preliminary conclusion is that the environmental impacts of alternatives, at least in some impact categories, reach moderate or large significance.

So to review; in their Generic Environmental Impact Statement, NRC examined environmental issues at all sites and found that the same conclusion could be made for 69 Category 1 issues. In our analysis we found no information that was new and significant and we adopted the GEIS conclusions. We also performed site specific analysis for Category 2 issues applicable to Quad Cities. And lastly, we found no new impacts that were not discussed in the GEIS.

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To summarize our findings; for the 69 Category 1 issues presented in the GEIS, again we found no information that was new and significant. Our team analyzed the remaining issues in the supplemental EIS and we found the environmental effects resulting from these issues were also a small significance with one exception. On one segment of the transmission line the induced currents were calculated to be six miliamps. Since this slightly exceeds the national, the NESC standard of 5 miliamps, we judge the impact to be a moderate significance. Since this line is not owned by the licensee, NRC has notified the owner of its findings.

Lastly, we found that the environmental impacts of alternatives, at least in some impact categories, reached moderate or low significance.

Now, I turn it back to Chip, see if there's any questions.

MR. CAMERON: Okay, thanks, Bruce. Bruce talked about the number of different categories of environmental impacts that the NRC looked at, including alternatives. Are there any questions about some of the potential impacts, findings of the Draft Environmental Impact Statement?

Yes, sir. And if you can just give us your name, please.

MR. BROWN: My name is Bennett Brown. I'd like to know more about how the directory expense system of this plant in particular was considered in the plant's specific environmental impact statement.

MR. MCDOWELL: The which?

MR. CAMERON: Can you just state that again for us?

MR. BROWN: The Quad Cities plants both are Mark 1 Reactors from General Electric. And their containment system, that the primary containment, is a concrete shell designed to contain the reactor under high pressure. The secondary containment is a one million gallon donut shaped tank of water under ground. And in the '70's, after five years of operation, these reactors were identified as having been designed incorrectly. The tank was recognized as being under sized and a recommendation was made by the NRC that modifications needed to be made to all of those 18 plants because there was a 90 percent likelihood that if called upon in the event of an accident that that secondary containment system would fail, the 90 percent likelihood that it would fail.

To address that problem the Mark 1 owners, the collaboration of companies that own Mark 1 reactors from General Electric, came up with a solution which was approved by the NRC as a patch work fix to the design of these plants to bypass containment in the event of an accident

by connecting the torus, the donut shape tank of water, to the stack so that if the pressure in the cooling, the secondary cooling tank in the torus builds up above 30 PSI, the reactor operates under several hundreds of PSI, I believe. If the pressure in that donut shaped tank rises above 30 PSI, then a plug is blown and butterfly valve at the option of plant control operators can be opened to the stack. And then the emissions are released to the atmosphere directly bypassing the containment.

I'm wondering how that modification, my question then is how is that modification to the original plant taken into consideration in your analysis of the risk of radioactive release to the public?

MR. CAMERON: Okay, and thank you, Bennett. And I think there's at least two parts to this and we're going to go to Bob Palla. But the first part, Bob, is to comment on Bennett's characterization of the issue. And I think the second part is is that an issue that the NRC deals with under the normal operating regulation framework or is it something that would be looked at in terms of license renewal either in the safety evaluation or the environmental impact statement.

MR. PALLA: Yes, let me explain. And it's a fairly accurate characterization of what this system is. It may be called a Torus Vent system. And it's true that the owners group at NRC's urging, all of the Mark 1 plants with maybe some exceptions on — there may be an exception with an isolation Mark 1 plants. But they implemented a venting system that would allow the Torus pressure to be relieved in certain events. And by relieving the pressure, in essence you have a controlled release and you avoid a catastrophic rupture of the containment, the primary containment or the torus itself.

The types of sequences that this vent was intended to address are beyond design basis. These involve multiple failures of the containment heat removal system. And the scenario that typically forms a basis for this plant improvement is a scenario in which the containment heat removal is completely lost and for an extended period of time. And I'm talking on the order of a day. It could be 24, 36 hours.

The reactor scrams. There's no heat removal from the torus where the heat would normally be drawn from and put the heat exchangers in release. So over time the water in the torus would heat up, boil, create a bunch of steam and then gradually over pressurize the containment unless it was vented. And all this time the core is still being kept cool. Water's being injected to the core. But it's being steamed into the containment and the pressure's increasing. So this vent system was installed to allow the containment to be vented without a loss of the containment function.

And if you lost the containment and if you lost the torus, you could drain the water out of the torus and lose, this is the water you want to have so you can inject it to the core. So, this is,

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again, it's beyond design basis accident. It's picked up typically in a probabilistic risk assessment study, you would look at that class of accidents.

Before the vent was installed, these accidents would go out to about 24 hours or so, leave the containment failure. The core is cooled at that time but then, as a result of the containment failure, you'd lose injection to the core and then you'd have a core melt. So, you know, at about a day, you know, a little after a day.

With this vent system installed, again, you're going to have to lose containment heat removal for over a day before you get into the situation. But with the vent, you'd vent the containment and conceivably would just keep injecting until eventually you would recover containment to your removal and you would not melt the core. You would just vent the containment. It's a clean release, so to speak. Core melt hasn't occurred yet.

MR. CAMERON: And this venting system, is this something that's dealt within the license renewal aging analysis, I guess is the next question or the environment impact statement.

MR. PALLA: It's not really an issue for, it's not an aging related issue. It's a facet of the design now that has been implemented, taking into account risk considerations and severe accident analysis. So, it's in essence a system that would prevent an accident from going to core damage as a result of containment failure. That's why that system was put in place.

MR. CAMERON: Okay, so, Bennett, I think that the answer to the question is, from what I understand —

MR. PALLA: That was a short answer.

MR. CAMERON: — it won't be dealt with in the License Renewal Aging Program or the Environmental Impact Statement. And perhaps, Bob, —

MR. PALLA: Let me just suggest how is it — it's not part of anything done in any of the environmental review other than if you've looked at just the severe accident mitigation alternative write up in Chapter 5, or back in the Appendix G, we look at the risk profile for the plan. And the risk profile would include — it has a, every plan has a risk profile, which is in essence a number of unique ways that you can end up with core damage and releases to the environment. And each one of those is assigned a frequency of occurrence and a source term, the quantities of fission products that would be released.

And there is a class of accidents that involve this loss of containment heat removal that would be identified. There would be a certain frequency assigned and a source term would be

assigned to that that would correspond to the release as it would occur. So there is a source term and a frequency assigned. And this is one of the components of the risk profile.

That's the starting point for the SAMA analysis. We look at that risk profile and then say, is there some way we can identify a further way to reduce the risk?

MR. CAMERON: You're going to talk about not this particular problem, necessarily, or issue but you're going to talk about the SAMA program in the next presentation. And Bennett, let me ask you if you have a follow up.

MR. BROWN: I had several questions, I guess, that arise as a result of this. But before proceeding I'd like to ask a procedural question. Are my questions in this section recorded in the comment section that will be appended to the SEIS?

MR. CAMERON: This is, this is on the record. And the transcript will show this. Often during the question and answer period someone will ask a question that implies a comment about something that we should look at. When that does happen, we treat that as a comment. We look at that issue. So, in other words, it doesn't have to be made formally characterized as a comment.

Is that the question you're asking?

MR. WHEELER: I think, Bennett, possibly before you came in, it was pointed out this meeting is being transcribed. We have a transcriber that's getting all this down. And I'll get a copy of the transcripts. And first of all, I'll put those transcripts in the public record. But then in preparing the final Environmental Impact Statement that will be issued in July, all of these comments will appear in Appendix A of that final.

To the extent that it is practical, I will just block feed right out of the transcript into the Environmental Impact Statement. If it gets so long of a project that the document becomes unwieldy, then I reserve the right to summarize at least somewhat. But the substantial substance of what is being said here will go into the final Environmental Impact Statement at Appendix A.

MR. CAMERON: Whether it's offered during the formal comment part of the meeting or was offered during the question and answer, right?

MR. WHEELER: Oh, absolutely, yes. Or any one of other ways that I'll get into a little later.

MR. CAMERON: I think that's what the concern is.

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Do you want to ask — okay, go ahead, Bennett.

MR. BROWN: I'm grateful for your time here and I don't want to take too much of it but it's an issue that's important to me and I think it's a critical question concerning this particular reactor. So if you'll bear with me and dwell on the question for a moment. I'm grateful for your help over the last several months in understanding the process related to this particular plant.

I have several questions that were raised by your explanation. One is that, you mentioned that it's a gradual build up of heat. And as I understand the calculations, an 800 megawatt plant, if it fails to scram for any reason, if there were any failure to stop the reaction, and I'm not talking about a super critical event. I'm simply talking about for one reason or another the plant needs to scram, for instance, the grid were to fail and the plant has nowhere to deliver that power and therefore needs to shut down the power so that the heat that is being generated will not boil the cooling water. So the plant needs to scram.

If that scram were to fail, how many seconds will it take before the heat storage available in the torus, in this million gallon tank, is exhausted before the million gallons of water boils? And as a physicist it's a back of the envelope calculation. A million gallons of water is, you know, four times that gets you liters, which is kilograms. You multiply it by a thousand to get grams and you multiply it by four to get joules. And I think it's five minutes.

So I think in the event of a failure to scram, five minutes from that point, once blow down begins, once the process of blowing pressurized reactor steam into the torus begins, it would be five minutes before that torus boils. At that point pressures would rise very rapidly. I'm sure you'd agree and it would be a matter of seconds before the direct torus vent system, the system that directly vents the torus to the atmosphere would need to be deployed. So I wanted to clarify your characterization of gradual.

MR. CAMERON: Okay, let me, before you do that, Bob, I know that for at least some of us in the room that we are using technical terms like scram and things like that that people probably, some people, some of us don't understand exactly what that means. And, Bob, this is an important issue and to answer the question. And maybe if we do have one more follow up from you, Bennett, you can, you know, bring us back up to, you know, 50,000 feet sort of and tell us what the implications are of what you're saying so that everybody understands that. Bob?

MR. PALLA: Now, the type of accident that you're referring to, we call it an anticipated transient without scram. And that could occur to varying degrees. It could be a complete loss or it could be a partial loss of shut down. So if you completely lost the shut down function, you would be dumping a large quantity of heat into a pool that can only take so much. So it would be a matter of — I'm not sure that it would be five minutes or whether it would be, you know, an hour. But it would be a relatively short term event.

Now, let me go back to, I guess, just to put this kind of an accident in the right kind of box, this is, again, an accident that involves the failure of multiple safety systems, systems that were put there deliberately to prevent that kind of an accident. And that was rule that mandated certain things be done to address that kind of event because it would be a challenge to the containment integrity. And it would be a challenge to the integrity with or without this torus vent. The torus vent is not large enough to, in and of itself, relieve the pressure and have everything just maintained at an adequately low pressure. Even if the torus vent actuates, you're still going to over pressurize the containment in this scenario. And so I don't think it really affects the, ultimately. It'll have some influence but it won't have a radical impact on what happens in that event. If it's a complete loss of shut down, you're going to basically pump the containment up with steam and not be able to control the pressure in the containment with or without that vent. You'd have to have a vent that it would probably be about three foot in diameter to deal with the K heat levels that I think you'd have in that accident.

MR. CAMERON: Thanks, Bob. And let me ask John to try to put all of this and Bennett's questions and concerns in a context.

MR. TAPPERT: Yes, I just want to bring it back to what your original question was, was the vent considered in the environmental review and things of that nature. And the answer is, yes. I mean, Bob's next presentation up here is going to be about severe accident mitigation charges. And he looks at these beyond design basis. These very rare but potentially high consequence events. So that as in the Chapter 5 analysis, in the review. And in the Generic Environmental Impact Statement, we also looked at severe accidents.

So, obviously Bob can go into bone crushing detail in all these scenarios. He'd be happy to do that with you after the meeting, if you'd like. But the short answer is these scenarios were, in fact, considered and Bob's next presentation's going to cover some of that.

MR. CAMERON: Okay. So, after Bob's presentation, if you have more questions on this, let's go to those at that point, okay?

MR. BROWN: Thank you.

MR. CAMERON: All right. Yes, madam, and could you just tell us your name, please?

MS. MONAHAN: Dorothy Monahan. I just had a question about how you determine fatigue value of the properties over the 20-year period. I know personally that 20 years can be very debilitating.

MR. CAMERON: Okay. I think that's an aging issue for perhaps Kimberley. And Kimberley, is the question clear to you?

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MS. CORP: Right, she's asking about the fatigue analysis. And they reevaluate all of those figures and the staff does an independent calculations of their own from the data that is from the plant. They use actual plant data to — they use Reg Guide 1.99 sets out the guidelines for their fatigue analysis. And the results of that will be in the Safety Evaluation Report, which will be, the draft will be published in March of next year. So, currently that's under review right now.

MR. CAMERON: So, if someone wanted to see more details on how we do the fatigue analysis, they could look, first of all, at this regulatory guide that we have —

MS. CORP: Right.

MR. CAMERON: — 1.99.

MS. CORP: Yes, that is correct. But it'll be specifically in Chapter 4 of the SER when it's published, the Time and Aging Analysis.

MR. CAMERON: Does that give you somewhat of an answer? I mean, we have documents and analysis that deal with it. But does that answer your question or can we provide some more?

MS. MONAHAN: Yes.

MR. CAMERON: All right. And we'll make sure that we talk to you after the meeting, too, to make sure that we have given you as much information on that as possible.

Anything else on the Draft Environmental Impact Statement at this point?

Okay. We're going to go to Bob — well, Bennett, do you have a question that's not going to be addressed in this presentation? In other words, you have another question on the Environmental Impact Statement?

MR. BROWN: Not having heard your presentation yet, I have no way of being able to say that obviously. But I wanted to ask a brief straightforward question so that you could be sure to include this information in your presentation. In considering alternatives and comparing the option to continue the license of this plant versus other power sources, I just want to know where the consideration of this design flow is taken into consideration. So when you look at, for instance, building a new nuclear power plant that would not have this flaw, which is, I understand, it would be easy enough to build a new one that would not have this flaw from these early nuclear power plants. Just if you would, please, point out how the risk factor of an accident and the exposure levels to the public are reduced in that model versus the existing models.

MR. PALLA: You're probably have to come back to me with a more, you know — I probably won't hit that enough to satisfy you.

MR. CAMERON: Just let me ask a question of the staff before we go on there. In terms of Bruce's discussion, the discussion in the Draft Environmental Impact Statement on looking at alternative sources, I think at least we can answer the question of when you look at alternatives, for example, another nuclear plant, did you consider doing that analysis any specific design issues related to the nuclear plant or did you only, Bruce, look at — what did you look at when you look at an alternative for another nuclear plant?

MR. MCDOWELL: The alternatives, what our task was is to evaluate the environmental impacts of alternatives. We analyzed the environmental impacts of the operation of Quad Cities. We looked at the environmental impacts of the new nuclear plant, a coal-fired plant, a gas-fired plant and all the different range of alternative technologies. And we came to a conclusion on the environmental impacts of each one of those.

For probably part of the reasons that Bob is going to tell you about, the accident that you're considering I think is dealt with to the NRC satisfaction in the safety space and we didn't consider that specific thing you're thinking about to be an impact area. It was, it's a flaw that I think Bob can talk more about how it's being addressed.

So, I just leave that up to him.

MR. PALLA: Yes, I'll try to hit on that but we can talk some more if I don't.

Okay, you want to go to the next slide there?

My name is Bob Palla. I'm with the Probabilistic Safety Assessment Branch of NRC. And I'll be discussing the environmental impacts of postulated accidents. These impacts are described in Section 5 of the Generic Environmental Impact Statement or GEIS. The GEIS evaluates two classes of accidents; design basis accidents and severe accidents. The design basis accidents are those accidents that both the licensee and the NRC staff evaluate to ensure that the plant can safely respond to a broad spectrum of postulated accidents without risk to the public.

The environmental impacts of design basis accidents are evaluated during the initial licensing process and the ability of the plant to withstand these accidents has to be demonstrated before the plant's granted a license. Most importantly, a licensee's required to maintain an acceptable design and performance capability throughout the life of the plant, including any extended life operation.

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Since the licensee has to demonstrate acceptable plant performance for the design basis accidents throughout the life of the plant, the Commission has determined that the environmental impact of design basis accidents are of small significance. Neither the licensee nor the NRC is aware of any new and significant information on the capability of the Quad Cities plant to withstand design basis accidents. Therefore, the staff concludes there are no impacts related to design basis accidents beyond those discussed in the GEIS.

The second category of accidents evaluated in the GEIS are severe accidents. Severe accidents are, by definition, more severe than design basis accidents because they could result in substantial damage to the reactor core. The Commission found in the GEIS that the risk of severe accident in terms of atmospheric releases fall out onto bodies, open bodies of water and releases the ground water and societal impacts. These are all small for all plants.

Nevertheless, the Commission determined that alternatives to mitigate severe accidents must be considered for all plants that have not done so. We refer to these alternatives as severe accident mitigational alternatives or SAMA's, for short. The SAMA evaluation is a site specific assessment and is a Category 2 issue as explained earlier. The SAMA review for Quad Cities is summarized in Section 5.2 and described in detail in Appendix G of the GEIS supplement.

Now, the purpose of performing the SAMA evaluation is to insure that plant changes with the potential for improving severe accident safety performance are identified and evaluated. The scope of plant improvements that were considered include hardware modifications. And along that line of things like filter vents, which would be a similar type of vent for this hardened torus vent that we're talking about. But it would include an added filter. Large vents, larger sized vents that could accommodate anticipated transients without scram. These are the kinds of things, the hardware mods that we looked at.

Also looked at procedure changes, training program improvements as well as additional changes. Basically a full spectrum of potential changes. And the scope includes SAMA's that would prevent core damage as well as SAMA's that improve containment performance given that core damage event were to occur.

The SAMA evaluation process consists of a four step process. The first step is to characterize the overall plant risk and the leading contributors to risk. This typically involves the extensive use of the plant specific probabilistic risk assessment study or PRA. The PRA is a study that identifies different combinations of system failures and human errors that would be required for an accident to progress to either core damage or containment failure.

The second step in the process is to identify potential improvements that could further reduce risk. The information from the PRA, such as dominant accident sequences, is used to help identify plant improvements that would have the greatest impact in reducing risk.

Improvements identified in other NRC and industry studies, as well as SAMA analysis for other plants are also considered.

The third step in the evaluation is to quantify the risk reduction potential in the implementation costs for each improvement. The risk reduction and the implementation cost for each SAMA are typically estimated using a bounding analysis. The risk reduction's generally overestimated by assuming that the plant improvement is completely effective in eliminating the accident sequences it is intended to address. And the implementation costs are generally underestimated by neglecting certain cost factors such as maintenance costs and surveillance costs that would be associated with the improvement.

The risk reduction in the cost estimates are used in the final step to determine whether implementation of any of the improvements can be justified. In determining whether an improvement is justified, the NRC staff looks at three factors. The first is whether the improvement is cost beneficial. In other words, is the estimated benefit greater than the estimated implementation cost of the SAMA. The second factor is whether the improvement provides a significant reduction in total risk. For example, does it eliminate a sequence or a containment failure mode that contributes to a large fraction of plant risk. And the third factor is whether the risk reduction is associated with aging affects during the period of extended operation. In which case, if it was, we would consider implementation of the improvement as part of the license renewal process.

Preliminary results of the Quad Cities' SAMA evaluation are summarized on this slide. Two hundred eighty candidate improvements were identified for Quad Cities based on review of the plant specific PRA, relevant industry and NRC studies on severe accidents and SAMA analysis performed for other plants. Exelon reduced this set to a set of 15 potential SAMA's based on a multi-step screening process.

Factors considered during this screening included whether the SAMA is not applicable to Quad Cities due to design differences, would it involve major plant modifications that would clearly exceed the maximum obtainable benefit or would provide only a minimal risk reduction based on review of the PRA. A more detailed assessment of the conceptual design and costs was then performed for each of the 15 remaining SAMA's. This is described in detail in Appendix G of the GEIS supplement.

The cost benefit analysis shows that four of the 15 SAMA's are cost beneficial when evaluated in accordance with NRC guidance for performing regulatory analysis. All four cost beneficial SAMA's involve procedural improvements rather than hardware modifications.

As shown on the next slide, the cost beneficial SAMA's involve developing procedures to operate equipment locally following loss of 120 volt bus by using temporary connections to the

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second unit. The second procedure involves, that would be developed involves procedures to manually control feedwater given the loss of a 120 volt DC control bus. 120 volt DC losses are important in the risk profile in this plant. That's why these improvements come to the top.

