Appendix B

Contributors to the Supplement

Appendix B

Contributors to the Supplement

The overall responsibility for the preparation of this supplement was assigned to the Office of Nuclear Reactor Regulation, U.S. Nuclear Regulatory Commission (NRC). The statement was prepared by members of the Office of Nuclear Reactor Regulation with assistance from other NRC organizations, and the Lawrence Livermore National Laboratory. Representatives from Argonne National Laboratory, Pacific Northwest National Laboratory, Energy Research Incorporated, and the Information Systems Laboratory also participated in this review.

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	PACIFIC NORTHWEST NATIONAL LABORATORY[e]	
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Eva Hickey		Radiation Protection
Van Ramsdell		Meteorology, Air Quality
	INFORMATION SYSTEMS LABORATORY	
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(a) Retired in April 2004.
(b) Lawrence Livermore National Laboratory is operated for the U.S. Department of Energy by the University of California.
(c) Currently with Pacific Northwest National Laboratory.
(d) Argonne National Laboratory is operated for the U.S. Department of Energy by the University of Chicago.
(e) Pacific Northwest National Laboratory is operated for the U.S. Department of Energy by Battelle Memorial Institute.

Appendix C

Chronology of NRC Staff Environmental Review Correspondence Related to Exelon Generation Company, LLC's Application for License Renewal of Quad Cities Nuclear Power Station, Units 1 and 2

Appendix C

Chronology of NRC Staff Environmental Review Correspondence Related to Exelon Generation Company, LLC's Application for License Renewal of Quad Cities Nuclear Power Station, Units 1 and 2

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

November 12, 2002	Comments from the Regular Minutes of the Prophetstown City Council pertaining to QCNPS license renewal application (Accession No. ML031970772).
January 3, 2003	Letter from Mr. Jeffrey A. Benjamin, Exelon, to NRC submitting the application for the renewal of the operating license for QCNPS, Units 1 and 2 (Accession No. ML030090203).
January 10, 2003	NRC Press Release No. 03-007 "NRC Announces Availability of License Renewal Applications for Dresden and Quad Cities Nuclear Power Plants" (Accession No. ML030100360).
January 22, 2003	Comment letter from Mr. James E. Bohnsack, County Board Chairman, Rock Island County Board, to NRC concerning the county board's decision to rescind their resolution of support for the license renewal of QCNPS (Accession No. ML030290020).
January 24, 2003	Comment letter from Roger Drey, Mayor, City of Morrison, Illinois, to NRC regarding the license renewal of QCNPS, Units 1 and 2 (Accession No. ML030450342).

January 24, 2003	NRC staff letter to Mr. John L. Skolds, Exelon, forwarding an information copy of a notice sent to the Office of the *Federal Register* regarding receipt and public availability of the Dresden and QCNPS license renewal applications (Accession No. ML030240603) (The notice was published in the *Federal Register* on January 30, 2003, at 68 FR 4800-4801.)
February 11, 2003	Letter from NRC staff to Ms. Sue Hebel, Cordova District Library, Cordova, Illinois, concerning the maintenance of reference material for public access related to the QCNPS license renewal environmental review (Accession No. ML030430199).
February 11, 2003	NRC staff letter to Ms. Lisa Ford, River Valley Public Library, Port Byron, Illinois, regarding the maintenance of reference material for public access related to the QCNPS license renewal environmental review (Accession No. ML030430314).
February 11, 2003	Letter from NRC staff to Ms. Cathy Stone, Davenport Public Library, Davenport, Iowa, concerning the maintenance of reference material for public access related to the QCNPS license renewal environmental review (Accession No. ML030430347).
February 26, 2003	NRC staff letter to Mr. John L. Skolds, Exelon, forwarding an information copy of a *Federal Register* notice of acceptance for docketing of the application and notice of opportunity for hearing regarding the renewal of QCNPS operating licenses, and the NRC schedule for the safety and environmental reviews of the license renewal application. (Accession No. ML030570654). (The notice was published on March 4, 2003, at 68 FR 10273-10274).
March 6, 2003	NRC staff letter to Mr. John L. Skolds, Exelon, forwarding an information copy of a *Federal Register* notice of intent to prepare an environmental impact statement and conduct scoping. (Accession No. ML030660237). (The notice was published on March 14, 2003, at 68 FR 12385-12386.)
March 11, 2003	NRC staff letter to the Honorable Steve Cadue, Chairperson, Kickapoo Tribe of Indians of the Kickapoo Reservation in Kansas, inviting participation in the environmental review scoping process (Accession No. ML030720491).

March 11, 2003	NRC staff letter to the Honorable Danny Kaskaske, Chairperson, Kickapoo Tribe of Oklahoma, inviting participation in the environmental review scoping process (Accession No. ML030710092).
March 11, 2003	NRC staff letter to the Honorable Alex Walker, Jr., Chairperson, Sac & Fox Nation of the Mississippi in Iowa, inviting participation in the environmental review scoping process (Accession No. ML030710774).
March 11, 2003	NRC staff letter to the Honorable John A. Barrett, Jr., Chairperson, Citizen Potawatomi Nation of Oklahoma, inviting participation in the environmental review scoping process (Accession No. ML030710725).
March 11, 2003	NRC staff letter to the Honorable Harold Frank, Chairperson, Forest County Potawatomi Tribal Community, inviting participation in the environmental review scoping process (Accession No. ML030710160).
March 11, 2003	NRC staff letter to the Honorable Gil Holliday, Chairperson, Huron Potawatomi Inc. of Michigan, inviting participation in the environmental review scoping process (Accession No. ML030720345).
March 11, 2003	NRC staff letter to the Honorable David K. Sprague, Chairperson, Match-E-Be-Nash-She-Wish Band of Potawatomi Indians of Michigan, inviting participation in the environmental review scoping process (Accession No. ML030720315).
March 11, 2003	NRC staff letter to the Honorable John Miller, Chairperson, Pokagon Band of Potawatomi Indians of Michigan, inviting participation in the environmental review scoping process (Accession No. ML030720282).
March 11, 2003	NRC staff letter to the Honorable Zachariah Pahmahmie, Chairperson, Prairie Band of Potawatomi Tribal Council, inviting participation in the environmental review scoping process (Accession No. ML030720370).
March 12, 2003	NRC staff letter to the Honorable Kenneth Meshigaud, Chairperson, Hannahville Indian Community, inviting participation in the environmental review scoping process (Accession No. ML030720573).
March 12, 2003	NRC staff letter to the Honorable Juan Garcan, Jr., Provisional Chairperson, Kickapoo Traditional Tribe of Texas, inviting participation in the environmental review scoping process (Accession No. ML030720600).

March 12, 2003	NRC staff letter to the Honorable Sandra Keo, Chairperson, Sac & Fox Nation of Missouri in Kansas and Nebraska, inviting participation in the environmental review scoping process (Accession No. ML030720617).
March 12, 2003	NRC staff letter to the Honorable Don Abney, Principal Chief, Sac & Fox Nation of Oklahoma, inviting participation in the environmental review scoping process (Accession No. ML030770275).
March 12, 2003	NRC staff letter to the Honorable Lewis DeRoin, Chaiperson, Iowa Tribe of Kansas and Nebraska, inviting participation in the environmental review scoping process (Accession No. ML030770314).
March 12, 2003	NRC staff letter to the Honorable Lawrence P. Murray, Chairperson, Iowa Tribe of Oklahoma, inviting participation in the environmental review scoping process (Accession No. ML030770384).
March 12, 2003	Letter from NRC staff to Mr. Rick Nelson, U.S. Fish and Wildlife Service, requesting information relevant to the NRC environmental review (Package No. ML030730775; Accession No. ML030730774; NRC letter; ML030760214, enclosures).
March 14, 2003	NRC public meeting notice (memorandum with information for the NRC web site) of the April 8, 2003, public meetings in Moline, Illinois to facilitate public participation in the environmental review scoping process (Accession No. ML030730776).
March 20, 2003	E-mail to the NRC staff from Exelon providing information requested during the site audit regarding groundwater drawdown (Accession No. ML031970777).
March 31, 2003	NRC Press Release No. III-03-021, “Public Meetings April 8 on License Renewal of Quad Cities Nuclear Power Plant” (Accession No. ML030910264).
April 11, 2003	E-mail to QuadCitiesEIS@nrc.gov from Mr. Scott Gardner providing public input to the environmental review scoping process (Accession No. ML031400164).
April 17, 2003	NRC staff letter to Exelon requesting additional information regarding new and significant information (Accession No. ML031070572).

April 24, 2003	E-mail to QuadCitiesEIS@nrc.gov from Mr. David Olson providing public input to the environmental review scoping process (Accession No. ML 031400167).
May 2, 2003	NRC staff letter to Exelon revising request for additional information regarding new and significant information (Accession No. ML031220535).
May 8, 2003	E-mail to QuadCitiesEIS@nrc.gov from Jack and Joyce Wiley providing public input to the environmental review scoping process (Accession No. ML031400174).
May 8, 2003	Letter from Mr. Stephen K. Davis, Illinois Department of Natural Resources, providing input to the environmental review scoping process (Accession No. ML031420027).
May 12, 2003	E-mail to QuadCitiesEIS@nrc.gov from M.J. Regan providing public input to the environmental scoping process (Accession No. ML031400177).
May 14, 2003	Letter from Exelon providing supplemental information for the analysis of transmission lines at QCNPS (Accession No. ML031400661).
May 14, 2003	E-mail from Exelon to the NRC staff providing information which was requested during the site audit regarding land use classifications (Accession No. ML031970776).
May 23, 2003	NRC staff letter to Mr. John Skolds, Exelon, requesting additional information regarding Severe Accident Mitigation Alternatives and transmission lines (Accession No. ML031430600).
May 27, 2003	NRC staff Note to File with information enclosed for the docket files and public availability which was provided to the staff by the licensee (Accession No. ML031480249).
May 28, 2003	Letter from Exelon forwarding additional information regarding the environmental review (Accession No. ML031540677).
June 3, 2003	NRC public meeting notice (memorandum with information for the NRC web site) of the June 7, 2003, public meetings in Rockville, MD to discuss the May 23, 2003, request for additional information regarding transmission line corridors (Accession No. ML031550388).

June 6, 2003	Letter to the NRC staff from the U.S. Department of the Interior, Fish and Wildlife Service, which provides comments regarding Federally listed threatened or endangered species for the proposed QCNPS license renewal (Accession No. ML031970770).
June 16, 2003	Summary of the public scoping meetings held in Moline, Illinois, as part of the NRC staff environmental scoping process (Accession No. ML031631260).
June 30, 2003	E-mail from Exelon to the NRC staff forwarding a draft of responses to the May 23, 2003, Request for Additional Information related to Severe Accident Mitigation Alternatives (Accession No. ML031960554).
July 1, 2003	NRC staff letter to Ms. Anita Walker, State Historical Society of Iowa, providing information regarding plans for publishing this draft Supplemental Environmental Impact Statement and requesting comments (Accession No. ML031830396).
July 1, 2003	NRC staff letter to Mr. Maynard Crossland, Illinois Historic Preservation Agency, providing information regarding plans for publishing this draft Supplemental Environmental Impact Statement and requesting comments (Accession No. ML031830303).
July 3, 2003	E-mail from Exelon to the NRC staff providing replacement pages 2-3 and 2-34 for the QCNPS license renewal Environmental Report (Accession No. ML031970774).
July 8, 2003	E-mail from Exelon to the NRC staff forwarding environmental monitoring data provided to Exelon by the Illinois Department of Nuclear Safety (Accession No. ML032030211).
July 11, 2003	E-mail from Exelon to the NRC staff providing a revised draft response to SAMA Question 6c (Accession No. ML032030217).
July 17, 2003	Exelon letter to the NRC staff providing the formal response to the staff's May 23, 2003, RAI (Accession No. ML032040302).
July 21, 2003	NRC staff letter to Exelon regarding issuance of the Scoping Summary Report for the QCNPS license renewal environmental review (Accession No. ML032030456).

July 24, 2003	NRC staff letter to Exelon providing the NRC staff position regarding Exelon's initial and subsequent interpretations of the NRC regulation regarding an assessment of electric shock from induced currents along transmission lines (Accession No. ML032050121).
July 29, 2003	Summary of the June 17, 2003, meeting between the NRC staff and Exelon to discuss the May 23, 2003, RAI regarding the scope of transmission lines included in the ER and the July 24, 2003, NRC staff follow up letter to Exelon (Accession No. ML032100697).
August 12, 2003	NRC staff letter to Mr. Rick Nelson, U.S. Fish and Wildlife Service, expanded the scope of the QCNPS license renewal environmental review, and requesting comments (Accession No. ML032250420).
September 15, 2003	Letter from the U.S. Fish and Wildlife Service providing a response to the August 12, 2003, NRC staff letter requesting information regarding threatened and endangered species in the vicinity of the QCNPS site and transmission lines (Accession No. ML032730715).
September 17, 2003	E-mail from Exelon to the NRC staff providing information related to MidAmerican Construction Services transmission line vegetation management practices (Accession No. ML032730712.)
September 18, 2003	E-mail from Exelon to the NRC staff providing information on proposed procedure modifications to address interests related to potential historic and archeological sites (Accession No. ML032730705).
September 22, 2003	NRC staff letter to Mr. Fidel Marquez, Exelon Energy Delivery, Transmission and Substations, regarding the findings of the QCNPS license renewal environmental review of the North Nelson Line (Accession No. ML032660226).
October 14, 2003	E-mail from Exelon to the NRC staff providing information related to Alliant Energy transmission line vegetation management practices (Accession No. ML032890481).
October 27, 2003	E-mail from Mr. William Maher, Exelon Generation Company, LLC, providing confirmation of completion of an Exelon procedure modification regarding the identification of potential historic or archaeological sites (Accession No. ML033090462).

October 30, 2003	Letter from the State Historic Society of Iowa reaffirming their concurrence in the no historic properties affected determination pending formal transmittal of that determination by the NRC staff (Accession No. ML033350301).
November 4, 2003	NRC staff letter to the Environmental Protection Agency forwarding Draft Supplement 16 to NUREG-1437 for official filing (Accession No. ML033080207).
November 4, 2003	NRC staff letter to Exelon forwarding Draft Supplement 16 to NUREG-1437 for review and comment (Accession No. ML033080241).
November 14, 2003	NRC staff letter to the Environmental Protection Agency confirming the end date of January 27, 2004, for the public comment period (Accession No. ML033180512).
November 19, 2003	NRC staff meeting notice regarding the December 16, 2003, public meeting in Moline, Illinois to receive public comments on Draft Supplement 16 to NUREG-1437 Accession No. ML033290621).
December 4, 2003	NRC staff letter to U.S. Fish and Wildlife Service requesting review and concurrence in the staff's Biological Assessment (Accession No. ML033390062).
December 16, 2003	Note from Dorothy Monahan to NRC given to the NRC staff at the December 16, 2003, public meetings in Moline, Illinois (Accession No. ML040090255).
December 16, 2003	E-mail from Diane P. and Elmus M. Jeffery to the NRC staff providing comments regarding the proposed Quad Cities, Units 1 and 2 license renewals (Accession No. ML040080776).
January 1, 2004	E-mail from Karene A. Nagel to the NRC staff providing comments regarding the proposed Quad Cities, Units 1 and 2 license renewals (Accession No. ML040080780).
January 13, 2004	NRC staff letter to the State Historic Society of Iowa providing the staff determination of no historic properties affected by the proposed Quad Cities, Units 1 and 2 license renewals (Accession No. ML040140773).

January 13, 2004	NRC staff letter to the Illinois Historic Preservation Agency providing the staff determination of no historic properties affected by the proposed Quad Cities, Units 1 and 2 license renewals (Accession No. ML040150460).
January 15, 2004	Letter from U.S. Department of the Interior, Fish and Wildlife Service, providing concurrence with determination in the NRC staff Biological Assessment regarding the proposed license renewals (Accession No. ML040480551).
January 16, 2004	Letter from U.S. Department of the Interior, Office of Environmental and Policy Compliance, providing comments on Draft Supplement 16 to NUREG-1437 (Accession No. ML040230534).
January 26, 2004	Letter from Exelon providing comments on Draft Supplement 16 to NUREG-1437 (Accession No. ML040330857).
January 26, 2004	E-mail from Illinois Emergency Management Agency providing comments on the Draft Supplement 16 to NUREG-1437 (Accession No. ML040330869).
January 27, 2004	Letter from the Environmental Law and Policy Center providing comments on the Draft Supplement 16 to NUREG-1437 (Accession No. ML040330862).
January 27, 2004	E-mail from MidAmerican Energy Company forwarding a MidAmerican letter dated January 27, 2004, which provides comments on the Draft Supplement 16 to NUREG-1437 (Accession No. ML040330882).
January 27, 2004	E-mail from Leslie Perrigo providing comments regarding the proposed license renewals for Quad Cities, Units 1 and 2 (Accession No. ML040330875).
February 3, 2004	Undated letter from Leslie Perrigo, received by the NRC Rules and Directives Branch on February 3, 2004, which provides comments on the proposed license renewals for Quad cities, Units 1 and 2 (Accession No. ML040420166).
February 5, 2004	Letter from the U.S. Environmental Protection Agency, Region 5, to the NRC staff providing comments on Draft Supplement 16 to NUREG-1437 (Accession No. ML040500711).

February 26, 2004	Letter from the Illinois Historic Preservation Agency providing concurrence in the NRC staff determination of no historic properties affected for the proposed Quad Cities license renewal (Accession No. ML040620270).
February 26, 2004	Letter from the State Historical Society of Iowa providing concurrence in the NRC staff determination of no historic properties affected for the proposed Quad Cities license renewal (Accession No. ML040760505).
March 8, 2004	Summary of the public meetings held by the NRC staff in Moline, Illinois, to discuss the Draft Supplement 16 to NUREG-1437 (Accession No. ML040700332).
March 18, 2004	NRC staff letter to Mr. John Skolds, Exelon, informing Exelon of NRC environmental project manager assignments for QCNPS and DNPS license renewal reviews (Accession No. ML040830239).

Appendix D

Organizations Contacted

Appendix D

Organizations Contacted

During the course of the staff's independent review of environmental impacts from operations during the renewal term, the following Federal, tribal, State, regional, and local agencies were contacted:

Bi-State Regional Commission Community Development Director

Blackhawk Community College Vice President for Administration and Finance

City of Rock Island Public Works Director

Erie School District Superintendent

Forest Potawatomi Tribal Community

Hannahville Indian Community

Huron Potawatomi Inc. of Michigan

Illinois Department of Natural Resources—Springfield Office

Illinois Department of Transportation

Illinois Environmental Protection Agency—Compliance Unit

Illinois Environmental Protection Agency—Industrial Unit

Illinois Environmental Protection Agency—Watershed Management Section

Illinois Historic Preservation Agency

Illinois State Social Services Department

Iowa Area Education Association

Iowa Tribe of Kansas and Nebraska

Iowa Tribe of Oklahoma

Kickapoo Traditional Tribe of Texas

Kickapoo Tribe of Oklahoma

Match-E-Be-Nash-She-Wish Band of Potawatomi Indians of Michigan

Pokagon Band of Potawatomi Indians of Michigan

Potawatomi Nation of Oklahoma

Prairie Band of Potawatomi Tribal Council

Rock Island City Manager

Rock Island County Board of Supervisors Chairman

Rock Island County Director of Planning and Geographic Information Systems

Rock Island County Public Works

Rock Island County Sheriff's Department

Rock Island County Supervisor of Assessors

Rock Island Regional Office of Education

Sac and Fox Nation of Missouri

Sac and Fox Nation of Oklahoma

Sac and Fox Nation of the Mississippi in Iowa

Scott County Director of Planning and Development

State Historical Society of Iowa

University of Illinois Educational Extension, Rock Island County

Upper Mississippi National Wildlife and Fish Refuge—Savanna District

U.S. Fish and Wildlife Service—Rock Island Ecological Services Field Office

U.S. Fish and Wildlife Service—Twin Cities Field Office

Whiteside County Administrator

Whiteside County Regional Office of Education Regional Superintendent

Appendix E

Quad Cities Nuclear Power Station, Units 1 and 2
Compliance Status and Consultation Correspondence

Appendix E

Quad Cities Nuclear Power Station, Units 1 and 2
Compliance Status and Consultation Correspondence

Correspondence received during the evaluation process of the application for renewal of the operating license for Quad Cities, Units 1 and 2 is identified in Table E-1. Copies of the correspondence are included at the end of this appendix.

The licenses, permits, consultations, and other approvals obtained from Federal, State, regional, and local authorities for Quad Cities, Units 1 and 2 are listed in Table E-2.

Table E-1. Consultation Correspondence

Source	Recipient	Date of Letter
U.S. Nuclear Regulatory Commission (P. T. Kuo)	U.S. Fish and Wildlife Service (R. C. Nelson)	March 12, 2003
Illinois Department of Natural Resources (S. K. Davis)	U.S. Nuclear Regulatory Commission	May 8, 2003
U.S. Fish and Wildlife Service (R. C. Nelson)	U.S. Nuclear Regulatory Commission (P. T. Kuo)	June 6, 2003
U.S. Nuclear Regulatory Commission (P. T. Kuo)	State Historical Society of Iowa (A. Walker)	July 1, 2003
U.S. Nuclear Regulatory Commission (P. T. Kuo)	Illinois Historic Preservation Agency (M. Crossland)	July 1, 2003
U.S. Nuclear Regulatory Commission (P. T. Kuo)	U.S. Fish and Wildlife Service (R. Nelson)	August 12, 2003
U.S. Fish and Wildlife Service (R. C. Nelson)	U.S. Nuclear Regulatory Commission (L. L. Wheeler)	September 15, 2003
U.S. Nuclear Regulatory Commission (L. L. Wheeler)	Exelon Energy (F. Marquez)	September 22, 2003
State Historical Society of Iowa (D. Jones)	U.S. Nuclear Regulatory Commission (P. T. Kuo)	October 30, 2003
U.S. Nuclear Regulatory Commission (L. L. Wheeler)	U.S. Fish and Wildlife Service (R. Nelson)	December 4, 2003

Table E-1. (contd)

Source	Recipient	Date of Letter
U.S. Nuclear Regulatory Commission (P. T. Kuo)	Illinois Historic Preservation Agency (M. Crossland)	January 13, 2004
U.S. Nuclear Regulatory Commission (P. T. Kuo)	State Historical Society of Iowa (A. Walker)	January 13, 2004
U.S. Fish and Wildlife Service (R. Nelson)	U.S. Nuclear Regulatory Commission (P. T. Kuo)	January 15, 2004
Illinois Historic Preservation Agency (A. E. Haaker)	U.S. Nuclear Regulatory Commission (P. T. Kuo)	February 26, 2004
State Historical Society of Iowa (D. Jones)	U.S. Nuclear Regulatory Commission (P. T. Kuo)	February 26, 2004

Table E-2. Federal, State, Local, and Regional Licenses, Permits, Consultations, and Other Approvals for Current Quad Cities Units 1 and 2 Operation

Agency	Authority	Description	Number	Issue Date	Expiration Date	Remarks
NRC	Atomic Energy Act 10 CFR Part 50	Operating license, Quad Cities Unit 1	DPR-29	December 14, 1972	December 14, 2012	Authorizes operation of Quad Cities Unit 1.
NRC	Atomic Energy Act 10 CFR Part 50	Operating license, Quad Cities Unit 2	DPR-29	December 14, 1972	December 14, 2012	Authorizes operation of Quad Cities Unit 2.
FWS	Section 7 of the Endangered Species Act (16 USC 1536)	Consultation	NA	N/A	NA	Requires a Federal agency to consult with FWS regarding whether a proposed action will affect endangered or threatened species.
NMFS	Section 7 of the Endangered Species Act (16 USC 1536)	Consultation	N/A	N/A	N/A	
Illinois Historic Preser-vation Agency	Section 106 of the National Historic Preservation Act (16 USC 470f)	Consultation	N/A	N/A	N/A	The National Historic Preservation Act requires Federal agencies to take into account the effect of any undertaking on any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register of Historic Places.
IEPA	Illinois Environmental Protection Act (Title 35 IAC, Subtitle C, Ch. 1)	National Pollution Discharge Elimination System	N/A	N/A	N/A	Permit for discharge of wastewater and once-through cooling water to the Mississippi. Section 1.E.15 of the permit states that the permit constitutes certification of compliance with Section 401 of the Federal Water Pollution Control Act (Clean Water Act).

Table E-1 (contd)

Agency	Authority	Description	Number	Issue Date	Expiration Date	Remarks
IEPA	IRS Ch. 111-1/2 Section 1039	Federally Enforceable Air Operating Permit	161807AAB	December 11, 2000	December 11, 2005	This permit authorizes emissions from diesel emergency generators, miscellaneous diesel engines, and miscellaneous emissions units and activities.
IEPA	IRS Ch. 111-1/2, Section 1039	Open Burning permit	App. #B0212031 ID #043083 Location ID #161807AAB	February 16, 2004	No date	Open burning for emergency response fire fighting training

CFR – Code fo Federal Regulations
FWS – U.S. Fish and Wildlife Service
NRC – Nuclear Regulatory Commission
NMFS – National Marine Fisheries Service
IEPA – Illinois Environmental Protection Act
IRS – Illinois Revised Statutes

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

March 12, 2003

Mr Rick Nelson
Field Supervisor
U S Fish and Wildlife Service
4469 48th Avenue Court
Rock Island, IL 61201

SUBJECT REQUEST FOR COMMENTS CONCERNING QUAD CITIES NUCLEAR POWER STATION APPLICATION FOR OPERATING LICENSE RENEWAL

Dear Mr Nelson

The U S Nuclear Regulatory Commission (NRC) is reviewing an application for the renewal of the operating license for the Quad Cities Nuclear Power Station (QCNPS), located on the east bank of Pool 14 of the Mississippi River As part of the review of the license renewal application, the NRC is preparing a Supplemental Environmental Impact Statement (SEIS) under the provision of the National Environmental Policy Act (NEPA) which includes analyses of pertinent environmental issues, including endangered or threatened species and impacts to fish and wildlife This letter is being submitted under the provisions of the Endangered Species Act and the Fish and Wildlife Coordination Act

The proposed action would include use and continued maintenance of existing facilities and transmission lines and would not result in any new construction or disturbance The Quad Cities Station is located in Rock Island County, Illinois In total, for the specific purpose of connecting QCNPS to the regional transmission system, there are approximately 53 miles of corridor that occupy around 1100 acres of land The transmission lines traverse the counties of Rock Island and Whiteside Counties, Illinois, and Scott and Clinton Counties in Iowa Starting at QCNPS, the Davenport line runs south of the plant, turns west crossing the Mississippi River for 12 8 miles with a 180 foot right-of-way, ending just north of Davenport, Iowa The Barstow line runs 2 miles southeast of QCNPS, and has a 520 foot right-of-way that ends in Rock Island County There are two Nelson lines The first is approximately 2 miles long heading southeast with a 520 foot wide right-of-way ending in Rock Island County, and the other line with a corridor width of 145 feet, runs 33 miles east of QCNPS ending in Rock Falls, Illinois The last line connecting QCNPS to the regional system is the Rock Creek line, that runs 5 miles north of the station with a 170 foot right-of-way, terminates in Comanche, Iowa Three figures are enclosed which show counties that fall within a 50-mile radius of QCNPS, a site boundary map, and a transmission line map

The plant uses once-through (open-cycle) cooling water system which draws from and discharges to the Mississippi River to remove waste heat from the facility River water is drawn through a canal, that is perpendicular to river flow, into the plant The heated water is discharged back to the Mississippi River through two 16-foot-diameter diffuser pipes into the deepest part of the river channel The Mississippi River in the vicinity of the plant is considered part of the aquatic environment of interest

R Nelson -2-

To support the environmental impact statement preparation process and to ensure compliance with Section 7 of the Endangered Species Act, the NRC requests a list of species and information on protected, proposed, and candidate species and critical habitat that may be in the vicinity of the Quad Cities Station and its associated transmission lines In addition, please provide any information you consider appropriate under the provisions of the Fish and Wildlife Coordination Act

We plan to hold a public NEPA scoping meeting on April 8, 2003, at The Mark of the Quad Cities, 1201 River Drive, Moline, Illinois You and your staff are invited to attend Your office will receive a copy of the draft SEIS along with a request for comments The anticipated publications date for the Draft SEIS is November 2003

If you have any questions concerning QCNPS, the license renewal application, or other aspects of this project, please contact Mr Louis Wheeler, Senior Project Manager, at (301) 415-1444 or by email at DXW@nrc gov

Sincerely,

Pao-Tsin Kuo, Program Director
License Renewal and Environmental Impacts
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

