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, the Lawrence Livermore National Laboratory, Los Alamos National Laboratory, Pacific Northwest National Laboratory, and the Information Systems Laboratory.

Name	Affiliation	Function or Expertise
NUCLEAR REGULATORY COMMISSION		
Jack Cushing	Nuclear Reactor Regulation	Project Manager
Andrew Kugler	Nuclear Reactor Regulation	Section Chief
Barry Zalcman	Nuclear Reactor Regulation	Technical Monitor
Jennifer A. Davis	Nuclear Reactor Regulation	Backup Project Manager
James Wilson	Nuclear Reactor Regulation	Aquatic and Terrestrial Biologist
Leslie Fields	Nuclear Reactor Regulation	Project Management
Robert Palla	Nuclear Reactor Regulation	Severe Accident Mitigation Alternatives
LAWRENCE LIVERMORE NATIONAL LABORATORY[a]		
Crystal Quinly		Task Leader
Lily A. Sanchez		Deputy Task Leader
Bruce McDowell		Alternatives
Jennifer Garrison		Terrestrial Ecology
Jessie Coty		Aquatic/Terrestrial Ecology
Jeff Stewart		Socioeconomics
Karen McWilliams		Technical Editor
Jennifer Nivens		Administrative Support
Stephanie Flores		Administrative Support
LOS ALAMOS NATIONAL LABORATORY[b]		
Bruce Masse		Cultural Resources
Paul Schumann		Water Use, Hydrology
Tony Ladino		Radiation Protection

Name	Affiliation	Function or Expertise
Allyn Pratt		Land Use, Related Federal Programs
PACIFIC NORTHWEST NATIONAL LABORATORY[c]		
Jim Droppo		Meteorology, Air Quality
INFORMATION SYSTEMS LABORATORY		
Kim Green		Severe Accident Mitigation Alternatives
Bruce Mrowca		Severe Accident Mitigation Alternatives

(a) Lawrence Livermore National Laboratory is operated for the U.S. Department of Energy by the University of California.
(b) Los Alamos National Laboratory is operated for the U.S. Department of Energy by the University of California.
(c) 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 the Southern Nuclear Operating Company's Application for License Renewal of Joseph M. Farley Nuclear Plant, Units 1 and 2

Appendix C: Chronology of NRC Staff Environmental Review Correspondence Related to the Southern Nuclear Operating Company's Application for License Renewal of Joseph M. Farley Nuclear Plant, Units 1 and 2

This appendix contains a chronological listing of correspondence between the U.S. Nuclear Regulatory Commission (NRC) and the Southern Nuclear Operating Company (SNC) and other correspondence related to the NRC staff's environmental review, under 10 CFR Part 51, of SNC's application for renewal of the Joseph M. Farley Nuclear Plant, Units 1 and 2 operating license. 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 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.

September 12, 2003 Letter from Mr. J. B. Beasley, to the NRC, submitting the application for the renewal of the operating licenses for the Joseph M. Farley Nuclear Plant, Units 1 and 2 (Accession Nos. ML032721356).

September 17, 2003 NRC press release announcing the availability of the license renewal application for the Joseph M. Farley Nuclear Plant, Units 1 and 2 (Accession No. ML032600165).

September 25, 2003 Letter from the NRC to Ms. Betty Forbus, Director Houston Love Memorial Library regarding the maintenance of documents related to the license renewal of the Joseph M. Farley Nuclear Plant, Units 1 and 2 for additional 20 years (Accession No. ML032730560).

September 30, 2003 Letter from the NRC to Mr. J. B. Beasley, SNC, regarding the receipt and availability of the license renewal application for the Joseph M. Farley Nuclear Plant, Units 1 and 2 (Accession No. ML032731456).

October 6, 2003	*Federal Register* Notice of the receipt of the application for the renewal of Facility Operating License Nos. NPF-2 and NPF-8 for the Joseph M. Farley Nuclear Plant, Units 1 and 2 for an additional 20-year period (68 FR 57715).
October 7, 2003	Letter from Mr. Paul Brown, Director, Henry County Emergency Management Agency, providing comments related to the license renewal of the Joseph M. Farley Nuclear Plant, Units 1 and 2 (Accession No. ML032950492).
October 15, 2003	Letter from Mr. Mark S. Culver, Chairman, Houston County Commission, providing comments related to the license renewal of the Joseph M. Farley Nuclear Plant, Units 1 and 2 (Accession No. ML032940508).
October 22, 2003	Letter from Ms. Amanda Smitherman, Resource Development Coordinator, Wiregrass Habitat for Humanity to the NRC, providing comments related to the license renewal of the Joseph M. Farley Nuclear Plant, Units 1 and 2 (Accession No. ML033030492).
October 23, 2003	Letter from the NRC to Ms. Barbara Crawford, Head Librarian, the Lucy Maddox Memorial Library, regarding the maintenance of documents related to the license renewal of the Joseph M. Farley Nuclear Plant, Units 1 and 2 for additional 20 years (Accession No. ML032970281).
October 24, 2003	Letter from the NRC to SNC, forwarding the determination of acceptability and sufficiency for docketing, proposed review schedule, regarding an application from the SNC for the renewal of the operating license for Joseph M. Farley Nuclear Plant, Units 1 and 2 (Accession No. ML032970522).
October 28, 2003	Letter from Mr. Clark Matthews, Community Coordinator, Dothan/Houston County Emergency Management to the NRC, providing comments related to the license renewal of the Joseph M. Farley Nuclear Plant, Units 1 and 2 (Accession No. ML033300346).
October 30, 2003	Letter from the NRC to the Poarch Band of the Creek Nation, inviting participation in the scoping process for the Joseph M. Farley Nuclear Plant, Units 1 and 2 license renewal (Accession No. ML033080269).
October 30, 2003	Letter from the NRC to the Muscogee (Creek) Nation, inviting participation in the scoping process for the Joseph M. Farley Nuclear Plant, Units 1 and 2 license renewal (Accession No. ML033080288).

October 30, 2003	Letter from the NRC to the Seminole Tribe of Florida, inviting participation in the scoping process for the Joseph M. Farley Nuclear Plant, Units 1 and 2 license renewal (Accession No. ML033080315).
October 30, 2003	Letter from Mr. James H. Reading, Commissioner—District 1, City of Dothan, providing comments related to the license renewal of the Joseph M. Farley Nuclear Plant, Units 1 and 2 (Accession No. ML033250325).
October 30, 2003	Letter from Mr. Amos Newsome, Commissioner—District 2, City of Dothan providing comments related to the license renewal of the Joseph M. Farley Nuclear Plant, Units 1 and 2 (Accession No. ML033250316).
October 30, 2003	Letter from Mr. Don Clements, Commissioner—District 3, City of Dothan, providing comments related to the license renewal of the Joseph M. Farley Nuclear Plant, Units 1 and 2 (Accession No. ML033250552).
October 30, 2003	Letter from Mr. Jason Rudd, Commissioner—District 4, City of Dothan, providing comments related to the license renewal of the Joseph M. Farley Nuclear Plant, Units 1 and 2 (Accession No. ML033250311).
October 30, 2003	Letter from Mr. Pat Thomas, Commissioner—District 5, City of Dothan, providing comments related to the license renewal of the Joseph M. Farley Nuclear Plant, Units 1 and 2 (Accession No. ML033250288).
October 30, 2003	Letter from Mr. Phillip Tidwell, Commissioner—District 6, City of Dothan, providing comments related to the license renewal of the Joseph M. Farley Nuclear Plant, Units 1 and 2 (Accession No. ML033250298).
October 30, 2003	Letter from Mr. Dennis L. Rubin, City Manager, City of Dothan, providing comments related to the license renewal of the Joseph M. Farley Nuclear Plant, Units 1 and 2 (Accession No. ML033250320).
November 3, 2003	Letter from Mr. J.B. Beasley, to the NRC, submitting additional information regarding the renewal of the operating license for the Joseph M. Farley Nuclear Plant, Units 1 and 2 (Accession No. ML033210178).
November 13, 2003	Letter from Donald E. Smith, Mayor of the City of Headland regarding the Joseph M. Farley Nuclear Plant, Units 1 and 2 license renewal application (Accession No. ML033360580).

November 17, 2003 Letter from Mr. Billy G. Davis, Superintendent, Henry County Board of Education to the NRC, providing comments related to the license renewal of the Joseph M. Farley Nuclear Plant, Units 1 and 2 (Accession No. ML033381197).

November 24, 2003 Letter from Dr. Barbara Alford, Interim President, Troy State University Dothan, providing comments related to the license renewal of the Joseph M. Farley Nuclear Plant, Units 1 and 2 (Accession No. ML033430381).

November 26, 2003 Letter from the NRC to SNC, forwarding the Notice of Intent to Prepare an environmental impact statement and conduct scoping process for the Joseph M. Farley Nuclear Plant, Units 1 and 2 license renewal (Accession No. ML033350042).

November 26, 2003 Letter from the NRC to Mr. Larry Goldman, U.S. Fish and Wildlife Service, requesting a list of protected species within the area under evaluation for the Joseph M. Farley Nuclear Plant, Units 1 and 2 (Accession No. ML033510611).

November 26, 2003 Letter from the NRC to Dr. Roy Crabtree, NOAA Fisheries Southeast Regional Office, requesting a list of protected species within the area under evaluation for the Joseph M. Farley Nuclear Plant, Units 1 and 2 (Accession No. ML033370721).

November 26, 2003 Letter from the NRC to Mr. Lonice C. Barrett, State Historic Preservation Officer for Georgia, inviting participation in the scoping process relating to the license renewal of the Joseph M. Farley Nuclear Plant, Units 1 and 2 (Accession No. ML033350314).

November 26, 2003 Letter from the NRC to Dr. Lee Warner, State Historic Preservation Officer, Alabama Historical Commission, inviting participation in the scoping process relating to the license renewal of the Joseph M. Farley Nuclear Plant, Units 1 and 2 (Accession No. ML033350363).

December 2, 2003 Letter from Mr. Matt Parker, President of the Dothan Area Chamber of Commerce, providing comments related to the license renewal of the Joseph M. Farley Nuclear Plant, Units 1 and 2 (Accession No. ML033430559).

December 4, 2003 NRC press release announcing two public meetings held January 8, 2004, to discuss the environmental process regarding the license renewal application for the Joseph M. Farley Nuclear Plant, Units 1 and 2 (Accession No. ML033381299).

December 5, 2003 *Federal Register* Notice of Intent to prepare an environmental impact statement and conduct scoping process for the Joseph M. Farley Nuclear Plant, Units 1 and 2 license renewal (68 FR 68125).

December 5, 2003 Letter from Mr. Larry C. Register, Register Realty Company, Inc., providing comments related to the license renewal of the Joseph M. Farley Nuclear Plant, Units 1 and 2 (Accession No. ML033630558).

December 5, 2003 Letter from Mr. Robert A. Hendrix, Executive Director, Dothan Area Convention and Visitors Bureau, providing comments related to the license renewal of the Joseph M. Farley Nuclear Plant, Units 1 and 2 (Accession No. ML033500442).

December 8, 2003 Letter from Mr. Joseph R. Donofro, Donofro and Associates, Architects, Inc.; providing comments related to the license renewal of the Joseph M. Farley Nuclear Plant, Units 1 and 2 (Accession No. ML033500438).

December 8, 2003 Letter from Mr. Pat Dalbey, Regional Vice President/General Manager, providing comments related to the license renewal of the Joseph M. Farley Nuclear Plant, Units 1 and 2 (Accession No. ML033500400).

December 11, 2003 Email from Dr. Stephania Bolden, NOAA Fisheries, regarding the Joseph M. Farley Nuclear Plant, Units 1 and 2, license renewal application (Accession No. ML033520044).

December 11, 2003 NRC meeting notice informing public of scoping meeting to be held in Dothan Alabama on January 8, 2004 (Accession No. ML033490514).

December 12, 2003 Letter from Mr. Robert C. Rudder, Jr., Rudder Farms, providing comments related to the license renewal of the Joseph M. Farley Nuclear Plant, Units 1 and 2 (Accession No. ML033530118).

December 13, 2003 Letter from NRC to Dr. Barbara Alford, Interim President, Troy State University Dothan, acknowledging receipt of comments regarding the Joseph M. Farley Nuclear Plant, Units 1 and 2 (Accession No. ML033530457).

December 13, 2003 Letter from NRC to Mr. Matt Parker, President, Dothan Area Chamber of Commerce, acknowledging receipt of comments regarding the Joseph M. Farley Nuclear Plant, Units 1 and 2 (Accession No. ML033560529).

December 13, 2003 Letter from NRC to Mr. Clark Matthews, Community Coordinator, Dothan/Houston County Emergency Management Agency, acknowledging receipt of comments regarding the Joseph M. Farley Nuclear Plant, Units 1 and 2 (Accession No. ML033560014).

December 13, 2003 Letter from NRC to Mr. Donald E. Smith, Mayor, City of Headland, acknowledging receipt of comments regarding the Joseph M. Farley Nuclear Plant, Units 1 and 2 (Accession No. ML033560048).

December 13, 2003 Letter from NRC to Mr. Billy G. Davis, Superintendent, Henry County Board of Education, acknowledging receipt of comments regarding the Joseph M. Farley Nuclear Plant, Units 1 and 2 (Accession No. ML033560113).

December 15, 2003 Letter from Mr. Steven E. Mashburn, Troy State University Dothan, providing comments related to the license renewal of the Joseph M. Farley Nuclear Plant, Units 1 and 2 (Accession No. ML033640576).

December 15, 2003 Letter from NRC to Mr. Pat Thomas, Commissioner—District 5, City of Dothan, acknowledging receipt of comments regarding the Joseph M. Farley Nuclear Plant, Units 1 and 2 (Accession No. ML033490576).

December 15, 2003 Letter from NRC to Mr. Jason Rudd, Commissioner—District 4, City of Dothan, acknowledging receipt of comments regarding the Joseph M. Farley Nuclear Plant, Units 1 and 2 (Accession No. ML033500088).

December 16, 2003 Letter from Mr. David L. Hicks, Executive Director, Wiregrass Area United Way Food Bank, providing comments related to the license renewal of the Joseph M. Farley Nuclear Plant, Units 1 and 2 (Accession No. ML033570387).

December 16, 2003 Letter from Mr. William J. Parker, Chairman, Headland Industrial Development Board, providing comments related to the license renewal of the Joseph M. Farley Nuclear Plant, Units 1 and 2 (Accession No. ML033570385).

December 16, 2003 Letter from Mr. Kenneth Lord, Superintendent, Houston County Schools, providing comments related to the license renewal of the Joseph M. Farley Nuclear Plant, Units 1 and 2 (Accession No. ML033570388).

December 16, 2003 Letter from Dr. Coy H. Poitevint and Mrs. Louise Poitevint, providing comments related to the license renewal of the Joseph M. Farley Nuclear Plant, Units 1 and 2 (Accession No. ML033570381).

December 17, 2003 Letter from NRC to SNC requesting additional information regarding severe accident mitigation alternatives for the Joseph M. Farley Nuclear Plant, Units 1 and 2 (Accession No. ML033520328).

December 17, 2003 Letter from Mr. Edward Jackson, Judge, Twentieth Judicial Circuit of Alabama, providing comments related to the license renewal of the Joseph M. Farley Nuclear Pant, Units 1 and 2 (Accession No. ML033570382).

December 18, 2003 Letter from NRC to Mr. Don Klima, Director, Advisory Council on Historic Preservation, regarding the Joseph M. Farley Nuclear Plant license renewal review (Accession No. ML033520222).

December 18, 2003 Letter from NRC to Mr. Amos Newsome, Commissioner—District 2, City of Dothan, acknowledging receipt of comments regarding the Joseph M. Farley Nuclear Plant, Units 1 and 2 (Accession No. ML033520502).

December 18, 2003 Letter from NRC to Mr. James H. Reading, Commissioner—District 1, City of Dothan, acknowledging receipt of comments regarding the Joseph M. Farley Nuclear Plant, Units 1 and 2 (Accession No. ML033530055).

December 18, 2003 Letter from NRC to Mr. Dennis L. Rubin, City Manager, City of Dothan, acknowledging receipt of comments regarding the Joseph M. Farley Nuclear Plant, Units 1 and 2 (Accession No. ML033530087).

December 18, 2003 Letter from NRC to Mr. Don Clements, Commissioner—District 3, City of Dothan, acknowledging receipt of comments regarding the Joseph M. Farley Nuclear Plant, Units 1 and 2 (Accession No. ML033530440).

December 18, 2003 Letter from NRC to Mr. Phillip Tidwell, Commissioner—District 6, City of Dothan, acknowledging receipt of comments regarding the Joseph M. Farley Nuclear Plant, Units 1 and 2 (Accession No. ML033530447).

December 18, 2003 Note to file docketing response from the National Marine Fisheries Service (NOAA Fisheries) regarding consultation under Section 7 of the Endangered Species Act in support of the review of the Joseph M. Farley, Units 1 and 2 license renewal application (Accession No. ML033570125).

December 18, 2003	Letter from Mr. R. Lawson Bryan, Senior Minister, First United Methodist Church, providing comments related to the license renewal of the Joseph M. Farley Nuclear Plant, Units 1 and 2 (Accession No. ML033580670).
December 23, 2003	Letter from Mr. Bruce McNeal, Director of Safety/Pre-Hospital Services, Southeast Alabama Medical Center, providing comments related to the license renewal of the Joseph M. Farley Nuclear Plant, Units 1 and 2 (Accession No. ML033640623).
December 29, 2003	Letter from Mr. Selden X. Bailey providing comments related to the license renewal of the Joseph M. Farley Nuclear Plant, Units 1 and 2 (Accession No. ML040060632).
December 30, 2003	Letter from Mr. Ronald S. Owen, Chief Executive Officer, Southeast Alabama Medical Center, providing comments related to the license renewal of the Joseph M. Farley Nuclear Plant, Units 1 and 2 (Accession No. ML040060643).
January 6, 2004	Letter from Mr. Steven Kornegay, Sales Manager, Mayer Electric Supply, providing comments related to the license renewal of the Joseph M. Farley Nuclear Plant, Units 1 and 2 (Accession No. ML040060636).
January 8, 2004	NRC January 8, 2004, scoping meeting slides (Accession No. ML040130083).
January 10, 2004	Letter from NRC to Mr. David L. Hanks, acknowledging receipt of your comments regarding the application for renewal of the operating licenses for Joseph M. Farley Nuclear Plant, Units 1 and 2 (Accession No. ML040200350).
January 10, 2004	Letter from NRC to Mr. Pat Dalbey, acknowledging receipt of your comments regarding the application for renewal of the operating licenses for Joseph M. Farley Nuclear Plant, Units 1 and 2 (Accession No. 040200564).
January 10, 2004	Letter from NRC to Mr. Kenneth Lord, acknowledging receipt of your comments regarding the application for renewal of the operating licenses for Joseph M. Farley Nuclear Plant, Units 1 and 2 (Accession No. 040200579).

January 10, 2004 Letter from NRC to the Honorable Edward Jackson, acknowledging receipt of your comments regarding the application for renewal of the operating licenses for Joseph M. Farley Nuclear Plant, Units 1 and 2 (Accession No. 040200876).

January 10, 2004 Letter from NRC to Mr. Bruce McNeal, acknowledging receipt of your comments regarding the application for renewal of the operating licenses for Joseph M. Farley Nuclear Plant, Units 1 and 2 (Accession No. 040230243).

January 13, 2004 Letter from NRC to Dr. R. Lawson Bryan, acknowledging receipt of your comments regarding the application for renewal of the operating licenses for Joseph M. Farley Nuclear Plant, Units 1 and 2 (Accession No. 040280492).

January 13, 2004 Letter from NRC to Mr. Larry C. Register, acknowledging receipt of your comments regarding the application for renewal of the operating licenses for Joseph M. Farley Nuclear Plant, Units 1 and 2 (Accession No. ML040280466).

January 13, 2004 Letter from NRC to Mr. Robert C. Rudder, Jr., acknowledging receipt of your comments regarding the application for renewal of the operating licenses for Joseph M. Farley Nuclear Plant, Units 1 and 2 (Accession No. ML040230306).

January 13, 2004 Letter from NRC to Mr. Robert A. Hendrix, acknowledging receipt of your comments regarding the application for renewal of the operating licenses for Joseph M. Farley Nuclear Plant, Units 1 and 2 (Accession No. ML040230440).

January 13, 2004 Letter from NRC to Mr. Joseph R. Donofro, acknowledging receipt of your comments regarding the application for renewal of the operating licenses for Joseph M. Farley Nuclear Plant, Units 1 and 2 (Accession No. ML040230521).

January 14, 2004 Letter from NRC to Dr. Coy H. Poitevint and Mrs. Louise Poitevint, acknowledging receipt of your comments regarding the application for renewal of the operating licenses for Joseph M. Farley Nuclear Plant, Units 1 and 2 (Accession No. ML040270146).

January 15, 2004 Letter from NRC to Mr. Selden X. Bailey, acknowledging receipt of your comments regarding the application for renewal of the operating licenses

for Joseph M. Farley Nuclear Plant, Units 1 and 2 (Accession No. ML040200031).

January 16, 2004 — Letter from Mr. Pierce of SNC to Mr. Goldman of the FWS responding to Mr. Goldman's letter dated July 9, 2002, (Accession No. ML040370201).

January 28, 2004 — Email from Mr. Goldman of the FWS to Dr. Garrison stating that the Daphne Alabama Field Office is the lead office for the FNP License renewal review (Accession No. ML040300817).

January 30, 2004 — Letter from NRC to Ms. Starla Moss Matthews, acknowledging receipt of your comments regarding the application for renewal of the operating licenses for Joseph M. Farley Nuclear Plant, Units 1 and 2 (Accession No. ML040340352).

February 5, 2004 — Summary of Public Scoping Meetings to Support Review of the Joseph M. Farley Nuclear Plant, Units 1 and 2 License Renewal Application (Accession No. ML040370553).

February 6, 2004 — Summary of Telecommunication with Southern Nuclear Operating Company (SNC) to Discuss Items Associated with the Environmental Site Audit for the Renewal of the Operating License for the Farley Nuclear Plant, Units 1 and 2 (Accession No. ML040370636).

February 6, 2004 — Letter to NRC from Larry Goldman, Field Supervisor, U.S. Fish and Wildlife Service providing list of Federally endangered species and comments pertaining to Farley Nuclear Plant, Units 1 and 2 (Accession No. ML040790118)

February 12, 2004 — Letter from Mr. L.M. Stinson, SNC, to NRC transmitting responses to environmental audit information requests (Accession No. ML040550159).

February 20, 2004 — Documentation from Mr. Thomas Moorer, SNC, regarding consultation with the FWS (Accession No. ML040580287).

February 24, 2004 — Letter from Bryan Alloway, Mayor of the City of Ashford to the NRC, expressing support for FNP license renewal (ML040690706).

February 26, 2004 — Letter from SNC to NRC supplying additional information regarding severe accident mitigation alternatives for the Joseph M. Farley Nuclear Plant, Units 1 and 2 (Accession No. ML040650645).

February 26, 2004	Letter from NRC to Mr. Steven E. Mashburn, acknowledging receipt of your comments regarding the application for renewal of the operating licenses for Joseph M. Farley Nuclear Plant, Units 1 and 2 (Accession No. ML040610152).
February 26, 2004	Letter from NRC to Mr. William J. Parker, acknowledging receipt of your comments regarding the application for renewal of the operating licenses for Joseph M. Farley Nuclear Plant, Units 1 and 2 (Accession No. ML040610393).
March 10, 2004	Letter from NRC to Mr. Bryan D. Alloway, acknowledging receipt of your comments regarding the application for renewal of the operating licenses for Joseph M. Farley Nuclear Plant, Units 1 and 2 (Accession No. ML040710427).
March 30, 2004	Letter from NRC to Mr. L. M. Stinson transmitting the environmental scoping summary report associated with the staff's review of the Joseph M. Farley Nuclear Plant, Units 1 and 2 (Accession No. ML040900537).
April 22, 2004	Letter from SNC to NRC supplying additional information regarding severe accident mitigation alternatives for the Joseph M. Farley Nuclear Plant, Units 1 and 2 (Accession No. ML041190297).
May 13, 2004	Summary of telecommunication with SNC regarding severe accident mitigation alternatives for the Joseph M. Farley Nuclear Plant, Units 1 and 2 (Accession No. ML041390572).
July 2, 2004	Biological Assessment for License Renewal of the Joseph M. Farley Nuclear Plant, Units 1 and 2, and a Request for Informal Consultation (Accession No. ML041890197).
August 6, 2004	Letter from NRC to the U.S. Environmental Protection Agency forwarding draft supplement 18 to NUREG-1437 regarding Joseph M. Farley Nuclear Plant, Units 1 and 2 for official filing (Accession No. ML042190384).
August 6, 2004	Letter from NRC to SNC forwarding draft Supplement 18 to NUREG-1437 regarding Joseph M. Farley Nuclear Plant, Units 1 and 2 for comment (Accession No. ML042190251).
August 12, 2004	NRC Press Release No. II-04-045, "NRC Staff Seeks Input on Farley Nuclear Plant Draft Environmental Report for License Renewal" (Accession No. ML042250312).

August 26, 2004	Letter from Ms. Serena G. Bellew, Georgia Department of Natural Resources, Historic Preservation Division forwarding finding of no historic properties affected determination regarding the Joseph M. Farley license renewal review (Accession No. ML042460383).
August 30, 2004	NRC meeting notice informing public of meetings to be held in Dothan Alabama, to discuss draft Supplement 18 to NUREG-1437 regarding Joseph M. Farley Nuclear Plant, Units 1 and 2 on September 30, 2004 (Accession No. ML042440145).
September 2, 2004	Letter from the Alabama Historical Commission to the NRC concurring in license renewal of the Joseph M. Farley Nuclear Plant, Units 1 and 2. (Accession Number ML042640261).
October 1, 2004	Email from Mr. Kenneth Chisholm providing comments related to the Joseph M. Farley Nuclear Plant, Units 1 and 2 license renewal review (Accession No. ML042990516).
October 27, 2004	Letter from Ms. Elaine Snyder-Conn, FWS, providing comments related to the Joseph M. Farley Nuclear Plant, Units 1 and 2 license renewal review (Accession No. ML043200355).
October 29, 2004	Letter from Mr. Gregory Hogue, U.S. Department of the Interior, providing comments related to the Joseph M. Farley Nuclear Plant, Units 1 and 2 license renewal review (Accession No. ML ML043350249).
November 2, 2004	Summary of Public DSEIS Meetings Held in Support of the Environmental Review of the Joseph M. Farley Nuclear Plant, Units 1 and 2 License Renewal Application (Accession No. ML043090548).
November 5, 2004	Letter from Mr. Heinz J. Mueller, EPA, providing comments related to the Joseph M. Farley Nuclear Plant, Units 1 and 2 license renewal review (Accession No. ML043210408).

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, State, regional, local, and Native American tribal agencies were contacted:

Advisory Council on Historic Preservation

Alabama Cooperative Extension System, Headland, Alabama

Alabama Historical Commission, Montgomery, Alabama

Chamber of Commerce, Dothan, Alabama

City Manager, Dothan, Alabama

Coldwell Banker, Alfred Saliba Realty, Dothan Alabama

Florida Fish and Wildlife Conservation Commission

Georgia Historic Preservation Division, Atlanta, Georgia

Georgia State Historic Preservation Office, Atlanta, Georgia

Muscogee (Creek) Nation, Okmulgee, Oklahoma

Poarch Band of Creek Nation, Atmore, Alabama

Seminole Tribe of Florida, Hollywood, Florida

University of Alabama Office of Archeological Research, Alabama State Site File, Moundville, Alabama

University of Georgia, Georgia State Site File, Athens, Georgia

U.S. Environmental Protection Agency, Atlanta, Georgia

U.S. Fish and Wildlife Service, Daphne, Alabama

U.S. Fish and Wildlife Service, Fort Benning, Georgia

U.S. Fish and Wildlife Service, Panama City, Florida

U.S. National Oceanic and Atmospheric Administration, National Marine Fisheries Service, St. Petersburg, Florida

Appendix E

Southern Nuclear Operating Company's Compliance Status and Consultation Correspondence

Appendix E: Southern Nuclear Operating Company's Compliance Status and Consultation Correspondence

Correspondence received during the process of evaluation of the application for renewal of the license for Farley 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 Farley 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 (L. Goldman)	November 26, 2003
U.S. Nuclear Regulatory Commission (P.T. Kuo)	NOAA Fisheries, Southeast Regional Office (R. Crabtree)	November 26, 2003
U.S. Nuclear Regulatory Commission (P.T. Kuo)	Georgia State Historic Preservation Office (L.C. Barrett)	November 26, 2003
U.S. Nuclear Regulatory Commission (P.T. Kuo)	Alabama State Historic Preservation Office (L. Warner)	November 26, 2003
NOAA Fisheries (S. Bolden)	U.S. Nuclear Regulatory Commission (J. Cushing)	December 11, 2003 (email)
U.S. Nuclear Regulatory Commission (P.T. Kuo)	Advisory Council on Historic Preservation (D. Klima)	December 18, 2003
Southern Nuclear Operating Company (C.R. Pierce)	U.S. Fish and Wildlife Service (L. Goldman)	January 16, 2004
U.S. Fish and Wildlife Service (L. Goldman)	U.S. Nuclear Regulatory Commission (Dr. Garrison)	January 28, 2004 (email)
U.S. Fish and Wildlife Service (L. Goldman)	U.S. Nuclear Regulatory Commission (P.T. Kuo)	February 6, 2004
U.S. Nuclear Regulatory Commission (P.T. Kuo)	U.S. Fish and Wildlife Service (L. Goldman)	July, 2, 2004
Georgia Dept. of Natural Resources (S.G. Bellew)	U.S. Nuclear Regulatory Commission	August 26, 2004
Alabama Historical Commission (E.A. Brown)	U.S. Nuclear Regulatory Commission (J. Cushing)	September 2, 2004
U.S. Fish and Wildlife Service (E. Snyder-Conn)	U.S. Nuclear Regulatory Commission (P.T. Kuo)	October 27, 2004

Table E-2. Federal, State, Local, and Regional Licenses, Permits, Consultations, and Other Approvals for Farley Units 1 and 2

Agency	Authority	Description	Number	Issue Date	Expiration Date	Remarks
NRC	10 CFR Part 50	Operating license, Farley Unit 1	NPF-5 (Unit 1)	December 1, 1977	June 5, 2017	Authorizes operation of Unit 1.
NRC	10 CFR Part 50	Operating license, Farley Unit 2	NPF-8 (Unit 2)	July 30, 1981	March 31, 2021	Authorizes operation of Unit 2.
FWS	Section 7 of the Endangered Species Act (16 USC 1536)	Consultation	N/A			Requires a Federal agency to consult with the FWS regarding whether a proposed action will affect endangered or threatened species.
USACE	Section 10 of the Rivers and Harbors Act (33 USC 403) and Section 404 of the Clean Water Act (33 USC 1344)	Permit	AL01-02094-V	February 1, 2002	February 1, 2007	Authorizes maintenance dredging of intake structure and canal.
DOT—Research and Special Programs Administration	HMTA (49 USC 5108) 49 CFR Part 107, Subpart G	Registration	061603001014L	June 8, 2004	June 30, 2005	Authorizes transportation of hazardous materials on public highways.

Agency	Authority	Description	Number	Issue Date	Expiration Date	Remarks
Alabama Historical Commission	Section 106 of the National Historic Preservation Act (16 USC 470f)	Consultation		June 11, 2002		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.
Georgia Department of Natural Resources Historical Preservation Division	Section 106 of the National Historic Preservation Act (16 USC 470f)	Consultation		June 14, 2002		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.
Florida Division of Historical Resources	Section 106 of the National Historic Preservation Act (16 USC 470f)	Consultation		June 14, 2002		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.