The third procedural enhancement involves developing procedures to terminate reactor depressurization prior to loss of the steam driven reactor injection pump so that core cooling can be maintained. And the fourth improvement involves developing procedures to control containment pressure during venting in order to assure adequate suction head for the pumps that are used for core injection.

So of these four, for all of the four, none of these four SAMA's are related to aging or managing the effects of plant aging. And therefore, none of them are required to be implemented as part of license renewal.

So, to summarize, the NRC staff's preliminary conclusion is that additional plant improvements to further mitigate severe accidents are not required at Quad Cities as part of license renewal. It's necessary for me to point out, however, that even though they're not required as part of license renewal, the staff intends to pursue these improvements further with Exelon under the current operating license.

So, I can take any additional questions.

MR. CAMERON: Okay, thanks, Bob. Bennett, with that perspective, do you want to ask some more questions about the particular design feature that you're talking about?

MR. BROWN: I think I understand how you, to what extent you included the directory expenses to —

MR. PALLA: There were some specific enhancements targeted in that area. These, when one looks at the cost estimates for doing hardware fixes like that, they're hugely expensive. When you look at the probability of the accidents that you're dealing with, and let's take these ATWS events, for example. Their frequency's quite low. Like ten to the minus eighth. In Appendix G there's a listing of dominant contributors and this one isn't labeled as well as it might have been. But in Table G1 on Page G3, Appendix G, manual shut down, initiating events/accident class is the heading and there's an entry Manual Shut Down. I believe this is a failure to manually shut down the reactor. It's something like basically ten to the minus seven events per year.

You have to account for the frequency in accessing what is the, you know, how much benefit are we going to derive from spending a certain amount of money. So, you've got a combination of an event that could, in fact, have a large consequence associated but it's probabalistically weighted. And then the costs are compared to that. And these are very expensive mods.

These are multi million dollar fixes. So that is one of the mods that would be screened out in the early phases of this process.

MR. CAMERON: Bob, I hate to, I hesitate to ask but is there any way that when you talk about a frequency of ten to the minus seven, can you give the people an idea of what that means?

MR. PALLA: One in ten million years.

MR. CAMERON: Okay, thank you.

Any other questions on this SAMA's or on Bruce's presentation on the other types of environmental impacts at this point?

Okay, well, Duke is going to give us a few words on how you submit comments. And then we're going to on to you for some more formal comments. Duke?

MR. WHEELER: Thank you. First of all, to summarize what our preliminary conclusions are in this Draft Environmental Impact Statement, first of all, the environmental impacts of license renewal is considered to be small for all impact areas with the one exception of the North Nelson Line that Bruce had pointed out where the induced current was 6 miliamps compared to the National Electric Safety Codes specification of 5 miliamps.

The impacts of alternatives to license renewal range anywhere from small to large and we end up with our preliminary recommendation is that the environmental impacts of license renewal for Quad Cities 1 and 2 are not so great that preserving the option of license renewal is unreasonable.

This slide just has a couple of key milestones in our schedule here that are related to the environmental review portion of our schedule. I did publish the Draft Environmental Impact Statement on November the 4th. We are now pretty much in the middle of our public comment period, which will expire on January the 27th of next year.

And by the way, one comment that I'd like to say is that I'm not going to slam the door shut the close of business on January the 27th. Anything that I do receive by that date I will include in the final environmental impact statement and the comment will be addressed in the final. If I do receive a comment after January the 27th, then I will try to address it.

But we get to a point where it becomes impractical because for me to publish by July, there's a certain time when I have to get the manuscript over to publication. And backing up from there, there's preparation of the manuscript. Getting it staffed through all the people that need to review it and concur in it. And after January the 27th, I'll just give it my best shot but can't make

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any promises. And yet the last item on the slide there is that we do have a schedule that does provide for issuance of the final environmental impact statement in July.

This slide just identifies myself as your primary point of contact with the NRC staff for matters related to the environmental impact statement and our environmental review. The slide also indicates where in the local community copies of our Environmental Impact Statement can be found. The Cordova District Library, the River Valley District Library and then also the Davenport Public Library. And after we mailed this out, I did get on the phone with all three libraries and did verify that they had received their copies of it so it's there if you want to take a look at it.

The last item on this slide also indicates how if you want to get on the Internet, you can access our Environmental Impact Statement. And that link that's on the slide is a pretty long one but it works. I tried it. It works just fine. However, if you have any difficulties with it or for some reason just are frustrated at the keyboard, give me a call and we will go through it one small step at a time until you get what you're looking for.

Other ways that we can receive comments, you can certainly send a letter into the NRC staff that'll end up on my desk by so called snail mail. I would ask that you address that letter though to the Chief of our Rules and Directives Branch. And what that does is that guarantees that your letter will be put in the public record. Whether or not it goes to Rules and Directives or directly to me, I will nevertheless make sure that all comments that come in do get put in the public record.

It's a long shot but if by chance anybody happens to be in the Washington D.C. or the Rockville, Maryland area where our Headquarters is located, you can certainly stop by and visit with us personally. And I will receive your comments. Whether I write them down or you write them down, though, the comments, before you leave, will end up being put on paper, again, so that I can get them into the public record. Or you can send in comments to the NRC staff at the e-mail address that is at the bottom of the slide. This address was created for the expressed purpose of providing the public another avenue of communicating with the NRC staff on this environmental review.

Now, it's an e-mail address. It is not a bulletin board. So if somebody who makes a comment wants to see what other comments have been made by other people, you wouldn't be able to get that information directly off of, you know, by coming into us at that e-mail address. There are ways, though, that you can find out what other people have said. And that is we do have a document management system that I will feed all of this into which can be accessed through our web site and all the information can be found through that system. If you want to know what's been said either by e-mail or other letters that have come in. And, of course, the transcripts of this meeting will also be on that web site. If you're not real familiar with our

system and are planning to play with it for the first time, my strong recommendation is that you just call me first. It might save a lot of frustration.

That concludes my prepared remarks and if there are no questions, I'll turn it back over to Chip.

MR. CAMERON: Okay, thanks, Duke. And that part of the meeting where we ask any of you who want to make a more formal comment on the Draft Environmental Impact Statement to come up and talk to us.

And Molly, did you want to make a comment, Molly Regan? You weren't sure at the beginning. I was just checking in with you.

MS. REGAN: No, I'm fine.

MS. CAMERON: Okay. Let's go to Bennett, Bennett Brown to come up and talk to us. Or you can do it from your seat. Okay, thank you, Bennett.

Anybody else have a comment at this point? Are there any final questions about schedule or commenting or anything like that that people need answers to?

Okay, I just want to emphasize that we're ending early but the NRC staff, and we're going to go to Bennett in a second here, is the NRC staff will be here after the meeting to talk about any of these subjects informally. And we talked about environmental review, we talked about the safety evaluation. I just wanted to mention, just introduce some people on the inspection side of the NRC staff. And, of course, we do have resident, resident inspectors at every plant. And I wanted to introduce our residents at Quad Cities. Senior Resident Karla Stoedter and I'll probably never get that right, and Mike Kurth and they're our residents.

And we do in every region or at least in this region we do have a lead inspector for all the plants in the Region for license renewal and that's Laura Kozak, who's right here. And do we also have our Branch Chief from the Region 3 Office, Mark Ring, who is right here. And we have other NRC staff with us from Headquarters. So if you have some questions, we have the people here to answer them.

And let me go to see if Bennett has another question or comment for us. Bennett?

MR. BROWN: I do have a couple other comments. I just wanted to give other people the opportunity to speak first since I had spoken during the presentation.

My comments fall into two categories and I'm really speaking under two different hats. The first is simply as a physicist interested in energy and safe reliable energy production. I studied

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physics at MIT. I had the opportunity to work briefly in a reactor. I'm by no means afraid of nuclear reactors but I think it's extremely important that they be operated safely and that safe designs, that we restrict ourselves to safe designs.

The design of the Quad Cities plant concerns me, not the design, the Quad Cities plant at this point concerns me really on two different grounds. The first one I've spoken to. It's a design issue. And I think it's simply an outdated design. I think there were mistakes made when the design was implemented. I think that the best attempt made possible has been made to correct those design problems so that the plant can live out its 40-year license period.

QC03-1 | And I don't feel as a physicist that it's appropriate to renew the license for a plant that bypasses such a fundamental component of its containment and safety systems. To give you an example, it was just this last April there was a scram. I found it shocking that you thought not many people in here don't know what a scram is. How many of you know what a scram is? Come on. Okay, okay, so significant. Forgive me for the antics. And it's appropriate. Everybody should be on board with the conversation.

Last April there was a scram at one of the two Quad Cities reactors. Scrams are hard on the plant's valves. The assert pressure transients. They're rapid changes in temperature and pressure throughout the reactor that's hard on materials just like it's hard if you heat up a piece of cookware and then stick it in the sink, it's likely to shatter under the sudden changes in temperature.

QC03-2 | Now, the plant is designed to be able to withstand a scram. But it still ages the plant and there are a number of scrams that have occurred at this plant over the years. The most recent one that I'm aware of, though I imagine it's probably not the most recent one considering the frequency with which they occur, was in April.

And in that incident a valve that connects the reactor core to the torus, that I was speaking of earlier, was open and stuck open. I'm not privy to the reasons that that valve was open or the reason that it was stuck open. It's a couple of systems to close it, both failed and a manual attempt to close the valve, as I understand, also failed. So the reactor was scrammed because steam was venting into the torus and that torus water was heating up.

At the time that the reactor was scrammed, the torus water had already heated up from what I presume is its normal temperature of ground temperature, which would be in the 50 Fahrenheit or 20 degree Celsius and it had already heated up to 95 degrees Celsius. Now, boiling of water occurs at 100 degrees Celsius.

The torus is designed to be able to not boil, to not have to vent to the atmosphere as long as the scram is initiated at a temperature that's 110 degrees or less. So it was already at 95 and

rising and they scrammed and they were successful in scramming. A scram, if everything goes correctly, takes just a few seconds. So no release occurred and it was business as usual and the plant returned to full power after the NRC returned to control the plant to Exelon the following day.

I believe all my details there are correct but I don't work at the plant. I see a couple of you shaking your head. Please —

MR. RING: There's probably several people that can talk to this. My name is Mark Ring and I'm the Regional Branch Chief and I think you got your Celsius and Fahrenheit values a little bit mixed up. I'd have to ask Carl or Mike probably but I think it started in the 70's somewhere, went to about 90 degrees or so. Actions were being taken and I think the high point was maybe around 110, 120, something like that.

MR. BROWN: Fahrenheit?

MR. RING: Right.

MR. BROWN: So the scram was initiated 95 degrees Fahrenheit and water — oh, this is the NRC log of the event. Okay, so the scram was initiated at 95 Fahrenheit. Water boils at 212 Fahrenheit and the plant is designed to be able to contain the problem as long as the scram is initiated at 110 Fahrenheit or less. And the water peaked at 118 Fahrenheit and there was no problem. Now I have the details correct.

I'm not going to speak anymore about the incident. I don't think it was a particularly unusual incident. I only raise it because I think that this is a serious problem with this reactor. Here we had one valve that failed, stuck open. And we were within 15 degrees Fahrenheit of the limit at which had we gone above that we would had to have vent the torus to the atmosphere, as I understand it.

QC03-3 I think it's unnecessary to continue operating a reactor beyond the year 2012 given that it has a fundamental design flaw. So that's the first of my objections to this particular reactor. And I would like to see the torus vent system addressed in the SEIS.

QC03-4 The second concern that I have is actually more alarming to me. As I say, I'm not an alarmist about nuclear power. I worked for many years with radioactive tracers in a biology lab. And this plant is aged. It's part of a fleet of boiling water reactors that have shown unexpected stresses due to radiation. After the first surprise event at which cracking of a core shroud was observed, I believe that that was in Ohio. Does anybody know, they can fill in the blank for me there? I think it was Davis Bessie but I just don't want to be citing things. I'm not speaking off of notes on this event.

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So a boiling water reactor was observed on inspections that weren't particularly routine to look for this so it was a surprise that there were cracks in the core shroud, the shroud that contains the core. And it was identified that they were of serious concern and a survey was undertaken by the NRC of other boiling water reactors in the country.

QC03-5 | The cracking was found to be widespread in the core shrouds and was a result of radiation exposure of the metals to the radiation from the core. This particular plant, the core shroud on one of the reactor cores exhibited severe cracking. The NRC classifies the cracking in this study as none, slight, moderate and severe. And at the Quad Cities plant the core shroud cracking was severe, in some cases with fissures up to a half of an inch in the core shroud wall and they hadn't yet penetrated through the wall but if they did, that would be a disastrous event.

QC03-6 | The core shroud is not the only component of the core that is subjected to this radiation and it's subjected to the type of aging that I'm speaking of. The components that concern me the most are the plates which keep the rods, both the control rods and fuel assembly rods in place so that if sudden insertion of a control rod is necessary, as it is every time a plant scrams, if those plates are worked or have crept or have buckled, all of these are consequences of radiation exposure of metals, then it's completely plausible that the control rods will be unable to insert as expected during a scram. If a plant fails to scram, the reaction continues and the heat has to go somewhere. That would be the torus, which brings me back to the design flaw of this particular plant.

QC03-7 | So, to summarize, I think there are two problems with the Quad Cities plants. Number one, QC03-8 they utilize an old flawed design that should be retired. And number two, they are subject to aging. That aging will be 40 years by the time of this license expiration. And the NRC study fairly clearly showed that reactors that were greater than 20 years old exhibited an unexpected spike in their aging characteristics.

To back up, when they look at the plant and looked at whether there was none, slight, moderate or severe cracking in the core shroud and presumably in other internal components of the core that were not so easily examined without full removal of all the fuel assemblies, they found the plants that were younger of 20 years mostly exhibited no aging of this type and plants that were more than 20 years old almost all of them exhibited cracking of this type.

QC03-9 | So I think to operate this for 40 years is iffy and I think to extend the license for 20 years is unnecessary. So that's the first category of my assignments and it's the first hat I'm wearing as a physicist.

QC03-10 | The second comment that I would like to make to the NRC and to be included in the SEIS concerns specifically alternatives considered in the impact statement. And I'd like to address specifically Section 8.2. So, in Section 8.2.3 you consider new nuclear power generation. And I

think it should be mentioned that there's a specific site being considered that Exelon has applied for an advance site permit for the construction of a new nuclear reactor in Illinois. And as you consider alternatives to this aged plant, I think it's relevant to mention that there is an alternative site already being assessed and considered by the NRC.

The second category of alternative I'd like to address is Section 8.2.5.2 and for those of you that have the appendix here, the SEIS draft, that's Pages 8-49 to 8-50. And that's about wind energy. And it's in this regard that I speak not as a physicist necessarily but as a board member and treasurer of the IWORLD Renewable Energy Association. I have been monitoring wind speeds in Iowa for a number of years. I live about 50 miles west of here, slightly north. And I'm part of an NSF funded study that looks at wind correlation.

QC03-11 And I find a section on considering wind energy as a replacement for the Quad Cities plants incomplete and in some cases misleading. So specifically what I would like to see you include in that assessment, you cite four reasons that wind is not an alternative to consider for nuclear power. And I'd like to address each one of those in turn, if you will give me the time needed to address that. I won't speak for long and I will be concise.

MR. CAMERON: Go ahead.

MR. BROWN: Thank you. The four arguments against wind that are advanced in the SEIS, in the plant specific environmental impact statement, the first one is that the power required to replace the Quad Cities plant is marginally present in Illinois. Specifically, this was the one point mentioned in today's presentations. Specifically that 4,200 megawatts would be needed to replace the plant capacity at Quad Cities.

And to be clear, with wind you have to distinguish between what is name plate on the turbine, you know, at the base of the tower, a one megawatt turbine, that's not what that turbine produces all the time because wind blows at varying rates. So that's the name plate capacity. And as was stated in your presentation, it would require 4,200 megawatts of name plate capacity of turbines to replace this nuclear power plant. That would, in effect, only be about 1,000 megawatts of consistent power production on average through the year.

So, 4,200 megawatts; that's a lot of power. Illinois only has 3,000 megawatts of Class 4 Wind Sites it says in the SEIS. That's probably not part of your field of knowledge since I see that most of you are within the nuclear realm. The Patel Class, the Department of Energy has classified U.S. land by how windy it is. The higher the number, the more the wind. A Patel Class 4 right now is developable. Wind farms are being built in the United States in Class 4 sites. Illinois has only 3,000 megawatts of Class 4 capacity.

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That's not enough. There are an additional 6,000 megawatts of Class 3 sites but those aren't as windy and therefore averaged over the year the cost per kilowatt hour is a little higher if you were to develop that wind. And utilities aren't interested in developing that wind for a good reason. They can put the turbine elsewhere to get more bang for their buck.

QC03-12 What's misleading is to use Illinois numbers. This plant, after all, is on the border of Iowa and Illinois. Illinois has a pathetic wind resource. I don't mean that to any detriment of Illinois but it's not a windy state despite Chicago's moniker.

Iowa is a windy state. In fact, Iowa has enough Class 4 and better sites to replace the Quad Cities, both of the Quad Cities plants 20 times over. Furthermore, north of Iowa, in the Dakotas, we could easily power the entire Midwest on turbines. The only issue would be how do you get the power to the population centers? The areas that are easily developed in the Dakotas are not on transmission lines so part of the cost of developing those turbines would have to include transmission.

So the first point here that sufficient power is marginal I think is incorrect. There is more than enough wind power in the vicinity to replace the Quad Cities.

Second, the NRC document mentions that it is enormously, and this is a quote, enormously expensive to develop these wind resources. I had the opportunity on Friday to attend the Midwest Regional Wind Collaborative. It was a meeting of about 15 people that included utility commissioners from Montana, the Dakotas, Minnesota. It also included legislators from as far south as Kansas. And the purpose of this meeting was to develop a regional plan for developing our wind energy resources and delivering them to market.

The subjects were broad ranging from how to develop it to how to monitor tradeable permits and so on. At that meeting were many utilities. I spoke with a person from Bason [?] Electric, a fairly large rural electric cooperative within what was formally the Map Region. It's a portion of the grid. And this fellow confided in me that a price that they were able to bring wind energy to market. So I will share with you what he gave to me as a public figure, which is that they are currently producing wind at two cents to two and-a-half cents per kilowatt hour.

That figure is flat for 20 years. So for the next 20 years they will be able to produce, and their total production is in the hundred megawatt range of wind. So it's sizeable. Two to two and-a-half cents of kilowatt hour is small when you consider that that includes capitalization of the turbine, it includes the transmission and roads necessary. It includes the interest on the capitalization. It includes the operation and maintenance. And it includes the fuel, which of course is free.

So, two to two and-a-half cents is definitely cost competitive with even a gas turbine, let alone a new nuclear power plant particularly if you omit the Price Anderson Act under which the nuclear industry has collectively said that nuclear power would not be economically feasible to develop if the nuclear industry had to carry liability for any accidents that were to occur.

QC03-13 So, I think to say that it is enormously expensive to develop is only correct in a silly expense. It is expensive. Power's expensive. It takes a lot of money to build a new nuclear power plant. It takes a lot of money to operate a nuclear power plant and it takes a lot of money to develop wind. But to compare it to other fuel sources I think is simply false. It's not economically expensive to develop in comparison with other fuels. It is economically viable.

QC03-14 The third point that the NRC document brings up is that the land use of turbines would be significant. And I bring this up because it is, after all, an environmental impact statement. Wind may be cheaper. It may not have the risk of accidents. We may not have to deal with the tailings from uranium mining or the terrorist problems with a power plant nor the storage problems with the waste. But wind turbines will take up land. A two megawatt turbine takes up about a quarter of an acre of land that you can farm right up to the turbine.

If you were to replace the Quad Cities plants, they would take about a square mile. It's not a significant consumption of land and it is an environmentally responsible consumption of land. It is a good neighbor to the farmers. In fact, farmers are clamoring to have wind turbines on their farms. I don't see a line of farmers here clamoring to have caskets on their farms. So, I think that the NRC needs to develop that section quite a bit more.

QC03-15 And finally the fourth point that SEIS brings up is that wind, I forget the wording, that wind can only provide intermittent power. That the Quad Cities plants provide a base load power that simply cannot be replaced by wind. This statement is inconsistent with a variety of conclusions that utilities both within the United States and internationally have reached.

To be specific about wind, I feel like there needs to be some education on this point so I'm going to belabor it a little bit. There are three ways in which the wind fluctuates. You get the gust. That's less than one second transience. Then you get the fluctuations that are from a second to ten minutes. And then there are fluctuations that are longer than that, the very short and medium term fluctuations.