Docket Nos 50-254 and 50-265

Enclosure As stated

cc w/encl See next page

LEGEND

- Nuclear Power Plants
- County Boundaries
- Lakes and Rivers
- Urban

FIGURE 2-1
50-Mile Vicinity Map

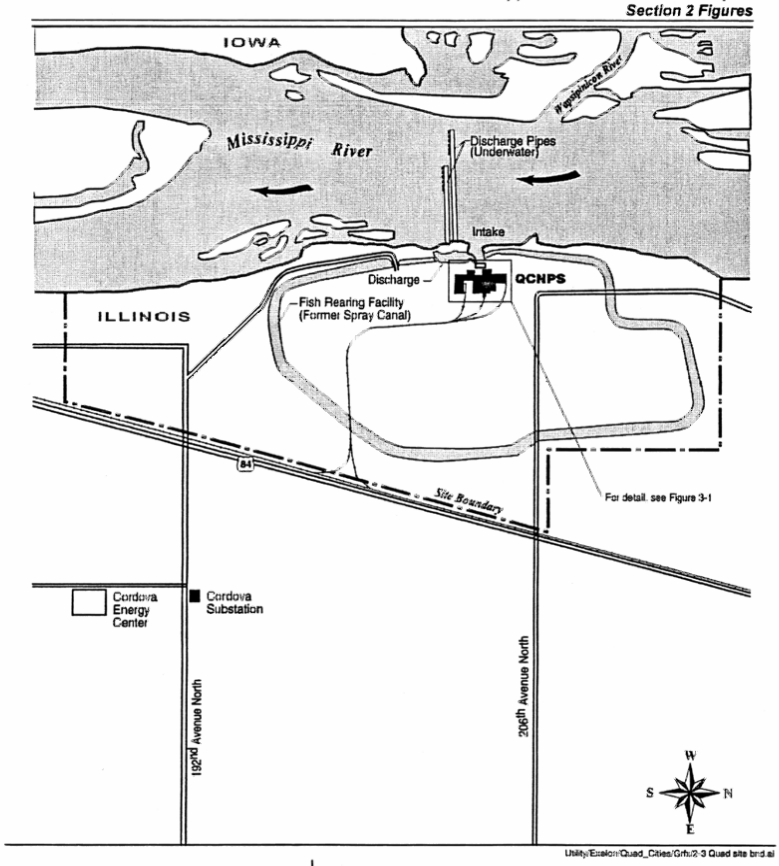
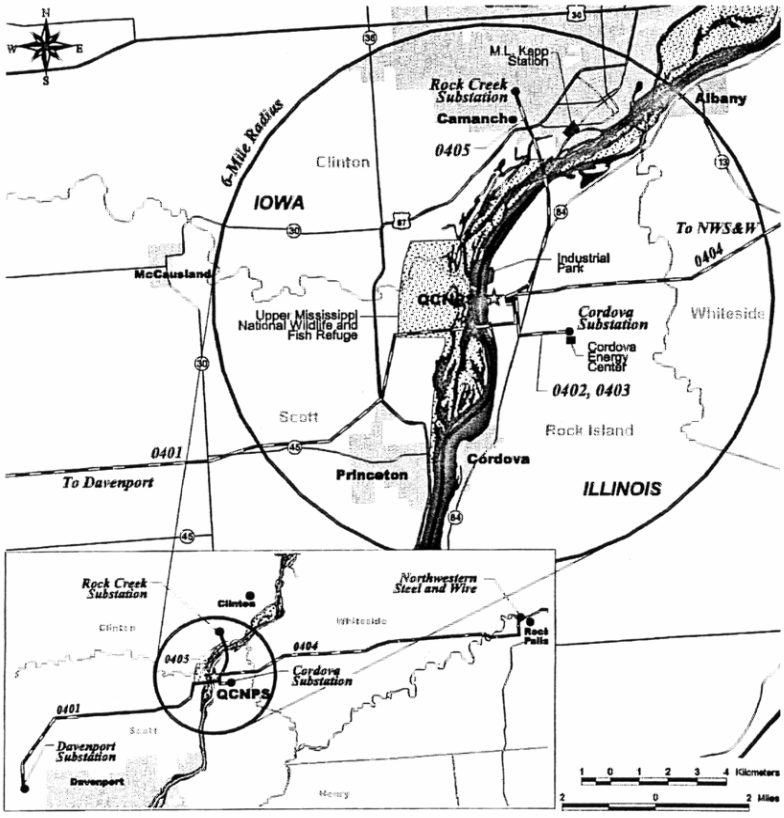


FIGURE 2-3
Site Boundary



LEGEND

- Substations
- Quad Cities Nuclear Station
- Transmission Lines
- County Boundaries
- Cities

NWS&W = Northwestern Steel and Wire

FIGURE 3-2
Transmission Line Map

Illinois
Department of
Natural Resources

http://dnr.state.il.us

One Natural Resources Way • Springfield, Illinois 62702-1271

Rod R. Blagojevich, Governor

May 8, 2003

3/14/03
68FR12385
(6)

NRC Docket Nos. 50-254 and 50-265
50-238 and 50-249

RECEIVED
Rules and Directives

Chief of Rules and Directives Branch
Division of Administrative Services
Mailstop T-6D59
United States Nuclear Regulatory Commission
Washington, DC 20555

RE: **Dresden Nuclear Power Station, Units 2 & 3 License Renewal**
Grundy County - License Nos. DPR-19 and DPR -25

Quad Cities Nuclear Power Station, Units 1 & 2 License Renewal
Rock Island County - License Nos. DPR-29 and DPR-30

Endangered Species Consultation Program
Natural Heritage Database Review #'s 0201014 & 0201015

To Whom This Concerns:

Thank you for submitting the January 3, 2003 operating license renewal applications regarding the Quad Cities Nuclear Power Station, Units 1 & 2 and Dresden Nuclear Power Station, Units 2 & 3 for consultation in accordance with the *Illinois Endangered Species Protection Act* [520 ILCS 10/11], the *Illinois Natural Areas Preservation Act* [525 ILCS 30/17], and Title 17 *Illinois Administrative Code* Part 1075. The Natural Heritage Database identified the presence of State protected resources within the vicinity of portions of the existing transmission lines associated with each power station. Adverse impacts to State protected resources do not appear likely. Excelon has been advised to inform the Department if new transmission lines are proposed in the future.

The Department thoroughly discussed and evaluated the operating license renewal applications for each of the subject power stations. It is the Department's biological opinion that continued operation of the power stations, as described and detailed in the operating license applications, will not adversely affect State protected resources or existing environmental conditions in the immediate vicinity of the Dresden and Quad Cities nuclear power stations.

Consultation is limited to State-listed threatened or endangered species, Illinois Natural Areas and dedicated Land & Water Reserves and Nature Preserves; it does not entail a comprehensive environmental impact assessment. The Department may raise concerns through other venues regarding potential impacts to other natural resources as it deems appropriate.

E-RIDS=ADM-03
Add=D. Wheeler (DXW)
Template=ADM-013

Printed on recycled and recyclable stock

NRC Docket Nos. 50-254 and 50-265
50-238 and 50-249

Thank you for the opportunity to comment on these nuclear power station operating license renewal applications. Should you have any questions, please do not hesitate to contact me.

Sincerely,

Stephen K. Davis, P.G.
Chief
Division of Natural Resource Review and Coordination
Office of Realty and Environmental Planning

cc: Division File
M. Conlin
T. Hickman
R. Pietruszka
D. Wheeler, NRC
K. Jury, Excelon

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Rock Island Field Office
4469 48th Avenue Court
Rock Island, Illinois 61201
Phone: (309) 793-5800 Fax: (309) 793-5804

IN REPLY REFER TO:
FWS/RIFO

June 6, 2003

United States Nuclear Regulatory Commission
Attn: Pao-Tsin Kuo, Program Director
License Renewal and Environmental Impacts
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation
Washington, D.C. 20555-0001

Dear Pao-Tsin Kuo:

This is in response to your letter of March 12, 2003, requesting our comments regarding federally listed threatened and endangered species for the proposed Quad Cities nuclear power plant station application for operating license renewal for the Quad Cities Station in Rock Island County, Illinois.

The following federally listed species are known to occur in Rock Island and Whiteside Counties, Illinois and Scott and Clinton Counties, Iowa.

Classification	Common Name (Scientific Name)	Habitat
Rock Island County		
Threatened	Bald eagle *Haliaeetus leucocephalus*	wintering
Endangered	Higgins' eye pearly mu ssel *Lampsilis higginsi*	sand/gravel substrates swift flowing current
Whiteside County		
Threatened	Bald eagle *Haliaeetus leucocephalus*	wintering
Scott County		
Threatened	Bald eagle *Haliaeetus leucocephalus*	wintering

Endangered	Higgins' eye pearly mu ssel *Lampsilis higginsi*	sand/gravel substrates swift flowing current
Clinton County		
Threatened	Bald eagle *Haliaeetus leucocephalus*	wintering/Breeding
Endangered	Higgins' eye pearly mu ssel *Lampsilis higginsi*	sand/gravel substrates swift flowing current
Endangered	Iowa Pleistocene snail (*Discus macclintocki*)	algific talus slopes
Statewide		
Threatened	Prairie bush-clover *Lespedeza leptostachya*	dry to mesic prairies
Threatened	Eastern prairie fringed orchid *Discus macclintocki*	wet grassland habitats
Endangered	Indiana bat	caves, mines; small stream corridors with well-developed riparian woods; upland and bottomland forests

The threatened **bald eagle** is listed as breeding in Clinton and Scott Counties, Iowa. Bald eagles build their nests in large trees near rivers or lakes. A typical nest is around 5 feet in diameter. Eagles often use the same nest year after year.

During the winter, this species feeds on fish in the open water areas created by dam tailwaters, the warm water effluents of power plants and municipal and industrial discharges, or in power plant cooling ponds. The more severe the winter, the greater the ice coverage and the more concentrated the eagles become. They roost at night in groups in large trees adjacent to the river in areas that are protected from the harsh winter elements. They perch in large shoreline trees to rest or feed on fish. There is no critical habitat designated for this species. The eagle may not be harassed, harmed, or disturbed when present nor may nest trees be cleared.

The endangered **Higgins' eye pearly mussel** is known to occur in the Mississippi River north of Lock and Dam 20 which includes the above listed counties. This species prefers sand/gravel substrates with a swift current and is most often found in the main channel border or an open, flowing side channel.

You should refer to the following document, "2001 Monitoring Report – Unionid Relocation from the Cordova Energy Effluent Site at Mississippi River Mile 504," (Ecological Specialists, Inc., 2002). Freshwater mussels being affected by the effluent plume of the power plant were relocated in 1999. The Fish and Wildlife Service issued a Biological Opinion stating that the

project was "not likely to jeopardize the continued existence of *L. higginsi*" and allowed an incidental take of 33 L. higginsi over the life of the project (USFWS, 1999). Conditions of the Biological Opinion included relocating unionids from the discharge area and establishing a monitoring program for relocated unionids and unionids that might recolonize the discharge area.

One of the largest populations of *Higgins' eye pearl mussel* known to occur is in the Mississippi River near Cordova. The Biological Opinion and 2001 Monitoring Report should be reviewed and the conditions stated in these documents should be included in your environmental impact statement. If any other projects are located near a known Higgins' eye mussel bed, it may be necessary to conduct a survey to determine the presence of the species.

The endangered **Iowa pleistocene snail** is known to occur on north-facing slopes of the driftless area in Clinton County, Iowa. It occupies algific (cold producing) talus slopes at the outlet of underground ice caves along limestone bluffs within a narrow regime of soil moisture and temperature. There is no critical habitat designated. It must not be harmed, harassed or disturbed.

The **prairie bush clover** occupies dry to mesic prairies with gravelly soil. Federal regulations prohibit any commercial activity involving this species or the destruction, malicious damage or removal of this species from Federal land or any other lands in knowing violation of State law or regulation, including State criminal trespass law. This species should be searched for whenever prairie remnants are encountered.

The **eastern prairie fringed orchid** occupies wet grassland habitats. Federal regulations prohibit any commercial activity involving this species or the destruction, malicious damage or removal of this species from Federal land or any other lands in knowing violation of State law or regulation, including State criminal trespass law. This species should be searched for whenever wet prairie remnants are encountered.

The **Indiana bat** potentially may occur in all counties in Illinois and Iowa south of Interstate 80.

During the summer, the Indiana bat frequents the corridors of small streams with well developed riparian woods as well as mature upland forests. It forages for insects along the stream corridor, within the canopy of floodplain and upland forests, over clearings with early successional vegetation (old fields), along the borders of croplands, along wooded fencerows, and over farm ponds and in pastures. It has been shown that the foraging range for the bats varies by season, age, and sex and ranges up to 81 acres (33ha). It roosts and rears its young in cavities and beneath the loose bark some live species of trees and those of large dead or dying trees. It winters in caves and abandoned mines.

An Indiana bat maternity colony typically consists of a primary roost tree and several alternate roost trees. The use of a particular tree appears to be influenced by weather conditions (temperature and precipitation). For example, dead trees found in more open situations were used more often during cooler or drier days while interior live and dead trees were selected during periods of high temperature and/or precipitation. It has been shown that pregnant and neonatal bats do not thermoregulate well and the selection of the roost tree with the appropriate microclimate may be a matter of their survival. The primary roost tree, however, appears to be

used on all days and during all weather conditions by at least some bats. Indiana bats tend to be philopatric, i.e. they return to the same roosting area year after year.

These comments provide technical assistance only and do not constitute a report of the Secretary of the Interior on a project within the meaning of Section 2(b) of the Fish and Wildlife Coordination Act, do not fulfill the requirements under Section 7 of the Endangered Species Act, nor do they represent the review comments of the U.S. Department of the Interior on any forthcoming environmental statement.

If you have any questions concerning our comments, please contact Kraig McPeek of my staff at (309) 793-5800 ext. 210.

Sincerely,

Richard C. Nelson
Supervisor

G:\Office Users\Kraig\FERC\QC Nuclear (T& E list).doc

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

July 1, 2003

Ms Anita Walker
Acting State Historic Preservation Officer
State Historical Society of Iowa
600 East Locust Street
Des Moines, IA 50319-0290

SUBJECT QUAD CITIES NUCLEAR POWER STATION LICENSE RENEWAL REVIEW (REFERENCE NO 020482156)

Dear Ms Walker

The U S Nuclear Regulatory Commission (NRC) staff is reviewing an application to renew the operating licenses for Quad Cities Nuclear Power Station, Units 1 and 2 (QCNPS), which is located in Rock Island County, Illinois Exelon Generation Company, LLC (Exelon) owns 75 percent of QCNPS and MidAmerican Energy Company (MidAmerican) owns the remaining 25 percent Exelon holds the NRC license to operate the plant, acting for itself and as agent for MidAmerican The application for renewal was submitted by Exelon on January 3, 2003, pursuant to NRC requirements at Title 10 of the *Code of Federal Regulations* Part 54 (10 CFR 54) The NRC has established that, as part of the staff review of any nuclear power plant license renewal action, a site-specific Supplemental Environmental Impact Statement (SEIS) to its "Generic Environmental Impact Statement for License Renewal of Nuclear Plants" (GEIS), NUREG-1437, will be prepared under the provisions of 10 CFR Part 51, the NRC rules that implement the National Environmental Policy Act (NEPA) In accordance with 36 CFR 800 8, the SEIS will include analyses of potential impacts to historic and cultural resources A draft SEIS is scheduled for publication in November of 2003, and will be provided to you for review and comment

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

While preparing its application, Exelon contacted your office by letter dated April 17, 2002, and your office responded on June 24, 2002 In its letter, Exelon stated that the operation of QCNPS, including the maintenance of identified transmission lines, through the license renewal term is not expected to affect cultural or historic resources in the area Exelon further stated that no new construction was planned, and maintenance activities would be limited to previously disturbed areas The June 24, 2002, State Historical Society of Iowa response letter stated that based on the information provided, no historic properties would be affected, and your office could concur with a determination of "No Historic Properties Affected" for this proposed project

A Walker 2

We request that you respond to this letter and indicate whether there are any changes to the determination in your June 24, 2002, letter to Exelon. For your information, enclosed is one example of a letter sent from the NRC staff to 15 Native American Tribes identified by the Bureau of Indian Affairs as having potential interest in the proposed undertaking affording them the opportunity to participate in this process and identify issues of concern to them. No issues have been identified to date. If you have any questions or require additional information, please contact the Environmental Project Manager for the QCNPS project, Duke Wheeler at 301-415-1444 or DXW@nrc.gov.

Sincerely,

Pao-Tsin Kuo, Program Director
License Renewal and Environmental Impacts
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

Docket Nos. 50-254, 50-265

Enclosure: As stated

cc w/o encl: See next page

ENCLOSURE

LETTER TO THE HONORABLE ALEX WALKER, JR, CHAIRPERSON

SAC & FOX NATION OF THE MISSISSIPPI IN IOWA

(NATIVE AMERICAN TRIBE IDENTIFIED BY THE BUREAU OF INDIAN AFFAIRS)

MARCH 11, 2003

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

March 11, 2003

The Honorable Alex Walker, Jr , Chairperson
Sac & Fox Nation of the Mississippi in Iowa
349 Meskawaki Road
Tama, IA 52339

SUBJECT: U S NUCLEAR REGULATORY COMMISSION REVIEW OF THE QUAD CITIES NUCLEAR POWER STATION LICENSE RENEWAL APPLICATION

Dear Mr Walker:

The U S Nuclear Regulatory Commission (NRC) is seeking input for its environmental review of an application from Exelon Generation Company, LLC (Exelon) to renew its operating license for the Quad Cities Nuclear Power Station, Units 1 and 2 (QCNPS), located in Rock Island County, Illinois QCNPS is in close proximity to lands that may be of interest to the Sac & Fox Nation As described below, the NRC process includes an opportunity for public participation in the environmental review We want to ensure that you are aware of our efforts and, pursuant to 10 CFR 51 28(b), the NRC invites the Sac & Fox Nation of the Mississippi in Iowa to provide input to the scoping process relating to the NRC's environmental review of the application

The NRC will hold public scoping meetings for the QCNPS license renewal supplement to the NRC's "Generic Environmental Impact Statement for License Renewal of Nuclear Plants" (GEIS) (NUREG-1437) These scoping meetings will be held at the The Mark of the Quad Cities, 1201 River Drive, Moline, Illinois, on April 8, 2003 There will be two sessions to accommodate interested parties The first session will convene at 1 30 p m and will continue until 4 30 p m , as necessary The second session will convene at 7 00 p m , with a repeat of the overview portions of the meeting, and will continue until 10 00 p m , as necessary Additionally, the NRC staff will host informal discussions one hour before the start of each session No formal comments on the proposed scope of the supplement to the GEIS will be accepted during the informal discussions To be considered, comments must be provided either at the transcribed public meetings or in writing The application and the environmental review process are described below

Under NRC regulations, the original operating license for a nuclear power plant is issued for up to 40 years The license may be renewed for up to an additional 20 years if NRC requirements are met The current operating licenses for QCNPS will expire in 2012 Exelon submitted an environmental report as part of its application for renewal of the QCNPS operating license on January 3, 2003 The application is electronically available for inspection from the Publicly Available Records component of NRC's Agencywide Documents Access and Management System (ADAMS) ADAMS is accessible at http://www.nrc.gov/reading-rm/adams.html, which provides access through the NRC's Public Electronic Reading Room (PERR) link If you do not have access to ADAMS or if there are problems in accessing the documents located in ADAMS, contact the NRC's Public Document Room (PDR) Reference staff at 1-800-397-4209, 301-415-4737, or by e-mail to pdr@nrc gov In addition, the application can be viewed on the Internet http://www.nrc.gov/reactors/operating/licensing/renewal/applications/dresden-quad.html

A paper copy of the document can be viewed at the NRC's PDR, located at One White Flint North, 11555 Rockville Pike (first floor), Rockville, Maryland, at the Cordova District Library, 402 Main Avenue, Cordova, Illinois, the River Valley Library, 214 South Main Street, Port Byron, Illinois, and at the Davenport Public Library, 321 Main Street, Davenport, Iowa. Also, the GEIS assesses the scope and impact of environmental effects that would be associated with license renewal at any nuclear power plant site. A copy of this document can also be found on the NRC's website or at the NRC's PDR.

The NRC is gathering information for the document that will be a QCNPS-specific supplement to the GEIS. The supplement will contain the results of the review of the environmental impacts on the area surrounding the QCNPS site that are related to terrestrial ecology, aquatic ecology, hydrology, cultural resources, and socioeconomic issues (among others) and will contain a recommendation regarding the environmental acceptability of the license renewal action.

Please submit any written comments the Sac & Fox Nation of the Mississippi in Iowa may have to offer on the scope of the environmental review by May 12, 2003. Comments should be submitted either by mail to the Chief, Rules and Directives Branch, Division of Administrative Services, Mail Stop T-6 D59, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555-0001, or by e-mail to QuadCitiesEIS@nrc.gov.

At the conclusion of the scoping process, the NRC staff will prepare a summary of the significant issues identified, the conclusions reached, and will mail a copy to you.

The NRC will prepare a draft supplemental environmental impact statement (SEIS) for public comment, and will hold another set of public meetings in the site vicinity to solicit comments on the draft. A copy of the draft SEIS will be sent to you for your review and comment. After consideration of public comments received on the draft, the NRC will prepare a final SEIS. The issuance of a final environmental statement for QCNPS is planned for July 2004. If you need additional information regarding the environmental review process, please contact Louis L. Wheeler, Project Manager, at (301) 415-1444.

Sincerely,

Pao-Tsin Kuo, Program Director
License Renewal and Environmental Impacts Program
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

Docket Nos. 50-254, 50-265

cc: See next page

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

July 1, 2003

Mr Maynard Crossland
Director
Illinois Historic Preservation Agency
Preservation Services Division
One Old State Capitol Plaza
Springfield, IL 62701

SUBJECT QUAD CITIES NUCLEAR POWER STATION LICENSE RENEWAL REVIEW (IHPA LOG NO 020116003WVA)

Dear Mr Crossland

The U S Nuclear Regulatory Commission (NRC) staff is reviewing an application to renew the operating licenses for Quad Cities Nuclear Power Station, Units 1 and 2 (QCNPS), which is located in Rock Island County, Illinois Exelon Generation Company, LLC (Exelon) owns 75 percent of QCNPS and MidAmerican Energy Company (MidAmerican) owns the remaining 25 percent Exelon holds the NRC license to operate the plant, acting for itself and as agent for MidAmerican The application for renewal was submitted by Exelon on January 3, 2003, pursuant to NRC requirements at Title 10 of the *Code of Federal Regulations* Part 54 (10 CFR 54) The NRC has established that, as part of the staff review of any nuclear power plant license renewal action, a site-specific Supplemental Environmental Impact Statement (SEIS) to its "Generic Environmental Impact Statement for License Renewal of Nuclear Plants" (GEIS), NUREG-1437, will be prepared under the provisions of 10 CFR Part 51, the NRC rules that implement the National Environmental Policy Act (NEPA) In accordance with 36 CFR 800 8, the SEIS will include analyses of potential impacts to historic and cultural resources A draft SEIS is scheduled for publication in November of 2003, and will be provided to you for review and comment

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

While preparing its application, Exelon contacted your office by letter dated January 11, 2002, and your office responded on February 7, 2002 In its letter, Exelon stated that the operation of QCNPS, including the maintenance of identified transmission lines, through the license renewal term is not expected to affect cultural or historic resources in the area Exelon further stated that no new construction was planned, and maintenance activities would be limited to previously disturbed areas The February 7, 2002, response letter stated that, based on the information provided, no historic properties would be affected, and IHPA had no objection to the undertaking proceeding as planned

We request that you respond to this letter and indicate whether there are any changes to the determination in your February 7, 2002, letter to Exelon. For your information, enclosed is one example of a letter sent from the NRC staff to 15 Native American Tribes identified by the Bureau of Indian Affairs as having potential interest in the proposed undertaking affording them the opportunity to participate in this process and identify issues of concern to them. No issues have been identified to date. If you have any questions or require additional information, please contact the Environmental Project Manager for the QCNPS project, Duke Wheeler at 301-415-1444 or DXW@nrc.gov.

Sincerely,

Pao-Tsin Kuo, Program Director
License Renewal and Environmental Impacts
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

Docket Nos. 50-254, 50-265

Enclosure: As stated

cc w/o encl: See next page

ENCLOSURE

LETTER TO THE HONORABLE JOHN A. BARRETT, JR, CHAIRPERSON

CITIZEN POTAWATOMI NATION, OKLAHOMA

(NATIVE AMERICAN TRIBE IDENTIFIED BY THE BUREAU OF INDIAN AFFAIRS)

MARCH 11, 2003

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

March 11, 2003

The Honorable John A Barrett, Jr , Chairperson
Citizen Potawatomi Nation, Oklahoma
1901 South Gordon Cooper Drive
Shawnee, OK 74801

SUBJECT: U S NUCLEAR REGULATORY COMMISSION REVIEW OF THE QUAD CITIES NUCLEAR POWER STATION LICENSE RENEWAL APPLICATION

Dear Mr Barrett:

The U S Nuclear Regulatory Commission (NRC) is seeking input for its environmental review of an application from Exelon Generation Company, LLC (Exelon) to renew its operating license for the Quad Cities Nuclear Power Station, Units 1 and 2 (QCNPS), located in Rock Island County, Illinois QCNPS is in close proximity to lands that may be of interest to the Potawatomi Nation As described below, the NRC process includes an opportunity for public participation in the environmental review We want to ensure that you are aware of our efforts and, pursuant to 10 CFR 51 28(b), the NRC invites the Citizen Potawatomi Nation of Oklahoma to provide input to the scoping process relating to the NRC's environmental review of the application

The NRC will hold public scoping meetings for the QCNPS license renewal supplement to the NRC's "Generic Environmental Impact Statement for License Renewal of Nuclear Plants" (GEIS) (NUREG-1437) These scoping meetings will be held at the The Mark of the Quad Cities, 1201 River Drive, Moline, Illinois, on April 8, 2003 There will be two sessions to accommodate interested parties The first session will convene at 1 30 p m and will continue until 4 30 p m , as necessary The second session will convene at 7 00 p m , with a repeat of the overview portions of the meeting, and will continue until 10 00 p m , as necessary Additionally, the NRC staff will host informal discussions one hour before the start of each session No formal comments on the proposed scope of the supplement to the GEIS will be accepted during the informal discussions To be considered, comments must be provided either at the transcribed public meetings or in writing The application and the environmental review process are described below

Under NRC regulations, the original operating license for a nuclear power plant is issued for up to 40 years The license may be renewed for up to an additional 20 years if NRC requirements are met The current operating licenses for QCNPS will expire in 2012 Exelon submitted an environmental report as part of its application for renewal of the QCNPS operating license on January 3, 2003 The application is electronically available for inspection from the Publicly Available Records component of NRC's Agencywide Documents Access and Management System (ADAMS) ADAMS is accessible at http://www.nrc.gov/reading-rm/adams.html, which provides access through the NRC's Public Electronic Reading Room (PERR) link If you do not have access to ADAMS or if there are problems in accessing the documents located in ADAMS, contact the NRC's Public Document Room (PDR) Reference staff at 1-800-397-4209, 301-415-4737, or by e-mail to pdr@nrc gov In addition, the application can be viewed on the Internet http://www.nrc.gov/reactors/operating/licensing/renewal/applications/dresden-quad.html

A paper copy of the document can be viewed at the NRC's PDR, located at One White Flint North, 11555 Rockville Pike (first floor), Rockville, Maryland, at the Cordova District Library, 402 Main Avenue, Cordova, Illinois, the River Valley Library, 214 South Main Street, Port Byron, Illinois, and at the Davenport Public Library, 321 Main Street, Davenport, Iowa Also, the GEIS assesses the scope and impact of environmental effects that would be associated with license renewal at any nuclear power plant site A copy of this document can also be found on the NRC's website or at the NRC's PDR.

The NRC is gathering information for the document that will be a QCNPS-specific supplement to the GEIS The supplement will contain the results of the review of the environmental impacts on the area surrounding the QCNPS site that are related to terrestrial ecology, aquatic ecology, hydrology, cultural resources, and socioeconomic issues (among others) and will contain a recommendation regarding the environmental acceptability of the license renewal action

Please submit any written comments the Citizen Potawatomi Nation may have to offer on the scope of the environmental review by May 12, 2003 Comments should be submitted either by mail to the Chief, Rules and Directives Branch, Division of Administrative Services, Mail Stop T-6 D59, U S Nuclear Regulatory Commission, Washington, D C 20555-0001, or by e-mail to QuadCitiesEIS@nrc gov.

At the conclusion of the scoping process, the NRC staff will prepare a summary of the significant issues identified, the conclusions reached, and will mail a copy to you.

The NRC will prepare a draft supplemental environmental impact statement (SEIS) for public comment, and will hold another set of public meetings in the site vicinity to solicit comments on the draft A copy of the draft SEIS will be sent to you for your review and comment After consideration of public comments received on the draft, the NRC will prepare a final SEIS The issuance of a final environmental statement for QCNPS is planned for July 2004 If you need additional information regarding the environmental review process, please contact Louis L Wheeler, Project Manager, at (301) 415-1444

Sincerely,

Pao-Tsin Kuo, Program Director
License Renewal and Environmental Impacts Program
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

Docket Nos 50-254, 50-265

cc See next page

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

August 12, 2003

Mr Rick Nelson
Field Supervisor
U S Fish and Wildlife Service
4469 48th Avenue Court
Rock Island, IL 61201

SUBJECT: EXPANDED SCOPE OF QUAD CITIES NUCLEAR POWER STATION APPLICATION FOR OPERATING LICENSE RENEWAL - REQUEST FOR COMMENTS

Dear Mr Nelson

This letter requests comments regarding the expanded scope of the environmental review associated with the proposed license renewal for Quad Cities Nuclear Power Station, Units 1 and 2 (QCNPS)

First, thank you for your letter of June 6, 2003, responding to our March 12, 2003, letter which requested comments on the application submitted by Exelon Generation Company, LLC (Exelon) for the renewal of the operating licenses for QCNPS, located on the east bank of Pool 14 of the Mississippi River near Cordova, Illinois To support the preparation of an environmental impact statement and to ensure compliance with Section 7 of the Endangered Species Act (ESA), the NRC staff requested information on protected, proposed and candidate species and critical habitat which may be in the vicinity of QCNPS and its associated transmission lines In addition, we requested that you provide any information considered appropriate under the provisions of the Fish and Wildlife Coordination Act (FWCA)

As you may be aware from our March 12, 2003, letter, as part of the process for review of the license renewal application, the NRC staff is preparing a Supplemental Environmental Impact Statement under the provision of the National Environmental Policy Act This will include analyses of pertinent environmental issues, including impacts to endangered or threatened species

Based on new information provided by Exelon in response to an NRC staff request for additional information, the scope of the transmission lines included in this environmental review has been expanded since our March 12, 2003, letter Specifically, the Davenport, Barstow, South Nelson and North Nelson lines have been extended as follows

The Davenport Line (0401): Our March 12, 2003, letter stated this line was 12 8 miles from the QCNPS site to Substation 91 The portion of the line applicable to this environmental review has now been extended to a total length of 27 miles from QCNPS to Substation 56

The Barstow Line (0402): Our letter stated this line was 2 miles long It ended at the Cordova Energy Station The portion of this line applicable to this environmental review now runs 17 5 miles from QCNPS to the Barstow Substation

The South Nelson Line (0403): Our letter stated this line was 2 miles long. It also ended at the Cordova Energy Station. The portion of this line applicable to our review now runs 41.9 miles from QCNPS to the Nelson Substation.