Agency	Authority	Description	Number	Issue Date	Expiration Date	Remarks
EPA and ADEM—Water Division	Section 402 of the Clean Water Act (33 USC 1251-1378); Alabama Water Pollution Control Act (Code of Alabama Sections 22-22-1 to 22-22-14); Alabama Environmental Management Act (Code of Alabama Sections 22-22A-1 to 22-22A-15)	National Pollution Discharge Elimination System Permit	AL0024619	February 9, 2001	February 28, 2006	Permit for regulating the discharge of liquid industrial and sanitary wastes and storm waters to waters of the United States.
ADEM—Water Division	Code of Alabama Sections 22-36-3 and 22-36-4	Permit	10146 069 010975	January 30, 1998	Renewed annually	This permit covers operation of one of two underground petroleum storage tanks.
ADEM—Water Division	Alabama Safe Drinking Water Act (Code of Alabama Sections 22-23-30 to 22-23-53); Alabama Environmental Management Act (Code of Alabama Sections 22-22A-1 to 22-22A-15)	Permit	96-583	August 15, 1996	October 1, 2006	This permit authorizes the operation of a public water supply system.
ADEM—Land Division	ADEM Administrative Code Rule 335-13-7	Generator identification	G-OTH00504	November 23, 1992	N/A	All medical waste generators are required to prepare and obtain an identification number and manage their waste in accordance with a Medical Waste Management Plan.

Agency	Authority	Description	Number	Issue Date	Expiration Date	Remarks
ADEM—Land Division	Solid Waste Disposal Act (Code of Alabama Sections 22-27-1 to 22-27-27); Alabama Environmental Management Act (Code of Alabama Sections 22-22A-1 to 22-22A-15)	Permit	35-05	December 16, 2002	December 15, 2007	The permit authorizes operation of, and establishes types and amounts of, waste approved for disposal in the onsite Farley landfill.
ADEM—Air Division				January 14, 1997	N/A	ADEM Administrative Code (ADEM Code 335-3-15-02-10, as adopted December 10, 1996)
Alabama Department of Economic and Community Development	Alabama Water Resources Act (Code of Alabama Section 9-10B-19); Administrative Rules implementing the Alabama Water Use Reporting Program	Certificate of Use	OWR-0063	August 23, 1994, Revised December 5, 2003	January 1, 2034	The permit authorizes withdrawal of groundwater and surface water for domestic and industrial uses.
South Carolina Department of Health and Environmental Control—Division of Radioactive Waste Management	South Carolina Radioactive Waste Transportation and Disposal Act (Act No. 429)	Permit	0051-01-03-X	November 12, 2003	December 31, 2005	Authorization to transport radioactive waste into the State of South Carolina.
State of Tennessee Department of Environment and Conservation Division of Radiological Health	Tennessee Code TN Regulation 1200-2-10.3(8)(d)	Permit	T-AL003-L03	Annually	December 31, 2005	Authorization to transport radioactive waste into the State of Tennessee.

Agency	Authority	Description	Number	Issue Date	Expiration Date	Remarks
Georgia Public Service Commission—Compliance and Safety Transportation Division	Rules of the Georgia Public Service Commission Chapter 1-15-1	Permit	N/A	Annually	December 31, 2005	Authorization to transport radioactive waste into the State of Georgia.
State of Utah Department of Environmental Control Division of Radiological Control	Utah Radiation Controls Rules R313-26	Permit	0112001241	Annually	December 31, 2005	The generator site access permit authorizes direct transport of radioactive waste to the Utah Envirocare Burial Site.

ADEM = Alabama Department of Environmental Management
CFR = Code of Federal Regulations
DOT = U.S. Department of Transportation
EPA = U.S. Environmental Protection Agency
FWS = U.S. Fish and Wildlife Service
HMTA = Hazardous Materials Transportation Act
NMFS = National Marine Fisheries Service
NPDES = National Pollution Discharge Elimination System
NRC = U.S. Nuclear Regulatory Commission
SHPO = State Historic Preservation Officer
USACE = U.S. Army Corps of Engineers
USC = United States Code

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

November 26, 2003

Mr. Larry Goldman
Field Supervisor
U.S. Fish and Wildlife Service
Daphne Field Office
P.O. Drawer 1190
Daphne, AL 36526

SUBJECT: REQUEST FOR LIST OF PROTECTED SPECIES WITHIN THE AREA UNDER EVALUATION FOR THE JOSEPH M. FARLEY NUCLEAR PLANT LICENSE RENEWAL

Dear Mr. Goldman:

The U.S. Nuclear Regulatory Commission (NRC) is reviewing an application submitted by Southern Nuclear Operating Company, Inc. (SNC) for the renewal of the operating licenses for Joseph M. Farley Nuclear Plant Units 1 and 2 (FNP). FNP is located in Houston County, Alabama, on the west bank of the Chattahoochee 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) of 1969, as amended, which includes an analysis of pertinent environmental issues, including endangered or threatened species and impacts to fish and wildlife. This letter is being submitted under the provisions of the Endangered Species Act of 1973, as amended and the Fish and Wildlife Coordination Act of 1934, as amended.

The proposed license renewal would include use and continued maintenance of existing plant facilities and transmission lines and would not result in new construction or disturbance. Any maintenance activities would be limited to previously disturbed areas. In total, for the specific purpose of connecting FNP to the regional transmission system, there are 473 kilometers (km) or 293.5 miles (mi) of corridor that occupy approximately 2,167 hectares (ha) or 5,335 acres (ac) of land. In Alabama, the transmission lines traverse the counties of Houston, Montgomery, Henry, Geneva, Dale, Pike, and Barbour counties. In Georgia, the lines cross Early, Baker, Mitchell, Tift, Worth, Miller, Seminole, and Decatur counties. In Florida, the lines traverse Jackson county. Two figures are enclosed which show the site boundary and transmission lines.

FNP-Webb Line: This line is 17 km (10.5 mi) long with a right-of-way (ROW) width of 38 meters (m) or 125 feet (ft) and it occupies 64 ha (159 ac). This line lies entirely in Alabama.

FNP-Pinckard Line: This line is 50 km (31 mi) long with a ROW width of 38 m (125 ft) and occupies 190 ha (469 ac). This line occurs entirely in Alabama.

FNP-S. Bainbridge Line: This line shares the ROW with the Farley-Raccoon Creek line for approximately the first 11 km (7 mi) of the ROW from the FNP site. The line is 74 km (46 mi) long with a ROW width of 38 m (125 ft) and occupies 282 ha (697 ac). This line crosses into Georgia from Alabama.

FNP-Raccoon Creek Line: This line shares the ROW with the Farley-S. Bainbridge line; specifically it shares the first 11 km (7 mi) of this ROW. The line is 100 km (62 mi) long with a ROW width of 46 m (150 ft) and occupies 456 ha (1,127 ac). This line also crosses into Georgia from Alabama.

FNP-Sinai Cemetery Line: This line is approximately 77 km (96 mi) long with a ROW width of 38 m (125 ft) and it occupies 236 ha (582 ac). This line crosses into Florida from Alabama.

The plant uses a closed-cycle cooling system with six mechanical draft cooling towers (i.e., each unit has three 14-cell cooling towers). The plant draws from and discharges to the Chattahoochee River to remove waste heat from the facility. River water is drawn through a canal that is perpendicular to river flow, to a storage pond, and then into the cooling towers. The heated water is discharged back to the Chattahoochee River through a single pipe, approximately 530 m (1,740 ft) downstream of the intake structure. The plant also uses both surface and groundwater to meet its water supply needs. Groundwater is used for potable, make-up, and fire-protection systems.

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 FNP and its associated transmission lines. In addition, please provide any information you consider appropriate under the provisions of the Fish and Wildlife Coordination Act.

On January 7, 2004, we plan to conduct a site audit. We plan to hold two public NEPA scoping meetings on January 8, 2004, at the Quality Inn, 3053 Ross Clark Circle, Dothan, Alabama 36301. You and your staff are invited to attend both the site audit and the public meetings. Your office will receive a copy of the draft SEIS along with a request for comments. The anticipated publication date for the draft SEIS is August 2004.

If you have any questions concerning FNP, the license renewal application, or other aspects of this project, please contact Mr. Jack Cushing, Environmental Project Manager, at (301) 415-1424 or by e-mail at JXC9@nrc.gov.

Sincerely,

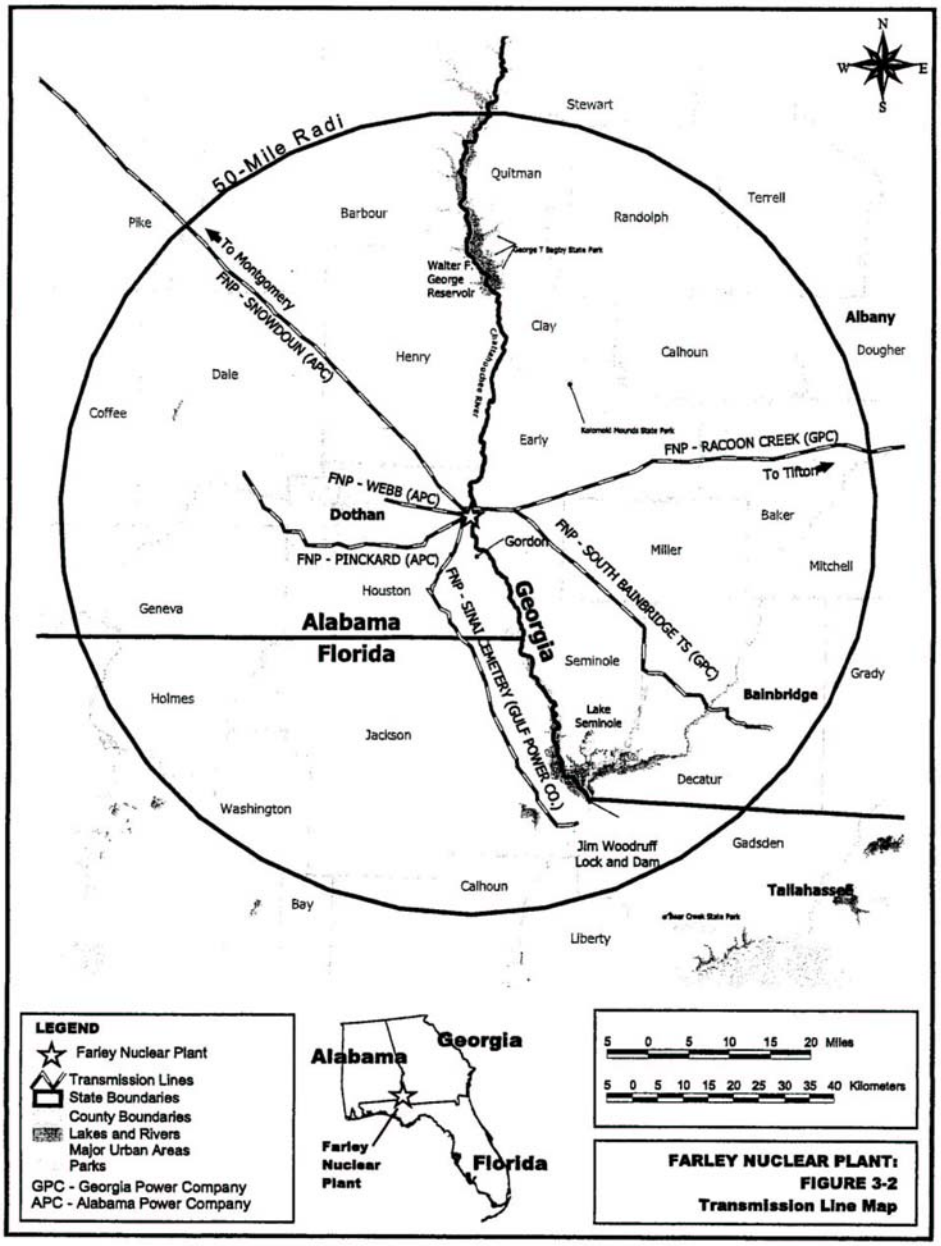
Pao-Tsin Kuo, Program Director
License Renewal and Environmental Impacts
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

Docket Nos.: 50-348, 50-364

Enclosures: As stated

cc w/encl.: See next page

ENCLOSURES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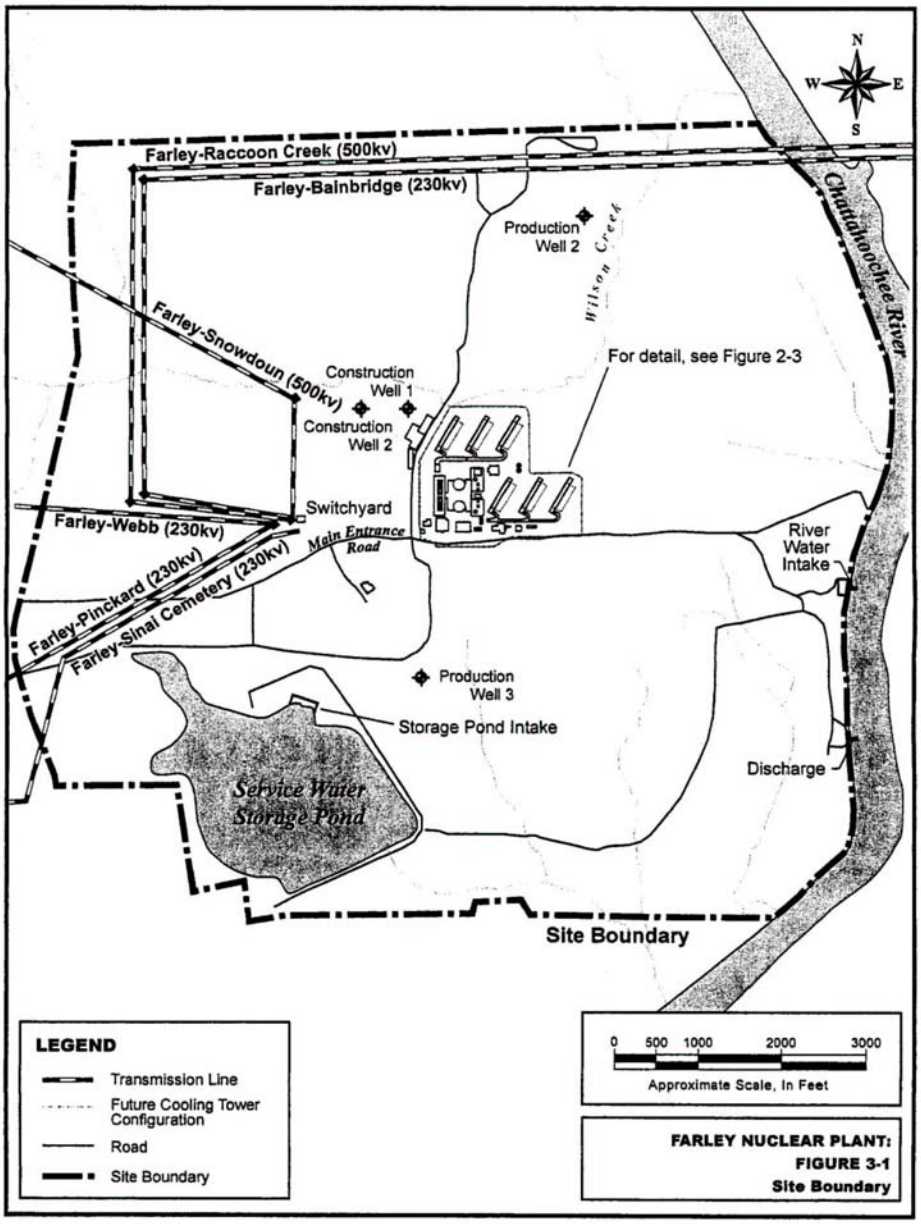
To Montgomery
FNP - SNOWDOUN (APC)
Walter F. George Reservoir
Clay
Albany
Dougher
Henry
Calhoun
Dale
Coffee
Early
FNP - RACOON CREEK (GPC)
To Tifton
FNP - WEBB (APC)
Dothan
Baker
Gordon
Miller
Mitchell
FNP - PINCKARD (APC)
Houston
Geneva
Alabama
Florida
Georgia
FNP - SINAI CEMETERY (GULF POWER CO.)
FNP - SOUTH BAINBRIDGE TS (GPC)
Seminole
Grady
Bainbridge
Holmes
Lake Seminole
Jackson
Decatur
Washington
Jim Woodruff Lock and Dam
Gadsden
Calhoun
Tallahassee
Bay
Liberty
LEGEND
Farley Nuclear Plant
Transmission Lines
State Boundaries
County Boundaries
Lakes and Rivers
Major Urban Areas
Parks
GPC - Georgia Power Company
APC - Alabama Power Company
Alabama
Georgia
Florida
Farley Nuclear Plant
5 0 5 10 15 20 Miles
5 0 5 10 15 20 25 30 35 40 Kilometers
FARLEY NUCLEAR PLANT:
FIGURE 3-2
Transmission Line Map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Farley-Raccoon Creek (500kv)
Farley-Bainbridge (230kv)
Production Well 2
Wilson Creek
Chattahoochee River
Farley-Snowdoun (500kv)
For detail, see Figure 2-3
Construction Well 1
Construction Well 2
Switchyard
Farley-Webb (230kv)
Main Entrance Road
River Water Intake
Farley-Pinckard (230kv)
Farley-Sinai Cemetery (230kv)
Production Well 3
Storage Pond Intake
Discharge
Service Water Storage Pond
Site Boundary
LEGEND
Transmission Line
Future Cooling Tower Configuration
Road
Site Boundary
0 500 1000 2000 3000
Approximate Scale, In Feet
FARLEY NUCLEAR PLANT:
FIGURE 3-1
Site Boundary

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

November 26, 2003

Dr. Roy Crabtree
Regional Administrator
NOAA Fisheries
Southeast Regional Office
9721 Executive Center Drive North
St. Petersburg, FL 33702

SUBJECT: REQUEST FOR LIST OF PROTECTED SPECIES WITHIN THE AREA UNDER EVALUATION FOR THE JOSEPH M. FARLEY NUCLEAR PLANT LICENSE RENEWAL

Dear Dr. Crabtree:

The U.S. Nuclear Regulatory Commission (NRC) is reviewing an application submitted by Southern Nuclear Operating Company, Inc. (SNC) for the renewal of the operating licenses for Joseph M. Farley Nuclear Plant Units 1 and 2 (FNP). FNP is located in Houston County, Alabama, on the west bank of the Chattahoochee 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) of 1969, as amended, which includes an analysis of pertinent environmental issues, including endangered or threatened species and impacts to fish and wildlife. This letter is being submitted under the provisions of the Endangered Species Act of 1973, as amended, and the Fish and Wildlife Coordination Act of 1934, as amended.

SNC contacted your office on May 7, 2002 (Enclosure 1), and your office responded by the enclosed letter dated June 21, 2002 (Enclosure 2), identifying the presence of the Gulf sturgeon (*Acipenser oxyrinchus desotoi*) within the Apalachicola-Chattahoochee-Flint river system. The NRC has contacted the FWS and requested a list of species and information on protected, proposed, and candidate species and critical habitat that may be in the vicinity of FNP and its associated transmission lines from U.S. Fish and Wildlife Service (FWS). The NRC also requests that the National Marine Fisheries Service (NMFS) provide a list of species and information on protected, proposed, and candidate species and critical habitat that may be in the vicinity of FNP and its associated transmission lines.

In your June 21, 2002, letter, you stated that Section 7 consultation regarding the Gulf sturgeon would likely fall within the purview of FWS. The NRC requests that you confirm to us if the NMFS would be involved in any Section 7 consultation on the Gulf sturgeon.

The proposed action would include use and continued maintenance of existing plant facilities and transmission lines and would not result in new construction or disturbance. Any maintenance activities would be limited to previously disturbed areas. In total, for the specific purpose of connecting FNP to the regional transmission system, there are 473 kilometers (km) or 293.5 miles (mi) of corridor that occupy approximately 2,167 hectares (ha) or 5,335 acres (ac) of land. In Alabama, the transmission lines traverse the counties of Houston, Montgomery,

2

Henry, Geneva, Dale, Pike, and Barbour counties. In Georgia, the lines cross Early, Baker, Mitchell, Tift, Worth, Miller, Seminole, and Decatur counties. In Florida, the lines traverse Jackson county. Two figures are enclosed which show the site boundary and transmission lines (Enclosure 3).

FNP-Webb Line: This line is 17 km (10.5 mi) long with a right-of-way (ROW) width of 38 meters (m) or 125 feet (ft) and it occupies 64 ha (159 ac). This line lies entirely in Alabama.

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On January 7, 2004, the NRC plans to conduct a site audit. In addition, we plan to hold two public NEPA scoping meetings on January 8, 2004, at the Quality Inn, 3053 Ross Clark Circle, Dothan, Alabama 36301. Your staff is invited to attend both the site audit and the public meetings. Additional information on these activities will be forwarded to Mr. David Bernhart. The NRC staff will forward to your office a copy of the draft SEIS along with a request for comments. The anticipated publication date for the draft SEIS is August 2004.

R. Crabtree 3

If you have any questions concerning FNP, the license renewal application, or other aspects of this project, please contact Mr. Jack Cushing, Environmental Project Manager, at (301) 415-1424 or by e-mail at JXC9@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.: 50-348, 50-364

Enclosures: As stated

cc w/encl.: See next page

ENCLOSURES

Southern Nuclear
Operating Company, Inc.
P. O. Box 1295
Birmingham, Alabama 35201-1295
Tel 205.992.5000

SOUTHERN COMPANY
Energy to Serve Your World™

May 7, 2002

Mr. Charles Oravetz
Chief, Protected Species Branch
National Marine Fisheries Service
Southeast Regional Office
9721 Executive Center Drive North
St. Petersburg, Florida 33702

Re: Joseph M. Farley Nuclear Plant
Request for Information on Threatened or Endangered Species

Dear Mr. Oravetz:

Southern Nuclear Operating Company (SNC) is preparing an application to the U.S. Nuclear Regulatory Commission (NRC) to renew the operating licenses for Farley Nuclear Plant Units 1 and 2 (FNP). The current operating licenses for Units 1 and 2 expire in 2017 and 2021, respectively. As part of the license renewal process, the NRC requires license applicants to "assess the impact of the proposed action on threatened or endangered species in accordance with the Endangered Species Act" (10CFR51.53). The NRC will be communicating with your organization during the application review of FNP's environmental report. We are contacting you early in the application process to identify any issues that need to be addressed or any information your office may need to expedite the NRC's review.

Flows in the lower Chattahoochee River (the portion of the river between Walter F. George Reservoir and the Chattahoochee-Flint confluence) are influenced by a series of locks and dams built in the 1950s for flow regulation, hydroelectric power generation, and improved navigation. Historically, the lower Chattahoochee River was subject to extreme seasonal fluctuations in flow and was navigable only at certain times of the year. After the three locks and dams were completed, it was possible for large vessels (including tugboats and barges) to move from the Gulf of Mexico to Columbus, Georgia, via a 9-foot-deep and 100-foot-wide channel maintained by the U.S. Army Corps of Engineers.

The construction of locks and dams along the lower Chattahoochee in the 1950s severely reduced or eliminated surviving runs of most anadromous fishes native to the river system, including the Gulf sturgeon (*Acipenser oxyrinchus desotoi*), Alabama shad (*Alosa alabamae*), and Gulf Coast striped bass (*Morone saxatilis*). Gulf sturgeon were abundant in the Chattahoochee before European settlement in the 19th century, ascending the river as far as the Fall Line. Habitat destruction and overfishing in the late-19th and early 20th century decimated the Chattahoochee River population, and completion of the Jim Woodruff Lock and Dam in 1957 effectively eliminated it. Alabama shad still migrate from the Gulf of Mexico into the Apalachicola River below Jim Woodruff Dam, but are blocked from moving upstream into the Chattahoochee River.

Enclosure 1

A landlocked population of striped bass occurs in the Chattahoochee River above Jim Woodruff Dam, but there is little or no movement to and from the Gulf of Mexico. Some Chattahoochee River striped bass do move downstream and pass the Jim Woodruff Lock and Dam when river flows are unusually high, but the Jim Woodruff Dam prevents upstream movement, so these fish are unable to return to the Chattahoochee River to spawn. Large numbers of striped bass (800,000) are stocked annually in the Apalachicola-Chattahoochee-Flint river system, including Lake Seminole and Walter F. George Reservoir. Striped bass are not plentiful in the Chattahoochee River adjacent to FNP, but they are occasionally caught by anglers pursuing the more common white and hybrid bass up- and downstream of George W. Andrews Lock and Dam.

In more than 25 years of monitoring the fish populations of the lower Chattahoochee River, Alabama Power and its contractors have never collected a listed anadromous species.

SNC is committed to the conservation of significant natural habitats and protected species, and expects that operation of the Plant through the license renewal period (an additional 20 years) would not adversely affect any listed marine species. SNC does not have any plans to alter current operations over the license renewal period. Any maintenance activities necessary to support license renewal would be limited to previously-disturbed areas. There is expansion of existing facilities planned, and there is no additional land disturbance anticipated in support of license renewal. We therefore request your concurrence with our determination that license renewal would have no effect on threatened or endangered anadromous species (including candidate species and species proposed for listing) and that formal consultation is not necessary. After your review, we would appreciate your sending a letter to us detailing any concerns you may have about any listed species in the area or confirming SNC's conclusion that operation of FNP over the license renewal term would have no effect on any threatened or endangered species under the jurisdiction of the National Marine Fisheries Service. SNC will include a copy of this letter and your response in the Environmental Report that will be submitted to the NRC as part of the FNP license renewal application.

Please do not hesitate to call Mr. Jim Davis at (205) 992-7692 if you have any questions or require any additional information.

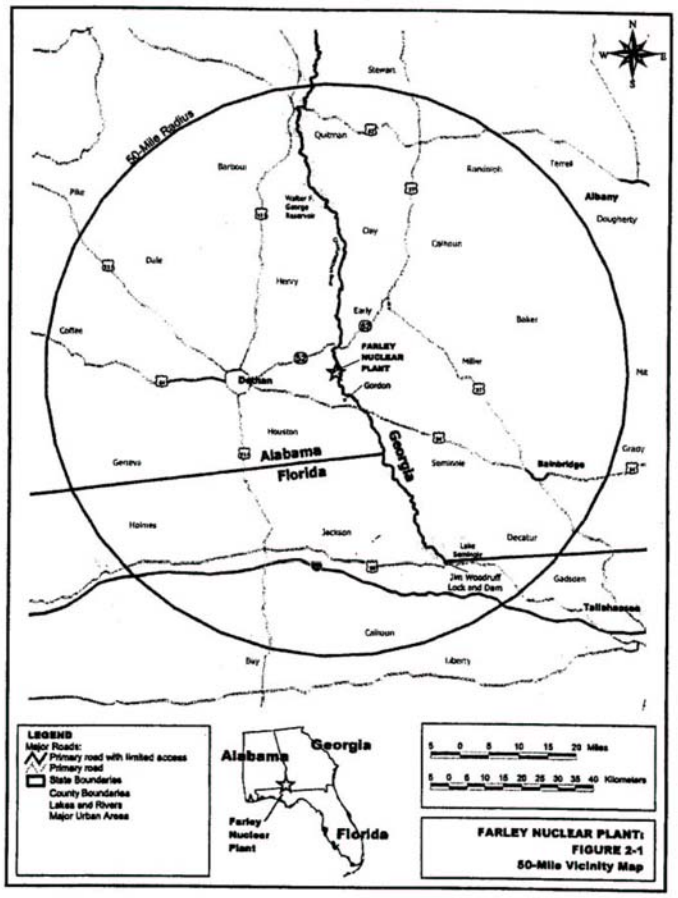
Sincerely,

C R Pierce

C. R. Pierce
License Renewal Services Manager

Enclosure: Figure 2-1

cc: L. M. Stinson
M. J. Ajluni
W. C. Carr
T. C. Moorer
J. T. Davis


50-Mile Radius
Stewart
Quitman
Randolph
Terrell
Albany
Dougherty
Calhoun
Clay
Early
Baker
Miller
Mitchell
Grady
Seminole
Bainbridge
Decatur
Lake Seminole
Jim Woodruff Lock and Dam
Gadsden
Tallahassee
Jackson
Holmes
Washington
Bay
Calhoun
Liberty
Houston
Geneva
Coffee
Dale
Henry
Barbour
Pike
Walter F. George Reservoir
FARLEY NUCLEAR PLANT
Gordon
Alabama
Florida
Georgia
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S
LEGEND
Major Roads:
Primary road with limited access
Primary road
State Boundaries
County Boundaries
Lakes and Rivers
Major Urban Areas
Alabama
Georgia
Florida
Farley Nuclear Plant
5 0 5 10 15 20 Miles
5 0 5 10 15 20 25 30 35 40 Kilometers
FARLEY NUCLEAR PLANT:
FIGURE 2-1
50-Mile Vicinity Map

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southeast Regional Office
9721 Executive Center Dr. N.
St. Petersburg, FL 33702
(727) 570-5312, FAX 570-5517
http://caldera.sero.nmfs.gov

F/SER3:SKB

JUN 21 2002

Mr. C.R. Pierce
License Renewal Services Manager
Southern Nuclear Operating Company, Inc.
P.O. Box 1295
Birmingham, Alabama 35201- 1295

Dear Mr. Pierce:

This is in response to your May 7, 2002, letter regarding the renewal of the operating licenses for the Farley Nuclear Plant (FNP) Units 1 and 2. Thank you for giving us the opportunity to comment on the project so early in the application process. We have considered the project and submit the following with respect to possible effects on the threatened Gulf sturgeon (*Acipenser oxyrinchus desotoi*), listed September 30, 1991 under the Endangered Species Act (ESA).

The FNP is located on the Chattahoochee River which is a part of the Apalachicola-Chattahoochee-Flint river system. The Chattahoochee and the Flint rivers join near the Florida/Georgia state borders and form Lake Seminole which then drains through the Jim Woodruff Lock and Dam (JWLD) into the Apalachicola River. Although there are numerous reports of Gulf sturgeon in the Chattahoochee and Flint rivers prior to the construction of the JWLD, no evidence exists that Gulf sturgeon pass through the JWLD system. Therefore it is likely that the JWLD precludes any passage of the Gulf sturgeon from the Apalachicola River into Lake Seminole and contiguous rivers.

Critical habitat was proposed for the Gulf sturgeon on June 6, 2002, (67 FR 39105). The Apalachicola River (from its mainstem beginning at the JWLD downstream to its discharge at Apalachicola Bay, Florida, including all Apalachicola River distributaries) was included in the proposed Gulf sturgeon critical habitat designation. This inclusion as proposed critical habitat demonstrates the Apalachicola's essential role in the conservation of the Gulf sturgeon.

Riverine spawning sites were identified as a constituent element (essential for conservation) in the proposed Gulf sturgeon critical habitat designation. Gulf sturgeon require specific substrate suitable for egg deposition and development such as limestone outcrops and cut limestone banks, bedrock, large gravel or cobble beds, marl, soapstone or hard clay. Because the Gulf sturgeon were abundant in the Chattahoochee prior to construction of the JWLD, suitable habitat was

evidently available in the river. Currently the distribution and availability of appropriate Gulf sturgeon spawning habitat in the Chattahoochee River is unknown.

We recommend FNP initiate a reconnaissance study to investigate the availability and distribution of appropriate Gulf sturgeon spawning habitat in the lower Chattahoochee River. NMFS would be happy to participate in the design of such a study and the results would immediately assist in our efforts to conserve the Gulf sturgeon.

NMFS also recommends that you contract the U.S. Fish and Wildlife Service (FWS) for their concurrence with your determination that license renewal would not effect listed species, and that formal consultation in the license renewal application would not be necessary. Although the Gulf sturgeon is jointly managed by FWS and NMFS, division of jurisdictional responsibilities was proposed in the June 6 critical habitat designation. In the proposed rule (67 FR 39105, June 6, 2002), consultation coordination was proposed as follows: FWS is responsible for all riverine actions, consultations for estuarine activities are to be directed to either FWS or NMFS based on action agency, and NMFS is responsible for all consultations in marine areas. Therefore, because of location, section 7 consultation for the FNP is likely to fall within FWS jurisdiction.

We look forward to working with the Southern Nuclear Operating Company, Inc. and the FNP in conserving our endangered and threatened resources. If you have any questions, please contact Dr. Stephania Bolden, fishery biologist, at (727) 570 - 5312 or by e-mail at stephania.bolden @noaa.gov.