QC03-16 Studies have been commissioned by the independent system operators that maintain the grid. And the conclusion is that the use of wind does not represent any change necessary to the grid of the United States as long as penetration is up to 25 percent. We could replace 25 percent of our electricity generation with wind and not have to change the grid at all. If we were to go beyond 25 percent penetration, we would have to address the fact that wind gusts.

Appendix A

The fluctuations in the wind, today it flows, tomorrow it doesn't, that's at one turbine. If you're talking about replacing two plants that are each hundreds of megawatts, you're talking about many, many turbines at different locations, some of them grouped in a farm so that when a gust hits one turbine it's not at another and averaged over that wind farm, it's a steady output power. And averaged over days, one farm, one wind farm is not particularly windy, another wind farm is. So the output power on a day to day basis even is fairly constant. It is a feasible base flowed production of energy.

One issue, however, is that it's not windy in August. It is windy in January. August is when we need power. It's when people turn on their air conditioners. And as such you have to design the wind production so that you build enough wind turbines so that even in low August wind power generation months you're generating enough power to service August demands. But that's simply a cost issue and when you do out the numbers, as I said, it is economically viable.

QC03-17 So, in conclusion, wind energy, I believe, is a very viable replacement for the Quad Cities plants. In neighboring Iowa, it could be done very easily. In the Dakotas it would require some transmission. The Lady Foundation has done some research on what transmission would be necessary to bring Dakota power to Chicago. It comes out to about two cents a kilowatt hour averaged over the lifetime of those transmission lines. It's not significant even to use Dakota power with new transmission. So thank you for your attention.

MR. CAMERON: Thank you, Bennett, for those specific suggestions and comments. Does anybody else have a comment or question before we adjourn for the night? Yes.

MS. PERRIGO: I'm Leslie Perrigo, again. I'm from ICAN and I'm actually, I'm also on the Board of IRENEW and as a follow up to one of Bennett's point about transmission lines and where the power comes from, we have contacted the Iowa Utility Board and they could not speak for the Illinois Quad Cities. But the Iowa Quad Cities only receives 23.6 percent of our power of total net generation from nuclear sources. Of those nuclear sources, they come from two separate power plants. One is in Nebraska and the other one is the Quad Cities plant.

MR. CAMERON: Thank you, Leslie.

Bennett, can you just make this short? I mean, your comments are very thought provoking and appreciated.

QC03-18 MR. BROWN: Thank you. I realize that I've taken more than my share of the air time if you divide the hours by the people in here. But the primary comment in the SEIS statement was that it would represent a doubling of U.S. wind capacity if we were to replace the Quad Cities plants with wind. That's true but it's, again, it's a irrelevant statistic. In fact, the Senate, as I'm sure you're well aware, considered a law that were required us to bump up to ten percent of our

generation from renewables, primarily wind, by 2010. This plant expires in 2012 with its existing license. So already the Senate was considering mandating going from 0 something percent of our capacity up to 10 percent, which would be like a twentyfold doubling before the plant is even up for its new license period.

MR. CAMERON: All right, thank you.

John, do you want to close us out?

MR. TAPPERT: Just want to thank everyone for coming out tonight and sharing your thoughts with us. And just to remind everyone, if you have some comments that you would like to share with us in the future, our comment period does extend till January 27th. So, you have our e-mail addresses and our phone numbers. So, please send those to us.

And thanks for coming out again tonight and have a good evening.

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11/13/03

68 FR 44372

(3)

To: NRC

From Dorothy Monahan,
5300 12th Ave., Moline, IL 61265-2850
Email OZ5300@aol.com

QC04-1 I understand that this is the last day for input re the Cordova Nuclear facility. I have been
QC04-2 concerned about it for a good number of years, particularly when flocks of birds were
found dead near it. We are fighting terrorists without, but living with the potential for
terror within.

About 15 years ago I asked a speaker for the plant what the plan was for when it was
closed down. He said he didn't know, was not an engineer, but supposed that it could be
cemented over. I didn't find this particularly reassuring because of the condition of many
of our roads.

QC04-3 Is there new technology for permanently sealing it off? I understand it was not
QC04-4 constructed properly for chimney emissions and that correcting this problem would be
terribly expensive.

QC04-5 How about rationing energy use instead? We are a very wasteful society. Somehow its ok
to kill and have our young people killed in order to keep energy available. I don't find
this acceptable.

Please advise.

Note: Mrs. Monahan gave this note to the NRC
staff following an NRC public meeting on
December 16, 2003, in Moline, Illinois. The
purpose of the meeting was to receive public
comments on a draft environmental impact
statement relate to a proposed license
renewal for Quad Cities, Units 1 and 2.

L. WHEELER, NRC Staff

F-RTDS=ADM-03

see = D. Wheeler (DXW)

Template=ADM-013

Received: from igate.nrc.gov
 by nrcgwia.nrc.gov; Thu, 01 Jan 2004 08:45:14 -0500
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 by smtp-gateway ESMTP id i01DeFU3012282
 for <QuadCitiesEIS@nrc.gov>; Thu, 1 Jan 2004 08:40:15 -0500 (EST)
 Received: from sdn-ap-017neomahp0171.dialsprint.net ([63.190.104.171] helo=homepc)
 by grebe.mail.pas.earthlink.net with smtp (Exim 3.33 #1)
 id 1Ac38S-0004kB-00
 for QuadCitiesEIS@nrc.gov; Thu, 01 Jan 2004 05:45:12 -0800
 Message-ID: <002701c3d06d\$794985a0\$ab68be3f@homepc>
 From: "Karene Nagel" <miamidolfans@earthlink.net>
 To: <QuadCitiesEIS@nrc.gov>
 Subject: Say NO to Renewal-Extension of Cordova Plant
 Date: Thu, 1 Jan 2004 07:45:09 -0600
 MIME-Version: 1.0
 Content-Type: multipart/alternative;
 boundary="-----_NextPart_000_0024_01C3D03B.2E03E180"
 X-Priority: 3
 X-MSMail-Priority: Normal
 X-Mailer: Microsoft Outlook Express 6.00.2800.1158
 X-MimeOLE: Produced By Microsoft MimeOLE V6.00.2800.1165

QC05-1
 QC05-2
 QC05-3
 QC05-4

I am writing to express my dismay and horror at the thought of any extension to the use of the Cordova Nuclear power plant! I am a citizen with a family living in the shadows of this plant. Personally, I wish all nuclear plants had *never been* built! They are a constant threat to our environment, and in fact to our lives. The waste aspect alone caused by nuclear plants is enough reason for me to object vehemently to them. In addition, we now face the added threat of terrorists using a nuclear plant for their evil purposes! Renewable energy is where all of our resources and development should be placed. I have felt this way for many, many years.

QC05-5
 QC05-6
 QC05-7
 QC05-8

All of this aside even, I must stress that any extension of this plant's operations beyond its original intended use is utterly unthinkable! Surely, this would be asking for disaster! This plant has NOT operated without problems or violations, therefore why would you seek to continue operations of Quad Cities Units 1 and 2, beyond their useful life span of 25 years. There is always an unknown factor of wear and tear on these reactors; this can not be seen or accurately measured, but will over time increasingly put all life around them at higher risk. Also, this plant and most others were designed and built long before 9/11; and therefore they have inherent risks to terrorist attacks, which we never planned for.

QC05-9

Please do not endanger me and my family, and our environment by allowing the Cordova plant to continue operating beyond its original useful life-span!!!
 This is truly a matter of life and death, do not let it be a matter of *money* in some *corporate* pockets!

Yours truly,
 Karene Arp Nagel
 2617 LeClaire St.
 Davenport, Iowa 52803

Appendix A

Received: from igate.nrc.gov
by nrcgwia.nrc.gov; Tue, 16 Dec 2003 06:36:40 -0500
Received: from smtpout-3102.bay.webtv.net (smtpout-3102.bay.webtv.net [209.240.204.193])
by smtp-gateway ESMTP id hBGBVeU3014308
for <QuadCitiesEIS@nrc.gov>; Tue, 16 Dec 2003 06:31:41 -0500 (EST)
Received: from storefull-3135.bay.webtv.net (bay-6me-tv-1a-natpool-1.bay.webtv.net [209.240.207.249])
by smtpout-3102.bay.webtv.net (WebTV_Postfix+sws) with ESMTP id 0FB8EBE3B
for <QuadCitiesEIS@nrc.gov>; Tue, 16 Dec 2003 03:36:30 -0800 (PST)
Received: (from production@localhost) by storefull-3135.bay.webtv.net (8.8.8-wtv-
f/mt.gso.26Feb98) id DAA09780; Tue, 16 Dec 2003 03:36:29 -0800 (PST)
X-WebTV-Signature: 1
ETAtAhQ/sDplTVwr3OfxyoaPtdUmJj0owIVAMwYqplWXT9iCf3wKlk91ZQ8UJII
From: patjeffery@webtv.net (Pat Jeffery)
Date: Tue, 16 Dec 2003 05:36:29 -0600 (CST)
To: QuadCitiesEIS@nrc.gov
Subject: Personal Plea
Message-ID: <6773-3FDEEE3D-3380@storefull-3135.bay.webtv.net>
Content-Disposition: Inline
Content-Type: Text/Plain; Charset=US-ASCII
Content-Transfer-Encoding: 7Bit
MIME-Version: 1.0 (WebTV)

QC06-1
QC06-2
QC06-3

The QuadCities need to have the generator at Cordova repaired, better yet , replaced. It is no longer safe to use. Please find other more suitable fuel alternatives. Don't keep this plant open for another twenty years. I speak for my whole family, and all my neighbors. They, like my husband and me are older and handicapped. We can't get to the meetings, etc., so I've chosen this method of contacting you with our plea to get rid of the nuclear generator plant in our midst.
Sincerely,
Diane P Jeffery and Elmus M Jeffery
1116 40 Street
Moline IL 61265



IN REPLY REFER TO:

United States Department of the Interior

OFFICE OF THE SECRETARY
Office of Environmental Policy and Compliance
Custom House, Room 244
200 Chestnut Street
Philadelphia, Pennsylvania 19106-2904

11/13/03
68 FR 64372
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January 16, 2004

ER 03/959

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The U.S. Department of the Interior (Department) has reviewed the Generic Environmental Impact Statement (EIS) for License Renewal of Nuclear Plants, NUREG-1437, Draft Supplement 16 (dated November 2003), regarding Exelon Generation Company, LLC, Quad Cities Nuclear Power Station, Units 1 and 2, Rock Island County, Illinois.

QC07-1

The proposed license renewal does not involve any major construction, refurbishment, or physical alteration of the project area. The Generic EIS and Draft Supplement 16 adequately address the concerns of the Department regarding fish and wildlife resources, as well as species protected by the Endangered Species Act. We concur with the preliminary conclusions of the U.S. Nuclear Regulatory Commission staff with respect to the impacts of continued operations on these resources and species. We have no comment on the adequacy of other resource discussions presented in the document.

We appreciate the opportunity to provide these comments.

Sincerely,

Michael T. Chezik
Regional Environmental Officer

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Faint, mostly illegible typed text, likely a draft or a scan of a document with bleed-through.

template = ADM-013

F-RIDS = ADM-03
Call - D. Wheeler (DWW)



Exelon Generation
4300 Winfield Road
Warrenville, IL 60555

www.exeloncorp.com

11/13/03

68FR 64372

10 CFR 51

RS-04-010

(5)

January 26, 2004

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Office of Administration
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Washington, DC 20555-0001

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Quad Cities Nuclear Power Station, Units 1 and 2
Facility Operating License Nos. DPR-29 and DPR-30
NRC Docket Nos. 50-254 and 50-265

Subject: Comments Concerning Draft Plant-Specific Supplement 16 to the Generic Environmental Impact Statement Regarding License Renewal for Quad Cities Nuclear Power Station

Reference: Letter from Louis L. Wheeler (USNRC) to John Skolds (Exelon Generation Company, LLC), "Request for Comments on the Draft Plant-Specific Supplement 16 to the Generic Environmental Impact Statement Regarding License Renewal for Quad Cities Nuclear Power Station," dated November 4, 2003

This letter is being submitted in response to the NRC's request for comments concerning the draft plant-specific Supplement 16 to NUREG-1437, "Generic Environmental Impact Statement for License Renewal of Nuclear Plants," regarding the renewal of operating licenses for Quad Cities Nuclear Power Station, Units 1 and 2, for an additional 20 years of operation.

Exelon Generation Company, LLC appreciates the opportunity to comment on draft Supplement 16 to NUREG-1437. We agree that the adverse environmental impacts of license renewal for Quad Cities Units 1 and 2 are not so great that preserving the option of license renewal for energy-planning decision-makers would be unreasonable.

Specific comments on draft Supplement 16 to NUREG-1437 are provided in Attachment 1 and comments pertaining to Severe Accident Management Analysis (SAMA) are provided in Attachment 2.

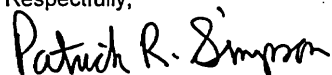
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*E-RIDS = ADM-03
Call = J. Wheeler (Jxw)*

January 26, 2004
U. S. Nuclear Regulatory Commission
Page 2

If you have any questions, please contact Al Fulvio at 610-765-5936.

Respectfully,



Patrick R. Simpson
Manager – Licensing

Attachments:

Attachment 1: Comments on Draft Supplement 16 to NUREG-1437
Attachment 2: Comments on SAMA

cc: Regional Administrator – NRC Region III
NRC Senior Resident Inspector – Quad Cities Nuclear Power Station
Illinois Emergency Management Agency – Division of Nuclear Safety

Appendix A

Attachment 1

Specific Comments on Draft Supplement 16 to NUREG-1437

Number	Location (pg/line)	What is in DEIS	What should be in DEIS	Why the change
1	Pg xviii / 14	... specified in the National Electric Safety ...	... specified in the 1981 National Electric Safety ...	The year of the National Electric Safety Code that the NRC uses in the GEIS for analyzing this issue should be specified in the report.
2	Pg 2-13/35	... (ComEd 2000).	... (Exelon 2003a).	The reference for the NPDES Permit is incorrect.
3	Pg 2-47/36	... and plotted it on land that would ...	... and plotted on or near land that would ...	Changes make wording consistent with prior sentence describing approximate location.
4	Pg 2-48/11-16	Though he felt what he had observed had little likelihood of proving significant, he recommended 'use of due caution' during excavation.	Though he felt that the likelihood of what he observed as proving significant was remote, he had alerted appropriate plant personnel to the areas of interest and they were to use due caution during excavation operations.	The replacement wording comes directly from the letter and, more appropriately, characterizes Mr. Bareis' findings in his letter.
5	Pg 4-16/17	Blank line.	Remove line.	The line appears to be unnecessary.
6	Pg 4-20/9	Consideration of mitigation is warranted in the vicinity ...	Consideration of mitigation may be warranted in the vicinity ...	This wording change is in keeping with the wording used elsewhere in the report.
7	Pg 4-25/33	... to perform routine maintenance and other activities....	... to perform routine maintenance and other activities related to license renewal.	As noted in the Environmental Report and the GEIS, the assumption used is that these additional personnel would be needed to perform those activities related to aging management activities that need to be performed as a result of the renewing the license.

QC08-1

QC08-2
QC08-3

QC08-4

QC08-5

QC08-6

QC08-7

Appendix A

Number	Location (pg/line)	What is in DEIS	What should be in DEIS	Why the change
8 QC08-8	Pg 4-25/34	... these routine activities during scheduled outages.	... these routine activities.	As noted in the Environmental Report and the GEIS, the assumption used is that these additional personnel would be needed to perform those activities related to aging management activities that need to be performed as a result of the renewing the license.
9 QC08-9	Pg 4-25/35 - 36	... to their permanent staff during license renewal...	... to their permanent staff during the license renewal period...	Wording change for grammatical reasons.
10 QC08-10	Pg 4-30/15 - 17	The Quad Cities site is in an area of moderate-to-high potential. However, there are reports of archaeological resources on the Quad Cities site.	Areas of the Quad Cities site may have moderate-to-high potential. There is a report of an archaeological resource on or near the Quad Cities site.	The archaeological reports cited as a basis for this statement do not state that the entirety of the Quad Cities site possesses the possibility for moderate to high potential. Furthermore, there are no references cited from any State or National source (other than the University of Chicago report listed on pg 2-47) that could be used to form the basis for the conclusion regarding areas having a potential for archaeological resources.
11 QC08-11	Pg 4-31/32-33	... for guidance on requirements for an archaeological survey when any ...	... for guidance when any ...	This wording change is needed to bring into it into conformance with what was committed to by Exelon in e-mail under ADAMS Accession # ML033090462.

Number	Location (pg/line)	What is in DEIS	What should be in DEIS	Why the change
12	Pg 4-32/1	... the staff's preliminary determination is ...	... the staff's determination is ...	Wording change needed for final report.
13	Pg 4-39/24, 30, and 32	These lines mention Exelon practices as they pertain to vegetation management in the transmission corridors. There is no discussion of the owners of the other transmission lines under this review (i.e., MidAmerican and Alliant).	... the staff has preliminarily concluded that ...	Wording change needed for final report.
14	Pg 4-40/12	... the staff has preliminarily concluded that ...	... the staff has concluded that ...	Wording change needed for final report.
15	Pg 4-40/18	This line mentions Exelon practices as they pertain to vegetation management in the transmission corridors in this review. There is no discussion of the owners of the other transmission lines under this review (i.e., MidAmerican and Alliant).	... it is the staff's preliminary finding that ...	Wording change needed for final report.
16	Pg 4-40/19	... it is the staff's preliminary finding that ...	... it is the staff's finding that ...	Wording change needed for final report.
17	Pg 4-44/30, 41	These lines mention Exelon practices as they pertain to vegetation management in the transmission corridors in this review. There is no discussion of the owners of the other transmission lines under this review (i.e., MidAmerican and Alliant).	... and its contractors at the end of the consultation,	It is not clear what consultation the staff is referencing in this section.
18	Pg 4-44/41	Agency for direction on level of effort necessary for archaeological survey in such project areas, ...	Agency for guidance, ...	This wording change is needed to bring into it into conformance with what was committed to by Exelon in e-mail under ADAMS Accession # ML033090462.
19	Pg 4-46/18	These lines mention Exelon practices as they pertain to vegetation management in the transmission corridors in this review. There is no discussion of the owners of the other transmission lines under this review (i.e., MidAmerican and Alliant).	... the staff has preliminarily determined ...	Wording change needed for final report.
20	Pg 4-50/18, 37	... the staff's preliminary conclusion ...	... the staff's conclusion ...	Wording change needed for final report.
21	Pg 4-51/1-2	... the transmission line owner, ComEd, is ...	... the transmission line owner, Exelon Power Delivery, is ...	Wording change reflects the addressee in the letter sent (ADAMS Accession #ML032660226).
22	Pg 4-51/35			
23	Pg 4-51/39			

QC08-12

QC08-13

QC08-14

QC08-15

QC08-16

QC08-17

QC08-18

QC08-19

QC08-20

QC08-21

QC08-22

QC08-23

Number	Location (pg/line)	What is in DEIS	What should be in DEIS	Why the change
24	Pg 8-427, Pg 8-45/31 -- Pg 8-46/12, Pg 9-8/16	These discussions of aesthetic impacts of the alternate nuclear plant are not consistent with the analysis presented in the GEIS for aesthetic impacts of license renewal for the existing plant. During the construction of the alternate plant on the Quad Cities site, impacts would be introduced that may bring the overall site to a MODERATE level of impact, however, once the alternate plant is operating and the existing site is fully decommissioned, the overall impacts would not be much different that what currently exists. As stated in the GEIS in the conclusion of the analysis of this issue, the "staff believes that the impacts on aesthetic resources would be small in the future". For this reason, Exelon believes the staff should review their conclusions with respect to their analysis of this issue.		
25	Pg 8-48/20 - 22	Duplicate of lines 18 - 19 that can be deleted.		
26	Pg 9-5/8	... the staff's preliminary conclusion is ...	... the staff's conclusion is ...	Wording change needed for final report.
27	Pg 9-8/5	LARGE, under Historic and Archaeological Resources	SMALL, under Historic and Archaeological Resources	This makes the wording here consistent with the conclusion in Section 4.4.5.
28	Pg 9-8/31	... MODERATE ....	... MODERATE for that portion of the North Nelson line where the induced shock is greater than 5 ma. ... considered SMALL....	This wording change clarifies the area where the impact has been analyzed as being MODERATE.
29	Pg 9-8/32	... considered LARGE....	... considered SMALL....	This makes the wording here consistent with the conclusion in Section 4.4.5.