The North Nelson Line (0404): Our letter stated this line was 33 miles long. It ended in Rock Falls, Illinois at the Northwestern Steel and Wire Company. The portion of this line applicable to our review now runs 39.7 miles from QCNPS to the Nelson Substation.

The Rock Creek Line (0405) remains the same as stated in our March 12, 2003, letter.

As provided for by the ESA and FWCA, we request that you consider what effects the expanded scope of the project may have on endangered and threatened species of fish and wildlife. Please notify us of any issues which should be considered in our evaluation.

If you have any questions concerning the process for the NRC staff review of the license renewal application, please contact Mr. Louis Wheeler, Senior Project Manager, of my staff at (301) 415-1444 or via email at DXW@nrc.gov.

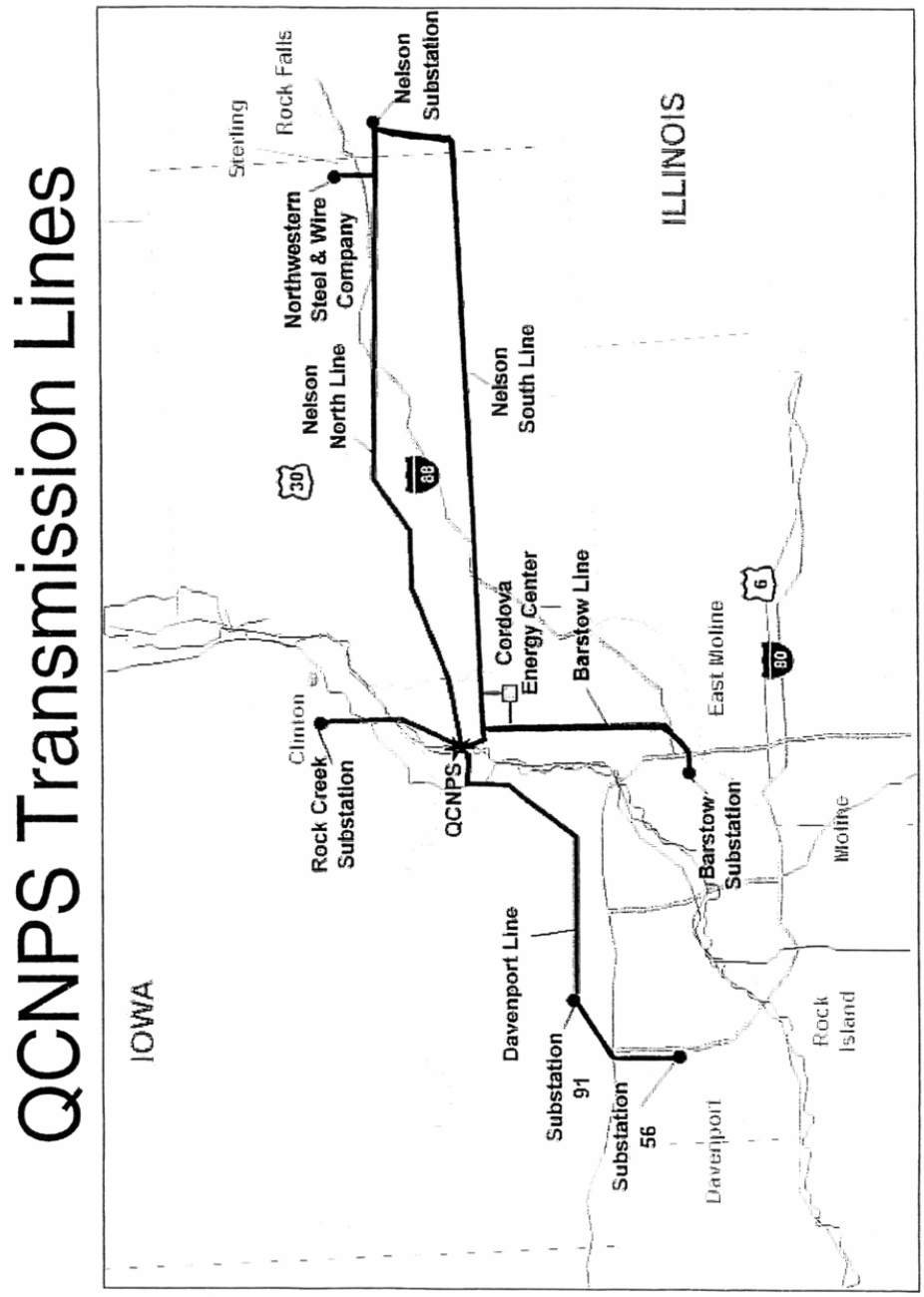
Sincerely,

Pao-Tsin Kuo, Program Director
License Renewal and Environmental Impacts
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

Docket Nos. 50-237 and 50-249

Enclosure: QCNPS Transmission Line Map

cc w/encl: See next page


QCNPS Transmission Lines
IOWA
ILLINOIS
Sterling
Rock Falls
Clinton
Rock Creek Substation
QCNPS
Nelson Substation
Northwestern Steel & Wire Company
Nelson North Line
Nelson South Line
Cordova Energy Center
Barstow Line
East Moline
Barstow Substation
Moline
Rock Island
Davenport
Davenport Line
Substation 91
Substation 56
30
88
6
80

ENCLOSURE

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Rock Island Field Office
4469 48th Avenue Court
Rock Island, Illinois 61201
Phone: (309) 793-5800 Fax: (309) 793-5804

IN REPLY REFER TO:
FWS/RIFO

September 15, 2003

United States Nuclear Regulatory Commission
Attn: Mr. Louis Wheeler, Senior Project Manager
License Renewal and Environmental Impacts
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation
Washington, D.C. 20555-0001

Dear Mr. Wheeler:

This is in response to your letter of August 12, 2003, requesting our comments regarding the expanded scope of the environmental review associated with the proposed license renewal for Quad Cities Nuclear Power Station (QCNPS), Units 1 and 2 in Rock Island, Whiteside, Scott, Clinton, and Lee Counties in Iowa and Illinois. The expanded scope consists of expanding transmission lines into other counties.

The following federally listed species are known to occur in the counties of Rock Island, Whiteside, Scott, Clinton and Lee.

Classification	Common Name (Scientific Name)	Habitat
Rock Island County		
Threatened	Bald eagle *Haliaeetus leucocephalus*	wintering
Endangered	Higgins' eye pearly mu ssel *Lampsilis higginsi*	sand/gravel substrates swift flowing current
Whiteside County		
Threatened	Bald eagle *Haliaeetus leucocephalus*	wintering
Scott County		
Threatened	Bald eagle *Haliaeetus leucocephalus*	wintering

Endangered	Higgins' eye pearly mu ssel *Lampsilis higginsi*	sand/gravel substrates swift flowing current
Clinton County		
Threatened	Bald eagle *Haliaeetus leucocephalus*	wintering/breeding
Endangered	Higgins' eye pearly mu ssel *Lampsilis higginsi*	sand/gravel substrates swift flowing current
Endangered	Iowa Pleistocene snail *Discus macclintocki*	algific talus slopes
Lee County		
Threatened	Prairie bush-clover *Lespedeza leptostachya*	dry to mesic prairies
Statewide		
Threatened	Prairie bush-clover *Lespedeza leptostachya*	dry to mesic prairies
Threatened	Eastern prairie fringed orchid *Discus macclintocki*	wet grassland habitats
South of Interstate 80 in Iowa and Statewide in Illinois		
Endangered	Indiana bat *Myotis sodalis*	caves, mines; small stream corridors with well-developed riparian woods; upland and bottomland forests

The threatened **bald eagle** is listed as breeding Clinton County, Iowa, and wintering in Rock Island and Whiteside Counties in Illinois and Scott and Clinton Counties in Iowa. Bald eagles build their nests in large trees near rivers or lakes. A typical nest is around 5 feet in diameter. Eagles often use the same nest year after year.

During the winter, this species feeds on fish in the open water areas created by dam tailwaters, the warm water effluents of power plants and municipal and industrial discharges, or in power plant cooling ponds. The more severe the winter, the greater the ice coverage and the more concentrated the eagles become. They roost at night in groups in large trees adjacent to the river in areas that are protected from the harsh winter elements. They perch in large shoreline trees to rest or feed on fish. There is no critical habitat designated for this species. The eagle may not be harassed, harmed, or disturbed when present nor may nest trees be cleared. Please refer to the enclosed "Management Guidelines for Breeding Areas."

The endangered **Higgins' eye pearly mussel** is known to occur in the Mississippi River north of Lock and Dam 20, which includes Rock Island, Scott and Clinton Counties. We have entered into Section 7 consultation with QCNPS in the past with regard to this species.

We recommend that you refer to the following document, "2001 Monitoring Report – Unionid Relocation from the Cordova Energy Effluent Site at Mississippi River Mile 504," (Ecological Specialists, Inc., 2002). Freshwater mussels being affected by the effluent plume of the power plant were relocated in 1999. The Fish and Wildlife Service issued a Biological Opinion stating that the project was "not likely to jeopardize the continued existence of *L. higginsi*" and allowed an incidental take of 33 *L. higginsi* over the life of the project (USFWS, 1999). Conditions of the Biological Opinion included relocating unionids from the discharge area and establishing a monitoring program for relocated unionids and unionids that might recolonize the discharge area.

One of the largest populations of *L. higginsi* in the world is known to occur in the Mississippi River near Cordova. The Biological Opinion and 2001 Monitoring Report should be reviewed and the conditions stated in these documents should be included in your environmental impact statement. If any other projects are located near a known Higgins' eye mussel bed, it may be necessary to conduct a survey to determine the presence of the species.

The endangered **Iowa Pleistocene snail** is known to occur on north-facing slopes of the driftless area in Clinton County, Iowa. It occupies algific (cold-producing) talus slopes at the outlet of underground ice caves along limestone bluffs within a narrow regime of soil moisture and temperature. There is no critical habitat designated. It must not be harmed, harassed or disturbed.

The **prairie bush clover** is known to occur in Lee County, Illinois and potentially occurs throughout Iowa and Illinois. Prairie bush clover occupies dry to mesic prairies with gravelly soil. Federal regulations prohibit any commercial activity involving this species or the destruction, malicious damage or removal of this species from Federal land or any other lands in knowing violation of State law or regulation, including State criminal trespass law. This species should be searched for whenever prairie remnants are encountered.

The **eastern prairie fringed orchid** occupies wet grassland habitats and potentially occurs throughout Illinois and the eastern half of Iowa. Federal regulations prohibit any commercial activity involving this species or the destruction, malicious damage or removal of this species from Federal land or any other lands in knowing violation of State law or regulation, including State criminal trespass law. This species should be searched for whenever wet prairie remnants are encountered.

The **Indiana bat** may occur in all counties in Iowa south of Interstate 80 and statewide in Illinois.

During the summer, the Indiana bat frequents the corridors of small streams with well-developed riparian woods as well as mature upland forests. It forages for insects along the stream corridor, within the canopy of floodplain and upland forests, over clearings with early successional vegetation (old fields), along the borders of croplands, along wooded fencerows, and over farm ponds and in pastures. It has been shown that the foraging range for the bats varies by season, age, and sex and ranges up to 81 acres (33ha). It roosts and rears its young in cavities and

beneath the loose bark some live species of trees and those of large dead or dying trees. It winters in caves and abandoned mines.

An Indiana bat maternity colony typically consists of a primary roost tree and several alternate roost trees. The use of a particular tree appears to be influenced by weather conditions (temperature and precipitation). For example, dead trees found in more open situations were used more often during cooler or drier days while interior live and dead trees were selected during periods of high temperature and/or precipitation. Indiana bats tend to return to the same roosting area year after year. Please refer to the attached "Indiana bat guidelines for Iowa and Illinois."

Migratory birds
In addition to trying to ensure that electrical transmission lines and structures do not adversely affect threatened and endangered species, the U. S. Fish and Wildlife Service is also interested in minimizing potential impacts to other wildlife resources, particularly migratory birds. The Migratory Bird Treaty Act (16 U.S.C. 703-712) prohibits the taking, killing, possession, sale, transportation and importation of migratory birds, their eggs, parts and nests, except when specifically authorized by the Secretary of the Interior. The Bald and Golden Eagle Protection Act (16 U.S.C. 668) prohibits the taking of any bald or golden eagle except when specifically authorized by the Secretary of the Interior. These laws do not allow the killing of migratory birds, including eagles without a permit. To avoid killing migratory birds, many companies employ raptor and migratory bird deterents and line configurations, which minimize electrocution. These and other methods are described in *Avian Power Line Interaction Committee (APLIC), 1994; Mitigating Bird Collisions with Power Lines: The State of the Art in 1994, Edison Electric Institute, Washington D.C., 78.pp.; Avian Power Line Interaction Committee (APLIC), 1996; Suggested Practices for Raptor Protection on Power Lines, Edison Electric Institute/Raptor Research Foundation, Washington, D. C., 128 pp.* Copies can be obtained via the internet at *http://www.eei.org/productsandservices/descriptionandaccess/* or by calling 1-800-334-5453.

We encourage you to work with us to eliminate loss of migratory birds attributable to power lines and other power transmission facilities. If you would like additional information, please contact us as indicated below.

In addition, The Corps of Engineers is the Federal agency responsible for wetland regulation. We recommend that you contact them for assistance in delineating any wetland types and acreage within the expanded scope of the project. Priority consideration should be given to avoid impacts to these wetland areas. Any activities that would alter these wetlands may require a Section 404 permit. Unavoidable impacts will require a mitigation plan to compensate for any losses of wetland functions and values. The U.S. Army Corps of Engineers, Clock Tower Building, P.O. Box 2004, Rock Island, Illinois 61201, should be contacted for information about the permit process.

These comments provide technical assistance only and do not constitute a report of the Secretary of the Interior on a project within the meaning of Section 2(b) of the Fish and Wildlife Coordination Act, do not fulfill the requirements under Section 7 of the Endangered Species Act, nor do they represent the review comments of the U.S. Department of the Interior on any forthcoming environmental statement.

If you have any questions concerning our comments, please contact Ginger Molitor of my staff at (309) 793-5800 ext. 212.

Sincerely,

Richard C. Nelson
Supervisor

Cc: Jessie Coty
Enclosures

G:\Word Documents\Ginger\completed\Illinois\QCNuclear Regulatory Commission (2)

From:
Northern Spotted Owl Recovery Plan
1983

Appendix E

MANAGEMENT GUIDELINES FOR BREEDING AREAS

The purpose of these guidelines is to provide minimum criteria for protecting bald eagles at their breeding areas from human disturbance and to preserve and enhance important habitat features of these areas. The criteria are based on a synthesis of existing guidelines in present use by the U.S. Forest Service (Eastern Region), U. S. Fish and Wildlife Service, and the views of eagle researchers.

Although eagles often use particular nests for many years, they frequently move to different sites. Turnover of existing nests, from losses to wind, changes by the eagles, and other natural factors may be as much as 12% of the sites per year. Eagle "real estate" is much less fixed than for humans. Thus, the conservation and management of nesting habitat is far more important than the identification and preservation of specific nest sites or even breeding areas.

Eagle tolerance of human presence is highly variable, both seasonally and among different individuals or pairs of eagles. Some bald eagles nest and accept people, boaters, hikers, cabins, roads, and other human presence in very close proximity, possibly as a result of habituation. On the other hand, some may be extremely intolerant and be disturbed readily. This variability must be recognized in both research and management. Management should be conservative and assume that intolerant birds may be present now or in the future. We should be especially conservative in areas with low populations.

All nesting eagles are disturbed more easily at some times of the nesting season than at others. Four periods of sensitivity to disturbance can be identified for nesting areas. These are as follows.

1. Most critical period. Prior to egg laying bald eagles engage in courtship activities and nest building. During this and the incubation periods they are most intolerant of external disturbances and may readily abandon the area. The most critical period for disturbances therefore extends from approximately one month prior to egg laying through the incubation period.

2. Moderately critical period. This includes approximately one month prior to the above period and about four weeks after hatching. Prior to the nesting season individual pairs of eagles vary considerably in time of return to the nest site or, if permanent residents, the time they begin to come into physiological condition for breeding and become sensitive to

disturbance. After hatching the chicks are quite vulnerable to inclement weather and need frequent brooding and feeding. Disturbance can keep adults from nests and, depending on the weather and length of time involved, may cause weakening or death of chicks. The adults are quite protective of the nest site as long as one or more healthy chicks are present. Thus, disturbance at this time is less critical, although still potentially detrimental, than during the pre-laying and incubation period.

3. Low critical period. This period extends from the time chicks are about one month of age until approximately six weeks after fledging. During this time adults are still quite attached to nesting areas but tolerate moderate amounts of human presence. Restriction should be decided on a case by case basis.

4. Not critical period. The existence of this period depends on whether adults are permanent residents in their nesting areas. In most regions adults leave the vicinity for a few weeks or months each year. During the time they are gone one need be concerned only with activities that alter the habitat in ways that would make it unsuitable for future nesting.

The timing of these periods depends on geographic location. Eagles tend to breed earlier farther south or in coastal locations. Establishment of critical periods in managment planning will therefore depend on the timing of nesting in each area.

Management of nesting areas will depend on the amount of suitable habitat, numbers of pairs present, extent of the areas used by nesting eagles, and present land uses. Plans should be prepared for each breeding area and planning should encompass larger units when habitat is suitable and many nesting pairs are present. In planning for a large region, particularly if major changes in land use or development are anticipated, the following major items should be addressed:

1. Distribution of habitat modification. Large contiguous areas of habitat should remain suitable, not just small, specific sites where nests currently are located.

2. Upper limit to habitat modification. Limits on habitat modification should be clearly established in advance, and unplanned development should be discouraged or prohibited. Limits set in advance are generally more acceptable to persons desiring further development; the process permits reasonable negotiation and compromise and limits are easier to enforce.

3. Rate of development. Development should only be allowed to approach the upper limit slowly, over a period of years. Sudden, large-scale development should be prevented if possible.

4. Seasonal timing of human activity. Construction and related activities should be confined to the low or non-critical periods of the year described above.

5. Human attitudes toward eagles in the area. Much human-eagle interaction depends on the predominant attitude of human residents of each area. Residents and visitors of some areas are very favorably disposed toward the birds, if not proud and quite protective. They may be careful not to disturb the birds and may help prevent disturbance or destruction by other persons. Such attitudes should be encouraged through education and law enforcement. Illegal shooting of eagles, especially young birds of the year still in the vicinity of nests during the fall hunting season, should be severely penalized.

The above guidelines pertain to larger geographic units where several eagles may be nesting. The following pertain to specific breeding areas.

SITE-SPECIFIC MANAGEMENT PLANS

A. Basic information and essential habitat. Site-specific management plans should be tailored to the size and configuration of essential habitats, and should address such factors as the prey base, habitat used for foraging, and any other features necessary for maintaining habitat suitability. In addition, management plans should clearly specify restrictions on human activities and habitat alterations in establishing buffer zones around nests (see next point in outline). For basic information forms, see end of this appendix.

B. Disturbance Buffer Zones for Nest Trees. Each nest within a breeding area will be protected by three zones that become less restrictive to human activity as the distance from the nest increases. Some activities need to be restricted only during the nesting season, or critical periods. Guidelines for zones, based on those developed by the U. S. Forest Service in the Eastern Region and used in several parts of the United States, are described below. If buffer zones are used they should be established around all nest sites within a breeding area regardless of their activity status, since alternate nests often are used as feeding platforms and roosting sites.

1. Primary Zone

   a) Size: The boundary of this zone should be 330 feet (5 chains) from the nest.

   b) Restrictions: All land use except actions necessary to protect or improve the nest site should be prohibited in this zone. Human entry and low-level aircraft operations should be prohibited during the most critical and moderately critical periods, unless performed in connection with eagle research or management by qualified individuals. Motorized access into this zone should be prohibited. Restrictions on human entry

at other times should be addressed in the breeding area management plan, considering the types, extents, and durations of proposed or likely activities.

2. Secondary zone

a) Size: This zone should extend 660 feet (10 chains) from the nest.

b) Restrictions: Land-use activities that result in significant changes in the landscape, such as clearcutting, land clearing, or major construction, should be prohibited. Actions such as thinning tree stands or maintenance of existing improvements can be permitted, but not during the most critical and moderately critical periods. Human entry and low-level aircraft operations should be prohibited during the most critical period unless performed in connection with necessary eagle research and management by qualified individuals. Roads and trails in this zone should be obliterated, or at least closed during the most and moderately critical periods. Restrictions on human entry at other times should be addressed in the breeding area management plan, considering the types, extents, and durations of proposed or likely activities.

3. Tertiary Zone

a) Size: This is the least restrictive zone. It should extend one-quarter mile (20 chains) from the nest, but may extend up to one-half mile (40 chains) if topography and vegetation permit a direct line of sight from the nest to potential activities at that distance. The configuration of this zone, therefore, may be variable.

b) Restrictions: Some activities are permissible in this zone except during the most critical period. Each breeding area management plan may identify specific hazards that require additional constraints.

C. Other Management Guidelines.

1. Abandoned Nest Trees

a) When a tree containing an eagle nest has blown down or has been damaged so it can no longer support a nest, remove all buffer zones. The breeding area management plan itself, however, should remain in effect or be revised, such as by removing buffer zones until a new nest is established.

b) When a nest structure disappears but the nest tree remains the buffer zones should remain in effect through at least the following three breeding seasons. If the nest is not rebuilt, remove the zoning but still consider the area as essential habitat and protect it accordingly.

c) When a nest is classified as a remnant, that is, one that has been unoccupied for five consecutive years, and is not being maintained by eagles, retain only the primary zone.

Roosting and Potential Nest Trees.

a) Three or more super-canopy trees (preferably dead or with dead tops) should be identified and preserved within one-quarter mile of each nest as roosting and perching sites.

b) In areas identified as potential nesting habitat, there should be at least four to six over-mature trees of species favored by bald eagles for every 320 acres within 1320 feet of a river or lake larger than 40 acres. These trees should be taller than surrounding trees or at the edge of the forest stand, and there should be clear flight paths to them.

c) Artificial nest structures may be provided where suitable nest sites are unavailable in occupied or potential habitat. Structures may be placed in trees containing dilapidated nests; in trees without existing nests, but which otherwise appear suitable; or in man-made structures such as powerlines or tripods. Nest platforms should be approximately five to six feet in length and width (25-36 square feet) and be made to last for several years. Roosting structures may be erected using powerpoles with several horizontal perches near the upper end.

3. Prey Base Management

a) Fisheries management should strive to maintain a prey base consistent with eagle food habits.

b) In some breeding areas, particularly in the west, mammals form a portion of the diet of bald eagles. Land management in these areas should maintain an adequate prey base in terrestrial habitats.

c) Feeding of eagles may be considered a valid management tool in areas where natural prey are highly contaminated or temporarily unavailable for some reason. This management option rarely will be used.

d) In some regions, commercial and sport fishermen may be providing an important but unrecognized (by people) food source for eagles by dumping rough fish. Many commercial fishermen are also suffering from reduced catches of game fish and quotas imposed for the purpose of managing fisheries. Subsidization perhaps in the form of monetary or tax incentives might benefit eagles, fishermen, and possibly the fisheries.

SITE-SPECIFIC MANAGEMENT PLANS

Outline for data file and breeding area management plans

Breeding Area No. and Name: _____

Nest No.(s): _____

Location: _____

Date: _____

By: _____

I. Breeding Area Characteristics

A. General Description
Nest Site Relationships
Overview of Habitat and Land Uses

B. Feeding Areas (Known and/or Assumed)

C. Known or Potential Perch/Roost Trees

D. Potential Nest Sites Available

E. Land Ownership within Breeding Area
Identify Acquisition Needs

F. Post-nesting Use of Habitat

II. Nest Site Characteristics (Each nest in territory)

A. Tree Measurements (height, DBH, size); Nest Measurements

B. Condition of Nest Tree

C. Date Constructed

D. Timber Type, Size and Density

E. Distance to Water

F. Distance to Roads and Other Development

G. Accessibility

H. Relation of Nest Height to Surrounding Canopy

I. Precise Directions for Reaching Nest

- E6 -

If the project site contains any habitat that fits the above description, it may be necessary to conduct a survey to determine whether the bat is present. If Indiana bats are known to be present, they must not be harmed, harassed or disturbed when present. **Large-scale habitat alterations within known or potential Indiana bat habitat should not be permitted without a bat survey and/or consultation with this office.**

Minor tree clearing (i.e. timber stand improvement or clearing of small stands) should conserve trees which are dead or have loose bark and should be limited to non-maternity periods between the dates of September 16 and April 14.

If you have any comments or questions, please contact the Rock Island Field Office at (309) 793-5800.

Guidelines for Protection of Indiana Bat Summer Habitat in Illinois

The endangered Indiana bat (*Myotis sodalis*) is known to occur in Adams, *Alexander, Bond, Ford, *Hardin, Henderson, *Jackson, *Jersey, Johnson, *La Salle, Madison, Macoupin, McDonough, *Monroe, Perry, Pike, *Pope, Pulaski, Saline, Schuyler, Scott, *Union, and Vermilion Counties in Illinois. (*Counties with hibernacula) **The Blackball Mine in La Salle County has been listed as Critical Habitat. Potential habitat for this species occurs statewide, therefore, Indiana bats are considered to potentially occur in any area with forested habitat.**

Indiana bats migrate seasonally between winter hibernacula and summer roosting habitats. Winter hibernacula include caves and abandoned mines. Females emerge from hibernation in late March or early April to migrate to summer roosts. Females form nursery colonies under the loose bark of trees (dead or alive) and/or cavities, where each female gives birth to a single young in June or early July. A maternity colony may include from one to 100 individuals. A single colony may utilize a number of roost trees during the summer, typically a primary roost tree and several alternates. Some males remain in the area near the winter hibernacula during the summer months, but others disperse throughout the range of the species and roost individually or in small numbers in the same types of trees as females. The species or size of tree does not appear to influence whether Indiana bats utilize a tree for roosting provided the appropriate bark structure is present. However, the use of a particular tree does appear to be influenced by weather conditions, such as temperature and precipitation.

During the summer, the Indiana bat frequents the corridors of small streams with riparian woods as well as mature upland forests. It forages for insects along stream corridors, within the canopy of floodplain and upland forests, over clearings with early successional vegetation (old fields), along the borders of croplands, along wooded fencerows, over farm ponds and in pastures. **To avoid impacting this species, tree clearing activities should not occur during the period of April 15 to September 15. If a proposed action occurs within a 5-mile radius of a winter hibernacula, tree clearing should be prohibited from April 1 to November 15.** If it is necessary to clear trees during this time frame, mist net surveys may be necessary to determine if Indiana bats are present. "Mist Netting Guidelines" can be obtained from our office. A search for this species should be made prior to any cave-impacting activities.

Suitable summer habitat in Illinois is considered to have the following characteristics within a ½ mile radius of a project site:

1) forest cover of 15% or greater;
2) permanent water;
3) one or more of the following tree species: shagbark and shellbark hickory that may be dead or alive, and dead bitternut hickory, American elm, slippery elm, eastern cottonwood, silver maple, white oak, red oak, post oak, and shingle oak with slabs or plates of loose bark;
4) potential roost trees with 10% or more peeling or loose bark

Guidelines for Protection of Indiana Bat Summer Habitat in Iowa

The endangered Indiana bat (*Myotis sodalis*) has been noted as occurring in Appanoose, Clarke, Davis, Decatur, Des Moines, Henry, Iowa, Jasper, Jefferson, Keokuk, Lee, Louisa, Lucas, Madison, Mahaska, Marion, Monroe, Muscatine, Poweshiek, Ringgold, Union, Van Buren, Wapello, Warren, Washington, and Wayne Counties in Iowa. **It could potentially occur in all counties south of Interstate 80, including those portions of Dallas, Polk, Jasper, Poweshiek, Iowa, Johnson, Muscatine and Scott counties south of Interstate 80.**

Indiana bats migrate seasonally between winter hibernacula and summer roosting habitats. Winter hibernacula include caves and abandoned mines. Females emerge from hibernation in late March or early April to migrate to summer roosts. Females form nursery colonies under the loose bark of trees (dead or alive) and/or cavities, where each female gives birth to a single young in June or early July. A maternity colony may include from one to 100 individuals. A single colony may utilize a number of roost trees during the summer, typically a primary roost tree and several alternates. Some males remain in the area near the winter hibernacula during the summer months, but others disperse throughout the range of the species and roost individually or in small numbers in the same types of trees as females. The species or size of tree does not appear to influence whether Indiana bats utilize a tree for roosting provided the appropriate bark structure is present. However, the use of a particular tree does appear to be influenced by weather conditions, such as temperature and precipitation.