Sincerely yours,

Georgia Cranmore
Assistant Regional Administrator
for Protected Resources

cc: F/PR3
FWS - Panama City

Ref: I/SER/2002/00498
o:\section7\informal\sturgeon\farleynuclear.wpd
File: 1514-22.o. (NRC)

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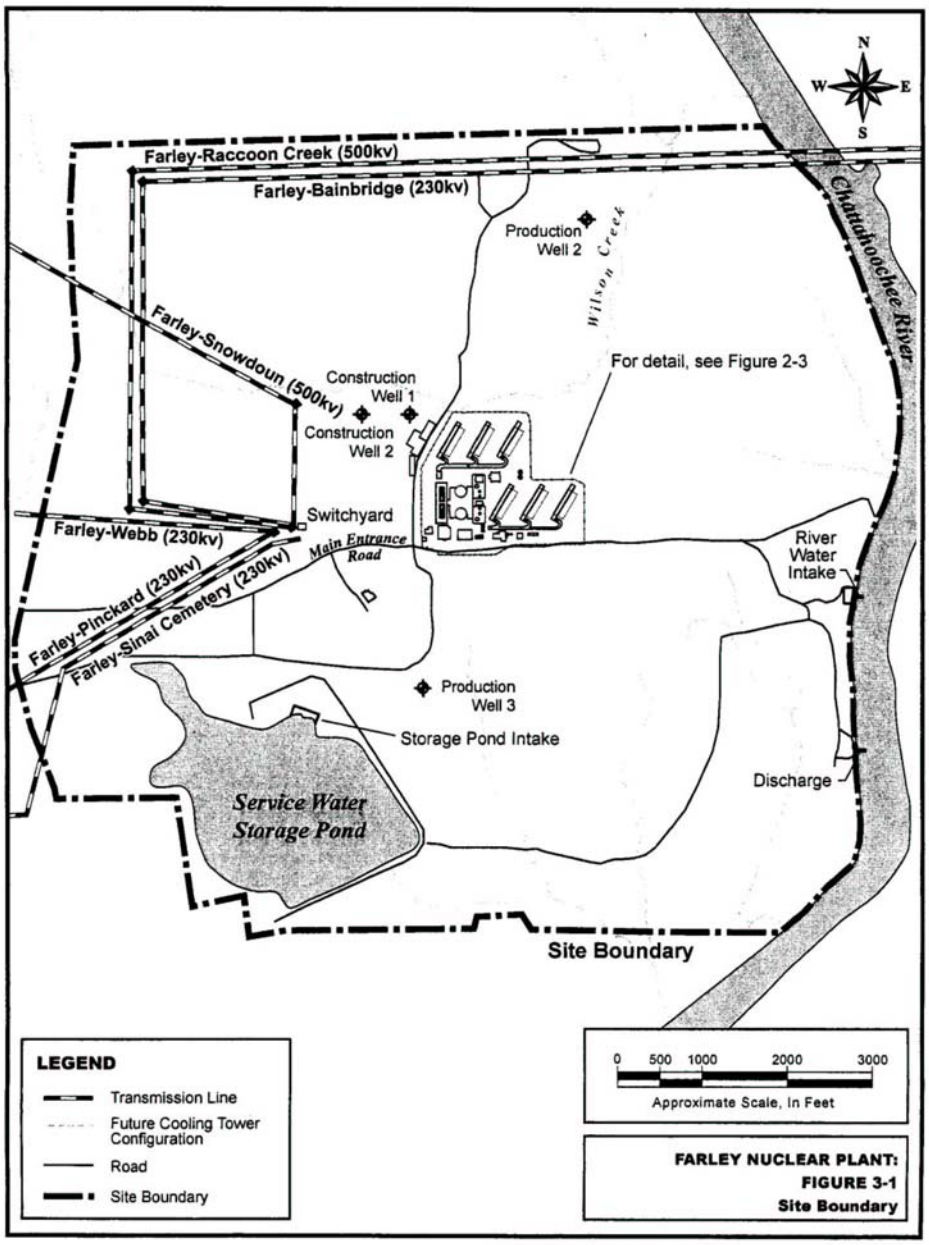
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Farley-Raccoon Creek (500kv)
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For detail, see Figure 2-3
Switchyard
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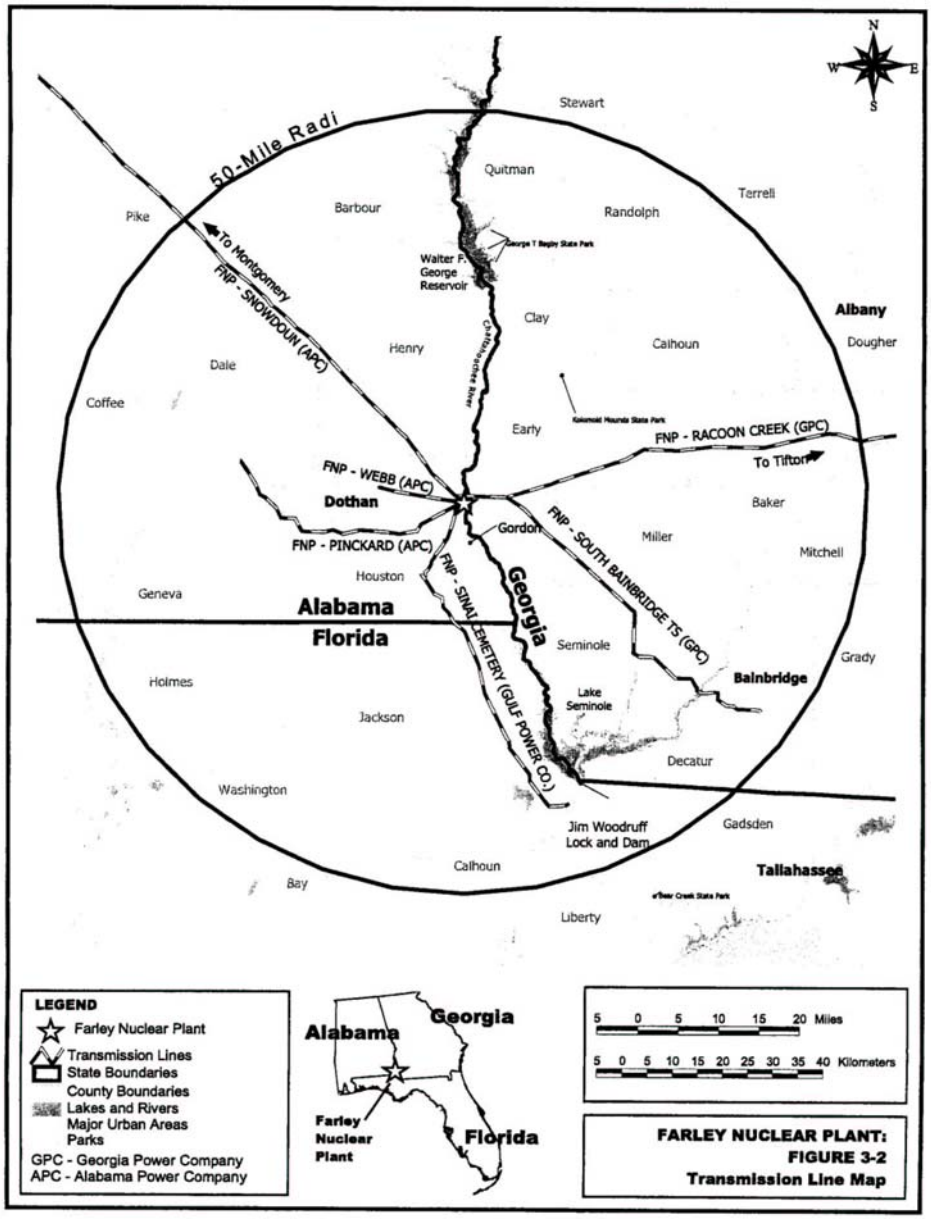
Main Entrance Road
River Water Intake
Farley-Pinckard (230kv)
Farley-Sinai Cemetery (230kv)
Production Well 3
Storage Pond Intake
Discharge
Service Water Storage Pond
Site Boundary
LEGEND
Transmission Line
Future Cooling Tower Configuration
Road
Site Boundary
0 500 1000 2000 3000
Approximate Scale, In Feet
FARLEY NUCLEAR PLANT:
FIGURE 3-1
Site Boundary


50-Mile Radi
N
W
E
S
Stewart
Quitman
Terrell
Randolph
Barbour
Pike
To Montgomery
FNP - SNOWDOUN (APC)
Walter F. George Reservoir
George T. Bagby State Park
Albany
Clay
Dougher
Calhoun
Henry
Dale
Coffee
Chattahoochee River
Early
Kolomoki Mounds State Park
FNP - RACOON CREEK (GPC)
To Tifton
FNP - WEBB (APC)
Dothan
Baker
Gordon
FNP - PINCKARD (APC)
Miller
Mitchell
FNP - SOUTH BAINBRIDGE TS (GPC)
Houston
Georgia
Geneva
Alabama
Florida
FNP - SINAI CEMETERY (GULF POWER CO.)
Seminole
Grady
Bainbridge
Holmes
Lake Seminole
Jackson
Decatur
Washington
Jim Woodruff Lock and Dam
Gadsden
Calhoun
Tallahassee
Bay
Liberty
LEGEND
Farley Nuclear Plant
Transmission Lines
State Boundaries
County Boundaries
Lakes and Rivers
Major Urban Areas
Parks
GPC - Georgia Power Company
APC - Alabama Power Company
Alabama
Georgia
Florida
Farley Nuclear Plant
5 0 5 10 15 20 Miles
5 0 5 10 15 20 25 30 35 40 Kilometers
FARLEY NUCLEAR PLANT:
FIGURE 3-2
Transmission Line Map

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

November 26, 2003

Mr. Lonice C. Barrett
State Historic Preservation Officer/DNR
156 Trinity Avenue, SW, Suite 101
Atlanta, GA 30303-3600

SUBJECT: JOSEPH M. FARLEY NUCLEAR PLANT LICENSE RENEWAL REVIEW (REFERENCE NO. HP-020513-004)

Dear Mr. Barrett:

The U.S. Nuclear Regulatory Commission (NRC) staff is reviewing an application to renew the operating licenses for Joseph M. Farley Nuclear Plant, Units 1 and 2 (FNP), which is located in Houston County, Alabama, on the west bank of the Chattahoochee River. FNP is operated by Southern Nuclear Operating Company, Inc. (SNC). The application for renewal was submitted by SNC on September 15, 2003, pursuant to NRC requirements at Title 10 of the *Code of Federal Regulations* Part 54 (10 CFR Part 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 August of 2004, and will be provided to you for review and comment.

In the context of the National Historic Preservation Act of 1966, as amended, 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, may potentially have an effect on known or proposed historic sites. This determination is made irrespective of ownership or control of the lands of interest.

While preparing its application, SNC contacted your office by letter dated May 7, 2002, and your office responded on June 14, 2002. In its letter, SNC stated that the operation of FNP will not adversely affect cultural or historical resources in the area because SNC does not have any plans to alter current operations over the license renewal period. SNC further stated that no expansion of existing facilities is planned, and that no major structural modifications have been identified for the purpose of license renewal. Also, no land-disturbing activities are anticipated beyond those required for routine maintenance and repairs. The June 14, 2002, response memorandum determined that no historic properties or archaeological resources that are listed in or eligible for listing in the National Register of Historic Places will be affected by this undertaking.

3

On January 8, 2004, the NRC will conduct two public NEPA scoping meetings at the Quality Inn, 3053 Ross Clark Circle, Dothan, Alabama, 36301-1121. You and your staff are invited to attend. The anticipated publication date for the draft SEIS is August 2004. Your office will receive a copy of the draft SEIS for review and comment. If you have any questions or require additional information, please contact the Environmental Project Manager for the FNP project, Mr. Jack Cushing at 301-415-1424 or JXC9@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.: 50-348, 50-364

cc: See next page

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

November 26, 2003

Dr. Lee Warner
State Historic Preservation Officer
Alabama Historical Commission
468 South Perry Street
Montgomery, AL 36130-0900

SUBJECT: JOSEPH M. FARLEY NUCLEAR PLANT LICENSE RENEWAL REVIEW (REFERENCE NO. AHC 02-0940)

Dear Dr. Warner:

The U.S. Nuclear Regulatory Commission (NRC) staff is reviewing an application to renew the operating licenses for Joseph M. Farley Nuclear Plant, Units 1 and 2 (FNP), which is located in Houston County, Alabama, on the west bank of the Chattahoochee River. FNP is operated by Southern Nuclear Operating Company, Inc. (SNC). The application for renewal was submitted by SNC on September 15, 2003, pursuant to NRC requirements at Title 10 of the *Code of Federal Regulations* Part 54 (10 CFR Part 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 August of 2004, and will be provided to you for review and comment.

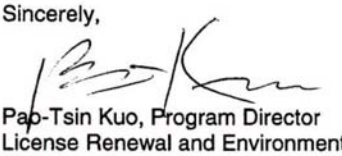
In the context of the National Historic Preservation Act of 1966, as amended, the Agency official (the Director, Office of Nuclear Reactor Regulation, NRC) has determined that the area of potential effect (APE) for a license renewal action is the area at the power plant site and its immediate environs 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, may potentially have an effect on known or proposed historic sites located beyond the immediate environs of the proposed site. This determination is made irrespective of ownership or control of the lands of interest.

While preparing its application, SNC contacted your office by letter dated May 7, 2002, and your office responded on June 11, 2002. In its letter, SNC stated that the operation of FNP will not adversely affect cultural or historical resources in the area because SNC does not have any plans to alter current operations over the license renewal period. SNC further stated that no expansion of existing facilities is planned, and that no major structural modifications have been identified for the purpose of license renewal. Also, no land-disturbing activities are anticipated beyond those required for routine maintenance and repairs. The June 11, 2002, Alabama Historical Commission response letter determined that the project activities will have no effect on any known cultural resources listed on or eligible for the National Register of Historic Places.

4

On January 8, 2004, the NRC will conduct two public NEPA scoping meetings at the Quality Inn, 3053 Ross Clark Circle, Dothan, Alabama, 36301-1121. You and your staff are invited to attend. The anticipated publication date for the draft SEIS is August 2004. Your office will receive a copy of the draft SEIS for review and comment. If you have any questions or require additional information, please contact the Environmental Project Manager for the FNP project, Mr. Jack Cushing at 301-415-1424 or JXC9@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.: 50-348, 50-364

cc: See next page

C:\WINDOWS\TEMP\GW}00001.TMP Page 1

Mail Envelope Properties (3FD890F1.660 : 5 : 13920)

Subject: Farley Nuclear license renewal
Creation Date: 12/11/03 10:43AM
From: "Stephania Bolden" <Stephania.Bolden@noaa.gov>

Created By: Stephania.Bolden@noaa.gov

Recipients
nrc.gov
owf4_po.OWFN_DO
JXC9 (Jack Cushing)

fws.gov
Jerry_Ziewitz CC (jerry ziewitz)

noaa.gov
Eric.Hawk CC (Eric Hawk)

Post Office	Route
owf4_po.OWFN_DO	nrc.gov
	fws.gov
	noaa.gov

Files	Size	Date & Time
MESSAGE	662	12/11/03 10:43AM
stephania.bolden.vcf	333	
Mime.822	2531	

Options
Expiration Date: None
Priority: Standard
Reply Requested: No
Return Notification: None

Concealed Subject: No
Security: Standard

5

From: "Stephania Bolden" <Stephania.Bolden@noaa.gov>
To: <JXC9@nrc.gov>
Date: 12/11/03 10:44AM
Subject: Farley Nuclear license renewal

Dear Mr. Cushing,

This is in response to your December 9, 2003 letter requesting confirmation from NMFS regarding jurisdiction for the aforementioned project. As stated in our June 21, 2002, letter, consultation regarding Gulf sturgeon and their designated critical habitat for this project area falls within the purview of FWS. Therefore, NMFS would support FWS consultation recommendations. However, if the FWS is not able to consult on the project impacts relative to the Gulf sturgeon and its designated critical habitat, then NMFS would become involved in the ESA section 7 consultation.

Sincerely,
Stephania Bolden

Project: I/SER/2002/00498

CC: Eric Hawk <Eric.Hawk@noaa.gov>, jerry ziewitz <Jerry_Ziewitz@fws.gov>

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southeast Regional Office
9721 Executive Center Dr. N.
St. Petersburg, FL 33702
(727) 570-5312, FAX 570-5517
http://caldera.sero.nmfs.gov

F/SER3:SKB

JUN 21 2002

Mr. C.R. Pierce
License Renewal Services Manager
Southern Nuclear Operating Company, Inc.
P.O. Box 1295
Birmingham, Alabama 35201-1295

Dear Mr. Pierce:

This is in response to your May 7, 2002, letter regarding the renewal of the operating licenses for the Farley Nuclear Plant (FNP) Units 1 and 2. Thank you for giving us the opportunity to comment on the project so early in the application process. We have considered the project and submit the following with respect to possible effects on the threatened Gulf sturgeon (*Acipenser oxyrinchus desotoi*), listed September 30, 1991 under the Endangered Species Act (ESA).

The FNP is located on the Chattahoochee River which is a part of the Apalachicola-Chattahoochee-Flint river system. The Chattahoochee and the Flint rivers join near the Florida/Georgia state borders and form Lake Seminole which then drains through the Jim Woodruff Lock and Dam (JWLD) into the Apalachicola River. Although there are numerous reports of Gulf sturgeon in the Chattahoochee and Flint rivers prior to the construction of the JWLD, no evidence exists that Gulf sturgeon pass through the JWLD system. Therefore it is likely that the JWLD precludes any passage of the Gulf sturgeon from the Apalachicola River into Lake Seminole and contiguous rivers.

Critical habitat was proposed for the Gulf sturgeon on June 6, 2002, (67 FR 39105). The Apalachicola River (from its mainstem beginning at the JWLD downstream to its discharge at Apalachicola Bay, Florida, including all Apalachicola River distributaries) was included in the proposed Gulf sturgeon critical habitat designation. This inclusion as proposed critical habitat demonstrates the Apalachicola's essential role in the conservation of the Gulf sturgeon.

Riverine spawning sites were identified as a constituent element (essential for conservation) in the proposed Gulf sturgeon critical habitat designation. Gulf sturgeon require specific substrate suitable for egg deposition and development such as limestone outcrops and cut limestone banks, bedrock, large gravel or cobble beds, marl, soapstone or hard clay. Because the Gulf sturgeon were abundant in the Chattahoochee prior to construction of the JWLD, suitable habitat was

evidently available in the river. Currently the distribution and availability of appropriate Gulf sturgeon spawning habitat in the Chattahoochee River is unknown.

We recommend FNP initiate a reconnaissance study to investigate the availability and distribution of appropriate Gulf sturgeon spawning habitat in the lower Chattahoochee River. NMFS would be happy to participate in the design of such a study and the results would immediately assist in our efforts to conserve the Gulf sturgeon.

NMFS also recommends that you contract the U.S. Fish and Wildlife Service (FWS) for their concurrence with your determination that license renewal would not effect listed species, and that formal consultation in the license renewal application would not be necessary. Although the Gulf sturgeon is jointly managed by FWS and NMFS, division of jurisdictional responsibilities was proposed in the June 6 critical habitat designation. In the proposed rule (67 FR 39105, June 6, 2002), consultation coordination was proposed as follows: FWS is responsible for all riverine actions, consultations for estuarine activities are to be directed to either FWS or NMFS based on action agency, and NMFS is responsible for all consultations in marine areas. Therefore, because of location, section 7 consultation for the FNP is likely to fall within FWS jurisdiction.

We look forward to working with the Southern Nuclear Operating Company, Inc. and the FNP in conserving our endangered and threatened resources. If you have any questions, please contact Dr. Stephania Bolden, fishery biologist, at (727) 570 - 5312 or by e-mail at stephania.bolden @noaa.gov.

Sincerely yours,

Georgia Cranmore
Assistant Regional Administrator
for Protected Resources

cc: F/PR3
FWS - Panama City

Ref: I/SER/2002/00498
o:\section7\informal\sturgeon\farleynuclear.wpd
File: 1514-22.o. (NRC)

2

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

December 18, 2003

Mr. Don Klima, Director
Office of Federal Agency Programs
Advisory Council on Historic Preservation
Old Post Office Building
1100 Pennsylvania Avenue, NW, Suite 809
Washington, DC 20004

SUBJECT: JOSEPH M. FARLEY NUCLEAR PLANT LICENSE RENEWAL REVIEW

Dear Mr. Klima:

The U.S. Nuclear Regulatory Commission (NRC) staff is reviewing an application to renew the operating licenses for Joseph M. Farley Nuclear Plant, Units 1 and 2 (FNP), which is located in Houston County, Alabama, on the west bank of the Chattahoochee River. FNP is operated by Southern Nuclear Operating Company, Inc. (SNC). The application for renewal was submitted by SNC on September 15, 2003, pursuant to NRC requirements at Title 10 of the *Code of Federal Regulations* Part 54 (10 CFR Part 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 pursuant to 10 CFR Part 51, the NRC regulations that implement the National Environmental Policy Act of 1969 (NEPA). In accordance with 36 CFR 800.8, the SEIS will include analyses of potential impacts to historic properties. A draft SEIS is scheduled for publication in August of 2004, and will be provided to you for review and comment.

If you have any questions or require additional information, please contact the Environmental Project Manager for the FNP project, Mr. Jack Cushing at 301-415-1424 or JXC9@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.: 50-348, 50-364

cc: See next page

6

Southern Nuclear
Operating Company, Inc.
P. O. Box 1295
Birmingham, Alabama 35201-1295
Tel 205.992.5000

SOUTHERN COMPANY
Energy to Serve Your World℠

January 16, 2004

LR-04-0070

Mr. Larry Goldman
Field Supervisor
Daphne (AL) Field Office
U.S. Fish & Wildlife Service
1208-B Main Street
P.O. Drawer 1190
Daphne, AL 36526

Re: Joseph M. Farley Nuclear Plant License Renewal
Response to requests for information from USFWS July 9, 2002 letter.

Dear Mr. Goldman:

As part of the NRC review process, SNC is formally responding to the requests that your organization identified in your July 9, 2002 letter. The information provided formally by this letter has been previously provided and discussed with Mr. Bill Young of your staff. Accompanying this letter is a copy of documents (on CD) referenced in the following response.

SNC does not have any plans to alter current plant operations over the license renewal period. Any maintenance activities necessary to support license renewal would be limited to previously disturbed areas. No expansion of existing facilities planned, and no additional land disturbance is anticipated in support of license renewal. As a consequence, SNC believes that operation of FNP, including maintenance of transmission lines by Alabama Power Company over the license renewal period (an additional 20 years), would not adversely affect any threatened or endangered species.

SNC is requesting your concurrence that extending the operating license for Joseph M. Farley Nuclear Plant would not adversely affect any threatened and endangered species. We would appreciate you providing us with a response to this letter by February 16, 2004. We will forward a copy of your response to the NRC for consideration during their environmental review.

Please do not hesitate to call Mr. Jim Davis at (205) 992-7692 if you have any questions or require any additional information.

Sincerely,

C. R. Pierce

C. R. Pierce
License Renewal Services Manager

Enclosure:

7

cc: L. M. Stinson
C. D. Collins
J. S. Cushing (NRC) w/CD
M. J. Ajluni
W. C. Carr
T. C. Moorer w/CD
J. T. Davis w/CD
LR File No: R.01.01
Document Storage w/CD

SNC RESPONSE TO REQUESTS FOR ADDITIONAL INFORMATION

1. **We would like a copy of the existing Joseph M. Farley Nuclear Plant NPDES permit for our review.**

   Response to item 1

   Provided on the CD accompanying this letter is a copy of the Farley Nuclear Plant (FNP) License Renewal Application Environmental Report (ER). A copy of the current NPDES permit can be found under Attachment B to the ER.

2. **We would like to review available data for the past two years (or for the most recent two year period) on the water temperature of in-stream flow of the river immediately below the point of discharge, as well as that immediately downstream and upstream of the point of discharge.**

   Response to item 2

   FNP does not monitor water temperature of in-stream flow of the river immediately below the point of discharge or upstream or downstream of discharge. Provided on the CD accompanying this letter is a copy of a thermal study conducted in February 1991 that evaluated the thermal mixing zone in the Chattahoochee River related to the Farley Nuclear Plant main combined facility discharge.

3. **We would like to receive information collected on the effects of the thermal discharge on fish and other aquatic biota.**

   Response to item 3

   Provided on the CD accompanying this letter is a copy of a thermal study conducted in February 1991 that evaluated the thermal mixing zone in the Chattahoochee River related to the Farley Nuclear Plant main combined facility discharge that concludes that there would be no adverse impacts on fish and other aquatic biota. In addition FNP was not required to evaluate heat shock in the application ER to the NRC because FNP design utilizes cooling towers. The NRC evaluated this type of design in NUREG 1437, Generic Environmental Impact Statement for License Renewal of Nuclear Plants, in Section 4.3 and determined that the impacts to water quality and aquatic ecology "are considered to be impacts of small significance." Selected sections of NUREG 1437, including Section 4.3, are included on the CD accompanying this letter for your review. The original Final Environmental Statement for FNP provides analysis for thermal plume discharge and is included on the CD accompanying this letter.

SNC RESPONSE TO REQUESTS FOR ADDITIONAL INFORMATION

4. **We would like to receive any dissolved oxygen data that has been collected on the Chattahoochee River both upstream and down stream of the point of discharge of the facility by the Southern Nuclear Operating Company, Inc. and/or consultants.**

Response to item 4

Neither Southern Nuclear Operating Company, Inc. (SNC) and/or consultants have collected any dissolved oxygen data upstream or downstream of the point of discharge for Farley Nuclear Plant.

5. **Please provide us with a copy of monthly operating reports on radioactive releases and contamination, including that of fish tissue sampling and analyses that were submitted to the Nuclear Regulatory Commission over the last two years or the most recent of such data.**

Response to item 5

Provided on the CD accompanying this letter is a copy of the 2000, 2001 and 2002 Annual Radiological Environmental Operating Reports and the 2001 and 2002 Annual Radiological Effluent Release Reports. These reports contain information on the radioactive releases and also contain the results of fish tissue sampling.

6. **Please list all radioactive pollutants, toxics and caustics discharged to the Chattahoochee River or to waste holding ponds.**

Response to item 6

The NPDES permit identifies the non-radiological FNP discharged pollutants and their associated limits. In addition the thermal discharge study also discusses the pollutants discharged to the Chattahoochee River and concluded that there would be no adverse environmental impact to aquatic organisms in the Chattahoochee River. The Annual Radiological Environmental Operating Reports and Annual Radiological Effluent Release Reports contain information on the radioactive releases to the environment.

7. **Are biocides to be used in the operation? If so, how will those biocides be contained and prevented from being discharged into the Chattahoochee River?**

Response to item 7

Biocides are used in the operation of FNP and those discharged into the Chattahoochee are controlled within the limits specified in the NPDES permit. As discussed above the impact of the pollutants on the Chattahoochee River environment has been evaluated and no adverse environmental impacts have been identified.

SNC RESPONSE TO REQUESTS FOR ADDITIONAL INFORMATION

8. **Has there been any water quality sampling and monitoring (physical, chemical and biological) done on the Chattahoochee River by the Southern Nuclear Operating Company, Inc.? If so we would like a copy of such information generated over the last three years for our review.**

Response to item 8

SNC does not perform non-radiological water quality sampling and monitoring on the Chattahoochee River. However, samples upstream and downstream of the discharge are taken and analyzed for radioactive contaminants. The results of this analysis are contained in the Annual Radiological Environmental Operating Reports.

9. **What is the 7Q10 and average monthly discharge rates (cfs) at the point of intake or withdrawal (withdrawal for cooling water) and discharge intake point? We ask that you calculate them from actual in-stream flow data rather than using runoff coefficients. Please provide us with the calculations used. If the Southern Nuclear Operating Company, Inc. has in-stream flow data (upstream or downstream), we ask that you submit it for our review. How would plant impacts be affected by implementation of the proposed water allocation formula for the Apalachicola, Chattahoochee, Flint River Basins currently being considered by the states of Alabama, Florida, and Georgia?**

Response to item 9

The 2050 cfs 7Q10 value used for Farley Nuclear Plant flow based calculations is determined from stream flow data taken at USGS Gage 02343801 (Chattahoochee River at Columbia, AL). SNC has also provided USGS flow data for USGS Gage 02343801 on the accompanying CD that includes historical data for your review. USGS Gage 02343801 is the closest gage to FNP and is located below George W. Andrews Lock and Dam.

SNC is monitoring the progress of proposed water allocation formula for the Apalachicola, Chattahoochee, Flint River Basins currently being considered by the States of Alabama, Florida and Georgia. Impacts will be evaluated when this becomes finalized. SNC does not anticipate any impact to FNP as a result of what is being currently proposed. However, SNC will continue to monitor developments as they progress.

SNC RESPONSE TO REQUESTS FOR ADDITIONAL INFORMATION

10. What are the average and maximum discharge rates (cfs) for thermal discharge into the Chattahoochee River? We would like a copy of the discharge flow data generated over the last two years.

Response to item 10

The FNP ER in Section 4.1 documented the discharge rate of 57,844 gpm (129 cfs) to the Chattahoochee River for a period of 5 years (1996 – 2000). In addition, SNC has included on the CD copies of the Farley Nuclear Plant Annual Water Use Reports for 2000, 2001 and 2002.

11. For any water withdrawals, we recommend suitable screening be provided over the intake structure to minimize entrainment/impingement of fish during water diversion. Please present the design specifications for any existing screening designs for the present intake structure. The velocity through the screen should not exceed one foot per second (fps).

Response to item 11

ER Section 3.1.2.1 provides a description of the intake structure design, screen size and flow rate through the screen. The velocity through the screen is less than 0.5 fps.

12. Please provide us with maps (USGS quadrangle level of detail) showing the layout of transmission lines.

Response to item 12

Provided on the CD accompanying this letter is the USGS maps of our transmission lines. ER Section 3.1.3 describes the Transmission Facilities and Figure 3-1 and 3-2 provide a map of the transmission corridors from FNP to the first substations.

13. Will there be any refurbishments made of the facility and system? If so please provide details of those plans.

Response to item 13

There are no planned refurbishments of the facility or systems directly due to license renewal for Farley Nuclear Plant.