QC08-24

QC08-25

QC08-26

QC08-27

QC08-28

QC08-29

12

Attachment 2

Comments on SAMA

Comments on SAMA

Exelon's Severe Accident Management Analysis (SAMA) was an extensive exercise that was done to determine if proposed plant changes are required to support license renewal for the Quad Cities station. Exelon concluded that none are needed to support license renewal and the Nuclear Regulatory Commission (NRC) has agreed (Quad Cities Draft Environmental Impact Statement (QC DEIS) pg 5-9).

Because the current Exelon evaluation of SAMA improvements is performed only to support license renewal, this analysis was done in a conservative manner. Additional analysis is required to ensure that all aspects, both positive and negative, are captured prior to any actual changes in plant equipment, procedures, or training. This is consistent with the NRC DEIS review that concludes, "further evaluation of these SAMAs by Exelon is warranted" (QC DEIS pg G-30).

Exelon wishes to note the following points that were listed in the NRC review:

- a. The cost ranges provided by Exelon are consistent with those provided by other licensees for similar applications (QC DEIS pg G-18).
- b. The severe accident analysis typically assumes that the proposed change completely eliminates the associated risk (e.g., Phase II SAMA #6 risk calculation). In reality, no modification made can ever be perfect. Such bounding calculations overestimate the benefit and are conservative (QC DEIS pg G-13).
- c. The cost-benefit analysis performed by Exelon did not take into account any replacement power or on-going maintenance costs that may be incurred for any plant modifications. Taking these into account would reduce any risk-cost benefit (QC DEIS pg G-10 through 15).
- d. Both Exelon and NRC agree that significant conservatisms exist in the current fire PRA. These conservatisms overstate the actual risk from fire at Quad Cities (QC DEIS pg G-24). The NRC staff reviewers, however, disagreed with a risk multiplier of 5 used by Exelon to account for uncertainties in external events analysis, mostly for fire. The NRC suggested a value of 10. It should be pointed out that the existing 1999 fire PRA study was performed not to provide detailed estimates of fire risk to be used in routine plant analysis, but was limited to the IPEEE purpose of discovery of major fire vulnerabilities. Furthermore, the NRC has provided no basis for the determination of their suggested value of 10. If additional consideration by Exelon were performed, it would include a more realistic review of fire impacts. This more realistic review is expected to verify that the factor of 5 used by Exelon is accurate.

QC08-30

With respect to the specific recommendations by the NRC:

- a. For SAMAs #1 & #2 regarding cooling for the Safe Shutdown Makeup Pump (SSMP) room and alternate drywell spray, the NRC has already concluded only marginal risk-cost benefit exists (QC DEIS, page G-25).
- b. For SAMAs #6 & #8, local electrical breaker operation would require human actions to close breakers onto energized, high voltage buses. Such actions create an industrial safety concern for the personnel performing such actions. Testing the capability to perform such actions would impose actual hazards on personnel during the testing, while the likelihood of ever having to perform the actions during an accident are quite remote (loss of all 125 V DC

QC08-31

QC08-32

QC08-33

- power is calculated to occur roughly once per 1 million years as documented in the Quad Cities 2002 PRA).
- c. For SAMAs #10 and #14, the changes suggested in the QC DEIS would require deviations from NRC-approved emergency procedure guidelines. Each would be impacted by the change suggested by the Staff as well as causing a significant deviation from the approved Boiling Water Owners Group (BWROG) strategy.

Chief, Rules and Directives Branch
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Dear Sir or Madam,

The Illinois Emergency Management Agency (IEMA) appreciates the opportunity to comment on Supplement 16 to NUREG-1437, the draft environmental impact statement concerning the application for Plant Life Extension (PLEX) at the Quad Cities (QC) site. We have two separate but related issues concerning the application. One directly concerns Supplement 16, the other is more safety analysis related. But because the two are related we will include both in these comments. The two issues are collective occupational radiation exposure, and the condition of steam dryers in both reactors.

Occupational radiation exposure is covered in section 4.6.3 of the generic environmental impact statement (GEIS), NUREG-1437. In this section, NRC evaluates the impact on occupational exposure during the renewal term. They examined baseline trends in cumulative occupational exposure, and the projected increments to occupational dose due to plant aging. The projections were compared with dose levels then being experienced to estimate accumulated dose and spontaneous cancer risk. Table 4.10 indicates that average individual dose rates between 1973-1989 decreased from a ~850 mrem to ~360 mrem at boiling water reactors. This indicates a significant and desirable downward trend. These levels are also well below the 5 rem/year 10CFR20 individual dose limit. The GEIS states that as plants age, there will be a slight increase in radioactive inventories, resulting in slight increases in occupational doses.

NUREG-1437 concluded that over a renewal period, the greatest increment to higher doses was assumed to be a ten-year In Service Inspection outage. The dose increment related to aging was forecast to be an increase of 25%, or a BWR increase from 439 person/rem to 535 person/rem. The range of cancer deaths caused by industry wide collective exposure is 0-17. So the conclusion in the GEIS is that the exposure risk after license renewal is not expected to be significantly different from that during the initial license term, so occupational exposure was made it a category 1 issue.

In draft Supplement 16 for QC, the staff agreed with the GEIS and concluded that there were no impacts related to occupational exposure beyond the

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F-RIDS = ADM-03
All = D. Wheeler (DKW)

GEIS, the overall impact on occupational exposure is SMALL, and *additional plant-specific mitigation measures are not likely to be sufficiently beneficial to be warranted* (Supplement 16, Section 4.3). The conclusion was that the maximum doses during the renewal term is within the range of doses experienced during normal operation and maintenance outages, and would be well within regulatory limits.

In a review of the collective occupational doses at QC from 1999-2002, IEMA determined that the collective doses by year were: 169 person-rem/year in 1999, 847 person-rem/year in 2000, 126 person-rem/year in 2001, and 1,722 person-rem/year in 2002. Two of the four years are quite good; two are quite bad. It is difficult to forecast a trend. We assume plant radiation protection personnel follow rigorous ALARA procedures, and individual doses remain well within regulatory limits.

QC09-1

We understand that collective doses are related to the background radiation levels resulting from the source term from activated corrosion products in the reactor and related systems, and the number of outages at a plant each year. IEMA hopes that 800 and 1,700 person-rem/year level collective doses are not indicative of the doses to be expected during the renewal term. Part of our concern is that the QC plants are in the bottom quartile of nuclear plants in regard to source term. Therefore, we question the NRC conclusion that no mitigative measures are needed in the renewal term. Many of those accumulating these exposures are Illinois citizens.

Therefore, IEMA would like to see as a condition to PLEX application approval, a requirement for the licensee to proactively monitor and control the source term over the renewal period. Decontamination and preventive methods are available to keep source terms under control.

QC09-2

It can be argued that there were an extraordinary number of maintenance outages in those years when the levels were high. Granted, the cause of much of the high exposures in 2002 is due to outages related to steam dryer failures. One plant had back-to-back failures. The plant's UFSARs assume structurally sound steam dryers in their current licensing basis. The QC steam dryers have not remained structurally sound. In addition, the root cause analyses and corrective actions done as a result of the first failure did not prevent the second failure.

QC09-3

Extended power upgrades are speculated to be the root cause of the dryer failures. That may or may not turn out to be the case. Regardless, we assume those increased power levels will extend into the renewal period. We noted from inspection reports that during the scoping inspections done at QC, the steam dryers were not considered reactor internal components for PLEX purposes, although the

FSAR does list them as a reactor internal component. Additionally, they were excluded from age related degradation management programs prior to and during the renewal period. The reason given was because they were non-safety related, and failure is an operational concern, but not a safety concern. We are not so sure.

QC09-4 The conclusions of operability evaluations concerning the steam dryer failures made some assumptions. Among them was that any dryer parts that broke off would stay in the area of the separator/dryer, or be carried down the main steam line, where they would not affect any safety-related functions. It was determined as a result of the second dryer failure, some dryer material did not remain in the dryer area, but did travel through a recirculation loop and into the reactor vessel as a loose part. We anticipate that further engineering safety evaluations will conclude that the loose part(s) will cause no harm in the vessel. Regardless, thus far, steam dryer structural integrity is a present issue and contains large uncertainties over a twenty-year renewal term. Therefore, IEMA recommends that the status of the steam dryers at Quad Cities be re-evaluated as to their non-safety related status under PLEX, and be considered a reactor component subject to an aging management program.

QC09-5 In conclusion, our observations are that recent steam dryer problems at QC have caused forced outages. Only time will tell if the root cause of the dryer failures is a result of an extended power upgrade program. Regardless, the program will extend into the renewal term. It is not clear what effect the upgraded power level program might have on future plant component failures, but the increased number of outages needed to deal with them so far has dramatically increased the collective occupational exposure at the station. This was not anticipated in assumptions that went into the GEIS. Therefore, IEMA would like to see the steam dryers re-classified as a reactor component subject to an age-related degradation program under PLEX, and the licensee be required to commit to a proactive source term management program through the renewal term.

QC09-6 Again, IEMA appreciates the opportunity to submit these comments for consideration. We consider plant life extension to be a practical program in the nation's energy policy, and believe radiation and reactor safety can be maintained over a renewal term if adequate measures are taken to manage age related degradation. Please call me at (217) 785-9875 if these comments raise questions we can respond to.

Sincerely,

Neill Howey
Senior Policy Analyst

Bureau of Nuclear Facility Safety
Illinois Emergency Management Agency



ENVIRONMENTAL LAW & POLICY CENTER
ILLINOIS INDIANA MICHIGAN MINNESOTA OHIO WISCONSIN

January 27, 2004

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Via e-mail (QuadCitiesEIS@nrc.gov)
And United States Mail

11/13/03

Chief, Rules and Directives Branch
Division of Administrative Services
Office of Administration
Mailstop T-69D 59
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

68FR 64372

(6)

Re: Comments on Draft Supplement 16 to the Generic Environmental Impact Statement
for the Quad Cities Nuclear Power Station Units 1 and 2 License Renewal Application

Dear Sir or Madam:

QC10-1 These comments are submitted by the Environmental Law and Policy Center ("ELPC")
on Draft Supplement 16 to the Generic Environmental Impact Statement for the Quad Cities
Nuclear Power Station license renewal application ("Draft Supplement"). The NRC's analysis in
QC10-2 the Draft Supplement fails to comply with the requirements of the National Environmental
Policy Act ("NEPA") in at least two ways. First, there is no analysis in the Draft Supplement of
whether or not there is a need for the power created by Quad Cities. Second, the NRC has not
complied with its legal duty to objectively evaluate energy efficiency, renewable energy
resources, and other clean energy resources as viable alternatives to the renewal of the Quad
Cities operating license.

I. NEPA Requires That the NRC Thoroughly Analyze the Need for Power

QC10-3 The environmental analysis of the Quad Cities license renewal application is being
carried out pursuant to regulations that constrain the scope of the analysis in a manner that
violates NEPA. In particular, 10 C.F.R. 51.95(c) provides that the NRC need not consider "the
need for power" in determining whether or not to grant a license renewal for Quad Cities. The
need for power, however, is at the heart of the purpose and need statement which, in turn, serves
as the baseline by which the reasonableness of various alternatives are to be measured. Without
this essential factor, there is no way for the NRC to use the EIS process to accurately weigh

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Add = D. Wheeler (DXW)

alternatives against one another or to conclude whether it is appropriate to allow Quad Cities to continue operating for an additional 20 years. While the NRC suggests that the need for power can be considered by the state government at some later date, it clearly violates NEPA to abdicate the analysis of the “need for power” issue to non-federal decisionmakers long after the EIS process has been concluded.

II. The NRC Has Failed to Rigorously Explore and Objectively Evaluate All Reasonable Alternatives

QC10-4 The Draft Supplement fails to “rigorously explore and objectively evaluate all reasonable alternatives” to renewing the Quad Cities license, as required by NEPA. 40 C.F.R. 1502.14(a). In particular, the Draft Supplement erroneously rejects energy efficiency and renewable energy resources as not feasible from an economic, technological, and/or environmental standpoint. The analysis of these alternatives in the Draft Supplement is unsupported or it relies on flawed and outdated information. As explained below, energy efficiency, renewable energy sources, and clean distributed generation, in combination with “clean coal” resources, present a lower-cost, safer, and environmentally preferable approach to meeting energy needs than renewing the license for the aging Quad Cities nuclear power plant.

A. Energy Efficiency Alternatives are Available, Cost Effective, and Environmentally Preferable

QC10-5 The Draft Supplement concludes, with no factual support, that it would not be economically feasible for energy efficiency efforts to replace the power generation that would be lost if the Quad Cities license renewal was denied. (Draft Supplement Section 8.2.5.11, p. 8-54). The Draft Supplement cites a 1992 study suggesting that energy efficiency improvements cost 4 cents for every kilowatt-hour saved. The Draft Supplement then rejects this cost estimate arguing that: (1) if energy efficiency were really that cost-effective it would have already occurred, and (2) replacing the energy produced by Quad Cities would require such a large-scale energy efficiency effort that the cost of energy efficiency would increase well beyond 4 cents. The Draft Supplement, however, provides no support for these contentions and does not even attempt to estimate the cost of using energy efficiency to replace the power produced by Quad Cities.

QC10-6 In contrast to the unsupported analysis provided in the Draft Supplement, recent studies demonstrate that energy efficiency is an even more viable and cost effective alternative. For example, the 2001 *Repowering the Midwest* study,¹ which is one of the most comprehensive clean energy development analyses conducted on the Midwest’s energy sector, demonstrated that energy efficiency efforts can significantly reduce the demand for power at a cost of 2.5 cents per kilowatt hour or less – lower than the cost of generation, transmission, and distribution of electricity from power plants. Implementing modern new cost-effective energy efficiency technologies like commercial and residential lighting, heating, ventilation and cooling, industrial motors, refrigerators, and other appliances, will flatten our electricity demand over the next two decades. Using the methodology of the U.S. Department of Energy’s 1997 “Five National Labs”

¹ Environmental Law and Policy Center, et al., *Repowering the Midwest: The Clean Energy Development Plan for the Heartland* (2001).

Study (which is an analysis by a working group with members from five national energy laboratories),² *Repowering the Midwest* concluded that:

- Energy efficiency efforts can reduce electricity demand by 16% in 2010 and 28% in 2020 vs. a projected base case scenario.
- Energy efficiency efforts can save 50,761 GWh of electricity annually by 2020 in Illinois alone.
- Energy efficiency efforts would be highly cost-effective, requiring an average investment of only 2.5 cents per kilowatt-hour.
- Energy efficiency efforts would reduce net electricity costs in Illinois by \$1 billion by 2020.
- These energy efficiency initiatives use “off the shelf” technologies and equipment that is widely available today.

QC10-7 Other analyses have come to similar conclusions regarding the viability of energy efficiency. For example, the Clean Energy Blueprint concluded that energy efficiency efforts throughout the U.S. could save 915 billion kilowatt-hours by 2010 and 2,512 billion kilowatt-hours of electricity by 2020.³ Additionally, the economic benefits of greater efficiency should not be ignored. A follow-up analysis of the economic impact of the recommendations in *Repowering the Midwest* concluded that with investments in energy efficiency, 43,000 new jobs would be created and \$4.7 billion in additional economic output would be created by 2020⁴. Clearly, energy efficiency is a technologically and economically feasible alternative to the renewal of the Quad Cities operating license.

QC10-8 Perhaps realizing that energy efficiency alternatives cannot be rejected on their merits, the Draft Supplement also asserts that energy efficiency is not viable because utility deregulation has removed the incentive for Exelon to invest in energy efficiency. Energy efficiency, however, is a cheaper (and less environmentally destructive) alternative to new power generation. Exelon and its subsidiary Commonwealth Edison should consider investments in energy efficiency to meet Illinois’ power needs. But even if they prefer not to do so, that does not obviate the NRC’s legal obligation under NEPA to do so. The point made in the Draft Supplement is legally flawed – an otherwise reasonable alternative cannot be rejected under NEPA simply because an applicant may not want to or cannot carry it out. Cf. 42 C.F.R. 1502.14(c) (agency cannot reject an alternative simply because it is outside the agency’s jurisdiction); *Muckleshoot Indian Tribe v. U.S. Forest Serv.*, 177 F.3d 800, 814 (9th Cir. 1999) (same). Instead, the NRC has the legal authority to tell Exelon that there is a better, cheaper, and environmentally preferable alternative to license renewal. The fact that energy efficiency efforts are more likely to materialize as a result of state or federal government initiatives (such as an energy efficiency investment fund or

² U.S. Department of Energy, *U.S. Carbon Reductions: Potential Impacts of Energy Technologies by 2010 and Beyond* (1997).

³ Steve Clemmer, et al., *Clean Energy Blueprint: A Smarter National Energy Policy for Today and the Future* (Oct. 2001), at 11.

⁴ Environmental Law and Policy Center, et al., *Job Jolt: The Economic Impacts of Repowering the Midwest* (2002).

an energy-efficient building code) in no way provides a basis for rejecting the economically, technologically, and environmentally feasible alternative of energy efficiency.

B. Wind Power is a Viable and Growing Source of Clean Renewable Power

The Draft Supplement's analysis of the feasibility of wind power is also flawed. The Draft Supplement notes that the wind resource in Illinois is sufficient to replace the power currently generated by Quad Cities, but then rejects this alternative for two reasons. First, harnessing this wind power would be a massive undertaking involving nearly a doubling of current wind generation in the U.S. Second, such extensive development of wind power would result in significant land impacts for the construction of turbines and transmission lines.

- QC10-10 The Draft Supplement erroneously rejects wind power, which is a viable alternative. First, the Draft Supplement improperly limits its analysis to wind resources in Illinois. As documented in *Repowering the Midwest*, six of the 10 states with the highest wind power potential in the U.S. are in the Midwest. With some improvements to the transmission grid, wind farms in neighboring states such as Iowa could be a viable source of energy for Illinois. Just as the Quad Cities nuclear power plant supplies 25% of its energy to Iowa, wind farms in Iowa can supply energy to Illinois. Second, technological advancements are increasing the amount of power created by wind turbines. The largest commercially available wind turbine is 1.65MW (not 1.5MW as stated in the Draft Supplement), and will likely increase to 2.1MW in 2005, and may increase to 3MW to 5MW in the near future.⁵ In addition, wind turbines have an availability factor of 98%, higher than most other power sources.⁶
- QC10-11
- QC10-12
- QC10-13 Third, the cost of wind power has fallen dramatically since the 1980s, with an average generation cost of three to six cents per kilowatt-hour,⁷ so that it is now competitive with most other energy sources. In addition, because wind is free fuel, wind power generation bears no risk of fluctuating fuel prices. These technological advancements and economic advantages have led to a substantial increase in the amount of wind power installed – from 2001 through 2003 a total of 3,795 megawatts of wind energy was installed nationwide, raising the total wind energy in the U.S. to 6,374 megawatts.⁸ Within Illinois, the first utility-scale wind project has recently begun operations and approximately 1,700 MW of additional wind projects are in various stages of development. Across the border in Iowa, there are 420 MW of wind generation installed with an additional 345 MW in development. In light of these facts, the NRC's concerns regarding the need for substantial growth in the wind industry in order for wind to be a viable alternative are misplaced, especially given that the current operating license for Quad Cities does not expire until 2012.
- QC10-14 The Draft Supplement also overestimates the impact that an expansion of wind power would have. Nearly 95% of the land devoted to a wind power site remains available for other uses such as agriculture. Most new wind facilities would also be located near existing
- QC10-15

⁵ Ari Reeves, *Wind Energy For Electric Power: A REPP Issue Brief* (Nov. 2003), at 22.

⁶ American Wind Energy Association, *The Most Frequently Asked Questions About Wind Energy* (2002), p. 5.

⁷ *Repowering the Midwest*, at p. 26.

⁸ American Wind Energy Association, *Wind Power Outlook 2003* (2003); American Wind Energy Association, *Wind Energy Fast Facts* (Jan. 2004).

- QC10-16 transmission lines. Therefore, the land impacts of new wind power would not be significant. In addition, wind generation uses no coolant water, has no emissions and does not degrade land.
- QC10-17 There are very few avian collisions with modern wind turbines.⁹

C. The Draft Supplement Misstates the Impacts of Solar Power

- The conclusion in the Draft Supplement that Illinois would need a 46-square-mile area of photovoltaic (“PV”) cells to replace the power produced by Quad Cities provides a distorted view of the impacts that solar power would have. In particular, the Draft Supplement’s suggestion that solar power would have a substantial impact to natural resources and land use ignores the fact that solar power is distributed power. Most solar power units are located on rooftops of buildings, meaning that solar power would not cause land disturbance.
- QC10-18
- QC10-19 it is important to note that solar PV technology has advanced to the point where PVs are a good source of power, especially in remote areas and to help meet peak power demand. The average solar PV cell has a conversion rate of 12% to 17%, not the 10% assumed in the Draft Supplement.