During the summer, the Indiana bat frequents the corridors of small streams with riparian woods as well as mature upland forests. It forages for insects along stream corridors, within the canopy of floodplain and upland forests, over clearings with early successional vegetation (old fields), along the borders of croplands, along wooded fencerows, over farm ponds and in pastures. **To avoid impacting this species, tree clearing activities should not occur during the period of April 15 to September 15.**

Suitable summer habitat in Iowa is considered to have the following characteristics within a ½ mile radius of a project site:

1) forest cover of 15% or greater;
2) permanent water;
3) one or more of the following tree species: shagbark and shellbark hickory that may be dead or alive, and dead bitternut hickory, American elm, slippery elm, eastern cottonwood, silver maple, white oak, red oak, post oak, and shingle oak with slabs or plates of loose bark;
4) potential roost trees with 10% or more peeling or loose bark

If the project site contains any habitat that fits the above description, it may be necessary to conduct a survey to determine whether the bat is present. If Indiana bats are known to be present, they must not be harmed, harassed or disturbed when present. **Large-scale habitat alterations within known or potential Indiana bat habitat should not be permitted without a bat**

survey and/or consultation with this office. "Mist Netting Guidelines" can be obtained from our office.

Minor tree clearing (i.e. timber stand improvement or clearing of small stands) should conserve trees which are dead or have loose bark and should be limited to non-maternity periods between the dates of September 16 and April 14.

If you have any comments or questions, please contact the Rock Island Field Office at (309) 793-5800.

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

September 22, 2003

Mr. Fidel Marquez
Vice President, Exelon Energy Delivery
Transmission and Substations
2 Lincoln Centre
Oakbrook Terrace, IL 60181

SUBJECT: INFORMATION REGARDING THE NORTH NELSON LINE PERTAINING TO QUAD CITIES NUCLEAR POWER STATION LICENSE RENEWAL

Dear Mr. Marquez:

The purpose of this letter is to provide information regarding a transmission line owned, operated and maintained by Exelon Energy Delivery which came to the attention of the U.S. Nuclear Regulatory Commission (NRC) staff during an environmental review related to an application by Exelon Generation Company, LLC (Exelon) for renewal of the operating licenses for Quad Cities Nuclear Power Station, Units 1 and 2 (QC).

An Environmental Report (ER) was included with Exelon's license renewal application. The ER stated in Section 4.13, Electromagnetic Fields - Acute Effects, that EGC calculated induced currents using the AC/DCLINE computer code produced by the Electric Power Research Institute, and the results of the calculations have been verified through field measurements by several utilities. The input parameters included the National Electric Safety Code (NESC) requirements that line sag be determined at 120 degrees Fahrenheit conductor temperature, and the maximum vehicle size under the lines as a tractor trailer truck.

The NESC specifies a maximum field strength of 5 milliamps. However, Exelon's ER stated that one of the lines reviewed (the North Nelson Line - 0404) had a limiting case induced current of 6.0 milliamps. The NRC staff has determined that the environmental impact of license renewal is SMALL for lines which comply with NESC specifications. The NRC staff has further determined that for the North Nelson Line, the environmental impact of the proposed license renewal is MODERATE, based on the amount by which this line exceeds the NESC Code specification. This determination will be included in a draft environmental impact statement scheduled for publication in November 2003.

If there are any questions regarding this correspondence, please contact me at (301) 415-1444.

Sincerely,

Louis L. Wheeler, Senior Project Manager
Environmental Section
License Renewal and Environmental Impacts Program
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

Docket Nos. 50-254 and 50-265

cc: See next page

STATE HISTORICAL SOCIETY of IOWA
Division of the Iowa Department of Cultural Affairs

October 30, 2003

In reply refer to:
R&C#: 020482156

Pao-Tsin Kuo, Program Director
License Renewal & Environmental Impacts
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commision
Washington, D.C. 20555-0001

RE: NRC – SCOTT COUNTY – RS-02-079 – QUAD CITIES NUCLEAR POWER STATION UNITS 1 & 2 LICENSE RENEWAL – POWER STATION LICENSE RENEWAL REVIEW – ADDITIONAL CORRESPONDENCE FROM NRC

Dear Mr. Pao-Tsin Kuo,

We have received and reviewed the submitted additional correspondence concerning the above referenced project. We understand that there is no new construction proposed as part of the license renewal. This renewal is limited to maintenance of existing transmission lines in Iowa. These activities will be limited to the currently existing R.O.W. We also understand that portions of the currently existing R.O.W. have been previously surveyed and one previously identified archaeological site, 13ST157, is located within the R.O.W. This site was previously evaluated as not eligible for listing on the National Register of Historic Places and our office concurred with that determination. Based on all of this information, we still could concur with a determination of **No Historic Properties Affected** for this proposed project once that determination has been provided to our office by your federal agency for this proposed federal undertaking.

We have made these **comments** and **recommendations** according to our responsibility defined by Federal law pertaining to the Section 106 process. The responsible federal agency does not have to follow our **comments** and **recommendations** to comply with the Section 106 process. It remains the responsible federal agency's decision on whether or not to provide additional information to our office or whether or not to proceed with the project without the concurrence of this office. It also remains the responsible federal agency's decision on how you will proceed from this point for this project.

Should you have any questions please contact me at the number below.

Sincerely,

Douglas W. Jones

Douglas W. Jones, Archaeologist
Historic Preservation Bureau
(515) 281-4358

cc: Rosetta O. Virgilio, Federal Preservation Officer, U.S. Nuclear Regulatory Commission

600 East Locust Street, Des Moines, IA 50319-0290 P: (515) 281-5111

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

December 4, 2003

Mr. Richard C. Nelson
Supervisor
U.S. Fish and Wildlife Service
4469 48th Avenue Court
Rock Island, Illinois 61201

Subject: REQUEST FOR CONCURRENCE - BIOLOGICAL ASSESSMENT FOR QUAD CITIES NUCLEAR POWER STATION, UNITS 1 AND 2 LICENSE RENEWAL

Dear Mr. Nelson:

The Nuclear Regulatory Commission (NRC) staff has prepared the enclosed Biological Assessment (BA) to evaluate whether the proposed renewal of the operating licenses of the Quad Cities Nuclear Power Station, Units 1 and 2 (Quad Cities), for an additional 20-year period would have adverse effects on listed species, and request concurrence by your office.

Quad Cities is located on the east bank of Pool 14 of the Mississippi River between Lock and Dams 13 and 14, and 815.1-km (506.5 mi) upstream from its confluence with the Ohio River. This BA evaluates the potential impacts of the proposed license renewal on Federally listed threatened or endangered species. Seven species, afforded protection under the Endangered Species Act of 1973, could potentially inhabit the Quad Cities site or transmission line rights-of-way (ROWs). For five of the species, the renewal of the licenses for an additional 20 years will have "no effect." For the bald eagle *(Haliaeetus leucocephalus)* and the Higgins' eye pearlymussel (*Lampsilis higginsii*), known to occur near or occasionally use the site or ROWs, license renewal may affect, but is not likely to adversely affect these two species.

In reaching our conclusion, we relied on information provided by Exelon Generation Company, LLC (the licensee), on research performed by the NRC staff, and on current listings of species provided by the Rock Island Field Office of the U.S. Fish and Wildlife Service.

If you have any questions regarding this BA or our request for concurrence, please contact, Mr. Duke Wheeler, NRC Senior Environmental Project Manager, at (301) 415-1444.

Sincerely,

Pao-Tsin Kuo, Program Director
License Renewal and Environmental Impacts
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

Docket Nos.: 50-254 and 50-265

Enclosure: As stated

cc w/encl: See next page

Biological Assessment

Quad Cities Nuclear Power Station, Units 1 and 2
License Renewal Review

Rock Island County, Illinois

December 2003

Docket Nos. 50-254 and 50-265

U.S. Nuclear Regulatory Commission
Rockville, Maryland

Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Enclosure

Biological Assessment of the Effects of License Renewal for the Quad Cities Nuclear Power Station, Units 1 and 2 on Threatened or Endangered Species

Executive Summary

This Biological Assessment (BA) evaluates the potential impacts of the proposed license renewal for the Quad Cities Nuclear Power Station, Units 1 and 2 (Quad Cities) on Federally listed threatened or endangered species. There will be no major construction, refurbishment, or replacement activities associated with this action. A total of seven species, afforded protection under the Endangered Species Act of 1973, could potentially inhabit the Quad Cities site or transmission line rights-of-way (ROWs). The U.S. Nuclear Regulatory Commission (NRC) staff has conducted a BA of these seven species and has determined that five of the species, the western prairie fringed orchid (*Platanthera praeclara*), the eastern prairie fringed orchid (*Platanthera leucophaea*), the prairie bush-clover (*Lespedeza leptostachya*), the Indiana bat (*Myotis sodalis*), and the Iowa Pleistocene snail (*Discus macclintocki*) are not known from the site or transmission ROWs. For these five species the NRC staff has concluded that the renewal of the Quad Cities license for an additional 20 years will have "no effect." For the bald eagle (*Haliaeetus leucocephalus*) and the Higgins' eye pearlymussel (*Lampsilis higginsii*), known to occur near or occasionally use the site or ROWs, the staff has determined that license renewal for Quad Cities may affect, but is not likely to adversely affect these two species.

Introduction

The NRC licenses the operation of domestic nuclear power plants in accordance with the Atomic Energy Act of 1954, as amended, and NRC implementing regulations. Exelon Generation Company, LLC (Exelon) operates Quad Cities pursuant to NRC Operating License Numbers DRP-29 and DRP-30, both of which expire on December 14, 2012.

Exelon has prepared an environmental report in conjunction with its application for renewal of the Quad Cities operating licenses, as provided for by the following NRC regulations:

- Title 10, Energy, Code of Federal Regulations (CFR), Part 54, Requirements for Renewal of Operating Licenses for Nuclear Power Plants, Section 54.23, Contents of Application - Environmental Information (10 CFR 54.23)

- Title 10, Energy, CFR, Part 51, Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions, Section 51.53, Postconstruction Environmental Reports, Subsection 51.53(c), Operating License Renewal Stage [10 CFR 51.53(c)]

The renewed operating licenses would allow up to 20 additional years of plant operation beyond the current licensed operating period of 40 years.

No major refurbishment or replacement of important systems, structures, or components are expected during the Quad Cities license renewal period. In addition, no construction activities are expected to be associated with license renewal.

The purpose of this BA is to provide the NRC staff's assessment to the U.S. Fish and Wildlife Service (FWS) concerning the potential impacts of continued operation of Quad Cities on threatened or endangered species and designated critical habitat pursuant to Section 7(a)(2) of the Endangered Species Act. This consultation is between the NRC staff and the FWS.

This BA examines the effects of the Quad Cities operation on Federally listed species that occur in the counties where the Quad Cities site and associated transmission lines are located. The seven Federally listed species that could occur within the Quad Cities site or along its associated transmission lines are listed in Table 1. No designated critical habitat exists for any of the listed species on or in the vicinity of the Quad Cities site or transmission ROWs. No species known from the site or ROWs are proposed for listing or are candidate species.

Table 1. Species Listed as Endangered or Threatened or Candidates for Listing by the FWS that Occur or Potentially Occur within Rock Island, Whiteside and Lee Counties, Illinois, and Clinton and Scott Counties, Iowa

Scientific Name	Common Name	Federal Status[1]	County	Habitat[2]
	Plants			
Platanthera praeclara	western prairie fringed orchid	T	All	mesic to wet tallgrass prairies and meadows; old fields; roadside ditches
Platanthera leucophaea	eastern prairie fringed orchid	T	All	wet grassland habitats
Lespedeza leptostachya	prairie bush-clover	T	All	dry to mesic prairies
	Birds			
Haliaeetus leucocephalus	bald eagle	T	Rock Island, Whiteside, Scott, Clinton	Wintering, breeding (Clinton County)
				Open water, riparian, bottomlands

Table 2 (continued)

Scientific Name	Common Name	Federal Status[1]	County	Habitat[2]
	Mollusks			
Discus macclintocki	Iowa Pleistocene snail	E	Clinton	algific talus slopes
Lampsilis higginsii	Higgins' eye pearlymussel	E	Rock Island, Scott, Clinton	sand/gravel substrates; swift flowing currents
	Mammals			
Myotis sodalis	Indiana bat	E	South of Interstate 80 in Iowa and All Counties in Illinois	caves, mines; small stream corridors with well-developed riparian woods; upland and bottomland forests

1. T = Threatened; E = Endangered
2. No designated critical habitat occurs in the counties of concern

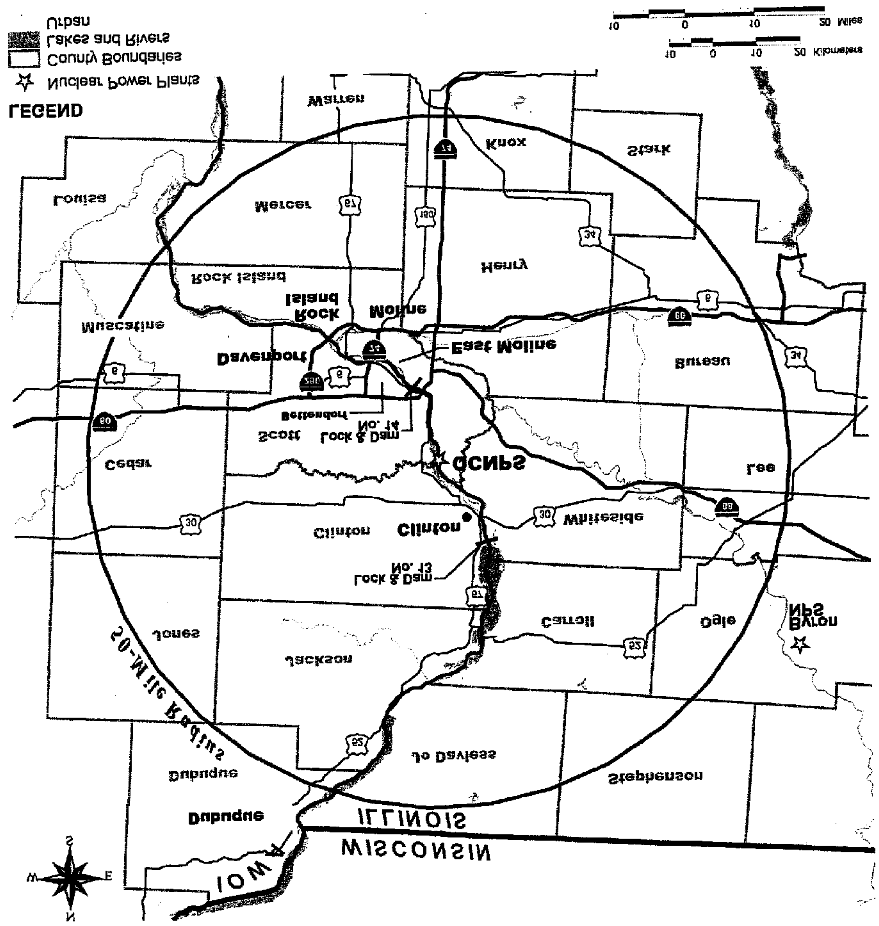
Source: FWS 2003a and FWS 2003c

This BA summarizes pertinent project information and existing data, and discusses the potential consequences of the proposed 20-year license renewal on the seven species listed in Table 1 with emphasis on the Higgins' eye pearlymussel and the bald eagle.

Project Description

The proposed action is the renewal of the operating licenses for Quad Cities. The Quad Cities site is located on the banks of the Mississippi River at river-km 815.1 (river-mi 506.5) and about 32 km (20 mi) northeast of the Quad Cities Metropolitan Area of Davenport and Bettendorf, Iowa; and Rock Island, Moline, and East Moline, Illinois (Figures 1 and 2). The current operating licenses for both Units 1 and 2 expire on December 14, 2012. By letter dated January 3, 2003, Exelon submitted an application to the NRC (Exelon 2003a) to renew these operating licenses for an additional 20 years of operation (i.e., until December 14, 2032).

Figure 1. Quad Cities Nuclear Power Station 80-km (50-mi) Region



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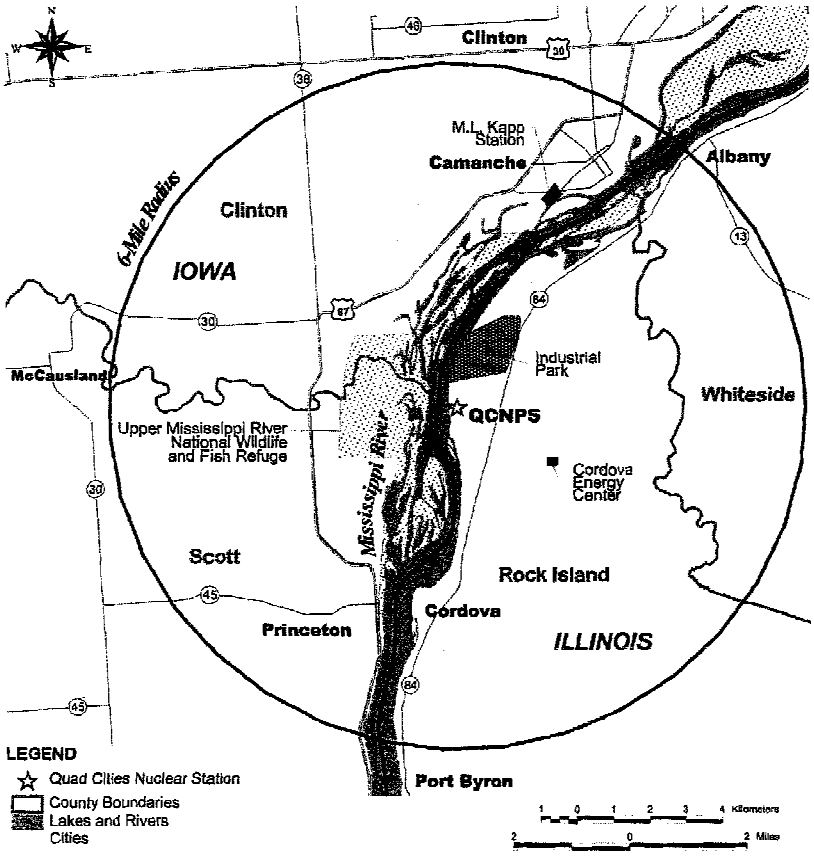

Figure 2. Quad Cities Nuclear Power Station, 10-km (6-mi) Region

In a letter dated March 12, 2003, the NRC staff requested comments from the FWS on the operating license renewal application for Quad Cities. Specifically, the NRC requested a list of species and information on protected, proposed, and candidate species, and any critical habitat, that may be in the vicinity of the Quad Cities plant and its associated transmission lines (NRC 2003a). In response, on June 6, 2003, the FWS provided information regarding

Federally listed species that have been observed or that may occur in the vicinity of the Quad Cities site and its associated transmission lines (FWS 2003a). On August 12, 2003, the NRC staff requested additional information from the FWS for an expanded scope of the transmission lines under review for license renewal (NRC 2003b). The FWS responded on September 15, 2003, with this requested information (FWS 2003c). This information has been reviewed by the NRC staff and is included in this BA.

Exelon also has corresponded with the FWS regarding potential impacts of license renewal on threatened or endangered species (Jury 2002). The FWS indicated that it had no objection to the license renewal action (Millar 2002). Quad Cities is not located near the designated critical habitat of any of the threatened or endangered species discussed in this assessment.

Exelon has no plans to conduct major refurbishment or construction activities at Quad Cities as part of continued operations during the license renewal period; therefore, the proposed project is not a major construction activity (Exelon 2003b).

Description of Project Area

1. General Plant and Ecological Resources Information

Quad Cities is owned and operated by Exelon (2003b). It is located in the Upper Mississippi Basin on the Illinois side of the Mississippi River approximately 80-kilometers (50 mi) south of the northern boundary of the State of Illinois and 815.1 river-km (506.5 river-mi) upstream from its confluence with the Ohio River. It is located on the east bank of Pool 14 of the Mississippi River between Lock and Dams 13 and 14 (Figures 1 and 2).

The Quad Cities site is located on moderately high bluffs between 6 m (20 ft) and 12-m (40 ft) above the surface of the river. The site is flat with a grade level of approximately 2.7-m (9 ft) above maximum flood stage. The Quad Cities site features two boiling water reactor units, intake and discharge canals, auxiliary buildings, switchyards, and a spent fuel pool. The site occupies approximately 331 ha (817 ac) of both developed and undeveloped areas. The site also contains a 4.8-km (3-mi) retired spray canal that is now used to raise fish (Exelon 2003b). The developed areas mostly occupy the western half of the site. Undeveloped areas are located generally on the eastern half of the site and support habitats that include open fields and planted pines. Approximately 22 ha (55 ac) are leased for farming (i.e., hay). The surrounding area is rural farmland and woods with an industrial park located 1.6-km (1 mi) north of the site, and the Cordova Energy Center, a gas-fired power plant, located approximately 1.6-km (1 mi) to the southeast. Prior to plant operations, the primary use of the site was agricultural and residential (AEC 1972).

The Quad Cities site is located in an area of sandy soil with little bushy or wooded habitat. The agricultural lands in the vicinity are used for grain and cattle forage crops (AEC 1972). Some of the species (i.e., especially terrestrial mammals) that inhabit areas adjacent to the Quad Cities site probably also use the limited natural areas within the site boundaries. Other important local habitats are nearby river islands and areas adjacent to the river in Scott and Clinton counties in Iowa. These areas, which are generally encompassed by the Upper Mississippi River National Wildlife and Fish Refuge (NWFR) and the Princeton Wildlife Management Area (PWMA),

provide upland and bottomland habitats, including hardwood forests, grasslands, agricultural fields, islands, wetlands, sloughs, lakes, and shoreline (FWS 2003c). Birds (e.g., migratory passerines, raptors, waterfowl, and shorebirds) use the area extensively. The wetlands, forests, and prairies are used by more than 50 species of mammals that include deer, raccoon, muskrat, red and gray fox, coyote, weasel, mink, badger, skunk, river otter, and many other small mammals (FWS 2000c; AEC 1972).

The PWMA, a 482-ha (1190-ac) habitat management unit within the Upper Mississippi River NWFR, was constructed to provide optimum habitat conditions for fish and wildlife species. The water levels within these units are managed to provide emergent vegetation and mud/sand flats to maintain diverse habitat types for many wetland-dependent species (FWS 2000c). Floodplain forest habitats dominate this management area and include such plant species as silver maples, green ash, and cottonwoods. Large numbers of bald eagles live this area during the winter months as well as waterfowl and migratory passerines (Iowa Bird and Birding 2002).

The principal aquatic resources in the vicinity of the Quad Cities site are associated with the Mississippi River. The transmission lines associated with Quad Cities cross a number of streams, ranging in size from small intermittent streams to the Rock River. The major changes and modifications within the Upper Mississippi River that have had the greatest effect on aquatic resources include: (1) loss of floodplain connectivity due to extensive levee construction, (2) impoundment of the river from construction of locks and dams, (3) river channelization related to navigation, (4) water quality degradation in tributary streams, and (5) invasion of exotic species through man-made navigation projects (Upper Mississippi River Conservation Committee 1993). The main channel of the Upper Mississippi River is periodically dredged in some reaches to maintain the 3-m (9-ft) navigation channel (Fremling and Drazkowski 2000). The impacts of contaminants from agricultural, industrial, municipal, and residential sources on river biota are largely unknown (Fremling and Drazkowski 2000).

Ninety-two fish species have been collected in Pool 14 of the Mississippi River (Bowzer and Lippincott 2000). The most abundant species include the gizzard shad, common carp, emerald shiner, river shiner, bluegill, and freshwater drum. The most common game species include channel catfish, white bass, pumpkinseed, largemouth bass, white crappie, black crappie, walleye, and sauger (Bowzer and Lippincott 2000). Commercial fisheries also exist for species such as the bigmouth buffalo, common carp, catfish and bullheads, and freshwater drum (FWS 1991). Walleye and hybrid striped bass have increased in Pool 14 due to stocking of these fish by Exelon (Bowzer and Lippincott 2000; LaJeone and Monzingo 2000).

The Upper Mississippi River contains a rich assortment of freshwater mussels. Historically, as many as 50 species have been documented from the Upper Mississippi River, but only about 30 species have been reported in recent surveys (U.S. Geological Survey [USGS] 1999). Mussels are often found in dense aggregations called mussel beds. While these beds may be miles apart, an individual bed can be up to several miles long (USGS 1999). Populations of fingernail clams have declined in certain reaches of the Upper Mississippi River during recent decades. These declines have occurred chiefly during low-flow periods associated with droughts (Fremling and Drazkowski 2000). An introduced species, the zebra mussel, became established in the Upper Mississippi River by 1992. The increase in the numbers of this species has caused a decline among many native mussels because zebra mussels can

out-compete native species for oxygen and food and are so prolific that native mussel beds are smothered (FWS 2001). The zebra mussel has also increasingly displaced other macroinvertebrates, such as hydropsychid caddis flies, that live on submerged hard surfaces (Fremling and Drazkowski 2000).

2. Heat Dissipation System

Quad Cities has two General Electric boiling water reactors, with a design rating for net electrical power output of 930 megawatts electric per unit. Plant cooling and auxiliary water systems are provided by a once-through condenser cooling system that withdraws and returns water from and into the Mississippi River. The plant withdraws water from a canal intake structure located along the east side of the river. Quad Cities utilizes a two-pipe diffuser system to return the cooling water to the river. The two pipes are 4.9 m (16 ft) in diameter and lie on the bottom of the river across the main river flow. The combined cooling and service water, with an increase of as much as 15.6°C (28°F) above intake temperature, is discharged into the deepest part of the river through regularly spaced jet nozzles in the diffuser pipes. The total flow of Mississippi River water through Quad Cities for condenser circulating water and service water is approximately 61,000 L/s (970,000 gpm or 2,160 cfs). The temperature increase at the edge of the discharge mixing zone is required to be less than 2.8°C (5°F) above ambient temperature (Illinois Environmental Protection Agency 2000). At Camanche, Iowa, approximately 10 km (6 mi) upstream of the Quad Cities site, the Mississippi River has an annual mean flow of 1,380,000 L/s (48,750 cfs) (USGS 2000). The Wapsipinicon River flows into the Mississippi River from the west immediately upstream of the Quad Cities site, contributing an additional 48,000 L/s (1700 cfs) (USGS 2000), bringing the average river flow at the Quad Cities site to 1,430,000 L/s (50,500 cfs).

3. Transmission System

Quad Cities is connected to the transmission system via five transmission lines, totaling approximately 185 km (115 mi) and with ROWs covering approximately 880 ha (2200 ac). These lines traverse mainly agricultural land along with some natural terrestrial habitats (Exelon 2003b; AEC 1972). Approximately 90 to 95 percent of the transmission corridor can be classified as agricultural. The transmission lines are the Davenport line (Line 0401), the Barstow line (Line 0402), the south Nelson line (Line 0403), the north Nelson line (Line 0404), and the Rock Creek line (Line 0405) (Table 2).

Table 2. Quad Cities Transmission Line Corridors

Substation (line)	Number of Lines	kV	Approximate Corridor Length		Corridor (Right-of-Way) Width		Estimated Corridor Area	
			km	(mi)	m	(ft)	ha	ac
Davenport (0401)	1	345	20.6	12.8	55	180	110	280
Barstow (0402)	1	345	28.1[a]	17.5[a]	158, 44[b]	520, 145[b]	160[c]	400[c]
Nelson (South line 0403)	1	345	67.4[a]	41.9[a]	158, 44[b]	520, 145[b]	330[c]	830[c]
Nelson (North line 0404)	1	345	63.9	39.7	44	145	280	700
Rock Creek (0405)	1	345	8.0	5.0	52	170	40	100
Total	5		185.0[a]	115.0[a]			880[c]	2200[c]

a. The initial 3.2-km (2 mi) of corridor is shared by Barstow and Nelson South lines. The initial 3.2-km (2 mi) is counted once in the total.
b. The initial 3.2-km (2 mi) of the corridor is 158 m (520 ft) wide.
c. The area includes the area of the shared corridor. The area of the shared corridor is only included once in the total.
Source: Exelon 2003b.

Except for the Upper Mississippi River NWFR and the PWMA, the Quad Cities transmission lines traverse land cultivated for row crops and pasture typical of eastern Iowa and northwestern Illinois.

The Davenport and the Rock Creek transmission corridors are maintained by mowing (Exelon 2003c), trimming, tree removal, and use of approved herbicides (Exelon 2003c; Exelon 2003d). Unless otherwise noted, vegetation management follows a three-year cycle within the Davenport corridor (Exelon 2003c) and a six-year cycle within the Rock Creek corridor (Exelon 2003d). Herbicide application is performed according to label specifications by certified applicators. Pre-activity surveys are not routinely performed for the Davenport and the Rock Creek transmission lines (Exelon 2003c; Exelon 2003d). Line maintenance staff receives training in identifying Federally and State listed species and their habitats that may occur in the vicinity of the Rock Creek line and in procedures to follow if one of these species is encountered during maintenance activities (Exelon 2003d). Line maintenance staff working within the Davenport corridor does not receive similar training (Exelon 2003c).

Description of Federally Protected Species Potentially Occurring in the Project Area

1. Indiana Bat (*Myotis sodalis*)

The Indiana bat was orlginally listed in 1967 as Federally endangered. Its decline is largely attributed to cave destruction and disturbance (FWS 1991b). The Indiana bat is very small, with a wingspan of 23 to 28 cm (9 to 11 in.) and weighing approximately 9 g (0.3 ounces) (FWS 2003c). In winter, the Indiana bat uses limestone caves or abandoned mines for hibernation, although some hibernate under bridges, in old buildings, or under loose bark and in hollows of trees (FWS 2003c; FWS 1991b). This species forages for insects along stream corridors, within the canopy of floodplain and upland forests, over clearings with early successional vegetation (old fields), along the borders of croplands, along wooded fencerows, and over farm ponds and in pastures. It has been shown that the foraging range for the bats varies by season, age, and sex and ranges up to 33 ha (81 ac) (FWS 2003c). Roosting and rearing of young usually occurs in caves, although it may occur in the loose bark of trees (FWS 1991b). Exelon has not noted any Indiana bats in the vicinity of the Quad Cities site or its associated transmission lines. Undeveloped portions of the Quad Cities site have not been surveyed for the Indiana bat.[1] The FWS notes that the bat may occur in all counties in Iowa south of Interstate 80 (FWS 2003c). Interstate 80 is a major east-west highway in Illinois and Iowa approximately 5 miles south of the Quad Cities site. The Iowa Department of Natural Resources did not note any occurrences of threatened or endangered species in the vicinity of the transmission lines associated with Quad Cities (Brandrup 2002). The NRC staff has concluded that the Indiana bat is unlikely to utilize the site or the transmission ROWs on a regular basis, and that license renewal for an additional 20 years will have "no effect" on the listed speceis.