SNC RESPONSE TO REQUESTS FOR ADDITIONAL INFORMATION

Contents of accompanying CD

1. Farley Nuclear Plant License Renewal Environmental Report
2. FNP NPDES permit
3. 1991 FNP Thermal Study
4. Selected Sections of NUREG 1437 Generic Environmental Impact Statement for License Renewal of Nuclear Plants
5. 2000, 2001, & 2002 FNP Annual Radiological Environmental Operating Reports
6. 2001, & 2002 FNP Annual Radiological Effluent Release Reports
7. USGS Gage 02343801 Flow Data Report
8. 2000, 2001, & 2002 FNP Annual Water Use Reports
9. USGS Topographical Maps of FNP Transmission Lines
10. Final Environmental Statement related to operation of Joseph M. Farley Nuclear Plant Units 1 And 2, December 1974

From: Crystal Quinly <quinly2@llnl.gov>
To: <JXC9@nrc.gov>
Date: 1/28/04 4:32PM
Subject: Fwd: FW: Farley Nuclear Power Plant License Renewal

Jack,
Below is FYI re: USFWS and Daphne stating to Jennifer that AL is the lead office.
Crystal
>Date: Wed, 28 Jan 2004 12:10:40 -0800
>Subject: FW: Farley Nuclear Power Plant License Renewal
>From: Jennifer S Garrison <garrison13@llnl.gov>
>To: Crystal Quinly <quinly2@llnl.gov>, Jessie Coty <coty1@llnl.gov>
>
>FYI
>----------
>Jennifer S.E. Garrison, PhD
>Ecologist/Wildlife Biologist
>Environmental Protection Department
>Lawrence Livermore National Laboratory
>PO BOX 808, L-627
>Livermore, CA 94551
>
>Phone: 925-422-4056; Fax: 925-424-3008
>
>------ Forwarded Message
>From: Larry_Goldman@fws.gov
>Date: Wed, 28 Jan 2004 08:00:17 -0600
>To: garrison13@llnl.gov
>Cc: Stan_Simpkins@fws.gov, Sandy_Tucker@fws.gov, Merry_Bates@fws.gov
>Subject: Farley Nuclear Power Plant License Renewal
>
>Dr. Garrison--Evidently there may have been some confusion regarding which
>of the FWS Field Offices (Panama City, Daphne, Athens, GA) would be leading
>our involvement in the review of the license renewal for this powerplant. I
>have discussed this with others and we have determined that the Daphne
>Field Office will be the lead office for the renewal. Our contact point
>will be Bill Young. I would appreciate it if you would share this
>information with others involved in the relicensing work. Should you have
>any questions, please contact me at 251-441-5870.
>
>Larry Goldman
>Field Supervisor
>Daphne, AL Field Office
>------ Forwarded by Larry Goldman/R4/FWS/DOI on 01/28/2004 07:54 AM -----
>
> Stan Simpkins
> To: garrison13@llnl.gov
> 12/18/2003 10:56 cc: Gail
>Carmody/R4/FWS/DOI@FWS, Sandy Tucker/R4/FWS/DOI@FWS, Larry
> AM Goldman/R4/FWS/DOI@FWS
> Subject: Farley Nuclear Power
>Plant License Renewal
>
>
>

>
>Dr. Garrison, thank you for contacting us in reference to the above
>project. I will be the Panama City Field Office point of contact for this
>project review. Due to other commitments, I will be unable to attend the
>01/07 scoping meeting.
>
>At this time, I really do not have any additional issues to add to those
>that were identified in our letter of 06/13/02. I note that in Southern
>Company's letter of 05/07/02 to our office, Mr. C.R. Pierce stated that "
>....we believe that operation of FNP, including maintenance of transmission
>lines by Alabama and Gulf Power Companies over the license renewal period
>(an additional 20 years) will not adversely affect any threatened or
>endangered species".
>
>Before our office could concur with the above determination, we would need
>to be provided with a discussion of the maintenance activities and whether
>any federally listed species occur along the Sinai Cemetery Transmission
>line in the Florida panhandle. The Panama City Field Office review of this
>project would be limited to the Sinai Cemetery Transmission Line.
>
>Please feel free to contact me for if you have any questions or for further
>coordination.
>
>Stan Simpkins
>Panama City Field Office
>(850) 769-0552 x234
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>----- Forwarded by Stan Simpkins/R4/FWS/DOI on 12/18/2003 10:03 AM -----
>
> Gail Carmody
> To: Stan
>Simpkins/R4/FWS/DOI@FWS
> 12/16/2003 02:26 cc:
> PM Subject: Farley Nuclear Power
>Plant License Renewal
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>----- Forwarded by Gail Carmody/R4/FWS/DOI on 12/16/03 02:25 PM -----
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> Jennifer S
> Garrison To:
><panamacity@fws.gov>, <gail_carmody@fws.gov>
> <garrison13@llnl cc: Jessie Coty
><coty1@llnl.gov>
> .gov> Subject: Farley Nuclear Power
>Plant License Renewal
>
> 12/08/03 06:19
> PM

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>
>Dear Ms. Carmody,
>
>I am a contractor (biologist) working with the Nuclear Regulatory
>Commission on the Farley Nuclear Power Plant License Renewal EIS. In 2002,
>the Southern Nuclear Operating Company contacted you/your office regarding
>potential Threatened and Endangered Species issues along the Sinai Cemetery
>transmission line corridor that runs from the Farley Nuclear Power Plant in
>Houston County, Alabama to the Sinai Cemetery substation in located near
>Sneads, Jackson County, Florida. I have a copy of your response letter
>dated June 13, 2002, which provided valuable information regarding species
>potentially found in the corridor and some of the activities that may
>potentially affect these species. I would like to take the opportunity now
>to follow up on that letter and ask if the Fish and Wildlife Service has
>any other additional information or concerns regarding the transmission
>lines and standard maintenance practices (mowing and selected herbicide
>use) in the transmission corridor, for both terrestrial and aquatic T &E
>species. If you like, I can call you on the phone to discuss the issues,
>although email/letter form is preferred for documentation purposes. Please
>let me know which you prefer.
>
>In addition, I would like to inform you that there will be a scoping
>meeting at the Farley Nuclear Plant in Jan 2004 (Jan 7, I believe), which
>you or someone from your office is welcome to attend if you would like to
>meet in person to discuss any concerns. If you would like to set up a
>meeting, please let me know ASAP so I can work it into the schedule.
>
>
>Thank you very much.
>
>Sincerely,
>Jennifer Garrison
>
>
>
>----------
>Jennifer S.E. Garrison, PhD
>Ecologist/Wildlife Biologist
>Environmental Protection Department
>Lawrence Livermore National Laboratory
>PO BOX 808, L-627
>Livermore, CA 94551
>
>Phone: 925-422-4056; Fax: 925-424-3008
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>------ End of Forwarded Message

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Crystal Quinly
Environmental Evaluations Group
Lawrence Livermore National Laboratory
Phone: 925-424-3279

United States Department of the Interior

FISH AND WILDLIFE SERVICE
P. O. Drawer 1190
Daphne, Alabama 36526

IN REPLY REFER TO:

04-0397

February 6, 2004

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

Dear Mr. Kuo:

Thank you for your letter of November 26, 2004, requesting comments for the NEPA review of re-licensing of the Joseph M. Farley Nuclear Plant Units 1 and 2 (FNP), located in Houston County, Alabama, on the west bank of the Chattahoochee River. We have reviewed the information you enclosed and are providing the following comments in accordance with the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. et seq.) and the Endangered Species Act of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.).

Federally Listed Species

Historical data for the Chattahoochee River, Houston County, Alabama and Early County, Georgia are poor. One threatened species, purple bankclimber (*Elliptoideus sloatianus*), and three endangered species, shinyrayed pocketbook (*Lampsilis subangulata*), Gulf moccasinshell (*Medionidus penicillatus*), and oval pigtoe (*Pleurobema pyriforme*) are known from the mainstem of the Chattahoochee above Houston and Early counties, and are considered to have occurred throughout the mainstem, in appropriate habitats (Brim Box, and Williams, 2000). The latter three species are known in Tributaries that feed into the mainstem in Early County, Georgia, currently support populations of three endangered species: Shinerayed pocketbook (*Lampsilis subangulata*), Gulf moccasinshell and oval pigtoe (*Pleurobema pyriforme*). Sawhatchee Creek, Early County, Georgia supports reproducing populations of Gulf moccasinshell (*Medionidus penicillatus*) and oval pigtoe (*Pleurobema pyriforme*) (Brim Box and Williams, 2000). There is archeological record of *E. sloatianus* in the mainstem of the Chattahootchee River, Houston County, Alabama (Williams and Fradkin 1999 in US FWS 2003).

No recent survey data are available for the mainstem Chattahoochee in this location. However, a single specimen of *E. sloatianus* was collected in upstream of the project area in Goat Rock Lake by Stringfellow (pers. comm.. 2003 in US FWS 2003), located on the mainstem of the Chattahootchee River, Lee County, Alabama. Since historical data within this reach of the

PHONE: 334-441-5181 www.fws.gov FAX: 334-441-6222
SHIPPING ADDRESS: 1208-B Main Street, Daphne, AL 36526

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Chattahoochee River are poor and recent data are lacking, it is possible that the Chattahoochee River may still support some of these listed species in Houston County, Alabama and Early County, Georgia, and as such this reach may represent areas important to recovery of these species (pers. conv. with Ms. Holly Blalock-Herod, malacologist, US FWS, Panama City FO 2004).

The Service recommends that a survey be conducted for the Federally mussel species listed above. Further information on conducting the survey is provided under "**Recommendations**" below.

Species and habitat descriptions for the listed mussel species are provided in the recovery plan (USFWS 2003, http://endangered.fws.gov/). Enter the species name in the search box for information on each species.

We concur with the survey results for terrestrial species, but have remaining concerns listed below under "Maintenance of Transmission Line Rights-of-Way."

Concerns

We have the following concerns regarding the project:

- Release of radionuclides in the Chattahoochee River and long-term exposure of Federally protected mussels and other aquatic organisms
- Effects of plant operation on health and reproduction of fish and other aquatic organisms in the Chattahoochee River, especially effects on potential host fish of listed mussels
- Release of thermal heated water, chlorine, copper, and hydrazine into the Chattahoochee River in concentrations harmful to Federally protected mussels and other aquatic organisms
- Entrainment and subsequent mortality of aquatic organisms in intake cooling water due to exposure to intense heat, chlorine, and hydrazine
- Maintenance practices for existing transmission lines rights-of-way

Long-term Exposure of Aquatic Organism to Low Level Radiation

We are concerned about the effects of long-term, low-level radiation on Federally protected mussels, if present, as well as other aquatic organisms, communities, populations, and fishery resources in the project area. Freshwater mussels in the discharge of nuclear power plant effluent can accumulate radionuclides in soft tissues and shell at levels several orders higher than surrounding waters (Lutz, et al. 1980). Radionuclides do not concentrate consistently throughout the food chain, but vary in concentration depending on the system, species, and other variables (Lutz, et al. 1980). Radionuclide concentrations in biota vary depending on the organism's age, size, sex, tissue, season of collection, and other variables--and these have to be acknowledged

when integrating radiological analyses (Eisler 1994). In general, lower trophic levels of aquatic organisms have greater concentrations of radionuclides than higher trophic levels (Bowen et al. 1971).

Bivalves contain strontium in their shells at much higher rates than fish bone, making them good monitors of low-level radionuclide contamination of the environment (Smith 1974). Also, bivalves accumulate cesium and other metals in soft tissue. This is due to: (1) strontium replacement of calcium in the shells, (2) longer half-life of radionuclides in mussels than in fish, and (3) enhanced physical absorption by filter-feeding bivalves, and (4) consumption of particulate and phytoplankton, both rich sources of radionuclides, by bivalves. Concentrations in phytoplankton are 2,500 to 6,200 times that of surrounding water, whereas, the concentrations in fish are only 25 to 50 times that of surrounding water (Smith 1974). Since radionuclides are deposited in mollusk growth rings, their shells provide a record of the radionuclide contamination in their environment (Nelson 1962).

According to Mr. Jim Davis, Senior Engineer and Environmental Lead for Relicensing, FNP used to sample mussels as biomonitors of radionuclides contamination 1977-1981, but had difficulty finding mussels, therefore discontinued sampling. They searched all the way downstream from FNP plant to Lake Seminole for mussels. According to Mr. Davis, no habitat occurred within 10-15 miles of the plant. We are concerned if the lack of mussels is due to unsuitable habitat created by the powerplant and/or effluent exposures.

Results of fish tissue sampling provided in FNP's 2000, 2001, and 2002 Annual Radiological Environmental Operating Reports and 2001 and 2002 Annual Radiological Effluent Release Reports indicated low levels of radiation present for fish fillets. This information is applicable for evaluating human health concerns, but not for assessing aquatic organisms health.

Large populations of local filter feeders may drastically increase the rate of sedimentation of added trace elements and radionuclides, thus increasing their accumulation in the sediments (Hoffman, J.H., et al. 2003). Thus, large populations of *Corbicula* could cause increases in radionuclide concentrations in the sediments. *Corbicula* population growth could be stimulated by FNP's thermal discharge into the Chattahoochee River, resulting in this impact.

Reproduction of Fish and Other Aquatic Organisms

The Cooling Water Intake Study (316b) Demonstration by FNP (APC 1983) states that reproduction was observed for clupeids (herring and shad), but not other fish species. We are concerned that the release of radionuclides, contaminants, and/or thermal discharges from FNP plant may be having an adverse effect on resident fish populations and other groups of aquatic organisms. Mussels are dependent on fish as the host organism for glochidial attachment. Therefore, adverse effects to the host fish could indirectly cause adverse effects on listed mussel reproduction and recruitment.

NPDES Permit Limits

We believe the NPDES permit limits for temperature (111° F Daily Maximum and 100 ° F Monthly Average, April 1- Nov. 30; Daily Maximum = Monitor and Monthly Average 81.7 ° F, Dec. 1- March 31) may not be protective of listed mussels (if present) or of other aquatic life. A segment of Chattahoochee River below the Walter F. George Dam and upstream of the project area is on Georgia's 303(d) List due to violation of State standards for dissolved oxygen (D.O.) and fecal coliform bacteria. The cited causes are Walter F. George Dam release and non-point source runoff. The beneficial use classification of the Chattahoochee River is Fish and Wildlife. A minimum dissolved oxygen (D.O) concentration of 5.0 mg/l has been established by ADEM as minimum numeric standard for supporting aquatic life and healthy warmwater fish populations. Limited or periodic (monthly) sampling by Georgia Department of Natural Resources, Water Protection Branch (Periodic Water-Quality Records, Apalachicola River Basin, 2000 Calendar Year) in Chattahoochee River at a station located 2.3 miles south of Columbia (river mile mark 46.5), yielded D.O. concentrations as low as 4.0 mg/L. A D.O. of 5.7 mg/L was recorded downstream at Alaga, Alabama. Water temperatures during that period ranged from 28.6 – 30.3 °C. We are concerned that a discharge limit of 100-111 °F (within ZID) may result in temperature outside the ZID exceeding State water quality standard for temperature (90 °F, not to exceed ambient by 5 °F) and D.O. concentrations lethal to freshwater mussels and other aquatic life within and outside the ZID. A significant amount of habitat including the ZID (878 feet) may be adversely affected. FNP does not have ample water temperature monitoring data to fully evaluate temperature and DO impacts on listed mussels (if present), fish, and other aquatic life in the Chattahoochee River.

Elevated water temperatures at various distances from a studied nuclear generating facility had and adverse effect on the growth, survival and recruitment of mussels (Lutz et.el. 1980). In a study on effects of drought on freshwater mussels in the lower Flint River, habitat conditions and mussel survival were monitored weekly during the period of the drought. D.O. concentrations were highly correlated to mussel mortality. Unionid mortality increased when dissolved oxygen concentrations fell below 5 mg/L, with high mortality of *L. subangulata*, *M. pencilatus*, and *P. puriforme* experienced high mortality when D.O. fell below 5.0 mg/L (Jones et. el. 2000).

FNP uses chlorine as a biocide for *Corbicula* control. Chlorine is extremely toxic to a wide variety of freshwater organisms (Hunn and Schnick 1990). Safe concentrations (i.e., those that do not produce lethality or sublethal effects) are likely much lower, especially considering the relatively sessile nature and long life span of mussels relative to these short- term test exposures. Under longer-term exposures (>96 hours), lethality to fish and aquatic invertebrates has been documented at chlorine concentrations between 3.4 and 26 ug /L (EPA 1985). Because of chlorine's extreme toxicity, the USEPA established a Federal ambient water quality criterion maximum concentration of 0.019 mg/L and a continuous concentration (CCC) of .011 mg/L for chlorine, respectively, to protect aquatic life (EPA 2002). Studies have shown that mussels are very similar in sensitivity to other sensitive aquatic organisms and that 0.019 mg/ L is likely protective (Ingersoll 2003). FNP should meet this criterion by inclusion of dechlorination unit or

use alternatives such as UV or ozonation. Alternatively, high flow rate velocity flushes, ultrasound, or robotic mechanical cleaning could occur on influent and effluent pipes.

The toxicity of chlorine to aquatic life is a function of total residual chlorine (TRC), which includes both free chlorine and chloramines (Flora et al. 1984). Monitoring of free chlorine does not serve as an adequate indicator of the potential toxicity of facility effluents nor does it provide adequate data to avoid toxic effects to listed mussels. We therefore recommend measurement of TRC rather than free chlorine.

FNP uses hydrazine to scavenge oxygen during blowdowns of its cooling towers. Discharges of this potential toxicant into the Chattahootchee River may cause more than detrimental effects to Federally listed mussels, if present, as well as many other aquatic organisms. The rate of degradation of hydrazine in water is highly dependent on factors such as pH, temperature, oxygen content, alkalinity, hardness, and the presence of organic material and metal ions. The toxicity of hydrazine increased for guppies in soft water (at pH < 7.0) compared with the toxicity in hard water at a pH ≈ 8.0 (Slonim 1977), indicating increased persistence of hydrazine in soft, non-alkaline water. Increased water temperature also enhance the toxicity of the compound for bluegills (Hunt et al., 1981) (http://www.inchem.org/documents/ehc/ehc/ehc68.htm#SectionNumber:5.1). According to modeling data collected by FNP at the point of discharge, the Chattahoochee River has low alkalinity. Instream water temperatures are elevated above ambient due to FNP's thermal discharge. These conditions elevate concerns for the toxicity of hydrazine in the discharge, and potential adverse effects on aquatic biota.

There is no maximum concentration limit for hydrazine in FNP's NPDES permit, but merely a "de facto" limit of 70 ppb. Standard acute toxicity test were performed for hydrazine on freshwater fish, lower trophic level organisms, and amphibians. The guppy (*Lebistes reticulatus*), fathead minnow (Pimephales promelas) (eggs), bluegill sunfish (*Lepomis macrochirus);* bacteria, *Pseudomonas putida*; protozoa (*Uronema paraduczi*) and (*Chilomenas paramecium)*; the water flea (*Daphnia pulex*); and the amphibia, South African clawed toad (*Xenopus laevis*) (larvae). All experience mortality below 70 ppb.

Entrainment

We are also concerned about uptake of aquatic organisms into the boiler reactor water by Entrainment, including larvae and early life stages of Federally protected Mussels (if present), as well as other mussels, fish, phytoplankton, and zooplankton. FNP withdraws 171 cfs of Chattahoochee River water for cooling of its reactors. The volume of water withdrawn represents 8 % of the 7Q10. Historic stream flow data (1975-2002) taken at the USGS Gauge Station in the Chattahoochee River near Columbia, Alabama, show short term (1-2 days) minimum flow occurrences on a regular frequency due to managed releases from Walter F. George Reservoir. The flow during those periods typically range from 650-1500, well below the 7Q10. During those periods of minimum flow, FNP's withdrawal may be as much as 25% of the instream flow. Pressurized boiler reactor water is subjected to intense pressure, heat, and biocide treatment. Any aquatic organisms taken up by entrainment into the intake pipe and subjected to such environment would be killed.

Maintenance of Transmission Lines Right-of-Way

We are concerned about FNP's practice of controlling vegetation at stream crossings, using mowing and herbicide applications to reduce the cover to herbaceous species. This modification to the natural vegetative cover may lead to erosion and sedimentation of streams. We are particularly conerned about this practice at stream crossings where Federally listed mussels may occur and specifically Sawhatchee Creek, mentioned above, where three Federally listed mussel species are known to occur.

Recommendations:

1.Perform a full characterization of different radionuclides and contaminants in the effluent waste stream on a minimum of 10 different full-strength (100% effluent) samples.

2. Conduct an initial mussel habitat survey extending from two miles upstream of the FNP site downstream to Lake Seminole. A malaecologist with a current collecting permit, familiar with the listed mussels and their habitats should conduct the survey. The habitat should be mapped and a detailed description provided, including substrate type, embeddedness, and velocity. A detailed mussel survey should follow in suitable habitat, with adherence to non-wadable stream protocols. Substrate characteristics and velocity should be recorded for each collection or observation location. A mussel species distribution map should be produced from the survey information. Dominant benthic fauna, including estimated densities should also be recorded.

3. Contingent on positive findings in Recommendation 1, sample surficial sediment (0-7 cm) in the mixing zone and stream reach above and immediately below the mixing zone for the detected radionuclide analytes. At each location, collect composite, triplicate samples consisting of at least five subsamples. In selecting sampling stations, look for pools where there is likelihood of fine sediment and organics in the deposits. Grain size and total organic carbon should be determined on sampled sediment. Depending on levels of targeted analytes found during initial limited sediment sampling, we may recommend more extensive sampling and isocuric mapping of radionuclide analytes in sediments (Churchill et al.1980). Also, if concentrations are significantly elevated above background, we may recommend mapping targeted radionuclide analytes distributions and compare to unionid mussel distributionson a map to determine possible relationships.

4. Collect large adult native unionid mussels and analyze tissue and shell for the radionuclides typically retained in these tissues. Areas and stations to collect unionids should be based on mussels distribution as determined from the survey. Mussels within, or downstream and closest to the mixing zone should be included in the analysis and compared with mussels at various distances upstream downstream. At least three mussels should be collected at each site. (Note: a nonlisted mussels should be collected and not listed species.

5. Sample the following large adult whole fish (skin on): largemouth bass (*Micropterus salmoides*), flathead catfish (*Pylodcitis olivaris*), and spotted sucker (*Minytrema melanops*) as bio-indicators of radionuclides. Sample six sites – (1) in the mixing zone or ZID, (2)

immediately upstream of Walter F. George Reservoir, (3) two miles upstream of discharge, (4) two miles downstream of the discharge, (5) riverine habitat immediately upstream of Lake Seminole, and (6) Lake Seminole forebay. Collect five fish of each species at each sampling site.

6. If levels of radionuclides in sediments are determined to be elevated in areas where *Corbicula* populations are high, also design and conduct a study to determine if FNP thermal discharge is causing an increase in the *Corbicula* population and whether those populations are affecting radionuclide concentrations in sediments, fish, and/or turtles consuming the *Corbicula*.

7. Design and conduct a study of native resident fish in the ZID, downstream of the ZID, and at least one mile upstream of the project site to determine whether fish abundance, diversity, and fecundity are affected by radionuclides, other contaminants, (e.g., hydrazine, copper, chlorine), thermal shock, or other plant operations.

8. Quantify the diversity and abundance of organisms entrained by water withdrawal at all intake pipes and evaluate screening mesh size, low velocity intake, and other techniques to minimize entrainment. Quantification should occur at least monthly for the year of the study and for the year following screen changes.

9. Monitor temperature, D.O., TRC, copper, and hydrazine at the downstream end of the ZID on a monthly basis to determine if modeling has accurately predicted concentrations. The Walter F. George Reservoir manages its releases such that there are frequently two consecutive days in which flow is well below the 7Q10. That period should be targeted for monitoring. Conduct a formal risk assessment (RA) using EPA methods to assess whether concentrations are protective of sensitive fish and invertebrates, particularly Federally listed mussels, if present. Include low – flow, high-temperature conditions in the RA.

10. If hydrazine is detemined to pose a risk to aquatic species (particularly mussels), eliminate discharge of hydrazine by designing a system for separating and containing hydrazine from all discharges to the Chattahoochee River.

11. Reduce or eliminate discharge of chlorine to the Chattahoochee River through use of a dechlorination unit for removal of chlorine before discharge. If there is a discharge of chlorine, then at least monitor TRC daily. To provide adequate protection of aquatic life, the permit should establish the EPA criterion chronic concentration of 0.011 mg of total residual chlorine per L as a permit limitation for continuous discharges and monitor it daily. If chlorine treatments are intermittent, the criterion for protection of aquatic life from acute toxicity can be substituted.

12. Compare alpha and beta radiation levels found in sediment within and downstream of the ZID to evaluate whether concentrations are protective of aquatic life, especially mussels. Compare concentrations found in fish (whole) and mussels (shell) to background conditions and concentrations considered protective of those organisms. If sediments, mussels, and fish levels are determined not to be protective, determine corrective measures needed.

13. Use mowing or prescribed burns as an alternative to herbicide use for controlling vegetation along transmission right-of-way, particularly near stream crossings and in gopher tortoise habitat. Where gopher tortoise burrows are known to be present, mowing should be restricted to during the winter period when gopher tortoises are hibernating. If herbicides are used, use Roundup Custom or Accord, together with a low toxicity surfactant such as LI 700 (Agri-Dex) or equivalent herbicides and surfactants, in strict adherence to the label. Periodically survey to determine if Federally listed pant species have become established in rights-of-way. If established, please contact our office.

14. At all stream crossings, especially where Federally listed mussels are known to occur, plant and maintain stream riparian areas with native shrub species. It is our understanding that Ms. Sandy Abbot, with the W. Georgia Field Office, USFWS, Ft. Benning, Georgia, will be working with FNP to develop a list of recommended species for the Georgia area where stream crossings are involved. FNP should also contact Panama City, Florida Field Office, as well as our office (Daphne, Alabama) to develop a recommended species list in Florida and Alabama.

Depending on radionuclide results in sediments, we may recommend a histopathological study and stress proteins response analysis study using molecular biomarkers to assess effects of radionuclides on fish physiology and reproduction. Please provide copies of all D.O. monitoring data to this office.

We welcome the opportunity to assist in the design of monitoring plans. Upon receipt of recommended survey and study reports, we will provide our final comments and consultation under section 7 of the Endangered Species Act. Initiation of formal consultation with the Nuclear Regulatory Commission may be necessary after our review of the requested information.

If you have any questions or need additional information, please contact Mr. Bill Young at (251) 441-5842. In correspondence, please refer to the reference number above.

Sincerely,

Elaine Snyder-Conn

Acting for Larry E. Goldman
Field Supervisor

cc: EPA
ADEM

Enclosure

References:

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

July 2, 2004

Mr. Larry Goldman
Field Supervisor
U.S. Fish and Wildlife Service
P.O. Drawer 1190
Daphne, Alabama 35626

SUBJECT: BIOLOGICAL ASSESSMENT FOR LICENSE RENEWAL OF THE JOSEPH M. FARLEY NUCLEAR PLANT, UNITS 1 AND 2, AND A REQUEST FOR INFORMAL CONSULTATION

Dear Mr. Goldman:

The U.S. Nuclear Regulatory Commission (NRC) has prepared the enclosed biological assessment (BA) to evaluate whether the proposed renewal of the Joseph M. Farley Nuclear Power Plant, Units 1 and 2 (Farley) operating licenses for a period of an additional 20 years would have adverse effects on listed species. The proposed action (license renewal) is not a major construction activity. Farley is located on the west bank of the Chattahoochee River at approximately River Km 70 (RK, or River Mile 43.5) between the George W. Andrews (4.8 km [3 mi] upstream) and the Jim Woodruff Lock and Dam (70.8 km [44 mi] downstream).

By letter dated November 26, 2003, (Kuo 2003), the NRC requested a list of Federally threatened or endangered species that may be in the vicinity of Farley and its associated transmission lines. In a letter dated February 6, 2004, (Goldman 2004) the U.S. Fish and Wildlife Service (FWS) provided a list of Federally threatened or endangered species. The FWS identified the following freshwater mussel species: one threatened species, the purple bankclimber (*Elliptoideus sloatianus*); and three endangered species, shinyrayed pocketbook (*Lampsilis [Villosa] subangulata*), Gulf moccasinshell (*Medionidus penicillatus*), and oval pigtoe (*Pleurobema pyriforme*). In its February 6, 2004, letter, the FWS also concurred with Southern Nuclear Company's (SNC) terrestrial species survey results, but expressed concerns regarding maintenance of transmission line rights-of-way.

For documentation purposes, the NRC has addressed terrestrial species and the Gulf sturgeon in the enclosed BA (Enclosure 1), as well as the 4 freshwater mussels identified by the FWS in your February 6, 2004, letter. In addition, the NRC also included the fat threeridge mussel (*Amblema neislerii*) and the Chipola slabshell mussel (*Elliptio chipolaensis*). Thus this BA provides an evaluation of the potential impact of renewing the Farley Units 1 and 2 operating licenses for an additional 20 years of operation on twenty-four listed species and one candidate species identified in Table 1 of the BA.

The NRC has determined that the proposed action may affect, but is not likely to adversely affect, the bald eagle (*Haliaeetus leucocephalus*), red-cockaded woodpecker (*Picoides borealis*), American alligator (*Alligator mississippiensis*), flatwoods salamander (*Ambystoma cingulatum*), pondberry (*Lindera melissifolia*), mock bishop-weed (*Ptilimnium nodosum*), fringed

campion (*Silene polypetala*), gentian pinkroot (*Spigelia gentianoides*), Florida torreya (*Torreya taxifolia*), relict trillium (*Trillium reliquum*), Crystal Lake nailwort (*Paronychia chartacea minima*), chaffseed (*Schwalbea americana*), Cooley's meadowrue (*Thalictrum cooleyi*), and Hirst's panic grass (*Panicum hirstii*). In addition, the staff had concluded that the proposed action will have no effect on the wood stork (*Mycteria americana*), Gulf sturgeon (*Acipenser oxyrinchus desotoi*), eastern indigo snake (*Drymarchon corais couperi*), gray bat (*Myotis grisecens*), and Indiana bat (*Myotis sodalis*). Finally, the staff has concluded that the proposed action will have no effect on the fat threeridge, and may affect, but is not likely to adversely affect the purple bankclimber, shinyrayed pocketbook, Gulf moccasinshell, oval pigtoe, and Chipola slabshell. No designated critical habitat for these twenty-four listed and one candidate species is located near the proposed action.

Your letter of February 6, 2004, also included a list of concerns and recommendations related to the operation of Farley and its impacts to freshwater mussels and their host fish with particular focus on National Pollution Discharge Elimination System (NPDES) permit limits for temperature, the use of biocides, and entrainment. Substantive regulation of water pollution is not within the statutory authority of the NRC. See Tennessee Valley Authority (Yellow Creek Nuclear Plant, Units 1 & 2), ALAB-515, 8 NRC 702. 712-13 (1978). Authority for NPDES permitting lies with Environmental Protection Agency or the States under the Clean Water Act. The Endangered Species Act provides for a consultation process with agencies (here the NRC) involved with a proposed action. The NRC's response to consultation is limited to actions within the NRC's authority. Enclosure 2 addresses your concerns related to discharges controlled by the NPDES permit, however, as stated above, NRC authority does not extend to substantive regulation of water pollution, i.e., setting discharge limits.

We are placing this BA in our project files and are requesting your concurrence with our determination. In reaching our conclusion, the NRC staff relied on information provided by the licensee, on research performed by NRC staff, and information from FWS (i.e., including current listings of species provided by the FWS, Daphne, Alabama Field Office).

If you have any questions regarding this BA or the staff's request, please contact Mr. Jack Cushing, Environmental Project Manager, at (301) 415-1424.

Sincerely,

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

Docket Nos. 50-348 and 50-364

Enclosures: As stated

cc w/encl.: See next page

ENCLOSURE 1
BIOLOGICAL ASSESSMENT

BIOLOGICAL ASSESSMENT FOR LICENSE RENEWAL OF THE JOSEPH M. FARLEY NUCLEAR PLANT, UNITS 1 AND 2

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

June 2004

I. INTRODUCTION

The U.S. Nuclear Regulatory Commission (NRC) is reviewing an application submitted by Southern Nuclear Operating Company, Inc. (SNC, the applicant) for the renewal of the operating licenses for Joseph M. Farley Nuclear Plant Units 1 and 2 (Farley) for a period of an additional 20 years. The purpose of this biological assessment (BA) is to provide information to the U.S. Fish and Wildlife Service (FWS) concerning the potential impacts of continued operation of Farley Units 1 and 2 on threatened or endangered species and designated critical habitat pursuant to Section 7(a)(2) of the Endangered Species Act (ESA). This consultation is between the NRC and FWS.

This BA examines the effects of the proposed action on twenty-four Federally listed species and one candidate species (Table 1) that could occur within the Farley site, near the site, or along its associated transmission line rights-of-way (ROWs). The staff has also addressed the additional FWS concerns communicated to the NRC in a letter dated February 6, 2004, (Goldman 2004) regarding four of the freshwater mussels in a separate evaluation.