D. Distributed Generation Is a Clean Alternative for Providing Baseload Power

- QC10-20 The Draft Supplement does not adequately address the opportunities for meeting baseload power needs through efficient on-site natural gas-fired generation, such as Combined Heat and Power (“CHP”), district energy systems, and fuel cells. Such natural gas distributed generation emits substantially less air pollution than coal-fired power plants, and does not pose the high-level waste and safety hazards inherent to nuclear power, and therefore could serve as a cleaner and safer baseload supplement to energy efficiency and renewable energy alternatives. *Repowering the Midwest* estimates that Illinois alone has the potential for 2,162 MW of efficient distributed gas-fired generation by 2010, and 5,000 MW by 2020.¹⁰

* * *

- QC10-21 For the above reasons, the NRC should complete a rigorous and objective analysis of the need for power and reasonable alternatives such as energy efficiency, renewable energy resources, clean distributed generation, and “clean coal” resources before deciding whether or not to relicense the aging Quad Cities nuclear power plant.

Thank you for the opportunity to comment on the Draft Supplement EIS for the Quad Cities license renewal application.

Sincerely,

Shannon Fisk
Staff Attorney
Environmental Law and Policy Center

⁹ National Wind Coordinating Committee, *Avian/Wind Turbine Interaction: A Short Summary of Research Results and Remaining Questions* (Dec. 2002).
¹⁰ *Repowering the Midwest*, at p. 83.



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Charles R. Montgomery
Managing Senior Attorney

January 27, 2004

Chief Rules and Directives Branch
Division of Administrative Services
Office of Administration
Mailstop T-6D 59
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Re: Quad Cities Nuclear Power Station, Units 1 and 2
Facility Operating License Nos. DPR-29 and DPR-30
NRC Docket Nos. 50-254 and 50-265

Comments Concerning Draft Plant-Specific Supplement 16 to the
Generic Environmental Impact Statement Regarding License
Renewal For Quad Cities Nuclear Power Station

Letter from Louis L. Wheeler (USNRC) to John Skolds (Exelon Generation
Company, LLC), "Request for Comments on the Draft Plant-Specific Supplement 16
to the Generic Environmental Impact Statement Regarding License Renewal for Quad
Cities Nuclear Power Station," dated November 4, 2003

This letter is being submitted in response to the NRC's request for comments concerning the draft plant-specific Supplement 16 to NUREG-1437, "Generic Environmental Impact Statement for License Renewal of Nuclear Plants," regarding the renewal of operating licenses for Quad Cities Nuclear Power Station, Units 1 and 2, for an additional 20 years of operation. MidAmerican Energy Company appreciates the opportunity to comment on draft Supplement 16 to NUREG-1437. We agree that the adverse environmental impacts of license renewal for Quad Cities Units 1 and 2 are not so great that preserving the option of license renewal for energy-planning decision-makers would be unreasonable.

MidAmerican's response to the comments of Mr. Bennett Brown, regarding wind power as a possible substitute for Quad Cities Units 1 and 2, is provided in Attachment 1. Mr. Brown's comments were offered at the NRC's public comment hearing held on December 16, 2003. His comments begin on page 77, line 6, of the official transcript of those proceedings.

Sincerely,

A handwritten signature in black ink, appearing to read "Charles R. Montgomery". The signature is written in a cursive style and extends to the right with a long, sweeping tail.

Attachments

ATTACHMENT 1

Comments in Response to the Statement of Mr. Bennett Brown

Regarding Wind Power

At the Hearing of December 16, 2003

Attachment 1

Comments of MidAmerican Energy Company

By Thomas J. Budler, Wind Project Manager

Below are the comments of MidAmerican Energy Company in response to Mr. Bennett Brown's characterization of wind power beginning on page 77, line 6 of the official transcript of proceedings of the Nuclear Regulatory Commission, on December 16, 2003, concerning Exelon Generation Company's application for license renewal for Quad Cities Nuclear Power Station ("QCNPS"). MidAmerican possesses a 25% ownership share in QCNPS. MidAmerican is also currently developing a 310 MW wind generation project in Iowa, and is a participant in existing wind generation projects as well.

- QC11-1 As an overall comment, MidAmerican would note that it is not opposed to wind-generated power as evidenced by our past and present participation in wind generation projects. However, MidAmerican sees wind-powered generation as a complement to, and not a viable substitute for, base load nuclear generation already in existence.
- In his comments, Mr. Brown attempts to refute the four arguments against utilizing wind power that were advanced in the Plant Specific Environmental Impact Statement ("SEIS"). In summary, the four points Mr. Brown states he is refuting are as follows: (1) That the potential for wind power development, in Illinois, to replace QCNPS, is only "marginally present;" (2) That it is "enormously expensive" to develop wind resources; (3) That the land required for development of wind resources is "significant;" and (4) That wind-powered generation can provide only "intermittent power." MidAmerican addresses Mr. Brown's comments on each of these points, below.
1. Availability of Sufficient Wind Resources. The wind power capacity that would be necessary to replace the QCNPS is not available in Illinois. Mr. Brown recognizes that in his testimony, at pages 78-79 of the above-mentioned transcript, where he also touts Iowa as the location for substitute capacity. The SEIS noted that a capacity of 4,200 megawatts would be necessary to replace the capacity of QCNPS. In fact, the necessary capacity would probably be even greater. MidAmerican's experience has shown that MAPP, the NERC reliability council with which MidAmerican's wind generation is accredited, actually credits wind capacity at approximately 17% of rated nameplate. This means that to replace the generating capacity of the QCNPS some 10,729 megawatts of wind generation would actually have to be installed.
- QC11-2
- QC11-3 Mr. Brown also notes, at page 77 of the transcript, that 4,200 megawatts of wind generation would be about 1,000 megawatts of consistent power production throughout the year. In fact, during MidAmerican's research for development of its Iowa Wind Power Project, the Company discovered historical wind resource records showing that for approximately 10% of the available operating time there would be insufficient wind to produce any wind generation at all. Moreover, these historical records show that for approximately 37% of available operating time the wind generating facilities would be generating at less than 25% of

Appendix A

nameplate capacity. Therefore, for nearly 50% of the available operating time, a wind facility in Iowa would likely be operating at less than 25% of its rated capacity.

- QC11-4 2. Costs of Wind Power. Mr. Brown notes that the NRC documents mention it is enormously expensive to develop wind resources. (Transcript, pp. 79 – 81) Mr. Brown attempts to refute this statement with second-hand information from an electric co-op representative who states that the co-op's wind generation production cost is 2.0 to 2.5 cents/kWh. MidAmerican's knowledge of the wind industry would suggest that approximately 5.0 cents/kWh is the more commonly accepted production cost figure for wind generation. That cost can be reduced through use of government subsidies (e.g., the federal Production Tax Credit and CO₂ credits), however, it is important to note that the federal Production Tax Credit expired on December 31, 2003, and has not yet been renewed by Congress. The federal Production Tax Credit is currently valued at 1.8 cent/kWh and the value of CO₂ credits is currently estimated at 0.4 cents/kWh, though there is still not a mature market for trading CO₂ credits.
- QC11-5 In contrast, MidAmerican's existing coal units generate at an average cost of 2.1 cents/kWh, existing nuclear units generate at a cost of 2.7 cents/kWh, and combined cycle units generate at approximately 6.0 cents/kWh. However, it should be noted that all of these units are counted as reliable and dispatchable¹ for capacity during system peak. It should be noted that wind generation is neither reliable nor dispatchable in any given specific time of need for capacity or generation.
- QC11-6 Mr. Brown asserts that it is inappropriate to compare the cost of wind generation with generation based on other fuels. MidAmerican would agree that wind generation cannot be compared to other dispatchable generation since wind is not dispatchable based on system load. Wind generation is only dispatchable when the wind resource is available. However, with the above-noted subsidies, and to the extent that wind is available, MidAmerican's wind facilities will displace all other generating units in the dispatch order. This utilization makes wind generation a very important part of MidAmerican's overall generation portfolio.
- QC11-7 In his cost discussion, Mr. Brown also ignores the significant cost of transmission system impacts. (Mr. Brown appears to assert that his 2.0 to 2.5 cents/kWh does include outlet transmission costs, but then apparently ignores the costs of transmission system impacts.) As a member of MAPP, MidAmerican is required to meet MAPP's reliability criteria. A requirement of MAPP is that the transmission system must be sufficient such that the generation is able to deliver rated output for certain system conditions. As discussed in number 1, above, this means the transmission system would have to be upgraded sufficiently to address all impacts for the additional 10,729 megawatts of nameplate wind generation.

¹"Dispatchable" as used herein means the ability to control generation output to match load and economics requirements.

This could be a very significant cost when taken in consideration with a wind project location and existing transmission system constraints.

QC11-8 3. Land Requirements for Wind Generation. Mr. Brown also comments (Transcript, pp. 81-82) on the NRC document noting the land use for a wind facility would be significant. Mr. Brown states that a two megawatt turbine required only a quarter of an acre of actual land use and that farmers are still able to utilize much of their land. This in fact is fairly consistent with what MidAmerican has seen with its wind project development. What Mr. Brown fails to account for is the necessary spacing for capture of the wind resource. Wind turbines must be sufficiently spaced apart to maximize capture of the available wind energy. If the turbines are too close together one turbine can impact the efficiency of another turbine. Based on MidAmerican's experience the appropriate spacing of wind turbines equates to approximately 72 acres per megawatt. This would mean the project footprint for 10,729 megawatts would entail over 772,000 acres. This is a more significant number than that cited by Mr. Brown.

QC11-9 4. Intermittent Power. Mr. Brown notes (Transcript, pp. 82-84) that the SEIS discusses the intermittent nature of wind. The lack of wind energy dispatchability is discussed in number one, above. Mr. Brown also discusses the short- and medium-term fluctuations in wind generation, noting that a penetration of 25% is viable with no change to the transmission grid. MidAmerican plans to install 310 MW of wind generation in the next three years, in Iowa. As of May 2003, this 310 MW represents approximately 7% of MidAmerican's nameplate generation. Transmission system impact studies note nineteen separate upgrades necessary to accommodate this generation. There would likely need to be significant changes and related investments in the transmission grid to accommodate an additional 18% penetration. To say that no changes would be required in the transmission grid and that Iowa could very easily accommodate a 25% penetration of wind energy is clearly not correct.

In his own discussion, Mr. Brown is not clear whether the 25% penetration he notes is nameplate capacity or actual generation. He does go on to discuss the need to increase generation capacity during peak periods. This is also the same discussion noted in number 1, above. As such, existing MAPP requirements would necessitate the building of 10,729 megawatts of wind generation to cover this peak capacity need.

Respectfully submitted by: Thomas J. Budler
Wind Project Manager
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Appendix A

Received: from igate.nrc.gov
by nrcgwia.nrc.gov; Tue, 27 Jan 2004 17:36:25 -0500
Received: from hotmail.com (bay2-f90.bay2.hotmail.com [65.54.247.90])
by smtp-gateway ESMTP id i0RMa2db003004
for <QuadCitiesEIS@nrc.gov>; Tue, 27 Jan 2004 17:36:02 -0500 (EST)
Received: from mail pickup service by hotmail.com with Microsoft SMTPSVC;
Tue, 27 Jan 2004 14:36:18 -0800
Received: from 208.248.158.89 by by2fd.bay2.hotmail.msn.com with HTTP;
Tue, 27 Jan 2004 22:36:18 GMT
X-Originating-IP: [208.248.158.89]
X-Originating-Email: [wntrlark@hotmail.com]
X-Sender: wntrlark@hotmail.com
From: "Leslie Perrigo" <wntrlark@hotmail.com>
To: QuadCitiesEIS@nrc.gov
Subject: QCNPS comments
Date: Tue, 27 Jan 2004 22:36:18 +0000
Mime-Version: 1.0
Content-Type: text/html
Message-ID: <BAY2-F90khJnctTwQ190000b1ad@hotmail.com>
X-OriginalArrivalTime: 27 Jan 2004 22:36:18.0658 (UTC) FILETIME=[FB254420:01C3E525]
X-MIME-Autoconverted: from 8bit to quoted-printable by igate.nrc.gov id i0RMa2db003004

Attention: Duke Wheeler!

QC12-1

Although the final decision may not be made until June of this year, the license renewal of the QCNPS is an issue of grave significance to every resident of the Quad Cities and surrounding area. The plant at Cordova is one of twenty-one nuclear power plants along the Mississippi River watershed, and one of the oldest Boiling Water Reactors in the nation. The inherent design flaws of this model pose a serious threat to not only members of the Quad Cities, but all those downstream from us. Typical discharge points for gaseous and liquid releases to air, water and soil from nuclear power plants include planned releases from the reactor's routine operation and unplanned releases from leaks and accidents. The design of the Torus containment system employed by GE Mark 1 Boiling Water Reactors increases the risk of releases to the environment by venting any high pressure buildup of radioactive steam generated during an accident directly to the atmosphere through the 300 foot stack, UNfiltered.

QC12-2
QC12-3

A report published by the NRC in 1993 confirmed that age-related degradation will damage or destroy many vital safety-related components inside the reactor vessel before the 40 year license expires. We cannot afford to put the Quad Cities and our neighbors downstream at risk. It is time to seek serious solutions to solve our energy needs. Iowa and Illinois have a monumental

QC12-4

opportunity to set an example for the rest of the country and help our great nation claim its energy independence. Investing in renewable energy today could create thousands of new jobs and stimulate the local economy. Efficiency is a viable alternative that could actually eliminate the need for over 127 power plants by 2010. And it does not take mass amounts of money, create toxic waste, or pollute the environment for thousands of years.

Also of concern to me is the draft supplement's blatant misrepresentation of alternative technologies. The investigators obviously made little effort to seriously work out the details of illeget technologies which they illegetly deemed unfeasible, too costly or needing too much space. Solar and geothermal alternatives are generally incorporated into existing structures, and wind turbines can share the field with crops, with farmers harvesting up to within 1 foot of the turbine tower. As a board member of the Iowa Renewable Energy Association, I know whereof I speak. I believe you have heard the same from Bennett Brown as well. So please, before you discount the benefits of renewable alternatives AND efficiency, I implore you to undergo an independent study of viable alternatives for the Quad Cities.

Respectfully,

QC12-5

Leslie Perrigo, Davenport, IA

563-445-0369

PS- The following text is a copy of my summation from the afternoon session at the Mark in December, which I had told members of the NRC I would get to them. I was told that these were more "security issues," yet the security of the plant and its aging components has direct bearing on the surrounding environment, and its neighbors downstream. Please encourage your counterparts to take these issues seriously in that they affect us in the Quad Cities, and the Mississippi River watershed immediately. Thanks.

Leslie Perrigo for IECAN

There are a couple of issues which I feel need to be addressed as they are legitimate concerns that relate directly to the health, safety and general well being of the environment surrounding the Quad Cities Nuclear Power Station.

Regarding plant performance; failure to comply with NRC procedures and complete basic routine maintenance on schedule has incurred preliminary wear and irreversible damage to vital reactor components, increasing the possibility of mechanical failure and the likelihood of a major accident.

In June of 1996 a fine of \$100,000 was proposed against the utility for failing to correct design deficiencies for components in one of the plant's emergency core cooling systems. Modifications to pipe supports and structural steel in the 1980's had resulted in additional loads on the steel beams- in some cases exceeding those permitted in the original plant design. These deficiencies were

Appendix A

not corrected until 1996.

In June of 1997 a fine of \$50,000 was proposed for deferring repairs to the interior and exterior siding of the reactor building at QCNPS. Both interior and exterior siding are needed for the reactor building to fill its design function of containment.

In 1998 the NRC proposed fines in excess of \$450,000 for failure to implement an adequate program for monitoring maintenance; failure to develop adequate procedures and systems to safely shut down the QCNPS, and for performing a pressure test of the Unit 2 reactor vessel and piping AFTER the reactor had started up INSTEAD of BEFORE the reactor startup in order to detect any leaks in the reactor vessel and piping.

Between June of 1999 and September of 2002 the utility neglected to correct multiple switch failures which impacted the availability, reliability and (2min) capability of equipment used to respond to initiating events and prevent undesirable consequences from a plant fire.

In March 2003 the NRC staff identified a number of human performance issues, including damage to a control drive pump due to improper setting of a lubricating device; failure to recognize that the Unit 2 shut down cooling system was inoperable for several MONTHS and several instances of valves placed in the wrong position.

These are but a few of the events which have increased the amount of undue stress on reactor components and accelerated the aging process. The NRC has confirmed that age-related degradation in BWR will damage or destroy vital internal components well BEFORE the standard 40 year license expires, yet the readiness of the industry to meet projected maintenance and repair challenges is unclear. For some components, methodologies are still in the conceptual phase of development (12 of 29 in 1994).

The core shroud is one (3min) of many safety-related components that may be damaged or destroyed by age-related degradation in BWRs. A German utility operating a GE Mark 1 BWR (like QC 1 2) where extensive core shroud cracking was found estimated the cost of replacement at \$65 million. Germany's oldest BWR was closed in 1995 after wary German nuclear regulators rejected a plan to repair rather than replace the reactor's cracked core shroud. Extensive core shroud cracking was discovered at QC Unit 1 in 1994.

Reactor aging will require a major continuous effort by industry officials to anticipate emerging age-related problems and resolve them before they become a crisis. By dealing with the whole problem of age-related degradation NOW, federal and state regulators can ensure future safety and engineering

implications of multiple component failures in BWRs.

Lastly, the continued operation of any General Electric Mark 1 BWR relies upon a nuclear waste cooling and storage pond that is elevated 6-10 stories up in the reactor's secondary containment building, and does not appear to have any significant structure to reduce the likelihood of penetration by deliberate attack. Only 4 of the 103 operating reactors have design features intended to resist aircraft impact: Limerick 1 & 2 and Seabrook reactors- 6 ton, Three Mile Island Unit 1- 90 ton. **No other US reactor was designed to withstand aircraft impact.**
5.1.1 35-39

The identified structural vulnerability of the Mark 1 irradiated fuel storage and cooling ponds constitutes an unreviewed safety issue. Attack on a reactor could lead to rapid onset core melt with open containment and a raging fire. An NRC study concluded that a generic estimate of 100% of the radioactive isotope Cesium-137 would be released in the event of a spent fuel pool fire. A full spent fuel pool contains 74 million curries of Cesium-137.

Defense of US nuclear facilities should be seen as a key component to Homeland Security. As such, spent fuel pools should be re-equipped with low density racks, and all other spent fuel should be hardened and dispersed throughout the site to make it a less attractive target.

In conclusion, I would just like to point out that the useful lifetime of a nuclear power plant is 25 years in actual practice. It is becoming abundantly clear that aging of reactor components poses serious economic and safety risks at BWRs. The GE Mark 1 in particular has significant inherent design flaws and lacks containment integrity during a nuclear accident. Under the circumstances, it would be prudent to retire the QCNPS in 2012, and seek out safer, more financially viable options for the community. Thank you.

TO The Honorable Duke Wheeler,
Chief Rules & Directive Branch - NRC

11/13/03
65 FR 64372

Please protect the Mississippi River Watershed for future generations, and give our states the opportunity to develop more viable energy solutions for our communities.

11

Dear DUKE,

Thank you for taking the time to consider public opinion. Enclosed you will find a petition that 153 people have signed, asking the NRC to retire the plant. I've also included 4 sign on letters from other non-profits, and an article on nuclear security. Please call me if you have any questions.

Sincerely,

Leslie Ferrigo
Leslie Ferrigo, IECAN

RECEIVED
2004 FEB -3 PM 3: 31
Rules and Directives
Branch
USNRC

Template = ADM-013

FRTDS = ADM-03
Call = D. Wheeler (DX)

**Petition to the Nuclear Regulatory Commission In Opposition
of the License Renewal of the Quad Cities Nuclear Power Station**
Presented by the Independent Environmental Conservation & Activism Network

We, the undersigned, strongly oppose the license renewal of the Quad Cities Nuclear Power Station, and urge the Nuclear Regulatory Commission to (SAFSTOR) decommission the plant, following the expiration of its original operating license.

QC13-1

At the meeting held April 8th at the Mark of the Quad Cities in Moline, T.J. Kim of the Nuclear Regulatory Commission (NRC) explained that the initial licensing period of 40 years was based more on economic factors than safety or technical specifications. This plant in particular has a rich history of poor routine maintenance; testing violations, equipment failure, security weakness, inoperable safety systems, and human performance errors. In light of these events, it is neither safe nor cost effective for the community, to continue to operate these reactors beyond their original lifespan.