2. Iowa Pleistocene Snail (*Discus macclintocki*)

The Federally endangered Iowa Pleistocene snail was originally listed in July 1978 (43 FR 28932 [FWS 1978]). This small land snail inhabits algific (i.e., cold producing) talus slopes, within the leaf litter of cool and moist hillsides (FWS 2003c). It breeds from late March to August by laying two-to-six eggs in this leaf litter, with the eggs hatching approximately 28 days later. The snail feeds on fallen leaves of birch and maple trees or dogwood shrubs. Climate change is attributed as the primary cause of long-term decline of this snail although the most immediate threats are from habitat degradation and destruction, human disturbance, and livestock grazing, as well as misapplication of pesticides (FWS 1997; FWS 2002b). The snail has been found in approximately 30 sites in Iowa and Illinois (FWS 2003c) with none noted by Exelon at Quad Cities (Exelon 2003a). Suitable habitat is unlikely to occur at the site or in the immediate vicinity of Quad Cities transmission lines and their corridors, with the majority of traversed land characterized as flat and agricultural (Exelon 2003a). The NRC has determined that license renewal for an additional 20 years will have "no effect" on the listed species.

3. Western Prairie Fringed Orchid (*Platanthera praeclara*)

The Federally threatened western prairie fringed orchid was listed as threatened in 1989, along with the eastern prairie fringed orchid (54 FR 39857 [FWS 1989]). It occurs in mesic to wet

(1) Personal communication with Ed Cunningham during Quad Cities site audit, March 12, 2003.

tallgrass prairies and meadows, but is also found in old fields or roadside ditches (FWS 1996; FWS 2003c). The western prairie fringed orchid is restricted to areas west of the Mississippi River and is known to occur in about 75 sites in 8 states (FWS 2003a). The prairie fringed orchids are mostly threatened by conversion of its habitats to cropland and other habitat loss activities. Other threats include invasive species competition, wetland destruction, intensive hay mowing, fire suppression, and overgrazing (FWS 2003c; Herkert 2002). Based on the known distribution of the species, it is unlikely to be found at the Quad Cities site or along the transmission ROWs. The NRC has determined that license renewal for an additional 20 years will have "no effect" on the listed species.

4. Eastern Prairie Fringed Orchid (*Platanthera leucophaea*)

The eastern prairie fringed orchid, listed as threatened in 1989 (54 FR 39857 [FWS 1989]), also occupies mesic to wet tallgrass prairie or grassland habitats (Herkert 2002; FWS 2003c). However, it can also occupy bogs, fens, and sedge meadows (FWS 2003c). This species formerly occurred throughout Illinois yet has been nearly eliminated from all but northeastern Illinois. There are 30 known Illinois populations; no known populations occur in Whiteside County, although it could occur in Rock Island or Lee counties (records for these counties are no longer extant [Herkert 2002]). No occurrences of either species (eastern or western prairie fringed orchid) have been documented for the Quad Cities site or in areas along its associated transmission lines (Exelon 2003a). The NRC has determined that license renewal for an additional 20 years will have "no effect" on the listed species.

5. Prairie Bush-clover (*Lespedeza leptostachya*)

The Federally-listed threatened prairie bush clover (52 FR 781 [FWS 1987]) occurs on dry gravel and sand prairies (Herkert 2002). It is found only in the tallgrass prairie region of four Midwestern states and is currently found at fewer than 40 sites in 23 counties of Iowa, Illinois, Minnesota, and Wisconsin (FWS 2003c), although it could occur throughout Illinois (FWS 2003c). Fourteen known populations occur in Illinois at present with five of these populations protected on public land; none of these known populations occur in Rock Island or Whiteside counties, although a recent record of a population is known for Lee County (Herkert 2002). The decline of the prairie bush clover is primarily due to the historic loss of tallgrass prairie habitat from conversion to agricultural land, and this species tends to only occur presently in areas that escaped plowing due to being too rocky or steep (FWS 2003c). The lack of suitable habitat leads the NRC staff to conclude that this species is not likely to be present at the site or along the transmission ROWs. The NRC has determined that license renewal for an additional 20 years will have "no effect" on the listed species.

6. Higgins' Eye Pearlymussel (*Lampsilis higginsii*)

The Federally-listed endangered Higgins' eye pearlymussel is only found in the Mississippi River, St. Croix River in Wisconsin, the Wisconsin River, and the Rock River in Illinois. The Higgins' eye pearlymussel spawns in late summer, but larvae are retained in the marsupia until they are released during the following spring or summer (FWS 2003c). Fish hosts for the glochidia (larvae) include freshwater drum, largemouth bass, black crappie, sauger, and walleye (FWS 2003). The Higgins' eye pearlymussel most frequently occurs in medium to large rivers with current velocities of about 0.15 to 0.46 m/sec (0.49 to 1.51 ft/sec) and in depths of 1.0 to 6.0 m (3.3 to 19.7 ft) with firm, coarse sand or mud-gravel substrates

(FWS 2000a, 2001). This species is common to abundant within Pool 14 of the Mississippi River (Bowzer and Lippincott 2000).

No critical habitat has been designated for the Higgins' eye pearlymussel. However, ten Essential Habitat Areas for the Higgins' eye pearlymussel occur within the Upper Mississippi River watershed. Essential Habitat Areas are locations known to contain reproducing populations of the Higgins' eye pearlymussel in association with a healthy and diverse unionid community (e.g., mussel beds) (FWS 1998). An Essential Habitat Area begins approximately 1.6 km (1.0 mi) downstream of Quad Cities, Units 1 and 2 at river-km 813.3 (river-mi 505.5) and continues downstream to river-km 809.3 (river-mi 503.0) at Cordova, Illinois (FWS 2003b).

The only other Essential Habitat Area located downstream of the Quad Cities site (river-km 815.1 or river-mi 506.5) occurs in Pool 15 in the Sylvan Slough at River Miles 485.5 through 486.0. The other Essential Habitat Areas are in upstream Pools 9 and 10 of the Mississippi River, the St. Croix River, and the Wisconsin River (FWS 2003b). Nearly all of the remaining habitat for the Higgins' eye pearlymussel within the Mississippi River occurs within the navigation channel.

Suitable host species for the glochidia (mussel larvae) of the Higgins' eye pearlymussel include sauger, freshwater drum, largemouth bass, smallmouth bass, walleye, yellow perch (*Perca flavescens*), and black crappie; while marginal host species include bluegill, northern pike (*Esox lucius*), and green sunfish (FWS 2003b). Most of these fish species are common to abundant and widespread; thus, it is doubtful that the presence of fish hosts is a limiting factor affecting the Higgins' eye pearlymussel (Rasmussen 1979).

7. Bald Eagle (*Haliaeetus leucocephalus*)

The bald eagle was originally listed as endangered by the FWS in 1978, but population increases prompted downlisting to threatened status in 1995. Recovery goals for the species have generally been met or exceeded within the species' range. In addition, population trends indicate that the bald eagle has recovered and is neither in danger of extinction nor likely to become in danger of extinction within the foreseeable future throughout all or a significant portion of its range. As a consequence, the bald eagle was proposed for delisting in 1999 (64 FR 36453 [FWS 1999]).

Bald eagles usually occur near large bodies of water, especially rivers, lakes and reservoirs that provide a reliable food source and isolation from human disturbance. Large trees and snags along shorelines are used as perches and nest sites. Bald eagles primarily feed on fish and waterfowl. These habitats and site components are available in the vicinity of the Quad Cities site and along riparian areas traversed by the Davenport and Rock Creek transmission lines.

The bald eagle is a common visitor to the Upper Mississippi River Valley, including the PWMA and the Savanna District of the Upper Mississippi River NWFR. The bald eagle uses the area as a winter migration corridor and for nesting habitat during the summer. From October to March, hundreds of bald eagles congregate in the area to feed on fish, typically near locks and dams or in ice-free backwater areas (FWS 2000b). These attractive winter feeding grounds include open water areas created by the warm water effluents from the Quad Cities plant (FWS 2003a).

The bald eagle also nests at the Savanna District of the Upper Mississippi River NWFR, usually on islands or along backwater shorelines (FWS 2000b). Bald eagles build their nests in large trees near rivers or lakes and often use the same nest year after year. Within the Savanna District, there are seven active (i.e., known) bald eagle nesting territories, and some of these nests have successfully produced young (FWS 2000b). The nearest known bald eagle nest to the Quad Cities site is located at river mile 514.3 on Beaver Island and has been established for over a decade with observed success in producing young. This nest is approximately 11.3-km (7 mi) or 8 river miles north of the Quad Cities site and 7.2-km (4.5 mi) or 5 river miles north of the Rock Creek transmission line. No other known bald eagle nests occur in the vicinity of the Quad Cities site or its associated transmission lines (Dee 2003). Bald eagles are easily observed in the vicinity of the Quad Cities site (Britton 2003) and are known to regularly occur there (Britton 2003). At this time, Exelon and the owners of the transmission lines (and their line maintenance contractors) have not needed to implement the Northern States Bald Eagle Recovery Plan and Management Guidelines (FWS 1983). This recovery plan provides guidance on the management of bald eagle nesting areas (e.g., providing disturbance buffer zones for nest trees, management of habitat and key components, etc.). The NRC staff expects that the owner of the transmission lines, and the line maintenance contractors, will become familiar with this plan and will implement the guidance within this plan if a need arises in the future.

Effects of the Proposed Action on Listed Species Occurring in the Project Area

This section presents the anticipated effects of the proposed action on listed species in the vicinity of Quad Cities and its associated transmission lines. As previously discussed, the western fringed orchid, the eastern fringed orchid, the prairie bush-clover, the Indiana bat and the Iowa Pleistocene snail are not known from the site or transmission ROWs and therefore will not be impacted by the continued operation of the facility during the proposed license renewal period. Only the Higgins' eye pearlymussel and bald eagle potentially occur in the vicinity of the site and therefore have the potential for adverse impact during the license renewal period. No designated critical habitat exists in the area and, therefore, no impacts to such habitat are anticipated.

1. Higgins' Eye Pearlymussel (*Lampsilis higginsii*)

Past actions that have adversely affected the freshwater mussels (including the Higgins' eye pearlymussel) within the Upper Mississippi River have included the pearl button and cultivated pearl industries, siltation, chemicals, establishment and maintenance of the 3-m (9-ft) deep navigation channel, commercial and recreational navigation, and introduced species particularly the zebra mussel (*Dreissena polymorpha*) (USG 1999). The FWS (2000a) has determined that the continuation of the current operation and maintenance activities of the 2.7-m (9-ft) navigation channel in the Mississippi River for another 50 years would jeopardize the continued existence of the Higgins' eye pearlymussel. Two of the Essential Habitat Areas for the Higgins' eye pearlymussel, both located in Wisconsin, are located within the navigation channel (FWS 2000a). However, the major adverse effect would be associated with continuing upstream transport of zebra mussels by barge traffic. Currently, there are no effective ways to control established populations of zebra mussels at the scale required to eliminate their threat to the Higgins' eye pearlymussel (FWS 2003c). Reintroductions of the Higgins' eye

pearlymussel into rivers from which it has been extirpated have been conducted since 2000, but it is too early to determine the success of these reintroductions (FWS 2003c).

The presence of the Higgins' eye pearlymussel in the Essential Habitat Area downstream from the Quad Cities site suggests that the operation of Quad Cities has not adversely affected the species. Relocations of unionids (including Higgins' eye pearlymussels) were required as a condition of a FWS Biological Opinion (Ecological Specialists, Inc. 2002). The mussels were relocated from river mile 504 to approximately river mile 505, which is closer to the Quad Cities site. Walleye are annually released as part of the fish production operation at the Quad Cities site (Bowzer and Lippincott 2000). As previously mentioned, it is one of several suitable host fishes for the glochidia of the Higgins' eye pearlymussel (FWS 2003c). Thus, release of walleye may provide a small benefit to the mussels that occur downstream from the Quad Cities site. However, the Essential Habitat Area at Cordova, Illinois, and the two in Wisconsin that occur within the navigation channel have become severely infested with zebra mussels (FWS 2003c).

The Quad Cities cooling-water intake and discharge are closely monitored under the National Pollutant Discharge Elimination System (NPDES) program. NPDES permit limits are reviewed on a regular basis by state regulatory agencies to ensure the protection of aquatic biota. The heated condenser water is completely mixed with river water and meets the 2.8°C (5°F) criterion within 152-m (500 ft) downstream of the diffuser pipes (LaJeone and Monzingo 2000). Thus, thermal discharges related to the operation of Quad Cities affect a relatively small area of the Mississippi River. The required thermal mixing zone does not exceed 10.5-ha (26 ac). This is only about 0.25 percent of the area of Pool 14. Furthermore, it extends no more than 152 m (500 ft) downstream of the point of discharge. The Cordova (Illinois) Essential Habitat Area for the Higgins' eye pearlymussel is over 1.6-km (1.0 mi) downstream of the Quad Cities site and thermal mixing zone. Therefore, this mussel bed is not affected by thermal discharges from Quad Cities. Also, there are no plans to conduct refurbishment or construction at Quad Cities (Exelon 2003b).

On the basis of the minimal anticipated impacts of cooling water intake and discharge on the Higgins' eye pearlymussel or its habitat, the NRC staff concludes that continued operation of Quad Cities over the 20-year license renewal period is not likely to adversely affect the Higgins' eye pearlymussel.

2. Bald Eagle

Bald eagles visit the open water and riparian habitats on or near Quad Cities as well as the Davenport and Rock Creek transmission line corridors during winter migration, and they nest in this area in the summer. Continued operation of Quad Cities could affect bald eagles if plant operations resulted in changes to conditions in the Mississippi River that affected food availability (i.e., the availability of fish or waterfowl), or if the Rock Creek or the Davenport transmission lines presented a hazard to the eagles, or if transmission line vegetation management activities disturbed the eagles or degraded their habitats.

Discharges of heated water to the Mississippi River during plant operations result in warmer water in the outfall area. During the winter, the resulting open water may attract eagles that

would otherwise migrate further south. This additional open water increases food availability for bald eagles during the winter and represents a benefit to eagles.

On the basis of their design, location, and surrounding habitats, the Rock Creek and Davenport transmission lines are unlikely to affect the bald eagle adversely. The Rock Creek transmission line is an 8-km (5-mi) long, 345-kV line. This line runs through the industrial park just north of Quad Cities and then crosses the river into Iowa. Its corridor crosses the Mississippi River and the Savanna District of the Upper Mississippi River NWFR approximately 3-km (2 mi) north of the site (Exelon 2003b). The Rock Creek transmission line crosses only open water and riparian habitats within the Upper Mississippi River NWFR. The NRC staff expects that the owners of the transmission line, and the line maintenance contractors, will ensure all ROW maintenance activities for this transmission line that occur in the refuge will be reviewed and approved by the FWS through the Savanna District Office of the Upper Mississippi River NWFR. The remainder of this line traverses lands cultivated for row crops and pasture typical of eastern Iowa.

The Davenport transmission line is a 20.6-km (12.8-mi) long, 345-kV line. This line crosses the Mississippi River and the Upper Mississippi River NWFR immediately south of the Quad Cities site as it enters Iowa from Illinois. The portion of the Upper Mississippi River NWFR traversed by the Davenport corridor is within the PWMA. The Iowa Department of Natural Resources manages this area under a cooperative agreement with the Savanna District of the Upper Mississippi River NWFR. The portion of the Davenport corridor crossing this area is slightly more than 1.6-km (1 mi) in length. The NRC staff expects that the owners of the transmission line, and the line maintenance contractors, will ensure all ROW maintenance activities for this transmission line that occur in the refuge will be reviewed and approved by the FWS through the Savanna District Office of the Upper Mississippi River NWFR. The transmission line then crosses predominantly agricultural land with the exception of a short passage (less than 0.8-km [0.5 mi]) through dense timber and a shorter crossing through sparse timber.

In addition, many habitats along these transmission lines are not likely to be used by bald eagles because of the level of disturbance and human activities normally associated with these relatively developed and agricultural areas. These conditions substantially reduce or eliminate the probability that bald eagles would accidentally strike the transmission line and be killed or injured. The protected open water and riparian areas associated with the Upper Mississippi River NWFR and the PWMA are likely to be used by bald eagles yet represent a small percentage of the transmission line corridors.

The impacts of transmission lines on birds were analyzed in the Generic Environmental Impact Statement (GEIS) on the effects of nuclear power plant license renewal (NRC 1996). In the GEIS, the NRC concluded that mortality resulting from bird collisions with transmission lines associated with license renewal and an additional 20 years of operation would be of small significance. This conclusion was based on (1) the fact that existing literature does not indicate that collision mortality is high enough to result in population-level effects, and (2) the lack of known instances where nuclear power plant lines affect large numbers of individuals in local areas. Neither Exelon nor the NRC staff is aware of any new or significant information that would change the above evaluation of effects on the bald eagle. Exelon and its contractors are not aware of any bald eagle injuries or mortalities as a result of collisions with the lines.

No management actions for bald eagle nesting and breeding areas (*e.g.*, those actions recommended by the Management Guidelines and Breeding Areas of the Northern States Bald Eagle Recovery Plan) have been needed along the Quad Cities transmission lines. However, it is expected that the owners of the transmission line, and the line maintenance contractors, would implement such actions upon identification of a nest. Vegetation management staff would coordinate and work closely with the FWS, the Upper Mississippi NWFR's Savanna District, the Illinois Department of Natural Resources, and the Iowa Department of Natural Resources to identify needed management actions and would implement actions needed to protect the bald eagle and its habitat. Additionally, it is expected that the transmission line owner, and its vegetation management contractors, would report any incidences of bald eagle injury or mortality along these transmission lines. No incidents have been reported because neither Exelon nor its contractors have observed any injuries or mortalities to bald eagles in the area of Quad Cities and its transmission lines (MidAmerica 2003; Exelon 2003d; Cunningham 2003; Exelon 2003b).

The NRC staff expects that the transmission line owner, and its contractors, will implement Best Management Practices for protecting the bald eagle and its habitats during vegetation management activities. The transmission line owner, and its vegetation management contractors, are expected to work with the FWS and state agencies to ensure that any maintenance operations for the transmission lines minimize any potential for adverse impacts on the bald eagle. Based on this review, the staff concludes that the continued operation of Quad Cities may affect, but is unlikely to adversely affect, the bald eagle.

Conclusion

Exelon has no plans to conduct major refurbishment or construction activities at Quad Cities for continued operations during the license renewal period. The proposed project is not a major construction activity. The proposed project is not located near designated critical habitat of any of the threatened and endangered species discussed in this assessment. Based on information concerning life history and the habitat present at the site and long the transmission ROWs, the continued operation of Quad Cities during the proposed 20-year license renewal period will have "no effect" on the western prairie fringed orchid, the eastern prairie fringed orchid, the prairie bush-clover, the Iowa Pleistocene snail, and the Indiana bat. Additionally the NRC staff has determined that continued operation during the proposed renewal period "may affect", but is "not likely to adversely affect", the Higgins' eye pearlymussel or the bald eagle.

References

Britton, E. 2003. Personal communication with E. Britton, District Manager, Savanna District, Upper Mississippi National Wildlife and Fish Refuge. May 8.

Bowzer, T. W., and B. L. Lippincott. 2000. *A Summary of Long-term Fisheries Monitoring in Pool 14 of the Upper Mississippi River near Quad Cities Station (1971-1999).* Prepared by Lawler, Matusky & Skelly Engineers, LLP, for the Commonwealth Edison Company, Chicago, Illinois. May.

Cunningham, E. 2003. *ComEd Transmission Vegetation Management Program.* Internal Company Manual. Chicago, Illinois.

Dee, D. 2003. Personal Communication with D. Dee, Field Staff, Savanna District, Upper Mississippi River NWFR. September 23.

Ecological Specialists, Inc. 2002. *2001 Monitoring Report-Unionid Relocation from the Cordova Energy Effluent Site at Mississippi River Mile 504.* Prepared by Ecological Specialists, Inc., O'Fallon, Missouri, for Cordova Energy Company, LLC, Davenport, Iowa. July.

Exelon Generation Company (Exelon). 2003a. *Application for Renewed Operating Licenses, Quad Cities Units 1 and 2.* Docket Nos. 50-254 and 50-265. Warrenville, Illinois.

Exelon Generation Company (Exelon). 2003b. *Applicant's Environmental Report-Operating License Renewal Stage, Quad Cities Nuclear Power Plant, Units 1 and 2. License Nos. DPR-29 and DPR-30.* Warrenville, Illinois.

Exelon Generation Company (Exelon). 2003c. Email to the NRC staff providing information regarding vegetation management practices by MidAmerican Construction Services, and forwarding an attached document titled *Forestry Services Work Technical Specifications.* NRC Agencywide Document Access and Management System (ADAMS) Document Accession No. ML032730712 (accessible at <http://www.nrc.gov/reading-rm.html>). September 17.

Exelon Generation Company (Exelon). 2003d. Email to the NRC staff forwarding Alliant Energy document titled *Line Clearance Vegetation Plan.* ADAMS Document Accession No. ML032890481 (accessible at <http://www.nrc.gov/reading-rm.html>). October 14.

Fremling, C., and B. Drazkowski. 2000. *Ecological, Institutional, and Economic History of the Upper Mississippi River.* St. Mary's University of Minnesota, Resource Studies Center. Accessed at <http://www.umbsn.org/news/documents/UMR_Ecological_History.html>

Illinois Environmental Protection Agency. 2000. National Pollutant Discharge Elimination System (NPDES). Permit Number IL0005037. May 26.

Iowa Bird and Birding. 2002. *Important Bird Areas in Iowa, Princeton Wildlife Area.* Accessed at <http://www.IOWAbirds.org/IBA> on September 5, 2003.

Jury, K. R. 2002. Letter from K. R. Jury, Exelon Generation Company, Warrenville, Illinois, to J. Millar, U.S. Fish and Wildlife Service, Rock Island, Illinois. Subject: "Quad Cities Nuclear Power Station, Units 1 and 2, License Renewal: Request for Information on Threatened or Endangered Species." January 11.

LaJeone, L. J., and R. G. Monzingo. 2000. "316(b) and Quad Cities Station, Commonwealth Edison Company." *Environmental Science & Policy* 3: S313-S322.

Millar, J. 2002. Letter from J. Millar, U.S. Fish and Wildlife Service, Rock Island, Illinois, to K. R. Jury, Exelon Generation Company, Warrenville, Illinois. February 12.

Upper Mississippi River Conservation Committee. 1993. *Facing the Threat: An Ecosystem Management Strategy for the Upper Mississippi River.* Rock Island, Illinois. Accessed at <http://www.mississippi-river.com/umrcc/pubs/call-for-action-pub.html> on March 6, 2003.

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 No. 50-254 and 50-265. Directorate of Licensing, Washington, D.C.

U.S. Fish and Wildlife Service (FWS). 1983. *Northern States Bald Eagle Recovery Plan,* Appendix E, Management Guidelines for Breeding Areas. U.S. Department of the Interior, U.S. Fish and Wildlife Service. Denver, Colorado.

U.S. Fish and Wildlife Service (FWS). 1991. *Fishes of the Upper Mississippi River National Wildlife Fish Refuge.* U.S. Fish and Wildlife Service, Northern Prairie Wildlife Research Center, Jamestown, North Dakota. Accessed at <http://endangered.fws.gov/i/a/saa08.html on April 23, 2003.

U.S. Fish and Wildlife Service (FWS). 1998. *Revised Higgins' Eye Pearly Mussel (*Lampsilis higginsii*) Recovery Plan.* U.S. Fish and Wildlife Service, Division of Endangered Species, Fort Snelling, Minnesota.

U.S. Fish and Wildlife Service (FWS). 1999. "Proposed Rule to Remove the Bald Eagle in the Lower 48 States from the List of Endangered and Threatened Wildlife." *Federal Register.* Vol. 64, No. 128, pp. 36453-36464. July 6.

U.S. Fish and Wildlife Service (FWS). 2000a. *Biological Opinion for the Operation and Maintenance of the 9-Foot Navigation Channel on the Upper Mississippi River System.* U.S. Fish and Wildlife Service, Division of Endangered Species, Fort Snelling, Minnesota. Accessed at <http://midwest.fws.gov/Endangered/Section%207/umrbofinal.pdf> on February 24, 2003.
U.S. Fish and Wildlife Service (FWS). 2000b. *Upper Mississippi River National Wildlife and Fish Refuge.* Accessed at <http://www.umesc.usgs.gov/umr_refuge.html> on May 8, 2003.

U.S. Fish and Wildlife Service (FWS). 2001. *Saving the Higgins Eye Pearlymussel. Propagation at Genoa National Fish Hatchery May 2001.* U.S. Fish and Wildlife Service, Division of Endangered Species, Fort Snelling, Minnesota. Accessed at <http://midwest.fws.gov/Endangered/clams/higginseye/propagation_fs.html> on February 25, 2003.

U.S. Fish and Wildlife Service (FWS). 2003a. Letter from R. Nelson, U.S. Fish and Wildlife Service, Rock Island, Illinois, to P.T. Kuo, U.S. Nuclear Regulatory Commission, Washington, D.C. June 6.

U.S. Fish and Wildlife Service (FWS). 2003b. *Higgins' Eye Pearlymussel (*Lampsilis higginsii*) Draft Recovery Plan: First Revision.* U.S. Fish and Wildlife Service, Region 3, Division of Endangered Species, Fort Snelling, Minnesota. August.

U.S. Fish and Wildlife Service (FWS). 2003c. Letter from R. Nelson, U.S. Fish and Wildlife Service, Rock Island, Illinois, to I. Wheeler, U.S. Nuclear Regulatory Commission, Washington, D.C. September 15.

U.S. Geological Survey (USGS). 1999. *Ecological Status and Trends of the Upper Mississippi River System 1998: A Report of the Long Term Resource Monitoring Program (LTRMP-99-T001).* U.S. Geological Survey, Upper Midwest Environmental Science Center, La Crosse, WI. Accessed at: <http://www.umesc.usgs.gov/reports_publications/status_and_trends.html> on February 21, 2003.

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). 2003a. Letter from P.T. Kuo, Program Director, Office of Nuclear Reactor Regulation, to Rick Nelson, Field Supervisor, U.S. Fish and Wildlife Service, Rock Island, Illinois. Subject: "Request for Comments Concerning Quad Cities Nuclear Power Station Application for Operating License Renewal." March 12.

U.S. Nuclear Regulatory Commission (NRC). 2003b. Letter from P.T. Kuo, Program Director, Office of Nuclear Reactor Regulation to Rick Nelson, Field Supervisor, U.S. Fish and Wildlife Service, Rock Island, Illinois. Subject: "Expanded Scope of Quad Cities Nuclear Power Station Application for Operating License Renewal-Request for Comments." August 12.

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

January 13, 2004

Mr. Maynard Crossland
Director
Illinois Historic Preservation Agency
Preservation Services Division
One Old State Capitol Plaza
Springfield, IL 62701

SUBJECT: QUAD CITIES NUCLEAR POWER STATION LICENSE RENEWAL REVIEW (IHPA LOG NO. 020116003WVA)

Dear Mr. Crossland:

The U.S. Nuclear Regulatory Commission (NRC) staff is reviewing an application to renew the operating licenses for Quad Cities Nuclear Power Station, Units 1 and 2 (QCNPS), which is located in Rock Island County, Illinois. Exelon Generation Company, LLC (Exelon) owns 75 percent of QCNPS and MidAmerican Energy Company (MidAmerican) owns the remaining 25 percent. Exelon holds the NRC license to operate the plant, acting for itself and as agent for MidAmerican. As part of its review of the proposed action, the NRC staff has prepared a site-specific Supplemental Environmental Impact Statement (SEIS) to its "Generic Environmental Impact Statement for License Renewal of Nuclear Plants" (GEIS), NUREG-1437. The SEIS includes analyses of relevant environmental issues, including potential impacts to historic, archeological and cultural properties from refurbishment activities associated with license renewal, and for the extended period of operation. In accordance with our letter to you of July 1, 2003, a copy of the draft supplement is enclosed. Pursuant to 36 CFR 800.8, we are requesting your comments on the draft supplement and on our preliminary conclusions regarding historic properties.

As stated in our July 1, 2003, letter the NRC staff has determined that the area of potential effect (APE) for a license renewal action is the area at the power plant site and its immediate environs which may be impacted by post-license renewal land disturbing operation or projected refurbishment activities associated with the proposed action. The staff views the APE for the QCNPS license renewal as including the QCNPS site and the immediate environs.

The NRC staff has conducted an environmental audit at the site, and has reviewed historic and archaeological records. As noted in our July 1, 2003, letter we also contacted fifteen Native American Tribes identified as having potential interest in the proposed undertaking. To date, no comments have been received.

In the context of the National Environmental Policy Act of 1969 under which the draft environmental impact statement was prepared, the NRC staff's preliminary determination is that the impact of license renewal on historical and archaeological resources is SMALL and additional mitigation is not warranted. Under the provisions of the National Historic Preservation Act of 1966, the NRC staff's preliminary determination is that there will be no historic properties affected for the proposed action.