The Federally listed species considered in this BA, although not observed to occur at the Farley site, near the site or within habitats along its associated transmission lines include two birds, the wood stork (*Mycteria americana*) and red-cockaded woodpecker (*Picoides borealis*); two mammals, the gray bat (*Myotis grisescens*), and Indiana bat (*Myotis sodalis*); one fish, the Gulf sturgeon (*Acipenser oxyrinchus destoi*); one amphibian, the flatwoods salamander (*Ambystoma cingulatum*); and one reptile, the eastern indigo snake (*Drymarchon corais couperi*); nine plants, pondberry (*Lindera melissifolia*), Crystal Lake nailwort (*Paronychia chartacea minima*), mock bishop-weed (*Ptilimnium nodosum*), chaffseed (*Schwalbea americana*) fringed campion (*Silene polypetala*), gentian pinkroot (*Spigelia gentianoides*), Cooley's meadowrue (*Thalictrum cooleyi*), Florida torreya (*Torreya taxifolia*), and relict trillium (*Trillium reliquum*); one candidate plant Hirst's panic grass (*Panicum hirstii*); and six invertebrates, the purple bankclimber (*Elliptoideus sloatianus*), shinyrayed pocketbook (*Lampsilis [Villosa] subangulata*), Gulf moccasinshell (*Medionidus penicillatus*), oval pigtoe (*Pleurobema pyriforme*), the fat threeridge (*Amblema neisleri*), and the Chipola slabshell (*Elliptio chipolaensis*). Two Federally listed species considered in this BA and known to exist in the vicinity of the Farley site and its transmission line corridors are one bird, the bald eagle (*Haliaeetus leucocephalus*), and one reptile, the American alligator (*Alligator mississippiensis*).

The freshwater mussel species (i.e., the fat threeridge, Chipola slabshell, purple bankclimber, shinyrayed pocketbook, Gulf moccasinshell, and the oval pigtoe) are of particular interest to the FWS. These freshwater mussels are not observed to occur in the vicinity of the Farley site nor within aquatic habitats traversed by its transmission lines, however, the potential effects of the proposed action on the species ability to reestablish in this project area are of concern. Therefore, this BA summarizes pertinent project information and existing data and discusses the potential consequences of the proposed action on the aforementioned six species of Federally protected freshwater mussels.

Table 1. Federally Listed Special-Status Species Potentially Occurring in Baker, Coffee, Decatur, Early, Miller, Mitchell, Seminole, Tift, and Worth Counties (Georgia), Barbour, Dale, Geneva, Henry, Houston, Montgomery, and Pike Counties (Alabama), and Jackson County (Florida)

Scientific Name	Common Name	Federal Status[a]
Birds		
Haliaeetus leucocephalus	bald eagle	T
Mycteria americana	wood stork	E
Picoides borealis	red-cockaded woodpecker	E
Mammals		
Myotis grisescens	gray bat	E
Myotis sodalis	Indiana bat	E
Reptiles and Amphibians		
Alligator mississippiensis	American alligator	T (S/A)
Ambystoma cingulatum (Phaeognathus cingulatum)	flatwoods salamander	T
Drymarchon corais couperi	eastern indigo snake	T
Plants		
Lindera melissifolia	pondberry	E
Paronychia chartacea minima	Crystal Lake nailwort	T
Ptilimnium nodosum	mock bishop-weed	E
Schwalbea americana	chaffseed	E
Silene polypetala	fringed campion	E
Spigelia gentianoides	gentian pinkroot	E
Thalictrum cooleyi	Cooley's meadowrue	E
Torreya taxifolia	Florida torreya	E
Trillium reliquum	relict trillium	E
Panicum hirstii (Dicanthelium hirstii)	Hirst's panic grass	C
Fish		
Acipenser oxyrinchus desotoi	Gulf sturgeon	T
Invertebrates		
Amblema neislerii	fat threeridge	E
Elliptio chipolaensis	Chipola slabshell	T

Scientific Name	Common Name	Federal Status[a]
Elliptoideus sloatianus	purple bankclimber	T
Lampsilis (Villosa) subangulata	shinyrayed pocketbook	E
Medionidus penicillatus	Gulf moccasinshell	E
Pleurobema pyriforme	oval pigtoe	E

[a]E = endangered, T = threatened, C = candidate for Federal listing, T (S/A) = threatened due to similarity of appearance

II. PROJECT DESCRIPTION

The proposed action is renewal of the operating licenses for Farley Units 1 and 2. Farley is located in Houston County in southeastern Alabama on the west bank of the Chattahoochee River approximately 8 km (5 mi) north of Gordon, Alabama, 27 km (17 mi) east of Dothan, Alabama, 161 km (100 mi) southeast of Montgomery, Alabama, and 290 km (180 mi) south-southeast of Atlanta, Georgia (Figures 1 and 2). The current operating license for Unit 1 expires on June 25, 2017, and for Unit 2 on March 31, 2021. By letter dated September 15, 2003, SNC submitted an application to the NRC (SNC 2003a) to renew these operating licenses for an additional 20 years of operation (i.e., until June 25, 2037, for Unit 1 and March 31, 2041, for Unit 2). The renewed licenses, if issued, will be effective from its date of issuance until 20 years after the expiration date of the current operating licenses.

In a letter dated November 26, 2003, the NRC requested a list of Federally listed endangered or threatened species and information on protected, proposed, and candidate species–as well as any designated critical habitat--that may be in the vicinity of Farley Units 1 and 2 and its associated transmission line ROWs (Kuo 2003). In response, on February 6, 2004, after receiving additional information from SNC (as discussed below) and the NRC's request, the FWS provided additional information regarding Federally listed species that have been observed or may occur in the vicinity of the Farley site and its associated transmission lines. The FWS, in their letter of February 6, 2004 (Goldman 2004), also raised a number of concerns related to plant operation on four species of freshwater mussels. The NRC has addressed these FWS concerns separately.

In a letter dated May 7, 2002, SNC also corresponded with the FWS, regarding potential impacts of license renewal on threatened or endangered species at Farley (Pierce 2002). The FWS responded to SNC on July 9, 2002, with a request for additional information related to the proposed license renewal action (Goldman 2002). SNC responded to this FWS request and provided the FWS with responses to their requests for additional information on January 16, 2004 (Pierce 2004). Information provided to FWS by the licensee is also incorporated in this BA.

SNC (2003b) has no plans to conduct major refurbishment or construction activities at Farley for continued operations during the license renewal period; the proposed project is not a major

- 4 -

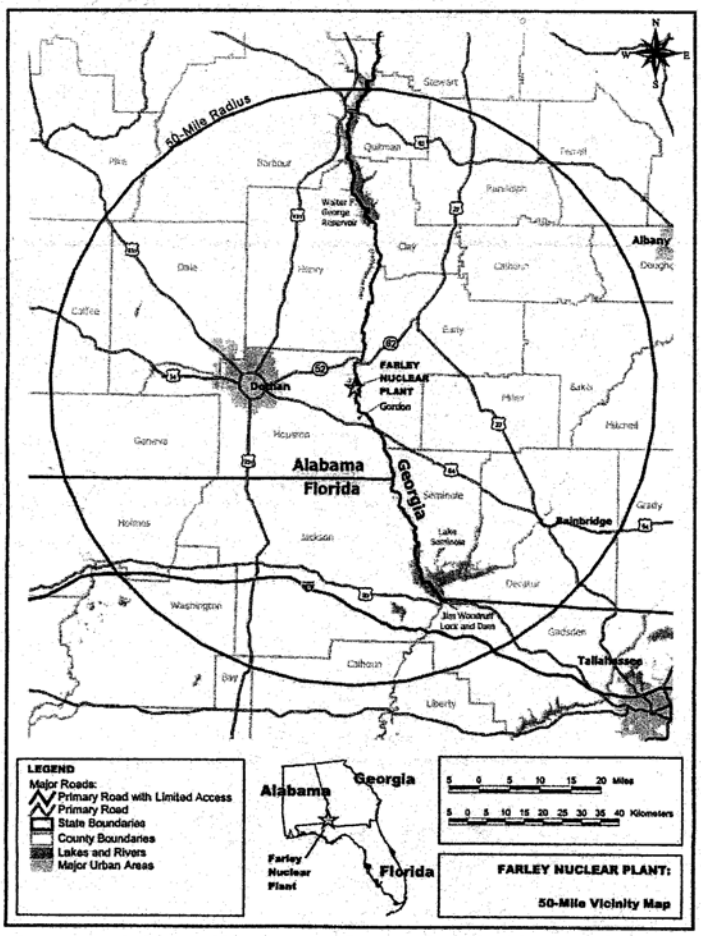
50-Mile Radius
FARLEY NUCLEAR PLANT
Gordon
Dothan
Albany
Alabama
Florida
Georgia
Bainbridge
Tallahassee
Lake Seminole
Jim Woodruff Lock and Dam
LEGEND
Major Roads:
Primary Road with Limited Access
Primary Road
State Boundaries
County Boundaries
Lakes and Rivers
Major Urban Areas
Farley Nuclear Plant
FARLEY NUCLEAR PLANT:
50-Mile Vicinity Map

Figure 1

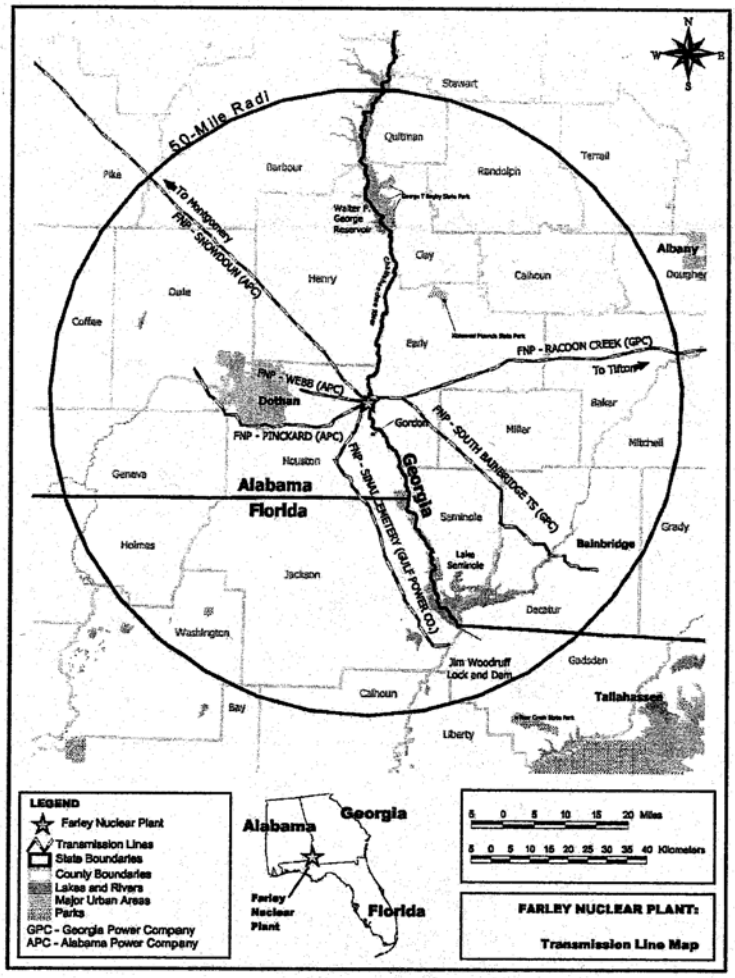
60-Mile Radi
To Montgomery
FNP - SHORTOWN (APC)
FNP - WEBB (APC)
FNP - PINCKARD (APC)
FNP - RACOON CREEK (GPC)
To Tifton
FNP - SOUTH BAINBRIDGE TS (GPC)
FNP - SMALLEY CEMETERY (GULF POWER CO.)
Stewart
Quitman
Randolph
Terrell
Barbour
Pike
Walter F. George Reservoir
Clay
Calhoun
Albany
Dougher
Henry
Dale
Coffee
Early
Dothan
Baker
Miller
Mitchell
Houston
Geneva
Alabama
Florida
Georgia
Seminole
Grady
Bainbridge
Holmes
Jackson
Lake Seminole
Decatur
Washington
Jim Woodruff Lock and Dam
Gadsden
Tallahassee
Bay
Liberty
N
W
E
S
LEGEND
Farley Nuclear Plant
Transmission Lines
State Boundaries
County Boundaries
Lakes and Rivers
Major Urban Areas
Parks
GPC - Georgia Power Company
APC - Alabama Power Company
Alabama
Georgia
Florida
Farley Nuclear Plant
5 0 5 10 15 20 Miles
5 0 5 10 15 20 25 30 35 40 Kilometers
FARLEY NUCLEAR PLANT:
Transmission Line Map

Figure 2

construction activity. The proposed project is not located near designated critical habitat of any of the threatened or endangered species identified by FWS or discussed in this assessment.

III. DESCRIPTION OF PROJECT AREA

A. General Plant and Ecological Resources Information

Farley is owned by Alabama Power Company (APC) and operated by SNC (SNC 2003b). It is located on the west bank of the lower Chattahoochee River at approximately River km 70 (RK, or River Mile 43.5). The plant lies between the George W. Andrews (4.8 km [3 mi] upstream) and the Jim Woodruff Lock and Dam (70.8 km [44 mi] downstream) (SNC 2003b); this reach is approximately 75.6 km (47 mi) long. At the location of the plant's discharge structure, the Chattahoochee River is approximately 114 m (375 ft) wide, with an average depth of 3.7 m (12 ft) and average velocity of 0.9 m/s (3 ft/s). Downstream portions of the river range up to 132.6 m (435 ft) in width and 7.3 m (24 ft) in depth (APC 1991). The Chattahoochee River flows in a northwest-to-southeast direction and discharges into the Gulf of Mexico (SNC 2003b).

The Farley site, geologically, is located near the boundary of the Dougherty Plain and Southern Red Hills physiographic regions of the east Gulf Coastal Plain. There are two major topographical subdivisions at the site: (1) gently rolling upland west of the Chattahoochee River Valley and (2) the river terraces and floodplain of the Chattahoochee River. This contributes to a diverse distribution of habitats, with diverse wildlife and plant species. Habitats at Farley consist of river bluff forest, ravine forest, floodplain forest, pine-mixed hardwood forest, pine forest, non-floodplain wetlands, and mowed grassy areas (Tetra Tech 2002).

The Farley site consists of 749 ha (1850 ac) on the west bank of the Chattahoochee River in Houston County, Alabama. Approximately, 202 ha (500 ac) of the site are used for generation and maintenance facilities, laydown areas, parking lots, and roads. The developed areas are primarily located on a plateau approximately 0.8 km (0.5 mi) west of the river, with the area adjacent to the river mostly undeveloped. The remainder of the site consists of forested areas, ponds, wetlands, and open fields (SNC 2003b). Although the topography of the Farley site is generally flat to gently rolling, some slopes along streams approach 12 percent. Much of the flatland areas adjacent to the Chattahoochee River periodically flood (FNP 2000).

Wildlife species that occur in the forested portions of the Farley site are those typically found in similar habitats in southern Alabama. Common mammals at the site include the opossum (*Didelphis virginiana*), armadillo (*Dasypus novemcinctus*), eastern cottontail (*Sylvilagus floridanus*), gray squirrel (*Sciurus carolinensis*), racoon (*Procyon lotor*), and white-tailed deer (*Odocoileus virginianus*). Wading birds (egrets and herons) occur in wetlands and along the edges of ponds and the Chattahoochee River. Numerous bird species (e.g., eastern bluebird [*Sialia sialis*], purple martin [*Progne subis*], common bobwhite [*Colinus virginianus*], blue jay [*Cyanocitta cristata*], and various warblers), as well as several reptile and amphibian species, including the Alabama State protected gopher tortoise (*Gopherus polyphemus*) occur at the site (SNC 2003b).

The dam immediately upstream of the Farley plant is the George W. Andrews Lock and Dam (River Mile 47), 5 km (3 mi) upstream of Farley, which forms Lake Andrews. Lake Andrews is a long (47 km [29 mi]), narrow impoundment with a surface area of only 623 ha (1540 ac). The lock and dam were built to regulate downstream flow and improve navigation, and are not used

for hydroelectric power generation. The flows, circulation patterns, and retention times in this reservoir are more characteristic of a river than a reservoir. For water years 1976 to 1999, annual mean flow at the George W. Andrews gaging station ranged between 9.7 million L/min and 27.2 million L/min (5718 cfs and 16,000 cfs), and averaged 18.7 million L/min (11,000 cfs) (USGS 2000). Flows in this portion of the Chattahoochee River are highest in winter and early spring (January to April) and lowest in late summer and fall (August to October), a pattern observed throughout the river system. Alabama Department of Environmental Management uses a 7Q10[1] of 58 m^3/s (2050 cfs) and a Most Probable flow of 224 m^3/s (8000 cfs) for NPDES purposes.

The principal aquatic resources in the vicinity of the Farley site are associated with the Chattahoochee River. Other important aquatic habitats include the 44 ha (108 ac) service and makeup water pond (i.e., on the Farley site), and habitats associated with multiple river and creek crossings, wetlands, swamps, marshes, and ponds through which transmission corridors traverse (Tetra Tech 2002). These crossings also include important habitats within Elmodel and Lake Seminole Wildlife Management Areas in Georgia (SNC 2003b). The transmission lines associated with Farley traverse three States (i.e., Alabama, Georgia, and Florida) and maintenance activities occurring near aquatic resources are currently carried out by subcontractors to APC, Georgia Power Company (GPC), and Gulf Power Company under uniform guidance provided by SNC's vegetation management policy (SNC 2004).

Most of the floodplain forests are dominated by high floodplain or ridge floodplain species. On the highest ridges and in high floodplains, willow oak (*Quercus phellos*), Shumard oak (*Quercus shumardii*), bitternut hickory (*Carya cordiformis*), sweet gum (*Liquidambar styraciflua*), swamp chestnut oak (*Quercus michauxii*), and cherrybark oak (*Quercus pagoda*) are present. Along the river in early successional areas, sycamore (*Platanus occidentalis*), silver maple (*Acer saccharinum*), and black willow (*Salix nigra*) dominate. In sloughs, backwaters, and poorly-drained areas, bald cypress (*Taxodium distichum*), water tupelo (*Nyssa aquatica*), red maple (*Acer rubrum*), and laurel oak (*Quercus laurifolia*) are commonly found (Tetra Tech 2002).

Several non-floodplain wetlands occur on the Farley site. Most of these are generally weedy marsh areas with scattered red maple, sweet gum, black willow, and buttonbush (*Cephalanthus occidentalis*) woody species. Plume grass (*Erianthus sp.*), woolgrass bulrush (*Scirpus cyperinus*), needlerushes (*Juncus spp.*), and other wet site emergent, non-woody species are also found in these wetlands. One wetland has a broad expanse of open water dominated by water lilies (*Nuphar lutea* and *Nymphaea odorata*), water shield (*Brasenia screberi*), and non-woody marsh grasses such as woolgrass bulrush and common needlerush (*Juncus effusus*) (Tetra Tech 2002).

The hardwood bottoms in the vicinity of the river include species such as the water oak (*Quercus nigra*), cherrybark oak, white oak (*Quercus alba*), and tulip poplar (*Liriodendron tulipfera*). The hardwood areas and mixed pine-hardwood areas along the streams and in the upland areas consists of various oaks, sweetgum, and poplar (FNP 2000).

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[1] 7Q10 is defined as the lowest stream flow for seven consecutive days that would be expected to occur once in ten years.

A recent study that broadly surveys the aquatic communities of the lower Chattahoochee River, in the vicinity of the Farley site, is not available in the scientific literature (SNC 2003b). Rather, the most comprehensive source of information on these local aquatic communities is the *Cooling Water Intake Study 316b Demonstration for Farley Units 1 and 2*, which contains detailed information on phytoplankton, zooplankton, and fish populations (APC 1983). More recently, information on the habitat preferences and life histories of Chattahoochee River fishes, as well as species distribution maps and collections by county, may be found in *Fishes of Alabama* (Mettee et al 1996). Updated information on the distribution, abundance, and conservation status of unionid mussels in the lower Chattahoochee River is available from studies in the 1990s (Brim Box 2000; FWS 2003g). Relevant information from these sources is summarized in this BA.

The fish community of the Chattahoochee River in the vicinity of the Farley site is diverse, comprised of a mix of common southeastern stream species (many of which adapt well to reservoir conditions), species typically found in swamps and backwaters of rivers, and a small number of migratory and semi-migratory species (SNC 2003b). Approximately 92 known fish species occur in the Chattahoochee River system (Mettee et al 1996) and approximately two-thirds of these species are found in the lower Chattahoochee, within which Farley Units 1 and 2 are located (SNC 2003b).

Stream fishes commonly observed and occasionally collected in the lower Chattahoochee River near the Farley site include longnose gar (*Lepisosteus osseus*), redfin pickerel (*Esox americanus*), river redhorse (*Moxostoma carinatum*), greater jumprock (*Moxostoma lachneri*), green sunfish (*Lepomis cyanellus*), redbreast sunfish (*Lepomis auritus*), channel catfish (*Ictalurus punctatus*), and several common minnow species (e.g., longnose shiner [*Notropis longirostris*] and weed shiner [*Notropis texanus*]), as well as bowfin (*Amia calva*), spotted sucker (*Minytrema melanops*), chain pickerel (*Esox niger*), and flier (*Centrarchus macropterus*). A number of other fish species found in the Chattahoochee River in the vicinity of the Farley site are adapted to a range of environmental conditions and are abundant in rivers, lakes, reservoirs, and swamps across the Southeast. These include the gizzard shad (*Dorosoma cepedianum*), common carp (*Cyprinus carpio*), blacktail shiner (*Cyprinella venusta*), bluegill (*Lepomis machrochirus*), and largemouth bass (*Micropterus salmoides*) (SNC 2003b).

Three *Morone* species (striped bass [*M. saxatilis*], white bass [*M. chrysops*], and hybrid bass [e.g., palmetto bass, *M. chrysops x saxatilis*]) are found in the lower Chattahoochee River and are sought by anglers in the spring of the year near George W. Andrews Lock and Dam. In addition to these anadromous (e.g., striped bass) and semi-anadromous (e.g., white bass and hybrid bass) populations, small numbers of catadromous American eels (*Anguilla rostrata*) are also found in the lower Chattahoochee River.

Benthic macroinvertebrate populations inhabiting the Chattahoochee River in the vicinity of the Farley site have not been systematically surveyed (SNC 2003b). Rapidly shifting bottom sands have prevented the establishment of a diverse benthic community in this area (AEC 1974). Detailed information on the historic and current distribution of 22 unionids (freshwater mussels) in the Apalachicola, Chattahoochee, and Flint Rivers, which together comprise the Apalachicola Basin were surveyed in the 1990s (Brim Box 2000). Species diversity and abundance of freshwater mussels has declined in the Chattahoochee River since the early part of the twentieth century, with a dramatic decline over the past decades. This decline has been attributed to erosion and sedimentation (from land clearing and intensive farming in the river

basin); dredging, snag removal, and channel modifications (for navigation); the development of impoundments for flood control and hydropower; runoff of agricultural chemicals and animal wastes (chiefly poultry); mining activities in tributary streams; and discharges from wastewater treatment facilities. In addition, the prolific Asiatic clam (*Corbicula fluminea*) invaded the Chattahoochee River system, competing with native mussels for habitat and resources. At present, it appears that the once rich and abundant Chattahoochee River mussel fauna have been reduced to remnant and isolated populations in small headwater streams and monospecific populations of common species (e.g., *Utterbackia imbecilis*) in impoundments on the river (Brim Box 2000; FWS 2003g).

B. Heat Dissipation and Transmission Systems

Heat Dissipation System

Farley Units 1 and 2 have two Westinghouse-designed pressurized water reactors. The rated thermal power level for each unit is 2775 MWt. The gross electrical output for each unit is approximately 910 MWe. Unit 1 has a net electrical output of 847 MWe, and Unit 2 has a net electrical output of 852 MWe.

A nuclear power plant is cooled by a series of closed cooling systems which are isolated from each other by metal tubes of a heat exchanger. This isolation prevents the radionuclides in the reactor coolant system (RCS) from coming into direct contact with the outside environment. These systems include the RCS, the feedwater system, and the circulating water system. The reactor core is cooled by the RCS. Heat is transferred from the RCS to the feedwater system on the secondary side of the plant through the metal tubes of the steam generator. The steam generator converts the feedwater into steam to turn the tubine-generator to make electricity. The steam is exhausted from the turbine to the condenser and is condensed back into water to be recycled through the steam generators and converted back into steam.

The condenser is a tube and shell heat exchanger, with the steam from the turbine on the outside of the metal tubes and cooling water (circulating water system) inside the tubes. The cooling water for the Farley Nuclear Plant is from a storage pond that is supplied via an intake structure with screens to reduce the effects of entrainment from the Chattahoochee River. The Farley Nuclear Plant uses best available technology (cooling towers) to reduce the amount of heat discharged to the river. As part of the plant's normal operating and maintenance activities, Farley is constructing new mechanical draft cooling towers to replace the current towers for both units. Construction commenced in January 2003 and is to be completed by May 2005. The blowdown from the cooling towers and a portion of the service and circulating water are returned to the river (SNC 2003b). The Farley plant withdraws water from the river at an average rate of approximately 292,000 L/min (77,000 gpm). This represents approximately 3.0 percent of the river's annual mean flow.

Transmission System

Six high-voltage (230 and 500-kilovolt [kV]) transmission lines originate at Farley Units 1 and 2 and connect to six sub-stations, comprising approximately 472 km (294 mi) of transmission lines and covering 2186 ha (5,402 ac) in the ROWs. Transmission lines and ROWs associated with Farley Units 1 and 2 traverse multiple counties in three states. These include Barbour, Dale, Geneva, Henry, Houston, Montgomery, and Pike Counties, in Alabama; Baker, Decatur,

Early, Miller, Mitchell, Seminole, Tift, and Worth Counties, in Georgia; and Jackson County, Florida (SNC 2003b).

The transmission corridors are located primarily within the east Gulf Coastal Plain physiographic province. The region is characterized by sandy soils and flat to gently rolling terrain. The slope, aspect, and underlying substrate of the soils play a significant role in determining the assemblage of plants and animals that occur in a given area. Because of the substantial length of the transmission corridors and the different directions they take from Farley Units 1 and 2, they transect a wide array of geophysical conditions that occur in the east Gulf Coastal Plain. Swamps, marshes, and river and creek crossings along transmission corridors provide habitats that appear suitable for multiple Federally listed species, as discussed above. Numerous marshes and beaver ponds occur along the transmission corridors. These areas provide excellent foraging habitat for many wildlife species. Many animal species are highly mobile and utilize more than one habitat type. The transmission corridors provide an open canopy and offer an abundance of herbaceous ground cover. Thus, they can be natural avenues for movement and foraging by some animals, especially those that prefer open habitats (Tetra Tech 2002). One transmission line crosses a stream (i.e., Mill Creek) with a known occurrence of one of the Federally listed mussel species (Chipola slabshell) covered in this BA (SNC 2003b; Brim Box 2000; FWS 2003g).

Transmission line ROW maintenance activities in the vicinity of aquatic crossings employ best management practices to minimize shoreline disturbance, erosive activities, and herbicide use (SNC 2003b; SNC 2004). Mowing cycles for vegetation management of ROWs vary between transmission lines, with cycles ranging between 3 and 6 years. Herbicide application occurs on a 2-year cycle in Alabama (APC 2004). In Georgia, herbicides are used on an "as needed" basis between their 5-year mowing cycles (GPC 2004a). In Florida, vegetation management recently shifted from mowing to herbicide application, which provides a lengthened maintenance cycle (i.e., 4- to 6-year maintenance cycle) (Gulf 2004). When used for vegetation management along any of the transmission line ROWs associated with Farley Units 1 and 2, herbicides are applied during the growing season (i.e., generally May to October) and typically by using backpack sprayers, although some sensitive areas involve manual removal of vegetation. When necessary, aerial application (i.e., helicopter spraying) is also used (SNC 2004; APC 2004). Herbicide application is performed according to label specifications by certified applicators. The Raccoon Creek transmission corridor that crosses into Elmodel Wildlife Management Area (i.e., structures 163-166) is managed by the Georgia Department of Natural Resources (GPC 2004b). The South Bainbridge transmission corridor passes through Lake Seminole Wildlife Management Area (i.e., Structures 179-181) and is maintained by GPC contractors (GPC 2004a; GPC 2004b).

IV. DESCRIPTION OF LISTED TERRESTRIAL SPECIES POTENTIALLY OCCURRING IN PROJECT AREA

This section describes the Federally protected terrestrial species that may occur at the Farley site, near Farley Units 1 and 2, or within habitats of associated transmission line ROWs.

A. Birds

1. *Haliaeetus leucocephalus*, bald eagle

The bald eagle was originally listed as endangered by the FWS in 1978, however 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 no longer in danger of extinction, nor is it 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 1999a]).

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 Farley site and within the ROWs of associated transmission lines. Bald eagles are thought to occur in all counties of Alabama, Florida, and Georgia traversed by these transmission lines (ADCNR 2003; FNAI 2002; Krakow 2002). During terrestrial surveys conducted for SNC, a single bald eagle was observed on the Chattahoochee River's eastern shoreline adjacent to Farley in Early County, Georgia (Tetra Tech 2002).

It is possible that bald eagles could be present at Farley and within transmission line ROWs, at least occasionally, especially in areas with river crossings or lakes. Continued operation of Farley Units 1 and 2 could potentially affect bald eagles if plant operations resulted in changes to the Chattahoochee River that affected food availability (e.g., fish and waterfowl). However, Farley Units 1 and 2 uses a closed cycle cooling system, and discharges are regulated through the NPDES permit program protecting water quantity and quality, thereby minimizing effects to fish in the area. Any disturbance of nesting eagles while conducting vegetation management at Farley and within transmission line ROWs could affect this species; however, no known nesting sites exist at Farley or within the ROWs of the associated transmission lines (SNC 2003b).

A bald eagle could collide with the 524 km (326 mi) of transmission lines associated with Farley. The NRC assessed the impacts of transmission lines on avian populations in its Generic Environmental Impact Statement (GEIS) for 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. There have been no reports of collisions or electrocutions of bald eagles or other protected birds along the six transmission lines associated with Farley (SNC 2003b) and no other demonstrated impact to this species during the operation of Farley Units 1 and 2. Therefore, the staff has concluded that the continued operation of Farley Units 1 and 2 may affect, but is not likely to adversely affect, the bald eagle.

2. *Mycteria americana*, wood stork

The wood stork was listed as endangered throughout its entire range by the FWS in 1984 due to this species' decline of over 75% from its 1930 levels (49 FR 7332 [FWS 1984a]). Wood stork habitats include cypress or gum ponds, river swamps, marshes, and bays. Storks usually forage in shallow water (i.e., 15 to 51 cm [6 to 20 in.]) and are a highly gregarious species. Wood storks may forage, at least occasionally, in suitable wetlands within or near the transmission line ROWs associated with Farley Units 1 and 2 (Tetra Tech 2002). However, SNC has not observed this species at Farley or along associated transmission lines (SNC 2003b) and no stork rookeries were noted during terrestrial surveys conducted for SNC, either at the site nor within the ROWs (Tetra Tech 2002). This species is thought to occur in Barbour and Montgomery Counties, Alabama; Baker, Decatur, Early, Miller, Mitchell, Seminole, Tift, and Worth Counties, Georgia; and Jackson County, Florida. Florida Natural Areas Inventory records indicate a possible wood stork rookery approximately 1.6 km (1 mi) southwest of the transmission line in Jackson County, Florida, near Ocheesee Pond (Carmody 2002). However, vegetation management within transmission line ROWs will not affect these species as the workers do not enter the wetlands, or use machinery in these habitats. Therefore, the staff has concluded that continued operation of Farley Units 1 and 2 will have no effect on the wood stork.

3. *Picoides borealis*, red-cockaded woodpecker

The red-cockaded woodpecker was Federally listed as endangered in 1970 (i.e., 35 FR 16047). This species lives in groups and excavates cavities in live pines within open, mature pine stands with sparse midstory vegetation. Cavities are rarely found in trees as young as 30 to 40 years old; rather, most cavity trees are at least 80 years old. Ideal foraging habitat consists of pine stands with trees greater than 23 cm (9 in.) diameter at breast height (dbh). However, pine stands of 10 to 23 cm (4 to 9 in.) dbh may also be used, as well as pine trees found scattered throughout hardwood stands (Tetra Tech 2002). This preferred habitat does not exist at Farley, although some portions of the Raccoon Creek transmission line traverse what appears to be suitable red-cockaded woodpecker habitat. The red-cockaded woodpecker has not been observed at Farley or along associated transmission line ROWs, with no cavity trees observed within these areas as well (Tetra Tech 2002). This species is thought to occur where suitable habitat exists in Barbour, Dale, Geneva, Henry, Houston, Montgomery, and Pike Counties, Alabama (ADCNR 2003); Baker, Decatur, Early, Miller, Mitchell, Seminole, Tift and Worth Counties, Georgia (Krakow 2002); and Jackson County, Florida (Carmody 2002). Red-cockaded woodpeckers may be negatively affected by collisions with the transmission lines, however, no record of this species striking the lines has been documented (SNC 2003b). The probability of this species occurring on the Farley site or along the transmission lines is very low, due to the absence of suitable habitat at Farley and the absence of cavity trees in the limited suitable habitat along the associated transmission line ROWs. Therefore, the staff has concluded that continued operation of Farley Units 1 and 2 may affect, but is not likely to adversely affect, the red-cockaded woodpecker.