Background

The Quad City Nuclear Power Station (QCNPS) was completed and ready for operation in 1972, one of six stations owned and operated by Commonwealth Edison Company. The two-unit station occupies 784 acres on the east bank of the Mississippi River, with a net electrical output of 789 megawatts per unit.

In 2001, Unicorn, the parent company of Commonwealth Edison, merged with PECO Energy and formed a parent entity- Exelon Corporation. The ownership and operation of Commonwealth Edison's 10 operating nuclear power plants and 3 retired nuclear plants was then transferred to Exelon.

Later that year, Exelon submitted a request to the NRC for changes to the operating licenses and Technical Specifications for Dresden Nuclear Power Station (DNPS) and QCNPS, to allow operation at uprated power levels. The NRC approved this request. The Safety Evaluation accompanying the approval amendment required that Exelon confirm to the NRC that necessary modifications to the main steam and torus-attached piping systems were completed prior to the implementation of the power uprate.

The power uprate at Quad Cities 1 and 2 will increase the power of each reactor by 17.8%, to about 912 megawatts of electricity per unit. Modifications were completed prior to implementation of the uprate for QCPS Unit 2 during the refueling outage that ended on March 5, 2002. The piping system modifications for QCNPS Unit 1 were completed during the refueling outages in fall of 2002.

Currently the Quad Cities area gets 23.6% of its total commercial power from nuclear energy. Although much of it comes from the QCNPS, some is subcontracted from a similar plant in Nebraska.

Significant Events

September 8, 1987

On May 1, 1987, Commonwealth Edison Company (CECO), the existence of a gap in the Quad Cities neutron absorber panel has been confirmed by underwater neutron radiography conducted by Nusurtec, Inc. The racks that store the spent fuel are made with boron and

QC13-2

carbon so that they absorb neutrons created as the spent fuel continues to decay. There were gaps between panels of the racks, which were created by radiation damage to the storage racks, and presumably would have worsened had they not been noticed. Had the gaps gotten larger, they could have allowed enough neutrons to pass from one spent fuel rod to another. The fuel pond would have gone critical—meaning that the chain reaction used to boil water inside the reactor would have boiled the water in the cooling pond. The concern is that separation of the neutron-absorbing material used in high density fuel storage racks might compromise safety.

August 16, 1993

Ruptured discs burst, releasing steam into the HPCI room, burning, and slightly contaminating, five workers. The ruptured discs burst within one second after the turbine was started. Fire doors between the Unit 1 and Unit 2 HPCI rooms were blown off their hinges into the Unit 2 HPCI room. Upon investigating the event, the licensee determined that water had accumulated in the turbine casing because the drain system level switches for the Unit 1 HPCI system had failed. In April 1992, the licensee performed a reliability-centered maintenance study, which recommended the level switches be included in the preventive maintenance program but the recommendation had not been acted on at the time of the event. Failure to complete the recommended maintenance eventually impacted the outer disc as designed and caused it to burst as well. The exhaust line pressure sensors did not detect a high pressure and should have immediately isolated the steam supply upon sensing a high exhaust pressure before the rupture discs burst. The steam injured five workers, four of whom were participating in the HPCI pump surveillance test. The fifth, and most severely injured worker was a health physics technician in the room on routine rounds, who was not aware of the danger posed by the surveillance test. The test procedure contained no specific guidance on room occupancy. The HPCI and RCIC rupture discs at Quad Cities Station had been in service for 20 years and were not part of any scheduled inspection or preventive maintenance program.

July 25, 1994

The NRC issued a generic letter to all holders of operating licenses or construction permits for boiling water reactors (BWRs) except for Big Rock Point, which does not have a core shroud. Intergranular stress corrosion cracking (IGSCC) of BWR internal components had been identified as a technical issue of concern by both the NRC staff and the industry. Inspection findings caused the NRC staff and industry to re-evaluate the significance of this issue, due to the extent of 360 degree cracking, and the location at a lower elevation where extensive cracking had been found at Dresden Unit 3 and Quad Cities Unit 1 on July 19, 1994. In addition to the core shroud, NRC has an overall concern with cracking of BWR internals and encourages licensees to work closely with the BWR Owners Group (BWROG) on coordination of inspections, evaluations and repair options for internals cracking.

May 10, 1996

An alert was declared for the Quad Cities Units 1 and 2, due to high winds and a possible tornado in the area. Unit 1 was completing a refueling outage and Unit 2 was operating at 100% power. About 25% of the outer layer of sheet metal was blown from the east side of the reactor building. The sheet metal ruptured an N2 line that feeds nitrogen from the tank farm to the containment for the containment purge and damaged cabling from the Station Blackout diesels. 27 Area sirens lost power, data from the meteorology tower was interrupted, the oil storage building was destroyed, spilling about 15 gallons of uncontaminated oil, and the roof of the mixed waste building was damaged.

June 14, 1996

The NRC proposed a \$100,000 fine against Commonwealth Edison after the utility failed to promptly correct design deficiencies in structural steel beams and supports for components in one of the plant's emergency core cooling systems. The utility's architect-engineer determined

that modifications to pipe supports and structural steel in the 1980's had not been evaluated to determine their effect on seismic design criteria. The modifications resulted in additional loads on the steel beams and supports which, in some cases, exceeded those permitted in the original plant design. These deficiencies were not corrected until February 1996 at Quad Cities and until March 1996 for Dresden Unit 2. Commonwealth Edison personnel were aware of the design deficiency for over five years without effective resolution.

June 26, 1997

The NRC proposed a \$50,000 fine against Commonwealth Edison for deferring repairs to the interior and exterior siding of the reactor building at the Quad Cities Nuclear Power Station. Both the interior and exterior siding are needed for the reactor building to fill its design function of containing radioactive releases in the unlikely event of a reactor accident. The siding also includes "blow out" panels that are designed to relieve pressure inside the reactor building should there be a steam release that could potentially damage the building's structure. In notifying the utility of the proposed fine, NRC Regional Administrator A. Bill Beach said, "These violations are significant because your staff failed to translate the design into surveillance tests to ensure the structure remained operable."

September 1997

The owner of the Quad Cities nuclear plant in Illinois informed the NRC that a fire could cut off the power to ALL of the emergency pumps and cause serious reactor core damage. Following the disastrous fire at the Browns Ferry nuclear plant in March 1975, the NRC required all owners to modify their plants to ensure that a fire could not interrupt the power to both the primary emergency pumps and their backups. More than 22 years later, the Quad Cities plant was still vulnerable. It took the plant's owners nearly a year to re-route power cables and revise emergency procedures to remedy the problems.

March 4, 1998

The Nuclear Regulatory Commission staff has proposed a \$55,000 fine against Commonwealth Edison Company for 18 violations involving the failure to implement an adequate program for monitoring the effectiveness of maintenance done on plant systems and equipment at the Quad Cities plant. In two instances, the utility took no action after it became clear that the type of preventive maintenance being performed on systems and equipment was not effective in preventing a functional failure. It was only after NRC inspectors identified the extensiveness of the deficiencies, that aggressive, substantive actions were implemented.

March 13, 1998

The NRC proposed a \$330,000 fine against Commonwealth Edison for performing a pressure test of the Unit 2 reactor vessel and piping on June 22 of last year after the reactor had started up, rather than prior to startup. This test is required by the NRC to be performed before the reactor startup to detect any leakage from the reactor vessel and associated piping. The plant staff also failed to adequately perform required monitoring of the reactor vessel and piping as part of the test. Similar monitoring violations were identified for earlier tests at both of the Quad Cities units.

September 15, 1998

The NRC proposed an \$88,000 fine against Commonwealth Edison Company for failing to develop adequate procedures and systems to safely shut down the Quad Cities Nuclear Power Station under certain fire conditions. NRC Acting Regional Administrator James Caldwell said, "These violations represent a very significant safety concern because they involve inadequacies in Commonwealth Edison's ability to shut down the Quad Cities facility following a postulated fire." Both reactors remained shut down until May of this year for improvements to plant safety systems and procedures for use in the event of a fire. In addition to the inadequacies in the shutdown procedures, the NRC staff also cited Commonwealth Edison for initially changing its procedures to rely on an additional diesel generator without doing the necessary safety reviews.

February 24, 1999

During the switch over the licensee inadvertently failed to close the "A" RHR minimum flow valve as required by the procedure. Sometime later operators noted a decreasing reactor water level. On the basis of post event reviews, it appears that the minimum flow valve in the "A" loop was left open because the nuclear station operator failed to ensure that the tasks were performed in the sequence specified in the operating procedures. The operating crew did not recognize that there was any problem until approximately 10 minutes had passed and the water level had decreased about 13 inches because of a misinterpretation of causes of the level decrease. After detecting the decrease, the operating crew was slow to react, which allowed the level to decrease another 20 inches before the operators isolated shutdown cooling, which terminated the draindown. Operations staff practices including poor communications, poor activity briefings for high-risk activities, lack of effective pre-shift briefings, inadequate supervision of important control room activities, inadequate monitoring of control room panels, and slow event response may have contributed to the event.

May 8, 2001

NRC force-on-force tests of security preparedness at nuclear power plants resumed, which pit a handful of simulated intruders against a plant's physical defenses and squadrons of armed security personnel. In 1998, these tests had revealed significant security weaknesses in about 47 percent of the plants tested. The NRC quietly discontinued the testing, but the ensuing public outrage forced the agency to re-institute the tests. Since the tests have been resumed, about 47 percent of the plants continue to have significant security flaws revealed. In 2000, force-on-force tests at the Waterford plant in Louisiana and the Quad Cities plant in Illinois demonstrated serious security problems that warranted extensive repairs and upgrades. The owner of the Waterford spent more than \$2 million fixing its inadequate security system.

December 11, 2001

While performing calculations associated with the power uprate project, Quad Cities Nuclear Power Station determined that the Standby Liquid Control (SLC) system relief valves on Unit 1 and Unit 2 may intermittently lift during the most limiting transients. The specific scenario evaluated is a Main Steam Line isolation at rated power with failure of the normal, backup, and alternate rod insertion scram functions. This issue also applies to the current rated power level during two-pump SLC operation. While the relief valve was lifted, the system flow rate would not meet the required equivalent flow rate into the vessel. Therefore, this condition was not in direct compliance with 10 CFR 50.62.

September 30, 2002

The licensee failed to follow procedural requirements regarding the initiation of condition reports and determining the extent of condition following the discovery of a large amount of grease in the 1A core spray room cooler motor. As a result, the licensee did not provide a basis for continued operability of potentially impacted plant motors for approximately 40 days.

Ineffective corrective actions resulted in repetitive failures of the 2A residual heat removal normal/alternate switch between June 1999 and September 2002 and a Non-Cited Violation of 10 CFR 50. The failure to correct the multiple normal/alternate switch failures was more than minor because the switch failures impacted the availability, reliability, and capability of equipment used to respond to initiating events and prevent undesirable consequences from a plant fire.

March 26, 2003

A letter from the NRC to Exelon Nuclear addresses plant safety performance during the previous

year and states that the NRC staff "has identified a substantive cross-cutting issue in the area of human performance involving a number of findings." Some of the examples include the damage to a control drive pump due to improper setting of a lubricating device, a failure to recognize that the Unit 2 shut down cooling system was inoperable for several months and instances of valves placed in the wrong position.

April 16, 2003

An emergency alert was declared due to a stuck open [power operated] relief valve. The problem occurred when the large tank of emergency cooling water- known as the torus- was rapidly heating above the maximum 110-degree limit the torus was designed to handle. The temperature increase was due to steam leaking through an open valve in the reactor. Efforts to shut the valve were unsuccessful, which led to the emergency.

The torus was originally designed to absorb the heat energy produced in an accident to prevent the primary containment building from exploding, as the reactor at Chernobyl did in 1986. After Mark I reactors had been operating for five years, measurements indicated that the torus water would heat up too quickly and reach boiling temperatures. If this happened, the resulting pressure would cause the torus to explode and release radioactivity from the core into the environment. In 1986, the NRC's top safety official testified that, if called upon to contain an accident, the torus had a 90% likelihood of failure. To prevent such an explosion, two holes were drilled into the torus, and ducts were installed from the torus to the power plant's 300-foot emissions stack.

This "direct torus venting system" put an end to the hope that an accident could be contained, but would at least, in many scenarios, prevent the containment buildings from exploding.

The power plant was shutdown before radioactive gases were released into the atmosphere, and the plant will be able to return to normal operations. The event will however have implications for the future of the Quad cities plant. Each SCRAM is hard on a nuclear power plant's safety equipment because of the sudden changes in temperature and because the force of inserting the control rods into the core exerts a pulse of high pressure on valves, tubes, and gaskets. Each SCRAM ages the components of a nuclear power plant. The flaw in the torus design, and the dangerous solution intended to get the plants through their 40-year license, call into question whether the licenses for flawed nuclear plants should be renewed.

QC13-3

May 20, 2003

The plant was shut down due to reactor coolant boundary leakage. The Unit One Reactor Coolant System was determined to have Pressure Boundary Leakage. The Unit was in the process of shutting down for a maintenance outage, and sub critical at the time. The leakage was found during a Drywell inspection as part of the shutdown.

June 2003

The NRC began a special inspection at the Quad Cities Nuclear Power Station to review damage to a pump which led to the shutdown of the Unit 1 reactor on January 9, 2003. When a brace holding the jet pump in position broke, causing portions of the pump to separate, reactor operators promptly began to shut down the reactor to investigate the problem. Reactor cooling was maintained without the need for backup or emergency cooling systems.

QC13-4

We believe that these incidents constitute legitimate concerns that relate directly to the health, safety and general well being of the surrounding population. These events characterize a blatant disregard for the NRC's own policies, and the people and environment which they are intended to protect; and present unwarranted risks to public health, safety and general well being.

- QC13-5 •Energy efficiency is the quickest, cheapest, easiest way to achieve energy independence. Adopting the household appliance efficiency standards agreed to by both the Clinton and Bush (senior) administrations would eliminate the need for 127 power plants by 2020.
- QC13-6 •Failure to comply with NRC procedures and complete basic routine maintenance on schedule has incurred preliminary wear and irreversible damage to vital reactor components, increasing the possibility of mechanical failure and the likelihood of a major accident.
- QC13-7 •Since containment buildings were not designed to withstand attacks by aircraft, there is an inherent possibility that a terrorist attack on a spent fuel pool could contaminate the surrounding environment and do irreversible harm to the Mississippi River watershed.
- QC13-8 •Because there is no known way to dispose of radioactive waste- the byproduct of nuclear facilities, and the Yucca Mountain Repository is not a suitable choice due to flawed science and the potential exposure of millions of people who live, work and play within mere miles of the proposed transport route, it would be prudent to reduce the amount of waste BEING GENERATED until a viable solution is discovered.
- QC13-9 •There are numerous alternatives to nuclear power which are renewable; do not pollute like coal or diesel, and do not produce thousands of tons of radioactive waste which we have no feasible means to dispose of. These clean, abundant technologies have a real potential to create new job markets, boost the economy and improve the environment.
- QC13-10 **Furthermore, it is unacceptable to expect ratepayers and Illinois residents, through their taxes, to continue to support a decrepit power plant that does not benefit its investors due to the many inevitable repairs which accompany the extension of an operating license.**

As it stands, Exelon has submitted an appeal for a reduction of the stations taxable value, which would have a devastating effect upon the local taxing districts, and deprive the county of over \$400,000. The college will lose over a quarter million, resulting in substantial layoffs and the corresponding reduction of social services. The school district will lose more than \$2 million- nearly 29 percent of its entire budgeted revenues.

Conclusion

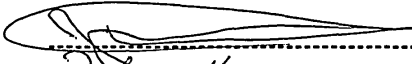
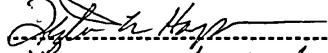
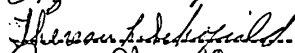
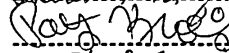
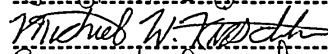

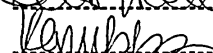
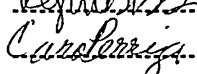
- QC13-11 The useful lifetime of a nuclear power plant is approximately 25 years, in actual practice. Materials have a fixed number of cycles of strain they can bear before they begin to crack and fail. Due to radiation induced within their originally non-radioactive components, reactors and other major nuclear facilities may become dangerous to operate- or even approach- long BEFORE they show signs of physical deterioration.
- QC13-12 The Quad Cities units are members of an aging fleet of Boiling Water Reactors (BWR), engineered long before terrorism was even a consideration. In addition to the physical and chemical processes, which accelerate aging degradation of the systems, structures and components- such as corrosion, embrittlement, fabrication defects, vibration, water hammer and wear- there is also the concern of structural vulnerability. None of the 103 nuclear power plants operating in the United States were designed to withstand suicide attacks from the air, such as we tragically experienced on September 11, 2001.
- QC13-13 Currently, nuclear waste, or spent fuel, is kept in high-density pools six to ten stories up in the reactor's secondary containment building. **The pools share a common wall with an exterior wall of the building, and do not appear to have any structural reinforcement to prevent the likelihood of penetration by deliberate attack.** Attack on a reactor could lead to rapid onset core melt with an open containment, accompanied by a raging fire. Due to high radiation fields across the site, access to the site by personnel would be precluded.

A full spent fuel pool contains 74 million curies of the radioactive isotope Cesium-137. An NRC

study concluded that a generic estimate of the release of Cesium isotopes during a spent fuel pool fire is 100%. Cesium-137 accounts for most of the off-site radiation attributed to Chernobyl and has a half-life of 30 years. Cesium-137 would be released into the atmosphere in small particles, and deposited on the ground and other surfaces. These particles would then emit intense gamma radiation, leading to whole-body radiation doses to exposed persons. Cesium-137 would also contaminate water and food sources.

- QC13-14 Even with the highest NRC rating or upgrades, nuclear plants are not invincible. They can approach near-meltdown conditions through mechanical failure alone, without any security breach from outside. The Project on Government Oversight found that nuclear plants in general still remain ill equipped, under-staffed, and under-trained. Public assurances by the NRC do little to dispel this impression.
- QC13-15 Nuclear power plants present many complications and risks to our health, environment and economy, which are unique to this form of energy. Although emissions from nuclear plants are significantly lower than emissions from fossil fuels, **carbon is emitted at every step of the nuclear fuel chain.**
- QC13-16 The overall inherent dangers of radiation far outweigh the benefits of nuclear power.
- QC13-17 The Quad Cities Nuclear Power Station has outlived its purpose. We, the people, demand responsible energy solutions. Options, which can increase efficiency, meet our needs, create new jobs, and stimulate the local economy. A license renewal for the QCNPS offers little more than higher utility bills, further environmental degradation and greater potential for a nuclear disaster.
- QC13-18
- QC13-19 We urge you to deny Exelon's request for an extension of their operating license for Quad Cities Units 1 and 2, and give us the opportunity to develop alternative energy sources that are renewable, do not pollute like coal or diesel, and do not generate dangerous toxic waste which we have no feasible means to dispose of.

Sincerely,

Signature	Printed Name	Address
	Jesse J. Oller	320 Brady St. Davenport IA 52801
	Leanne A. Hays	320 Brady St. Apt 46 Davenport IA 52801
	Theresa Schafeld	106 E 3rd St #508 Davenport IA 52801
	Patty Brolik	423 W 8th St Davenport IA 52801
	Michael W. Kirschbaum	106 E 3rd Apt. 908 Davenport IA 52801
	Beth Holland	23319 Buff Rd Princeton IA 52768
	Kelly Gibbs	1825 W 40th St Davenport IA 52806
	Carol Perrigo	1825 W 40th St Davenport IA 52806

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of the License Renewal of the Quad Cities Nuclear Power Station**
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We believe that these are legitimate concerns relating directly to the health, safety and general well being of the surrounding population. These events characterize a blatant disregard for the NRC's own policies, and the people and environment which they are intended to protect; and present unwarranted risks to public health, safety and general well being.

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The Quad Cities units are members of an aging fleet of Boiling Water Reactors (BWR), engineered long before terrorism was even a consideration. In addition to the physical and chemical processes, which accelerate aging degradation of the systems, structures and components- such as corrosion, embrittlement, fabrication defects, vibration, water hammer and wear- there is also the concern of structural vulnerability. None of the 103 nuclear power plants operating in the United States were designed to withstand suicide attacks from the air, such as we tragically experienced on September 11, 2001.