Please note that the period for public comment expires on January 27, 2004. If your office requires additional time, or if there are any other questions regarding this correspondence, please have your representative contact the Environmental Project Manager, Mr. Louis Wheeler, at 301-415-1444 or DXW@nrc.gov.

Sincerely,

for Pao-Tsin Kuo, Program Director
License Renewal and Environmental Impacts
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

Docket Nos.: 50-254, 50-265

Enclosure: As stated

cc w/o Encl.: See next page

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

January 13, 2004

Ms. Anita Walker
Acting State Historic Preservation Officer
State Historical Society of Iowa
600 East Locust Street
Des Moines, IA 50319-0290

SUBJECT: QUAD CITIES NUCLEAR POWER STATION LICENSE RENEWAL REVIEW (REFERENCE NO. 020482156)

Dear Ms. Walker:

The U.S. Nuclear Regulatory Commission (NRC) staff is reviewing an application to renew the operating licenses for Quad Cities Nuclear Power Station, Units 1 and 2 (QCNPS), which is located in Rock Island County, Illinois. Exelon Generation Company, LLC (Exelon) owns 75 percent of QCNPS and MidAmerican Energy Company (MidAmerican) owns the remaining 25 percent. Exelon holds the NRC license to operate the plant, acting for itself and as agent for MidAmerican. As part of its review of the proposed action, the NRC staff has prepared a site-specific Supplemental Environmental Impact Statement (SEIS) to its "Generic Environmental Impact Statement for License Renewal of Nuclear Plants" (GEIS), NUREG-1437. The SEIS includes analyses of relevant environmental issues, including potential impacts to historic, archeological and cultural properties from refurbishment activities associated with license renewal, and for the extended period of operation. In accordance with our letter to you of July 1, 2003, a copy of the draft supplement is enclosed. Pursuant to 36 CFR 800.8, we are requesting your comments on the draft supplement and on our preliminary conclusions regarding historic properties.

As stated in our July 1, 2003, letter the NRC staff has determined that the area of potential effect (APE) for a license renewal action is the area at the power plant site and its immediate environs which may be impacted by post-license renewal land disturbing operation or projected refurbishment activities associated with the proposed action. The staff views the APE for the QCNPS license renewal as including the QCNPS site and the immediate environs.

The NRC staff has conducted an environmental audit at the site, reviewed historic and archaeological records, and has discussed the project with Mr. Douglas W. Jones of your office. These activities identified one site within the existing right-of-way, 13ST157, which has been determined to be ineligible for listing on the National Register of Historic Places (NRHP). We also contacted fifteen Native American Tribes identified as having potential interest in the proposed undertaking. To date, no comments have been received.

In the context of the National Environmental Policy Act of 1969 under which the draft environmental impact statement was prepared, the NRC staff's preliminary determination is that the impact of license renewal on historical and archaeological resources is SMALL and additional mitigation is not warranted. Under the provisions of the National Historic Preservation Act of 1966, the NRC staff's preliminary determination is that there will be no historic properties affected for the proposed action.

Please note that the period for public comment expires on January 27, 2004. If your office requires additional time, or if there are any other questions regarding this correspondence, please have your representative contact the Environmental Project Manager, Mr. Louis Wheeler, at 301-415-1444 or DXW@nrc.gov.

Sincerely,

/RA/

Pao-Tsin Kuo, Program Director
License Renewal and Environmental Impacts
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

Docket Nos.: 50-254, 50-265

Enclosure: As stated

cc w/o Encl.: See next page

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Rock Island Field Office
4469 48th Avenue Court
Rock Island, Illinois 61201
Phone: (309) 793-5800 Fax: (309) 793-5804

IN REPLY REFER TO:
FWS/RIFO

January 15, 2004

Mr. Pao-Tsin Kuo, Program Director
License Renewal and Environmental Impacts
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation
Nuclear Regulatory Commission
Washington, DC 20555-0001

Dear Mr. Kuo:

We have reviewed your December 2003, biological assessment regarding impacts to threatened and endangered species resulting from the Quad Cities Nuclear Power Station, Units 1 and 2 license renewal. The operating license renewal is for an additional 20-year period for the Quad Cities Nuclear Power Station, Units 1 and 2, on the east bank of Pool 14 of the Mississippi River between Lock and Dams 13 and 14, and 815.1-km (506.5 mi) upstream from its confluence with the Ohio River. We have the following comments.

No construction, refurbishment, or replacement activities are associated with the license renewal. Therefore, we concur with your findings that the proposed project is not likely to adversely affect federally listed threatened and endangered species. Should the project be modified or new information indicate endangered species may be affected, consultation should be initiated.

Thank you for the opportunity to comment. If you have any additional questions or concerns, please contact Heidi Woeber of my staff.

Sincerely,

Richard C. Nelson
Supervisor

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Illinois Historic
Preservation Agency

1 Old State Capitol Plaza • Springfield, Illinois 62701-1507 • Teletypewriter Only (217) 524-7128
Voice (217) 782-4836

Various Counties
Rock Island & Whiteside Counties
Quad Cities Nuclear Power Plant Stations/Units 1 & 2 License Renewal (Old PrjID:0201160038WVA)
Transmission lines are located in Rock Island & Whiteside County
IHPA Log #036011602

February 26, 2004

Pao-Tsin Kuo
United States Nuclear Regulatory Commission
License Renewal and Environmental Impacts
Division of Regulatory Improvement Programs
Washington, DC 20555-0001

Dear Mr. Kuo:

We have reviewed the Generic EIS for License Renewal of Nuclear Plants, dated November 2003, submitted for the above referenced project(s) in accordance with 36 CFR Part 800.4. Based upon the information provided, we concur that no historic properties are affected. We, therefore, have no objection to the undertaking proceeding as planned.

Please retain this letter in your files as evidence of compliance with section 106 of the National Historic Preservation Act of 1966, as amended. This clearance remains in effect for two years from date of issuance. It does not pertain to any discovery during construction, nor is it a clearance for purposes of the Illinois Human Skeletal Remains Protection Act (20 ILCS 3440).

If you have any further questions, please contact Cody Wright, Cultural Resources Manager, Illinois Historic Preservation Agency, 1 Old State Capitol Plaza, Springfield, IL 62701, 217/785-3977.

Sincerely,

Anne E. Haaker

Anne E. Haaker
Deputy State Historic
Preservation Officer
AEH

STATE HISTORICAL SOCIETY of IOWA

A Division of the Iowa Department of Cultural Affairs

11/13/03
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Rules and Directives Branch SNRC

February 26, 2004

In reply refer to:
R&C#: 020482156

Pao-Tsin Kuo, Program Director
License Renewal & Environmental Impacts
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commision
Washington, D.C. 20555-0001

RE: NRC – SCOTT COUNTY – RS-02-079 – QUAD CITIES NUCLEAR POWER STATION UNITS 1 & 2 LICENSE RENEWAL – POWER STATION LICENSE RENEWAL REVIEW – DRAFT REPORT FOR COMMENT – GENERIC ENVIORNMENTAL IMPACT STATEMENT FOR LICENSE RENEWAL OF NUCLEAR PLANTS – SUPPLEMENT 16

Dear Mr. Pao-Tsin Kuo,

We have received the submitted Supplemental Enviornmental Impact Statement (SEIS) to the Generic Environmental Impact Statement for License Renewal of Nuclear Plants (GEIS, NUREG-1437). Based on a review of this document, we concur with your determination of **No Historic Properties Affected** for this proposed undertaking under the Section 106 of the National Historic Preservation Act of 1966 and that the impact of license renewal on historical and archaeological resources is small and no mitigation is warranted under the National Environmental Policy Act of 1969.

We have made these **comments** and **recommendations** according to our responsibility defined by Federal law pertaining to the Section 106 process. If design changes are made for this project which would involve undisturbed new rights-of-way or easements, please forward additional information to our office for further comment along with your determination of effect. If project activities uncover an item(s) that might be of archeological, historical or architectural interest, or if important new archeological, historical or architectural data should be encountered in the project APE, the contractor should make reasonable efforts to avoid further impacts to the property until an assessment can be made by an inidividual meeting the appropriate Secretary of the Interior standards for the identified resource.

Should you have any questions please contact me at the number below.

Sincerely,

Douglas W. Jones

Douglas W. Jones, Archaeologist
Historic Preservation Bureau
State Historical Society of Iowa
(515) 281-4358

cc: Rosetta O. Virgilio, Federal Preservation Officer, U.S. Nuclear Regulatory Commission
Louis Wheeler, Env. Project Manager, US Nuclear regulatory Commission

E-RIDS=ADM-03

Template=ADM-013

Add=D. Wheeler (DKW)

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Appendix F

GEIS Environmental Issues Not Applicable to Quad Cities Units 1 and 2

Appendix F

GEIS Environmental Issues Not Applicable to Quad Cities Units 1 and 2

Table F-1 lists those environmental issues listed in the *Generic Environmental Impact Statement for License Renewal of Nuclear Plants* (GEIS) (NRC 1996; 1999)[(a)] and 10 CFR Part 51, Subpart A, Appendix B, Table B-1 that are not applicable to Quad Cities Units 1 and 2 because of plant or site characteristics.

Table F-1. GEIS Environmental Issues Not Applicable to Quad Cities Units 1 and 2

ISSUE—10 CFR Part 51, Subpart A, Appendix B, Table B-1	Category	GEIS Sections	Comment
SURFACE WATER QUALITY, HYDROLOGY, AND USE (FOR ALL PLANTS)			
Altered salinity gradients	1	4.2.1.2.2 4.4.2.	The Mississippi River is an inland freshwater river with no salinity gradient.
Altered thermal stratification of lakes	1	4.2.1.2.3 4.4.2.2	The Quad Cities plant has a once-through cooling system that discharges directly to a river.
Water use conflicts (plants with cooling ponds or cooling towers using make-up water from a small river with low flow)	2	4.3.2.1 4.4.2.1	The Quad Cities plant has a once-through cooling system that discharges directly to a river.
AQUATIC ECOLOGY (FOR PLANTS WITH COOLING-TOWER-BASED HEAT DISSIPATION SYSTEMS)			
Entrainment of fish and shellfish in early life stages	1	4.3.3	This issue is related to heat dissipation systems that are not installed at Quad Cities.
Impingement of fish and shellfish	1	4.3.3	This issue is related to heat dissipation systems that are not installed at Quad Cities.
Heat shock	1	4.3.3	This issue is related to heat dissipation systems that are not installed at Quad Cities.

(a) The GEIS was originally issued in 1996. Addendum 1 to the GEIS was issued in 1999. Hereafter, all references to the "GEIS" include the GEIS and its Addendum 1.

Table F-1 (contd)

ISSUE—10 CFR Part 51, Subpart A, Appendix B, Table B-1	Category	GEIS Sections	Comment
GROUND-WATER USE AND QUALITY			
Ground-water use conflicts (potable and service water, and dewatering; plants that use > 100 gpm)	1	4.8.1.1 4.8.1.2	Quad Cities uses more than 100 gpm of groundwater.
Ground-water use conflicts (plants using cooling towers withdrawing make-up water from a small river)	2	4.8.1.3	This issue is related to heat dissipation systems that are not installed at Quad Cities.
Ground-water-use conflicts (Ranney wells)	2	4.8.1.4	Quad Cities Units 1 and 2 do not have or use Ranney wells.
Ground-water quality degradation (Ranney wells)	1	4.8.2.2	Quad Cities Units 1 and 2 do not have or use Ranney wells.
Ground-water quality degradation (saltwater intrusion)	1	4.8.2.1	The Mississippi River is an inland freshwater river with no salinity gradient.
Ground-water quality degradation (cooling ponds in salt marshes)	1	4.8.3	This issue is related to heat dissipation systems that are not installed at Quad Cities.
Ground-water quality degradation (cooling ponds at inland sites)	2	4.8.3	This issue is related to heat dissipation systems that are not installed at Quad Cities.
TERRESTRIAL RESOURCES			
Cooling tower impacts on crops and ornamental vegetation	1	4.3.4	This issue is related to heat dissipation systems that are not installed at Quad Cities.
Cooling tower impacts on native plants	1	4.3.5.1	This issue is related to heat dissipation systems that are not installed at Quad Cities Units 1 and 2.
Bird collisions with cooling towers	1	4.3.5.2	This issue is related to heat dissipation systems that are not installed at Quad Cities Units 1 and 2.
Cooling pond impacts on terrestrial resources	1	4.4.4	This issue is related to heat dissipation systems that are not installed at Quad Cities.

F.1 References

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

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.

Appendix G

NRC Staff Evaluation of Severe Accident Mitigation Alternatives (SAMAs) for Quad Cities Nuclear Power Station, Units 1 and 2, in Support of License Renewal Application

Appendix G

NRC Staff Evaluation of Severe Accident Mitigation Alternatives (SAMAs) for Quad Cities Nuclear Power Station, Units 1 and 2, in Support of License Renewal Application

G.1 Introduction

Exelon Generation Company, LLC (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) available at that time, a plant-specific offsite consequence analysis performed using the MELCOR Accident Consequence Code System 2 (MACCS2), and insights from the Quad Cities Individual Plant Examination (IPE) (ComEd 1996a & b) and Individual Plant Examination of External Events (IPEEE) (ComEd 1997). In identifying and evaluating potential SAMAs, Exelon considered SAMA analyses performed for other operating plants which have submitted license renewal applications, as well as industry and NRC documents that discuss potential plant improvements, such as NUREG-1560 (NRC 1997a). Exelon identified 280 potential SAMA candidates. This list was reduced to 15 unique SAMA candidates by eliminating SAMAs that were not applicable to Quad Cities due to design differences, had already been implemented, or had high implementation costs. (A set of 14 candidate SAMAs is identified in the ER. One additional SAMA that was originally identified for retention was omitted and subsequently identified and addressed while responding to a staff request for additional information.) Exelon assessed the costs and benefits associated with each of the potential SAMAs and concluded that none of the candidate SAMAs evaluated would be cost-beneficial for Quad Cities.

Based on a review of the SAMA assessment, the NRC issued a request for additional information (RAI) to Exelon by letter dated May 23, 2003 (NRC 2003). Key questions concerned: dominant risk contributors at Quad Cities and the SAMAs that address these contributors, the potential impact of external event initiators and uncertainties on the assessment results, and detailed information on some specific candidate SAMAs. Exelon submitted additional information by letter dated July 17, 2003 (Exelon 2003b). In the response, Exelon provided tables containing importance measures for various events and their relationship to evaluated SAMAs; rationale for why the core damage frequency (CDF) for fire events would be substantially lower than reported in the IPEEE; results of a revised screening based on consideration of the potential impact of external events and uncertainties; more realistic estimates of the benefits and implementation costs for seven SAMAs that appeared to be cost-beneficial based on the revised screening; and the costs and benefits associated with several lower cost alternatives. Exelon's responses addressed the staff's concerns and reaffirmed that none of the SAMAs would be cost-beneficial. Despite the fact that Exelon

determined that there were no cost-beneficial SAMAs, Exelon stated that they plan to implement a modification to provide alternative air supplies in the case of failure of instrument air (Phase 2 SAMA 17).

Based on its review, the staff concluded that the contribution to risk from fire events would be higher than assumed in Exelon's SAMA analysis. The staff adjusted Exelon's risk reduction estimates to account for the contribution to risk (and risk reduction) from fire events, and found that four of the candidate SAMAs would be cost-beneficial and two additional SAMAs are close to being cost-beneficial, and could be cost-beneficial given a more detailed assessment of their benefits in external events, or when uncertainties are taken into account. However, these six SAMAs do not relate to adequately managing the effects of aging during the period of extended operation, and therefore need not be implemented as part of license renewal pursuant to 10 CFR Part 54.

An assessment of SAMAs for Quad Cities is presented below.

G.2 Estimate of Risk for Quad Cities

Exelon's estimates of offsite risk at Quad Cities are summarized in Section G.2.1. The summary is followed by the staff's review of Exelon's risk estimates in Section G.2.2.

G.2.1 Exelon's Risk Estimates

Two distinct analyses are combined to form the basis for the risk estimates used in the SAMA analysis: (1) the Quad Cities Level 1 and 2 PRA model, which is an updated version of the "Updated" (IPE) (ComEd 1996a and 1996b), and (2) a supplemental analysis of offsite consequences and economic impacts (essentially a Level 3 PRA model) developed specifically for the SAMA analysis. The SAMA analysis is based on the most recent Level 1 and 2 PRA model available at the time of the ER, referred to as the 2002B model (or Update Revision 02B). The scope of the Quad Cities PRA does not include external events.

The baseline CDF for the purpose of the SAMA evaluation is approximately 2.2×10^{-6} per year, and the baseline large early release frequency (LERF) is approximately 2.7×10^{-7} per year. The CDF and LERF are based on the risk assessment for internally-initiated events. Although there have been several PRA revisions since the time of the IPE, the CDF for the 2002B model is coincidentally the same as the value reported in the Updated IPE. Exelon did not include the contribution to risk from external events within the Quad Cities risk estimates, nor did it account for the potential risk reduction benefits associated with external events in the SAMA screening process described in the ER. It is Exelon's position that the existing fire and IPEEE programs have already addressed potential plant improvements related to these areas (Exelon 2003a). In response to an RAI, Exelon performed a separate assessment of the impact on the results if

the SAMA benefits (for internal events) were increased to account for additional benefits in external events. This is discussed further in Sections G.4 and G.6.2.

The breakdown of CDF by initiating event/accident type is provided in Table G-1. As shown in this table, 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 dominant contributors to the CDF. Bypass events contribute one percent to the total internal events CDF.

Table G-1. Quad Cities Core Damage Frequency

Initiating Event/Accident Class	CDF (Per Year)	% Contribution to CDF
Loss of 125-V DC Buses 1 and 2	7.6×10^{-7}	35
Loss of Offsite Power (LOOP)[1] (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**

[1]Includes station blackout (SBO)

The Level 2 PRA model has been updated since the IPE. During 1999, Exelon revised the PRA to include a simplified LERF methodology as described in NUREG/CR-6595 (NRC 1999a). In 2002, Exelon replaced the simplified LERF model with a full Level 2 PRA. The source terms were also updated to account for the extended power uprate which was approved by the NRC in 2001 (NRC 2001b). The conditional probabilities, fission product release fractions, and release characteristics associated with each release category were provided in response to an RAI (Exelon 2003b).

The offsite consequences and economic impact analyses use the MACCS2 code to determine the offsite risk impacts on the surrounding environment and public. Inputs for this analysis include plant-specific and site-specific input values for core radionuclide inventory, source term and release characteristics, site meteorological data, projected population distribution (within a 80 km [50-mi] radius) for the year 2032, emergency response evacuation modeling, and economic data.

In the ER, Exelon estimated the dose to the population within 80 km (50 mi) of the Quad Cities site to be approximately 0.0167 person-Sv (1.67 person-rem) per year. The breakdown of the total population dose by containment release mode is summarized in Table G-2.

Table G-2. Breakdown of Population Dose by Containment Release Mode

Containment Release Mode	Population Dose (Person-Rem[a] Per Year)	% Contribution
Early containment failure	0.93	56
Late containment failure	0.67	40
Containment Bypass	0.07	4
No Containment Failure	~0	~0
Total	**1.67**	**100**

[a]One person-Rem = 0.01 person-Sv

G.2.2 Review of Exelon's Risk Estimates

Exelon's determination of offsite risk at Quad Cities is based on the following three major elements of analysis:

- the Level 1 and 2 risk models that form the bases for the 1996 "Modified" and "Updated" IPE submittals (ComEd 1996a and 1996b) and the 1997 IPEEE submittal (ComEd 1997),
- the major modifications to the IPE model that have been incorporated in the Quad Cities PRA, and
- the MACCS2 analyses performed to translate fission product release frequencies from the Level 2 PRA model into offsite consequence measures.

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

The staff's review of the Quad Cities IPE is described in an NRC report dated November 9, 1995 (NRC 1995). Based on a review of the original IPE submittal, the staff could not reach the conclusion that Commonwealth Edison had met the intent of Generic Letter 88-20 (NRC 1988). By letter dated August 30, 1996, Commonwealth Edison submitted a "Modified" IPE (ComEd

1996a), and in December 1996, an "Updated" IPE was submitted (ComEd 1996b). The staff's review of the Modified and Updated IPEs is documented in a letter dated July 9, 1997 (NRC 1997b). In that review, the staff focused on whether the licensee addressed the concerns documented in the November 9, 1995, staff evaluation. The staff concluded that Modified and Updated IPE submittals met the intent of Generic Letter 88-20; that is, the Updated IPE was of adequate quality to be used to look for design or operational vulnerabilities.

The Updated IPE CDF, which included internal floods, was reported to be 2.2×10^{-6} per year. The PRA used in the SAMA analysis indicates no increase in the total CDF of 2.2×10^{-6} per year; however, the current PRA model does not include internal floods. A separate analysis was completed which yielded a flooding CDF of 4.67×10^{-7} per year, which is approximately 18-percent of the total internal events CDF (Exelon 2003b). The total internal events CDF, including internal floods, is slightly higher than what was reported in the Updated IPE. Since the time of the Updated IPE, there have not been any significant plant hardware changes at Quad Cities, with the exception of changes related to the extended power uprate (EPU). These changes are summarized in response to an RAI (Exelon 2003b). A summary listing of the notable PRA changes was provided in the ER and in response to an RAI (Exelon 2003a, 2003b), and include:

- updated initiating event frequencies utilizing Quad Cities most recent operating experience,
- revised offsite AC power recovery,
- revised human reliability analysis, especially to include dependent operator actions,
- revised anticipated transients without scram (ATWS) event trees to make consistent with standard boiling water reactor (BWR) practice, and revised mechanical and electrical ATWS probabilities based on NUREG/CR-5500 (NRC 1999b)
- revised model for EPU plant configuration and MAAP 4.0.4 computer code analysis,
- updated maintenance unavailability data and individual component random failure probabilities, and revised common cause failure calculations using NUREG/CR-5497 (NRC 1998c) and NUREG/CR-5485 (NRC 1998d),
- revised LOOP/dual-unit LOOP analysis for initiating event frequencies and non-recovery probabilities, and
- credited repair/recovery of residual heat removal for long term loss of decay heat removal events.

The CDF value for Quad Cities is at the lower end of the range of the CDF values reported in the IPEs for other BWR 3/4 plants. Figure 11.2 of NUREG-1560 shows that the IPE-based total internal events CDF for BWR 3/4 plants ranges from $1x10^{-6}$ to $8x10^{-5}$ per year (NRC 1997a). It is recognized that other plants have reduced values for CDF subsequent to the IPE submittals due to modeling and hardware changes. The current internal events CDF results for Quad Cities remain comparable to other plants of similar vintage and characteristics.

The staff considered the peer reviews performed for the Quad Cities PRA, and the potential impact of the review findings on the SAMA evaluation. In response to an RAI, Exelon described the previous peer reviews, the most significant of which was the Nuclear Energy Institute (NEI)/Boiling Water Reactor Owners Group (BWROG) Peer Review/Certification conducted in the Fall of 1999 (Exelon 2003b). The NEI/BWROG review of 1999 PRA model concluded that the Quad Cities PRA is consistent with other industry PRAs in scope, methods, data usage, and results. In response to a follow-up question, Exelon indicated that all suggestions for improvement were evaluated for potential impact on risk results. Many of the items were implemented as noted in the RAI response. Those that were deferred or otherwise dispositioned were assessed and determined to have only a minor impact on risk.

One recommendation that was not addressed was that a capability to model uncertainties be added to the model and uncertainty analyses be performed. In an RAI, the staff requested that Exelon provide an estimate of the uncertainties associated with the internal events CDF, and an assessment of the impact on the Phase 1 screening and Phase 2 evaluation if the risk reduction estimates are increased to account for uncertainties (NRC 2003). In response to this request, Exelon estimated the uncertainties based on a review of other plants' CDF uncertainty distributions (Exelon 2003b). Exelon's evaluation and results are discussed in further detail in Section G.4 and G.6.2.

Given that the Quad Cities PRA has been peer reviewed and the peer review findings were either addressed or judged to have no impact on the SAMA evaluation, and that Exelon satisfactorily addressed staff questions regarding the PRA, the staff concludes that the Level 1 PRA model is of sufficient quality to support the SAMA evaluation.

Exelon submitted an IPEEE in February 1997 (ComEd 1997), in response to Supplement 4 of Generic Letter 88-20. The initial fire analysis portion of the Quad Cities IPEEE identified potential fire vulnerabilities which resulted, in part, from the lack of separation of redundant equipment, the complex operator actions for fire recovery, and the reliance on opposite unit equipment to shut down the affected unit. The associated fire CDF was estimated to be about $5.4x10^{-3}$ per year for Unit 1 and about $5.2x10^{-3}$ per year for Unit 2. During the IPEEE review, the staff identified discrepancies between the safe shutdown analysis and the post-fire safe shutdown procedures. These issues led to a shutdown of both units in 1997. The NRC issued a confirmatory action letter on January 16, 1998, to document the licensee's commitments

related to resolving the safe shutdown issues (NRC 1998a). The NRC closed the confirmatory action letter by letter dated May 22, 1998 (NRC 1998b). By letter dated July 29, 1999, the licensee submitted a revised fire analysis which reflected its resolution of the safe shutdown issues and included other changes to the fire model. In the revised analysis, the CDFs were reduced to about 6.6×10^{-5} per year for Unit 1 and about 7.13×10^{-5} per year for Unit 2 (ComEd 1999). The revised fire analysis also concluded that there are no potential fire vulnerabilities.

Based on the staff safety evaluation of the Quad Cities IPEEE, the differences between the original and revised analyses were mostly due to more detailed and realistic information on cable routing, a revised fire initiation frequency evaluation, the use of the safe-shutdown model, and the use of a fire propagation model. The revised analysis showed that more equipment would be available for safe-shutdown, and recovery actions could be performed using plant emergency operating procedures with most operator actions taken in the main control room. In a letter dated April 26, 2001, (NRC 2001a), the staff concluded that the submittal met the intent of Supplement 4 to Generic Letter 88-20, and that the licensee's IPEEE process is capable of identifying the most likely severe accidents and severe accident vulnerabilities.

The Quad Cities fire analysis employed the Fire Induced Vulnerability Evaluation methodology for screening of compartments and Electric Power Research Institute's (EPRI) Fire PRA Implementation Guide (EPRI 1995) for detailed evaluation of the unscreened compartments. The licensee's overall approach in the IPEEE fire analysis is similar to other fire analysis techniques, employing a graduated focus on the most important fire zones using qualitative and quantitative screening criteria. The fire zones or compartments were subjected to at least two screening stages. In the first stage, a zone was screened out if it was found to not contain any safety-related equipment. In the second stage, a CDF criterion of 1×10^{-6} per year was applied. Plant information gathered for compliance with Appendix R to 10 CFR Part 50 was extensively used in the fire IPEEE. The licensee used the IPE model of internal events to quantify the CDF resulting from a fire initiating event. The conditional core damage probability was based on the equipment and systems unaffected by the fire. Initially, all fire event sequences were quantified assuming all equipment/cables in the area would fail by the fire. The CDF for each zone was obtained by multiplying the frequency of a fire in a given fire zone by the conditional core damage probability associated with that fire zone. The screening methodology applied by the licensee makes less and less conservative assumptions (e.g., equipment that may survive the fires in the area) until a fire zone is screened out, the results do not indicate a vulnerability, or a vulnerability is identified and addressed. After the screening, eight compartments remained for Unit 2 that contributed more than the screening value of 1.0×10^{-6}; similar results were obtained for Unit 1. These compartments are:

Zone Description (fire area)	CDF
Turbine Room	2.28×10^{-5}
Cable vault or tunnel	1.12×10^{-5}
Main control room	1.00×10^{-5}
Mezzanine floor	3.43×10^{-6}
Turbine building ground floor	3.52×10^{-6}
Switchgear room	3.20×10^{-6}
Direct current (DC) panel room	2.23×10^{-6}
Cable spreading room	1.05×10^{-6}

Given that the fire CDF (7.13×10^{-5} per year) is about a factor of 30 greater than the internal events CDF (2.2×10^{-6} per year), the staff inquired why Exelon neither considered fire explicitly in the SAMA study nor considered the impact of fire CDF in its uncertainty assessment. In a RAI (NRC 2003), the staff asked Exelon to explain, for each fire area, what measures were taken to further reduce risk, and explain why these CDFs can not be further reduced in a cost-beneficial manner. While not explicitly addressing the fire areas, Exelon did list plant improvements that arose from insights from the fire study (Exelon 2003b). These included: improvements to the response time of the sprinkler heads in the reactor feedwater pump areas, yielding a 25% reduction in the fire CDF, and a planned improvement to the containment vent system by providing an alternate or redundant air supply for the containment vent valves, yielding a 17% reduction in the fire CDF (see Section G.6.2 for further discussion of this plant improvement.)

Exelon also noted that 14 other potential plant modifications were analyzed for fire CDF reduction. These modifications were principally developed based on deterministic Appendix R evaluations to enhance Appendix R compliance efforts. A majority of the modifications (nine) were shown to have less than a one-percent reduction in the fire CDF. For three of the modifications, a fire CDF risk reduction was not directly available. These enhancements were related to rerouting a feed to a 125-V DC bus, providing control room or alternate local control station access for select residual heat removal and reactor core isolation cooling valves, respectively. Exelon did not pursue these modifications due to the extensive design engineering and analysis work that would be needed, and because the actual benefit could not be readily measured. For two other modifications, the risk reduction was qualitatively determined to have a minimal risk benefit. These modifications included installation of relays and fuses to improve 125-V DC control power availability for 4-kV and 480-V switchgear, respectively. Although Exelon did not perform a quantitative assessment for those modifications, SAMAs 6 and 8 address bypassing major DC buses, locally starting equipment, and controlling feedwater when 125-V DC is lost; therefore, these SAMAs would be expected to provide risk reduction benefits in fire events. Based on the revised fire analyses, the staff has not identified any fire-related vulnerabilities and thus, no additional SAMAs have been identified besides those identified by the licensee that would specifically address fire-related risks.