B. Mammals

1. *Myotis grisescens*, gray bat

The gray bat was listed as endangered throughout its entire range by the FWS in 1976 as result of habitat destruction that threatens this species with extinction (41 FR 17736 [FWS 1976]). This species inhabits moist caves in limestone strata and forages primarily over water up to 40 km (25 miles) from their cave roost. No known caves occur in Alabama and Georgia, making it unlikely that gray bats occur in these states. However, it is expected that gray bats could occur in Jackson County, Florida (Carmody 2002). This county has one of the highest concentrations of caves in Florida (Gore 1987). Large colonies of gray bats occur in the Florida Caverns State Park, approximately 16 km (10 miles) from the Sinai Cemetery transmission line (one of the transmission lines associated with Farley Units 1 and 2), although no records of this species occurring within habitats of the Sinai Cemetary ROW have been noted (Carmody 2002). Large water bodies along this ROW are scarce and it is unlikely that these bats forage along this ROW (Tetra Tech 2002). It is possible, however, that the bats may cross the ROW while traveling to and from their foraging areas. SNC has not noted any gray bats in the vicinity of the Farley site or its associated transmission lines (SNC 2003b). However, due to the difficulty in detecting bats, it is possible they could be present in appropriate habitats. Vegetation management practices within transmission line ROWs is unlikely to affect these bats (i.e., bats are nocturnal species), even if present, and mortality due to power line strikes is likely to be low or non-existent (i.e., bats echolocate and are agile fliers). Therefore, the staff has concluded that continued operation of Farley Units 1 and 2 will have no effect on the gray bat.

2. *Myotis sodalis*, Indiana bat

The Indiana bat was listed in 1967 as Federally endangered. Its decline is largely attributed to cave destruction and disturbance (FWS 1991a). It is a very small bat, with a wingspan of 23 to 28 cm (9 to 11 in.) and weighing approximately 9 g (0.3 oz). 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. 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. Roosting and rearing of young usually occurs in caves, although it may occur under the loose bark of trees (FWS 1991a). Indiana bats are migratory, traveling as far as 483 km (300 mi) between winter and summer habitats (Humphrey 1992). In summer, the Indiana bat is absent south of Tennessee (FWS 1991a). There are no recorded occurrences of this species in Georgia or in Alabama counties crossed by transmission line ROWs. However, documented occurrences of the Indiana bat exist for Jackson County, Florida (FNAI 2002), although not within areas traversed by the transmission lines associated with Farley Units 1 and 2. SNC has not noted any Indiana bats in the vicinity of the Farley site or its associated transmission lines (SNC 2003b). However, due to the difficulty in detecting bats, it is possible they could be present in appropriate habitats. No known hibernation or nursery caves occur within the vicinity of Farley or its transmission lines. The potential for occurrence of this species within this project area is very low, although this species may pass through or use this area during migration. Vegetation management practices within the transmission line ROWs is unlikely to affect these bats (i.e., bats are nocturnal species), even if present, and mortality due to power line strikes is likely to be low or non-existent (i.e.,

bats echolocate and are agile fliers). Therefore, the staff has concluded that continued operation of Farley Units 1 and 2 will have no effect on the Indiana bat.

C. Reptiles and Amphibians

1. *Alligator mississippiensis*, American alligator

The American alligator was originally Federally listed in 1967 as endangered throughout its entire range (23 FR 4001 [FWS 1975]), downlisted in 1975 to threatened in some areas of its range (40 FR 44412 [FWS 1975]), and subsequently delisted to threatened throughout its entire range in 1987 (52 FR 21059 [FWS 1987b]). However, the American alligator is considered threatened due to similarity of appearance to the American crocodile, which is listed as endangered. Excessive alligator exploitation and habitat destruction resulted in its endangered listing; however, as a result of Federal and State protection, this species experienced a considerable increase in numbers resulting in its current status (FWS 1975; FWS 1987b). Female alligators lay eggs in a nest constructed of leaves and other vegetation. These nests are fairly easy to recognize as they can reach 2.1 m (7 ft) in diameter and 1 m (3 ft) in height (GMNH 2000a). Alligator habitat consists of swamps, marshes, ponds, lakes, and slow-moving streams and rivers. Within these habitats, alligators occur in Alabama, Florida, and southern Georgia; this includes counties traversed by transmission lines associated with Farley Units 1 and 2. It is likely that alligators occur in suitable habitats within the ROWs of these lines (Tetra Tech 2002; GMNH 2000a). SNC has observed American alligators within the project area, including noting their tracks at the entrance to an alligator den within the ROW of the Farley-Sinai Cemetery transmission line in Jackson County, Florida during terrestrial wildlife surveys conducted in 2002 (Tetra Tech 2002). Alligators have also been observed on the Farley site, with one residing in the service water pond (Causey 1993). American alligators could potentially be affected by mowing and herbicide use along wetland borders during the nesting season (i.e., March through June). However, alligator nests usually occur in swampy areas where heavy equipment is not used; the nests are also easily detected and contractors avoid nests for safety reasons. Therefore, the staff has concluded that the continued operation of Farley Units 1 and 2 may affect, but is not likely to adversely affect, the American alligator.

2. *Ambystoma cingulatum (Phaeognathus cingulatum)*, flatwoods salamander

The flatwoods salamander was listed by the FWS as threatened in 1999 (64 FR 15691 [FWS 1999b]). Habitat loss and degradation from agriculture, urbanization, and silvicultural practices resulted in the loss of 80% of its habitat and led to its protected status (FWS 1999b). Habitat loss and degradation remain a current threat to this species through activities such as clear cutting, burning, and soil disturbance by heavy machinery (GMNH 2000b). This salamander inhabits pine-flatwoods-wiregrass communities that adjoin cypress heads or ponds without large predatory fish (Tetra Tech 2002). SNC has not observed the flatwoods salamander at Farley or within ROWs of associated transmission lines (SNC 2003b; Tech Tech 2002); however, this species is extremely cryptic and is difficult to observe without extensive pit trapping (Tetra Tech 2002). No pine flatwoods habitat exists within the Farley site and the salamanders are not expected to occur at the site. Flatwoods salamanders are known to occur in Houston County, Alabama (Lewis 2002); Baker, Early, Miller, Tift and Worth counties, Georgia (Krakow 2002); and Jackson County, Florida (FNAI 2002). However, the flatwoods salamander is unlikely to occur along the transmission lines because the ROWs lack suitable habitat for this species. A moderate possibility exists that this species may occur in areas adjacent to the ROWs (Tetra

Tech 2002). Vegetation management within the habitat of this salamander using heavy machinery (i.e., mowing machines) could affect this species. However, this habitat is absent at the Farley site and within the ROWs of associated transmission lines. Therefore, the staff has concluded that the continued operation of Farley Units 1 and 2 may affect, but is not likely to adversely affect, the flatwoods salamander.

3. *Drymarchon corais couperi*, eastern indigo snake

The eastern indigo snake was listed by the FWS as threatened in 1978 (43 FR 4026 [FWS 1978]). Threats to this species that made this action necessary included habitat modification, collection for the pet trade, and gassing while inhabiting gopher tortoise burrows (FWS 1978). Eastern indigo snakes typically inhabit dry areas that are bordered by water. Indigo snakes are found in southern Alabama, Georgia, and Florida, and typically spend the winter in gopher tortoise burrows (FWS 1991b). SNC has not observed this species at Farley or within habitats of the associated transmission line ROWs (SNC 2003b). However, snakes are often difficult to detect, and therefore their presence cannot be ruled out in these areas. Suitable habitat for this species does occur at Farley and within its transmission line ROWs (Tetra Tech 2002). Eastern indigo snakes are known to occur in Barbour, Dale, Geneva, Henry, Houston, Montgomery, and Pike Counties, Alabama (Lewis 2002); Baker, Decatur, Miller, Mitchell, Seminole, Tift, and Worth Counties, Georgia (Krakow 2002); and Jackson County, Florida (FNAI 2002). Because indigo snakes are active during the day (i.e., mobile and able to escape harm), it is unlikely that vegetation management activities at Farley or within the transmission line ROWs affect these snakes, if present. Therefore, the staff has concluded that continued operation of Farley Units 1 and 2 will have no effect on the eastern indigo snake.

D. Plants

1. *Lindera melissifolia*, pondberry

Pondberry was listed by FWS as endangered in 1986 (51 FR 27495 [FWS 1986]). This deciduous, small shrub was limited to 19 locations in the southeastern U.S. and became endangered as a result of threats including land clearing, timber harvesting, drainage activities, and invasive species encroachment (FWS 1986). It reaches heights of 0.5 to 2 m (1.6 to 6.6 ft) and often grows in thickets within shallow pools, along margins of cypress ponds, and in seasonally wet low areas within bottomland hardwoods (Patrick 1995). Potential pondberry habitat occurs along the South Bainbridge and Raccoon Creek transmission lines associated with Farley Units 1 and 2, although pondberry was not observed in these areas during terestrial surveys conducted for SNC (Tetra Tech 2002). This species is considered extremely rare and is primarily known from a few populations in Baker and Wheeler Counties in Georgia. It is considered extirpated from Alabama and Florida (FWS 1993). This species could be affected by vegetation management activities conducted near wetland habitats within associated transmission line ROWs (e.g., mowing and herbicide use). However, because it is a shrub that would not respond well to ongoing mowing and herbicide application, and because of its extreme rarity (FWS 1993), this species is most likely absent from the transmission line ROWs. However, if pondberry were discovered within these ROWs, its location would be marked and avoided during regular vegetation maintenance activities. Therefore, the staff has concluded that the continued operation of Farley Units 1 and 2 may affect, but is not likely to adversely affect, pondberry.

2. *Paronychia chartacea minima*, Crystal Lake nailwort

Crystal Lake nailwort was listed by FWS as threatened in 1987 (FWS 1999c) throughout its entire range. The primary threat to this species, resulting in its protected status, is the loss of scrub habitat; more than two-thirds of this habitat was lost by 1980. It is a short-lived (i.e., annual) mat-forming herb that is found along the margins of karst lakes in the Florida panhandle. The Crystal Lake nailwort is apparently favored by mild disturbance, prefers open habitats, and thrives in fire lanes and along sand roads. Flowering occurs in late summer and fruits mature in September and October (FWS 1999c). SNC has not observed this plant at Farley (SNC 2003b) and it was not found during terrestrial surveys along associated transmissions lines conducted for SNC. The transmission line occurring in Florida (i.e., Sinai Cemetary) does not traverse areas near lake shores; therefore, it is unlikely to be found along this transmission line (Tetra Tech 2002). It is also not expected to exist within the Farley site. This species, if present, would benefit from ongoing mowing regimes within transmission line ROWs, because enough time passes between mowing events to allow for plants to mature and set seed. In addition, if populations of this herb were discovered along the Sinai Cemetery transmission line, locations would be recorded and herbicide use would be avoided in areas surrounding the population. Therefore, the staff has concluded that the continued operation of Farley Units 1 and 2 may affect, but is not likely to adversely affect, Crystal Lake nailwort.

3. *Ptilimnium nodosum*, mock bishop-weed

Mock bishop-weed was listed by the FWS as endangered in 1988 (53 FR 37978 [FWS 1988a]). At the time of its listing, this species was eliminated from over half of its known historical populations site throughout its range (FWS 1988a). The mock bishop-weed is an annual herb that reaches 10 to 40 cm (4 to 16 in.) in height. It is found in wet savannas and within peaty fringes of pineland pools and cypress ponds in Alabama and Georgia (Patrick 1995). It is also found on granite outcrops in Georgia (FWS 1990b). Mock bishop-weed is not known to occur in Alabama at Farley or in counties traversed by associated transmission lines, although it could potentially occur along the South Bainbridge transmission line in Decatur County, Georgia (Krakow 2002). However, it was not observed along this line in terrestrial surveys conducted for SNC (Tetra Tech 2002). Also, it has not been recorded within 5 km (3 mi) of the transmission line within Georgia (Krakow 2002). Therefore it is unlikely that this species is present along the transmission lines associated with Farley Units 1 and 2. The primary threat to mock bishop-weed is lowering of the water table (FWS 1990b). SNC does not impact water levels within aquatic areas traversed by associated transmission lines. It is unlikely that vegetation management activities within ROWs would have a large effect on this species, if it were present. Mowing of stream banks or wetlands and the application of herbicides might negatively affect this species, if it were to occur within the ROWs. If mock bishop-weed were identified within transmission line ROWs associated with Farley, the location would be recorded with mowing and herbicide use subsequently avoided at these locations. Therefore, the staff has concluded that the continued operation of Farley Units 1 and 2 may affect, but is not likely to adversely affect, mock bishop-weed.

4. *Schwalbea americana*, chaffseed

Chaffseed was listed by the FWS as endangered in 1992 (57 FR 44703 [FWS 1992a]). At the time of its listing, 20 extant populations of this plant were known. Widespread habitat destruction as a result of development and fire suppression (thereby providing the opportunity

for other vegetation to compete with this species) caused its decline (FWS 1992a). Chaffseed is a perennial herb and it reaches a height of 50 to 70 cm (19 to 28 in.). It grows in fire-maintained wet savannas and in grassy openings and swales within longleaf pine woods (Patrick 1995). It is thought to occur in Baker, Decatur, Early, Miller, Tift, and Worth Counties in Georgia (Krakow 2002) and may potentially occur in appropriate habitats along the Raccoon Creek and South Bainbridge transmission lines that traverse these areas. However, it was not observed during terrestrial surveys conducted for SNC (Tetra Tech 2002). This species is shade intolerant and adapted to open conditions. In South Carolina it is often found in power line ROWs that experience frequent mowing (FWS 1995b). This species, if present, would benefit from ongoing ROW vegetation management practices. Therefore, the staff has concluded that the continued operation of Farley Units 1 and 2 may affect, but is not likely to adversely affect, chaffseed.

5. *Silene polypetala*, fringed campion

Fringed campion was listed by the FWS as endangered in 1991 (56 FR 1932 [FWS 1991c]). This plant is known to occur in two separate geographic areas; a four-county area in central Georgia, west of Macon and at the confluence of the Flint and Apalachicola Rivers in a three-county area (i.e., occurs on both Georgia and Florida borders). Threats to this plant include logging, development, and the invasive Japanese honeysuckle plant (FWS 1991c). The fringed campion is a perennial, mat-forming herb that spreads by sending out long runners, which terminate in rosettes (Patrick 1995). Each rosette produces one to several flowering shoots up to 40 cm (16 in.) in height (FWS 1992b). It occupies mature hardwood and hardwood-pine forests on river bluffs, stream terraces, moist slopes, and well shaded ridge crests (Patrick 1995). Fringed campion is thought to be present in Jackson County, Florida and Decatur County, Georgia, and thus may be present in appropriate habitats within the ROWs for the Sinai Cemetery and South Bainbridge transmission lines (i.e., lines associated with Farley Units 1 and 2). It is shade-tolerant and negatively affected by activities that disturb the litter layer (Patrick 1995). Therefore, it is unlikely to be found within ROW areas that are regularly mowed or treated with herbicides and, if not present, will not be affected by ongoing vegetation management. However, the fringed campion may potentially occur in areas adjacent to these ROWS that have no vegetation management and will not be affected by transmission line maintenance activities. Therefore, the staff has concluded that the continued operation of Farley Units 1 and 2 may affect, but is not likely to adversely affect, fringed campion.

6. *Spigelia gentianoides*, gentian pinkroot

Gentian pinkroot was listed by the FWS as endangered in 1990 (55 FR 49046 [FWS 1990a]). Its historical range included counties adjacent to its known occurrences at the time of listing which included two populations in Jackson County, Florida. This plant declined due to threats from recreational activities and habitat alteration from forestry practices (FWS 1990a). The gentian pinkroot is an extremely rare perennial herb with a single stem reaching 10 to 30 cm (4 to 12 in.) in height. It occupies mixed pine-hardwood forests and longleaf-wiregrass woods (FWS 1992c). Gentian pinkroot is present in Jackson County, Florida (Carmody 2002) and may occur in appropriate habitats within the ROW of the Sinai Cemetery transmission line associated with Farley Units 1 and 2. However, no observations of this species were noted during terrestrial surveys conducted for SNC (Tetra Tech 2002). Little is known about its habitat requirements (FWS 1992c). It is known to normally occur in woodlands and forests; these habitats are unlikely within the transmission line ROWs where vegetation management

occurs (e.g., regular cycles of mowing). Therefore, the staff has concluded that the continued operation of Farley Units 1 and 2 may affect, but is not likely to adversely affect, gentian pinkroot.

7. *Thalictrum cooleyi*, Cooley's meadowrue

Cooley's meadowrue was listed by the FWS as endangered in 1989 (54 FR 5935 [FWS 1989]). Its decline is due to threats including fire suppression, mining, drainage activities associated with silviculture and agricultural, and development (FWS 1989). Cooley's meadowrue is a tall (1 m [3.3 ft]) perennial herb that occurs in fine sandy loam within open, periodically disturbed, seasonally wet pine-hardwood stands and within adjacent wet savannas (Patrick 1995; FWS 1994). It may now be mainly limited to roadsides and power line ROWs in Georgia (Patrick 1995). Cooley's meadowrue is thought to occur in Decatur, Tift, and Worth counties in Georgia (Krakow 2002). It is known to occur within ROWs of power lines and it is possible that Cooley's meadowrue is present in appropriate habitats within the ROWs of the Raccoon Creek and South Bainbridge transmission lines associated with Farley Units 1 and 2. However, it was not observed along these lines during terrestrial surveys conducted for SNC (Tetra Tech 2002). Ongoing vegetation management (i.e., mowing) within these ROWs benefits this species, if present, in that it provides an open and periodically disturbed habitat that suits this plant (FWS 1994). Therefore, the staff has concluded that the continued operation of Farley Units 1 and 2 may affect, but is not likely to adversely affect, Cooley's meadowrue.

8. *Torreya taxifolia*, Florida torreya

Florida torreya was listed by the FWS as endangered in 1984 (49 FR 2783 [FWS 1984b]). It historically occurred within the Apalachicola River area in Georgia and Florida. Its decline resulted from a fungal disease that kills trees prior to their reaching seed-bearing size (FWS 1984b). The blight that resulted in critically endangering this species may possibly be associated with fire suppression (Esser 1993). Most mature trees were killed by this fungus and other infections; this left root sprouts that generally grow to less than 3 m (9.8 ft) in height before also succumbing to this fungus (FWS 1991d). The commercial fungicide Maneb successfully treats the fungus (Esser 1993). The Florida torreya is a relatively small, conical, needle-bearing evergreen tree that reaches up to 18 m (59 ft) in height (Patrick 1995; FWS 1991d). It occurs in beech-magnolia forests, mixed hardwoods on middle slopes of steep ravines with nearly permanent seepage (steepheads), and on lower ravine slopes and adjacent floodplains (Patrick 1995). Florida torreya is thought to occur in Decatur County, Georgia and Jackson County, Florida. The transmission lines in these areas may potentially have habitat conducive for this species (i.e., within the Sinai Cemetery and South Bainbridge transmission line ROWs). However, this species was not observed along these lines in the terrestrial survey conducted for SNC (Tetra Tech 2002). It is unlikely that the Florida torreya will occur within the ROWs in which vegetation management occurs (i.e., due to historical mowing or herbicide application) and where most trees were removed when the ROW was originally created; therefore, this evergreen is unlikely to be affected by ongoing ROW vegetation management. If individuals of this species are discovered, mowing and herbicide application would be avoided in the immediate area. Therefore, the staff has concluded that the continued operation of Farley Units 1 and 2 may affect, but is not likely to adversely affect, Florida torreya.

9. *Trillium reliquum*, relict trillium

Relict trillium was listed by the FWS as endangered in 1988 (53 FR 10879 [FWS 1988b]). At the time it was listed, it was only known from ten locations, including two sites in Alabama and five sites in Georgia. Threats that led to this species' decline include timber harvesting, wildfires, and development (FWS 1988b). Relict trillium is a small perennial herb with three strongly mottled leaves on the end of a 5- to 25-cm (2- to 10-in.) long stem. It is mainly found in undisturbed hardwood forests in Alabama, Georgia, and South Carolina (Patrick 1995; FWS 1990c). Relict trillium is thought to occur in Henry County, Alabama (Lewis 2002) and Decatur, Early, and Tift Counties, Georgia (Krakow 2002). This species may occur within the ROWs of transmission lines associated with Farley Units 1 and 2 that traverse these areas (i.e., Snowdoun, Raccoon Creek, and South Bainbridge). However, this species is negatively affected by disturbance (FWS 1990c) and past vegetation management within the ROWs make it unlikely to occur in these areas. It is also unlikely to be significantly affected by ongoing vegetation management in the ROWs, if not present; mowing and herbicide use are unlikely to be used in habitats the relict trillium inhabits, if present. Therefore, the staff has concluded that the continued operation of Farley Units 1 and 2 may affect, but is not likely to adversely affect, relict trillium.

10. *Panicum hirstii (Dicanthelium hirstii)*, Hirst's panic grass

Hirst's panic grass, a candidate for listing, is a purplish-green grass reaching heights of 0.6 to 1.2 m (2 to 4 ft). It is found in small, seasonally wet ponds (Patrick 1995). Hirst's panic grass has been recorded as occurring in Miller County, Georgia (USDA 2002), although it may be extirpated from Georgia (FWS 2002). It may be present in appropriate habitats within the South Bainbridge transmission line ROW. The main cause for decline of Hirst's panic grass is drainage of wetlands and encroachment by woody vegetation (FWS 2002). Farley Units 1 and 2 do not alter water levels within the ROWs of its associated transmission lines and woody vegetation is controlled by vegetation management within these ROWs. If present along this transmission line, this species is likely to benefit from ongoing vegetation management. Therefore, the staff has concluded that the continued operation of Farley Units 1 and 2 may affect, but is not likely to adversely affect, Hirst's panic grass.

V. DESCRIPTION OF LISTED AQUATIC SPECIES POTENTIALLY OCCURRING IN PROJECT AREA

This section describes the Federally protected acquatic species that may occur at the Farley site, near Farley Units 1 and 2, or within habitats of associated transmission line ROWs.

A. Fish

1. *Acipenser oxyrinchus desotoi*, Gulf sturgeon

The Gulf sturgeon was listed as a Federally threatened species on September 30, 1991 ([56 FR 49653] FWS 1991e). Historically, this fish occurred in most major rivers from the Mississippi River to the Suwannee River; currently, its population levels in these rivers are unknown (with the exception of the Suwannee and the Apalachicola Rivers) but are considered reduced from historic levels. This is an anadromous fish, migrating from marine habitats (i.e., the marine waters of the central and eastern Gulf of Mexico to Florida Bay) into large coastal rivers. Both

immature and mature fish migrate into freshwater rivers, spending eight to nine months each year in the rivers and three to four of the coolest months in the estuaries and Gulf waters. Gulf sturgeon less than two years old remain in riverine and estuary habitats all year. Barriers (e.g., dams) to its spawning habitats, loss of habitat, poor water quality, and overfishing are considered threats that negatively impacted this species (FWS 2003h).

Gulf sturgeon migrated 322 km (200 mi) upstream into the Apalachicola-Chattahoochee-Flint River system (ACF) before the dam construction in 1957 (i.e., the Jim Woodruff Lock and Dam), with numerous anecdotal reports of this fish in the Flint and Chattahoochee Rivers. No evidence exists that the Gulf sturgeon passes through this lock system. A recovery plan for the Gulf sturgeon was issued in September 1995 by the FWS (FWS 1995b). Critical habitat was designated for the Gulf sturgeon on March 19, 2003 ([68 FR 13370] FWS 2003i) but does not include any critical habitat units for the Chattahoochee River or in the areas traversed by transmission lines associated with Farley Units 1 and 2 (FWS 2003i). It is not expected that the Gulf sturgeon will occur in the lower Chattahoochee River, in the vicinity of Farley nor immediately downstream of Farley, due to the lock and dam located downstream that impedes upstream migration into the area. The Recovery Plan for the Gulf sturgeon does not note any known recent occurrences in this area (FWS 1995b).

This dam structure continues to completely restrict any migration of the Gulf sturgeon upstream. The FWS recovery plan for the Gulf sturgeon recommends a recovery action that involves identifying critical dam and lock sites that offer the greatest feasibility for successful restoration of up-river spawning areas. Subsequent recommended actions include providing a viable bypass route around these structures (FWS 1995a). If the Jim Woodruff Lock and Dam is identified in the future and is subsequently retrofitted with a bypass, the potential affects on the Gulf sturgeon from the continued operations of Farley Units 1 and 2 would need to be re-evaluated. The staff concludes that the continued operation of Farley Units 1 and 2 will have no effect on the Gulf sturgeon.

B. Invertebrates

All six Federally listed freshwater mussels described in this section were listed as Federally endangered or threatened species on March 16, 1998, (63 FR 12664 [FWS 1998]) throughout their range. Because of the extent of their decline and continuing threats to habitat, securing the viability of existing subpopulations of six listed freshwater mussel species and their habitat are part of FWS's recovery plan (FWS 2003g). Current plans are to reestablish viable populations within their historical ranges that have suitable habitat and water quality (FWS 2003g).

The six freshwater mussels evaluated in this BA, dramatically declined and were extirpated from most of their historical range by the impacts of human activities. These threats included the construction of impoundments, channelization, pollution, sedimentation, and other factors. Current threats to the remaining populations include habitat fragmentation or destruction by erosive land practices, construction of new impoundments, water withdrawals, and invasive species. Such activities result in mussel habitats impacted by sedimentation, turbidity changes, increased suspended solids, and pesticides. In particular, mussel species with low population levels and restricted ranges (especially the fat threeridge, Gulf moccasinshell, oval pigtoe, and purple bankclimber) are particularly vulnerable to toxic chemical spills and other catastrophic events, and further genetic isolation. However, the FWS recovery plan is addressing these

remaining threats by applying knowledge of current freshwater mussel distributions and habitat needs in conjunction with the reduction or prevention of threats (i.e., through regulatory mechanisms, habitat restoration programs, and partnerships with various stakeholders) (FWS 2003g).

1. *Amblema neislerii*, fat threeridge

Within its range, the (endangered) fat threeridge is known to occur in Florida (FWS 2003a), while it is endemic to the ACF and historically occurred in the Apalachicola, Flint, and Chipola Rivers (FWS 2003g). It has never been reported from the Chattahoochee River drainage (Brim Box 2000). It is currently considered extirpated from the Flint River (which constituted the majority of its historical range) and is known to occur at 15 sites of unknown viability in the Apalachicola and lower Chipola Rivers. The fat threeridge inhabits main channels of small to large rivers with slow-to-moderate currents. It uses substrates that vary from gravel to cobble to a mixture of sand and sandy mud (FWS 2003g; Brim Box 2000). Five potential host fish species have been identified for the fat threeridge; the weed shiner, bluegill, redear sunfish (*Lepomis microlophus*), largemouth bass, and blackbanded darter (*Percina nigrofasciata*) (FWS 2003g). This species historically did not occur nor is it expected to currently occur in the lower Chattahoochee River, in the vicinity of Farley. Therefore, the staff has concluded that the continued operation of Farley Units 1 and 2 will have no effect on the fat threeridge.

2. *Elliptio chipolaensis*, Chipola slabshell

Within its range, the (threatened) Chipola slabshell is known to occur in Alabama and Florida (FWS 2003b). Prior to its decline, it occurred in the Chipola River system and one site in the Chattahoochee River system; its range includes one tributary of the Chattahoochee River, Mill Creek in Houston County, Alabama (Brim Box 2000). It is currently known, albeit sporadically, mainly from the middle portion of the Chipola River system. The Chipola slabshell inhabits large creeks and the Chipola River's main channel in slow to moderate currents and in substrates of silty sand. It is typically found in sloping bank habitats. The historical extent of occurrence for this species in the lower Chattahoochee River is 6 river miles, with a current extent of 0 river miles and no known subpopulations (FWS 2003g). Only one individual specimen of the Chipola slabshell was found in Mill Creek in 1991-92 and this is the only known record of this species from outside of the Chipola River drainage (Brim Box 2000). This species historically occurred in a tributary of the lower Chattahoochee River, but is not expected to currently occur in the lower Chattahoochee River, in the vicinity of Farley. Therefore, the staff has concluded that the continued operation of Farley Units 1 and 2 may affect, but is not likely to adversely affect, the Chipola slabshell.

3. *Elliptoideus sloatianus*, purple bankclimber

Within its range, the (threatened) purple bankclimber is known to occur in Georgia and Florida (FWS 2003c). Although it once occurred in larger streams throughout the ACF and Ochlockonee River systems, it is now known to sporadically occur in the Apalachicola, Flint, and Ochlockonee Rivers, and to occur at single sites in the Chattahoochee River and a Flint River tributary (FWS 2003g). Populations of the purple bankclimber were found in a 1991-92 study, immediately below the Jim Woodruff Lock and Dam in the Apalachichola River. A total of 30 sites with the purple bankclimber were found in the Apalachichola and Flint Rivers. It is the second largest freshwater mussel in the ACF Basin, with the largest specimens now found

in the Apalachicola River below this dam (Brim Box 2000). The purple bankclimber inhabits small to large river channels with slow to moderate currents and with sand, sand mixed with mud, or gravel substrates. It uses the eastern mosquitofish (*Gambusia holbrooki*), blackbanded darter, guppy (*Poecilia reticulata*), and greater jumprock as host fish. The historical extent of occurrence for this species in the lower Chattahoochee River is 75 river miles, with a current extent of 0 river miles and no known subpopulations (FWS 2003g). It is not expected that this species currently occurs in the lower Chattahoochee River, in the vicinity of Farley. The last record of this species in the Chattahoochee River was in the early 1800s, with the exception of one live individual recently noted in 2000, in Lee County, AL and Harris County, GA (FWS 2003g; Brim Box 2000). Therefore, the staff has concluded that the continued operation of Farley Units 1 and 2 may affect, but is not likely to adversely affect, the purple bankclimber.

4. *Lampsilis (Villosa) subangulata*, shinyrayed pocketbook

Within its range, the (endangered) shinyrayed pocketbook is known to occur in Alabama, Georgia, and Florida (FWS 2003d). It is historically endemic to the main channels and tributaries of the ACF Basin rivers (i.e., includes the Chattahoochee River) and Ochlockonee River system; it currently occurs in scattered areas in tributaries of the ACF Basin and in the Ochlockonee River and is considered extirpated from the main stems of these rivers with the exception of the Flint River (FWS 2003g; Brim Box 2000). The shinyrayed pocketbook inhabits small to medium creeks and rivers. It prefers clean or silty sand substrates in slow to moderate currents. They are often found at the interface of stream channels and sloping bank habitats (i.e., in areas in which transitional sediment particle size and current strength exist) (FWS 2003g). The host fish for this mussel are the largemouth bass and spotted bass (*Micropterus punctatus*) (Brim Box 2000). The historical extent of occurrence in the lower Chattahoochee River is 58 river miles with a current extent of 9 river miles and two known subpopulations (FWS 2003g). In the 1991-92 survey, the shinyrayed pocketbook was found in two tributaries of the Chattahoochee River and, in 1994, this species was found in the Sawhatchee Creek (i.e., a creek outside the area of Farley and its associated transmission lines), another tributary of the river (Brim Box 2000). Based on the habitat modifications due to the run of the river impoundments, the lack of current records within the reach of the river where Farley is located, and the FWS conclusion that the species is no longer known beyond a reach of 9 river miles, the staff has concluded that the continued operation of Farley Units 1 and 2 may affect, but is not likely to adversely affect, the shinyrayed pocketbook.