Even with the highest NRC rating or upgrades, nuclear plants are not invincible. They can approach near-meltdown conditions through mechanical failure alone, without any security breach from outside. The Project on Government Oversight found that nuclear plants in general still remain ill equipped, under-staffed, and under-trained. Public assurances by the NRC do little to dispel this impression.

Nuclear power plants present many complications and risks to our health, environment and economy, which are unique to this form of energy. Although emissions from nuclear plants are significantly lower than emissions from fossil fuels, **carbon is emitted at every step of the nuclear fuel chain.** The overall inherent dangers of radiation far outweigh the benefits of nuclear power.

The Quad Cities Nuclear Power Station has outlived its purpose. We, the people, demand responsible energy solutions. Options, which can increase efficiency, meet our needs, create new jobs, and stimulate

Appendix A

the local economy. A license renewal for the QCNPS offers little more than higher utility bills, further environmental degradation and greater potential for a nuclear disaster.

We urge you to deny Exelon's request for an extension of their operating license for Quad Cities Units 1 and 2, and give us the opportunity to develop alternative energy sources that are renewable, do not pollute like coal or diesel, and do not generate dangerous toxic waste which we have no feasible means to dispose of.

Sincerely,

Name	Signature	Address
BOBICA Schuk-Claus	<i>BOBICA Schuk-Claus</i>	100 Clinton
Margie Spurney	<i>Margie Spurney</i>	1325 Broadway St. JC
_____	_____	728 College St Iowa City
Dan East	<i>DAN EAST</i>	1608 1/2 S 10th St Goshen, IN 46526
Ryan Kachey	<i>Ryan Kachey</i>	↑ same
Joe Hartman	<i>Joe Hartman</i>	1700 S. Main St Goshen, IN 46526
Charles Buell	<i>Charles Buell</i>	775 Elizabeth St JC
Tom Hansen	<i>Tom Hansen</i>	1307 Carroll St Iowa City
Cody Haasen	<i>Cody Haasen</i>	1307 Carroll St Iowa City
Azure Lee Stein	<i>Azure Lee Stein</i>	Po Box 4770 Davenport IA 52808-4771
MARY VOPAVA	<i>Mary C. Vopava</i>	1624 14 1/2 St. ROCK ISLAND, IL 61201
Hope Aldeman	<i>Hope Aldeman</i>	1120 37th St. Rock Island, IL 61201
Mary Linda Krato	<i>Mary Linda Krato</i>	1624 14 1/2 St Rock Island IL 61201
Staci Hammill	<i>Staci Hammill</i>	1332-25th Av Rock Island IL 61201
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Appendix A

around nuclear plants in the fall of 2001. Currently, nuclear waste, or spent fuel, is kept in high-density pools six to ten stories up in the reactor's secondary containment building. The pools share a common wall with an exterior wall of the building, and do not appear to have any structural reinforcement to prevent the likelihood of penetration by deliberate attack. Attack on a reactor could lead to rapid onset core melt with an open containment, accompanied by a raging fire. Due to high radiation fields across the site, access to the site by personnel would be precluded.

A full spent fuel pool contains 74 million curries of the radioactive isotope Cesium-137. An NRC study concluded that a generic estimate of the release of Cesium isotopes during a spent fuel pool fire is 100%. Cesium-137 accounts for most of the off-site radiation attributed to Chernobyl and has a half-life of 30 years. Cesium-137 would be released into the atmosphere in small particles, and deposited on the ground and other surfaces. These particles would then emit intense gamma radiation, leading to whole-body radiation doses to exposed persons. Cesium-137 would also contaminate water and food sources.


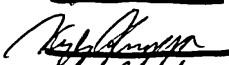

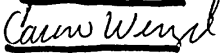
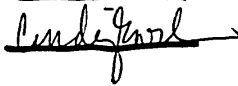
Even with the highest NRC rating or upgrades, nuclear plants are not invincible. They can approach near-meltdown conditions through mechanical failure alone, without any security breach from outside. The Project on Government Oversight found that nuclear plants in general still remain ill equipped, under-staffed, and under-trained. Public assurances by the NRC do little to dispel this impression.

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The Quad Cities Nuclear Power Station has outlived its purpose. We, the people, demand responsible energy solutions. Options, which can meet our needs, create new jobs, and stimulate the local economy. A license renewal for the QCNPS offers little more than higher utility bills, further environmental degradation and greater potential for a nuclear disaster.

We urge you to deny Exelon's request for an extension of their operating license for Quad Cities Units 1 and 2, and give us the opportunity to develop alternative energy sources that are renewable, do not pollute like diesel and coal, and do not generate dangerous radioactive waste which we have no feasible means to dispose of.

Sincerely,

Signature	Printed Name	Address
	<u>Douglas Clouse</u>	<u>2 Woodland Pl</u> ⁵¹⁵²¹ _{Cherry Hill, NJ}
	<u>Kyle Knappe</u>	<u>131 John St. #3</u> ^{IL} _{DeKalb, IL 60115}
	<u>Roger Mohr</u>	<u>10512 96 Ke. Highway</u> ^{IL} ₆₁₄₄₁
	<u>CARONWENZEL</u>	<u>2107 EDGEWOOD</u> ^{IL} _{Woodstock, IL 60097}
	<u>Cindy Enzler</u>	<u>4493 S. Daysville Rd.</u> ^{OR} _{Oregon, IL 6101}

Signature	Printed Name	Address
	Eric E. Peterson	1530 Coventry Rd, Schaumburg IL 60195
	Jim Lamb	621 Dalton Pl Northbrook IL 60062
	Brent C. Peterson	6321 High Country Dr NE Cedar Rapids IA 52411
	Joseph Benner	815 Sturdevant St 50252
	Justin D. Hoffman	Davenport Iowa
	Miss. Vukobeg	1025 1/2 W. 4th, Davenport, IA
	Justin Teetes	5227 36th Ave RI
	Heather Hogbin	
	Ann McMillan	20120 43rd Ave Ct. N Port Byron, IL 61276
	Kenneth Staples	721 Perry St. #12 DAVENPORT IA
	LEE de las CASAS	721 PERRY ST. DAVENPORT IA
	PATRICIA SIFFERT	2116 E. 53rd St DAV IA
	ERIC Gilmore	1006 W 17th St DAV, IA
	KELLY MAYFIELD	430 W. 16th St DAV, IA
	Pauli Mayfield	430 W. 16th St, DAV. IA
	Dijah Zielstorff	1600 Harrison St DAV. IA
	Barbara Swanson	124 W. 13th St #9 DAV. IA
	Carrie Mirfield	10816 Marguette DAV. IA
	Rachel B. Boyster	117 1/2 N. Cody Ct. DAV. IA
	Trish Rinehart	2108 Glenwood DAV. IA
	Herdi Hernandez	3117 W 30th St DAV. IA 52803
	Kris Hernandez	343 W 30th St DAV. IA 52803
	Scott Welch	5916 PINTO RD TUCSON AZ
	Kristin Quirk	409 E Rusholme St Davenport IA 52803
	VICTORIA NAVARRO	1223 E A ST DAV 52813
	Amelia Schweneman	514 28th St R. I. Th. IA
	Megan Quinn	" " " " "

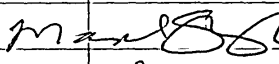
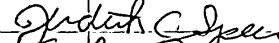
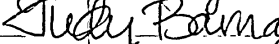
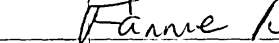
Appendix A

Signature	Printed Name	Address
Mark Shipley	Mark Shipley	Chicago, IL
Jackie McKay	Jackie McKay	Chicago
MARVIN BRESSEN	MARVIN BRESSEN	IL
LENORE BEYER-CLOW	LENORE BEYER-CLOW	Woodstock, IL
Aimee Collins	Aimee Collins	Ringwood, IL
JAY RAKUS	JAY RAKUS	1721 1/2 25th St. R.I., IL
<p>Chg John Campbell, Craig G. Campbell, 1918 Douglas St., Rockford IL 61103</p>		
<p>Gene Parkhurst, 745 Hill Drive #1214, Hoffman Estates, IL 60184</p>		
<p>1350 Elm St. Box 153000 4324 Cornwell P.O. Box 9712 Downers Grove, IL 60515-9712</p>		
<p>James Comsto - 7th Creston Dr - Naperville, IL 60540</p>		
CAREY G. DOAN	Carey Doan	481 ARGYLE ELMHURST 60126
LINDA ZALAZA	Linda Zalaza	2320 Calwagner Malverne Pa, CA 90160
Nicholas Amelise	Nicholas Amelise	514 S. SEWARD ST. Winnebago IL 61100
Mary Myers	Mary Myers	960 W. Meadows Freeport, IL 61032
Ganetty Koeppen	Ganetty Koeppen	Oregon IL 61061
WILLIAM	WILLIAM	339 STERLING CIR Cary IL 60013
Swan Crouse	Swan Crouse	339 Sterling Cir. Cary IL 60013
Elsa Fehl	Elsa Fehl	1051 Brookside Dr. Deerfield IL 60015
Bob Rudner	Bob Rudner	1409 W. Lunt #2 Chgo, IL 60626
Anna Schaber	Anna Schaber	2925 Edgewood Pkwy Woodridge, IL 60517
Julie Maruna	Julie Maruna	42 W. 60th St #108 Westmont, IL 60559
Mia Kenyon Brown	Mia Kenyon Brown	879 Eds Ave Mechanicsville, VA 52306
Sandford Jacques	Sandford Jacques	2615 E. Court St. IL IA 52245
ACH DANA	ACH DANA	272 B AVE GUELSEY IA 52221
John Bald	John Bald	PO BOX 792 ANDALUSIA, IL 61232
Matt Nowick	Matt Nowick	2047 Market Blvd SE Cedar Rapids IA 52403

SIGNATURE	PRINT NAME	ADDRESS
<i>Kurt Guernsey</i>	KURT GUERNSEY	36768 GREENBUSH 12540 Boxwood Ct.
<i>Raymond M. Edgerton</i>	Raymond H. Edgerton	11 Kentley, IL 60142
<i>Sue Edgerton</i>	Sue Edgerton	12540 Boxwood Ct Huntley IL 60142
<i>Jeremy Dixon</i>	Jeremy Dixon	1164 W. Pleasant st Freeport IL 61032
<i>Elizabeth Fross</i>	Elizabeth Fross	6325 N. Mozart Chicago, IL 60659
<i>Elsa Kahl</i>	Elsa Kahl	1031 Brookside Ln Deerfield IL 60015
<i>Michael Muller</i>	Michael Muller	304 Sherwood Oak Park IL 60077
<i>Nelores C. Pind</i>	Nelores C. Pind, Esq.	7200 Wilson Ter, Morton Grove IL 60053
<i>Aaron Lehva</i>	Aaron Lehva	1700 Main St. Goshen, IN 46526
<i>Eric Skoden</i>	Eric Skoden	625 E Burlington St Apt 8
<i>Sabrina Susen</i>	Sabrina Susen	8625 E Burlington

Appendix A

Signature	PRINT NAME	Address
<i>Sue Breidigan</i>	Sue Breidigan	2430 Barrington Pl. Rockford IL 61107
<i>Linda Marlovitz</i>	LINDA MARLOVITZ	4652 N. Kenmore Chicago, IL 60640
<i>derek roller</i>	derek roller	521 E. Washington #3 ia ct-7, ia 52240
<i>Colleen Sarna</i>	Colleen Sarna	200 N. Michigan Ave Chicago, IL 60607
<i>Mike Sandknop</i>	MIKE SANDKNOP	4418 West Lombard St. Davenport Ia 52809
<i>Anna C. Huld</i>	ANN HOLMUND	117 1/2 N. Cody LeClaire Ia 52553
MIKE SANDKNOP 4418 WEST LOMBARD ST. DAVENPORT IA 52809		

	SIGNATURE	PRINT NAME	ADDRESS
C		MARK SMITH	527 BASSITT ST 15520 RT 173 HARVARD IL 60033
		JUDITH C. SPEER	2203 N. CHURCH ST ROCKFORD IL 61103
		JUDY BERNARD	114 UNION ST JOLIET IL 60433
		FANNE BUSSARD	


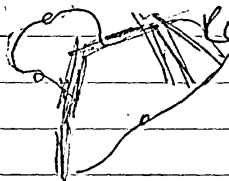
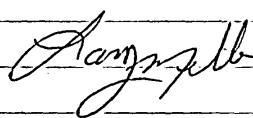
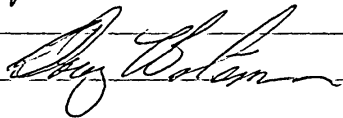
Appendix A

	Signature	Print Name	Address
	Craig Howard	Craig Howard	600 Grove Plymouth IA
	Caren Cronk Thomas	CAREN CRONK THOMAS	582 WILLGATE GLENCOE, IL
	Tom Henry	Tom Henry	28W613 Lester St. West Chicago ^{Ill}

	Signature	Print NAME	Address
	<i>[Signature]</i>	Anneta Beckstein	C'Dale, IL 62475
	<i>[Signature]</i>	Dennis Connolly	1145 BAKER Hill Rd ⁶²⁹²⁰ COBDEN IL
	<i>[Signature]</i>	Mary Jo Burke	118 Stagecoach Tr. Nora, IL 61059
	<i>[Signature]</i>	Lyn Vogl	1230 E Honey Creek Rd Green Th 61611
	<i>[Signature]</i>	Corina Vogl	1230 E Honey Creek Rd Green Th IL
	<i>[Signature]</i>	Stuart	1519 18th St B Moline IL 61661
	<i>[Signature]</i>	Liz Turner	3403-15 th Ave., Rock Island
	<i>[Signature]</i>	RONALD W. FELLIX	1503 Jersey Ridge Rd, Mt Jai
	<i>[Signature]</i>	Jay Allison	1407 27 th AVE Moline IL
	<i>[Signature]</i>	SARA i Roberts	1407 27 th Ave IL
	<i>[Signature]</i>	monique mcdonald	1301 Sunny Hill Ct BETHA
	<i>[Signature]</i>	Lillian Laki-Lawson	1631 Mississippi Blvd Bethel IA
	<i>[Signature]</i>	Chi Burt	212 E. Division Des Moines IA 50317
	<i>[Signature]</i>	Ken Wehnbach	7207 118 th St Lane Rd Elk River IA
	<i>[Signature]</i>	Mike Blommer	220 2 nd AJ Haydon IL 61256
	<i>[Signature]</i>	Michelle Keller	1908 23 rd St. Moline, IL 61265
	<i>[Signature]</i>	Kuskele	1908 ...
	<i>[Signature]</i>	Victoria Schwepke	3110 Magnolia St Bett 5702
	<i>[Signature]</i>	Erson Snow	4570 Steinbeck Apt 3 Ames IA 50014
	<i>[Signature]</i>	SINGER	1821-2 nd Ave RI
	<i>[Signature]</i>		(61201) 1821 2 nd AVE R.I.
	<i>[Signature]</i>	Nick Larson	10201 35 th St. W. RI. 61201

Appendix A

Signature	Print Name	Address
	Rebecca M. Wren	1203 1/2 5th Ave Apt #4 Moline, IL 61265
	Jan Smith	1112 25th Ave Ct Moline, IL 61265
	Lake Hull	IL 61265 3549 13th St. Mol. IL
	JOSHUA M. LONG	970 40th St Moline, IL 61262
	Larry Ortiz-Miller	4842 7th AVE Moline, IL
	CLAIRE L. FINLEY	3115 TRANT AVE. DEERFIELD, IL 60015
	Joe Hodgett	500 White Oak Ct Geneseo, IL 61244
	Colt Detrick	1586 Shady Ct. Swishica, IA 52238
	ALAN JOHNSON	2917 30TH ST MOLINE IL 61267
	Anthony THOMAS	2714 8th AVE MOLINE, ILL 61265
	Matthew Foh	1174 N Madison Ave, Dehann IA

	<p>Felix Morelo P.O. Box 3254  Rock Island Illinois ? ? ? ? ?</p>
	<p>ANA MOORE 1502 12th AVE  ROCK ISLAND IL 61201</p>
	<p>DAN HUSTING P.O. BOX 3085 3085 Clbma 2933 9 1/2 St E malwa Davenport IA 52804</p>
	<p>LARRY MILLER 1841 - 32nd St 161104 E 11. </p>
	<p>Kris Schaf KRIS Schaf 3242-36 Ave Rock Island IL 61201</p>
	<p>Karla Bateman 2500-21st Ave RD 61201  25th 21st Ave RT 61201</p>



wntrlark@hotmail.com

Printed: Saturday, January 24, 2004 10:24 PM

From : Teresa Sieckert <tslions@machlink.com>
Sent : Wednesday, September 10, 2003 6:37 PM
To : "Leslie Perrigo" <wntrlark@hotmail.com>
Subject : Re: urgent, please sign on!

You have my permission to include my name on your petition - Teresa Sieckert - Muscatine, IA

— Original Message —

From: Leslie Perrigo

To: ellioth@hotmail.com ; mjregan@mchsl.com ; mamadreadjo@aol.com

Cc: onetroulilly@yahoo.com ; tech@advancedenergyonline.com ; TheLorax@planet-save.com ;
 neis@forward.net ; erwoodwork@yahoo.com ; Grn14r@aol.com ; vwfatmobile@hotmail.com ;
 mkenyon@lowacan.org ; IECAN@yahoogroups.com ; steelbrightblade_1@yahoo.com ; Jlh2220@aol.com ;
 jemsun@juno.com ; lady_alchemy@celticcrow.com ; spikeschippedhead@msn.com ;
 bleumage29@hotmail.com ; leannezone1@mchsl.com ; mdl5011@hotmail.com ; nirsnet@igc.org ;
 Kuxansuum@aol.com ; moose52556@yahoo.com ; jroot@mpw.org ; Slut_Toy@SexMagnet.com ;
 laugh@avalon.net ; spicoli.j@lycos.com ; Info@eRideShare.com ; gratefulofearthmama@hotmail.com ;
 tslions@machlink.com ; Schaferk645@aol.com ; timhites@mchsl.com ; todd@admospheres.com ;
 tyrtlemyrle@metacrawler.com

Sent: Tuesday, September 09, 2003 7:47 PM

Subject: urgent, please sign on!

Hey all-

This is the shortened version of our petition to retire the Cordova Nuclear Power Plant at the end of its glorious and scary run, in 2012. Please please please sign on, and pass it around to your friends, family anyone you know who may be interested in helping with this. We are also forming a petitioning party for an upcoming saturday. If you would like to get involved call me at 563-445-0369. Keep up the good work beautiful people!

Leslie

"Never doubt that a small group of thoughtful, committed citizens can change the world. Indeed, it is the only thing that ever has."
 - Margaret Mead

The Independent Environmental Conservation & Activism Network works to facilitate energy reform and serves as a watchdog organization for Iowa and the Illinois Quad Cities. Learn more about us!
<http://iecan.tripod.com/index.html>

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.../getmsg?curmbox=F00000001&a=9e0c954ab1c2b756fb352e6d99587c79&msg=MSG10601/24/2004

Hello Leslie --

Please sign NEIS on to your NRC Petition Letter. If you need an actual person, here's how to write it:

David Kraft, Director,
Nuclear Energy Information Service, Evanston, IL

Stay well, keep on doing,

--Dave Kraft, NEIS--



wntrlark@hotmail.com

Printed: Saturday, January 24, 2004 10:19 PM

From : Mary Olson <nirs.se@mindspring.com>
Sent : Friday, September 12, 2003 6:09 PM
To : wntrlark@hotmail.com
Subject : sign-on

Hi Leslie -- If it will help, please add to your petition to close Quad Cities:

Mary Olson
Director, Southeast Office
Nuclear Information and Resource Service
Asheville, North Carolina

A personal note -- I grew up in Mt.Carroll, Illinois -- not far from Davenport. That thing gave me the creeps when they started building it just as we moved away to Indiana...downwind of course!

.../getmsg?curmbox=F000000001&a=9e0c954ab1c2b756fb352e6d99587c79&msg=MSG10601/24/2004

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From: WISE Amsterdam <wiseamster@antenna.nl> 

Sent: Thursday, September 11, 2003 7:49 AM

To: wntrlark@hotmail.com

Subject: please include WISE

World Information Service on Energy, WISE
Amsterdam, The Netherlands
Peer de Rijk, director


New on the WISE Web Site; The Smiling Sun Web Shop
at <http://www.antenna.nl/wise/shop/index.html>

World Information Service on Energy - WISE Amsterdam
PO Box 59636
(Visitors: Ketelhuisplein 43)
1040 LC Amsterdam
The Netherlands
T: +31-20-6126368
F: +31-20-6892179
E: wiseamster@antenna.nl
W: <http://www.antenna.nl/wise/>


  

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A DIRECT THREAT TO OUR ENVIRONMENT as well.