Exelon also described three areas in which it believes significant conservatism exists in the fire CDF estimates -- initiating event frequencies, system response/fire modeling, and human reliability modeling. Removal of or reduction in the conservatism in these areas would result in a reduction of the fire CDF to about $6x10^{-6}$ per year which is a factor of three greater than the internal events CDF (Exelon 2003b). Exelon accounted for the contribution from external events, as well as internal flooding and uncertainty, by applying a multiplier of five to the averted cost estimates reported in the ER. Exelon characterized the result as an "upper bound averted cost estimate" (Exelon 2003b). The staff's review is described in Section G.6.2. In that review, the staff concluded that the contribution to risk from fire events could be larger than assumed in Exelon's upper bound estimate, and accordingly used a higher multiplier in its assessment of potential SAMAs.

The IPEEE uses a focused scope EPRI seismic margins analysis. This method is qualitative and does not provide the means to determine the numerical estimates of the CDF contributions from seismic initiators. The licensee expanded its Unresolved Safety Issue A-46 (NRC 1987) program to include all equipment and components on the IPEEE safe shutdown equipment list, which was developed using the EPRI seismic margins analysis methodology for the primary and secondary shutdown paths. All equipment in the seismic IPEEE scope was reviewed per procedures from the Unresolved Safety Issue A-46 program. After the resolution of the seismic outliers, Exelon estimated the plant's high confidence low probability of failure (HCLPF) to be at least 0.24g peak ground acceleration, which is less than the 0.3g review level earthquake used in the IPEEE. The plant HCLPF was originally assessed to be 0.09g. The staff estimates that if the HCLPF capacity is increased from 0.24 g to 0.3g, the resulting CDF would be reduced by about $2x10^{-6}$ per year. A reduction of this magnitude would have a benefit of approximately $100K. Based on this estimation, the staff requested that Exelon confirm that all improvements addressing seismic outliers listed in Table 2.7 of NUREG-1742 (NRC 2002a) had been implemented and that Exelon identify the systems, structures, and components that limit the plant HCLPF and explain why modifications to increase seismic capacity would not be cost-beneficial when evaluated consistent with the regulatory analysis guidelines (NRC 2003). In its response, Exelon stated that all the outliers listed in NUREG-1742 (e.g., enhancing anchorage/support capacity) had been resolved (Exelon 2003b). Furthermore, Exelon listed the Systems, structures, and components that had a HCLPF value of 0.24g or higher but had not been verified to 0.3g (examples are 4 categories of cable trays, a 125V battery charger, three residual heat removal service water pump room coolers, and 22 motor control centers), and estimated that changes required to address these items would be in excess of $2M. This value is based on EPRI estimates of the costs to implement less extensive Seismic Qualification Utility Group modifications at other plants. The staff concludes that the opportunity for seismic-related SAMAs has been adequately explored and that there are no cost-beneficial, seismic-related SAMA candidates.

The Quad Cities IPEEE evaluated high winds, floods and other events using the progressive screening approach recommended in NUREG-1407 (NRC 1991). Based on this evaluation, the

licensee determined that the risk from high winds, floods and other events was negligible. Additionally, the Quad Cities IPEEE demonstrated that transportation and nearby facility accidents were not considered to be significant vulnerabilities at the plant.

The staff reviewed the process used by Exelon to extend the containment performance (Level 2) portion of the PRA to an assessment of offsite consequences (essentially a Level 3 PRA). This included consideration of the source terms used to characterize fission product releases for the applicable containment release category and the major input assumptions used in the offsite consequence analyses. The MACCS2 code was utilized to estimate offsite consequences. Plant-specific input to the code includes the Quad Cities reactor core radionuclide inventory, source terms for each release category, emergency evacuation modeling, site-specific meteorological data, and projected population distribution within a 80-km (50-mi) radius for the year 2032. This information is provided in Appendix F of the ER (Exelon 2003a).

Exelon characterized the releases for the spectrum of possible radionuclide release scenarios using a set of 10 release categories, defined based on the timing and magnitude of the release. Two of the categories were combined with other categories, resulting in the use of only eight release categories. Each end state from the Level 2 analysis is assigned to one the release categories. The process for assigning accident sequences to the various release categories and selecting a representative accident sequence for each release category was described in response to RAIs (Exelon 2003b and 2003c). The release categories and their frequencies are presented in Table 4-5 of the ER (Exelon 2003a). Table 3-4 of the response to an RAI provides a break out of the source term by release category (Exelon 2003b). The source terms used for the SAMA evaluation have been updated since the Updated IPE to account for the EPU and are based on the MAAP 4.0.4 computer code. The staff concludes that the assignment of release categories and source terms is consistent with typical PRA practice and acceptable for use in the SAMA analysis.

The core inventory input used in the MACCS2 was obtained from the MACCS2 User's Guide and corresponds to the end-of-cycle values for a 3,578 MW(t) BWR plant. A scaling factor of 0.8264 was applied to provide a representative core inventory of 2,957 MW(t) for Quad Cities (the uprated power level). All releases were modeled as occurring at ground level. The staff questioned the non-conservatism of this assumption and requested an assessment of the impact of alternative assumptions (e.g., releases at a higher elevation). In response to the RAI, Exelon reassessed the doses for all eight release categories assuming that all plumes originated from the top of the reactor building. The results showed that the 50-mile population dose could increase by up to about 12 percent (Exelon 2003b), which equates to approximately a 5.6 percent increase in the maximum attainable benefit. This small increase has a negligible impact on the analysis and its results.

Exelon used site-specific meteorological data, obtained from the plant meteorological tower, processed from hourly measurements for the 2000 calendar year as input to the MACCS2 code. Data from this year was selected because it contained the fewest data voids. Data voids were filled with data from other tower measurements for smaller gaps and from the Quad Cities Airport tower for larger gaps. The staff notes that previous SAMA analyses results have shown little sensitivity to year-to-year differences in meteorological data and considers use of the 2000 data in the base case to be reasonable.

The population distribution the applicant used as input to the MACCS2 analysis was estimated for the year 2032, based on the NRC geographic information system for 1990 (NRC 1997c), and the population growth rates were based on 2000 county-level census data (USCB 2001). The staff considers Exelon's methods and assumptions for estimating population reasonable and acceptable for purposes of the SAMA evaluation.

The emergency evacuation model was modeled as a single evacuation zone extending out 16 km (10 mi) from the plant. It was assumed that 95 percent of the population would move at an average speed of approximately 1.07 meters per second (2.4 miles/hour) with a delayed start time of 15 minutes (Exelon 2003a). This assumption is conservative relative to the NUREG-1150 study (NRC 1990), which assumed evacuation of 99.5 percent of the population within the emergency planning zone. The evacuation assumptions and analysis are deemed reasonable and acceptable for the purposes of the SAMA evaluation.

Much of the site-specific economic data were provided from SECPOP90 (NRC 1997c) by specifying the data for each of the 21 counties surrounding the plant, to a distance of 50 miles. In addition, generic economic data that are applied to the region as a whole were revised from the MACCS2 sample problem input when better information was available. The agricultural economic data were updated using available data from the 1997 Census of Agriculture (USDA 1998). These included per diem living expenses, relocation costs, value of farm and non-farm wealth, and fraction of farm wealth from improvements (e.g., buildings).

Exelon did not perform sensitivity analyses for the MACCS2 parameters, such as evacuation and population assumptions. However, sensitivity analyses performed as part of previous SAMA evaluations for other plants have shown that the total benefit of the candidate SAMAs would increase by less than a factor of 1.2 (typically about 20 percent) due to variations in these parameters. This change is small and would not alter the outcome of the SAMA analysis. Therefore, the staff concludes that the methodology used by Exelon to estimate the offsite consequences for Quad Cities provides an acceptable basis from which to proceed with an assessment of risk reduction potential for candidate SAMAs. Accordingly, the staff based its assessment of offsite risk on the CDF and offsite doses reported by Exelon.

G.3 Potential Plant Improvements

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

G.3.1 Process for Identifying Potential Plant Improvements

Exelon's process for identifying potential plant improvements (SAMAs) consisted of the following elements:

- review of plant-specific improvements identified in the Quad Cities IPE and IPEEE and subsequent PRA revisions,
- review of SAMA analyses submitted in support of original licensing and license renewal activities for other operating nuclear power plants, and
- review of other NRC and industry documentation discussing potential plant improvements, e.g., NUREG-1560.

Based on this process, an initial set of 280 candidate SAMAs was identified, as reported in Table F-1 in Appendix F to the ER. In Phase 1 of the evaluation, Exelon performed a qualitative screening of the initial list of SAMAs and eliminated SAMAs from further consideration using the following criteria:

- the SAMA is not applicable at Quad Cities due to design differences,
- the SAMA is sufficiently similar to other SAMAs, and as such is combined with another SAMA,
- the SAMA has already been implemented at Quad Cities, and
- the SAMA has no significant safety benefit, or has implementation costs greater than any possible risk benefit.

Based on this screening, 226 SAMAs were eliminated leaving 54 for further evaluation. Of the 226 SAMAs eliminated, 63 were eliminated because they were not applicable to Quad Cities, 49 were similar and combined with other SAMAs, 82 were eliminated because they already had been implemented at Quad Cities, and 32 were eliminated because they either had no significant safety benefit or had implementation costs greater than any risk benefit. A preliminary cost estimate was prepared for each of the 54 remaining candidates to focus on those that had a possibility of having a net positive benefit. A screening cutoff of approximately

$110K, the maximum attainable benefit (MAB) if all severe accident risk could be eliminated, was then applied to the remaining candidates (see discussion in Section G.6.1 for a derivation of the MAB). Thirty-nine of the 54 SAMAs were eliminated because their estimated cost exceeded this MAB, leaving 15 candidate SAMAs for further evaluation in Phase 2. It is noted that only a set of 14 SAMAs were retained for further evaluation in the ER. One additional SAMA (Phase 1 SAMA 237) was marked for retention but was inadvertently not transferred to Phase 2. This error was identified and corrected during a response to an RAI (Exelon 2003b).

In response to an RAI concerning the impact of external events and uncertainties on the SAMA identification process, Exelon re-evaluated the Phase 1 SAMAs using a screening value of $500K rather than $110K. As a result, 83 Phase 1 SAMAs were identified for further consideration (rather than the 54 SAMAs originally identified). These SAMAs were subsequently reassessed using the same criteria as described in the ER. Table 7-2 of the response to the RAI contains the 83 SAMAs and their subsequent disposition. Seventeen of the 83 SAMAs were retained for further evaluation in Phase 2 as discussed in Section G.6.2 (the 15 SAMAs identified through the original screening plus two additional SAMAs) (Exelon 2003b).

The 17 remaining SAMAs were further evaluated and subsequently eliminated in the Phase 2 evaluation, as described in Sections G.4 and G.6.1 below.

G.3.2 Review of Exelon's Process

Exelon's efforts to identify potential SAMAs focused primarily on areas associated with internal initiating events. The initial list of SAMAs generally addressed the accident categories that are dominant CDF and containment failure contributors or issues that tend to have a large impact on a number of accident sequences at Quad Cities.

The preliminary review of Exelon's SAMA identification process raised some concerns regarding the completeness of the set of SAMAs identified and the inclusion of plant-specific risk contributors. The staff requested clarification regarding the portion of risk represented by the dominant risk contributors (NRC 2003). Because a review of the importance ranking of basic events in the PRA could identify SAMAs that may not be apparent from a review of the top cut sets, the staff also questioned whether an importance analysis was used to confirm the adequacy of the SAMA identification process. In response to the RAI, Exelon provided a tabular listing of the contributors with the greatest potential for reducing risk as demonstrated by the risk reduction worth (RRW) assigned to the event (Exelon 2003b). Exelon used a cutoff of 1.02, and stated that events below this point would influence the CDF by less than two-percent. This equates to an averted cost-risk (benefit) of approximately $2,000. Exelon also reviewed the LERF-based RRW events to determine if there were additional equipment failures or operator actions that should be included in the provided table. Similarly, Exelon correlated the

top RRW events with the SAMAs evaluated in the ER (Exelon 2003b). Based on these additional assessments, Exelon concluded that the set of 280 SAMAs evaluated in the ER addresses the major contributors to CDF and LERF, and that the review of the top risk contributors does not reveal any new SAMAs.

The staff questioned Exelon about lower cost alternatives to the SAMAs evaluated, including the use of a portable generator to power the battery chargers and backup nitrogen bottles or portable air compressors as backup to instrument air (NRC 2003). In response, Exelon provided estimated benefits and implementation costs for several lower cost alternatives, including those in the form of potential procedural changes (Phase 2 SAMAs 1, 2, 4, 6, 7, 8, 10, and 14) (Exelon 2003b). These are discussed further in Section G.6.2.

Exelon considered potential improvements to further reduce fire risk. These included an improvement to the response time of the sprinkler heads in the reactor feedwater pump areas which yielded a 25% reduction in the fire CDF. In addition, Exelon is planning to implement an improvement to the containment vent system by providing an alternate or redundant air supply for the containment vent valves which is expected to yield a 17% reduction in the fire CDF (see Phase 2 SAMA 17). Although Exelon did not evaluate specific fire modifications as part of the SAMA analysis, several of the SAMAs identified based on the internal events risk profile would also be effective in fire events, e.g., procedures for bypassing major ac buses, locally starting equipment, and controlling feedwater when 125-V DC is lost.

The staff notes that the set of SAMAs submitted is not all inclusive, since additional, possibly even less expensive, design alternatives can always be postulated. However, the staff concludes that the benefits of any additional modifications are unlikely to exceed the benefits of the modifications evaluated and that the alternative improvements would not likely cost less than the least expensive alternatives evaluated, when the subsidiary costs associated with maintenance, procedures, and training are considered.

The staff concludes that Exelon used a systematic and comprehensive process for identifying potential plant improvements for Quad Cities, and that the set of potential plant improvements identified by Exelon is reasonably comprehensive and therefore acceptable. This search included reviewing insights from the IPE and IPEEE and other plant-specific studies, reviewing plant improvements considered in previous SAMA analyses, and using the knowledge and experience of its PRA personnel. While explicit treatment of external events in the SAMA identification process was limited, it is recognized that the implementation of plant modifications for fire and seismic events and the absence of external event vulnerabilities reasonably justifies examining primarily the internal events risk results for this purpose.

G.4 Risk Reduction Potential of Plant Improvements

Exelon evaluated the risk-reduction potential of the 17 Phase 2 SAMAs that were applicable to Quad Cities. A majority of the SAMA evaluations were performed in a bounding fashion in that the SAMA was assumed to completely eliminate the risk associated with the proposed enhancement. Such bounding calculations overestimate the benefit and are conservative.

Exelon used model re-quantification to determine the potential benefits. The CDF and population dose reductions were estimated using the 2002B Update of the Quad Cities PRA. The changes made to the model to quantify the impact of SAMAs are detailed in Section F.6 of Appendix F to the ER (Exelon 2003a) and in the response to the RAI (Exelon 2003b). Table G-3 lists the assumptions considered to estimate the risk reduction for each of the 17 Phase 2 SAMAs, the estimated risk reduction in terms of percent reduction in CDF and population dose, and the estimated total benefit (present value) of the averted risk as used in the staff's assessment. The determination of the benefits for the various SAMAs is further discussed in Section G.6.1.

The staff has reviewed Exelon's bases for calculating the risk reduction for the various plant improvements and concludes that the rationale and assumptions for estimating risk reduction are reasonable and generally conservative (i.e., the estimated risk reduction is higher than what would actually be realized). Accordingly, the staff based its estimates of averted risk for the various SAMAs on Exelon's risk reduction estimates reported in the ER, but applied a multiplier of 10 to these values to account for benefits in external events as discussed in Section G.6.2.

Table G-3. SAMA Cost/Benefit Screening Analysis

Phase 2 SAMA	Assumptions	% Risk Reduction		Total Benefit ($)		Cost ($)
		CDF	Population Dose	Baseline [1]	Best Estimate[2]	
1 - Provide means for alternate safe shutdown makeup pump room cooling a - Revise procedures to use fire protection system as backup b - Develop procedures to open doors and use portable fans to extend safe shutdown makeup pump run time	Eliminate all failures associated with safe shutdown makeup pump room cooling	12	11	123,000	24,600	1a) 25,000 1b) 50,000
2 - Develop procedures to use Fire protection system as a containment spray source	Assign complete success to the drywell spray effectiveness in Level 2 for all sequences except Class II, IV, and V	0	15	107,000	36,800	50,000
3 - Extend direct current power availability in a station black-out (SBO) a - Use fuel cells to extend DC power availability in an SBO b - Use portable generators as battery charges during an SBO	Change the 4-hour offsite AC recovery time to 8 hours.	6	3	47,000		3a) >50,000 3b) 50,000
4 - Develop/enhance procedures to direct a 4 kV bus cross-tie. Investigate installation of hardware that would perform an automatic cross-tie to the opposite 4 kV bus given the failure of the dedicated diesel generator.	Reduce the operator action human error probability by a factor of 100	<1	<1	8,000		25,000
5 - Provide a redundant and diverse source of cooling for the diesel generators [3]	Eliminate all diesel generator cooling water failures	0	0	0		>50,000

Table G-3. SAMA Cost/Benefit Screening Analysis (contd)

Phase 2 SAMA	Assumptions	% Risk Reduction		Total Benefit ($)		Cost ($)
		CDF	Population Dose	Baseline [1]	Best Estimate[2]	
6 - Allow for powering specific loads given an ac bus failure a - Provide procedures and hardware for bypassing major ac buses b - Provide procedures for locally starting equipment	**Eliminate all DC power failures as severe accidents**	**35**	**25**	**320,000**	**320,000**	**6a) >250,000 6b) 100,000**
7 - Develop procedures to delete high drywell pressure signal from shutdown cooling isolation to allow initiation of shutdown cooling when the drywell is at elevated pressure	Set the basic event “shutdown cooling isolates on high drywell pressure” to zero	<1	<1	8,000		25,000
8 - Develop procedures to control feedwater flow without 125-V DC power to prevent tripping feedwater on high/low level	**Reduce all DC power failures by 50%**	**18**	**13**	**167,000**	**167,000**	**75,000**
9 - Remove the low pressure coolant injection loop select logic or install a bypass switch to allow use of the “A” loop for injection in the event of a “B” injection path failure [2]	Change the probability of failure to manually open the low pressure coolant injection A injection valve from 1.0 to 0.0	0	0	0		>50,000
10 - Develop procedures to stop reactor depressurization at 100 psig and demonstrate reactor core isolation cooling operability following depressurization	**Eliminate all reactor core isolation cooling failures associated with suppression pool cooling**	**21**	**19**	**215,000**	**72,000 [4]**	**100,000**
11 - Provide an alternate means of opening a pathway to the reactor pressure vessel for standby liquid control injection	Set the random and common cause failure of the explosive valves to zero	1	3	26,000		>100,000

Table G-3. SAMA Cost/Benefit Screening Analysis (contd)

Phase 2 SAMA	Assumptions	% Risk Reduction		Total Benefit ($)		Cost ($)
		CDF	Population Dose	Baseline [1]	Best Estimate[2]	
2 - Enrich boron to reduce the time required to achieve shutdown, thereby increasing time available for successful activation of standby liquid control	Reduce the human error probabilities for boron initiation and reactor pressure vessel water level control by 50%	<1	<1	7,000		>50,000
13 - Add a rupture disk to the hardened vent to provide passive overpressure relief	Set vent failure modes to zero	7	7	72,000		>100,000
14 - Develop or enhance existing procedures to control containment venting within a narrow band of pressure	**Eliminate all Class II sequences with successful containment venting**	**23**	**21**	**236,000**	**78,000 [4]**	**100,000**
15 - Provide hardware modification and procedural guidance to permit inter-unit cross-tie capability for turbine building closed cooling water	Set turbine building closed cooling water initiating event frequency and all turbine building closed cooling water component failures to 0.0	6	5	57,000		>50,000
16 - Bypass main steam isolation valve in turbine trip ATWS scenarios	Reduce human error probability for operator failure to bypass main steam isolation valve low reactor pressure vessel level interlock (or ATWS) from 0.91 to 0.01.	5	7	60,000		>100,000
17 - Improve instrument air reliability, thereby increasing ability to vent containment [5] a - Allow cross connection of uninterruptable compressed air supply to opposite unit b - Provide backup bottles or portable air compressors to open valves when instrument air is lost	Set vent failure modes to zero	7	7	72,000	28,000	17a) >50,000 17b) 50,000

Table G-3. SAMA Cost/Benefit Screening Analysis (contd)

Note: SAMAs in **bold** were judged to be cost-beneficial.

1 Values are based on Exelon averted cost estimates reported in the ER, but are increased by a factor of 10 to account for additional risk reduction benefits in external events.

2 Values based on Exelon's more detailed re-evaluation of cost estimates, but are increased by a factor of 10 to account for additional risk reduction benefits in external events.

3 This SAMA was retained for further analysis because it did not meet any of the Phase 1 screening criteria discussed in Section G.3.1, but in the Phase 2 assessment was found to have no noticeable impact on CDF or population dose.

4 Revised benefit is based on a factor of three reduction from the baseline benefit. The staff expects that the actual benefit would be greater than this value, and above the estimated implementation cost.

5 This SAMA was retained for further analysis as a low cost alternative to major instrument air modifications (EC335806 and EC335807) that were approved for implementation but subsequently canceled due to the large scope of equipment changes. Although this SAMA has a negative net value, Exelon plans to implement this modification independent of the SAMA evaluation.

G.5 Cost Impacts of Candidate Plant Improvements

Exelon estimated the costs of implementing the 17 candidate SAMAs through the application of engineering judgment and review of other plants' estimates for similar improvements. The cost estimates conservatively did not include the cost of replacement power during extended outages required to implement the modifications, nor did they include recurring maintenance and surveillance costs or contingency costs associated with unforeseen implementation obstacles. Cost estimates typically included procedures, engineering analysis, training, and documentation, in addition to any hardware.

The staff reviewed the bases for the applicant's cost estimates. For certain improvements, the staff also compared the cost estimates (presented in Table 7-3 of the response to the RAI) to estimates developed elsewhere for similar improvements, including estimates developed as part of other licensees' analyses of SAMAs for operating reactors and advanced light-water reactors. The cost estimates provided in the response to the RAI were typically in the form of ranges. The staff reviewed these ranges and found them to be consistent with estimates provided in support of other plants' analyses. In response to an RAI, Exelon provided more specific values, typically at the upper end of the previously provided ranges. For purposes of evaluating specific SAMAs, the staff selected values from the range to represent a reasonable or typical cost.

The staff concludes that the cost estimates provided by Exelon, as adapted by the staff (see Section G.6.2), are sufficient and appropriate for use in the SAMA evaluation.

G.6 Cost-Benefit Comparison

Exelon's cost-benefit analysis and the staff's review are described in the following sections.

G.6.1 Exelon Evaluation

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

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

where,

APE = present value of averted public exposure ($)
AOC = present value of averted offsite property damage costs ($)
AOE = present value of averted occupational exposure costs ($)
AOSC = present value of averted onsite costs ($)
COE = cost of enhancement ($).

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

Averted Public Exposure (APE) Costs

The APE costs were calculated using the following formula:

APE = Annual reduction in public exposure (Δperson-rem/year)
x monetary equivalent of unit dose ($2,000 per person-rem)
x present value conversion factor (10.76 based on a 20-year period with a 7 percent discount rate).

As stated in NUREG/BR-0184 (NRC 1997d), it is important to note that the monetary value of the public health risk after discounting does not represent the expected reduction in public health risk due to a single accident. Rather, it is the present value of a stream of potential losses extending over the remaining lifetime (in this case, the renewal period) of the facility. Thus, it reflects the expected annual loss due to a single accident, the possibility that such an accident could occur at any time over the renewal period, and the effect of discounting these potential future losses to present value. For the purposes of initial screening, Exelon calculated an APE of approximately $36,000 for the 20-year license renewal period, which assumes elimination of all severe accidents.

Averted Offsite Property Damage Costs (AOC)

The AOCs were calculated using the following formula:

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

For the purposes of initial screening which assumes all severe accidents are eliminated, Exelon calculated an annual offsite economic risk of about $2,800 based on the Level 3 risk analysis.

This results in a discounted value of approximately $30,200 for the 20-year license renewal period.

Averted Occupational Exposure (AOE) Costs

The AOE costs were calculated using the following formula:

AOE = Annual CDF reduction
x occupational exposure per core damage event
x monetary equivalent of unit dose
x present value conversion factor.

Exelon derived the values for averted occupational exposure from information provided in Section 5.7.3 of the regulatory analysis handbook (NRC 1997d). Best estimate values provided for immediate occupational dose (3300 person-rem) and long-term occupational dose (20,000 person-rem over a 10-year cleanup period) were used. The present value of these doses was calculated using the equations provided in the handbook in conjunction with a monetary equivalent of unit dose of $2,000 per person-rem, a real discount rate of 7-percent, and a time period of 20 years to represent the license renewal period. For the purposes of initial screening, which assumes all severe accidents are eliminated, Exelon calculated an AOE of approximately $800 for the 20-year license renewal period.

Averted Onsite Costs (AOSC)

Averted onsite costs (AOSC) include averted cleanup and decontamination costs and averted power replacement costs. Repair and refurbishment costs are considered for recoverable accidents only and not for severe accidents. Exelon derived the values for AOSC based on information provided in Section 5.7.6 of the regulatory analysis handbook (NRC 1997d).

Exelon divided this cost element into two parts – the Onsite Cleanup and Decontamination Cost, also commonly referred to as averted cleanup and decontamination costs, and the replacement power cost.

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

ACC = Annual CDF reduction
x present value of cleanup costs per core damage event
x present value conversion factor.

The total cost of cleanup and decontamination subsequent to a severe accident is estimated in the regulatory analysis handbook to be $1.5 x 10^9 (undiscounted). This value was converted to

present costs over a 10-year cleanup period and integrated over the term of the proposed license extension. For the purposes of initial screening, which assumes all severe accidents are eliminated, Exelon calculated an ACC of approximately $26,000 for the 20-year license renewal period.

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

RPC = Annual CDF reduction
x present value of replacement power for a single event
x factor to account for remaining service years for which replacement power is required
x reactor power scaling factor

Exelon based its calculations on the value of 912 MW(e). Therefore, Exelon applied a power scaling factor of 912 MW(e)/910 MW(e) to determine the replacement power costs. For the purposes of initial screening, which assumes all severe accidents are eliminated, Exelon calculated an RPC of approximately $17,300 for the 20-year license renewal period.

Using the above equations, Exelon estimated the total present dollar value equivalent associated with completely eliminating severe accidents at Quad Cities to be about $110K.

Exelon's Results

If the implementation costs were greater than the MAB of $110K, then the SAMA was screened from further consideration. Thirty-nine of the 54 SAMAs surviving the initial Phase 1 screening were eliminated from further consideration in this way leaving 15 for final analysis. A more refined look at the costs and benefits was performed for the 15 SAMAs, and none were found to be cost-beneficial. The Phase 1 screening was revisited using a screening value of $500K rather than $110K to account for the potential impact of external events, and two additional SAMAs were identified.

Exelon applied a multiplier of five to the averted cost estimates (for internal events) for each SAMA to account for the potential impact of external events and uncertainties. As a result, seven of the 17 SAMAs were found to be potentially cost-beneficial. Exelon performed a more detailed assessment of each of the seven SAMAs to more realistically estimate the risk reduction and implementation costs for each SAMA. Based on this assessment, Exelon concluded that none of the seven SAMAs would be cost-beneficial.

G.6.2 Review of Exelon's Cost-Benefit Evaluation

The cost-benefit analysis performed by Exelon was based primarily on NUREG/BR-0184 (NRC 1997d) and was executed consistent with this guidance.

In response to an RAI, Exelon considered the uncertainties associated with the internal events CDF (see Table G-4 below). Since Exelon does not currently have an uncertainty analysis for the Quad Cities PRA, they estimated the uncertainty distribution by reviewing representative distributions for several plants (Exelon 2003b). Exelon used the results of the LaSalle Risk Methods Integration and Evaluation Program PRA to obtain the Quad Cities 95th percentile value. The ratio of the 95th percentile CDF to the mean CDF value in the LaSalle study is 4.5. The 2.2×10^{-6} per year point estimate mean CDF for Quad Cities was multiplied by this ratio, yielding a 95th percentile value of 1.0×10^{-5} per year for Quad Cities. This value and an error factor of eight are used to obtain the median value, and subsequently the 5th percentile value. If the 95th percentile value of the CDF were utilized in the cost-benefit analysis instead of the mean CDF value, the estimated benefits would increase by about a factor of five.

Table G-4. Uncertainty in the calculated CDF for Quad Cities

Percentile	CDF (per year)
95th	1.0×10^{-5}
mean	2.2×10^{-6}
median	1.25×10^{-6}
5th	1.6×10^{-7}

In the IPEEE, Exelon reported a fire CDF of 7.13×10^{-5} per year. This is approximately 30 times higher than the internal events CDF of 2.2×10^{-6} per year. Due to the large contribution from fire events, the staff asked Exelon to consider the impact on the SAMA identification and screening process by including the risk from external events. In response to the RAI, Exelon stated that the methodology used to determine the fire CDF is judged to be highly conservative, particularly in the areas of initiating event frequencies, fire response modeling and human reliability analysis. In Attachment A to its response, Exelon discusses the conservatism it believes exists in the model in each of these areas, and the approximate reduction that the conservatism affords. Exelon's rationale and the staff's assessment are summarized below.