5. *Medionidus penicillatus*, Gulf moccasinshell

Within its range, the (endangered) Gulf moccasinshell is known to occur in Georgia and Florida (FWS 2003e). Historically, it occurred in the main channels and tributaries of the ACF Basin rivers and Econfina Creek. It is currently considered extirpated from the main stems of the Chattahoochee, Apalachicola, and Suwannee Rivers with known occurrences in the Econfina Creek, the Flint and Chipola Rivers, and various tributaries throughout its range (FWS 2003g). In a 1991-92 survey, one specimen was found in a Chattahoochee River tributary (note: not clear in literature which tributary). Populations of this species in Alabama are considered to be extirpated from their historical range (Brim Box 2000). The Gulf moccasinshell is found within the channels of small- to medium-sized creeks and large rivers with slow to moderate currents and with sand and gravel or silty sand substrates. Fish hosts for this mussel include the blackbanded darter and the brown darter (*Etheostoma edwini*) (Brim Box 2000). The historical extent of occurrence for this species in the lower Chattahoochee River is 84 river miles, with a

current extent of 9 river miles and two known subpopulations (FWS 2003g). It is not expected that this species currently occurs in the lower Chattahoochee River, in the vicinity of Farley. Therefore, the staff has concluded that the continued operation of Farley Units 1 and 2 may affect, but is not likely to adversely affect, the Gulf moccasinshell.

6. *Pleurobema pyriforme*, oval pigtoe

Within its range, the (endangered) oval pigtoe is known to occur in Georgia and Florida (FWS 2003f). Its historic range includes the Suwannee drainage west to the Econfina Creek drainage (Brim Box 2000). The oval pigtoe occurs in small to medium-sized creeks to small rivers and it uses silty sand to sand and gravel substrates, typically with slow to moderate currents. Stream channels provide the best habitat for this species. Glochidia use the sailfin shiner (*Pteronotropis hpselopterus*), eastern mosquitofish and the guppy to host their transformation to juveniles. The historical extent of occurrence for this species in the lower Chattahoochee River is 84 river miles, with a current extent of 9 river miles and approximately one known subpopulation (FWS 2003g). No live specimens or shells were found in the Chattahoochee River mainstem during the 1991-92 survey, although two shells were found in a tributary of this river (i.e., the Sawhatchee Creek), and additional live individuals were found in this tributary, in 1994. This species is considered extirpated from its historic localities in the Chattahoochee River with the exception of the Sawhatchee Creek located in southwestern Georgia (Brim Box 2000) and outside the area of Farley and its associated transmission lines. This species is not expected to currently occur in the lower Chattahoochee River, in the vicinity of Farley. Therefore, the staff has concluded that the continued operation of Farley Units 1 and 2 may affect, but is not likely to adversely affect, the oval pigtoe.

VI. CONCLUSIONS

This BA examined the potential effects of the proposed action on all twenty-four Federally listed species and one candidate species for the project area.

In summary, vegetation management practices within the transmission line ROWs associated with Farley Units 1 and 2 created habitat for plant species that prefer open, early successional habitats. This type of habitat has been greatly reduced in surrounding areas due to fire suppression. Therefore, vegetation management along transmission lines provides a potentially beneficial effect for species adapted to these open conditions (i.e., Crystal Lake nailwort, chaffseed, Cooley's meadowrue, and Hirst's panic grass). Because these ROWs have been maintained as open habitats for over 30 years, plant species not adapted to these habitats (i.e., pondberry, fringed campion, gentian pinkroot, Florida torreya, and relict trillium) are unlikely to be present in the ROWs in which vegetation management occurs.

SNC has no plans to conduct major refurbishment or construction activities at Farley to support continued operation during the license renewal period. The proposed project is not a major construction activity and the proposed project is not located near designated critical habitat of any of the threatened and endangered species discussed in this assessment.
Based on historic range and distribution, current known occurrences, life history information operational characteristics of the plant, the known thermal plume characteristics, and studies on other discharges of the plant, the continued operation of Farley Units 1 and 2 during the proposed 20-year license renewal period will have no effect on the fat threeridge, and may

affect, but is not likely to adversely affect, the Chipola slabshell, purple bankclimber, shinyrayed pocketbook, Gulf moccasinshell, and oval pigtoe.

In addition, the staff has concluded that the proposed action will have no effect on the wood stork, Gulf sturgeon, American alligator, eastern indigo snake, gray bat, or Indiana bat. The NRC has determined that the proposed action may affect, but is not likely to adversely affect, the bald eagle, red-cockaded woodpecker, flatwoods salamander, pondberry, mock bishop-weed, fringed campion, gentian pinkroot, Florida torreya, relict trillium, Crystal Lake nailwort, chaffseed, Cooley's meadowrue, and Hirst's panic grass.

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

ENCLOSURE 2

CONCERNS RAISED BY U.S. FISH AND WILDLIFE SERVICE IN ITS FEBRUARY 6, 2004, CORRESPONDENCE RELATED TO NPDES REGULATED DISCHARGES

The U.S. Nuclear Regulatory Commission (NRC) staff herein addresses the concerns expressed by the U.S. Fish and Wildlife Service (FWS) in its February 6, 2004, letter regarding the proposed action and its impacts to aquatic species with particular focus on National Pollution Discharge Elimination System (NPDES) permit limits for temperature, the use of biocides, and entrainment. Substantive regulation of water pollution is not within the statutory authority of the NRC. See Tennessee Valley Authority (Yellow Creek Nuclear Plant, Units 1 & 2), ALAB-515, 8 NRC 702. 712-13 (1978). Authority for NPDES permitting lies with EPA or the States under the Clean Water Act. The Endangered Species Act provides for a consultation process with agencies (here the NRC) involved with a proposed action. The NRC's response to consultation is limited to actions within its authority. The NRC has responded to your concerns, however, as stated above, NRC authority does not extend to substantive regulation of water pollution, e.g., setting discharge limits.

A. Low-Level Radionuclide Discharges

The NRC has not established radiation exposure standards for fish and wildlife because it is assumed that radiation guidelines which are protective of human health also provide adequate protection to plants and animals. The validity of this assumption has been upheld by national and international bodies that have examined the issue, including the National Council on Radiation Protection and Measurement (NCRP Report No. 109, Effects of Ionizing Radiation on Aquatic Organisms, 1991), the International Atomic Energy Agency (IAEA Technical Report Series No. 332, Effects of Ionizing Radiation on Plants and Animals at Levels Implied by Current Radiation Protection Standards, 1992), and the International Commission on Radiological Protection (ICRP Publication 26, 1977). In all of these cases, it has been emphasized that individuals of non-human species may be adversely affected by such radiation levels, but effects at the population level are not detectable.

For Federally threatened and endangered species, effects on an individual organism becomes of critical concern, rather than effects solely to the species' populations. The existence of extremely radiosensitive biota is possible, with this heightened radiosensitivity possibly a result of environmental interactions with other stresses (e.g., heat, biocides). However, no biota have yet been discovered that show a significantly increased sensitivity (i.e., morbidity or mortality) to radiation exposure at predicted levels. Furthermore, at all nuclear power plants for which an analysis of radiation exposure to biota (i.e., non-humans) has been made, there have been no cases of exposures that can be considered significant in terms of harm to the species or that approach the exposure limits set for public health (NRC 1996)

The NRC has rigorous limits on allowable effluent releases from nuclear power plants. These are defined in Appendix B to Part 20 of Title 10 of the Code of Federal Regulations (CFR). Nuclear power plants are limited by license conditions to more restrictive off-site dose limits defined by Appendix I to 10 CFR Part 50. To ensure compliance with Appendix I limits, radionuclide releases to the environment are through systems which reduce the releases to below regulatory limits. The NRC requires licensees to report plant discharges, results of environmental radiological monitoring around their plants, as well as calculated doses to ensure the potential impacts are detected and reviewed. In annual reports, licensees identify the amount of liquid and airborne radioactive effluents discharged from plants. Licensees also

must report environmental radioactivity levels around their plants annually. Copies of the reports for Farley Units 1 and 2 were provided by Southern Nuclear Operating Company, Inc. (SNC) to the FWS (Pierce 2004). The NRC assumes that radionuclide limits that protect public health also protect biota, including the Federally listed freshwater mussels considered in the BA.

B. Chemical and Thermal Plume Discharges

Hydrazine

Hydrazine is used to prevent corrosion in closed systems, including the main steam and reactor cooling systems, by removing dissolved oxygen. During startup, hydrazine also helps to form a passivation layer on coolant system components, protecting the system. Farley Units 1 and 2 use hydrazine in the reactor cooling system during unit startups; this requires approximately 4.7 L (5 quarts) of hydrazine with each start up. In the plant's secondary system of chemical control, hydrazine is added as needed to maintain approximately a 110-150 ppb concentration in this system. During the wet lay-up process (i.e., the process of filling the steam generator with water to prevent corrosion during shutdown), the hydrazine concentration is maintained at a 75 to 500 ppm concentration in the steam generators. Discharges from the main steam and reactor cooling systems, including blowdown, that contain hydrazine are minimized to the maximum extent possible and monitored to ensure compliance with water quality permit requirements to protect public health and biota (ADEM 2001).

Cooling system water discharges containing hydrazine from Farley Units 1 and 2 into the Chattahoochee River are closely monitored under the NPDES program and Farley's NPDES permit (ADEM 2001). Also, the NPDES permit limits are reviewed on a regular basis by State regulatory agencies (e.g., Alabama Department of Environmental Management [ADEM]) to ensure the protection of water quality. For its NPDES permit, Alabama Power Company (APC) conducted a hydrazine study between October 31 to November 1, 1990. This study used EPA approved mathematical modeling techniques to generate isoplethic plots of hydrazine concentrations; it related the hydrazine data set to total residual chlorine (TRC) field data (i.e., September 28-30, 1990 TRC data). This study was performed during a period in which worst case conditions of river low flow and high water temperatures occurred. APC described the results of this study to the ADEM, indicating "that significant concentrations of hydrazine in the Chattahoochee River will not occur during the draining of layup water containing hydrazine" (APC 1991). As a result of this study, ADEM did not set a NPDES limit for hydrazine in Farley's discharges but rather a mandate for monitoring. Farley's current NPDES permit requires it to sample during periods of discharge after layup or other non-routine discharges where hydrazine has been added. Table 1 describes hydrazine analytical results from such sampling between 2001 and 2003 (ADEM 2001).

Although the NPDES permit for Farley Units 1 and 2 has no limit for hydrazine, SNC is required to monitor hydrazine concentrations from Farley discharge releases during periods of hydrazine use (ADEM 2001) to comply with its NPDES permit. Additionally, the studies that APC conducted in 1990-91 demonstrated that at an "end of pipe" value of 70 ppb, the water quality criterion for hydrazine would not be exceeded in the mixing zone during an extreme low flow event (i.e., the hydrazine concentration outside the zone of initial dilution would be well below the 70 ppb value and protective of aquatic life) (APC 1991). The results demonstrated in Table below show that end of pipe values were all well under this 70 ppb value, with the exception of

one, over the 2-year period (2001-02). The periodic NPDES permit renewals (i.e., every 5 years) provide the opportunity to require modification of the plant's discharges or to alter discharge monitoring in response to water quality concerns in the future.

Table 1. Hydrazine Analytical Results for 2001-02 at the Main Combined Facility Discharge Location.

Date	Value (mg/L)
10/26/2001	0.082
10/28/2001	0.005
11/05/2001	0.004
11/12/2001	0.012
10/09/2002	0.023
10/21/2002	0.005

Total Residual Chlorine (TRC)

The service water systems at Farley provide cooling capability that is essential to the continued safe operation of the plant (APC 1991). A program to control macrofouling by the Asiatic clam, *Corbicula fluminea,* within Farley's closed cycle cooling system began in 1986 as a result of safety related issues. A study to determine the minimum combination of chlorine concentration and exposure duration for *Corbicula* control resulted in an ADEM Approved Best Management Practices Plan for the Control of Corbicula at Farley on April 15, 1988 (APC 1990). Macrofouling efforts at Farley include a daily chlorine dioxide treatment, used to control general fouling in the service water system, and a periodic *Corbicula* control program using sodium hypochlorite (APC 1991).

In accordance with Farley's NPDES permit, TRC samples must be taken during periods of chlorination use for control of *Corbicula* or microbiofouling to verify compliance with TRC limitations (i.e., a daily maximum of 0.20 mg/L and a monthly average of 0.20 mg/L if more than one sample is taken in that month) (ADEM 2001). Reviewing analytical results for TRC at Farley Units 1 and 2 between October 1, 2002, and September 30, 2003 (daily sampling at the Main Combined Facility Discharge location), TRC values ranged from 0.01 mg/L to 0.18 mg/L, with a monthly average of 0.08 mg/L (ADEM 2001). Table 2 provides these data in more detail. All results were below the NPDES permit limits set to protect water quality and uses of the river (i.e., including environmental uses).

Table 2. TRC Analytical Results for October 1, 2002, to September 30, 2003, at the Main Combined Facility Discharge Location.

Date	Average Value (mg/L)	Lowest Value (mg/L)	Highest Value (mg/L)	Number of Samples
October 2002	0.05	0.01	0.18	26
November 2002	0.12	0.01	0.16	29
December 2002	0.13	0.05	0.18	31
January 2003	0.1	0.01	0.13	24
February 2003	0.1	0.01	0.15	26
March 2003	0.09	0.01	0.18	23
April 2003	0.02	0.01	0.08	26
May 2003	0.08	0.01	0.15	27
June 2003	0.11	0.01	0.15	24
July 2003	0.05	0.01	0.13	25
August 2003	0.09	0.01	0.15	26
September 2003	0.1	0.01	0.15	23

Based on review of literature and operational monitoring reports, consultations with utilities and regulatory agencies, and comments on the NRC's draft GEIS, water quality effects of discharge of chlorine and other biocides are considered to be of small significance for all nuclear power plants. Small quantities of biocides are readily dissipated and/or chemically altered in the receiving water body so that significant cumulative impacts to water quality would not be expected (NRC 1996). No change in operation of the cooling system is expected during the license renewal term, so no change in the effects of biocide discharges on receiving water quality is anticipated (SNC 2003b).

Temperature

The blowdown from the cooling towers (three cooling towers per unit) is discharged at the surface into the Chattahoochee River (AEC 1974) and a small portion of the service and circulating water flow is returned to the river (SNC 2003). A study of the thermal plume (i.e., defined as water with a 2.8°C [5°F] or more temperature rise above ambient river temperature) associated with the discharge of service and cooling water from Farley Units 1 and 2 back to the Chattahoochee River showed that the thermal plume extended less than 7.6 m (25 ft) downstream of the discharge structure. The discharge plume declined in temperature to 1.1°C (2°F), or less, above ambient river temperature approximately 122 m (400 ft) downstream of the discharge structure. Temperatures of this discharge plume, were within 0.7° C (1.2°F) of ambient river temperature at a distance of less than 457 m (1500 ft) from the discharge

structure. This study was conducted during a low flow event 23 m^3/s (820 cfs) during cool weather conditions (February) (APC 1991). Thus, thermal discharges related to the operation of Farley Units 1 and 2 affect a relatively small area of the Chattahoochee River. The Farley Units 1 and 2 cooling water intake and discharge are closely monitored under the NPDES program, and NPDES permit limits are reviewed on a regular basis by State regulatory agencies to ensure the protection of aquatic biota.

C. Entrainment

Although the intrusion of the non-native Asiatic clam into the service water system at Farley demonstrates the possibility for similar shellfish species (i.e., egg and larval stages) to become entrained, several controls and characteristics of the plant keep the impacts of entrainment small. However, even low rates of entrainment can be a concern when an unusually important resource is affected, such as Federally threatened or endangered species (NRC 1996).

Cooling towers mitigate entrainment losses of species for power plants. Unlike once-through cooling systems at a number of other nuclear power plants, use of closed-cycle cooling at Farley Units 1 and 2 minimizes water withdrawals from the Chattahoochee River. As a result, the probability of entraining Federally protected freshwater mussels, even if these species were to become present in the vicinity of Farley, is small. The Federal Water Pollution Control Act of 1972, Section 316(b) entrainment studies conducted for Farley Units 1 and 2 support the finding that entrainment may affect, but will not adversely affect Federally protected freshwater mussels, if present (SNC 2003). The relatively small volumes of makeup and blowdown water needed for closed-cycle cooling systems result in concomitantly low entrainment, impingement, and discharge effects. Studies of intake and discharge effects of closed-cycle systems have generally supported the judgment that the impacts are not noticeable (NRC 1996).

Although threatened or endangered freshwater mussels are generally not presently known to exist in the Chattahoochee River near Farley, the FWS recovery plan (2003) endeavors to reestablish these species in their historic habitats. It is unlikely that the small volumes of water withdrawn and discharged by this closed-cycle cooling system would interfere with the future restoration of these protected mussels' habitats and reestablishment of their populations. Based on reviews of literature and operational monitoring reports, consultations with utilities and regulatory agencies, and comments on the NRC's draft GEIS, these potential effects have not been shown to cause reductions in the aquatic populations near any existing nuclear power plants. Effects of all of these issues are considered to be of small significance for all plants (NRC 1996).

D. Transmission Line Maintenance

The staff expects that best management practices (BMP) for protecting aquatic habitats while carrying out vegetation management activities will be implemented by SNC and its contractors. This includes pre-activity surveys, training of field staff to recognize Federally listed species and their habitats, minimal use of approved herbicides (i.e., for aquatic habitats), and practices that minimize erosion near or within such habitats. The protection of native vegetation at aquatic crossings and, when possible, the planting of native vegetation to re-establish these plant communities to protect these crossings is highly recommended by staff. The staff expects that SNC and its vegetation management contractors will work with the FWS and State agencies, as required (e.g., within Elmodel or Lake Seminole Wildlife Management Areas) to ensure that any

maintenance operations for the transmission lines associated with Farley Units 1 and 2 minimize any potential for adverse impacts on Federally listed species that may occur in the project area and their habitats.

REFERENCES

Alabama Department of Environmental Management (ADEM). 2001. National Pollutant Discharge Elimination System Permit, Farley Nuclear Plant, Permit No. AL0024619.

Alabama Power Company (APC). 1990. Evaluation of Mixing Zones for Temperature and Total Residual Chlorine in the Chattahoochee River Related to The Farley Nuclear Plant Main Combined Facility Discharge. November, 1990.

Alabama Power Company (APC). 1991. Final Report: Evaluation of Mixing Zones for Temperature, Hydrazine and Total Residual Chlorine in the Chattahoochee River Related to The Farley Nuclear Plant Main Combined Facility Discharge. March 1991.

Pierce, C.R. 2004. Letter from C.R. Pierce, Southern Nuclear Operating Company, Inc., Birmingham, Alabama to L. Goldman, U.S. Fish and Wildlife Service, Daphne, Alabama. Subject: "Joseph M. Farley Nuclear Plant License Renewal: Response to Requests for Information from USFWS July 9, 2002, Letter." January 16, 2004.

Southern Nuclear Operating Company (SNC). 2003. *Applicant's Environmental Report – Operating License Renewal Stage Joseph M. Farley Nuclear Plants Units 1 and 2.* Dothan, Alabama.

U.S. Atomic Energy Commission (AEC). 1974. *Final Environmental Statement Related to Operation of Joseph M. Farley Nuclear Plant Units 1 and 2, Alabama Power Company (Docket Nos. 50-348 and 50-364).* December 1974.

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

Georgia Department of Natural Resources

Noel Holcomb, Commissioner

Historic Preservation Division

W. Ray Luce, Division Director and Deputy State Historic Preservation Officer
47 Trinity Avenue, S.W., Suite 414-H, Atlanta, Georgia 30334
Telephone (404) 656-2840 Fax (404) 657-1040 http://www.gashpo.org

MEMORANDUM

TO: United States Nuclear Regulatory Commission
Office of Nuclear Reactor Regulation
Washington, DC 20555-0001

FROM: Serena G. Bellew
Environmental Review Coordinator
Historic Preservation Division

RE: Finding of "No Historic Properties Affected"

PROJECT: **NRC: License Renewal, Joseph M. Farley Nuclear Plant, Georgia and Alabama**
Federal Agency: NRC
HP-040812-002

COUNTY: Early County, Georgia

DATE: August 26, 2004

The Historic Preservation Division has reviewed the information received concerning the above-referenced project. Our comments are offered to assist federal agencies and project applicants in complying with the provisions of Section 106 of the National Historic Preservation Act.

Based on the information submitted, HPD believes that no historic properties or archaeological resources that are listed in or eligible for listing in the National Register of Historic Places will be affected by this undertaking. Please note that historic and/or archaeological resources may be located within the project's area of potential effect (APE), however, we believe that they will not be impacted by the above-referenced project. Furthermore, any changes to this project as proposed will require further review by our office for compliance with the Section 106 process.

If we may be of further assistance contact me at (404) 651-6624. Please refer to the project number assigned above in any future correspondence regarding this project.

SGB:mcv

cc: Paul Forgey, Southwest Georgia Regional Development Center

A099

preserveALA
ALABAMA HISTORICAL COMMISSION

September 2, 2004

Jack Cushing
Environmental Project Manager
Office of Nuclear Reactor Regulation
Nuclear Regulatory Commission
Washington D.C. 20555-0001

Re: AHC 2002-0940
Notice of Availability of Plant-Specific Supplement 18 to General EIS, Joseph M. Farley Nuclear Plant
Houston County

LEE H. WARNER
Executive Director

468 South Perry Street
Montgomery, Alabama
36130-0900

tel 334 242•3184
fax 334 240•3477

Dear Mr. Cushing:

The Alabama Historical Commission concurred with the above referenced project in a letter dated June 11, 2002 and addressed to the Southern Company. Our office continues to concur provided that we are consulted for individual projects on a case-by-case basis prior to the initiation of construction, demolition or ground disturbing activity.

We appreciate your efforts in helping us preserve Alabama's non-renewable cultural resources. Should you have any questions or comments or if we may be of further service, please contact Stacye Hathorn of our office and include the AHC project number referenced above.

Very truly yours,

Elizabeth Ann Brown
Deputy State Historic Preservation Officer

EAB/LDB/ALM/sgh

Daphne Field Office
U.S. Fish and Wildlife Service
1208-B Main Street
Daphne, AL 36526
phone: 251-441-5181 fax: 251-441-6222

04-0397a

October 27, 2004

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

Dear Mr. Kuo:

Our office has completed review of Southern Nuclear Company's (SNC's) proposed re-licensing application for the Joseph M. Farley Nuclear Plant. This plant is located east of Dothan, Alabama, in Houston County, in the Chattahoochee Watershed. Our comments are provided in accordance with the Fish and Wildlife Coordination Act (48 Stat. 884, as amended; 16 U.S.C. et seq.) and the Endangered Species Act of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.) and included review of the following:

- information in "Generic Environmental Impact Statement for License Renewal of Nuclear Plants, Supplement 18"
- data on the freshwater mussel survey downstream of effluent discharges, conducted October 8-10, 2004 by Yokley Environmental Consulting Company
- previous plant and wildlife survey data for the Farley plant site and four connecting transmission lines
- data provided on effluent quality, including radiological and contaminants data, and
- information provided on herbicides used and herbicide and mowing practices.

We are extremely pleased with SNC's efforts to provide information essential for review. Per the information provided and commitments made during our meeting of October 22, as well as during our teleconference on October 15, 2004, our office concurs that re-issuance of the operating license for the Farley Nuclear Plant in not likely to adversely affect any Federally listed threatened or endangered species in Alabama. This concurrence is predicated on SNC's agreements to the following:

- SNC will ensure that applicators will avoid any broadcast aerial herbicide spraying within 300 ft of waters with any potential habitat for listed plant, amphibian, mussel or fish species.

- Surfactants used with any herbicide should be no more than slightly to practically nontoxic to *Daphnia* and trout in 48-hr EC50 and 96-hr LC50 testing, respectively (i.e., EC_{50}'s and LC_{50}'s occur only at concentrations greater than 10 mg/L [and ideally greater than 100 mg/L]).

- SNC will evaluate herbicide spray drift to natural areas from aerial applications and the need for more stringent best management practices to avoid drift into non-target natural areas. Drift cards or other accepted methods will be used in the evaluation to determine the extent of drift under several wind speeds within the range of normal application conditions. To assure representative results, applicators will not notified of the assessment.

- Within stream and wetland buffer, vegetation controls will include mechanical removal or spot/hand treatments with glyphosate or imazapyr or other products similarly low in whole-formulation toxicities and similarly lacking in other detrimental effects on invertebrates, amphibians, or fish.

- Disturbance (e.g., construction, repair, or herbicide treatments) will be avoided or delayed in the immediate area if a wood stork (*Mycteria americana*) is observed until the wood stork has abandoned the area.

- SNC will follow Fish and Wildlife Service guidance on protection of the bald eagle.

No further endangered species consultation will be required unless: 1) the identified action is subsequently modified in a manner that causes an effect on listed species or a designated Critical Habitat; 2) new information reveals the identified action may affect Federally protected species or designated Critical Habitat in a manner or to an extent not previously considered; or 3) a new species is listed or Critical Habitat is designated under the Endangered Species Act that may be affected by the identified action.

If you have any questions or need additional information, please contact me at (251) 441-5871. Please refer to the reference number above.

Sincerely,

Elaine Snyder-Conn

Elaine Snyder-Conn
Acting Field Supervisor

cc: Jack Cushing, License Renewal, U.S. Nuclear Regulatory Commission

Appendix F

GEIS Environmental Issues Not Applicable to Farley Units 1 and 2

Appendix F: GEIS Environmental Issues Not Applicable to Farley Units 1 and 2

Table F-1 lists those environmental issues listed in the *Generic Environmental Impact Statement for License Renewal of Nuclear Plant*s (GEIS), NUREG-1437, Volumes 1 and 2 (NRC 1996, 1999)[(a)] and 10 CFR Part 51, Subpart A, Appendix B, Table B-1, that are not applicable to Farley Units 1 and 2, because of plant or site characteristics.

Table F-1. GEIS Environmental Issues Not Applicable to Farley 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; 4.4.2.2	The Chatahoochee River is an inland river with no salinity gradient.
Altered thermal stratification of lakes	1		Farley discharges to the Chatahoochee River.
Water-use conflicts (plants with once-through cooling systems)	1	4.2.1.3	Farley Units 1 and 2 do not use a once-through cooling system.
AQUATIC ECOLOGY (FOR PLANTS WITH ONCE - THROUGH AND COOLING POND HEAT DISSIPATION SYSTEMS)			
Entrainment of fish and shellfish in early life stages	2	4.2.2.1.2; 4.4.3	This issue is related to heat-dissipation systems that are not installed at Farley.
Impingement of fish and shellfish	2	4.2.2.1.3; 4.4.3	This issue is related to heat-dissipation systems that are not installed at Farley.
Heat shock	2	4.2.2.1.4; 4.4.3	This issue is related to heat-dissipation systems that are not installed at Farley.
GROUNDWATER USE AND QUALITY			
Groundwater use conflicts (potable and service water, and dewatering; plants that use <100 gpm)	1	4.8.1.1; 4.8.1.2	Farley Units 1 and 2 use more than 100 gpm groundwater.
Groundwater-use conflicts (Ranney wells)	2	4.8.1.4	Farley Units 1 and 2 do not have or use Ranney wells.

(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.

ISSUE—10 CFR Part 51, Subpart A, Appendix B, Table B-1	Category	GEIS Sections	Comment
Groundwater quality degradation (Ranney wells)	1	4.8.2.2	Farley Units 1 and 2 do not have or use Ranney wells.
Groundwater quality degradation (saltwater intrusion)	1	4.8.2.1	Farley site is not near a saltwater body.
Groundwater quality degradation (cooling ponds at inland sites)	2	4.8.3	Farley Units 1 and 2 do not have or use cooling ponds.
Groundwater quality degradation (cooling ponds in salt marshes)	1	4.8.3	Farley Units 1 and 2 do not have or use cooling ponds.
TERRESTRIAL RESOURCES			
Cooling pond impacts on terrestrial resources	1	4.4.4	This issue is related to a heat-dissipation system that is not installed at Farley.

References

10 CFR 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 Farley Nuclear Plant Units 1 and 2, in Support of License Renewal Application

Appendix G: NRC Staff Evaluation of Severe Accident Mitigation Alternatives (SAMAs) for Farley Nuclear Plant Units 1 and 2, in Support of License Renewal Application

G.1 Introduction

Southern Nuclear Operating Company (SNC) submitted an assessment of severe accident mitigation alternatives (SAMAs) for Farley as part of the Environmental Report (ER) (SNC 2003). This assessment was based on the most recent Farley Probabilistic Risk Assessment (PRA) available at that time, a plant-specific offsite consequence analysis performed using the MELCOR Accident Consequence Code System 2 (MACCS2) computer program, and insights from the Farley Individual Plant Examination (IPE) (SNC 1993) and Individual Plant Examination of External Events (IPEEE) (SNC 1995). In identifying and evaluating potential SAMAs, SNC considered SAMA analyses performed for other operating plants which have submitted license renewal applications, as well as industry and Nuclear Regulatory Commission (NRC) documents that discuss potential plant improvements, such as NUREG-1560 (NRC 1997a). SNC identified 124 potential SAMA candidates. This list was reduced to 11 unique SAMA candidates by eliminating SAMAs that were not applicable to Farley due to design differences, were already addressed by the existing design, procedures, and/or training program, or had high implementation costs. SNC assessed the costs and benefits associated with each of the Phase 2 SAMAs and concluded in the ER that none of the candidate SAMAs evaluated would be cost-beneficial for Farley.

Based on a review of the SAMA assessment, the NRC issued a request for additional information (RAI) to SNC by letter dated December 17, 2003 (NRC 2003). Key questions concerned dominant risk contributors at Farley 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. SNC submitted additional information by letters dated February 26, 2004 and April 22, 2004 (SNC 2004a,b), including tables containing summaries of peer review comments and disposition thereof; breakout of the internal events core damage frequency (CDF) by initiating event and by accident sequence group; tables containing source terms and functional sequences; results of a revised screening based on consideration of the potential impact of external events and uncertainties; details on costs for requested SAMAs; and the costs and benefits associated with several lower-cost alternatives and several additional SAMAs considered in a previous analysis performed for the V.C. Summer SAMA. SNC's responses addressed the staff's concerns.

As a result of a revised assessment of external event impacts and the consideration of additional SAMAs identified by the staff, SNC identified that two candidate SAMAs would be

potentially cost-beneficial. Based on a reassessment of uncertainties, a third SAMA was identified as potentially cost-beneficial. SNC currently has plans to implement one of the SAMAs and further evaluate the other two SAMAs. None of these SAMAs relate to adequately managing the effects of aging during the period of extended operation, and they, therefore, need not be implemented as part of license renewal pursuant to 10 CFR Part 54. An assessment of SAMAs for Farley is presented below.

G.2 Estimate of Risk for Farley

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

G.2.1 SNC's Risk Estimates

Two distinct analyses are combined to form the basis for the risk estimates used in the SAMA analysis: (1) the Farley Level 1 and 2 PRA model, which is an updated version of the IPE (SNC 1993), 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 Revision 5 PRA. The scope of the Farley PRA does not include external events.

The baseline CDF for the purpose of the SAMA evaluation is approximately 3.4×10^{-5} per year. The CDF is based on the risk assessment for internally-initiated events. SNC did not include the contribution to risk from external events within the Farley risk estimates; however, it did account for the potential risk reduction benefits associated with external events by tripling the estimated benefits for internal events. This is discussed further in Sections G.4 and G.6.2.

The breakdown of CDF by initiating event is provided in Table G-1. As shown in this table, special initiators and loss of offsite power (LOOP) are dominant contributors to the CDF. Special initiators relate to loss of a support system and include, for example, a loss of one or both trains of service water or component cooling water (CCW), and loss of instrument air or a DC bus. Bypass events (i.e., interfacing systems loss of coolant accident (LOCA) and steam generator tube rupture) contribute less than two percent to the total internal events CDF.