SEPT. 11 A YEAR LATER

MONDAY
9-SEPTEMBER-2002

Report: Al-Qaida considered hitting nuclear facilities

Interview indicates terrorists have not ruled out option

DUBAI, United Arab Emirates (AP) — Al-Qaida considered striking U.S. nuclear facilities in the Sept. 11 attacks and has not ruled out nuclear attacks in the future, an Arab television reporter who interviewed two plotters of the terror attacks said Sunday.

Yosri Fouda, correspondent for the satellite station Al-Jazeera, told The Associated Press that he was taken, blindfolded, to a secret location in Pakistan to meet Khalid Shaikh Mohammed and Ramzi Binalshibh in a June interview arranged by al-Qaida operatives.

Fouda said he waited until now to air the audiotaped interview — it is scheduled to run Thursday on al-Jazeera — because he wanted to include it in a documentary marking the first anniversary of the attacks.

A videotape of al-Qaida leader Osama bin Laden released by U.S. officials in December for many established al-Qaida's responsibility for Sept. 11. According to Fouda's account, Mohammed and Binalshibh spell out the link even more clearly.

U.S. officials regard Mohammed as one of the highest-ranking al-Qaida leaders at large and believe he is still planning attacks against U.S. interests. U.S. officials say Binalshibh was a member of a

Hamburg-based cell led by Mohammed Atta, the Egyptian-born suspected lead hijacker on Sept. 11.

"I am the head of the al-Qaida military committee and Ramzi (Binalshibh) is the coordinator of the 'Holy Tuesday' operation," Fouda quoted Mohammed as saying. Sept. 11, 2001 fell on a Tuesday.

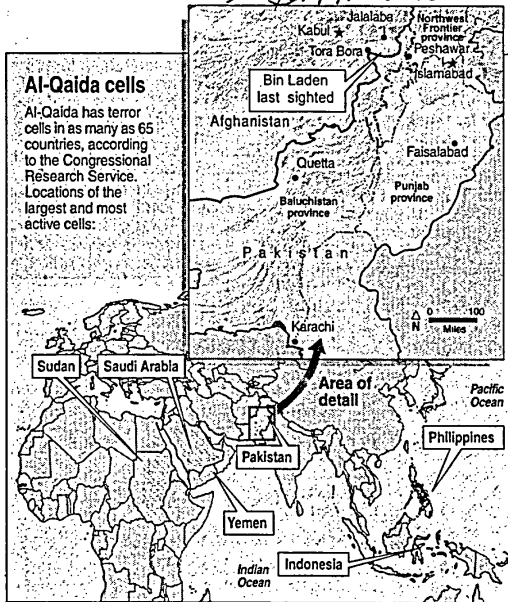
Mohammed said planning began two and a half years before Sept. 11 and that the first targets considered were nuclear facilities.

We "decided against it for fear it would go out of control," Fouda quoted Mohammed as saying. "You do not need to know more than that at this stage, and anyway it was eventually decided to leave out nuclear targets — for now."

Fouda, speaking by telephone from London, said al-Qaida operatives told him not to bring any electronic equipment — including a camera or recorder — to the interview. The al-Qaida members videotaped the interview but instead of sending a copy of the video as they promise, sent him only the audiotape, he said.

Fouda said at one point, while he was being led blindfolded to the meeting, he thought he was going to meet with al-Qaida leader Osama bin Laden.

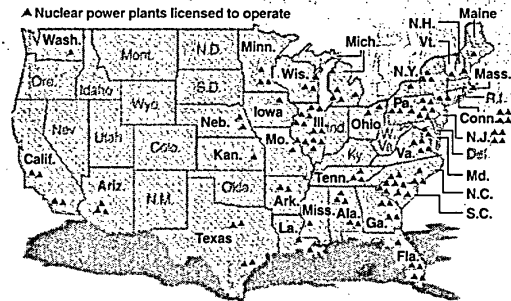
Fouda said during the two days he spent talking to the two, Mohammed once referred to bin Laden in the past tense and that a sense of disarray led him to believe bin Laden could be dead.



Source: GANNETT NEWS SERVICE research Dave Merrill, GANNETT NEWS SERVICE

Where the nukes are

Al-Qaida terrorists considered attacking a nuclear power plant in the United States, a Qatari television station reports. Only 103 of the 110 sites shown are in operation, but the other seven still contain radioactive waste.



Note: There are no commercial reactors in Alaska or Hawaii.
Source: U.S. Nuclear Regulatory Commission Janet Loehke, Gannett News Service

Emotions spill over at Ground Zero

ComEd seeks rate hike

Utility to take case to state legislature

By Melita Marie Garza
Tribune staff reporter

Commonwealth Edison Co. said Tuesday that it wants a long-term rate increase and quick regulatory approval to buy financially troubled Illinois Power Co.

Chicago-based ComEd, the state's largest electric utility, said it would ask the General Assembly to give state regulators the authority to act within

six months on the joint request. Under current law, the Illinois Commerce Commission can take up to 11 months to raise rates and approve mergers.

ComEd declined to provide details about how much it wants to raise customers' electricity bills, but officials said the hike would be in "single digits."

If the Illinois Power deal is approved, ComEd's service territory would expand to cover 85 percent of Illinois, up from 70 percent. Company officials said that negotiations with Illinois Power remain under way, and that they couldn't provide details. Last month ComEd dis-

closed that it was in exclusive talks to buy the Decatur-based company, the state's second-largest electric utility.

ComEd wants lawmakers to consider its bill in the General Assembly's six-day fall session, which starts next month.

"We are listening to their ideas," said Steve Brown, a spokesman for Illinois House Speaker Michael Madigan (D-Chicago). Madigan is waiting to learn more next week at an informational hearing of the House Public Utilities Committee, Brown said.

PLEASE SEE COMED, PAGE 16

COMED: CUB doubts need to lock in rates now

CONTINUED FROM PAGE 1

Unlike the much-criticized SBC Illinois deal this year, in which the state's largest phone company briefly won a wholesale rate increase from the legislature before it was overturned by a federal judge, ComEd officials said they are not making an end run around the rate-setting ICC. In this case, the ICC still would determine whether

ComEd could buy Illinois Power and raise customer bills.

But the Citizens Utility Board, a watchdog group, assailed ComEd's plan and vowed to fight it. CUB said it was troubled that the proposed rate increase was being linked with the Illinois Power purchase.

Any rate increase would not take effect until 2007. State lawmakers froze rates as a benefit to consumers when they deregulated Illinois' electric utilities several years ago.

"But what this is really about is locking in excessive rates through the end of the decade," said Martin Cohen, CUB's executive director.

Cohen said it is impossible for ComEd, a unit of Chicago-based Exelon Corp., to know now what reasonable rates will be in 2007

and beyond. Cohen argued that customers' electricity bills probably should decline because of what he described as a glut of electrical power, primarily caused by an overbuilding of natural gas generating plants.

"If the company wants a rate increase, it can seek one under the current law," Cohen said. "But it would have to justify that, and that is what ComEd is trying to avoid."

CUB criticized what it described as the rushed nature of ComEd's plan, coming right before the legislature's fall session.

Complicating the deal is the shaky financial condition of Illinois Power's parent company, Houston-based Dynegy Inc. Illinois Power and Dynegy carry debt ratings below investment

grade.

"Dynegy does not have the luxury of waiting," said ComEd President Frank Clark. "They are a company in financial stress, and they would, in my judgment, have to look at other options" besides a merger with ComEd.

Clark added, "The state legislature must act first, in order for Exelon to pursue this new opportunity."

Clark suggested that ComEd's merger with Illinois Power would be optimal for consumers, workers and businesses.

"We're firmly committed to Illinois and appreciate the importance of retaining local jobs, especially in hard-hit communities like Decatur," he said.

ComEd officials have been working behind the scenes to

muster support for the bid to buy Illinois Power. The Illinois Manufacturers Association, the Illinois Retail Merchants Association and the Chicagoland Chamber of Commerce are some of the business groups that have expressed support for the purchase.

Local units of the International Brotherhood of Electrical Workers also have expressed support.

"Exelon's commitment to job security and its pledge to invest in Illinois Power's infrastructure not only addresses the needs of working men and women in Illinois, it also ensures Illinois consumers will continue to benefit from a reliable power supply," said Dominic Rivara, president of IBEW Local 51.

Clark said that the union had

been pleased with voluntary separation packages and contract extensions offered by ComEd. Further, he said, Dynegy and Illinois Power have streamlined operations, leaving little room for more job cuts.

But CUB's Cohen said, "ComEd is trying to portray itself as the white knight coming in to save jobs downstate."

If the merger goes through, it would be the second ownership change for Illinois Power within four years. Dynegy bought Illinois Power in February 2000, when Dynegy was riding high as an energy-trading company.

Since then, Dynegy has exited the energy-trading business, restated earnings for the last three years and been under federal investigation for alleged accounting irregularities.

This could happen w/ Exelon.

Please protect the Mississippi River Watershed for future generations, and give our states the opportunity to develop more viable energy solutions for our communities.

To Duke Wheeler,

QC14-1

In regards to the relicensing of the Quad City Nuclear Power Station, please retire this plant as it served its term, give us the opportunity to develop alternative energy sources, which will not pollute ~~our~~ air and waterways.

QC14-2

The initial licensing period wasn't based upon safety specifications. As the plant ages, the ~~chances~~ chances of accidents grow bigger,

Thank you
Cucoberrige
Davenport Ia
52806

Please protect the Mississippi River Watershed for future generations, and give our states the opportunity to develop more viable energy solutions for our communities.

Dear Sirs,

QC15-1

the Quad Cities nuclear power station has outlived its purpose. Increasing energy efficiency would actually provide us with more power than the GENPS currently generates. The people of the Quad Cities deserve responsible energy solutions which can increase efficiency, meet our needs, create new jobs and stimulate the local economy. A license renewal for the GENPS offers little more than higher utility bills, further environmental degradation and greater potential for a nuclear disaster.

Thanks,
Richard Fischer



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

FEB 05 2004

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Rules and Directives Branch
REPLY TO THE ATTENTION OF
B-19J

Chief, Rules Review and Directives Branch
U.S. Nuclear Regulatory Commission
Mail Stop T6-D59
Washington, D.C. 20555-0001

11/13/03

68 FR 64372

12

Re: Generic Environmental Impact Statement for License Renewal of Nuclear Plant, Supplement 16: Quad Cities Nuclear Power Station, Units 1 and 2, Draft Report, NUREG-1437 (CEQ # 030513)

Dear Sir or Madam:

In accordance with Section 309 of the Clean Air Act and the National Environmental Policy Act (NEPA), the U.S. Environmental Protection Agency (EPA) has reviewed the Generic Environmental Impact Statement for License Renewal of Nuclear Plant, Supplement 16: Quad Cities Nuclear Power Station, Units 1 and 2, which is a draft report. The Nuclear Regulatory Commission (NRC) developed the Generic Environmental Impact Statement (GEIS) to streamline the license renewal process on the premise that environmental impacts of most nuclear power plant license renewals are similar, in most cases. NRC develops facility-specific supplemental environmental impact statements (SEIS) for individual plants as the facilities apply for license renewal. EPA provided comments on the GEIS during its development process, in 1992 (draft) and again in 1996 (final).

The Exelon Generation Company, LLC has submitted a permit application to the NRC to extend the operating license for the Quad Cities Units 1 and 2 for an additional 20 years. The Quad Cities plant is located on the bank of the Mississippi River in Rock Island County, Illinois and has operated since 1973. The plant is a two-unit nuclear-powered steam electric plant with a once-through cooling system using water from the Mississippi River to remove heat from the main condensers and other auxiliary equipment. The reactors are refueled on a 24-month schedule. Spent fuel is stored in the spent fuel pool. Exelon plans to build dry storage casks for spent fuel storage and begin using them in 2005. The plant produces as much as 2,957 megawatts (thermal) and supplies electricity to 350,000 industrial, commercial, and residential users.

Based on our review of the Quad Cities draft SEIS, we have given the project an EC-2 rating. The "EC" means that we have environmental concerns with the proposed action, and the "2" means that additional information needs to be provided in the final SEIS. Our concerns include impacts from power uprates, on-site waste storage, transportation to off-site repositories, sediments, and estimates of risk. We recommend the NRC's final SEIS address these issues

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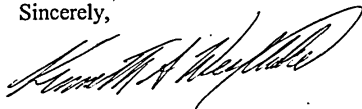
Recycle = ADM-013

Call = D. Wheeler (D.XW)

because they involve changes in plant operation and changes to actual, potential, or cumulative environmental impacts. We have enclosed our comments and the U.S. EPA rating system summary.

If you have any questions or wish to discuss any aspect of the comments, please contact Anna Miller of my staff at (312) 886-7060.

Sincerely,



Kenneth A. Westlake, Chief
Environmental Planning and Evaluation Branch
Office of Strategic Environmental Analysis

Enclosures

**U.S. EPA Comments on
Generic Environmental Impact Statement for License Renewal of Nuclear Plant,
Supplement 16: Quad Cities Nuclear Power Station, Units 1 and 2, Draft Report,
NUREG-1437**

- QC16-1 1. Although the license applicant's environmental report (ER) to the Nuclear Regulatory Commission (NRC) need not discuss aspects of storage of spent fuel, as noted on page 1-5, citing 10 CFR 51.23 (b), we suggest the NRC's final supplemental environmental impact statement (SEIS) discuss impacts from dry storage casks, because it would be a change in operation for the new license period. The draft SEIS states that Exelon plans to build an independent spent fuel storage installation for storing spent fuel in dry storage casks for use in 2005 (section 2.1.4, page 2-9). The change in storage option is not addressed elsewhere in the document. We suggest the NRC's final SEIS address spent fuel storage in dry storage casks, at least as far as it may be addressed in the License Renewal Generic EIS, and include discussion about potential environmental impacts. In particular, the final SEIS should describe any differences in environmental impacts associated with this change to storage.
- QC16-2 2. Although the applicant's ER need not discuss the demand for power, as noted on page 1-5, citing 10 CFR 51.53(c)(2), we note it is a reasonably foreseeable action and therefore should be discussed in the NRC's final SEIS. We note that Exelon requested and received NRC approval for a license amendment to carry out an 18% power uprate, which took place in May 2002 (section 2.1.4, page 2-9). The reports documenting the uprate's impact will not be delivered until May 2004, though the NRC estimates that the uprate could increase radiological effluent releases by a corresponding 18%. The draft SEIS states that the 18% radiological effluent increase will be within NRC limits. The draft SEIS does not, however, assess the potential for future uprates and the possible effects of future uprates. We recommend the final SEIS (1) include a discussion of environmental impacts from past power uprates, (2) assess the potential for future power uprates during the extended license period, and (3) discuss potential and cumulative environmental impacts from uprates.
- QC16-3 3. Under *Section 4.1 Environmental Impacts of Operation, Cooling System*, page 4-6: The generic no-impact language referenced in this section about sediments states that sediment contamination is not a problem at most plants, and no new or significant information has been identified for the Quad Cities site. Accumulation of contaminants in sediments is a cumulative impact. The absence of an impact over the past years of operation does not demonstrate that accumulations will not reach a level of concern over an additional 20 years of operation. Furthermore, copper discharge was an issue at one power plant and was satisfactorily mitigated, according to the GEIS. We recommend the final SEIS for the Quad Cities site describe the potential for accumulation of contaminants in sediments in light of 20 additional operating years and consider whether mitigation may be advisable.

- QC16-4 4. *Section 5.2.2, Estimate of Risk:* Page 5-5 states “The baseline core damage frequency (CDF) for Quad Cities is approximately 2.2×10^{-6} per year, based on internally-initiated events. Exelon did not include the contribution to CDF from external events in these estimates even though the risk from external events is significantly higher for Quad Cities than risk from internal events.”
- We recommend evaluating and presenting risk estimates from both internal and external events. In addition, given the draft SEIS statements referenced above, effects of external events should be included in the risk decision considerations, as necessary, to get an accurate portrayal of the risk of the licensing renewal. If the final SEIS does not incorporate external events into risk calculations or risk decisions, it should provide a rationale for using internally-initiated events only.
- QC16-5 5. *Section 6.1, The Uranium Fuel Cycle,* page 6-6. Under the bullet point for Off-site radiological impacts (spent fuel and high level waste disposal), no consideration appears to be given to the potential long term storage of the spent fuel and high level waste materials on site until such time as a permanent facility is finally licensed and begins to accept these materials for disposal. A reference to other sections or documents where this evaluation may have been included should be provided here; otherwise, the issue needs to be considered and evaluated.
- QC16-6 6. *Section 6.1, The Uranium Fuel Cycle,* page 6-8. Under the bullet point for On-Site Spent Fuel. A more thorough evaluation for the volume of spent fuel expected to be generated during the addition licensed time needs to be provided along with more specific information as to site specific circumstances that may impair or improve the risk values for potential exposures to this spent fuel.
- QC16-7 7. *Section 6.1, The Uranium Fuel Cycle,* page 6-8. The draft SEIS should be clearer about environmental impacts of transporting spent fuel to a repository site. We realize it may be premature to assess this fully on a power plant-specific basis; however, transportation to the nuclear waste repository appears to be reasonably foreseeable. The SEIS refers to the License Renewal GEIS (where transportation was discussed in a supplement: NUREG-14137, Vol.1, Addendum 1, 1999). The GEIS supplement, in turn, refers to the Draft Environmental Impact Statement (DEIS) for the Yucca Mountain Repository, which had not been finished at the time. These generic documents appear to assess impacts only within the State of Nevada. We recommend the final SEIS include more specific information about transport from this site, or else include a reference to route-specific impacts, as they may be covered in the Yucca Mountain Repository DEIS. In addition, we suggest the final SEIS be clear about whether transportation includes the process of removing spent fuel from casks and pools and loading it into vehicles. We suggest these processes be part of the transportation section, if not handled elsewhere, and we suggest the final SEIS discuss their impacts.

Appendix A

- QC16-8 8. *Section 7.1, Decommissioning, page 7-2, 7-3:* Under bullet point Radiation Doses. As the GEIS is based on a forty-year licensing period, an extension of another twenty years would have an site-specific impact with respect to radiation doses that needs to be quantified and reported. This information should be included specifically in the final SEIS as part of the risk that would be associated with the license extension.
- QC16-9 9. *Coal Fired Generation Alternative, Section 8.2.1.1, Closed-Cycle Cooling System, page 8-21,* Under the Human Health bullet point: Any dose estimate that would have the potential to fall within the risk range of 10^{-6} to 10^{-4} or greater needs to be specifically evaluated for potential regulatory requirements or risk impacts to the public health. This should be estimated conservatively using the data that is currently available or that can be logically extrapolated from currently available information.
- QC16-10 10. *Nuclear Power Generation Alternative, Section 8.2.3.1, Closed -Cycle Cooling System, page 8-44:* Both waste impacts and human health impacts need to be specified rather than referenced to provide a clearer understanding of the risk determination made in this section of the document.

SUMMARY OF RATING DEFINITIONS AND FOLLOW UP ACTION*

Environmental Impact of the Action

LO-Lack of Objections

The EPA review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposal.

EC-Environmental Concerns

The EPA review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce the environmental impacts. EPA would like to work with the lead agency to reduce these impacts.

EO-Environmental Objections

The EPA review has identified significant environmental impacts that must be avoided in order to provide adequate protection for the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no action alternative or a new alternative). EPA intends to work with the lead agency to reduce these impacts.

EU-Environmentally Unsatisfactory

The EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of public health or welfare or environmental quality. EPA intends to work with the lead agency to reduce these impacts. If the potential unsatisfactory impacts are not corrected at the final EIS site, this proposal will be recommended for referral to the CEQ.

Adequacy of the Impact Statement

Category 1-Adequate

The EPA believes the draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project or action. No further analysis or data collecting is necessary, but the reviewer may suggest the addition of clarifying language or information.

Category 2-Insufficient Information

The draft EIS does not contain sufficient information for the EPA to fully assess the environmental impacts that should be avoided in order to fully protect the environment, or the EPA reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analyzed in the draft EIS, which could reduce the environmental impacts of the action. The identified additional information, data, analyses, or discussion should be included in the final EIS.

Category 3-Inadequate

EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analyzed in the draft EIS, which should be analyzed in order to reduce the potentially significant environmental impacts. EPA believes that the identified additional information, data analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. EPA does not believe that the draft EIS is adequate for the purposes of the NEPA and/or Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS. On the basis of the potential significant impacts involved, this proposal could be a candidate for referral to the CEQ.

*From EPA Manual 1640 Policy and Procedures for the Review of the Federal Actions Impacting the Environment