For initiating events, Exelon refers to a recently issued NRC report concerning a revised fire events database (NRC 2002b). Exelon states that the NRC data would support the use of lower fire initiating event frequencies than used in the Quad Cities IPEEE. Based on a comparison of the initiating event frequencies from the report and from the Quad Cities model

for several fire areas, Exelon states that a factor of two reduction in the initiating event frequency portion of the fire CDF can be made as a reasonable assumption to provide a more accurate comparison to the internal events CDF. Exelon essentially argues that reductions in initiating event frequencies in these fire areas directly translate into similar reductions in specific equipment ignition frequencies. A staff review of the NRC report verified that the initiating frequencies were lower than those originally reported in the Quad Cities IPEEE, however, the data is only provided for fire areas and does not support the determination of ignition frequencies for specific equipment. In addition, less significant fires were screened from the data. Therefore, the data represent the fire ignition frequencies for more severe fires. These data are not directly comparable to the ignition frequencies in the IPEEE. Although the staff believes that reductions in the ignition frequencies have occurred, it does not believe that the evidence provided by the licensee is sufficient to justify a factor of two reduction. This is especially true for the risk-significant fires where ignition frequencies are typically low and the development of the ignition frequency is typically more rigorous.

For system fire response modeling, Exelon states that the Quad Cities fire model typically utilized bounding approaches regarding the immediate effects of the fire (e.g., all cables in a tray are always failed for a cable tray fire, and all failed cables lead to failure states of the associated equipment). Severity factors were utilized for the purposes of distinction (size and consequence of fire). The complement of the severity factor was also maintained in the analysis such that the total frequency was always preserved. In addition, Exelon repeats its discussion regarding lower initiating event frequencies. The staff finds that there are three points presented in support of this reduction factor: lower ignition frequencies, lower severity factors and bounding approaches regarding the fire's immediate effects. The staff's view on lower ignition frequencies is discussed above. For severity factors, a review of the NRC report did not find evidence that it supported a reduction in severity factor. The report states "Fire severity, risk implications, and duration of power operation fire events were not updated from the initial study." As a result the staff can not support this contribution to the system fire response modeling reduction. The final point is the claim that the bounding approaches were used regarding the fire's immediate effects. A review of the Quad Cities IPEEE Revision 1 submittal found that detailed fire modeling practices were used for risk-significant contributors. Given these observations, the staff believes that the proposed reduction factor is not supported.

For human reliability analysis and level of detail, Exelon provides examples of what it believes are simplified human reliability analysis modeling and lack of sufficient level of detail in the model, and concludes that such factors can easily lead to an additional factor of three reduction in the fire CDF. The IPEEE Revision 1 submittal states that the fire PRA model incorporated all of the operator actions included in the plant's internal events PRA. Actions in the main control room were not considered adversely impacted by postulated fire events outside the control room. For fires in the control room, actions with a required response time of 30 minutes or less were considered failed. All actions outside the control room were set to 1.0 except for two.

These two actions were considered as applicable and not modified from their internal-events values. The IPEEE submittal also states, "The extensive use of a human error probability of 1.0 for potential operator actions outside the control room is conservative but does not have a significant impact on the overall analysis results. This is because these events do not appear in the dominant cutsets for the analysis." Although the staff believes that the consideration of additional actions would likely reduce the calculated risk, we do not believe that the factor of three reduction due to human reliability analysis and level of detail is fully supported.

In addition to the above discussion, Exelon noted that a large oil fire involving the reactor feedwater pumps was the dominant risk contributor from the IPEEE fire study. In response to this insight, a modification was performed at Quad Cities to improve the response time of the sprinkler heads in the reactor feed pump area, and the modification results in a 25% reduction in fire risk. Exelon also noted that the installation of a modification to provide alternate or redundant air supply for the containment vent valves (addressed by Phase 2 SAMA 17) in the Fall 2003 has been estimated to reduce the fire CDF by 17 percent. However, Exelon notes that the combined benefit of this modification with the sprinkler head modification would likely be less than the sum of the benefits from each of these modifications.

As a result of the improvements in ignition frequency, fire response modeling, and human reliability analysis, Exelon states that it believes the fire CDF can be reduced by a factor of 12 from 7.13×10^{-5} per year to 6.1×10^{-6} per year. As such, the fire CDF would be about three times the internal events CDF. Based on this assessment, Exelon applied a multiplier of five to the averted cost estimates (for internal events) for each SAMA, and characterized the result as an upper bound averted cost estimate. These values could be considered to account for SAMA benefits in internal events, external events, and internal floods. These values would also represent the impact of uncertainties in internal event frequencies (i.e., the impact if the CDF was increased from the mean value of 2.2×10^{-6} per year to the 95th percentile value of 1.0×10^{-5} per year).

The staff agrees that the Quad Cities IPEEE fire analysis contains numerous conservatisms and that a more realistic assessment could result in a substantially lower fire CDF. In the staff's view, the factor of 12 reduction in CDF claimed by Exelon represents the maximum reduction that could be justified. At this level, the fire CDF would be three times the internal events CDF, and the benefits of SAMAs in external events would be accommodated by applying a multiplier of five to the internal events benefits. However, the staff believes that the information provided by Exelon is not sufficient to support the full reduction and that the reduction in fire CDF may be much smaller than claimed by Exelon, closer to a factor of two to three. Given a factor of three reduction in the IPEEE fire CDF, the resulting fire CDF would be about a decade higher than the internal events CDF. This would justify use of a multiplier of 10 rather than five to represent the additional SAMA benefits in external events. Consideration of uncertainties could result in further increases in this multiplier.

In view of the large relative contribution to risk from fire events at Quad Cities, the staff increased the averted cost estimates reported in the ER (which are based on consideration of only internal events) by a factor of 10 to obtain a baseline estimate of the benefits for each SAMA. This implicitly assumes that each SAMA would offer the same percentage reduction in external event CDF and population dose as it offers in internal event CDF and population dose. While this provides only a crude approximation of the potential benefits, such an adjustment 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 baseline benefit values are shown in Table G-3 for the 17 Phase 2 SAMAs. To account for a potentially greater contribution from external events and the impact of uncertainties, the staff also considered the impact that further increases in the multiplier would have on the identification and dispositioning of candidate SAMAs, as described below.

As shown in Table G-3, the baseline benefits exceed the estimated implementation costs for seven of the Phase 2 SAMAs (1, 2, 6, 8, 10,14, and 17). Exelon re-examined each of these SAMAs to ensure that the averted cost estimates from the internal events analysis appropriately represent the potential benefit rather than the maximum benefit. This included re-examining the assumptions used in the initial screening analysis, as well as recognizing existing model limitations that could lead to over-estimation of the averted costs. In some cases, the implementation costs were also refined to better represent the actual costs that would be incurred. The results of this reassessment are provided in Table 7-4 of the RAI response (Exelon 2003b), and summarized below. The staff considered this additional information and where appropriate, developed revised estimates of the benefits for these SAMAs. These are reported as "best estimate" values in Table G-3.

- SAMA 1 involves improving the existing procedural guidance for use of the fire protection system as a backup for providing safe shutdown makeup pump room cooling. The staff initially estimated the benefit of this SAMA to be $123,000 per unit based on Exelon's risk reduction estimate reported in the ER and a factor of 10 adjustment to account for external events. Based on additional information provided by Exelon, the benefit would be about a factor of five lower, or about $24,600 per unit, if a more realistic human error probability was used for the operator action to utilize the fire protection system as a backup means of safe shutdown makeup pump room cooling. Exelon states that the current failure probability for this action is 0.11, which is based on a lack of clear symptom-based direction for subsequent losses of service water following initial use of the safe shutdown makeup pump. However, all the dominant cutsets that include this human error probability result from the loss of service water as an initiating event. The licensee states that the current procedural direction for using the Fire protection system to recover when service water is lost as an initiating event is very clear and states that a more realistic human error probability for these

scenarios is a factor of five lower. The staff finds this rationale to be reasonable and concludes that the benefit of this SAMA would more realistically be about $24,600. Exelon estimated the cost of implementing this SAMA to be about $25,000 to $50,000 per unit, including the cost of engineering analysis and procedure development. The staff expects the costs to be towards the low end of this range because this appears to be an enhancement to current procedures as opposed to the development of new procedures, and does not appear to require additional engineering analysis. As an alternative, Exelon also considered developing procedural guidance to open safe shutdown makeup pump room doors and use portable fans to extend safe shutdown makeup pump run time. A thermal analysis would be needed to demonstrate the viability of this strategy. The costs and benefits associated with this alternative would be higher than those for the fire system procedure modification due to the required thermal analysis. The staff concludes that this SAMA would have a slightly negative net value. However, the costs and benefits are comparable, and the SAMA could be cost-beneficial given a more detailed assessment of its benefits in external events, or when uncertainties are taken into account.

- SAMA 2 involves enhancing the drywell spray system by developing procedural guidance to use the fire protection system as an alternative source of water. The staff initially estimated the benefit of this SAMA to be $107,000 per unit based on Exelon's risk reduction estimate reported in the ER and a factor of 10 adjustment to account for external events. Exelon states that two classes of scenarios account for much of the calculated averted cost and that these scenarios would not benefit from SAMA 2. In one scenario class, Exelon states that power would not be available to the drywell spray valves precluding any benefit from the proposed improvement. The other scenario class does not credit the recovery of the low pressure coolant injection pumps for the drywell spray function even though these pumps are available. The staff finds this rationale to be reasonable. When credit for the SAMA is eliminated for these two scenarios, the total benefit is reduced to $36,800 per unit. Exelon estimated the cost of implementing this SAMA to be about $25,000 to $50,000 per unit, including the cost of engineering analysis, procedure development, and training. The staff expects the costs to be at the upper end of this range because of the need for engineering analysis to support procedure development. The staff concludes that this SAMA has a negative net value. However, the costs and benefits are generally comparable, and the SAMA could be cost-beneficial given a more detailed assessment of its benefits in external events, or when uncertainties are taken into account.

- SAMA 6 involves two options for improving the plant's response to the loss of 125-V DC power. These are: (a) the installation of hardware and development of procedures for bypassing major DC buses, and (b) the development of procedures for locally starting equipment using temporary cables to feed DC from switchgear from the other unit. Based on Exelon's risk reduction estimate reported in the ER and a factor of 10 adjustment to account for external events, the staff estimates that SAMA 6 has a benefit of approximately

$320,000 per unit. Exelon states that alternative feeds are already proceduralized for those buses that can be fed from either unit, and that bypassing the other DC buses would require additional hardware, including buses, distribution cabinets, and breakers. Exelon estimates that the costs associated with option 6a (hardware, engineering analysis, procedure development, and training) would exceed $250,000 per unit. The staff finds this position to be reasonable given the extent of the associated hardware modifications. For the second alternative, Exelon states that locally starting equipment without DC power is not a trivial action due to personnel hazard that results when the DC powered protection and interlocks are also not available. Exelon concludes that preparing procedural direction to bypass major DC buses, providing instructions for local start, and providing training for the recommended approaches would lead to overall implementation costs that would easily exceed $200,000 per unit. The staff believes that the cost estimate may be overstated, and may more reasonably be estimated at $100,000 per unit. The staff notes that Exelon identified several modifications for potential fire CDF reduction in response to RAIs, including the installation of relays and fuses to improve 125-V DC control power availability for 4-kV and 480-V switchgear, respectively (see Section G.2.2). However, the licensee stated that these were not pursued due to the extensive design engineering and analysis (Exelon 2003b). The staff believes that locally starting equipment could be effective in recovering some of these fire-related events. The staff believes that the licensee review of the protection and interlock requirements for the 4-kV and 480-V AC breakers would benefit from the design similarities within each class of breakers and that standard sets of precautions and processes could be developed. It is further believed that considerable savings in engineering analysis would be achieved due to the similarities between the units. As such, the costs of SAMA 6b are expected to be lower than estimated by Exelon. The staff concludes that when these lower costs are taken into consideration, SAMA 6b would be cost-beneficial.

- SAMA 8 increases the functionality of feedwater during loss of 125-V DC scenarios through the development of procedures to control feedwater without 125-V DC. Based on Exelon's risk reduction estimate reported in the ER and a factor of 10 adjustment to account for external events, the staff estimates that SAMA 8 has a benefit of approximately $167,000 per unit. Exelon originally estimated that the cost of implementing this SAMA would be about $50,000 to $100,000 per unit, including the cost of engineering analysis, procedure development, and training. In its revised assessment, Exelon indicates that the cost would be $100,000 per unit. Exelon states that the difficulty of controlling feedwater without DC power is not with the feedwater control system but with the leakage past the closed feedwater regulation valves. Exelon explained that the operators would need to trip two of the three reactor feed pumps (RFPs) to reduce flow and would attempt to control reactor vessel level on the remaining pump. However, the loss of 125-V DC results in the loss of control power and protective functions to the RFPs. In addition, due to the leakage past the closed feedwater control valves, the remaining RFP would need to be cycled on and off to

maintain level. Without DC power, the tripping of the two RFPs and the cycling of the remaining RFP have to be performed locally at the breaker. It is further stated that these compensating actions are difficult such that procedures would require significant development work and engineering analysis. The NRC staff believes that procedural direction and training addressing the precautions and actions for timely local tripping of two RFPs and the local operation of the remaining pump would be an effective means of improving the likelihood of success of these difficult compensatory actions. The NRC staff also believes that developing guidance for these actions prior to the event will be far more effective than attempting to mitigate a loss of 125-V DC without such guidance. The staff expects the costs to be within the range originally provided by Exelon, but less than the upper end of this range because the implementation issues appear to be well understood and the engineering analysis does not appear to be extensive. The staff concludes that SAMA 8 would be cost-beneficial.

- SAMA 10 involves the development of operating procedures to terminate reactor depressurization prior to loss of the steam-driven reactor core isolation cooling pump (e.g., 100 psig), and supporting analyses to establish that reactor core isolation cooling can run reliably following depressurization. The staff initially estimated the benefit of this SAMA to be $215,000 per unit based on Exelon's risk reduction estimate reported in the ER and a factor of 10 adjustment to account for external events. In response to an RAI, Exelon argued that the risk reduction would be about a factor of three less if operator recovery of reactor pressure vessel injection following venting (which is not credited in the PRA) were taken into account. Exelon states that current procedures allow considerable flexibility in implementing containment venting and providing long term injection. Numerous alternate injection systems are identified in the current emergency operating procedures and there is significant time available for the Emergency Response Organization to develop a strategy to utilize this equipment following venting. Exelon identified several specific alternatives for providing long-term injection and the associated procedures, including using low pressure coolant injection pumps with an inventory source from the condensate storage tank, using condensate pumps with inventory provided by the hotwell with makeup to the hotwell provided by standby coolant supply and using the fire protection system pumps through the residual heat removal system. Exelon concludes that given these considerations, its original benefit estimate is high by at least a factor of three. SAMA 14 addresses a similar improvement associated with providing procedural enhancements for the control of containment venting in order to avoid the adverse impacts on low pressure emergency core cooling injection systems. The estimated benefits for SAMA 14 are similar to those for SAMA 10, and Exelon also argued that the benefits ascribed to SAMA 14 are high by a factor of three for the same reasons as stated for SAMA 10.

  Exelon's justification for the factor of three reduction is a judgement that if the numerous alternatives available for injection were credited in the PRA the associated CDF would be

reduced by a factor of three or more. The staff believes that some risk improvement would be achieved if these strategies were credited in the PRA, but based on the quantitative rationale provided by Exelon was not able to reach a conclusion that a factor of three reduction was appropriate. Exelon originally estimated that the cost of implementing SAMA 10 or 14 would be about $50,000 to $100,000 per unit, including the cost of engineering analysis, procedure development, and training, which could be extensive. In its revised assessment Exelon indicates that the cost would be $100,000 per unit. The staff considers this estimate to be reasonable. The staff notes that without additional credit for operator action, SAMA 10 or 14 would be cost-beneficial, whereas with the full reduction in benefits claimed by Exelon (i.e., a benefit of $72,000 rather than $215,000 for SAMA 10) both of these SAMAs would have a negative net value. The staff expects that the actual benefit would be higher than claimed by Exelon, and close to or greater than the estimated implementation costs for these SAMAs. Accordingly, the staff concludes that SAMAs 10 and 14 are cost-beneficial.

It should be noted that since both SAMAs 10 and 14 address a similar safety function, the implementation of either SAMA might reduce the risk reduction potential to a level at which the remaining SAMA would not be cost-beneficial.

- SAMA 17 involves the use of a cross connection of uninterruptable compressed air supply to the opposite unit. The lower cost alternative to this SAMA is the use of backup bottles or portable air compressors. Based on Exelon's risk reduction estimate reported in the ER and a factor of 10 adjustment to account for external events, the staff originally estimated the benefit associated with this SAMA to be about $72,000. This estimate was based on assuming a perfect vent. Exelon provided a revised benefit estimate based on a refinement of the modeling approach used to estimate the benefit. Specifically, the revised estimate assumes that the instrument air recovery is perfect. The staff considers this assumption to be more representative of the benefits offered by this SAMA. Based on the revised estimate, the staff estimates the benefit for this SAMA to be $28,000 per unit. Although the estimated implementation costs ($50,000) are higher that the estimated benefit, Exelon plans to implement this modification.

Based on the staff's review of the information provided by Exelon in response to the RAI, the staff has determined that six SAMAs are potentially cost-beneficial (Phase 2 SAMAs 1,2, 6, 8, 10, and 14).

The staff also considered the impact that further increases in the contribution from external events or analysis uncertainties would have on the dispositioning of the 10 Phase 2 SAMAs that were screened out (i.e., the unshaded SAMAs in Table G-3). When Exelon's averted cost estimates reported in the ER are increased by a factor of 10, SAMA 3 comes close to being cost-beneficial, with an estimated benefit of $47,000 and an estimated implementation cost of

$50,000 per unit. The low cost alternative explored in SAMA 3 involves the use of portable diesel generators to provide backup power to the battery chargers. Based on staff estimates produced as part of the resolution of Generic Safety Issue 189, "Susceptibility of Ice Condenser and Mark III Containments to Early Failure from Hydrogen Combustion During a Severe Accident," (NRC 2002c) the cost for use of a portable generator as backup power was estimated at about $200,000 per unit. Even if the implementation costs are somewhat lower, it is unlikely that SAMA 3 will be cost-beneficial at Quad Cities.

Several other SAMAs have estimated benefits within a factor of two of the estimated implementation costs, i.e., Phase 2 SAMAs 13, 15, and 16. The benefits for these SAMAs are estimated to range from $57,000 to $72,000 and the implementation costs are estimated to be greater than $100,000. However, each of these SAMAs involve hardware modifications as well as procedure changes. The cost range for hardware modifications provided by Exelon is greater than $100,000, up to $1million or more. Although Exelon did not provide details on the hardware modifications needed for these SAMAs, the staff believes that such modifications would be significantly greater than the minimal hardware cost provided by Exelon. Therefore, the staff does not believe that these SAMAs would be cost-beneficial at Quad Cities.

Exelon also performed a sensitivity analysis that addressed variations in discount rate. The use of a three-percent real discount rate (rather than seven percent used in the baseline) results in an increase in the maximum attainable benefit of approximately 28 percent. The results of the sensitivity study are bounded by the baseline averted cost estimates adopted by the staff for each SAMA.

The staff concludes that the costs of all of the SAMAs assessed would be higher than the associated benefits, with the exception of the six SAMAs discussed above.

G.7 Conclusions

Exelon compiled a list of 280 SAMA candidates using the SAMA analyses as submitted in support of licensing activities for other nuclear power plants, NRC and industry documents discussing potential plant improvements, and the plant-specific insights from the Quad Cities IPE, IPEEE, and current PRA model. A qualitative screening removed SAMA candidates that (1) were not applicable at Quad Cities due to design differences, (2) were sufficiently similar to other SAMAs, and therefore combined with another SAMA, (3) had already been implemented at Quad Cities, or (4) had no significant safety benefit or had implementation costs greater than any possible risk benefit. A total of 226 SAMA candidates were eliminated based on the above criteria, leaving 54 SAMA candidates for further evaluation.

Using guidance in NUREG/BR-0184 (NRC 1997d), the current PRA model, and a Level 3 analysis developed specifically for SAMA evaluation, a MAB of about $110K, representing the

total present dollar value equivalent associated with completely eliminating severe accidents at Quad Cities, was derived. Thirty-nine of the 54 SAMAs were screened from further evaluation because their implementation costs were greater than this MAB. Exelon performed a revised screening based on consideration of the potential impact of external events and uncertainties, and two additional SAMAs were identified. For the 15 SAMA candidates and two additional alternatives identified during the re-screening, a more detailed assessment and cost estimate were developed as shown in Table G-3. Exelon applied a multiplier of five to the averted cost estimates (for internal events) for each SAMA, and characterized the result as an upper bound averted cost estimate. The baseline benefits exceeded the estimated implementation costs for seven of the Phase 2 SAMAs. Exelon re-examined each of these SAMAs to ensure that the averted cost estimates from the internal events analysis appropriately represent the potential benefit rather than the maximum benefit. As a result of this reassessment, the cost-benefit analyses showed that none of the candidate SAMAs were cost-beneficial.

The staff reviewed the Exelon 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. The unavailability of a seismic and fire PRA model precluded a detailed quantitative evaluation of SAMAs specifically aimed at reducing risk of these initiators; however, to account for external events, the staff increased the estimated internal events benefits by factor of ten. Based on this evaluation, seven SAMAs would have a positive net value. When more realistic assumptions are used, this list is reduced to four SAMAs that would be cost-beneficial (SAMAs 6, 8, 10, and 14), and two additional SAMAs that are close to being cost-beneficial and could be cost-beneficial given a more detailed assessment of their benefits in external events, or when uncertainties are taken into account (SAMAs 1 and 2). The staff believes that these SAMAs could be effective in recovering some of the fire-related events. Since SAMA 10 and 14 address a similar safety function, implementation of either SAMA might reduce the residual risk to a level at which the remaining SAMA would not likely be cost-beneficial. Improvements realized as a result of the IPEEE process at Quad Cities, and implementation of these cost-beneficial SAMAs would minimize the likelihood of identifying further cost-beneficial enhancements. It is also noted that, although the SAMA is not cost-beneficial, Exelon plans to implement SAMA 17 independent of this SAMA evaluation.

Based on its review of the Exelon SAMA analysis, the staff concurs that none of the candidate SAMAs are cost-beneficial, except as noted above. This is based on conservative treatment of costs and benefits. This conclusion is consistent with the low residual level of risk indicated in the Quad Cities PRA and the fact that Quad Cities has already implemented many plant improvements identified from the IPE and IPEEE processes. Given the potential risk reduction and the relatively modest implementation costs of the six SAMAs identified above, the staff

concludes that further evaluation of these SAMAs by Exelon is warranted. However, these SAMAs do not relate to adequately managing the effects of aging during the period of extended operation. Therefore, they need not be implemented as part of license renewal pursuant to 10 CFR Part 54.

G.8 References

Electric Power Research Institute (EPRI). 1995. *Fire PRA Implementation Guide*. Science Applications International Corporation, EPRI Report TR-104031, December 1995.

Commonwealth Edison Company (ComEd). 1996a. Letter from John B. Hosmer, Commonwealth Edison Company, to U.S. Nuclear Regulatory Commission Document Control Desk. Subject: Response to NRC Review on Individual Plant Examination Submittal - Internal Events, August 30, 1996.

Commonwealth Edison Company (ComEd). 1996b. Letter from John B. Hosmer, Commonwealth Edison Company, to U.S. Nuclear Regulatory Commission Document Control Desk. Subject: Transmittal of Summary Documentation - Quad Cities Station - Probabilistic Safety Assessment Update, December 17, 1996.

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.

Commonwealth Edison Company (ComEd). 1999. Letter from R. M. Krich, Commonwealth Edison Company, to U.S. Nuclear Regulatory Commission Document Control Desk. Subject: Updated Individual Plant Examination of External events Report, July 29, 1999.

Electric Power Research Institute (EPRI). 1995. *Fire PRA Implementation Guide*. Science Applications International Corporation, EPRI Report TR-104031. December 1995.

Exelon Generation Company, LLC (Exelon). 2003a. *Applicant's Environmental Report–Operating License Renewal Stage, Quad Cities Nuclear Power Station Units 1 and 2.* 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.

Exelon Generation Company, LLC (Exelon). 2003c. E-Mail from William D. Maher, Exelon, to U.S. Nuclear Regulatory Commission. Subject: Additional Information Based on Follow-up Phone Call. August 18, 2003.

U.S. Nuclear Regulatory Commission (NRC). 1987. Generic Letter 87-02, "Verification of Seismic Adequacy of Mechanical and Electrical Equipment in Operating Reactors, Unresolved Safety Issue (USI) A-46," February 19, 1987.

U.S. Nuclear Regulatory Commission (NRC). 1988. Generic Letter 88-20, “Individual Plant Examination for Severe Accident Vulnerabilities,” November 23, 1988.

U.S. Nuclear Regulatory Commission (NRC). 1990. *Severe Accident Risks: An Assessment for Five U.S. Nuclear Power Plants.* NUREG-1150, Washington, D.C.

U.S. Nuclear Regulatory Commission (NRC). 1991. *Procedural and Submittal Guidance for the Individual Plant Examination of External Events (IPEEE) for Severe Accident Vulnerabilities.* NUREG-1407, Washington, D.C.

U.S. Nuclear Regulatory Commission (NRC). 1995. Letter from Robert M. Pulsifer, U.S. Nuclear Regulatory Commission, to D. L. Farrar, Commonwealth Edison Company. Subject: Review of Quad Cities Nuclear Power Station, Units 1 and 2, Individual Plant Examination Submittal, November 9, 1995.

U.S. Nuclear Regulatory Commission (NRC). 1997a. *Individual Plant Examination Program: Perspectives on Reactor Safety and Plant Performance.* NUREG-1560, Washington, D.C.

U.S. Nuclear Regulatory Commission (NRC). 1997b. Letter from Robert M. Pulsifer, U.S. Nuclear Regulatory Commission, to Irene Johnson, Commonwealth Edison Company. Subject: Quad Cities, Units 1 and 2, Modified and Updated Individual Plant Examination (IPE) Submittals, July 9, 1997.

U.S. Nuclear Regulatory Commission (NRC). 1997c. *SECPOP90: Sector Population, Land Fraction, and Economic Estimation Program*. NUREG/CR-6525, Washington, D.C.

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

U.S. Nuclear Regulatory Commission (NRC). 1998a. Letter from A. Beach, U.S. Nuclear Regulatory Commission, to O. Kingsley, Exelon. Subject: Confirmatory Action Letter (Fiche A1940-160 - A1940-163), January 16, 1998.

U.S. Nuclear Regulatory Commission (NRC). 1998b. Letter from J. Caldwell, U.S. Nuclear Regulatory Commission, to O. Kingsley, Exelon. Subject: Closure of Confirmatory Action Letter RIII-98-001 and Restart of Quad Cities Units 1 and 2 (Fiche A3735-167 - A3735-172), May 22, 1998.

U.S. Nuclear Regulatory Commission (NRC). 1998c. *Common-Cause Failure Parameter Estimations.* NUREG/CR-5497, Washington, D.C.

U.S. Nuclear Regulatory Commission (NRC). 1998d. *Guidelines on Modeling Common-Cause Failures in Probabilistic Risk Assessment.* NUREG/CR-5485, Washington, D.C.

U.S. Nuclear Regulatory Commission (NRC). 1999a. *An Approach for Estimating the Frequencies of Various Containment Failure Modes and Bypass Events.* NUREG/CR-6595, Washington, D.C.

U.S. Nuclear Regulatory Commission (NRC). 1999b. *Reliability Study, GE Reactor Protection System, 1984-1995.* NUREG/CR-5500, Vol. 3, Washington, D.C.

U.S. Nuclear Regulatory Commission (NRC). 2001a. Letter from S. Bailey, U.S. Nuclear Regulatory Commission, to O. Kingsley, Exelon. Subject: Quad Cities Nuclear Power Plant Review of Individual Plant Examination of External Events (IPEEE) Submittal, April 26, 2001.

U.S. Nuclear Regulatory Commission (NRC). 2001b. Letter from S. Bailey, U.S. Nuclear Regulatory Commission, to O. Kingsley, Exelon. Subject: Quad Cities Nuclear Power Station, Units 1 and 2 -- Issuance of Amendments for Extended Power Uprate, December 21, 2001.

U.S. Nuclear Regulatory Commission (NRC). 2002a. *Perspectives Gained From the IPEEE Program,* Final Report, Vols. 1 and 2, NUREG-1742, Washington, D.C, April 2002.

U.S. Nuclear Regulatory Commission (NRC). 2002b. "Fire Events - Update of U.S. Operating Experience, 1986 - 1999; Commercial Power Reactors," RES/OERAB/S02-01, January 2002.

U.S. Nuclear Regulatory Commission (NRC). 2002c. Memorandum from Ashok C. Thadani, RES, to Samuel J. Collins. NRR, Subject: RES Proposed Recommendation for Resolving Generic Safety Issue 189: "Susceptibility of Ice Condenser and Mark III Containments to Early Failure from Hydrogen Combustion During a Severe Accident," December 17, 2002.

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, May 23, 2003.

U.S. Bureau of the Census (USBC). 2001. Census 2000 Redistricting Data (P.L. 94-171) Summary File and 1990 Census. Internet Release Date, April 2, 2001. Available at <http://www.census.gov/population/cen2000/phc-t4/tab01.xls>.

U.S. Department of Agriculture (USDA). 1998. 1997 Census of Agriculture, National Agriculture Statistics Service, 1998. Available at <http://www.nass.usda.gov/census/census97/volume1/vol1pubs.htm>.