The Level 2 PRA model is based on the containment event tree and source terms from the IPE (SNC 1993). The containment event tree is replaced by a table which assigns a designator to the sequence based on the status of the containment. This containment functional designator is combined with the NUMARC functional group designator of the core damage sequence to specify the unique end state. The process to determine those sequences that are used to represent a source term bin is described in Section 4.7.2 of the Farley IPE (SNC 1993). For the

SAMA source term analysis, SNC examined the current core damage cutsets to determine the most representative functional sequence. These processes are further described in SNC's response to staff RAIs (SNC 2004a).

Table G-1. Farley Core Damage Frequency

Initiating Event	CDF (per year)	% Contribution to CDF
Loss of offsite power (LOOP)	7.76×10^{-6}	23.2
Loss-of-coolant accident (LOCA)	1.97×10^{-6}	5.9
Interfacing system LOCA (ISLOCA)	3.34×10^{-7}	1.0
Steam generator tube rupture (SGTR)	7.45×10^{-8}	0.2
Transients	5.59×10^{-6}	16.7
Special initiators	1.61×10^{-5}	48.1
Internal floods	1.63×10^{-6}	4.9
Total CDF (from internal events)	**3.35×10^{-5}**	**100**

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 2041, emergency response evacuation modeling, and economic data. The magnitude of the onsite impacts (in terms of clean-up and decontamination costs and occupational dose) is based on information provided in NUREG/BR-0184 (NRC 1997b).

In the ER, SNC estimated the dose to the population within 80 km (50 mi) of the Farley site to be approximately 0.0121 person-Sv (1.21 person-rem) per year. The breakdown of the total population dose by containment release mode is summarized in Table G-2. ISLOCA events dominate the population dose risk at Farley. As indicated in the Farley IPE and confirmed in response to an RAI, early containment failures are a negligible contributor to offsite release in the Farley PRA.

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

Containment Release Mode	Population Dose (person-rem[(a)] per year)	% Contribution
Late containment failure	0.06	5
SGTR	0.05	4
ISLOCA	0.69	57
Containment isolation failure	0.17	14
No containment failure	0.24	20
Total CDF (from internal events)	**1.21**	**100**

(a) One person-rem per year = 0.01 person-Sv per year

G.2.2 Review of SNC's Risk Estimates

SNC's determination of offsite risk at Farley is based on the following three major elements of analysis:

- The Level 1 and 2 risk models that form the bases for the 1993 IPE submittal (SNC 1993) and the 1995 IPEEE submittal (SNC 1995),
- The major modifications to the IPE model that have been incorporated in the Farley PRA, and
- The MACCS2 analyses performed to translate fission product source terms and release frequencies from the Level 2 PRA model into offsite consequence measures.

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

The staff's review of the Farley IPE is described in an NRC report dated February 26, 1996 (NRC 1996). Based on a review of the original IPE submittal, the staff concluded that IPE submittal met the intent of Generic Letter 88-20 (NRC 1988); that is, the IPE was of adequate quality to be used to look for design or operational vulnerabilities.

A comparison of internal events risk profiles between the IPE and the PRA used in the SAMA analysis indicates a decrease of approximately 9.7×10^{-5} per year in the total CDF (from 1.3×10^{-4} per year to 3.35×10^{-5} per year). The reduction is mainly attributed modeling improvements and some minor plant design changes that have been implemented at Farley since the IPE was

submitted. A summary listing of those changes that resulted in the greatest impact on the total CDF was provided in the ER and in response to an RAI (SNC 2004a), and include:

- Revised reactor coolant pump (RCP) seal LOCA, station blackout (SBO) and anticipated transient without scram (ATWS) modeling,
- Changed mission time for auxiliary feedwater (AFW) to 24 hours for general transient initiating events,
- Updated component reliability data to include plant experience through 12/31/97,
- Updated initiating event frequencies using NUREG/CR-5750 (NRC 1999) generic data and plant experience through 12/31/97,
- Expanded modeling of the service water intake structure and turbine building DC systems to include alternate battery chargers and battery banks,
- Revised human reliability analysis based on revised procedures,
- Added system model for emergency air compressors for atmospheric relief valves and AFW pumps,
- Revised flooding analysis for the CCW heat exchanger/pump room and service water intake structure, and
- Revised PRA model to address Westinghouse Owners Group (WOG) peer review comments.

The IPE CDF value for Farley is comparable to the CDF values reported in the IPEs for other Westinghouse 3-loop plants. Figure 11.6 of NUREG-1560 shows that the IPE-based total internal events CDF for three-loop Westinghouse plants ranges from 7×10^{-5} to 4×10^{-4} per reactor-year (NRC 1997a). It is recognized that other plants have reduced their values for CDF after the IPE submittals due to modeling and hardware changes. The current internal events CDF results for Farley remain comparable to other plants of similar vintage and characteristics.

The CDF used in the SAMA analysis is based on the risk assessment for internally initiated events for Unit 1. The staff inquired about the CDF for Unit 2. In response to the RAI, SNC stated that the CDF for Unit 2 is 5.8×10^{-5} per year (SNC 2004a). SNC explained that after the IPE, a dependency was discovered for the Unit 2 service water pumps. This resulted in higher initiating event frequencies for loss of service water, and thus, a higher total CDF for Unit 2. SNC stated that modifications to remove the dependency of service water pumps on auxiliary pumps for lubrication are scheduled to be completed before the extension of the operating

licenses. Information provided by SNC indicates that upon completion of these modifications, the CDF for Unit 2 will be bounded by the Unit 1 CDF (SNC 2004a).

The staff considered the peer reviews performed for the Farley PRA, and the potential impact of the review findings on the SAMA evaluation. In response to an RAI, SNC described the previous reviews, the most significant of which was the WOG Peer Review performed in August 2001 (SNC 2004a). The Westinghouse review of Revision 4 concluded that the technical elements of the PRA were such that the PRA is generally suitable for plant risk-informed applications. Most of the recommendations from this review were addressed or reflected in Revision 5 of the Farley PRA issued in December 2001, which is the version that was used for the SAMA analysis. Those recommendations not yet incorporated are in the areas of common cause failures (CCF), human reliability analysis (HRA), and quantification of uncertainties. With regard to CCF and HRA, SNC stated that efforts are underway to update CCF data and to perform a general update of the HRA; however, the current analysis is believed to be sufficient to support the SAMA analysis. With regard to quantification, the Farley PRA does not contain uncertainty analyses. SNC stated that it is following industry initiatives to develop an adequate methodology to perform uncertainty analyses to meet the intent of the American Society of Mechanical Engineers (ASME) PRA Standard. In response to an RAI, SNC re-evaluated the impact of the SAMA screening when uncertainties are included. This is discussed further in Section G.6.2.

Given that (1) the Farley PRA has been peer reviewed and the potential impact of the peer review findings on the SAMA evaluation has been assessed, (2) SNC satisfactorily addressed staff questions regarding the PRA (SNC 2004a), and (3) the CDF falls within the range of contemporary CDFs for Westinghouse three-loop plants, the staff concludes that the Level 1 and Level 2 PRA models are of sufficient quality to support the SAMA evaluation.

SNC submitted an IPEEE in June 1995 (SNC 1995), in response to Supplement 4 of Generic Letter 88-20. SNC did not identify any fundamental weaknesses or vulnerabilities to severe accident risk in regard to the external events related to seismic, fire, or other external events. The Farley hurricane, tornado and high winds analyses show that the plant is adequately designed to cope against the effects of these natural events. Additionally, the Farley IPEEE demonstrated that transportation and nearby facility accidents were not considered to be significant vulnerabilities at the plant. However, a number of areas were identified for improvement in both the seismic and fire areas, and were subsequently addressed as discussed below. In a letter dated October 1, 1998 (NRC 1998), 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 Farley IPEEE does not provide the means to determine the numerical estimates of the CDF contributions from seismic initiators. The seismic portion of the IPEEE consisted of a

reduced-scope seismic evaluation using the Electric Power Research Institute (EPRI) methodology for Seismic Margins Assessment (SMA), and the Seismic Qualification Utility Group Generic Implementation Procedure. A total of 117 outliers were identified and listed in the IPEEE. A number of actions were taken by SNC as part of the IPEEE evaluation of seismic risk. These included installing restraining wires for overhead lights, replacing anchor bolts, bolting cabinets together, installing missing screws and performing additional detailed analyses. In response to an RAI, SNC indicated that all seismic outliers were resolved prior to the SAMA analysis (SNC 2004a, NRC 2004).

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 phases. In the first phase, a compartment can be screened out if boundaries are not exposed and the compartment does not contain safe shutdown (SSD) equipment. For Farley, it was assumed that all compartments contain an SSD system; therefore, no compartments were screened out in Phase 1. In the second phase, a CDF criterion of 1×10^{-6} per year was applied. Plant information gathered for Appendix R compliance 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 (CCDP) was based on the damage caused by the compartment fire and the unavailability of equipment not evaluated for compartment fire effects. For unscreened compartments, the EPRI Fire Risk Analysis Implementation Guide (FRAIG) was utilized to quantify the fire sequences. The screening methodology applied by the licensee makes less and less conservative assumptions until a fire zone is screened out, the results do not indicate a vulnerability, or a vulnerability is identified and addressed.

Using the FRAIG, the IPEEE fire CDF was estimated to be about 1.6×10^{-4} per year (Unit 1). In response to IPEEE RAIs, this was reduced to about 5×10^{-5} per year (SNC 2004a). After the CDF was reduced, six compartments remained that contributed more than the screening value of 1.0×10^{-6} per year; these are:

Fire Compartment	CDF
Auxiliary building switchgear room train A	1.57×10^{-5}
Control room	1.16×10^{-5}
Auxiliary building switchgear room train B	1.04×10^{-5}
Service water intake structure	3.77×10^{-6}
Train A electrical penetration room	2.18×10^{-6}
Train B electrical penetration room	1.54×10^{-6}

In a SAMA-related RAI, the staff asked SNC to explain, for each fire compartment listed in NUREG-1742 (NRC 2002), what measures were taken to further reduce risk, and explain why these CDFs cannot be further reduced in a cost-effective manner (NRC 2003). For each area, SNC discussed the potential for cost-effective hardware changes to address the fire-related matters listed above (SNC 2004a). This included consideration of the major fire contributors assumed in the analysis and plant features. SNC identified several procedural enhancements that have been implemented to address fire-related issues (SNC 2004a), and confirmed that all fire-related plant improvements identified in NUREG-1742 were implemented prior to the SAMA analysis. However, SNC concluded that no further modifications would be cost-effective for any of the fire compartments.

The staff notes that additional SAMAs to reduce the fire risk contributors might be viable at Farley. However, given that the original fire CDF has already been reduced by over a factor of three through procedure changes, and that the plant meets Appendix R fire requirements, it is unlikely that further modifications would both substantially reduce risk and remain cost-beneficial.

The risk associated with other external events at Farley is small. The CDFs due to high winds, floods and other events were not estimated since they were screened out using the NUREG-1407 approach (NRC 1991).

As noted above, Farley is a reduced-scope plant whose safe shutdown earthquake value is 0.1 g (acceleration due to gravity). Thus, the seismic contribution to total CDF at Farley is small. In addition, the contribution from fires is comparable to that from internal events. SNC has previously made modifications specifically addressing external event vulnerabilities, and further improvements are not expected to be cost-effective. Furthermore, SNC accounted for the additional risk reduction that might be achieved in external events by applying a factor of three multiplier to the estimated benefits for internal events. Accordingly, the staff finds SNC's consideration of external events to be acceptable.

The staff reviewed the process used by SNC 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 Farley 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 mile) radius for the year 2041. This information is provided in Attachment F to the ER (SNC 2003).

SNC grouped the accident sequences into a set of 13 source term bins based on their expected source term results. Each source term bin is represented by an analyzed systemic sequence.

For each bin, this sequence was selected based on the dominant cutsets. Each source term bin is then assigned to one of five release categories. The process for selecting a representative accident sequence for a source term bin is described in response to the RAIs (SNC 2004a). The frequency and calculated consequences for each of the 13 source term bins are reported in Table F-6 and F-9 of the ER, respectively (SNC 2003). The response to an RAI provides a break out of the source term by accident sequence/release category (SNC 2004a). The staff concludes that the process used to assign release categories and source terms is consistent with typical PRA practice and acceptable for use in the SAMA analysis.

The reactor core inventory input to the MACCS2 code was obtained from the MACCS2 User's Guide, and corresponds to the end-of-cycle values for a 3412 MW(t) PWR plant. A scaling factor of 0.813 was applied to provide a representative core inventory of 2775 MW(t) for Farley. 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, SNC reassessed the doses for three of the release categories that are expected to be non-ground releases. The results showed that the 50-mile population dose could increase by up to about nine percent (SNC 2004a). In addition, SNC assessed the impact if the releases occurred with heat contents of 3, 30, and 300 MW (relative to ambient). These results showed that the 50-mile population dose could be further increased by up to 16 percent. However, this small increase has a negligible impact on the analysis and its results.

Site-specific annual meteorological data sets from 1998 through 2000 were investigated for use in MACCS2. The 1998 data set was selected because it was complete and was found to yield the largest doses. All data was collected from the plant meteorological tower. Inspection of the annual precipitation data showed that 1998 was a year with historically low precipitation. SNC investigated the effect of greater precipitation rate by multiplying the 1998 hourly precipitation set by the ratio (1.42) of the 1996 annual precipitation data (a recent year of high precipitation) to the 1998 precipitation data. The result was a decrease in risk of less than two percent. The staff considers use of the 1998 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 2041, based on the U.S. Census population data for 1990 and 2000. The population growth rate between 1990 and 2000 was determined for each of 160 sectors analyzed. To determine the projected population for 2041, the decennial growth rate for a sector's population was raised to the power of 4.1 (41-year difference divided by 10 years). This scaling factor was then applied to the 2000 population in that sector to obtain a year 2041 projection. The staff considers the 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 0.65 meters per second, with a delayed start time of 30 minutes (SNC 2003). 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.

Site-specific economic data were specified for each of the 28 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).

SNC 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 SNC to estimate the offsite consequences for Farley 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 SNC as discussed in Section G.6.2.

G.3 Potential Plant Improvements

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

G.3.1 Process for Identifying Potential Plant Improvements

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

- Review of SAMA analyses submitted in support of original licensing and license renewal activities for other operating nuclear power plants

- Review of other NRC and industry documentation discussing potential plant improvements, e.g., NUREG-1560.

Based on this process, an initial set of 124 candidate SAMAs was identified, as reported in Table F-10 in Attachment F to the ER. In Phase 1 of the evaluation, SNC 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 Farley due to design differences,
- The SAMA has already been addressed in the existing Farley design,
- The SAMA has already been addressed in Farley's procedures and/or training program, or
- The SAMA is sufficiently similar to other SAMA candidates and was combined or dropped.

Based on this screening, 84 SAMAs were eliminated, leaving 40 for further evaluation. Of the 84 SAMAs eliminated, 24 were eliminated because they were not applicable to Farley; 47 were eliminated because they already had been implemented or were addressed by existing procedures and/or training programs at Farley; and 13 were similar and combined with other SAMAs. A preliminary cost estimate was prepared for each of the 40 remaining candidates to focus on those that had a possibility of having a net positive benefit. To account for external events, the maximum attainable benefit or MAB was doubled to $1.4M, and then applied to the remaining candidates (see discussion in Section G.6.1 for a derivation of the MAB). Twenty-five of the 40 SAMAs were eliminated because their estimated cost exceeded this screening value, leaving 15 candidate SAMAs for further evaluation in Phase 2. In an RAI, the staff asked SNC to justify the doubling of the internal events CDF to account for external events, particularly since the fire CDF reported in the IPEEE is greater than the internal events CDF (NRC 2003). In response to the RAI, SNC stated that a multiplying factor of three is more appropriate than the factor of two used in the baseline analysis (SNC 2004a), and re-evaluated the Phase 1 SAMAs using a screening value of $2.1M rather than $1.4M. As a result, nine additional Phase 1 SAMAs were identified for further consideration, bringing the number of candidate SAMAs surviving the Phase 1 screening to 24.

During Phase 2, it was determined that two of the SAMA candidates would not contribute to a significant reduction in the CDF and were very expensive ($1M each). Two other SAMA candidates were determined to mitigate only the post core-damage release of radionuclides, but would not contribute to reducing the CDF. As such, their estimated costs greatly exceeded the MAB from avoiding offsite releases. One additional candidate SAMA (SAMA 121) relates to a plant modification that is currently in progress. Specifically, for SAMA 121, SNC noted that prior to the performance of the SAMA analysis, SNC management had approved implementation of proposed SAMA 121. The modifications have been completed on three of the five pumps. The remaining pumps are currently scheduled to be completed by the end of 2005. Thus, SAMA 121 was not considered further. Therefore, these five SAMA candidates were eliminated from further evaluation, leaving 19 SAMAs for further evaluation.

G.3.2 Review of SNC's Process

SNC'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 Farley.

The preliminary review of SNC'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. 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 topcut 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, SNC stated that the list of candidate SAMAs was reviewed by SNC PRA Services personnel familiar with the Farley PRA. Part of this review included knowledge gained by the reviewer through risk ranking activities performed for the Maintenance Rule program, but did not involve a new risk ranking. However, based on the ranking of the Maintenance Rule functions and human actions modeled in the Farley PRA, SNC provided a tabular listing of the operator actions/system functions with risk reduction worth (RRW) values greater than 1.100. This equates to an averted cost-risk (benefit) of approximately $200,000 (after the benefits are tripled to account for external events). In addition, SNC correlated these top RRW events with the SAMAs evaluated in the ER (SNC 2004a). Based on these additional assessments, SNC concluded that the set of 124 SAMAs evaluated in the ER addresses the major contributors to CDF and offsite dose, and that the review of the top risk contributors does not reveal any new SAMAs.

The staff questioned SNC about lower-cost alternatives to some of the SAMAs evaluated, including the use of portable battery chargers and a direct-drive diesel AFW pump (NRC 2003). In response, SNC provided details on the proposed modification and implementation costs for each alternative. These are discussed further in Section G.6.2. The staff also questioned SNC about several other candidate SAMAs that were previously evaluated by South Carolina Electric and Gas Company (SCE&G) for the V.C. Summer plant during its license renewal review (NRC 2003). In response to the RAI, SNC evaluated and provided justification for those SAMAs that were eliminated. Of the set evaluated, two additional SAMA candidates were added for further evaluation, bringing the total number of SAMAs evaluated in Phase 2 to 21.

The staff notes that the set of SAMAs submitted is not all-inclusive, because 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 SNC used a systematic and comprehensive process for identifying potential plant improvements for Farley, and that the set of potential plant improvements identified by SNC is reasonably comprehensive and therefore acceptable. This search included reviewing plant improvements considered in previous SAMA analyses and insights from industry documents. While explicit treatment of external events in the SAMA identification process was limited, it is recognized that 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

SNC evaluated the risk-reduction potential of the 21 Phase 2 SAMAs that were applicable to Farley. 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.

SNC used model re-quantification to determine the potential benefits. The CDF and population dose reductions were estimated using the Revision 5 of the Farley PRA. The changes made to the model to quantify the impact of SAMAs are detailed in Sections 5.1 through 5.11 of Attachment F to the ER (SNC 2003) and in response to an RAI (SNC 2004a). Table G-3 lists the assumptions considered to estimate the risk reduction for each of the 21 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. The determination of the benefits for the various SAMAs is further discussed in Section G.6. The baseline benefit includes a factor of three to account for external events.

The staff has reviewed SNC'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 SNC's risk reduction estimates as discussed in Section G.6.2.

Table G-3. SAMA Cost/Benefit Screening Analysis

Phase 2 SAMA	Assumptions	% Risk Reduction		Total Baseline Benefit ($)	Cost ($)
		CDF	Population Dose		
7[(a)]—Increase charging pump lube oil capacity by adding a supplemental lube oil reservoir for each charging pump	**Remove dependency of charging pumps on oil cooling**	**9**	**1.5**	**178,900**	**270,000**
8—Eliminate RCP thermal barrier dependence on component cooling such that loss of component cooling does not result directly in core damage	Set probability of failure of alternate seal injection source to 0.1	34.6	8.3	687,100	1,660,000
11—Use existing hydro test pump for RCP seal injection	**Set probability of failure of alternate seal injection source to 0.1**	**34.6**	**8.3**	**687,100**	**520,000**
14—Install additional CCW pump	Set probability of failure of alternate seal injection source to 0.1	34.6	8.3	687,100	1,500,000
19—Develop procedural guidance for use of cross-tied component cooling water or service water pumps,	Set probability of failure of alternate seal injection source to 0.1	34.6	8.3	687,100	1,750,000
24—Develop procedures and install sensors to take actions upon loss of control building HVAC	Room cooling is perfect, i.e., room cooling cannot fail	9.4	7.1	192,100	830,000
36—Create a passive design hydrogen ignition system	Completely eliminate offsite exposure costs and offsite economic costs	0	100	137,300	1,520,000
48—Install a passive containment spray system	Completely eliminate offsite exposure costs and offsite economic costs	0	100	137,300	2,000,000
80—Improve SGTR coping capabilities	Completely eliminate SGTR events	0.3	3.8	10,500	1,670,000
89—Install additional instrumentation for ISLOCAs	Remove ISLOCA sequences from the model	1	57.3	112,500	425,000
96—Add redundant and diverse limit switches to each containment isolation valve	Remove ISLOCA sequences from the model	1	57.3	112,500	960,000

Phase 2 SAMA	Assumptions	% Risk Reduction		Total Baseline Benefit ($)	Cost ($)
		CDF	Population Dose		
101—Install a digital feedwater upgrade	Remove feedwater flow control valve failures from the model	13.8	6.2	276,700	900,000
117—Install a leak-tight enclosure for fire protection piping in Unit 1 cable spreading room including guard pipe	Install a new guard pipe on fire protection piping header with a rupture probability of 0.001	1.3	0.9	25,400	122,000
118—Improve reliability of fire protection clapper valves	The clapper valve is open 1.2 percent rather than of the year	1.2	0.8	23,300	122,000
119—Add service water low flow alarms for critical room coolers (auxiliary feedwater, charging, residual heat removal, and containment spray)	Room cooling is perfect, i.e., room cooling cannot fail	9.4	7.1	192,100	930,000
120—Seal electrical cabinets in cable spreading room to prevent water intrusion during room flooding	Remove cable spreading room flooding initiators from the model	2.5	1.8	51,100	475,000
122—Replace residual heat removal heat exchanger heads with stronger material	Remove ISLOCA sequences from the model	1	57.3	112,500	1,400,000
123—Install pressure sensor between residual heat removal isolation motor-operated valves to allow detection of unseated outboard isolation valve	Remove ISLOCA sequences from the model	1	57.3	112,500	330,000
124—Redesign CCW miscellaneous header to allow either train to supply RCP thermal barrier without need for local manual realignment	Set probability of failure of alternate seal injection source to 0.1	34.6	8.3	687,100	1,746,000
S59 [(b)]—Refill condensate storage tank	Apply a recovery factor of 0.1 to cutsets involving failures of emergency core cooling system (ECCS) sump suction or ECCS sump cooling during recirculation phase	13.4	5.7	267,800	1,500,000

Phase 2 SAMA	Assumptions	% Risk Reduction		Total Baseline Benefit ($)	Cost ($)
		CDF	Population Dose		
S166[(b)]—Proceduralize local manual operation of auxiliary feedwater (AFW) when control power is lost	**Add a recovery factor of 0.01 to all cutsets involving failure of turbine-driven AFW pump uninterruptable power supply**	**10.8**	**4.4**	**216,600**	**100,000**

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

(a) This SAMA becomes potentially cost-beneficial when benefits are increased to account for uncertainties.

(b) SAMAs added in response to RAI concerning SAMAs evaluated for V.C. Summer.

G.5 Cost Impacts of Candidate Plant Improvements

SNC estimated the costs of implementing the 21 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 engineering, procedures, training, documentation, procurement, and construction (SNC 2004a).

The staff reviewed the bases for the applicant's cost estimates. For certain improvements, the staff also compared the cost estimates to estimates developed elsewhere for similar improvements, including estimates developed as part of other licensees' analyses of SAMAs for operating reactors and advanced light-water reactors. The staff reviewed the costs and found them to be consistent with estimates provided in support of other plants' analyses.

The staff concludes that the cost estimates provided by SNC are sufficient and appropriate for use in the SAMA evaluation.

G.6 Cost-Benefit Comparison

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

G.6.1 SNC Evaluation

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

Net Value = (APE + AOC + AOE + AOSC) - COE

where APE = present value of averted public exposure ($)

AOC = present value of averted offsite property damage costs ($)

AOE = present value of averted occupational exposure costs ($)

AOSC = present value of averted onsite costs ($)

COE = cost of enhancement ($).

If the net value of a SAMA is negative, the cost of implementing the SAMA is larger than the benefit associated with the SAMA and it is not considered cost-beneficial. SNC'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 (person-rem/year)

x monetary equivalent of unit dose ($2000 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 1997b), 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, SNC calculated an APE of approximately $26,100 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, SNC calculated an annual offsite economic risk of about $1800 based on the Level 3 risk analysis. This results in a discounted value of approximately $19,600 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.

SNC derived the values for averted occupational exposure from information provided in Section 5.7.3 of the regulatory analysis handbook (NRC 1997b). Best-estimate values provided for immediate occupational dose (3300 person-rem) and long-term occupational dose (20,000 person-rem over a 10-year cleanup period) were used. The present value of these doses was calculated using the equations provided in the handbook in conjunction with a monetary equivalent of unit dose of $2000 per person-rem, a real discount rate of 7 percent, and a time period of 20 years to represent the license renewal period. For the purposes of initial screening, which assumes all severe accidents are eliminated, SNC calculated an AOE of approximately $12,700 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. SNC derived the values for AOSC based on information provided in Section 5.7.6 of the regulatory analysis handbook (NRC 1997b).

SNC 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 after a severe accident is estimated in the regulatory analysis handbook to be $\$1.5 \times 10^9$ (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, SNC calculated an ACC of approximately $396,000 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

SNC based its calculations on the value of 852 MW(e). Therefore, SNC applied a power scaling factor of 852 MW(e)/910 MW(e) to determine the replacement power costs. For the purposes of initial screening, which assumes all severe accidents are eliminated, SNC calculated an RPC of approximately $247,000 for the 20-year license renewal period.

Using the above equations, SNC estimated the total present dollar value equivalent associated with completely eliminating severe accidents at Farley to be about $700K.

- **SNC's Results**

The total benefit associated with each of the 21 SAMAs evaluated by SNC is provided in Table G-3. These values were determined based on the above equations for the various averted costs together with the estimated annual reductions in CDF and person-rem dose (columns 3 and 4 of Table G-3). Based on a revised assessment (relative to the ER), the estimated benefits were then tripled to account for additional risk reduction in external events. The values for total benefit reported in Table G-3 include this tripling. As a result, two of the 21 SAMAs were considered to be cost-beneficial:

- SAMA 11: Use existing hydro test pump for RCP seal injection,

- SAMA S166: Proceduralize local manual operation of auxiliary feedwater (AFW) when control power is lost.

All of the remaining SAMAs have a negative net values in the baseline analysis.

G.6.2 Staff Evaluation

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

In response to an RAI, SNC considered the uncertainties associated with the internal events CDF. Since SNC does not currently have an uncertainty analysis for the Farley PRA, SNC estimated the uncertainty distribution by reviewing representative distributions for similar plants (SNC 2004a). To provide an upper bound estimate of the uncertainties in the CDF for internal and external events, the baseline benefit, which includes a factor of three for external events, was increased by an additional factor of two, yielding an MAB of $4.2M.

SNC assessed the impact of the upper bound benefit on the Phase 1 screening. As a result, seven additional SAMAs were screened in for further evaluation. SNC also re-visited the cost-benefit analyses for the Phase 2 SAMAs and found that SAMA 7 becomes cost-beneficial (SNC 2004a). SAMA 7 addresses increasing the charging pump lube oil capacity by adding a supplemental lube oil reservoir for each charging pump.

The staff questioned SNC about lower-cost alternatives to some of the SAMAs evaluated, including the use of portable battery chargers and a direct-drive diesel AFW pump (NRC 2003). In response, SNC stated that an appropriately sized charger would not be portable and would have to be permanently installed (SNC 2004b). The same is true of a diesel generator to energize one of the existing AFW pump motors. Due to plant configuration, the new battery charger would have to be located outside the auxiliary building and be connected via new safety-related switch gear and several hundred feet of safety-related cables permanently installed for this application. Regarding the direct-drive diesel AFW pump, installation of a diesel engine is not feasible due to the location of the pump in the plant (lower equipment room); insufficient space available in the pump room; and the need for engine fuel, air, and cooling. Due to plant configuration, the generator would need to be located at-grade, outside of the auxiliary building. About 30 m (100 ft) of large conductor cabling would be needed to connect the generator to the AFW pump motor, which is about 15 m (50 ft) below grade and inside watertight doors. Safety-related switchgear and disconnects would also be needed. The costs for each of these modifications would easily exceed the $500,000 estimated benefit. Based on these estimates, SNC concluded that neither of these alternatives would be cost-beneficial. The staff concurs with SNC's conclusion.

SNC 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 MAB of approximately 15 percent. The results of the sensitivity study are bounded by the uncertainty assessment described above, which considered an increase by a factor of two.

The staff concludes that, with the exception of the three potentially cost-beneficial SAMAs (SAMAs 7, 11, and S166), the costs of the SAMAs would be higher than the associated benefits. This conclusion is supported by uncertainty assessment and sensitivity analysis, and is upheld despite a number of additional uncertainties and non-quantifiable factors in the calculations, summarized as follows:

- External events were not included in the Farley risk profile. In response to an RAI, SNC re-evaluated the Phase 1 SAMAs by increasing the benefits by a factor of three to bound external events and uncertainty. As a result, two of the evaluated SAMAs were cost-beneficial.

- Uncertainty in the internal events CDF was not initially included in the calculations, which employed best-estimate values to determine the benefits. In response to an RAI, SNC re-evaluated the Phase 1 SAMAs by increasing the baseline benefit, which includes a factor of three for external events, by an additional factor of two. As a result, one additional SAMA became cost-beneficial.

- Risk reduction and cost estimates were found to be reasonable, and generally conservative. As such, uncertainty in the costs of any of the contemplated SAMAs would not likely have the effect of making them cost-beneficial.

G.7 Conclusions

SNC compiled a list of 124 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. A qualitative screening removed SAMA candidates that (1) were not applicable at Farley due to design differences, (2) had already been implemented at Farley, (3) were sufficiently similar to other SAMAs, and therefore combined with another SAMA, or (4) had implementation costs greater than any risk benefit. A total of 84 SAMA candidates were eliminated based on the above criteria, leaving 40 SAMA candidates for further evaluation.

Using guidance in NUREG/BR-0184 (NRC 1997b), the current PRA model, and a Level 3 analysis developed specifically for SAMA evaluation, an MAB of about $700K, representing the total present dollar value equivalent associated with completely eliminating severe accidents at Farley, was derived. To account for external events, this value was tripled to $2.1M. When the screening cutoff of $2.1M was applied, 16 of the 40 candidates were screened from further evaluation because their implementation costs were greater than this value, leaving 24. Four more SAMA candidates were removed because they were determined to not contribute a significant reduction in CDF and their implementation costs were high. One additional candidate SAMA (SAMA 121) relates to a plant modification that is currently in progress, and was therefore eliminated from further consideration. In response to an RAI, SNC evaluated

several additional SAMAs considered at a previous plant (V.C. Summer), and determined that two were applicable and should be retained for further analysis. For the 21 resulting SAMA candidates, a more detailed assessment and cost estimate were developed. As a result, two of the 21 SAMAs were considered to be cost-beneficial:

- SAMA 11: Use existing hydro test pump for RCP seal injection
- SAMA S166: Proceduralize local manual operation of AFW when control power is lost.

To obtain an upper bound estimate of the uncertainties in CDF for internal and external events, SNC increased the baseline benefit by an additional factor of two, and found that one additional SAMA became cost-beneficial:

- SAMA 7: Increase charging pump lube oil capacity by adding a supplemental lube oil reservoir for each charging pump.

SNC indicated that it plans to implement SAMA S166 and further evaluate SAMAs 7 and 11 (SNC 2004b).

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

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